2019 INITIAL LICENSE NRC EXAM
SCENARIO # 1

Facility:	Catawba NRC Exam 2019	Scenario No.: 1	Op Test No.: 2019301
Examiners:		Operators:	SRO
			RO
			BOP
Initial Conditions:	Unit 1 is at 75% power at the EOL. Unit 2 is at 100% power.		
Turnover:	Unit 1 is at 75% power at the EOL. Unit 2 is at 100% power. 1B CA Pump is removed from service for PMs. 1B CA Pump has been inoperable for 3 hours and is expected to be returned to service in 6 hours. Direction for the crew is to decrease reactor power to 50% and secure the 1A main feedwater pump for emergent repair work. A reactivity plan has been provided by Reactor Engineering for a 10% per hour decrease in reactor power.		

Event No.	Malf. No.	Event Type*	Event Description
1		R – RO N – BOP N – SRO	Decrease Reactor Power
2	OV_ SLIM16	C – BOP C – SRO	Letdown Heat Exchanger Temperature Control Valve (1KC-132) Failure
3	ENB013C	C – BOP C – SRO TS – SRO	N44 Loss of Instrument Power
4	NC007F	C – RO C – SRO TS – SRO	PZR PORV (1NC-34A) Fails Open / Isolated by Block Valve
5	FWP-012C FWP-015C	C – RO C – SRO	1A & 1B Main Feed Pumps Low Vacuum Trip / Main Turbine Trip Failure / Auto Rx Trip Failure
6	CA004A	C – RO C – SRO	1A CA Pump Failure
7	CA006	M – ALL	CAPT Discharge Isolated / Loss of Secondary Heat Sink
8	IRX015F14 IRX015H10	C – BOP C – SRO	Two Control Rods not fully inserted

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 1 – Summary

Initial Condition
Unit 1 is at 75% power at the EOL. Unit 2 is at 100% power.

Turnover:
Unit 1 is at 75% power at the EOL. Unit 2 is at 100% power. 1B CA Pump is removed from service for PMs. 1B CA Pump has been inoperable for 3 hours and is expected to be returned to service in 6 hours. Direction for the crew is to decrease reactor power to 50% and secure the 1A main feedwater pump for emergent repair work. A reactivity plan has been provided by Reactor Engineering for a 10% per hour decrease in reactor power.

Event 1
BOP will perform an initial boration and RO will input desired load rate and target load into the main turbine. RO may also insert control rods prior to placing the main turbine in 'GO' to initiate the power decrease at 10%/hour.

Event History: 75% downpower at EOL used 17 (1).

Event 2
Letdown Heat Exchanger Temperature Control Valve (1KC-132) setpoint increases causing 1KC-132 to close and causing a letdown heat exchanger outlet high temperature alarm. Additionally, if letdown temperature exceeds 136°F, the letdown heat exchanger outlet three-way valve (1NV-153A) will fail to automatically reposition and align flow to the VCT (i.e. will continue flow through NV demineralizers). Crew will refer to Annunciator Response Procedure for 1AD-7 F/3 (Letdn HX Outlet Hi Temp), place 1KC-132 in Manual, and adjust CCW flow to restore letdown cooling, and position 1NV-153A as required.

Verifiable Action – BOP will manually control 1KC-132 and operate 1NV-153A as required.

Event History: This failure used 17 (2).

Event 3
Power Range NI N44 will fail low. Crew will enter AP/1/A/5500/016 (Malfunction of Nuclear Instrumentation). TS evaluation by the SRO is required.

Verifiable Action – The BOP will remove N44 from service.

Event History: This exact malfunction is new. IR channel malfunction used 17 (4). PR malfunction not used on previous 2 exams - N41 {15 (1)}.

Event 4
While the BOP is removing N44 from service, NC PORV 1NC-34A will fail open. Crew will enter AP/1/A/5500/011 (Pressurizer Pressure Anomalies) to address this failure. TS evaluation by the SRO is required.

Verifiable Action – RO will attempt to manually close 1NC-34A. This valve will not close. The RO will close the associated PORV isolation valve (1NC-33A). Crew will enter AP/1/A/5500/011 (Pressurizer Pressure Anomalies), Case I (Pressurizer Pressure Decreasing).

Event History: This exact malfunction not used on last 2 exams – {12 (1)}. Similar PORV failure (1NC-32B) used on 17 (1).

Event 5
Main Feed Pump vacuum will rapidly decay resulting in a loss of 1A & 1B Main Feedwater Pumps. Upon loss of both feed pumps, AMSAC should trip the Main Turbine which will initiate a Reactor Trip since turbine power is greater than P-9 (69%). However, a failure of this AMSAC signal will require a manual Reactor and Turbine Trip. Crew will enter EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

Verifiable Action – RO will manually trip the Reactor and manually trip the Main Turbine.

Event History: New malfunction

Event 6
Upon Reactor Trip, 1A CA Pump will fail to start in Auto or Manual.

Verifiable Action – RO will manually start CAPT #1.

Event History: This exact malfunction is new. Similar malfunction used on 16 (4) – failure of a 1B vs 1A CA Pump following trip of one CF Pump at low power vs trip of both CF Pumps at high power.

Event 7
A loss of secondary heat sink will occur following failure of 1A CA pump to start (1B CA pump tagged out) and CAPT #1 discharge valve closed. Crew will enter EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink).

Verifiable Action – BOP will direct performance of CA valve alignment verification. RO will restore Aux Feedwater flow to all S/Gs following notification of open CAPT discharge valve.

Event History: Loss of Heat Sink used on 17 (1) and 16 (2) but different success paths (Bleed and Feed and depressurize to establish feed path via condensate system).

Event 8
Two Control Rods will fail to fully insert on Reactor Trip.

Verifiable Action – BOP will initiate Emergency Boration and calculate required boric acid addition.

Event History: New malfunction

Manual Control of Automatic Functions		
Event	**Position**	**Description**
2	BOP	Manually control Automatic Letdown HX Temperature Control Valve (1KC-132)

***Critical Task 1* – Manually isolate failed open Pressurizer PORV (1NC-34A) prior to any RPS actuation.**

***Critical Task 2* – Manually trip the reactor from the control room prior to S/G dryout conditions (<12% W/R level) occurs on any S/G.**

***Critical Task 3* – Establish feedwater flow to at least one S/G before NC feed and bleed is required (<24% W/R level in 3 out of 4 S/G).**

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	7
2. Malfunctions after EOP entry (1–2)	2
3. Abnormal events (2–4)	4
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	1
7. Critical tasks (2–3)	3

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

   1.1 Reset to IC # 168 and load schedule file for NRC Scenario 1

START TIME:__________

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
			LOA-CA018 (RACKOUT CA PUMP 1B)	RACK-OUT				
			MAL-IPX001A (AUTO REACTOR TRIP FAILURE TRN A)	ACTIVE				
			MAL-IPX001B (AUTO REACTOR TRIP FAILURE TRN B)	ACTIVE				
		2	OV_SLIM16SpIncPB (KC-132 Setpoint Increment pushbutton)	PRESSED			:10	2
		2	OV_SLIM16manPB (KC-132 Man Pushbutton)	PRESSED	:11		:01	2
			VLV-NV035A (NV153A L/D HX DIVERSION FAIL AUTO ACTIONS)	ACTIVE				2
		3	MAL-ENB013D (P/R 44 BLOWN FUSE)	INSTRUMENT				3
		11	VLV-NC007F (NC34A PZR PORV FAIL TO POSITION)	1				4
		10	VLV-NC006C (NC33A PZR PORV ISOL VLV FAIL PWR)	ACTIVE	10:00			4
		5	MAL-CF001A (LOSS OF CFPT 1A VACUUM)	20		:30		5
		5	MAL-CF001B (LOSS OF CFPT 1B VACUUM)	20		:30		5
		5	XMT-FWP001 (PCM_6700 CONDENSER VACUUM CFPT A MTR)	15		:30		5
		5	XMT-FWP002 (PCM_6710 CONDENSER VACUUM CFPT B METER)	15		:30		5
		5	OVR-FWP012C (CFPT 1A TRIP_RESET PB)	ON	:30			5
		5	OVR-FWP015C (CFPT 1B TRIP_RESET PB)	ON	:30			5
			MAL-EHC002 (TURBINE TRIP FAILURE)	AUTO				5
			MAL-CA004A (FAILURE OF CA PUMP A TO START)	BOTH				6
			VLV-CA030F (SA2 CA PMP TURB STM SPLY VL FAIL TO POSTION)	0				6
			VLV-CA031F (SA5 CA PMP TURB STM SPLY VL FAIL TO POSTION)	0				6
		12	LOA-NV078 (SEAL WATER LOW FLOW LCL REFLASH ACK (AD7,C4))	ACKN	2:00			

		13	VLV-CA030F (SA2 CA PMP TURB STM SPLY VL FAIL TO POSTION)	0			:01	6
		13	VLV-CA031F (SA5 CA PMP TURB STM SPLY VL FAIL TO POSTION)	0			:01	6
		15	MAL-ISE007A (AUTO CF ISOL SIGNAL TRN A)	BLOCK	4:00			
		15	MAL-ISE007B (AUTO CF ISOL SIGNAL TRN B)	BLOCK	5:00			
			MAL-IRX015F14 (STUCK ROD F14 ON RX TRIP)	24				8
			MAL-IRX015H10 (STUCK ROD H104 ON RX TRIP)	60				8
			LOA-CA006 (CA21-CAPT DISCH TO CA COMM HDR)	0				7
		14	LOA-CA006 (CA21-CAPT DISCH TO CA COMM HDR)	1		2:00		7
		Ensure EVENT 11 = XWSJOL01W (1SI-19 NC-44L NUC OVER PWR ROD STOP CH.IV BYP)						
		Ensure EVENT 12 = jpplp4(1) │ jpplp4(2) (Reactor Trip Either Train)						
		Ensure EVENT 13 = x10i091n (#1 CAPT to ON)						
		Place cover on 1B CA Pump						

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

2.2 Give a copy of Attachment 2 (Shift Turnover Information) to the CRS.

3. EXERCISE PRESENTATION

3.1 Familiarization Period

A. Allow examinees time to familiarize themselves with the Control Board alignments.

3.2 **Scenario EVENT 1**, Decrease Reactor Power

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as DEC-BA (Balancing Authority / SOC) by the crew to inform of commencing power decrease, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	WHEN contacted as Secondary Chemistry to obtain maximum blowdown for appropriate load (step 3.2.3.9), **REPORT** "Maintain blowdown at current flow rates."

3.3 **Scenario EVENT 2**, Letdown Heat Exchanger Temperature Control Valve (1KC-132) Fails Closed

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 2** to cause 1KC-132 to slowly close.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1KC-132 or 1NV-153A, **REPEAT** the information.

3.4 **Scenario EVENTS 3 & 4**, N44 Loss of Instrument Power / PZR PORV (1NC-34A) Fails Open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause a loss of N44.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for N44, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as IAE and directed to place bistables in the tripped condition per Model W/O #00874531, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Reactor Engineering informing of N44 failure, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1NC-34A, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an AO or the Unit Supervisor is contacted to create a clearance to remove power from 1NC-33A (1EMXC-F03C), **REPEAT** the information and **INSERT** **Trigger 10**.
	After 10 minutes, contact the control room and **REPORT** "Power has been removed from 1NC-33A."

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO to acknowledge seal water low flow alarm on reflash panel 1, **REPEAT** the information and **INSERT** **Trigger 12**.
	After 2 minutes, contact the crew and **REPORT** "Seal Water Low Flow alarm has been acknowledged".

3.6 **Scenario EVENT 5**, 1A & 1B Main Feed Pump Low Vacuum Trip / Main Turbine Trip Failure / Auto Rx Trip Failure

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR** **Trigger 5** to cause a loss of vacuum to 1A & 1B Main Feed Pumps.

3.7 **Scenario EVENTS 6, 7 & 8,** 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to expedite the return of 1B CA pump, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as primary chemistry to periodically perform NC boron samples, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Reactor Group Duty Engineer to perform analysis to determine required shutdown margin, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF maintenance is contacted to perform troubleshooting procedure EM/1/A/5200/007, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an AO is dispatched to verify CA Valve alignment per Enclosure 2, **REPEAT** the information.
	After 2 minutes, **REPORT** “1CA-21 (CA Pump No 1 Disch to S/G) is closed.

✓	BOOTH INSTRUCTOR ACTION
	IF AO is directed to open 1CA-21, **REPEAT** the information. **THEN INSERT SIMULATOR Trigger 14**.
	After 2 minutes, **REPORT** “1CA-21 (CA Pump No 1 Disch to S/G) is open.

✓	BOOTH INSTRUCTOR ACTION
	IF IAE is directed to reset CF Isolation following Safety Injection **THEN INSERT SIMULATOR Trigger 15**, **REPEAT** the information.
	After 5 minutes, **REPORT** “IAE has reset CF Isolation.”

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Event Description:	Decrease Reactor Power		

Note To Evaluator:

The scenario begins with a power decrease to 50% by the crew. This will involve several procedures to accomplish. The following procedures are included in this guide:

- **OP/1/A/6150/009 Enclosure 4.2 (Boration)**
- **OP/1/A/6150/008 Enclosure 4.16 (Control Bank Manual Operation At Power)**
- **OP/0/B/6300/001 Enclosure 4.2 (Load Changing)**

These procedures may be performed in any order by the crew. Instructions for continuing to the next Event are included at the end of OP/0/B/6300/001 Enclosure 4.2.

Enclosure 4.2 OP/1/A/6150/009

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1. Limits and Precautions

1.1 This procedure is Reactivity Management related because it controls activities that can affect core reactivity by changing boron concentration. (R.M.)

1.2 The following Limits and Precautions are Reactivity Management related: (R.M.)

1.2.1 If the boron concentration is being increased in the NC System, at least one NC pump or one ND pump shall be in operation, recirculating the NC System.

1.2.2 If the unit has operated continuously for several months, significant Boron 10 depletion may have occurred. The effective boron concentration of the NC System may be lower than indicated by Chemistry samples.

1.3 Maintaining VCT pressure as low as practical during large makeups will minimize gas absorption. VCT pressure can be reduced by diverting letdown or by VCT purge.

1.4 Due to Electromagnetic Interference within the Unit 1 Reactor Makeup Control System, the Unit 1 Boric Acid Counter may sporadically count up during dilution activities. OFF indications for the Boric Acid Xfer Pumps and Closed indication for valve 1NV-238A can be used by the Reactor Operators to validate that sporadic counts are indication only. (NCR 02081372).

2. Initial Conditions

AA 2.1 **IF** in Mode 1, 2 or 3, ensure R2 reactivity management controls established AD-OP-ALL-0203 (Reactivity Management). (R.M.)

AA 2.2 Verify the NV System is in operation per OP/1/A/6200/001 (Chemical and Volume Control System).

AA 2.3 Verify sufficient RHT volume is available to receive the reactor coolant displaced during the planned boration operation.

3. Procedure

NOTE:	This enclosure will affect reactivity of the core and is therefore designated important to Reactivity Management per the guidelines of AD-OP-ALL-0203 (Reactivity Management). (R.M.)

AA 3.1 Ensure valves are aligned per Enclosure 4.8 (Valve Checklist).

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Event Description:	Decrease Reactor Power						

Enclosure 4.2
Boration

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3.2 Ensure the following valve control switches in "AUTO":

_____ • 1NV-238A (B/A To Blender Ctrl Vlv)

_____ • 1NV-186A (B/A Blender Otlt To VCT Otlt)

_____ 3.3 Ensure 1NV-238A (B/A Xfer Pmp To Blender Ctrl) controller in auto.

_____ 3.4 Ensure at least one boric acid transfer pump is in "AUTO" or "ON".

☐ 3.5 Record the desired volume of boric acid to be added. __________ gallons

_____ 3.6 Adjust the boric acid counter to the desired volume of boric acid to be added. (R.M.)

_____ 3.7 IF the blender is set up for automatic makeup per Enclosure 4.1 (Automatic Makeup), record the setpoint of the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl). _______ gpm

_____ 3.8 Place the "NC MAKEUP MODE SELECT" switch in "BORATE".

NOTE: Boric Acid flow rates > 32 gpm may result in a boric acid flow deviation annunciator.

_____ 3.9 IF required, adjust the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) to the desired flow.

N/A 3.10 IF NC System boron concentration will be changed by ≥ 50 ppm, initiate PZR spray to equalize the boron concentration throughout the system by operating backup heaters per OP/0/A/6200/055 (Miscellaneous Component Operation).

_____ 3.11 IF AT ANY TIME it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows:

_____ 3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position.

_____ 3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT.

NOTE: Procedure may continue while performing the following step.

3.11.3 WHEN desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows:

_____ 3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.

_____ 3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.

Enclosure 4.2
Boration

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_____ 3.12 IF AT ANY TIME during the makeup it becomes necessary to change the makeup flow rate, adjust the setpoint for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) as necessary to achieve the desired flow.

_____ 3.13 IF AT ANY TIME while boration is in progress it becomes necessary OR it is desired to stop the boration, perform the following:

_____ 3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position.

3.13.2 Ensure the following valves close: (R.M.)

- _____ 1NV-238A (B/A To Blender Ctrl Vlv)
- _____ 1NV-186A (B/A Blender Otlt To VCT Otlt)

☐ 3.13.3 Record boric acid volume added as indicated on the Boric Acid counter.
____________ gallons

3.13.4 WHEN conditions allow resuming the boration, perform the following:

☐ 3.13.4.1 Determine remaining volume to be added by subtracting the amount previously added (Step 3.13.3) from the desired volume to be added (Step 3.5).

__________ - __________ = ___________ gallons
(Step 3.5) (Step 3.13.3)

_____ 3.13.4.2 Adjust boric acid counter to the volume of boric acid determined in Step 3.13.4.1. (R.M.)

_____ 3.13.4.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)

_____ 3.13.4.4 Verify the following:

☐ 1NV-238A (B/A To Blender Ctrl Vlv) modulates to establish desired flow
☐ 1NV-186A (B/A Blender Otlt To VCT Otlt) opens

_____ 3.13.4.5 IF in "AUTO", verify the boric acid pump starts.

_____ 3.14 WHILE makeup is in progress, monitor the following for expected results:

☐ Control rod motion
☐ NC System Tavg
☐ Reactor Power

Event Description: Decrease Reactor Power

Enclosure 4.2
Boration

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NOTE:	If a small makeup is being performed, placekeeping for Steps 3.15 through 3.18 may be performed after Step 3.19 is performed.

_____ 3.15 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)

_____ 3.16 Verify the following:

- ☐ 1NV-238A (B/A To Blender Ctrl Vlv) modulates to establish desired flow
- ☐ 1NV-186A (B/A Blender Otlt To VCT Otlt) opens

_____ 3.17 __IF__ in "AUTO", verify the boric acid transfer pump starts.

☐ 3.18 Verify proper flow by observing the Boric Acid Counter. {PIP 96-0137}

NOTE:	The boric acid counter may count up 1 - 5 gallons after termination.

3.19 __WHEN__ the desired volume of boric acid is reached on the boric acid counter, ensure the following valves close: (R.M.)

_____ • 1NV-238A (B/A To Blender Ctrl Vlv)

_____ • 1NV-186A (B/A Blender Otlt To VCT Otlt)

Event Description: Decrease Reactor Power

Enclosure 4.2
Boration

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NOTE:	If additional borations will be performed over the course of the shift, flushing the makeup line is **NOT** recommended.

N/A 3.20 **IF** desired, flush the makeup line as follows:

☐ 3.20.1 Record the setpoint on 1NV-242A (RMWST To B/A Blender Ctrl): ________gpm

_____ 3.20.2 Place controller for 1NV-242A (RMWST To B/A Blender Ctrl) in manual.

_____ 3.20.3 Increase demand on controller for 1NV-242A (RMWST To B/A Blender Ctrl) to full open.

NOTE:	It is essential for the operator to read and understand the following steps before initiating a flush of the makeup line. If a reactor makeup water pump is currently on, the following step will initiate flow to the makeup line. Steps 3.20.4, 3.20.5, and 3.20.6 may be performed prior to signing off the steps.

3.20.4 Open the following valves:

- _____ 1NV-242A (RMWST To B/A Blender Ctrl)
- _____ 1NV-186A (B/A Blender Otlt To VCT Otlt)

_____ 3.20.5 Ensure one reactor makeup water pump is in "ON".

NOTE:	Valves in the following step shall be positioned as sequenced to preclude unanticipated additional reactor makeup water flow due to seat leak by on 1NV-186A.

3.20.6 **WHEN** ~ 20 gallons of makeup water have been flushed through the makeup line, close the following valves:

_____ 3.20.6.1 1NV-242A (RMWST To B/A Blender Ctrl)

_____ 3.20.6.2 1NV-186A (B/A Blender Otlt To VCT Otlt)

3.20.7 Place the following valve control switches in "AUTO":

- _____ 1NV-242A (RMWST To B/A Blender Ctrl)
- _____ 1NV-186A (B/A Blender Otlt To VCT Otlt)

_____ 3.20.8 Ensure controller for 1NV-242A (RMWST To B/A Blender Ctrl) is set to the value recorded in Step 3.20.1. (R.M.)

_____ 3.20.9 Place controller for 1NV-242A (RMWST To B/A Blender Ctrl) in auto.

Enclosure 4.2

Boration

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_____ 3.20.10 **IF NOT** required for current plant operation, place the reactor makeup water pump started in Step 3.20.5 in "AUTO".

_____ 3.21 **IF** automatic makeup is desired, perform one of the following:

_____ 3.21.1 **IF** it is desired to change the blender outlet boron concentration, refer to Enclosure 4.1 (Automatic Makeup).

OR

_____ 3.21.2 **IF** makeup at the previous concentration is acceptable **AND** the system was previously aligned per Enclosure 4.1 (Automatic Makeup), perform the following:

_____ 3.21.2.1 Ensure the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) is set to the value recorded in Step 3.7. (R.M.)

_____ 3.21.2.2 Place the "NC MAKEUP MODE SELECT" switch in "AUTO".

_____ 3.21.2.3 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)

N/A 3.22 **IF** initiated in Step 3.10, terminate PZR spray by securing backup heaters per OP/0/A/6200/055 (Miscellaneous Component Operation).

3.23 Do **NOT** file this enclosure.

Enclosure 4.16
Control Bank Manual Operation At Power

OP/1/A/6150/008
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1. Limits and Precautions

1.1 This procedure is Reactivity Management related because it controls activities that can affect core reactivity by changing control rod position. (R.M.)

1.2 The following Limits and Precautions are Reactivity Management related: (R.M.)

1.2.1 When rods are being moved, observe "RODS IN/RODS OUT" light for proper direction.

1.2.2 When rods are being moved, observe the demand position and actual (digital) position to verify proper operation of the Rod Control System.

1.2.3 Adjusting T-Avg ± 1°F of T-Ref before transferring rod control to "AUTO" will prevent undesired rod movement.

1.2.4 Monitor startup rate continuously during any rod motion to ensure < 0.5 DPM stable startup rate.

1.3 Automatic rod control shall **NOT** be used when less than 15% (184 MW_e) turbine power.

1.4 Individual control bank positions on "CRD BANK SELECT" switch shall not be used to position rods manually. (The automatic overlap feature is disabled.)

1.5 After releasing Rod Motion lever, waiting 2 seconds before attempting to move rods again will allow all signals to clear the firing cards.

1.6 A rod motion demand below zero steps may result in the movable grippers **NOT** properly engaging the drive shaft.

2. Initial Conditions

AA 2.1 Ensure Reactivity Management controls established per AD-OP-ALL-0203 (Reactivity Management. (RM)

AA 2.2 Verify Unit 1 is **NOT** in an EP or AP.

AA 2.3 Verify one of the following exist:

- ☑ Control Bank movement required to increase/decrease Reactor Power
- ☐ Control Bank movement required to increase/decrease Tavg
- ☐ Control Bank movement required to maintain AFD
- ☐ Control Bank manual control required to support testing/maintenance activity

Enclosure 4.16
Control Bank Manual Operation At Power

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3. Procedure

NOTE:	Steps 3.1 through 3.6 may be signed off as time allows ensuring operator maintains proper focus on reactivity management.

AA 3.1 Monitor the following:

- Tavg/Tref
- Demand Counter positions
- DRPI rod positions
- ROD MOTION RODS-IN/RODS-OUT Light
- ROD MOTION DEMAND SIGNALS - TEMP ERROR/POWER MISMATCH
- Power Range instruments
- IR SUR (Startup Rate)

AA 3.2 **IF** MANUAL ROD movement is desired, perform the following:

- Verify the "ALM" LED on circuit card A206 in the left side of 1ERCC0006 (Rod Control Logic Cabinet) is **NOT** illuminated.
- Verify one GRP select light is illuminated on each power cabinet.

AA 3.3 **IF** plant conditions require, place the "CRD BANK SELECT" switch in "MAN".

N/A 3.4 **IF** withdrawing Control Banks, pull and hold the "ROD MOTION" lever "OUT" as required until control rods are in the desired position. (R.M.)

_____ 3.5 **IF** inserting Control Banks, push and hold the "ROD MOTION" lever "IN" as required until control rods are in the desired position. (R.M.)

_____ 3.6 **IF** automatic rod control is desired, perform the following:

_____ 3.6.1 Verify Unit 1 Reactor Power is ≥ 15% RTP.

_____ 3.6.2 **WHEN** Tavg is within 1°F of Tref, place "CRD BANK SELECT" in "AUTO".

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

Enclosure 4.2

Load Changing

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_____ 3.1.3.7 Verify new load target appears on Target Display.

_____ 3.1.3.8 Select "GO" and verify it illuminates to start load increase.

_____ 3.1.3.9 Coordinate with Secondary Chemistry to adjust S/G blowdown flowrates to obtain maximum blowdown for the appropriate load.

CAUTION:
1. The load, hydrogen pressure and power factor limits per the Unit One Revised Data Book Figure 43 shall **NOT** be exceeded.
2. Rate of change of First-Stage Bowl Inner Surface Temperature shall **NOT** exceed 150°F/hr (OAC point C1P1283 (First Stage Metal Temp Rate)).
3. OAC point C1A1140 (Turbine Lower Inner Shell Temp) vs. Percent Steam Flow (OAC point C1P1588 (Design Total Main Steam Flow, Measured (%)) shall be maintained above and to the left of curve in the Unit One OAC Databook "Load-Changing Recommendations".
4. Control valve casing difference, OAC point C1A0961 (Turb Valve Chest Inner Surface Metal Temp) minus C1A0967 (Turb Valve Chest Outer Surface Metal Temp), shall **NOT** exceed curve "Allowable Temp Difference on Turbine Valve Chest" in the Unit 1 OAC Databook.

_____ 3.2 **IF** decreasing turbine generator load, perform the following:

AA 3.2.1 Ensure the proper reactivity management controls established per AD-OP-ALL-0203 (Reactivity Management). (R.M.)

_____ 3.2.2 **WHILE** decreasing turbine generator load, perform the following:

AA 3.2.2.1 **IF** CV4 fully closes (92% of full load, 1127 MWe), verify 1SM-33 (Ctrl Vlv #4 Stm Lead Drn) opens.

_____ 3.2.2.2 **IF** CV3 fully closes (65% of full load, 796 MWe), verify 1SM-25 (Ctrl Vlv #3 Stm Lead Drn) opens.

Enclosure 4.2
Load Changing

OP/1/B/6300/001
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CAUTION:	1. Normal steady-state load change shall be made without exceeding limits shown on Enclosure 4.7 (Generator Operating Limits) and in the Unit 1 OAC Databook "Recommended Starting and Loading Curves". 2. Unit One Reactor Operating Data, Section 2.4 shall be referred to for allowable ramp rates.

3.2.3 Decrease turbine generator load by performing the following:

_____ 3.2.3.1 Select "LOAD RATE" and verify it illuminates.

_____ 3.2.3.2 Input the desired load rate.

_____ 3.2.3.3 Select "ENTER" and verify "LOAD RATE" goes dark

_____ 3.2.3.4 Select "TARGET" and verify it illuminates.

_____ 3.2.3.5 Input the desired load target.

_____ 3.2.3.6 Select "ENTER" and verify "TARGET" goes dark.

_____ 3.2.3.7 Verify new load target appears on Target Display.

_____ 3.2.3.8 Select "GO" and verify it illuminates to start load decrease.

_____ 3.2.3.9 Coordinate with Secondary Chemistry to adjust S/G blowdown flowrates to obtain maximum blowdown for the appropriate load.

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

Note to Evaluator:

At this point, the power decrease has begun. At the discretion of the Lead Evaluator, the scenario may continue to the next event by instructing the booth operator to INSERT Trigger 2 (1KC-132 Failure).

Op Test No.:	301	Scenario #	1	Event #	3 & 4	Page	23 of 111
Event Description:	N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open						

Control Room Indications
1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - LIT
1KC-132 (Letdn Hx Otlt Temp Ctrl) closing
Letdown temperature on 1NVPT5590 increasing
DCS Alarm "Letdown HX TEMP CTRL IN MAN"

Note To Evaluator:

The crew response for this failure can be found in the annunciator response for 1AD-7, F/3 on the following page. The failure is on the setpoint increase button on the controller for 1KC-132 and will delete after 10 seconds and transfer the controller to Manual. The crew will manually control 1KC-132 to increase cooling flow to the Letdown Heat Exchanger. If letdown temperature exceeds 136°F, then letdown 3-way valve 1NV-153A should bypass the mixed bed demineralizers. This is also failed, so crew may need to take 1NV-153A to the VCT position to manually bypass the demineralizers.

PANEL: 1AD-7

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F/3

LETDN HX OUTLET HI TEMP

SETPOINT: 128°F

ORIGIN:

Instrument	DCS	Description
1NVPT5590	1NVAA5590	LETDOWN HX OTLT TEMP

PROBABLE CAUSE:

1. Letdown flow too high
2. 1KC-132 (Letdn Hx Otlt Temp Ctrl) (controlled by 1NVSS5590) malfunction

AUTOMATIC ACTIONS:

IF letdown temp. continues to rise, at 136°F 1NV-153A (Ltdn Hx Otlt 3-Way Vlv) will divert Letdown to volume control tank.

IMMEDIATE ACTIONS:

1. IF due to hi letdown flow, reduce flow rate by removing orifices from service and/or taking manual control of 1NV-148 (Letdn Press Control Valve) as necessary.
2. IF due to a low KC flow, attempt to restore normal flow, by taking manual control of 1KC-132 (Letdn Hx Otlt Temp Ctrl).
3. IF KC flow CANNOT be restored to Letdown Heat Exchanger, refer to AP/1/A/5500/021 (Loss of Component Cooling).

SUPPLEMENTARY ACTIONS:

1. Ensure letdown flow does NOT exceed 120 gpm.
2. Ensure ND letdown flow in Modes 5, 6 or No Mode does NOT exceed 185 gpm.
3. Verify that 1NV-148 (Letdn Press Control) is maintaining proper back pressure of 350 psig.
4. IF letdown temperature exceeds 136°F, ensure 1NV-153A (Ltdn Hx Otlt 3-Way Vlv) diverts flow to the VCT.

   4.1 WHEN letdown temperature decreases below 136°F, ensure 1NV-153A (Ltdn Hx Otlt 3-Way Vlv) directs letdown flow to the NV demineralizers.

NOTE: Completion of the evaluation/inspection in the following step shall NOT delay a return to normal operation.

5. IF KC flow is lost to the Letdown Hx for greater than 30 seconds, contact Engineering to evaluate/inspect for any possible damage due to water hammer.

REFERENCES:

1. CN-1554-01.06
2. CN-1573-01.02
3. Westinghouse Precautions, Limitations and Setpoints Document (CNM-1201.00-39)
4. CNCE-10993
5. CNM 1399.03-0269.001 Drop 7 Sheet 312

Note to Evaluator:

This completes Event 2. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 3 (N44 Loss of Instrument Power).

Op Test No.:	301	Scenario #	1	Event #	3 & 4	Page	25 of 111

Event Description: N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open

Control Room Indications
1AD2, A/1 "P/R HI NEUTRON FLUX RATE ALERT" – LIT
1AD2, A/3 "P/R HI NEUTRON FLUX HI SET POINT ALERT" – LIT
1AD2, B/1 "P/R LOWER DET HI FLUX DEV OR AUTO DEFEAT" – LIT
1AD2, B/2 "P/R UPPER DET HI FLUX DEV OR AUTO DEFEAT" – LIT
1AD2, B/3 "COMPARATOR P/R CHANNEL DEVIATION" – LIT
1AD2, B/5 "P/R HI VOLTAGE FAILURE" – LIT
1AD2, E/8 "OVER POWER ROD STOP" – LIT
1AD2, F/10 "DCS TROUBLE" – LIT
N44 Indication fails to bottom of scale

Op Test No.:	301	Scenario #	1	Event #	3 & 4	Page	26 of 111
Event Description:	N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open						

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case IV Power Range Malfunction	PAGE NO. 11 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. Verify all rod motion - STOPPED.	__ IF unwarranted rod motion is occurring, THEN place "CRD BANK SELECT" to manual.
__ 2. Verify 1AD-2, E/8 "OVER POWER ROD STOP" - DARK.	__ Adjust Turbine load to maintain T-Avg at T-Ref.
3. Identify failed P/R channel: __ • N-41 OR __ • N-42 OR __ • N-43 OR __ • N-44.	
__ 4. Ensure unaffected channels - OPERABLE.	
5. Request IAE to place the following bistables in the tripped condition. REFER TO Model W/O #00874531: __ • OT DELTA T __ • OP DELTA T.	

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Event Description:	N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case IV Power Range Malfunction	PAGE NO. 12 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. **Perform the following actions at the Miscellaneous Control And Indication Panel:**

   __ a. Place the appropriate "ROD STOP BYPASS" switch to the affected channel position.

   __ b. Verify the affected nuclear overpower rod stop channel bypassed status light (1SI-19) - LIT.

   __ c. Place "POWER MISMATCH BYPASS" switch to the affected channel position.

Note to Evaluator:

Manipulation of this switch will trigger Event 4 (1NC-34A failure). The CRS should suspend actions of AP/16 and ensure proper Immediate Action performance by the OATC. Once plant conditions have stabilized, the CRS will decide procedure order (completion of AP/16 vs. AP/11).

7. **Perform the following actions at the Detector Current Comparator panel:**

   __ a. Place "UPPER SECTION" channel defeat switch to the affected channel.

   __ b. Verify the "CHANNEL DEFEAT" light for the upper section - LIT.

   __ c. Place "LOWER SECTION" channel defeat switch to the affected channel.

   __ d. Verify the "CHANNEL DEFEAT" light for the lower section - LIT.

__ 8. **At the Comparator And Rate panel, place the "COMPARATOR CHANNEL DEFEAT" switch to the affected channel position.**

Op Test No.: 301	Scenario # 1	Event # 3 & 4	Page 28 of 111				
Event Description: N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open							

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case IV Power Range Malfunction	PAGE NO. 13 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE The following annunciators will actuate in the following step: 1AD-2, A/1 "P/R HI NEUTRON FLUX RATE ALERT" 1AD-2, A/3 "P/R HI NEUTRON FLUX HI SET POINT ALERT" 1AD-2, B/5 "P/R HI VOLTAGE FAILURE".	
9. **De-energize the affected channel as follows:**	
__ a. Remove the control power fuses at Power Range A drawer.	
NOTE Replacement of the affected P/R control power fuses shall not occur without authorization of the Superintendent of Operations or his designee.	
__ b. Request the OSM to maintain the control power fuses under his control.	
__ c. Verify the affected Power Range cabinet shows no physical signs of damage.	__ c. Remove the instrument power fuses at Power Range B drawer.
__ 10. **Ensure affected channel bistables are in the required state. REFER TO Enclosure 1 (P/R Bistables That Must Be Tripped).**	**Note to Evaluator:** **Enclosure 1 is included as Attachment 3.**
__ 11. **Ensure operable P/R channel selected to record on NIS RECORDER.**	
__ 12. **Adjust control rods to maintain T-Ave at T-Ref.**	__ **IF rods will not move in manual, THEN adjust turbine load to maintain T-Ave at T-Ref.**
__ 13. **WHEN T-avg within 1°F of T-Ref, AND auto rod control desired, THEN return control rods to auto.**	

Op Test No.:	301	Scenario #	1	Event #	3 & 4	Page	29 of 111
Event Description:	N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open						

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case IV Power Range Malfunction	PAGE NO. 14 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 14. **Determine and correct cause of P/R malfunction.**	**TECH SPEC EVALUATION** ***See Attachment 10 for applicable Tech Specs.***
15. **Ensure compliance with appropriate Tech Specs:** __ • 3.2.4 (Quadrant Power Tilt Ratio (QPTR)) __ • 3.3.1 (Reactor Trip System (RTS) Instrumentation).	**T.S. 3.3.1** **Condition D: (Place Channel 4 of Power Range Neutron Flux High and Power Range Neutron Flux High Positive Rate in the tripped condition within 72 hours)** **Condition E: (Place Channel 4 Overtemperature ΔT and Overpower ΔT in the tripped condition within 72 hours)**
16. **Determine required notifications:** __ • REFER TO RP/0/A/5000/001 (Classification Of Emergency) __ • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).	**Condition R: (Verify P-10 is in required state for existing unit conditions within 1 hour)** **Condition S: (Verify P-7, P-8, and P-9 are in required state for existing unit conditions within 1 hour)**
__ 17. **Notify Reactor Group Engineer of occurrence.** __ 18. **WHEN the affected P/R channel is repaired, THEN ensure IAE returns the channel to service.** __ 19. **Determine long term plant status. RETURN TO procedure in effect.**	**NOTE:** **T.S. 3.2.4 SR 3.2.4.1 has a NOTE which allows the crew to use the remaining 3 operable channels to calculate QPTR as long as THERMAL POWER is < 75%. This calculation is not required until 12 hours after exceeding 50% power. The crew could also perform an incore flux map per SR 3.2.4.2 in lieu of performing SR 3.2.4.1.**

END

Event Description: N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open

Control Room Indications
1AD-6, D/10 "PZR LO PRESS PORV NC32 & 36 BLOCKED" – LIT
1AD-6, D/11 "PZR LO PRESS PORV NC34 BLOCKED" – LIT
1AD-6, E/10 "PZR PORV DISCH HI TEMP" – LIT
1AD-6, F/8 "PZR LO PRESS CONTROL" – LIT
1AD-6, F/11 "PRT HI PRESS" – LIT
Pressurizer Pressure Channels on 1MC-10 decreasing

Op Test No.:	301	Scenario #	1	Event #	3 & 4	Page	31 of 111
Event Description:	N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open						

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 2 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Verify all Pzr PORVs - CLOSED.**	**Perform the following:**
	__ a. CLOSE Pzr PORV(s).
	b. IF any Pzr PORV cannot be closed, THEN:
CRITICAL TASK #1	__ 1) CLOSE affected PORV(s) isolation valve.
	N/A 2) IF Pzr PORV isolation valve cannot be closed, THEN perform the following:
	__ a) IF in Mode 3 with CLAs isolated OR in Mode 4, THEN GO TO AP/1/A/5500/027 (Shutdown LOCA).
	__ b) Trip Unit 1 reactor.
	__ c) WHEN reactor tripped OR S/I setpoint reached, THEN ensure S/I initiated.
	__ d) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

Op Test No.:	301	Scenario #	1	Event #	3 & 4	Page	32 of 111
Event Description:	N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open						

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 3 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Control rods may withdraw on decreasing NC pressure.

__ 2. **Verify Pzr spray valve(s) - CLOSED.**

Perform the following:

__ a. CLOSE affected spray valve(s).

b. IF affected spray valve(s) will not close, THEN perform the following:

1) Select "FAIL CLOSED" for affected spray valve(s) mode select switch:

__ • "1 NC-27 PZR SPRAY VLV MODE SELECT"

__ • "1 NC-29 PZR SPRAY VLV MODE SELECT".

2) IF AT ANY TIME Control Room Supervisor determines that reactor trip required, THEN:

__ a) Trip Unit 1 reactor.

__ b) WHEN reactor power less than 5%, THEN stop NC Pumps 1A and 1B.

__ c) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

__ 3) IF NC pressure stable OR increasing, THEN GO TO Step 3.

(RNO continued on next page)

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 4 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	
	4) IF NC pressure continues to decrease, THEN: a) IF in Modes 1 or 2, THEN: __ (1) Trip Unit 1 reactor. __ (2) WHEN reactor power less than 5%, THEN stop NC Pumps 1A and 1B. __ (3) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). __ b) Stop NC Pumps 1A and 1B. __ c) IF 1C and 1D NCPs on, THEN stop one additional NCP. __ d) REFER TO AP/1/A/5500/004 (Loss of Reactor Coolant Pump).
__ 3. **Verify all Pzr heaters - ENERGIZED.**	**Perform the following:** __ a. IF Pzr pressure less than 2220 PSIG AND stable or decreasing, THEN ensure all Pzr heaters energized. __ b. IF Pzr pressure less than 2220 PSIG AND increasing, THEN operate Pzr heaters as required to stabilize Pzr pressure at 2235 PSIG. __ c. WHEN Pzr pressure returns to normal AND automatic Pzr pressure control desired, THEN place Pzr heaters in auto.

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 5 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 4. **Ensure 1NV-37A (NV Supply To Pzr Aux Spray) - CLOSED.**	

NOTE Positive reactivity is inserted during an increase in NC pressure which may cause auto rod insertion.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Verify NC pressure - STABLE OR INCREASING.**	__ **IF pressure continues to decrease, THEN REFER TO AP/1/A/5500/010 (REACTOR COOLANT LEAK).**
6. **WHEN NC pressure stable, THEN:** __ • Stabilize unit at appropriate power level. • Adjust the following as required to maintain T-Avg within 1°F of T-Ref: __ • Turbine load __ • Control rods __ • Boron concentration.	
N/A 7. **IF Pzr pressure channel failed, THEN perform following:**	
__ a. Verify "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) in required state for unit conditions.	__ a. Ensure compliance with Tech Spec 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation).
b. Notify IAE to fail following bistables for affected channel per Model W/O #00874531. Bistables shall be tripped within 72 hours: __ • Pzr low pressure S/I __ • OT Delta T __ • Pzr high pressure Reactor Trip __ • Pzr low pressure Reactor Trip.	

Op Test No.:	301	Scenario #	1	Event #	3 & 4	Page	35 of 111

Event Description: N44 Loss of Instrument Power / PZR PORV (NC-34A) Fails Open

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 6 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. Ensure compliance with appropriate Tech Specs: __ • 3.3.1 (Reactor Trip System (RTS) Instrumentation) __ • 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation) __ • 3.3.3 (Post Accident Monitoring (PAM) Instrumentation) __ • 3.3.4 (Remote Shutdown System) __ • 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits) __ • 3.4.4 (RCS Loops - MODES 1 and 2) __ • 3.4.5 (RCS Loops - MODE 3) __ • 3.4.6 (RCS Loops - MODE 4) __ • 3.4.9 (Pressurizer) __ • 3.4.10 (Pressurizer Safety Valves) __ • 3.4.11 (Pressurizer Power Operated Relief Valves (PORVs)) __ • 3.4.13 (RCS Operational Leakage).	**TECH SPEC EVALUATION** ***See Attachment 10 for applicable Tech Specs.*** **T.S. 3.4.11** **Condition B: (Close and remove power from associated block valve within 1 hour and restore PORV to OPERABLE status within 72 hours)** **T.S. 3.4.1** **Condition A: (Restore DNB parameter to within limits in 2 hours)** **NOTE: This LCO may apply depending on RCS pressure. OAC alarm (PZR Low Press DNB limit) will notify operators of this condition. Condition will mostly likely be cleared prior to Tech Spec review.**
__ 9. Determine long term plant status. RETURN TO procedure in effect.	

END

Note to Evaluator:

This completes Events 3 & 4. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 5 (1A & 1B Low Vacuum Trip / Failed Main Turbine Trip / Failed Auto Reactor Trip).

Op Test No.:	301	Scenario #	1	Event #	5	Page	36 of 111

Event Description: 1A & 1B Main Feed Pump Low Vacuum Trip / Main Turbine Trip Failure / Auto Rx Trip Failure

Control Room Indications
1AD-5, A/1 "CFPT A TRIPPED" – LIT
1AD-5, A/4 "CFPT A COMMON TROUBLE" – LIT
1AD-5, C/1 "CFPT B TRIPPED" – LIT
1AD-5, C/4 "CFPT B COMMON TROUBLE" – LIT
OAC Alarms for 1A & 1B CFPT Vacuum - LO

Note To Evaluator:

Following trip of the Main Feed Pumps, the OATC will initiate a manual Reactor trip in accordance with Immediate Actions of AP/1/A/5500/006 (see below) and then transition to E-0.

Manual trip of the Reactor is critical because Automatic trip of the Reactor and Main Turbine will be failed.

CNS AP/1/A/5500/006	LOSS OF S/G FEEDWATER Case I Loss of CF Supply To S/Gs	PAGE NO. 2 of 21 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Verify reactor power - LESS THAN 5%.** **CRITICAL TASK #2**	**IF AT ANY TIME all CF supply to S/G(s) lost, THEN perform the following:** __ a. Trip reactor. __ b. GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
__ 2. **Verify all S/G hi-hi level alert alarms (1AD-4) - DARK.**	**IF 2/4 S/G N/R levels on any one S/G greater than 83%, THEN perform the following:** __ a. Verify all Feedwater Isolation status lights (1SI-5) - LIT. b. IF any Feedwater Isolation status light not lit, THEN perform the following: __ 1) Initiate Feedwater Isolation. __ 2) IF proper status light indication not obtained, THEN CLOSE affected valve(s).
__ 3. **Verify 1AD-2, F/9 "DCS ALTERNATE ACTION" - DARK.**	**IF all the following conditions exist:** __ • 1AD-2, F/9 in alarm for CF control function in alternate action __ • At least one CF pump - IN SERVICE __ • 1AD-3, C/6 "CF ISOL TRN A" - DARK __ • 1AD-3, D/6 "CF ISOL TRN B" - DARK, __ THEN GO TO Case III (CF Control Not in Auto).

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 38 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **4 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** **Enclosure 1 is included as Attachment 4.**
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
2. **Verify Reactor Trip:**	**Perform the following:**
__ • All rod bottom lights - LIT	__ a. Trip reactor.
__ • All reactor trip and bypass breakers - OPEN	b. IF reactor will not trip, THEN concurrently perform the following:
__ • I/R power - DECREASING.	__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees)
	__ • GO TO EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS).
3. **Verify Turbine Trip:**	**Perform the following:**
__ • All turbine stop valves - CLOSED.	__ a. Trip turbine.
	N/A b. IF turbine will not trip, THEN perform the following:
Note to Evaluator: **The OATC should manually cycle Reactor Trip Breakers twice because all rod bottom lights will not be lit. The OATC and CRS will determine the Reactor is shutdown following reading of Immediate Action step.**	__ 1) Depress "MANUAL" pushbutton on turbine control panel.
	__ 2) Rapidly CLOSE control valves by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons.
	N/A 3) IF control valves will not close, THEN CLOSE: __ • All MSIVs __ • All MSIV bypass valves.

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 5 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 4. **Verify 1ETA and 1ETB - ENERGIZED.**	**Perform the following:** a. **IF** 1ETA **AND** 1ETB de-energized, **THEN GO TO** EP/1/A/5000/ECA-0.0 (Loss of All AC Power). __ b. **WHEN** time allows, **THEN** attempt to restore power to de-energized switchgear while continuing with this procedure. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power).

Op Test No.: 301 Scenario # 1 Event # 6, 7, 8	Page 40 of 111
Event Description:	1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 6 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify S/I actuated:**	
__ a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.	a. Perform the following: 1) Verify conditions requiring S/I: __ • Pzr pressure - LESS THAN 1845 PSIG OR __ • Containment pressure - GREATER THAN 1.2 PSIG. N/A 2) **IF** S/I required, **THEN** initiate S/I. 3) **IF** S/I not required, **THEN** concurrently perform the following: N/A • **IF** 1ETA **OR** 1ETB de-energized, **THEN** ensure the following pumps running on energized bus: __ • NV pump __ • KC pump __ • RN pump. __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ • **GO TO** EP/1/A/5000/ES-0.1 (Reactor Trip Response).
__ b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.	__ b. Initiate S/I.
__ 6. **Announce "Unit 1 Safety Injection".**	

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	41 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 2 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

Note to Evaluator:

Enclosure 1 is included as Attachment 5.

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

2. **Verify the following:**

- __ All 6.9 KV busses - ENERGIZED
- __ VI pressure - GREATER THAN 85 PSIG.

Perform the following:

a. **IF** loss of offsite power has occurred, **THEN** perform the following:

- __ CLOSE all MSIVs
- __ CLOSE all MSIV bypass valves
- __ Ensure available RN pump(s) - IN SERVICE AS REQUIRED
- __ **WHEN** time and manpower permit, **THEN** ensure available RL pump(s) in service as required. **REFER TO** OP/0/B/6400/003 (Low Pressure Service Water System).
- __ **WHEN** time and manpower permit, **THEN** ensure available KR pump(s) in service as required. **REFER TO** OP/0/B/6400/004 (Recirculated Cooling Water System).

b. **IF AT ANY TIME** VI pressure less than or equal to 55 psig, **THEN** CLOSE the following valves:

- __ All MSIVs
- __ All MSIV bypass valves.

c. **IF** S/G N/R level less than 11% in all S/Gs, **THEN** THROTTLE feed flow to achieve the following:

- __ Minimize cooldown
- __ Maintain total feed flow greater than 450 GPM.

(RNO continued on next page)

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Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 3 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. (Continued)

d. **WHEN** N/R level greater than 11% in any S/G, **THEN** THROTTLE feed flow further to achieve the following:

- __ Minimize cooldown
- __ Maintain at least one S/G N/R level greater than 11%.

e. **IF** VI pressure less than 85 PSIG, **THEN** perform the following:

- Align N_2 to Pzr PORVs by opening the following valves:
  - __ 1NI-438A (Emer N2 From CLA A To 1NC-34A)
  - __ 1NI-439B (Emer N2 From CLA B To 1NC-32B).
- __ Dispatch operator to ensure proper VI compressor operation. **REFER TO** AP/0/A/5500/022 (Loss of Instrument Air).

__ 3. **Announce "Unit 1 Reactor Trip, non-essential personnel stay out of Unit 1 Turbine bldg".**

NOTE Enclosure 2 (NC Temperature Control) shall remain in effect until subsequent steps provide alternative NC temperature control guidance.

__ 4. **Control NC temperature. REFER TO Enclosure 2 (NC Temperature Control).**

Note to Evaluator:

Enclosure 2 is included as Attachment 6.

5. **Determine required notifications:**

- __ **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)
- __ **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).

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Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 4 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Verify Main Generator as follows:**	
__ a. Verify turbine generator megawatt output - LESS THAN **OR** EQUAL TO ZERO MW.	a. Perform the following: __ 1) Determine and correct cause of continued turbine generator output. __ 2) **WHEN** turbine generator megawatt output less than or equal to zero MW, **THEN** perform Step 6.b and Step 6.c. __ 3) **GO TO** Step 6.d.
b. Ensure the following breakers and MODs - OPEN: __ • MOD 1BG and 1BT __ • MOD 1AG and 1AT __ • Generator Breakers 1A and 1B.	
__ c. Ensure main generator "EXCITATION" - OFF.	
__ d. Verify "MAN/AUTO REG" select switch "MAN" mode light - LIT.	__ d. Transfer to manual mode.

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 5 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Verify feedwater status as follows:**	
__ a. T-Avg - LESS THAN 564°F.	a. Perform the following: __ 1) **WHEN** T-Avg less than 564°F, **THEN** perform Steps 7.b and 7.c. __ 2) **GO TO** Step 7.c.
__ b. All Feedwater Isolation status lights (1SI-5) - LIT.	b. Perform the following: __ 1) Initiate Feedwater Isolation. __ 2) **IF** any status light remains dark, **THEN** perform Enclosure 3 (Closure of Feedwater Isolation Valves).
__ c. Total feed flow to S/G(s) - GREATER THAN 450 GPM.	c. Establish feed flow to maintain at least one S/G N/R level greater than 11% **OR** total feed flow greater than 450 GPM using one of the following: __ • CA pumps OR __ • Main Feedwater System. **REFER TO** OP/1/A/6250/001 (Condensate and Feedwater System).

Note to Evaluator:

This step may be used for guidance to start CAPT #1 if not previously started per Prudent Action.

The CAPT will not provide flow due to isolated discharge valve.

Once all S/G levels decrease below 11%, FR-H.1 entry conditions will be met.

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Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 6 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Verify adequate shutdown margin as follows:**	
__ a. DRPI indication - AVAILABLE.	a. Verify adequate shutdown margin as follows: 1) Emergency borate 10,000 gallons of 7000 PPM boron solution as follows: __ a) OPEN 1NV-236B (Boric Acid To NV Pumps Suct). __ b) **IF** 1NV-236B will not open, **THEN** dispatch operator to open 1NV-236B (Boric Acid To NV Pumps Suct) (AB-550, HH-JJ, 53-54, Rm 234). c) **WHEN** 1NV-236B open, **THEN** perform the following: __ (1) Start boric acid transfer pumps. __ (2) Calculate required injection time based on boric acid flowrate. __ (3) **WHEN** required boric acid injected, **THEN** secure emergency boration. __ 2) Notify Reactor Group Duty Engineer to perform analysis to determine required shutdown margin. __ 3) **GO TO** Step 8.c.

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 7 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	
__ b. All control and shutdown rods - FULLY INSERTED.	b. **IF** two or more rods not fully inserted, **THEN** perform the following: 1) Emergency borate 254 PPM for each rod not fully inserted as follows: __ a) OPEN 1NV-236B (Boric Acid To NV Pumps Suct). N/A __ b) **IF** 1NV-236B will not open, **THEN** dispatch operator to open 1NV-236B (Boric Acid To NV Pumps Suct) (AB-550, HH-JJ, 53-54, Rm 234). c) **WHEN** 1NV-236B open, **THEN** perform the following: __ (1) Start boric acid transfer pumps. __ (2) Calculate required boron addition. **REFER TO** Unit 1 ROD Book, Section 4.1. __ (3) Calculate required injection time based on boric acid flowrate. __ (4) **WHEN** required boric acid injected, **THEN** secure emergency boration. __ 2) Notify Reactor Group Duty Engineer to perform analysis to determine required shutdown margin.
Note to Evaluator: **Applicant should calculate a required boron addition of approximately 2400 gallons. Emergency boration flow will be approximately 100 gpm. Therefore, required injection time of approximately 24 minutes.** **Initial boron concentration at beginning of scenario - 187 ppm + 508 ppm = 695 ppm** **Per ROD Book, boron concentration increase from 185 ppm to 700 ppm requires an addition of 4941 gallons. This does not account for boric acid added during power reduction.**	
__ c. Stop any boron dilutions in progress.	

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 8 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	
__ d. All NC T-Colds - GREATER THAN 545°F.	d. Perform the following: __ 1) Determine lowest T-Cold. __ 2) Determine core burnup in effective full power days (EFPD) (OAC Point P1457 or from Reactor Operators logbook). __ 3) Verify lowest current T-Cold greater than or equal to allowable limit at present burnup. **REFER TO** Unit 1 ROD Book, Section 2.6. __ 4) **IF** lowest T-Cold less than allowable limit, **THEN** immediately add 40 gallons of 7000 PPM boron solution at greater than or equal to 30 GPM for each degree lowest T-Cold below limit of Unit 1 ROD Book, Section 2.6. __ 5) **GO TO** Step 9.
__ e. **IF AT ANY TIME** NC T-Colds trend down to less than or equal to 545°F, **THEN** perform Step 8.d.	

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 9 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Verify proper Pzr level control as follows:**	
__ a. Verify VI pressure - GREATER THAN 50 PSIG.	a. Perform the following: 1) **IF** Pzr Level less than 17%, **THEN** perform the following: __ a) Ensure normal letdown - ISOLATED. __ b) Ensure all Pzr heaters - OFF. __ c) Control charging to restore Pzr level to greater than 17% while maintaining flow less than 180 GPM. __ d) **WHEN** Pzr level greater than 17%, **THEN** Depress C Heater "ON" pushbutton. 2) **IF AT ANY TIME** NV controllers not maintaining stable charging flow, **THEN** perform the following: __ a) Maintain charging flow less than 180 GPM. b) Dispatch operator with radio to THROTTLE 1NV-295 (NV Pmps A & B Disch Ctrl Isol) (AB-551, JJ-55, Rm 231) to maintain the following: __ • Pzr level - GREATER THAN 17% __ • Pzr level - TRENDING TO "PZR REF LEVEL". (RNO continued on next page)

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 10 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	c) Dispatch operator with radio to perform the following: __ (1) THROTTLE 1NV-311 (Seal Wtr Inj Flow Ctrl Byp) (AB-555, JJ-54, Rm 233) as required to maintain 32 GPM total seal water flow in subsequent steps. __ (2) CLOSE 1NV-308 (Seal Wtr Inj Flow Ctrl Isol) (AB-554, JJ-54, Rm 233). __ d) **WHEN** dispatched operators throttled 1NV-295 and 1NV-311, **THEN** depress manual pushbutton and raise output to 100% demand position for 1NV-294 (NV Pmps A&B Disch Flow Ctrl). __ e) **WHEN** VI restored, **THEN** perform Step 9. __ f) **GO TO** Step 10.

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Event Description:	1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure						

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 11 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
__ b. Verify Pzr level - GREATER THAN 17%.	b. Perform the following: __ 1) Ensure normal letdown - ISOLATED. __ 2) Ensure all Pzr heaters - OFF. __ 3) Control charging to restore Pzr level to greater than 17% while maintaining flow less than 180 GPM. 4) **WHEN** Pzr level greater than 17%, **THEN** perform the following: __ a) Establish normal letdown. **REFER TO** AP/1/A/5500/012 (Loss of Charging or Letdown). __ b) Depress C Heater "ON" pushbutton. __ 5) **GO TO** Step 9.d.
Note to Evaluator: **Depending upon the speed at which the crew manually trips the Main Turbine, letdown may be isolated due to low pressurizer level resulting from cooldown.**	
__ c. Verify charging and letdown - IN SERVICE.	__ c. Restore charging and letdown. **REFER TO** AP/1/A/5500/012 (Loss of Charging or Letdown).
__ d. Verify Pzr level - TRENDING TO "PZR REF LEVEL".	__ d. Control charging and letdown to maintain Pzr level at "PZR REF LEVEL".
__ 10. **Verify Pzr pressure - GREATER THAN 1845 PSIG.**	**Perform the following:** __ a. Ensure S/I - ACTUATED. __ b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 51 of 111				

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 12 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 11. **Verify 1A and 1B NC pumps - ON.**	__ **Ensure Pzr spray valve for stopped NC pump - IN MANUAL AND CLOSED.**
__ 12. **Verify Pzr pressure - STABLE AT OR TRENDING TO 2235 PSIG.**	**Perform one of the following:** a. IF Pzr pressure less than 2235 PSIG AND trending down, THEN perform the following: __ 1) Ensure all Pzr PORVs - CLOSED. __ 2) IF any Pzr PORV cannot be closed, THEN CLOSE its isolation valve. 3) IF 1NC-32B OR 1NC-34A cannot be closed OR isolated, THEN perform the following: a) Align N_2 to PORVs by opening the following valves: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B). __ b) CLOSE affected Pzr PORV. __ 4) Ensure Pzr spray valves - CLOSED. 5) IF spray valve(s) cannot be closed, THEN perform the following: __ a) Stop NC pumps 1A and 1B. __ b) IF both 1C AND 1D NC pumps on, THEN stop one additional NC pump. __ 6) Ensure all Pzr heaters - ON. __ 7) GO TO Step 13. (RNO continued on next page)

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 13 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. (Continued)	
	b. **IF** Pzr pressure greater than 2235 PSIG **AND** trending up, **THEN** perform the following:
	__ 1) Ensure all Pzr heaters - OFF.
	__ 2) Control Pzr pressure using normal Pzr spray.
	3) **IF** normal Pzr spray not available, **THEN** perform the following:
	__ a) **IF** letdown in service, **THEN** control Pzr pressure using NV aux spray. **REFER TO** Enclosure 4 (NV Aux Spray).
	b) **IF** letdown not in service **OR** NV aux spray not available, **THEN** control Pzr pressure as follows:
	__ (1) Verify Pzr PORV(s) maintain Pzr pressure less than - 2335 PSIG.
	__ (2) **IF AT ANY TIME** Pzr pressure greater than - 2335 PSIG, **THEN** control pressure with one Pzr PORV in manual.
13. **Control S/G levels as follows:**	
__ a. Verify N/R level in any S/G - GREATER THAN 11%.	__ a. Maintain total feed flow greater than 450 GPM until at least one S/G N/R level greater than 11%.
__ b. THROTTLE feed flow to maintain S/G N/R levels between 11% and 50%.	__ b. **IF** N/R level in any S/G continues to trend up, **THEN** stop feed flow to that S/G.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	53 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 14 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 14. **Initiate concurrent actions in Abnormal Procedures as needed while continuing with this procedure.**	
15. **Verify all AC busses energized by offsite power as follows:** • <u>A Train</u>: __ • "FTA B/O NORM FDR FRM ATC" - CLOSED __ • "D/G 1A BKR TO ETA" - OPEN __ • 1ETA - ENERGIZED. • <u>B Train</u>: __ • "FTB B/O NORM FDR FRM ATD" - CLOSED __ • "D/G 1B BKR TO ETB" - OPEN __ • 1ETB - ENERGIZED.	**Perform the following:** __ a. Restore offsite power while continuing with this procedure. **<u>REFER TO</u>** AP/1/A/5500/007 (Loss of Normal Power). b. Start the following equipment: __ • Start all available CRD vent fans. __ • Dispatch operator to start all available VI compressors. __ c. **<u>IF AT ANY TIME</u>** Spent Fuel Pool cooling not restored within 2 hrs, **<u>THEN</u>** ensure available operator monitors Spent Fuel Pool level and temperature. **<u>REFER TO</u>** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 15 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. **Transfer condenser steam dump to pressure control mode as follows:**	
__ a. Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.	a. Perform the following:
	1) Place steam dumps in pressure mode as follows:
	__ a) Place "STM DUMP CTRL" in manual.
	__ b) Adjust "STM DUMP CTRL" output to 0% demand.
	c) Using "STEAM DUMP SELECT" switch, perform the following:
	__ • Reset C-7A and C-7B
	__ • Place steam dumps in pressure mode.
	__ 2) Dump steam using S/G PORV(s) in subsequent steps.
	__ 3) <u>**GO TO**</u> Step 17.

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Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 16 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. (Continued)	
__ b. Verify all MSIVs - OPEN.	b. Perform the following: **NOTE** If Pzr is solid, opening S/G PORVs too rapidly can cause a large drop in NC pressure. 1) Dump steam from isolated S/G(s) using S/G(s) PORV as follows: __ a) Ensure NC pressure maintained stable while throttling PORVs. __ b) Operate PORVS as required to stabilize S/G pressures at 1090 PSIG. __ c) Operate S/G PORVs as required in subsequent steps. __ 2) **IF** all MSIVs closed, **THEN GO TO** Step 17.
__ c. Verify steam dumps in T-AVE mode.	c. Perform the following: __ 1) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE. __ 2) **IF** C-7A and C-7B reset, **THEN GO TO** Step 16.d.3. 3) Using "STEAM DUMP SELECT" switch, perform the following: __ a) Reset C-7A and C-7B. __ b) Return steam dumps to pressure mode. __ c) **GO TO** Step 16.d.3.
Note to Evaluator: **Transition to FR-H.1**	

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Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 2 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
N/A 1. **IF total feed flow less than 450 GPM due to operator action, THEN RETURN TO procedure and step in effect.**	
CAUTION **If a non-faulted S/G is available, then feed flow should only be established to non-faulted S/G(s) in subsequent steps.**	
2. **Verify secondary heat sink required as follows:**	
__ a. NC pressure - GREATER THAN ANY NON-FAULTED S/G PRESSURE.	__ a. **IF** LOCA in progress, **THEN RETURN TO** procedure and step in effect.
__ b. Any NC T-Hot - GREATER THAN 350°F.	b. Perform the following while continuing in this procedure: __ 1) Attempt to place ND in service. **REFER TO** OP/1/A/6200/004 (Residual Heat Removal System). __ 2) **WHEN** adequate ND cooling established, **THEN RETURN TO** procedure and step in effect.
	Note to Evaluator: **Enclosure 1 is included as Attachment 7.**
__ 3. **Monitor Enclosure 1 (Foldout Page).**	
__ 4. **Verify at least one NV pump - AVAILABLE.**	__ **GO TO Step 21.**

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	57 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 3 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify NC System feed and bleed required as follows:**	
__ a. W/R level in at least 3 S/Gs - LESS THAN 24% (36% ACC).	a. Perform the following: __ 1) Monitor feed and bleed initiation criteria. **REFER TO** Enclosure 1 (Foldout Page). __ 2) **WHEN** criteria satisfied, **THEN GO TO** Step 21. __ 3) **GO TO** Step 6.
__ b. **GO TO** Step 21.	
__ 6. **Ensure S/G BB and NM valves closed. REFER TO Enclosure 9 (S/G BB and NM Valve Checklist).**	**Note to Evaluator:** **Enclosure 9 is included as Attachment 8.**
7. **Attempt to establish CA flow to at least one S/G as follows:**	
__ a. Verify 1AD-8, B/1 "UST LO LEVEL" - DARK.	a. Perform the following: __ 1) **REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater). __ 2) **GO TO** Step 7.c.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	58	of	111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 4 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ b. Verify 1CA-4 (CA Pmps Suct From UST) - OPEN.	b. Perform the following: __ 1) OPEN 1CA-4. 2) **IF** no suction source can be aligned, **THEN** OPEN the following valves: __ • 1RN-250A (RN Hdr A To CA Pmp Suct Isol) __ • 1CA-116A (CA Pump #1 Suct Frm RN Hdr A) __ • 1CA-15A (CA Pump 1A Suct Frm RN Isol) __ • 1CA-85B (CA Pump #1 Suct Frm RN Hdr B) __ • 1CA-18B (CA Pump 1B Suct Frm RN Isol) __ • 1RN-310B (RN Hdr B To CA Pmp Suct Isol).
c. Verify proper CA pump status as follows:	
__ 1) Power to both motor driven CA pumps - AVAILABLE.	1) Perform the following: N/A • **IF** 1ETA **OR** 1ETB de-energized, **THEN** restore power to affected essential bus. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power). __ • **IF** essential bus energized, **THEN** dispatch operator to determine cause of breaker failure.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	59	of	111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 5 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ 2) 1AD-5, F/3 "CAPT MECH OS TRIP" - DARK.	2) Perform the following: __ a) Dispatch operator to reset CAPT trip and throttle valve. __ b) **IF AT ANY TIME** CAPT trip and throttle valve reset prior to reaching feed and bleed criteria, **THEN** perform Step 7. __ c) **GO TO** Step 7.d.
__ 3) "CAPT TRIP T/V CTRL" - OPEN.	3) Perform the following: __ a) OPEN valve. __ b) **IF** valve will not open, **THEN** dispatch operator to open CAPT trip and throttle valve.
4) Verify the following valves - OPEN: __ • 1SA-2 (S/G 1B SM To CAPT) __ • 1SA-5 (S/G 1C SM To CAPT).	__ 4) Place CA Pump #1 to "ON".
__ d. Ensure all CA isolation valves - OPEN.	
__ e. Verify all CA flow control valves - OPEN.	e. Perform the following: __ 1) **IF** valve(s) closed as required by Step 37, **THEN GO TO** Step 7.f. __ 2) OPEN affected valve(s).
__ f. Start all available CA pumps.	

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	60	of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 6 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

__ g. Verify total CA flow - GREATER THAN 450 GPM.

g. Perform the following:

N/A 1) **IF** only one motor driven CA pump on, **AND** its discharge path cannot be aligned to associated S/Gs, **THEN** evaluate aligning flow to other S/Gs through motor driven CA train A/B cross-tie alignment. **REFER TO** Enclosure 3 (Motor Driven CA Pump Train A/B Cross-Tie Alignment).

N/A 2) **IF** any CA pump on, **AND** Step 37 has been implemented, **THEN GO TO** Enclosure 7 (S/G CA Flow Restoration).

N/A 3) **IF** any feed flow to at least one S/G verified, **THEN** perform the following:

__ a) Maintain flow to restore N/R level in at least one S/G to greater than 11% (29% ACC).

b) **IF AT ANY TIME** N/R level in at least one S/G trends up to greater than 11% (29% ACC) prior to reaching feed and bleed initiation criteria, **THEN** perform the following:

(1) **IF** NC System **OR** S/G depressurization in progress to feed S/G(s) from CM, **THEN** stabilize the following:

__ • NC pressure

__ • S/G pressure.

__ (2) **RETURN TO** procedure and step in effect.

(RNO continued on next page)

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	61 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 7 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

__ c) Dispatch operator to verify proper CA valve alignment. **REFER TO** Enclosure 2 (Local CA Flowpath Restoration).

__ d) **IF AT ANY TIME** CA flow restored greater than 450 GPM prior to meeting feed and bleed initiation criteria, **THEN** perform Step 7.

4) **IF** no CA flow indicated, **THEN** perform the following:

__ a) **IF** no CA pump can be started, **THEN** dispatch operator and maintenance to CA pumps to attempt to restore one CA pump to service. **REFER TO** EM/1/A/5200/007 (Troubleshooting Cause For CA Pump(s) Failing to Start).

__ b) Dispatch operator to verify proper CA valve alignment. **REFER TO** Enclosure 2 (Local CA Flowpath Restoration).

Note to Evaluator:

Enclosure 2 is included as Attachment 9.

__ c) **IF AT ANY TIME** CA flow restored prior to meeting feed and bleed initiation criteria, **THEN** perform Step 7.

Note to Evaluator:

Two minutes following dispatch, the dispatched operator will notify the crew that 1CA-21 is closed. This valve will be opened two minutes after direction is given. At that point, CA flow will be restored and the crew will re-perform Step 7. The correct path through this step is listed illustrated at page 66.

__ 5) **GO TO** Step 8.

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 8 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ h. Verify feed and bleed - PREVIOUSLY ESTABLISHED (Steps 22 through 26 completed).	h. Perform the following: 1) IF NC System OR S/G depressurization in progress to feed S/G(s) from CM, THEN stabilize the following: __ • NC pressure __ • S/G pressure. __ 2) RETURN TO procedure and step in effect.
__ i. GO TO Step 39.	
8. **Verify Condenser Steam Dump as follows:**	
a. Verify condenser available as follows: __ • "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT __ • Any MSIV - OPEN.	__ a. GO TO Step 9.
__ b. Verify steam dumps in - T-AVG MODE.	__ b. GO TO Step 9.
c. Place steam dumps in pressure mode as follows: __ 1) Place steam dumps in - PRESSURE MODE. __ 2) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.	
__ 9. **Stop all NC pumps.**	

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	63 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 9 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Verify CM System in service as follows:** __ • Hotwell pump(s) - ON __ • Condensate Booster pump(s) - ON.	**Perform the following:** __ a. Place CM System in service. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System). __ b. IF CM System cannot be placed in service, THEN observe Note prior to Step 19 and GO TO Step 19.
11. **Reset Feedwater Isolation as follows:**	
a. Verify the following annunciators - DARK: __ • 1AD-8, D/7 "INNER DOGHOUSE TRAIN A LEVEL HI" __ • 1AD-8, E/7 "INNER DOGHOUSE TRAIN B LEVEL HI" __ • 1AD-8, D/8 "OUTER DOGHOUSE TRAIN A LEVEL HI" __ • 1AD-8, E/8 "OUTER DOGHOUSE TRAIN B LEVEL HI".	__ a. IF doghouse level greater than or equal to 11 inches, THEN notify IAE to bypass Feedwater Isolation due to Hi-Hi doghouse level. REFER TO EM/1/A/5200/008 (Bypassing Feedwater Isolation Due to Hi-Hi Doghouse Level).
__ b. Verify S/I - HAS PREVIOUSLY ACTUATED.	b. Perform the following: __ 1) Reset Feedwater Isolation. N/A 2) IF Feedwater Isolation will not reset, THEN perform the following: __ a) Notify IAE to bypass Feedwater Isolation. REFER TO EM/1/A/5200/009 (Bypassing Feedwater Isolation). __ b) WHEN IAE has bypassed Feedwater Isolation signal, THEN ensure Feedwater Isolation reset. __ 3) GO TO Step 11.f.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	64 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 10 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. (Continued)	
__ c. Notify IAE to bypass Feedwater Isolation. **<u>REFER TO</u>** EM/1/A/5200/009 (Bypassing Feedwater Isolation).	
__ d. **<u>WHEN</u>** IAE has bypassed Feedwater Isolation signal, **<u>THEN</u>** ensure Feedwater Isolation reset.	
e. Ensure S/I - RESET:	
__ 1) ECCS.	__ 1) Locally reset ECCS. **<u>REFER TO</u>** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 4 (ECCS Master Reset).
__ 2) D/G load sequencers.	2) Dispatch operator to open affected sequencer(s) control power breaker: __ • 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496) __ • 1EDF-F01F (Diesel Generator Load Sequencer Panel 1DGLSB) (AB-560, BB-46, Rm 372).
__ 3) **<u>IF AT ANY TIME</u>** B/O occurs, **<u>THEN</u>** restart S/I equipment previously on.	
__ f. **<u>IF AT ANY TIME</u>** subsequent Feedwater Isolation occurs, **<u>THEN RETURN TO</u>** Step 11.	

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	65 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 11 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. **Attempt to establish CF flow to at least one S/G as follows:**	
__ a. Verify CM System - IN SERVICE.	__ a. **IF** CM System cannot be placed in service, **THEN** observe Note prior to Step 19 and **GO TO** Step 19.
b. Place the following valves in manual and closed: __ • All CF control valves __ • All CF bypass control valves.	
c. Ensure at least one of the following valves - OPEN: __ • 1CF-10 (1A CF Pump Disch Isol) (TB1-579, 1E-21) __ • 1CF-17 (1B CF Pump Disch Isol) (TB1-579, 1E-20).	__ c. Observe Note prior to Step 19 and **GO TO** Step 19.
__ d. Verify at least one CF pump - AVAILABLE TO BE STARTED.	__ d. **IF** both CF pumps known to be incapable of starting, **THEN GO TO** Step 14.
e. Verify following feedwater pump recirc valves - FULLY OPEN: __ • 1CF-6 (CF Pump 1A Recirc Ctrl) __ • 1CF-13 (CF Pump 1B Recirc Ctrl).	__ e. OPEN valve(s).

Note to Evaluator:

The following pages illustrate a return to step 7 once Aux Feedwater flow is reestablished.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	66 of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 3 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify NC System feed and bleed required as follows:**	
__ a. W/R level in at least 3 S/Gs - LESS THAN 24% (36% ACC).	a. Perform the following: __ 1) Monitor feed and bleed initiation criteria. **REFER TO** Enclosure 1 (Foldout Page). __ 2) **WHEN** criteria satisfied, **THEN GO TO** Step 21. __ 3) **GO TO** Step 6.
__ b. **GO TO** Step 21.	
__ 6. **Ensure S/G BB and NM valves closed. REFER TO Enclosure 9 (S/G BB and NM Valve Checklist).**	
7. **Attempt to establish CA flow to at least one S/G as follows:**	
__ a. Verify 1AD-8, B/1 "UST LO LEVEL" - DARK.	a. Perform the following: __ 1) **REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater). __ 2) **GO TO** Step 7.c.

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 4 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ b. Verify 1CA-4 (CA Pmps Suct From UST) - OPEN.	b. Perform the following: __ 1) OPEN 1CA-4. 2) **IF** no suction source can be aligned, **THEN** OPEN the following valves: __ • 1RN-250A (RN Hdr A To CA Pmp Suct Isol) __ • 1CA-116A (CA Pump #1 Suct Frm RN Hdr A) __ • 1CA-15A (CA Pump 1A Suct Frm RN Isol) __ • 1CA-85B (CA Pump #1 Suct Frm RN Hdr B) __ • 1CA-18B (CA Pump 1B Suct Frm RN Isol) __ • 1RN-310B (RN Hdr B To CA Pmp Suct Isol).
c. Verify proper CA pump status as follows:	
__ 1) Power to both motor driven CA pumps - AVAILABLE.	1) Perform the following: N/A • **IF** 1ETA **OR** 1ETB de-energized, **THEN** restore power to affected essential bus. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power). __ • **IF** essential bus energized, **THEN** dispatch operator to determine cause of breaker failure.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	68	of 111

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 5 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ 2) 1AD-5, F/3 "CAPT MECH OS TRIP" - DARK.	2) Perform the following: __ a) Dispatch operator to reset CAPT trip and throttle valve. __ b) **IF AT ANY TIME** CAPT trip and throttle valve reset prior to reaching feed and bleed criteria, **THEN** perform Step 7. __ c) **GO TO** Step 7.d.
__ 3) "CAPT TRIP T/V CTRL" - OPEN.	3) Perform the following: __ a) OPEN valve. __ b) **IF** valve will not open, **THEN** dispatch operator to open CAPT trip and throttle valve.
4) Verify the following valves - OPEN: __ • 1SA-2 (S/G 1B SM To CAPT) __ • 1SA-5 (S/G 1C SM To CAPT).	__ 4) Place CA Pump #1 to "ON".
__ d. Ensure all CA isolation valves - OPEN.	
__ e. Verify all CA flow control valves - OPEN.	e. Perform the following: __ 1) **IF** valve(s) closed as required by Step 37, **THEN GO TO** Step 7.f. __ 2) OPEN affected valve(s).
__ f. Start all available CA pumps.	

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 6 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ g. Verify total CA flow - GREATER THAN 450 GPM.	g. Perform the following: 1) **IF** only one motor driven CA pump on, **AND** its discharge path cannot be aligned to associated S/Gs, **THEN** evaluate aligning flow to other S/Gs through motor driven CA train A/B cross-tie alignment. **REFER TO** Enclosure 3 (Motor Driven CA Pump Train A/B Cross-Tie Alignment). 2) **IF** any CA pump on, **AND** Step 37 has been implemented, **THEN GO TO** Enclosure 7 (S/G CA Flow Restoration). 3) **IF** any feed flow to at least one S/G verified, **THEN** perform the following: __ a) Maintain flow to restore N/R level in at least one S/G to greater than 11% (29% ACC). b) **IF AT ANY TIME** N/R level in at least one S/G trends up to greater than 11% (29% ACC) prior to reaching feed and bleed initiation criteria, **THEN** perform the following: (1) **IF** NC System **OR** S/G depressurization in progress to feed S/G(s) from CM, **THEN** stabilize the following: __ • NC pressure __ • S/G pressure. __ (2) **RETURN TO** procedure and step in effect. (RNO continued on next page)

Event Description: 1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 7 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	__ c) Dispatch operator to verify proper CA valve alignment. **REFER TO** Enclosure 2 (Local CA Flowpath Restoration). __ d) **IF AT ANY TIME** CA flow restored greater than 450 GPM prior to meeting feed and bleed initiation criteria, **THEN** perform Step 7. 4) **IF** no CA flow indicated, **THEN** perform the following: __ a) **IF** no CA pump can be started, **THEN** dispatch operator and maintenance to CA pumps to attempt to restore one CA pump to service. **REFER TO** EM/1/A/5200/007 (Troubleshooting Cause For CA Pump(s) Failing to Start). __ b) Dispatch operator to verify proper CA valve alignment. **REFER TO** Enclosure 2 (Local CA Flowpath Restoration). __ c) **IF AT ANY TIME** CA flow restored prior to meeting feed and bleed initiation criteria, **THEN** perform Step 7. __ 5) **GO TO** Step 8.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	71 of 111
Event Description:	1A CA Pump Failure / CAPT #1 Discharge Valve Closed / Loss of Secondary Heat Sink / Control Rod Insertion Failure						

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 8 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ h. Verify feed and bleed - PREVIOUSLY ESTABLISHED (Steps 22 through 26 completed).	h. Perform the following: N/A 1) **IF** NC System **OR** S/G depressurization in progress to feed S/G(s) from CM, **THEN** stabilize the following: __ • NC pressure __ • S/G pressure. __ 2) **RETURN TO** procedure and step in effect.
__ i. **GO TO** Step 39.	**Note to Evaluator:** **Once this transition is made, the scenario may be terminated by instructing the booth operator to place the simulator in FREEZE.**
8. **Verify Condenser Steam Dump as follows:**	
a. Verify condenser available as follows: __ • "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT __ • Any MSIV - OPEN.	__ a. **GO TO** Step 9.
__ b. Verify steam dumps in - T-AVG MODE.	__ b. **GO TO** Step 9.
c. Place steam dumps in pressure mode as follows: __ 1) Place steam dumps in - PRESSURE MODE. __ 2) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.	
__ 9. **Stop all NC pumps.**	

Attachment List

Scenario 1

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 -	AP/1/A/5500/016 Enclosure 1 (P/R Bistables That Must Be Tripped)
ATTACHMENT 4 -	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page)
ATTACHMENT 5 -	EP/1/A/5000/ES-0.1 Enclosure 1 (Foldout Page)
ATTACHMENT 6 -	EP/1/A/5000/ES-0.1 Enclosure 2 (NC Temperature Control)
ATTACHMENT 7 -	EP/1/A/5000/FR-H.1 Enclosure 1 (Foldout Page)
ATTACHMENT 8 -	EP/1/A/5000/FR-H.1 Enclosure 9 (System Verification Following S/I Actuation)
ATTACHMENT 9 -	EP/1/A/5000/FR-H.1 Enclosure 2 (Local CA Flowpath Restoration)
ATTACHMENT 10 -	Scenario Specific Technical Specifications

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		1	Manually isolate failed open Pressurizer PORV (1NC-32B) prior to any RPS actuation.
		2	Manually trip the reactor from the control room prior to S/G dryout conditions (<12% W/R level) occurs on any S/G.
		3	Establish feedwater flow to at least one S/G before NC feed and bleed is required (<24% W/R level in 3 out of 4 S/G).

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION

Unit 1 Status

Power Level	Power History	NCS Boron	Xenon
75 **%**	EOL	187 PPM	per OAC

Controlling Procedure

- OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.2 (Power Decrease). The steps up to step 3.18 are complete.

Other Information Needed to Assume the Shift

- Unit 1 is at 75% power at the EOL. Unit 2 is at 100% power. 1B CA Pump is removed from service for PMs. 1B CA Pump has been inoperable for 3 hours and is expected to be returned to service in 6 hours. Direction for the crew is to decrease reactor power to 50% and secure the 1A main feedwater pump for emergent repair work. A reactivity plan has been provided by Reactor Engineering for a 10% per hour decrease in reactor power.

AOs Available

Seven AOs are available as listed on the status board

METEOROLOGICAL CONDITIONS

- Upper wind direction = 315 degrees, speed = 3 mph
- Lower wind direction = 315 degrees, speed = 4.5 mph
- Forecast calls for clear skies over the next 24 hours.

ATTACHMENT 3

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Enclosure 1 - Page 1 of 1 **P/R Bistables That Must Be Tripped**	PAGE NO. 15 of 15 Revision 27

1. **Ensure the following reactor trip system interlocks in required state (1SI-18) for existing unit conditions within 1 hour:**

   __ • P-7

   __ • P-8

   __ • P-9

   __ • P-10.

2. **Ensure the following bistables for the affected channel are placed in the tripped condition within 72 hours:**

   __ • NC loop OTDT reactor trip status light (1SI-7) - LIT
   __ • NC loop OPDT reactor trip status light (1SI-7) - LIT.

NOTE The following bistables can only be assured to stay in the tripped condition by the removal of the affected channel's control power fuses.

3. **Ensure the following bistables for the affected channel are in the tripped condition within 72 hours:**

   __ • P/R high flux low setpoint status light (1SI-3) - LIT
   __ • P/R high flux high setpoint status light (1SI-3) - LIT
   __ • P/R high flux rate status light (1SI-3) - LIT.

ATTACHMENT 4

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 1 - Page 1 of 2** **Foldout Page**	PAGE NO. **34 of 49** **Revision 43**

1. **NC Pump Trip Criteria:**
   - **IF** the following conditions satisfied, **THEN** trip all NC pumps while maintaining seal injection flow:
     - Any NV or NI pump - DELIVERING S/I FLOW TO NC SYSTEM
     - NC subcooling based on core exit T/Cs - LESS THAN OR EQUAL TO 0°F
     - Reactor power - LESS THAN 5%.
2. **CA Suction Source Switchover Criterion:**
   - **IF** 1AD-8, B/1 "UST LO LEVEL" lit, **THEN** **REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).
3. **Position Criteria for 1NV-202B and 1NV-203A (NV Pumps A&B Recirc Isol):**
   - **IF** NC pressure less than 1500 PSIG **AND** NV S/I flowpath aligned, **THEN** CLOSE 1NV-202B and 1NV-203A.
   - **IF** NC pressure greater than 2000 PSIG, **THEN** OPEN 1NV-202B and 1NV-203A.
4. **Ruptured S/G CA Isolation Criteria:**
   - **IF** both the following conditions met, **THEN** stop CA flow to affected S/G(s):
     - Level increasing in uncontrolled manner or radiation level in that S/G abnormal
     - N/R level - GREATER THAN 11% (29% ACC).
5. **Faulted S/G CA isolation Criteria:**
   - **IF** all the following conditions met, **THEN** stop CA flow to affected S/G:
     - S/G pressure decreasing in uncontrolled manner or completely depressurized
     - Only one S/G diagnosed as faulted
     - Secondary heat sink criteria met:
       - Total CA flow - GREATER THAN 450 GPM

         OR
       - ANY S/G(s) N/R level - GREATER THAN 11%(29% ACC).

ATTACHMENT 4

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 1 - Page 2 of 2** **Foldout Page**	PAGE NO. **35 of 49** **Revision 43**

6. **NS Pump Trip Criterion:**

- **IF** NS pump in recirc and S/I occurs, **THEN** perform one of the following:
  - **IF** train affected ECCS and D/G load sequencer - RESET, **THEN** stop NS pump

    OR

  - **WHEN** sequencer loading complete, **THEN** perform the following for affected train:

    a. Notify Control Room Supervisor.

    b. Reset ECCS.

    c. Reset D/G load sequencer.

    d. Secure NS pump.

    e. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.

ATTACHMENT 5

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE Enclosure 1 - Page 1 of 1 **Foldout Page**	PAGE NO. 27 of 41 Revision 45

1. **S/I Actuation Criteria:**

   - **IF** NC subcooling based on core exit T/Cs less than 0°F **OR** Pzr level cannot be maintained greater than 4%, **THEN** perform the following:

     a. Initiate S/I.

     b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

   - **IF** S/I actuation occurs, **THEN GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

2. **CA Suction Source Switchover Criterion:**

   - **IF** 1AD-8, B/1 "UST LO LEVEL" lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).

ATTACHMENT 6

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE Enclosure 2 - Page 1 of 6 **NC Temperature Control**	PAGE NO. 28 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 1. **Verify at least one NC pump - ON.**	**Perform the following:** __ a. Use NC T-Colds to determine NC temperature as required in subsequent steps. __ b. IF all MSIVs closed, THEN GO TO Step 4. c. Place steam dumps in pressure mode as follows: 1) Using "STEAM DUMP SELECT" switch, perform the following: __ • Reset C-7A and C-7B __ • Place steam dumps in pressure mode. __ 2) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE. __ 3) Ensure steam dumps control to maintain steam header pressure - 1090 PSIG. __ d. GO TO Step 4.
__ 2. **Use NC T-Avg to determine NC temperature as required in subsequent steps.**	
__ 3. **IF AT ANY TIME NC pumps tripped, THEN use NC T-Colds to determine NC temperature as required in subsequent steps.**	

ATTACHMENT 6

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE Enclosure 2 - Page 2 of 6 **NC Temperature Control**	PAGE NO. 29 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Verify one of the following:** __ • NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F OR __ • NC temperature - TRENDING TO 557°F.	__ **GO TO Step 7.**
__ 5. **Continue to monitor NC temperature.**	
6. **Do not continue in this enclosure until one of the following occurs:** __ • NC temperature - GREATER THAN 557°F AND TRENDING UP IN UNCONTROLLED MANNER OR __ • NC temperature - GREATER THAN 557°F AND STABLE OR __ • NC temperature - LESS THAN 557°F AND TRENDING DOWN IN UNCONTROLLED MANNER.	

ATTACHMENT 6

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE Enclosure 2 - Page 3 of 6 **NC Temperature Control**	PAGE NO. 30 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **Verify NC temperature - LESS THAN 557°F AND TRENDING DOWN.**	**Perform the following:** a. **IF** NC temperature greater than 557°F **AND** trending up, **THEN** stabilize NC temperature at 557°F as follows: __ 1) **IF** steam dumps available, **THEN** use steam dumps. __ 2) **IF** steam dumps not available, **THEN** use S/G PORVs. b. **IF** the following conditions exist: __ • NC temperature greater than 557°F and stable __ • Time and manpower available, **THEN** stabilize NC temperature at 557°F as follows: __ 1) **IF** steam dumps available, **THEN** use steam dumps __ 2) **IF** steam dumps not available, **THEN** use S/G PORVs. __ c. **GO TO** Step 9.

ATTACHMENT 6

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE Enclosure 2 - Page 4 of 6 **NC Temperature Control**	PAGE NO. 31 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Attempt to stop NC cooldown as follows:**	
a. **IF** steam dumps open **AND** any MSIV open, **THEN** place steam dumps in pressure mode as follows:	
1) Using "STEAM DUMP SELECT" switch, perform the following:	
__ • Reset C-7A and C-7B	
__ • Place steam dumps in pressure mode.	
__ 2) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.	
__ 3) Ensure steam dumps control to maintain steam header pressure - 1090 PSIG.	
__ b. Verify all S/G PORVs - CLOSED.	__ b. **IF** any S/G PORV cannot be closed, **THEN** CLOSE its isolation valve.
__ c. Ensure S/G blowdown isolated.	
d. CLOSE the following valves:	
__ • 1SM-77A (S/G 1A Otlt Hdr Bldwn C/V) __ • 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V) __ • 1SM-75A (S/G 1C Otlt Hdr Bldwn C/V) __ • 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V).	

ATTACHMENT 6

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE Enclosure 2 - Page 5 of 6 **NC Temperature Control**	PAGE NO. 32 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	
e. Verify MSR Second Stage steam supply valves - CLOSED: __ • 1HM-1 (MSRH 1A&1B SSRH Stm Source) __ • 1HM-2 (MSRH 1C&1D SSRH Stm Source).	e. Perform the following: __ 1) CLOSE MSR Second Stage steam supply valve(s). 2) **IF** steam flowpath cannot be isolated from Control Room, **THEN** CLOSE the following valves: __ • All MSIVs __ • All MSIV bypass valves.
f. Depress and hold "S/V BEFORE SEAT DRN" "CLOSE" pushbutton (1MC-3) to close the following valves: __ • 1SM-41 (Stop Vlv #1 Before Seat Drn) __ • 1SM-44 (Stop Vlv #2 Before Seat Drn) __ • 1SM-43 (Stop Vlv #3 Before Seat Drn) __ • 1SM-42 (Stop Vlv #4 Before Seat Drn).	

ATTACHMENT 6

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE Enclosure 2 - Page 6 of 6 **NC Temperature Control**	PAGE NO. 33 of 41 Revision 45

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	
__ g. Verify NC cooldown - STOPPED.	g. **IF** cooldown continues, **THEN** THROTTLE feed flow as follows: 1) **IF** S/G N/R level less than 11% in all S/G's, **THEN** THROTTLE feed flow to achieve the following: __ • Minimize cooldown __ • Maintain total feed flow greater than 450 GPM. 2) **WHEN** N/R level greater than 11% in any S/G, **THEN** THROTTLE feed flow further to achieve the following: __ • Minimize cooldown __ • Maintain at least one S/G N/R level greater than 11%. 3) **IF** cooldown continues, **THEN** CLOSE the following valves: __ • All MSIVs __ • All MSIV bypass valves. __ 4) **IF** cooldown continues **AND** faulted S/G exists, **THEN** stop feeding faulted S/G.
9. **Continue to perform actions of this enclosure as required to ensure one of the following:** __ • NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F OR __ • NC temperature - TRENDING TO 557°F.	

ATTACHMENT 7

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK Enclosure 1 - Page 1 of 1 **Foldout Page**	PAGE NO. 70 of 135 Revision 46

1. **Feed and Bleed Initiation Criteria:**
   - IF W/R level in at least 3 S/Gs less than 24% (36% ACC), **THEN GO TO** Section C. (Operator Actions), Step 21.

2. **IF AT ANY TIME a CA pump restored after Step 7 AND prior to meeting Feed and Bleed Initiation Criteria, THEN perform Section C. (Operator Actions), Step 7.**

3. **CA Suction Source Switchover Criterion:**
   - IF 1AD-8, B/1 "UST LO LEVEL" lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).

4. **Cold Leg Recirc Switchover Criterion:**
   - IF FWST level lowers to 20% (1AD-9, D/8 "FWST 2/4 LO LEVEL"), **THEN GO TO** EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation).

5. **Position Criteria for 1NV-202B and 1NV-203A (NV Pumps A&B Recirc Isol):**
   - IF NC pressure less than 1500 PSIG **AND** NV S/I flowpath aligned, **THEN** CLOSE 1NV-202B and 1NV-203A.
   - IF NC pressure greater than 2000 PSIG, **THEN** OPEN 1NV-202B and 1NV-203A.

ATTACHMENT 8

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK Enclosure 9 - Page 1 of 2 **S/G BB and NM Valve Checklist**	PAGE NO. 101 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE The following valves are closed to minimize S/G inventory loss.	
1. **Verify the following valves - CLOSED:**	__ **CLOSE valve(s).**
__ • 1BB-56A (S/G 1A Bldwn Cont Isol Insd)	
__ • 1BB-148B (S/G 1A Bldwn Cont Isol Byp)	
__ • 1BB-57B (S/G 1A Bldwn Cont Isol Otsd)	
__ • 1BB-19A (S/G 1B Bldwn Cont Isol Insd)	
__ • 1BB-150B (S/G 1B Bldwn Cont Isol Byp)	
__ • 1BB-21B (S/G 1B Bldwn Cont Isol Otsd)	
__ • 1BB-60A (S/G 1C Bldwn Cont Isol Insd)	
__ • 1BB-149B (S/G 1C Bldwn Cont Isol Byp)	
__ • 1BB-61B (S/G 1C Bldwn Cont Isol Otsd)	
__ • 1BB-8A (S/G 1D Bldwn Cont Isol Insd)	
__ • 1BB-147B (S/G 1D Bldwn Cont Isol Byp)	
__ • 1BB-10B (S/G 1D Bldwn Cont Isol Otsd)	
__ • 1NM-191B (S/G 1A Smpl Hdr Cont Isol)	
__ • 1NM-201A (S/G 1B Smpl Hdr Cont Isol)	
__ • 1NM-211B (S/G 1C Smpl Hdr Cont Isol)	
__ • 1NM-221A (S/G 1D Smpl Hdr Cont Isol)	

ATTACHMENT 8

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK Enclosure 9 - Page 2 of 2 **S/G BB and NM Valve Checklist**	PAGE NO. 102 of 135 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. (Continued)

__ • 1NM-187A (S/G A UPR Shell Smpl Cont Isol)

__ • 1NM-197B (S/G B UPR Shell Smpl Cont Isol)

__ • 1NM-207A (S/G C UPR Shell Smpl Cont Isol)

__ • 1NM-217B (S/G D UPR Shell Smpl Cont Isol)

__ • 1NM-190A (S/G 1A Bldwn Smpl Cont Isol)

__ • 1NM-200B (S/G 1B Bldwn Smpl Cont Isol)

__ • 1NM-210A (S/G 1C Bldwn Smpl Cont Isol)

__ • 1NM-220B (S/G 1D Bldwn Smpl Cont Isol).

ATTACHMENT 9

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK Enclosure 2 - Page 1 of 6 **Local CA Flowpath Restoration**	PAGE NO. 71 of 135 Revision 46

__ 1. **IF AT ANY TIME valve found out of indicated position while in this Enclosure, THEN contact Control Room to determine required position.**

2. **Verify the following valves - OPEN:**

- CA Pump 1A:
  - __ 1CA-11A (CA Pump 1A Norm Suct Isol) (AB-541, AA-BB, 50-51, Rm 255)
  - __ 1CA-25 (CA Pump 1A Suct Isol) (AB-535, AA-50, Rm 256) (Key #633)
  - __ 1CA-55 (CA Pump 1A Disch To S/G 1B Inlet Isol) (AB-550, DD-52, Rm 250) (Key #633)
  - __ 1CA-59 (CA Pump 1A Disch To S/G 1A Ctrl Inlet Isol) (AB-551, BB,49-50, Rm 250) (Ladder needed) (Key #633)
  - __ 1CA-60 (CA Pump 1A Flow To S/G 1A) (AB-551, BB-CC, 49-50, Rm 250) (Ladder needed)
  - __ 1CA-62A (CA Pmp A Disch To S/G 1A Isol) (DH-587, DD-EE, 44-45, Rm 591)
  - __ 1CA-87 (CA Pump 1A Disch To S/G Isol) (AB-533, BB-49, Rm 256) (Key #633)
  - __ 1CA-56 (CA Pump 1A Flow To S/G 1B) (AB-552, DD-52, Rm 250) (Ladder needed)
  - __ 1CA-58A (CA Pmp A Disch To S/G 1B Isol) (DH-586, DD-EE, 52-53, Rm 572).
- CA Pump 1B:
  - __ 1CA-9B (CA Pump 1B Norm Suct Isol) (AB-538, AA-BB, 50-51, Rm 255)
  - __ 1CA-30 (CA Pump 1B Suct) (AB-535, AA-51, Rm 255) (Key #633)
  - __ 1CA-39 (CA Pump 1B Disch To S/G 1D Ctrl Inlet Isol) (AB-551, BB, 49-50, Rm 250) (Ladder needed) (Key #633)
  - __ 1CA-43 (CA Pump 1B Disch To S/G 1C Ctrl Inlet Isol) (AB-552, DD-52, Rm 250) (Key #633)
  - __ 1CA-42B (CA Pmp B Disch To S/G 1D Isol) (DH-586, DD-EE, 43-44, Rm 591)
  - __ 1CA-40 (CA Pump 1B Flow To S/G 1D) (AB-553, BB-49, Rm 250) (Ladder needed)
  - __ 1CA-46B (CA Pmp B Disch To S/G 1C Isol) (DH-586, DD, 53-54, Rm 572)
  - __ 1CA-88 (CA Pump 1B Disch To S/G Isol) (AB-533, BB-50, Rm 255) (Key #633)
  - __ 1CA-44 (CA Pump 1B Flow To S/G 1C) (AB-552, CC-DD, 52-53, Rm 250) (Ladder needed).

ATTACHMENT 9

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK Enclosure 2 - Page 2 of 6 **Local CA Flowpath Restoration**	PAGE NO. 72 of 135 Revision 46

2. (Continued)

- CA Pump #1:

__ • 1CA-19 (CA Pump No 1 Suct) (AB-530, AA-52, Rm 254) (Key #633)

__ • 1CA-7A (CA Pump #1 Norm Suct Isol) (AB-537, AA-BB, 51-52, Rm 254)

__ • 1CA-21 (CA Pump No 1 Disch To S/G) (AB-535, BB-51, Rm 254) (Key #633)

__ • 1CA-35 (CA Pump No 1 Disch To S/G 1D Ctrl Inlet Isol) (AB-555, BB-50, Rm 250) (Ladder needed) (Key #633)

__ • 1CA-47 (CA Pump No 1 Disch To S/G 1C Ctrl Inlet Isol) (AB-552, DD-53, Rm 250) (Key #633)

__ • 1CA-51 (CA Pump No 1 Disch To S/G 1B Inlet Isol) (AB-552, DD-52, Rm 250) (Key #633)

__ • 1CA-63 (CA Pump No 1 Disch To S/G 1A Ctrl Inlet Isol) (AB-556, BB-50, Rm 250) (Ladder needed) (Key #633)

__ • 1CA-36 (CA Pump #1 Flow To S/G 1D) (AB-555, BB-CC, 49-50, Rm 250) (Ladder needed)

__ • 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol) (DH-584, DD-EE, 43-44, Rm 591)

__ • 1CA-64 (CA Pump #1 Flow To S/G 1A) (AB-556, BB-CC, 49-50, Rm 250) (Ladder needed)

__ • 1CA-66B (CA Pmp 1 Disch To S/G 1A Isol) (DH-584, DD-EE, 44-45, Rm 591)

__ • 1CA-52 (CA Pump #1 Flow To S/G 1B) (AB-546, DD-53, Rm 217)

__ • 1CA-54B (CA Pmp 1 Disch To S/G 1B Isol) (DH-584, DD-EE, 52-53, Rm 572)

__ • 1CA-48 (CA Pump #1 Flow To S/G 1C) (AB-551, DD-EE, 53, Rm 217)

__ • 1CA-50A (CA Pmp 1 Disch To S/G 1C Isol) (DH-584, EE-53, Rm 572)

__ • 1SA-1 (1B S/G Main Steam to CAPT Maintenance Isol) (DH-624, FF-53, Rm 572) (Breakaway lock)

__ • 1SA-3 (1B S/G Main Steam to CAPT Stop Check) (AB-551, DD-53, Rm 217) (Breakaway lock)

__ • 1SA-4 (1C S/G Main Steam to CAPT Maintenance Isol) (DH-624, FF-53, Rm 572) (Breakaway lock)

ATTACHMENT 9

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK Enclosure 2 - Page 3 of 6 **Local CA Flowpath Restoration**	PAGE NO. 73 of 135 Revision 46

2. (Continued)

__ • 1SA-6 (1C S/G Main Steam to CAPT Stop Check) (AB-551, DD-53, Rm 217) (Breakaway lock) (Ladder needed).

3. **Verify the following valves - CLOSED:**

• CA Pump 1A:

__ • 1CA-71 (CA Pump 1A Disch To UST Dome Throttle) (AB-533, BB-49, Rm 256)

__ • 1CA-72 (CA Pump 1A Disch To UST Dome Throttle Isol) (AB-551, BB-49, Rm 250).

• CA Pump 1B:

__ • 1CA-69 (CA Pump 1B Disch To UST Dome Throttle) (AB-533, BB-50, Rm 255)

__ • 1CA-70 (CA Pump 1B Disch To UST Dome Throttle Isol) (AB-550, BB-50, Rm 250).

• CA Pump #1:

__ • 1CA-67 (CA Pump No 1 Disch To UST Dome Throttle) (AB-540, BB-51, Rm 254)

__ • 1CA-68 (CA Pump No 1 Disch To UST Dome Throttle Isol) (AB-546, BB-51, Rm 250).

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK Enclosure 2 - Page 4 of 6 **Local CA Flowpath Restoration**	PAGE NO. 74 of 135 Revision 46

CAUTION **The following step is for verification only. Valve manipulation without Control Room Supervisor concurrence could result in loss of CA flow.**

NOTE For the remainder of this enclosure, level values in parenthesis are local indications, intended for use when Control Room indications are not available.

4. **Verify CA suction source alignment as follows:**

__ a. **IF AT ANY TIME** valve(s) found out of position, **THEN** consult with Control Room Supervisor for further guidance.

b. Verify Upper Surge Tank (UST) path as follows:

__ 1) Determine Upper Surge Tank (UST) level as indicated on Control Room indication or 1CSLG5970 (Upper Surge Tank Level) (TB-640, 1E-32).

2) **IF** UST level greater than 10% (5,000 gal), **THEN** verify the following valves - OPEN:

__ • 1CS-19 (CA Pumps Supply From Upper Surge Tank) (TB1-627, 1D-30) (Key #633)

__ • 1CA-4 (CA Pumps Suction From UST) (TB1-574, 1L-25).

3) **IF** UST level less than or equal to 10% (5,000 gal), **THEN** verify at least one of the following valves - CLOSED:

__ • 1CS-19 (CA Pumps Supply From Upper Surge Tank) (TB1-627, 1D-30) (Key #633)

OR

__ • 1CA-4 (CA Pumps Suction From UST) (TB1-574, 1L-25).

__ 4) **IF** UST valve(s) found out of position, **THEN** consult with Control Room Supervisor for further guidance.

ATTACHMENT 9

4. (Continued)

c. Verify Hotwell path as follows:

__ 1) Determine Hotwell level as indicated on Control Room indication or sightglass 1CMLG5450 (Local Full Range Hotwell Level) (TB-548, 1J-26).

2) **IF** Hotwell level greater than 6 inches, **THEN** verify the following valves - OPEN:

__ • 1CM-374 (Condenser Hotwell to CA Pumps Suction) (TB1-554, 1M-24)

__ • 1CA-2 (CA Pumps Suction From Hotwell Isol) (TB1-566, 1M-25).

3) **IF** Hotwell level less than or equal to 6 inches, **THEN** verify RN alignment as follows:

• Nuclear Service Water (RN) Train A:

__ • 1CA-116A (CA Pump #1 Suct Frm RN Hdr A) (AB-555, CC-BB, 52, Rm 250) (Ladder needed) - OPEN

__ • 1CA-15A (CA Pump 1A Suct Frm RN Isol) (AB-553, CC-50, Rm 250) (Ladder needed) - OPEN

__ • 1CA-300 (1A RN Train To CA Manual Isol) (AB-555, BB 52-53, Rm 250) (Ladder needed) (Key #633) - OPEN

__ • 1RN-250A (1A RN Supply Header to CA Pumps Suction Isol) (AB-587, LL-55, Rm 400) - OPEN.

• Nuclear Service Water (RN) Train B:

__ • 1CA-85B (CA Pump #1 Suct Frm RN Hdr B) (AB-552, CC-52, Rm 250) - OPEN

__ • 1CA-18B (CA Pump 1B Suct Frm RN Isol) (AB-554, CC, 51-52, Rm 250) (Ladder needed) - OPEN

__ • 1CA-308 (1B RN Train To CA Manual Isol) (AB-552, CC-53, Rm 250) (Ladder needed) (Key #633) - OPEN

__ • 1RN-310B (1B RN Header to CA Pumps Suction Isol) (AB-585, LL-55, Rm 400) - OPEN.

__ 4) **IF** valve(s) found out of position, **THEN** consult with Control Room Supervisor for further guidance.

ATTACHMENT 9

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK Enclosure 2 - Page 6 of 6 **Local CA Flowpath Restoration**	PAGE NO. 76 of 135 Revision 46

4. (Continued)

d. Verify Condenser Circulating Water (RC) path as follows:

__ 1) Consult with Control Room Supervisor to determine if CAPT #1 suction path from RC verification required.

__ 2) **IF** verification **NOT** required, **THEN** **GO TO** Step 5.

3) Verify the following valves - OPEN:

__ • 1CA-174 (RC To CA Suction Isol) (AB-544, CC-53, Rm 251)

__ • 1CA-175 (RC To CA Suction Isol) (AB-544, CC-53, Rm 251).

__ 4) **IF** valve(s) found out of position, **THEN** consult with Control Room Supervisor for further guidance.

__ 5. **Report status to Control Room Supervisor.**

ATTACHMENT 10

EVENT #3
N44 Loss of Instrument Power

3.3 INSTRUMENTATION

3.3.1 Reactor Trip System (RTS) Instrumentation

LCO 3.3.1 The RTS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.1-1.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.1-1 for the channel(s).	Immediately
B. One Manual Reactor Trip channel inoperable.	B.1 Restore channel to OPERABLE status. OR B.2 Be in MODE 3.	48 hours 54 hours
C. One channel or train inoperable.	C.1 Restore channel or train to OPERABLE status. OR C.2 Open reactor trip breakers (RTBs).	48 hours 49 hours

(continued)

ATTACHMENT 10

EVENT #3
N44 Loss of Instrument Power

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One channel inoperable.	------------------NOTE------------------ The inoperable channel may be bypassed for up to 12 hours for surveillance testing and setpoint adjustment of other channels. --	
	D.1.1 -------------NOTE------------- Only required to be performed when the Power Range Neutron Flux input to QPTR is inoperable. ------------------------------------	
	Perform SR 3.2.4.2.	12 hours from discovery of THERMAL POWER > 75% RTP AND Once per 12 hours thereafter
	AND	
	D.1.2 Place channel in trip.	72 hours
	OR	
	D.2 Be in MODE 3.	78 hours

(continued)

ATTACHMENT 10

EVENT #3
N44 Loss of Instrument Power

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One channel inoperable.	------------------NOTE------------------ The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. --	
	E.1 Place channel in trip.	72 hours
	OR	
	E.2 Be in MODE 3.	78 hours
F. THERMAL POWER > P-6 and < P-10, one Intermediate Range Neutron Flux channel inoperable.	F.1 Reduce THERMAL POWER to < P-6.	24 hours
	OR	
	F.2 Increase THERMAL POWER to > P-10.	24 hours
G. THERMAL POWER > P-6 and < P-10, two Intermediate Range Neutron Flux channels inoperable.	G.1 -------------NOTE------------- Limited boron concentration changes associated with RCS inventory control or limited plant temperature changes are allowed. ---------------------------------- Suspend operations involving positive reactivity additions.	Immediately
	AND	
	G.2 Reduce THERMAL POWER to < P-6.	2 hours

(continued)

EVENT #3
N44 Loss of Instrument Power

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. THERMAL POWER < P-6, one or two Intermediate Range Neutron Flux channels inoperable.	H.1 Restore channel(s) to OPERABLE status.	Prior to increasing THERMAL POWER to > P-6
I. One Source Range Neutron Flux channel inoperable.	I.1 -------------NOTE------------ Limited boron concentration changes associated with RCS inventory control or limited plant temperature changes are allowed. --------------------------------- Suspend operations involving positive reactivity additions.	Immediately
J. Two Source Range Neutron Flux channels inoperable.	J.1 Open RTBs.	Immediately
K. One Source Range Neutron Flux channel inoperable.	K.1 Restore channel to OPERABLE status. <u>OR</u> K.2 Open RTBs.	48 hours 49 hours

(continued)

ATTACHMENT 10

EVENT #3

N44 Loss of Instrument Power

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
L. One channel inoperable.	------------------NOTE------------------ The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. --	
	L.1 Place channel in trip.	72 hours
	<u>OR</u>	
	L.2 Reduce THERMAL POWER to < P-7.	78 hours
M. One Reactor Coolant Flow - Low (Single Loop) channel inoperable.	------------------NOTE------------------ The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. --	
	M.1 Place channel in trip.	6 hours
	<u>OR</u>	
	M.2 Reduce THERMAL POWER to < P-8.	10 hours
N. One Turbine Trip - Stop Valve EH Pressure Low channel inoperable.	------------------NOTE------------------ The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. --	
	N.1 Place channel in trip.	72 hours
	<u>OR</u>	
	N.2 Reduce THERMAL POWER to < P-9.	76 hours

(continued)

ATTACHMENT 10

RTS Instrumentation
3.3.1

EVENT #3
N44 Loss of Instrument Power

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
O. One or more Turbine Trip - Turbine Stop Valve Closure channels inoperable.	O.1 Place channel(s) in trip. OR O.2 Reduce THERMAL POWER to < P-9.	72 hours 76 hours
P. One train inoperable.	------------------NOTE------------------ One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. -- P.1 Restore train to OPERABLE status. OR P.2 Be in MODE 3.	 24 hours 30 hours

(continued)

ATTACHMENT 10

EVENT #3

N44 Loss of Instrument Power

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
Q. One RTB train inoperable.	----------------NOTE---------------- One train may be bypassed for up to 4 hours for surveillance testing, provided the other train is OPERABLE. --	
	Q.1 Restore train to OPERABLE status.	24 hours
	OR	
	Q.2 Be in MODE 3.	30 hours
R. One or more channel(s) inoperable.	R.1 Verify interlock is in required state for existing unit conditions.	1 hour
	OR	
	R.2 Be in MODE 3.	7 hours

(continued)

ATTACHMENT 10

EVENT #3
N44 Loss of Instrument Power

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
S. One or more channel(s) inoperable.	S.1 Verify interlock is in required state for existing unit conditions. OR S.2 Be in MODE 2.	1 hour 7 hours
T. One trip mechanism inoperable for one RTB.	T.1 Restore inoperable trip mechanism to OPERABLE status. OR T.2 Be in MODE 3.	48 hours 54 hours
U. Two RTS trains inoperable.	U.1 Enter LCO 3.0.3.	Immediately

Catawba Units 1 and 2 3.3.1-8 Amendment Nos. 173/165

ATTACHMENT 10

EVENT #3

N44 Loss of Instrument Power

Table 3.3.1-1 (page 1 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA	NA
	3[(a)], 4[(a)], 5[(a)]	2	C	SR 3.3.1.14	NA	NA
2. Power Range Neutron Flux						
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 110.9% RTP	109% RTP
b. Low	1[(b)],2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ 27.1% RTP	25% RTP
3. Power Range Neutron Flux						
High Positive Rate	1,2	4	D	SR 3.3.1.7 SR 3.3.1.11	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

EVENT #3

N44 Loss of Instrument Power

Table 3.3.1-1 (page 2 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Intermediate Range Neutron Flux	$1^{(b)}$, $2^{(c)}$	2	F,G	SR 3.3.1.1 SR 3.3.1.8$^{(l)(m)}$ SR 3.3.1.11$^{(l)(m)}$	≤ 38% RTP	25% RTP
	$2^{(d)}$	2	H	SR 3.3.1.1 SR 3.3.1.8$^{(l)(m)}$ SR 3.3.1.11$^{(l)(m)}$	≤ 38% RTP	25% RTP
5. Source Range Neutron Flux	$2^{(d)}$	2	I,J	SR 3.3.1.1 SR 3.3.1.8$^{(l)(m)}$ SR 3.3.1.11$^{(l)(m)}$	≤ 1.44 E5 cps	1.0 E5 cps
	$3^{(a)}$, $4^{(a)}$, $5^{(a)}$	2	J,K	SR 3.3.1.1 SR 3.3.1.7$^{(l)(m)}$ SR 3.3.1.11$^{(l)(m)}$	≤ 1.44 E5 cps	1.0 E5 cps
6. Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 1 (Page 3.3.1-19)	Refer to Note 1 (Page 3.3.1-19)

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(l) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(m) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the NOMINAL TRIP SETPOINT (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

ATTACHMENT 10

EVENT #3

N44 Loss of Instrument Power RTS Instrumentation
3.3.1

Table 3.3.1-1 (page 3 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
7. Overpower ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 2 (Page 3.3.1-20)	Refer to Note 2 (Page 3.3.1-20)
8. Pressurizer Pressure						
a. Low	$1^{(e)}$	4	L	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	$\geq 1938^{(f)}$ psig	$1945^{(f)}$ psig
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	$\leq$ 2399 psig	2385 psig
9. Pressurizer Water Level - High	$1^{(e)}$	3	L	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	$\leq$ 93.8%	92%
10. Reactor Coolant Flow - Low						
a. Single Loop	$1^{(g)}$	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	$\geq$ 89.7%	91%
b. Two Loops	$1^{(h)}$	3 per loop	L	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	$\geq$ 89.7%	91%

(continued)

(e) Above the P-7 (Low Power Reactor Trips Block) interlock.

(f) Time constants utilized in the lead-lag controller for Pressurizer Pressure - Low are 2 seconds for lead and 1 second for lag.

(g) Above the P-8 (Power Range Neutron Flux) interlock.

(h) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

ATTACHMENT 10

EVENT #3

N44 Loss of Instrument Power

RTS Instrumentation
3.3.1

Table 3.3.1-1 (page 4 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
11. Undervoltage RCPs	1(e)	1 per bus	L	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 5016 V	5082 V
12. Underfrequency RCPs	1(e)	1 per bus	L	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 55.9 Hz	56.4 Hz
13. Steam Generator (SG) Water Level - Low Low	1,2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 9% (Unit 1) ≥ 35.1% (Unit 2) of narrow range span	10.7% (Unit 1) 36.8% (Unit 2) of narrow range span
14. Turbine Trip						
a. Stop Valve EH Pressure Low	1(j)	4	N	SR 3.3.1.10 SR 3.3.1.15	≥ 500 psig	550 psig
b. Turbine Stop Valve Closure	1(j)	4	O	SR 3.3.1.10 SR 3.3.1.15	≥ 1% open	NA
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	P	SR 3.3.1.5 SR 3.3.1.14	NA	NA

(continued)

(e) Above the P-7 (Low Power Reactor Trips Block) interlock.

(i) Not used.

(j) Above the P-9 (Power Range Neutron Flux) interlock.

ATTACHMENT 10

EVENT #3

N44 Loss of Instrument Power

Table 3.3.1-1 (page 5 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2(d)	2	R	SR 3.3.1.11 SR 3.3.1.13	≥ 6.6E-6% RTP	1E-5% RTP
b. Low Power Reactor Trips Block, P-7	1	1 per train	S	SR 3.3.1.5	NA	NA
c. Power Range Neutron Flux, P-8	1	4	S	SR 3.3.1.11 SR 3.3.1.13	≤ 50.2% RTP	48% RTP
d. Power Range Neutron Flux, P-9	1	4	S	SR 3.3.1.11 SR 3.3.1.13	≤ 70% RTP	69% RTP
e. Power Range Neutron Flux, P-10	1,2	4	R	SR 3.3.1.11 SR 3.3.1.13	≥ 7.8% RTP and ≤ 12.2% RTP	10% RTP
f. Turbine Impulse Pressure, P-13	1	2	S	SR 3.3.1.12 SR 3.3.1.13	≤ 12.2% RTP turbine impulse pressure equivalent	10% RTP turbine impulse pressure equivalent
17. Reactor Trip Breakers(k)	1,2	2 trains	Q,U	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.4	NA	NA
18. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	T	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	1 each per RTB	C	SR 3.3.1.4	NA	NA
19. Automatic Trip Logic	1,2	2 trains	P,U	SR 3.3.1.5	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.5	NA	NA

(continued)

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(k) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

ATTACHMENT 10

EVENT #4
PZR PORV Fails Open

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

LCO 3.4.1 RCS DNB parameters for pressurizer pressure, RCS average temperature, and RCS total flow rate shall be within the limits specified in Table 3.4.1-1.

APPLICABILITY: MODE 1.

-----------------------NOTE-----------------------
Pressurizer pressure limit does not apply during:

a. THERMAL POWER ramp > 5% RTP per minute; or

b. THERMAL POWER step > 10% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Pressurizer pressure or RCS average temperature DNB parameters not within limits.	A.1 Restore DNB parameter(s) to within limit.	2 hours
B. RCS total flow rate ≥ 99%, but < 100% of the limit specified in the COLR.	B.1 Reduce THERMAL POWER to ≤ 98% RTP.	2 hours
	<u>AND</u>	
	B.2 Reduce the Power Range Neutron Flux – High Trip Setpoint below the nominal setpoint by 2% RTP.	6 hours

(continued)

<u>Note to Evaluator:</u>

Violation of these limits will be indicated by OAC Alarm (PZR Low Press DNB Limit). This condition may NOT be entered based on pressure decrease and, if entered, will clear soon.

ATTACHMENT 10

EVENT #4
PZR PORV Fails Open

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. RCS total flow rate < 99% of the value specified in the COLR.	C.1 Restore RCS total flow rate to ≥ 99% of the value specified in the COLR.	2 hours
	OR	
	C.2.1 Reduce THERMAL POWER to < 50% RTP.	2 hours
	AND	
	C.2.2 Reduce the Power Range Neutron Flux - High Trip Setpoint to ≤ 55% RTP.	6 hours
	AND	
	C.2.3 Restore RCS total flow rate to ≥ 99% of the value specified in the COLR.	24 hours
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 2.	6 hours

EVENT #4
PZR PORV Fails Open

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-----NOTES-----
Separate Condition entry is allowed for each PORV.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more PORVs inoperable and capable of being manually cycled.	A.1 Close and maintain power to associated block valve.	1 hour
B. One or two PORVs inoperable and not capable of being manually cycled.	B.1 Close associated block valves. AND B.2 Remove power from associated block valves. AND B.3 Restore PORV(s) to OPERABLE status.	1 hour 1 hour 72 hours

(continued)

ATTACHMENT 10

EVENT #4
PZR PORV Fails Open

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One block valve inoperable.	C.1 Place associated PORV in manual control. AND C.2 Restore block valve to OPERABLE status.	1 hour 72 hours
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	6 hours 12 hours
E. Three PORVs inoperable and not capable of being manually cycled.	E.1 Close associated block valves. AND E.2 Remove power from associated block valves. AND E.3 Be in MODE 3. AND E.4 Be in MODE 4.	1 hour 1 hour 6 hours 12 hours
F. More than one block valve inoperable.	F.1 Place associated PORVs in manual control. AND	1 hour

(continued)

ATTACHMENT 10

EVENT #4
PZR PORV Fails Open

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. (continued)	F.2 Restore one block valve to OPERABLE status if three block valves are inoperable. AND F.3 Restore remaining block valve(s) to OPERABLE status.	2 hours 72 hours
G. Required Action and associated Completion Time of Condition F not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 4.	6 hours 12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.11.1	-------------------------------NOTE-------------------------------- Not required to be met with block valve closed in accordance with the Required Action of Condition B or E. --- Perform a complete cycle of each block valve.	In accordance with the Surveillance Frequency Control Program

(continued)

2019 INITIAL LICENSE NRC EXAM
SCENARIO # 2

Facility:	Catawba NRC Exam 2019	Scenario No.: 2		Op Test No.:	2019301
Examiners:			Operators:	SRO	
				RO	
				BOP	

Initial Conditions: Unit 1 is at 100% power at the MOL. Unit 2 is at 100% power.

Turnover: Unit 1 is at 100% power at the MOL. Unit 2 is at 100% power. Unit 1 has previously entered AP/1/A/5500/037 due to a grid disturbance. Main generator voltage is currently less than the CNS Generator Voltage Operating Schedule due to this issue. All applicable actions have been completed. The SOC is working to restore grid voltage and will provide guidance, as required. Direction for the crew is to swap operating KC Pumps by starting 1B1 KC Pump and securing 1B2 KC Pump per OP/1/A/6400/005 (Component Cooling System), Enclosure 4.15 (Shifting KC Pumps). The SOC and site management have approved KC Pump swap. 1B1 KC Pump pre-start check is complete.

Event No.	Malf. No.	Event Type*	Event Description
1		N – BOP N – SRO	Swap CCW (KC) Pumps
2		N – RO N – SRO	Restore Main Generator Voltage
3	ND015	TS – SRO	1B RHR Pump Breaker Failure
4	KC023F	C – BOP C – SRO	RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed
5	OV_SLIM 42ManPB	C – BOP C – SRO	RCP Seal Injection Flow Control Valve (1NV-309) Failure
6	EPD003D EHC011A	C – RO C – SRO TS – SRO	Zone B Lockout / Auto Turbine Runback Failure
7	IRX007A2	C – RO C – SRO	Multiple Control Rods drop
8	NC005F8	M – ALL	Rod Ejection / LOCA
9	ISE002A ISE002B	C – BOP C – SRO	Safety Injection Auto Initiation Failure
10	CF012A	C – RO C – SRO	1CF-51 Feedwater Isolation Failure

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 2 – Summary

Initial Condition
Unit 1 is at 100% power at the MOL. Unit 2 is at 100% power.

Turnover:
Unit 1 is at 100% power at the MOL. Unit 2 is at 100% power. Unit 1 has previously entered AP/1/A/5500/037 due to a grid disturbance. Main generator voltage is currently less than the CNS Generator Voltage Operating Schedule due to this issue. All applicable actions have been completed. The SOC is working to restore grid voltage and will provide guidance, as required. Direction for the crew is to swap operating KC Pumps by starting 1B1 KC Pump and securing 1B2 KC Pump per OP/1/A/6400/005 (Component Cooling System), Enclosure 4.15 (Shifting KC Pumps). The SOC and site management have approved KC Pump swap. 1B1 KC Pump pre-start check is complete.

Event 1
Shift operating Component Cooling (KC) Pumps. Start 1B1 KC Pump and secure 1B2 KC Pump.

Event History: Exact evolution not previously used. Similar evolution used on 16 (4) – "A" Train pump swap.

Event 2
The SOC will inform the crew that grid voltage issues have been resolved and request Main Generator Voltage be adjusted to comply with the CNS Generator Voltage Operating Schedule. The CRS will provide direction and the RO will manually raise Main Generator Voltage to meet operating schedule.

Verifiable Action – RO will manually increase Main Generator Voltage.

Event History: New malfunction.

Event 3
1B ND (Residual Heat Removal) Pump breaker will experience a loss of control power. Crew will refer to Annunciator Response Procedure for 1AD-11 D/1 (4KV ESS Power Train B Trouble) and 1.47 Bypass Panel alarm on OAC to determine source of failure. TS evaluation by the SRO is required.

Event History: New malfunction.

Event 4
1KC-424B (NC Pumps Ret Hdr Cont Isol) will close isolating the CCW Reactor Building Non-Essential Header. This Header supplies cooling to RCP bearing coolers and thermal barrier coolers. The crew will enter AP/1/A/5500/021 (Loss of Component Cooling) which contains guidance to re-open this valve. The crew may also utilize guidance contained in OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines) to preserve the integrity of plant components to re-open the valve prior to AP/21 entry.

Verifiable Action – The BOP will re-open 1KC-424B.

Event History: New malfunction. Similar event (1KC-425A) not used on previous 2 exams {14 (2)}.

Event 5
1NV-309 (Seal Water Inj Flow) controller will transfer to Manual and throttle partially open decreasing RCP seal injection flow. Crew will refer to Annunciator Response Procedure for 1AD-7 C/4 (NCP Seal Water Lo Flow), and manually throttle 1NV-309 to restore seal injection flow.

Verifiable Action – BOP will manually control 1NV-309 Seal Injection Flow.

Event History: New malfunction.

Event 6
A Zone “B” Lockout will occur. The associated automatic Main Turbine runback to 48% power will fail. The crew will enter AP/1/A/5500/003 (Load Rejection), manually reduce turbine load, stabilize the plant, and borate to restore rod insertion limits. TS evaluation by the SRO is required to address the Zone “B” Lockout and Rod Insertion Limits.

Verifiable Action – RO will manually reduce Main Turbine load to ~48%. BOP will borate to restore rod insertion limits.

Event History: Not used on previous 2 exams {14 (2)}.

Event 7
Multiple control rods will drop into the core. The crew will initiate a reactor trip based on Immediate Actions of AP/1/A/5500/014 (Control Rod Misalignment). This procedure requires a reactor trip if two or more control rods are dropped or misaligned by greater than 24 steps.

Verifiable Action – RO will trip Unit 1 reactor.

Event History: Not used on previous 2 exams {14 (3)}.

Event 8
Upon the Reactor Trip, a rod ejection event will occur. The crew will enter EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and then transition to EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).

Event History: Not used on previous 2 exams {14 (3)}.

Event 9
Following the Rod Ejection, Safety Injection will fail to automatically initiate.

Verifiable Action – BOP will manually initiate both trains of Safety Injection.

Event History: Used 17 (2) with LBLOCA vs MBLOCA.

Event 10
Following the Reactor Trip and automatic Feedwater Isolation, 1CF-51 (S/G 1C CF Cont Isol) will fail to automatically close.

Verifiable Action – RO will manually close 1CF-51.

Event History: Exact failure is new. Similar (1CF-33) used on 17 (2).

Manual Control of Automatic Functions		
Event	**Position**	**Description**
5	BOP	Manually control failed Automatic RCP Seal Injection Flow Control Valve (1NV-309)
6	RO	Manually control failed Automatic Turbine Runback

***Critical Task 1* – Manually re-open 1KC-424B (NC Pumps Ret Hdr Cont Isol) prior to reaching RCP motor bearing temperature of 195 degrees (RCP trip criteria).**

Simulator validation reveals this criteria will be met in approximately 8 minutes.

***Critical Task 2* – Manually decrease Main Turbine load prior to overcurrent trip of 1A Generator PCB.**

Simulator validation reveals this criteria will be met in approximately 2 minutes. Following overcurrent trip of 1A Gen PCB, an OTΔT Reactor Trip will occur.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	8
2. Malfunctions after EOP entry (1–2)	2
3. Abnormal events (2–4)	5
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	0
7. Critical tasks (2–3)	2

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

   1.1 Reset to IC # 170 and load schedule file for NRC Scenario 2

START TIME:__________

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		3	LOA-ND015 (RACKOUT ND PMP 1B)	RACK-OUT				3
		4	VLV-KC023F (KC424B RTN HDR CONT ISOL INSIDE VLV FAIL TO POSITION)	0				4
		11	VLV-KC023F (KC424B RTN HDR CONT ISOL INSIDE VLV FAIL TO POSITION)	0			1 SEC	4
		5	OV_SLIM42ManPB (NV-309 Man Pushbutton)	PRESSED			:01	5
		5	OV_SLIM42OutIncPB (NV-309 Output Increment Pushbutton)	PRESSED			:02	5
		6	MAL-EP003D (ZONE 1B LOCKOUT)	ACTIVE				6
			MAL-EHC003F (ALL TURBINE AUTO RUNBACK FAILURE)	BLOCK				6
		7	MAL-IRX007A2 (DROP ROD GROUP CBA2)	ACTIVE				7
		12	MAL-NC005F8 (ROD F8 EJECTION)	2000	3 SEC			8
		12	MAL-EDA001F8 (ROD F8 DRPI-OPEN/SHORTED COIL)	BOTH	3 SEC			8
		12	MAL-EDA001F10 (ROD F10 DRPI-OPEN/SHORTED COIL)	BOTH	3 SEC			8
		12	MAL-EDA001H8 (ROD H8 DRPI-OPEN/SHORTED COIL)	BOTH	3 SEC			8
			MAL-ISE002A (AUTO SI TRN A FAILS TO ACTUATE)	ACTIVE				9
			MAL-ISE002B (AUTO SI TRN B FAILS TO ACTUATE)	ACTIVE				9
			VLV-CF012A (CF51 CF CONT ISOL VLV 1CF051 FAIL AUTO ACTIONS)	ACTIVE				10
		10	LOA-CNT002 H2 ANALYZERS	BOTH	10:00			
		13	LOA-NV078 (SEAL WATER LOW FLOW LCL REFLASH ACK (AD7,C4))	ACKN	2:00			
		Ensure TRIGGER 11 = x11i385o (KC-424B Open Button Depressed)						
		Ensure TRIGGER 12 = jpplp4(1) | jpplp4(2) (Reactor Trip Either Train)						
		Ensure 1B2 KC Pump in service						

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

2.2 Give a copy of Attachment 2 (Shift Turnover Information) to the CRS.

3. EXERCISE PRESENTATION

3.1 Familiarization Period

A. Allow examinees time to familiarize themselves with the Control Board alignments.

3.2 **Scenario EVENT 1**, Swap CCW Pumps. Start 1B1 KC Pump and secure 1B2 KC Pump

✓	BOOTH INSTRUCTOR ACTION
	IF AO dispatched to perform a pre-operational pump checkout, **REPORT** that the pump looks good for start.

✓	BOOTH INSTRUCTOR ACTION
	WHEN one minute has elapsed from the start of the 1B1 KC Pump, **CALL** the control room and inform them that the 1B1 KC Pump looks good for a continuous run.

3.3 **Scenario EVENT 2**, Restore Main Generator Voltage

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, CALL the control room as the SOC and inform them grid issues have been resolved and that the SOC requests CNS Unit 1 Main Generator Voltage be restored to the CNS Generator Voltage Operating Schedule. Also inform the crew that switchyard (grid) voltage is adequate and reliable.

3.4 **Scenario EVENT 3**, 1B ND Pump Breaker Failure

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 3 to cause 1B ND Pump control power to fail.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator dispatched to investigate 1B ND Pump breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or WR for 1B ND Pump, **REPEAT** back the information.
	After 5 minutes, contact the crew and **REPORT** "1B ND Pump Breaker Control Power Fuses have failed.".

✓	BOOTH INSTRUCTOR ACTION
	IF Unit Supervisor is directed to initiate a clearance for 1B ND Pump, **REPEAT** back the information.

3.5 **Scenario EVENT 4**, RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 4 to close 1KC-424B.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance is dispatched to investigate 1KC-424B, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or WR for 1KC-424B, **REPEAT** back the information.

3.6 **Scenario EVENT 5**, Seal Injection Control Valve (1NV-309) transfers to Manual

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 5** to cause 1NV-309 to transfer to Manual.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1NV-309, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO to acknowledge seal water low flow alarm on reflash panel 1, **REPEAT** the information and **INSERT Trigger 13**.
	After 2 minutes, contact the crew and **REPORT** "Seal Water Low Flow alarm has been acknowledged".

3.7 **Scenario EVENT 6**, Zone B Lockout / Auto Turbine Runback Failure

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 6** to cause a Zone B Lockout.

✓	BOOTH INSTRUCTOR ACTION
	IF the DEC TOP is contacted to investigate and repair loss of generator connection to with switchyard, **REPEAT** back information as required.

✓	BOOTH INSTRUCTOR ACTION
	IF the DEC TOP is notified to calculate RTCA, **REPEAT** back information as required.

✓	BOOTH INSTRUCTOR ACTION
	IF the DEC BA is notified of unit status, **REPEAT** back information as required.
✓	**BOOTH INSTRUCTOR ACTION**
	IF the SWM is contacted to initiate an NCR or WR for Zone B Lockout, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or WR for the Turbine Control System, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Radiation Protection is notified to sample and analyze gaseous effluents per SLC 16.11-6, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Primary Chemistry is notified to sample for isotopic analysis of iodine between 2 and 6 hours following power change in accordance with TS 3.4.16, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the Reactor Group Engineer is notified of the occurrence, **REPEAT** back the information.

3.8 **Scenario EVENT 7**, Multiple Control Rods Drop

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner**, THEN INSERT SIMULATOR Trigger 7** to cause Control Bank A Group 2 rods to drop.

3.9 **Scenario EVENTS 8, 9, 10** Control Rod Ejection, Safety Injection Auto Initiation Failure, 1CF-51 Feedwater Isolation Failure

✓	BOOTH INSTRUCTOR ACTION
	IF AO is dispatched to place the containment H_2 Analyzers in service per OP/1/A/6450/010, **REPEAT** the information and **INSERT** **Trigger 10**.
	After 10 minutes contact the crew and **REPORT** “Ice Condenser Air Handling Units have been secured per G-1 Enclosure 11, and the H_2 Analyzers have been placed in service per OP/1/A/6450/010”.

✓	BOOTH INSTRUCTOR ACTION
	IF Chemistry is notified to sample all S/Gs for activity, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified to frisk all cation columns for activity, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF AO is dispatched to secure the 1A and/or 1B D/G and place in standby readiness per OP/1/A/6350/002, **REPEAT** the information.

Event Description: Swap CCW Pumps. Start 1B1 KC Pump and secure 1B2 KC Pump

Enclosure 4.15

Shifting KC Pumps

OP/1/A/6400/005

Page 2 of 3

3. Procedure

N/A 3.1 **IF** shifting KC Train 1A pumps, perform the following:

3.1.1 Start the idle KC Train 1A pump:

_____ • "KC PUMP A1"
OR
_____ • "KC PUMP A2"

NOTE:	1KC-C37A (Train A Miniflow Isol) may open during performance of the next step.

3.1.2 Adjust the following flow controllers on 1MC11 to zero gpm flow:

_____ • 1KC-149 (KF Hx 1A Cool Wtr Otlt)

_____ • 1KC-156 (KF Hx 1B Cool Wtr Otlt)

3.1.3 Stop the desired KC Train 1A pump:

_____ • "KC PUMP A1"
OR
_____ • "KC PUMP A2"

_____ _____ 3.1.4 **IF** KC Train 1A flow approaches 5700 gpm while performing the next step, ensure 1KC-C37A (Train A Miniflow Isol) is closed.

3.1.5 Perform the following for the KF cooling loops that are in service:

_____ 3.1.5.1 **IF** 1A KF Cooling Loop is in service, adjust 1KC-149 (KF Hx 1A Cool Wtr Otlt) flow controller on 1MC11 to 3000 gpm or as necessary to maintain Spent Fuel Pool temperature < 125°F.

_____ 3.1.5.2 **IF** 1B KF Cooling Loop is in service, adjust 1KC-156 (KF Hx 1B Cool Wtr Otlt) flow controller on 1MC11 to 3000 gpm or as necessary to maintain Spent Fuel Pool temperature < 125°F.

Event Description: Swap CCW Pumps. Start 1B1 KC Pump and secure 1B2 KC Pump

Enclosure 4.15
Shifting KC Pumps

OP/1/A/6400/005
Page 3 of 3

_____ 3.2 IF shifting KC Train 1B pumps, perform the following:

3.2.1 Start the idle KC Train 1B pump:

- _____ "KC PUMP B1"
  OR
- _____ "KC PUMP B2"

NOTE:	1KC-C40B (Train B Miniflow Isol) may open during performance of the next step.

3.2.2 Adjust the following flow controllers on 1MC11 to zero gpm flow:

- _____ 1KC-149 (KF Hx 1A Cool Wtr Otlt)
- _____ 1KC-156 (KF Hx 1B Cool Wtr Otlt)

3.2.3 Stop the desired KC Train 1B pump:

- _____ "KC PUMP B1"
  OR
- _____ "KC PUMP B2"

_____ _____ 3.2.4 IF KC Train 1B flow approaches 5700 gpm while performing the next step, ensure 1KC-C40B (Train B Miniflow Isol) is closed.

3.2.5 Perform the following for the KF cooling loops that are in service:

N/A 3.2.5.1 IF 1A KF Cooling Loop is in service, adjust 1KC-149 (KF Hx 1A Cool Wtr Otlt) flow controller on 1MC11 to 3000 gpm or as necessary to maintain Spent Fuel Pool temperature < 125°F.

_____ 3.2.5.2 IF 1B KF Cooling Loop is in service, adjust 1KC-156 (KF Hx 1B Cool Wtr Otlt) flow controller on 1MC11 to 3000 gpm or as necessary to maintain Spent Fuel Pool temperature < 125°F.

3.3 File this enclosure in the Control Copy folder of this procedure.

Note to Evaluator:

This completes Event 1. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to contact the crew with instruction to restore Main Generator Voltage.

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Event Description:	Restore Main Generator Voltage		

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 4 of 20 Revision 04

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. **Operator Actions**	
✓ 1. **Verify Generator - TIED TO GRID.**	**Perform the following:** **NOTE** Shared systems (RN, VC, YC, VA) require an operable normal power source to be operable. a. **IF** notified by TCC degraded switchyard (grid) voltage conditions exist, **THEN** ensure compliance with the following Tech Specs. **REFER TO** PT/1/A/4350/002C (Available Power Source Operability Check). __ • 3.8.1 (AC Sources - Operating) __ • 3.7.8 (Nuclear Service Water System (NSWS) __ • 3.7.10 (Control Room Area Ventilation System (CRAVS)) __ • 3.7.11 (Control Room Area Chilled Water System (CRACWS)) __ • 3.7.12 (Auxiliary Building Filtered Ventilation System ABFVS)). __ b. **RETURN TO** procedure and step in effect.
2. **Verify Generator MVARs - EXCEED GENERATOR CAPABILITY CURVE limits. REFER TO one of the following:** __ • GENCAP (OAC Graphic Display) __ • Enclosure 1 (Unit 1 Generator Capability Curves).	**Perform the following:** __ a. **IF AT ANY TIME** GENERATOR CAPABILITY CURVE limits exceeded, **THEN GO TO** Step 3. ✓ b. Observe Note prior to Step 5 and **GO TO** Step 5.

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 5 of 20 Revision 04

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Perform the following to adjust Generator MVARs:**	
a. Adjust Generator MVARs to operate within Generator Capability Curve limits as follows: __ • Depress "LOWER" on VOLTAGE ADJUST to reduce lagging MVARs **<u>OR</u>** __ • Depress "RAISE" on VOLTAGE ADJUST to reduce leading MVARs.	a. Perform the following: 1) <u>IF</u> voltage regulator in "AUTO", <u>**THEN**</u> perform the following: __ a) Place voltage regulator in "MANUAL". __ b) Adjust MVARs to within GENERATOR CAPABILITY CURVE limits. 2) <u>IF</u> unable to maintain MVARs within Generator Capability Curve limits, <u>**THEN**</u> remove generator from service as follows: a) <u>IF</u> reactor power greater than or equal to 69%, <u>**THEN**</u> perform the following: __ (1) Trip reactor. __ (2) <u>GO TO</u> EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). b) <u>IF</u> reactor power less than 69%, <u>**THEN**</u> perform the following: __ (1) Trip turbine. __ (2) <u>GO TO</u> AP/1/A/5500/002 (Turbine Generator Trip).
__ b. <u>IF</u> Generator voltage operated outside Generator Voltage Schedule for more than 30 continuous minutes, <u>**THEN**</u> notify TCC/SOC.	

Op Test No.:	301	Scenario #	2	Event #	2	Page	16 of 142
Event Description:	Restore Main Generator Voltage						

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 6 of 20 Revision 04

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued) c. IF voltage regulator in "MANUAL", THEN perform the following: __ 1) Notify TCC/SOC voltage regulator in manual. __ 2) WHEN voltage regulator returned to auto, THEN notify TCC/SOC.	
__ 4. **Notify Engineering to evaluate generator abnormal operating conditions.**	

NOTE The TCC "Real Time Contingency Analysis" (RTCA) program determines if the Unit will have adequate switchyard voltage available for ECCS loads following a Unit Trip with Safety Injection actuation.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Verify TCC reported "Real Time Contingency Analysis" (RTCA) indicates CNS switchyard voltage would NOT be adequate if the unit should trip.**	**Perform the following:** N/A __ a. IF TCC has not reported "RTCA" indications, THEN notify TCC to monitor "RTCA" and report results to Control Room Supervisor. __ b. IF AT ANY TIME TCC reports "RTCA" indicates CNS switchyard voltage would NOT be adequate if the unit should trip, THEN GO TO Step 6. ✓ c. Observe Note prior to Step 18 and GO TO Step 18.
__ 6. **Record time TCC "RTCA" indicated CNS switchyard (grid) voltage NOT adequate.** ______________________	
__ 7. **Start 2 hour timer from time TCC "RTCA" indicated CNS switchyard (grid) voltage NOT adequate.**	

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 12 of 20 Revision 04

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Do not exceed any generator limits when adjusting generator voltage.	
18. **Coordinate with SOC and perform generator voltage adjustments as follows:**	
__ • Adjust Unit 1 Generator Bus Voltage per, Unit 1 Revised Data Book Figure 23 (CNS Generator Voltage Operating Schedule) OR __ • Adjust Unit 1 Generator Bus Voltage per SOC request.	**Note to Evaluator:** **The crew will use this guidance to raise Main Generator Voltage to match operating schedule found on OAC.**
__ 19. **When SOC/TCC verifies switchyard (grid) voltage adequate and reliable, THEN RETURN TO procedure step in effect.**	

END

Note to Evaluator:

This completes Event 2. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 3 (1B ND Pump Breaker Failure).

Event Description: 1B ND Pump Breaker Failure

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PANEL: 1AD-11 Page 39 of 123

D/1

4KV ESS PWR TRAIN B TROUBLE

SETPOINT: Local alarm actuated on 1RFMP3

ORIGIN: 1RFMP3: Module 1RFM45, 1RFM44, 1RFM43

PROBABLE CAUSE:
1. Loss of control power to breaker failure circuit.
2. Loss of control power to the breaker mode select circuit.
3. Loss of control power to any 4.16KV Essential breaker.
4. Any 4.16KV breaker is **NOT** in the CONNECT position.
5. Loss of control power to 1ETB degraded bus voltage circuit.

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS: Dispatch an operator to 1RFM45 located on 1RFMP3 (AB-560, BB-49) to determine the cause of alarm.

SUPPLEMENTARY ACTIONS:
1. **IF** alarm is due to loss of control power, dispatch an operator to 1EDF-F01C (SWGR. 1ETB Control Power) and 1ETB to determine cause.
2. Ensure proper operation of 125VDC/120VAC Vital Instrument and Control Power System per OP/1/A/6350/008 (125 VDC/120 VAC Vital I&C Power System).
3. Ensure proper operation of 125VDC Diesel Auxiliary Power System per OP/1/A/6350/006 (125 VDC Diesel Auxiliary System).
4. **IF** due to a breaker being out of the CONNECT position, ensure this condition is desirable and return to normal as soon as possible.
5. Refer to Tech Specs 3.8.9 and 3.8.10.

REFERENCES:
1. CNEE-0115-01.42
2. CN-1705-01.01-01
3. CNEE-0115-01.40
4. CNLT-1765-02.01

TECH SPEC EVALUATION

See Attachment 13 for applicable Tech Specs.

T.S. 3.5.2
Condition A: (Restore train(s) to OPERABLE status within 72 hours)

Note to Evaluator:

TS Evaluation completes this event. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 4 (1KC-424B Fails Closed).

Op Test No.:	301	Scenario #	2	Event #	4	Page	19 of 142
Event Description:	RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed						

Control Room Indications
1AD-6, C/1-4 "A,B,C,D MTR UPPER BRG KC OUTLET HI/LOW FLOW" - LIT
1AD-6, D/1-4 "A,B,C,D MTR LOWER BRG KC OUTLET LO FLOW" - LIT
1AD-6, E/1-4 "A,B,C,D THERMAL BARRIER KC OUTLET HI/LO FLOW" - LIT
1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - LIT
1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - LIT
1KC-424B CLOSED indicating light - LIT

Note To Evaluator:

The crew may take action to open 1KC-424B prior to and/or in place of AP/21 entry utilizing the guidance of OMP 1-7 (Emergency /Abnormal Procedure Implementation Guidelines) to "Take reasonable actions to preserve the integrity of plant components".

Opening 1KC-424B (per OMP 1-7 guidance or AP/21) completes this event. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 5 (1NV-309 Transfer to Manual).

Op Test No.:	301	Scenario #	2	Event #	4	Page	20	of	142
Event Description:	RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed								

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 2 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

CAUTION **Failure to restore NC pump seal cooling via thermal barrier cooling or NV seal injection within 10 minutes will cause damage to the NC pump seals resulting in NC inventory loss.**

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

Note to Evaluator:

Enclosure 1 is included as Attachment 3.

2. **Verify the following:**

__ • At least one KC pump - ON

AND

__ • Flow to KC loads presently in service.

Perform the following:

__ a. Start additional KC pump(s) as necessary.

b. **IF** no KC pump can be started, **THEN** perform the following:

__ 1) **IF** S/I has actuated on either unit, **THEN GO TO** Step 4.

CAUTION **YD can only supply one Unit's NV pump at a time.**

__ 2) Determine which unit will receive alternate NV pump cooling from YD.

__ 3) **IF** Unit 2 selected to receive YD cooling to 2A NV pump, **THEN GO TO** Step 4.

(RNO continued on next page)

Event Description: RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 3 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	
	NOTE • NV pumps may be started without regard to cooling water alignment. • Operating NV Pump will reach high temperature conditions in approximately 15 minutes with no cooling water.
	__ 4) Dispatch operator to align YD cooling to NV pump 1A. **REFER TO** Enclosure 2 (Alternate Cooling To NV Pump 1A).
	__ 5) Maximize NV pump run time. **REFER TO** Enclosure 5 (Maximize NV Pump Run Time).
	__ 6) **IF AT ANY TIME** S/I occurs on either unit, **THEN** notify dispatched operator to realign NV Pump 1A cooling to normal. **REFER TO** Enclosure 2 (Alternate Cooling To NV Pump 1A).
	__ 7) **GO TO** Step 4.
__ 3. **IF AT ANY TIME all KC pumps lost, THEN RETURN TO STEP 2.**	

Op Test No.:	301	Scenario #	2	Event #	4	Page	22 of 142
Event Description:	RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed						

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 4 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Uncooled letdown may result in loss of NV pumps within a matter of minutes.

4. **Verify the following:**

__ • 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK

AND

__ • At least one KC pump - ON.

IF KC flow unavailable to letdown HX, THEN isolate letdown as follows:

a. Ensure the following valves - CLOSED:

__ • 1NV-10A (Letdn Orif 1B Otlt Cont Isol)

__ • 1NV-11A (Letdn Orif 1C Otlt Cont Isol)

__ • 1NV-13A (Letdn Orif 1A Otlt Cont Isol).

__ b. Control charging to stabilize Pzr level at program level while maintaining seal injection flow.

__ c. Ensure 1NV-153A (Letdn Hx Otlt 3-Way Valve) - ALIGNED TO VCT.

__ d. Ensure 1NV-172A (3-Way Divert To VCT-RHT) - ALIGNED TO RHT.

__ e. Ensure VCT makeup - IN AUTO.

__ f. **WHEN** time and manpower permit, **THEN REFER TO** AP/1/A/5500/012 (Loss of Charging or Letdown).

g. **IF AT ANY TIME** the following conditions exist:

__ • VCT level - LESS THAN 23%

OR

__ • PZR level - GREATER THAN 85% **AND** TRENDING UP,

__ **THEN GO TO** Enclosure 6 (Rx Trip Sequence).

__ h. **GO TO** Step 6.

Op Test No.: 301	Scenario # 2	Event # 4	Page 23 of 142				
Event Description: RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed							

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 5 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **IF AT ANY TIME 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" lit, THEN perform Step 4 RNO.**	
__ 6. **Verify both KC surge tank levels - 50% - 90% AND STABLE.**	__ **Observe Caution prior to Step 8 and GO TO Step 8.**
__ 7. **Start additional KC pump(s) as necessary to supply any KC loads presently in service.**	__ **IF KC pump(s) damaged by fire, THEN notify IAE to repair cables to pumps needed for recovery. REFER TO IP/1/A/3890/027A (Fire Damage Control Procedure).**

CAUTION **A loss of KC cooling to the NC pumps results in a gradual approach to an overheated condition in approximately 10 minutes which will result in shaft seizure.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Verify KC flow to NC pumps as follows:**	**Perform the following:**
__ • 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK	a. Ensure the following valves - OPEN:
__ • 1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK.	__ • 1KC-425A (NC Pumps Ret Hdr Cont Isol)
	__ • 1KC-338B (NC Pumps Sup Hdr Cont Isol)
	__ • 1KC-424B (NC Pumps Ret Hdr Cont Isol).
	(RNO continued on next page)

Note to Evaluator:

Opening 1KC-424B will re-establish RCP cooling.

CRITICAL TASK #1

Note to Evaluator:

Opening 1KC-424B completes this event. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 5 (1NV-309 Transfer to Manual).

Op Test No.:	301	Scenario #	2	Event #	4	Page	24 of 142

Event Description: RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 6 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	

b. **IF AT ANY TIME** any of the following conditions met:

__ • Time since loss of KC - GREATER THAN 10 MINUTES

OR

__ • Any NC pump trip criteria from Enclosure 1 (Foldout Page) met,

THEN perform the following:

1) **IF** letdown isolated, **THEN** perform the following:

a) Ensure NV pump suction aligned to FWST as follows:

__ (1) 1NV-252A (NV Pumps Suct From FWST) - OPEN

__ (2) 1NV-253B (NV Pumps Suct From FWST) - OPEN

__ (3) 1NV-188A (VCT Otlt Isol) - CLOSED

__ (4) 1NV-189B (VCT Otlt Isol) - CLOSED.

__ b) **WHEN** reactor tripped, **THEN** attempt to establish and maintain slow cooldown as required to maintain PZR level.

__ 2) Ensure steam dumps - IN PRESSURE MODE.

__ 3) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.

__ 4) Ensure reactor - TRIPPED.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

5) **WHEN** reactor power less than 5%, **THEN** perform the following:

__ a) Trip all NC pumps.

__ b) Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED.

__ 6) Secure any dilutions in progress.

7) **IF** reactor trip breakers were closed, **THEN** perform one of the following while continuing with this procedure as time and conditions allow:

__ • **IF** above P-11, **THEN GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)

OR

__ • **IF** below P-11, **THEN GO TO** AP/1/A/5500/005 (Reactor Trip or Inadvertent S/I Below P-11).

Event Description: RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 8 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Verify KC available as follows:**	
	<u>NOTE</u> The KC non-essential header valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC surge tank level.
a. Verify the following Train A KC non-essential header isolation valves - OPEN: __ • 1KC-230A (Rx Bldg Non-Ess Hdr Isol) __ • 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol) __ • 1KC-50A (Aux Bldg Non-Ess Hdr Isol) __ • 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol).	__ a. **<u>WHEN</u>** OAC alarm C1D2215 (KC Train A Low-Low Level Surge Tank Isol) "**<u>NOT</u>** ACTUATED" **<u>AND</u>** cause of valve closure known, **<u>THEN</u>** ensure affected valve(s) open.

Op Test No.:	301	Scenario #	2	Event #	4	Page	27 of 142

Event Description: RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 9 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
	NOTE The KC non-essential header valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC surge tank level.
b. Verify the following Train B KC non-essential header isolation valves - OPEN: __ • 1KC-228B (Rx Bldg Non-Ess Hdr Isol) __ • 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol) __ • 1KC-53B (Aux Bldg Non-Ess Hdr Isol) __ • 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).	__ b. **WHEN** OAC alarm C1D2214 (KC Train B Low-Low Level Surge Tank Isol) "**NOT** ACTUATED" **AND** cause of valve closure known, **THEN** ensure affected valve(s) open.
__ c. Start additional KC pump(s) as necessary to supply any KC loads presently in service.	__ c. **IF** KC pump(s) damaged by fire, **THEN** notify IAE to repair cables to pumps needed for recovery. **REFER TO** IP/1/A/3890/027A (Fire Damage Control Procedure).

Event Description: RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 10 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Verify KC surge tank levels normal as follows:**	
__ a. Verify both KC surge tank levels - 50% - 90% AND STABLE.	a. Perform the following: 1) Dispatch operator to initiate makeup to surge tank(s) by opening appropriate valve(s): __ • 1KC-107 (1A KC Surge Tank YM M/U) (AB-601, PP-59, Rm 500) OR __ • 1KC-111 (1B KC Surge Tank YM M/U) (AB-601, PP-59, Rm 500). __ 2) Dispatch operators to locate and isolate KC System leakage. __ 3) **WHEN** affected KC surge tank(s) level greater than or equal to 90%, **THEN** notify dispatched operator to secure makeup. __ 4) GO TO Step 11.
__ b. GO TO Step 14.	

Event Description: RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 11 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. **Verify at least one KC surge tank above lo-lo level as follows:**	**Perform the following:**
__ • 1AD-10, A/1 "KC SURGE TANK A LO-LO LEVEL" - DARK	a. Verify the following:
OR	__ 1) Both Unit 1 RN essential headers - PRESSURIZED.
__ • 1AD-10, A/2 "KC SURGE TANK B LO-LO LEVEL" - DARK.	__ 2) **IF** only one RN essential header pressurized, **THEN** use it for surge tank makeup.
	__ 3) **IF** at any time RN essential header being used for makeup becomes depressurized, **THEN** notify dispatched operator to secure makeup from RN.
	NOTE Preference should be given to the surge tank with the highest stable level and available pumps.
	__ b. Dispatch operator to makeup to available train of KC from YM and RN. **REFER TO** Enclosure 3 (Surge Tank Makeup).
	__ c. Dispatch operators to locate and isolate KC System leakage.
	__ d. Notify Chemistry of RN makeup to KC System.
	(RNO continued on next page)

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 12 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. (Continued)

e. **WHEN** KC surge tank level above lo-lo level setpoint, **THEN** perform the following:

__ 1) Ensure KC pumps on affected train - ON.

NOTE The KC non-essential header valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC surge tank level.

2) OPEN non-essential header isolation valves for affected train as follows:

- Train A:
  - __ 1KC-230A (Rx Bldg Non-Ess Hdr Isol)
  - __ 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol)
  - __ 1KC-50A (Aux Bldg Non-Ess Hdr Isol)
  - __ 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol).

OR

- Train B:
  - __ 1KC-228B (Rx Bldg Non-Ess Hdr Isol)
  - __ 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol)
  - __ 1KC-53B (Aux Bldg Non-Ess Hdr Isol)
  - __ 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).

(RNO continued on next page)

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 13 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. (Continued)	
	__ f. **WHEN** one train's non-essential header isolation valves open, **THEN** perform Steps 12 and 13.
	__ g. **GO TO** Step 14.
__ 12. **Verify 1AD-10, A/1 "KC SURGE TANK A LO-LO LEVEL" - DARK.**	**Perform the following:**
	a. Ensure the following valves - CLOSED:
	__ • 1KC-230A (Rx Bldg Non-Ess Hdr Isol)
	__ • 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol)
	__ • 1KC-50A (Aux Bldg Non-Ess Hdr Isol)
	__ • 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol).
	__ b. Ensure both Train B KC pumps - ON.
	(RNO continued on next page)

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 14 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. (Continued)	

c. **IF** KC Surge Tank 1A level continues to trend down **OR** is empty, **THEN** perform the following:

1) Ensure the following Train B essential equipment - IN SERVICE AS NEEDED:

- __ NV Pump 1B
- __ NI Pump 1B
- __ ND Pump 1B
- __ ND Hx 1B
- __ CA Pump 1B
- __ NS Pump 1B
- __ KF Pump 1B.

2) Ensure the following Train A essential equipment - OFF:

- __ NV Pump 1A
- __ NI Pump 1A
- __ ND Pump 1A
- __ CA Pump 1A
- __ NS Pump 1A
- __ KF Pump 1A.

__ 3) Ensure both Train A KC pumps - OFF.

__ 4) Locate and isolate leak on Train A essential header.

Op Test No.:	301	Scenario #	2	Event #	4	Page	33	of	142
Event Description:	RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed								

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 15 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Verify 1AD-10, A/2 "KC SURGE TANK B LO-LO LEVEL" - DARK.**	**Perform the following:** a. Ensure the following valves - CLOSED: __ • 1KC-228B (Rx Bldg Non-Ess Hdr Isol) __ • 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol) __ • 1KC-53B (Aux Bldg Non-Ess Hdr Isol) __ • 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol). __ b. Ensure both Train A KC pumps - ON. c. <u>**IF**</u> KC Surge Tank 1B level continues to trend down <u>**OR**</u> is empty, <u>**THEN**</u> perform the following: 1) Ensure the following Train A essential equipment - IN SERVICE AS NEEDED: __ • NV Pump 1A __ • NI Pump 1A __ • ND Pump 1A __ • ND Hx 1A __ • CA Pump 1A __ • NS Pump 1A __ • KF Pump 1A. 2) Ensure the following Train B essential equipment - OFF: __ • NV Pump 1B __ • NI Pump 1B __ • ND Pump 1B __ • CA Pump 1B __ • NS Pump 1B __ • KF Pump 1B. __ 3) Ensure both Train B KC pumps - OFF. (RNO continued on next page)

Op Test No.:	301	Scenario #	2	Event #	4	Page	34 of 142

Event Description: RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 16 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. (Continued)	__ 4) Locate and isolate leak on Train B essential header.
__ 14. **Ensure KC heat exchanger outlet mode switches - PROPERLY ALIGNED.**	
__ 15. **Determine and correct cause of loss of KC.**	
16. **Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:**	
__ • SLC 16.9-7 (Boration Systems Flow Path - Shutdown)	
__ • SLC 16.9-8 (Boration Systems Flow Path - Operating)	
__ • SLC 16.9-9 (Boration Systems Pumps - Shutdown)	
__ • SLC 16.9-10 (Boration Systems Charging Pumps - Operating)	
__ • 3.5.2 (ECCS - Operating)	
__ • 3.5.3 (ECCS - Shutdown)	
__ • 3.6.6 (Containment Spray System)	
__ • 3.7.5 (Auxiliary Feedwater (AFW) System)	
__ • 3.7.7 (Component Cooling Water (CCW) System).	

Op Test No.:	301	Scenario #	2	Event #	4	Page	35 of 142
Event Description:	RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed						

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 17 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. **Determine required notifications:**	
__ • REFER TO RP/0/A/5000/001 (Classification Of Emergency)	
__ • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).	
N/A 18. **IF KC Hx leak to RN suspected, THEN perform the following:**	
__ • Notify Radiation Protection that a potential unmonitored release may have occurred.	
__ • Notify Station Management to evaluate a KC Hx to RN leak.	
19. **Verify KC surge tanks level as follows:**	__ **RETURN TO Step 9.**
__ • Greater than 50%	
__ • Stable or trending up.	
20. **WHEN plant conditions permit, THEN perform the following:**	
__ • Return KC pumps to normal operation. REFER TO OP/1/A/6400/005 (Component Cooling Water System).	
__ • Return NV Pump 1A to normal cooling as applicable. REFER TO Enclosure 2 (Alternate Cooling To NV Pump 1A).	
21. **Verify the following:**	**Perform the following:**
__ • 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK	__ a. IF letdown isolated, THEN REFER TO AP/1/A/5500/012 (Loss of Charging or Letdown).
__ • 1AD-7, H/3 "VCT HI TEMP" - DARK	__ b. Do not continue in this procedure until Step 21 conditions met.
__ • Normal letdown - IN SERVICE.	

Op Test No.:	301	Scenario #	2	Event #	4	Page	36 of 142
Event Description:	RCP CCW Return Header Containment Isolation (1KC-424B) Fails Closed						

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 18 of 36 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. **Ensure VCT and letdown path aligned as follows:**

N/A a. **IF** desired to align NV pump suction to VCT, **THEN** perform the following:

1) OPEN the following valves:

__ • 1NV-188A (VCT Otlt Isol)

__ • 1NV-189B (VCT Otlt Isol).

2) CLOSE the following valves:

__ • 1NV-252A (NV Pumps Suct From FWST)

__ • 1NV-253B (NV Pumps Suct From FWST).

__ b. **WHEN** NV suction aligned to VCT, **THEN** momentarily place 1NV-172A (3-Way Divert To VCT-RHT) to "VCT" position and return to "AUTO".

__ c. **IF** desired to restore letdown flow through NV demineralizers, **THEN** momentarily place 1NV-153A (Letdn Hx Otlt 3-Way Valve) to "DEMIN" position and return to "AUTO".

__ 23. **Determine long term plant status. RETURN TO procedure in affect.**

END

Op Test No.:	301	Scenario #	2	Event #	5	Page	37 of 142
Event Description:	RCP Seal Injection Control Valve (1NV-309) transfer to Manual						

Control Room Indications
1AD-7, C/4 "NCP SEAL WATER LO FLOW" - LIT

Note To Evaluator:

This malfunction can be mitigated by use of the Annunciator Response for low seal water injection flow (1AD-7 C/4). Per the ARP, the crew may refer to AP/08 (Malfunction of Reactor Coolant Pump) although this procedure contains no substantive actions.

Once proper control of 1NV-309 is demonstrated, and at Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 6 (Zone B Lockout/Auto Turbine Runback Failure).

Event Description: RCP Seal Injection Control Valve (1NV-309) transfer to Manual

OP/1/B/6100/010 H
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PANEL: 1AD-7

C/4

NCP SEAL WATER LO FLOW

SETPOINT: 7 gpm

ORIGIN:

Instrument	DCS	Description
1NVFT5330	1NVAA5330	NC PUMP A SEAL WTR FLOW
1NVFT5320	1NVAA5320	NC PUMP B SEAL WTR FLOW
1NVFT5310	1NVAA5310	NC PUMP C SEAL WTR FLOW
1NVFT5300	1NVAA5300	NC PUMP D SEAL WTR FLOW

PROBABLE CAUSE:

1. Hi D/P on seal water filter
2. Loss of injection water
3. Filling the seal water injection filter housing after filter replacement

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS:

1. Identify which pump is alarming on the DCS alarm screen.
2. Position 1NV-309 (Seal Water Inj Flow) as necessary to increase seal water flow.
3. Refer to AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump).
4. Refer to AP/1/A/5500/012 (Loss of Charging or Letdown).

SUPPLEMENTARY ACTIONS:

1. IF any NC pump is tripped, refer to AP/1/A/5500/004 (Loss of Reactor Coolant Pump).
2. Ensure KC flow to NC Pump thermal barrier is normal.
3. Monitor #1 seal leak-off flow and #1 seal outlet temperature.
4. IF filling the seal water injection filter housing after filter replacement, perform the following:
   - 4.1 Verify flow to the NCPs is maintained.
   - 4.2 WHEN filling is complete, verify flow returns to normal.
5. Dispatch an operator to 1RFM-14 on 1RFMP1 (AB-574, BB-55, Rm 491) to acknowledge the alarm.

REFERENCES:

1. CN-1554-1.5
2. CNM-1201.01-157
3. Westinghouse Precautions, Limitations and Setpoints Document (CNM-1201.00-39)
4. CNM 1399.03-0269.001 Drop 6 Sheet 317
5. CNM 1399.03-0269.001 Drop 8 Sheet 312
6. CNM 1399.03-0269.001 Drop 12 Sheet 319
7. CNM 1399.03-0269.001 Drop 7 Sheet 323

Note to Evaluator:

Proper control of 1NV-309 and restoration of RCP Seal Injection flow completes Event 5. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 6 (Zone B Lockout/Auto Turbine Runback Failure).

Op Test No.:	301	Scenario #	2	Event #	5	Page	39 of 142
Event Description:	RCP Seal Injection Control Valve (1NV-309) transfer to Manual						

CNS AP/1/A/5500/008	MALFUNCTION OF REACTOR COOLANT PUMP Case II. Loss of Seal Water Injection	PAGE NO. 11 of 24 Revision 19

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. Monitor Enclosure 1 (Foldout Page).	**Note to Evaluator:** **Enclosure 1 is included as Attachment 12.**

Event Description: RCP Seal Injection Control Valve (1NV-309) transfer to Manual

CNS AP/1/A/5500/008	MALFUNCTION OF REACTOR COOLANT PUMP Case II. Loss of Seal Water Injection	PAGE NO. 12 of 24 Revision 19

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **Failure to restore NC pump seal cooling within 10 minutes will cause damage to the NC pump seals resulting in NC inventory loss.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. **Verify the following parameters for all NC Pumps:** __ • #1 seal outlet temperature - LESS THAN 235°F __ • Lower bearing temperature - LESS THAN 225°F __ • #1 seal delta P - GREATER THAN 200 PSID.	**Perform the following:** a. IF in Mode 1 or 2, THEN perform the following: 1) IF all NC pumps affected, THEN perform the following: __ a) Place steam dumps in pressure mode. __ b) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE. __ 2) Trip reactor. 3) WHEN reactor power less than 5%, THEN perform the following: __ a) Trip affected NC pump(s). __ b) Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED. __ 4) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). __ b. Trip affected NC pump(s). __ c. Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED. __ d. GO TO AP/1/A/5500/004 (Loss of Reactor Coolant Pump).

CNS AP/1/A/5500/008	MALFUNCTION OF REACTOR COOLANT PUMP Case II. Loss of Seal Water Injection	PAGE NO. 13 of 24 Revision 19

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 3. **Verify 1AD-7, C/1 "NCP #1 SEAL LEAKOFF HI FLOW" - DARK.**	**Perform the following:** a. <u>**IF**</u> in Mode 1 or 2, <u>**THEN**</u> perform the following: 1) <u>**IF**</u> all NC pumps affected, <u>**THEN**</u> perform the following: __ a) Place steam dumps in pressure mode. __ b) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE. __ 2) Trip reactor. 3) <u>**WHEN**</u> reactor power less than 5%, <u>**THEN**</u> perform the following: __ a) Trip affected NC pump(s). __ b) Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED. __ 4) <u>**GO TO**</u> EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). __ b. Trip affected NC pump(s). __ c. Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED. __ d. <u>**GO TO**</u> AP/1/A/5500/004 (Loss of Reactor Coolant Pump).

Event Description: RCP Seal Injection Control Valve (1NV-309) transfer to Manual

CNS AP/1/A/5500/008	MALFUNCTION OF REACTOR COOLANT PUMP Case II. Loss of Seal Water Injection	PAGE NO. 14 of 24 Revision 19

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE In the following steps, seal injection flow should be established slowly to any NC pump that suffered a total loss of seal injection.	
__ 4. **Verify "N/R CHRG LN FLOW" - GREATER THAN OR EQUAL TO 32 GPM.**	N/A **IF loss of seal water injection caused by loss of charging, THEN GO TO AP/1/A/5500/012 (Loss of Charging or Letdown), Case I (Loss of Charging).**
5. **Verify the following seal injection filter alarms - DARK:** __ • 1AD-7, B/4 "SEAL INJECTION FILTER A HI D/P" __ • 1AD-7, E/4 "SEAL INJECTION FILTER B HI D/P".	**Perform the following:** __ a. Dispatch operator to shift filters. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System). __ b. WHEN notified by operator that filters shifted, THEN perform Steps 6 through 9. __ c. GO TO Step 10.
__ 6. **Verify "TOTAL SEAL WTR FLOW" - GREATER THAN OR EQUAL TO 32 GPM.**	**Perform the following:** __ a. Slowly adjust 1NV-309 (Seal Water Injection Flow) to establish 32 GPM "TOTAL SEAL WTR FLOW". b. IF seal water injection flow established, THEN perform the following: __ 1) Determine and correct cause of loss of seal water injection. __ 2) GO TO Step 9. __ c. IF seal water injection flow not established, THEN OPEN 1NV-309 (Seal Water Injection Flow).

Event Description: RCP Seal Injection Control Valve (1NV-309) transfer to Manual

CNS AP/1/A/5500/008	MALFUNCTION OF REACTOR COOLANT PUMP Case II. Loss of Seal Water Injection	PAGE NO. 15 of 24 Revision 19

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **Verify 1AD-7, C/4 "NCP SEAL WATER LO FLOW" - DARK.**	**Perform the following:** __ a. Identify affected NC pump(s). __ b. Dispatch operator to adjust seal injection flow to affected pump(s). <u>**REFER TO**</u> Enclosure 2 (Manual Adjustment Of Seal Injection Valves).
__ 8. **Determine and correct cause of loss of seal water injection.**	
9. **Verify the following NC pump seal return isolation valves - OPEN:** __ • 1NV-52A (NC Pump 1A Seal Return) __ • 1NV-63B (NC Pump 1B Seal Return) __ • 1NV-74A (NC Pump 1C Seal Return) __ • 1NV-85B (NC Pump 1D Seal Return).	**Perform the following:** __ a. <u>IF</u> seal return isolation valve(s) closed due to #1 seal leakoff high flow conditions, <u>**THEN**</u> <u>**GO TO**</u> Step 10. __ b. OPEN affected valve(s).
__ 10. **<u>WHEN</u> plant conditions allow, <u>THEN</u> perform PT/1/A/4150/001C (NC Pump Seal Injection Flow Verification).**	
11. **Ensure compliance with appropriate Tech Specs:** __ • 3.4.5 (RCS Loops - MODE 3) __ • 3.4.6 (RCS Loops - MODE 4) __ • 3.4.13 (RCS Operational Leakage) __ • 3.5.5 (Seal Injection Flow) __ • SLC 16.7-9 (Standby Shutdown System).	

Event Description: RCP Seal Injection Control Valve (1NV-309) transfer to Manual

CNS AP/1/A/5500/008	MALFUNCTION OF REACTOR COOLANT PUMP Case II. Loss of Seal Water Injection	PAGE NO. 16 of 24 Revision 19

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. **Determine required notifications:**

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

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

__ 13. **Determine long term plant status. RETURN TO procedure in effect.**

END

Op Test No.: 301	Scenario # 2	Event # 6	Page 45 of 142
Event Description: Zone B Lockout / Auto Turbine Runback Failure			

Control Room Indications
1AD-11, C/1 "GEN BKR A OVER CURRENT" - LIT
1AD-11, F/3 "ZONE B LOCKOUT TRIP" - LIT
1AD-11, J/4 "7KV NORM AUX PWR SYSTEM TROUBLE" - LIT

Op Test No.:	301	Scenario #	2	Event #	6	Page	46 of 142
Event Description:	Zone B Lockout / Auto Turbine Runback Failure						

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 3 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Verify turbine load - TRENDING DOWN IN AUTOMATIC.**	**Perform the following:** __ a. Select "MANUAL" on turbine control panel. __ b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load as required.
CRITICAL TASK #2	
2. **Verify proper reactor response:** __ • Control rods - IN "AUTO" AND STEPPING IN __ • P/R neutron flux - TRENDING DOWN.	**IF AT ANY TIME T-Avg greater than 1.5°F higher than T-Ref, THEN perform the following:** __ a. Insert control rods as required to maintain T-Avg within 1°F of T-Ref. b. IF control rods will NOT insert, THEN perform the following: __ 1) Trip Reactor. __ 2) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

Op Test No.: 301 Scenario # 2 Event # 6 Page 47 of 142

Event Description: Zone B Lockout / Auto Turbine Runback Failure

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 4 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Verify proper steam dump operation as follows:**	
__ a. Verify T-Ref instrumentation - AVAILABLE.	__ a. **IF** T-Avg Coastdown in progress, **THEN** determine T-Ref from table. **REFER TO** Enclosure 4 (T-Ref Value Following Runback/Power Reduction).
__ b. "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.	b. Perform the following: __ 1) Operate S/G PORVs as necessary to maintain T-Avg at T-Ref. __ 2) **GO TO** Step 4.
c. Verify the following: __ • "C-7A LOSS OF LOAD INTLK COND DUMP" status light (1SI-18) - LIT. __ • Steam dump valves - MODULATING.	c. **IF** steam dump valves closed **AND** T-Avg 3°F greater than T-Ref, **THEN** perform the following: __ 1) Place "STM DUMP CTRL" in manual. __ 2) Place steam dumps in pressure mode. __ 3) Operate condenser steam dump valves to maintain T-Avg at T-Ref. __ 4) **IF** steam dump valves fail to operate, **THEN** dump steam as necessary from available S/G PORVs to maintain T-Avg at T-Ref.

Op Test No.:	301	Scenario #	2	Event #	6	Page	48	of	142

Event Description: Zone B Lockout / Auto Turbine Runback Failure

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 5 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
__ d. T-Avg - TRENDING DOWN TO T-REF.	d. Perform the following: __ 1) Place "STM DUMP CTRL" in manual. __ 2) Place steam dumps in pressure mode. __ 3) Operate condenser steam dump valves to maintain T-Avg at T-Ref. __ 4) <u>IF</u> steam dump valves fail to operate, **<u>THEN</u>** dump steam as necessary from available S/G PORVs to maintain T-Avg at T-Ref.

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 6 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Verify Pzr PORV and Pzr spray valve status as follows:**	
__ a. All Pzr PORVs - CLOSED.	a. IF Pzr pressure less than 2315 PSIG, THEN perform the following: __ 1) CLOSE Pzr PORV(s). __ 2) IF any Pzr PORV cannot be closed, THEN close its isolation valve. 3) IF Pzr PORV isolation valve cannot be closed, THEN perform the following: __ a) Trip Unit 1 reactor. __ b) WHEN reactor tripped OR S/I setpoint reached, THEN ensure S/I initiated. __ c) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
__ b. Normal Pzr spray valves - CLOSED.	b. IF Pzr pressure less than 2150 PSIG, THEN perform the following: __ 1) CLOSE affected spray valve(s). __ 2) REFER TO AP/1/A/5500/011 (Pressurizer Pressure Anomolies).

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 7 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify proper CM System operation as follows:**	
__ a. **WHEN** reactor power less than 75%, **THEN** ensure both C-htr drain pumps - OFF.	
__ b. Verify reactor power - GREATER THAN 56% PRIOR TO THE EVENT.	__ b. GO TO Step 6.
__ c. Verify standby hotwell pump(s) - ON.	__ c. Start standby hotwell pump(s) as necessary.
__ d. Verify standby condensate booster pump(s) - ON.	__ d. Start standby condensate booster pump(s) as necessary.
6. **Verify the following generator alarms - DARK:** __ • 1AD-11, C/1 "GEN BKR A OVER CURRENT" __ • 1AD-11, F/1 "GEN BKR B OVER CURRENT".	__ **Ensure turbine generator load - REDUCED TO APPROXIMATELY 48% AND THE ALARM CLEARS.**
7. **Verify S/G levels adequate as follows:** __ • All S/G low level alert alarms (1AD-4) - DARK __ • All S/G low CF flow alarms (1AD-4) - DARK.	**Perform the following:** __ a. Ensure feedwater regulating valves - MODULATING TO CONTROL S/G LEVELS AT PROGRAM SETPOINT. b. IF any S/G(s) N/R level trending down in uncontrolled manner, THEN perform the following: __ 1) Trip reactor. __ 2) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

Op Test No.:	301	Scenario #	2	Event #	6	Page	51 of 142
Event Description:	Zone B Lockout / Auto Turbine Runback Failure						

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 8 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 8. **Verify reactor power - GREATER THAN 20%.**	**Perform the following:** __ a. Place "CRD BANK SELECT" switch in manual. __ b. Maintain control rods above insertion limits. __ c. Operate control rods to stabilize unit at appropriate power level. d. <u>IF AT ANY TIME</u> reactor power less than or equal to 5%, <u>THEN</u> perform the following: __ 1) Ensure steam dumps in pressure mode. __ 2) Ensure turbine - TRIPPED. __ 3) Ensure steam dumps maintain steam header pressure at 1090 PSIG. __ 4) Concurrently insert control rods to shutdown the reactor. <u>REFER TO</u> OP/1/A/6150/008 (Rod Control). __ 5) <u>GO TO</u> AP/1/A/5500/002 (Turbine Generator Trip). __ e. <u>GO TO</u> Step 10.
__ 9. **<u>IF AT ANY TIME</u> reactor power less than or equal to 20%, <u>THEN</u> perform Step 8 RNO.**	

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 9 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Maintain AS header pressure as follows:**	
__ a. Verify runback target load less than 85%.	__ a. <u>GO TO</u> Step 10.d.
__ b. Adjust 1AS-2 (Main Stm To Aux Steam) setpoint to maintain AS header pressure at 165 PSIG.	__ b. Adjust 1AS-2 as required to maintain AS header pressure at 165 PSIG.
__ c. <u>GO TO</u> Step 11.	
__ d. Verify AS header pressure maintained between 140 PSIG and 165 PSIG.	__ d. Adjust 1AS-2 as required to maintain AS header pressure between 140 PSIG and 165 PSIG.
__ 11. **Adjust 1TL-4 (Stm Seal Reg Byp) as necessary to maintain steam seal pressure between 4 PSIG - 6 PSIG.**	
__ 12. **Monitor Enclosure 3 (Rod Insertion Limit Boration).**	**<u>Note to Evaluator:</u>** **Enclosure 3 is included as Attachment 4.**

Event Description: Zone B Lockout / Auto Turbine Runback Failure

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 10 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Verify reactor power - LESS THAN 30%.**	**Perform the following:** N/A a. IF runback target load less than 30%, THEN perform the following: __ 1) **WHEN** time and manpower permit, **THEN** perform applicable steps of OP/1/A/6100/003 (Controlling Procedure For Unit Operation). __ 2) Do not continue in this procedure until reactor power less than 30%. __ 3) **WHEN** reactor power less than 30%, **THEN** **GO TO** Step 14. b. **WHEN** appropriate runback target load reached, **THEN** perform the following: __ 1) Stabilize unit at appropriate power level. __ 2) Maintain control rods above insertion limits. 3) Adjust the following as required to maintain T-Avg within 1°F of T-Ref: __ • Turbine load __ • Control rods __ • Boron concentration. __ c. **GO TO** Step 15.

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 11 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 14. **Verify "RESET" light on "AMSAC FOR CF VALVES" switch - DARK.**	**Perform the following:** __ a. <u>IF</u> turbine impulse pressure less than 190 PSIG, <u>THEN</u> notify IAE to correct cause of AMSAC failure to deactivate. __ b. Depress "BYPASS" pushbutton on "AMSAC FOR CF VALVES" switch. __ c. <u>WHEN</u> 2 minutes elapsed, <u>THEN</u> verify "RESET" light on "AMSAC FOR CF VALVES" switch remained dark.
__ 15. **Adjust power factor as necessary. <u>REFER TO</u> Unit 1 Revised Data Book, Figure 43 Generator Capability Curves.**	
16. **<u>WHEN</u> appropriate runback target load reached, <u>THEN</u> perform the following:** __ • Stabilize unit at appropriate power level. __ • Maintain control rods above insertion limits. • Adjust the following as required to maintain T-Avg within 1°F of T-Ref: __ • Turbine load __ • Control rods __ • Boron concentration.	

Op Test No.:	301	Scenario #	2	Event #	6	Page	55	of	142

Event Description: Zone B Lockout / Auto Turbine Runback Failure

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 12 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 17. **Verify at least one KG pump - RUNNING.**	**Perform the following:** **NOTE** Maximum generating time without KG flow is 1 hour at less than 23%. __ a. Restore at least one KG pump to service. __ b. IF flow from at least one KG pump cannot be established within 1 hour, **THEN** shutdown turbine/generator. **REFER TO** OP/1/B/6300/001 (Turbine Generator).
18. **Verify the following PCBs - CLOSED:** __ • Generator breaker 1A __ • Generator breaker 1B __ • PCB 14 __ • PCB 15 __ • PCB 17 __ • PCB 18.	**Perform the following:** a. IF any generator connection with switchyard lost, **THEN** perform the following: 1) Notify DEC TOP (Transmission Operations) to investigate and repair loss of generator connection with switchyard: • Outside line: __ • 800-326-6534 __ • 800-326-6537. • TOP satellite phone: __ • Local: 1-828-490-7791 __ • International: 011-8816-234-50494. __ • Two-way radio. (RNO continued on next page)

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 13 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18. (Continued)	2) <u>IF</u> any busline switchyard connection lost as follows: __ • PCB 14 <u>**AND**</u> PCB 15 OPEN <u>**OR**</u> __ • PCB 17 <u>**AND**</u> PCB 18 OPEN, __ <u>**THEN**</u> notify DEC TOP (Transmission Operations) to calculate Catawba RTCA (Real Time Contingency Analysis). __ 3) <u>**WHEN**</u> time and manpower permit, <u>**THEN**</u> restore affected generator connection with switchyard. <u>**REFER TO**</u> Enclosure 1 (Offsite Power Restoration) . b. <u>**IF AT ANY TIME**</u> the following condition exists: __ • Any switchyard bus energized <u>**AND**</u> • Any Unit Tie PCB will be open greater than 1 hour, __ <u>**THEN**</u> coordinate with Station Management to evaluate isolating affected Unit Tie PCB(s) to prevent damage to PCB capacitors. <u>**REFER TO**</u> OP/0/A/6350/010 (Operation of Station Breakers and Disconnects).

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Event Description:	Zone B Lockout / Auto Turbine Runback Failure						

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 14 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. **Notify DEC BA (Balancing Authority) of Unit 1 status using one of the following:** __ • Red dispatcher phone __ • 800-943-7586 • BA satellite phone: __ • Local: 1-828-490-9313 __ • International: 011-8816-234-60905.	
__ 20. **Determine and correct cause of load rejection.**	

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 15 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. **Shut down unnecessary plant equipment as follows:**	
a. Restore CM and CF as follows:	
__ 1) Verify C-htr drain pumps - ON.	__ 1) **<u>WHEN</u>** time and manpower permit, **<u>THEN</u>** complete shutdown of C-htr drain pumps. **<u>REFER TO</u>** OP/1/B/6250/004 (Feedwater Heater Vents, Drains and Bleed System).
__ 2) Verify both CF Pumps - IN SERVICE.	__ 2) **<u>GO TO</u>** Step 21.a.4.
__ 3) Shutdown one CF pump as necessary. **<u>REFER TO</u>** OP/1/A/6250/001 (Condensate and Feedwater System).	
__ 4) Shutdown excess Condensate Booster Pumps. **<u>REFER TO</u>** OP/1/A/6250/001 (Condensate and Feedwater System).	
__ 5) Shutdown excess Hotwell Pumps. **<u>REFER TO</u>** OP/1/A/6250/001 (Condensate and Feedwater System).	
__ b. RC pump(s) and cooling tower fans. **<u>REFER TO</u>** OP/1/B/6400/001A (Condenser Circulating Water System).	

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 16 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22. **Reset steam dump valves as follows:**	
__ a. Verify reactor power - STABLE.	a. Perform the following: __ 1) **WHEN** reactor power stable, **THEN** perform Steps 22.b through 22.g. __ 2) **GO TO** Step 23.
__ b. Verify steam dump valves - IN "T-AVG" MODE.	b. Perform the following: 1) **IF** using S/G PORVs, **THEN** perform the following: __ a) **WHEN** T-Avg within 1°F of T-Ref **AND** stable, **THEN** CLOSE S/G PORVs. __ b) **GO TO** Step 22.d. 2) **WHEN** T-Avg within 1°F of T-Ref **AND** stable, **THEN** perform the following: __ a) Ensure steam dumps - CLOSED. __ b) Perform Steps 22.d through 22.g. __ 3) **GO TO** Step 23.
__ c. Verify steam dump valves - CLOSED.	c. Perform the following: __ 1) **WHEN** steam dump valves closed, **THEN** perform Steps 22.d through 22.g. __ 2) **GO TO** Step 23.
__ d. Reset C7A and C7B by placing STEAM DUMP SELECT switch to RESET.	

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 17 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22. (Continued)	
e. Verify the following status lights (1SI-18) - DARK: __ • "C-7A LOSS OF LOAD INTLK COND DUMP" __ • "C-7B LOSS OF LOAD INTLK ATMOS DUMP".	__ e. **IF** C-7A or C-7B will not reset, **THEN** notify Station Management.
__ f. **IF** "T-AVG" mode of operation available, **THEN** ensure steam dump valves in "T-AVG" mode.	
__ g. Verify "STM DUMP CTRL" - IN AUTO.	__ g. **IF** steam dumps in "T-AVG" mode, **THEN** place "STM DUMP CTRL" in auto.
__ 23. **Verify reactor power - GREATER THAN 15%.**	__ **Transfer feed flow to CA nozzles. REFER TO Enclosure 2 (Transferring Feed Flow From CF To CA Nozzles).**
__ 24. **Verify CA pumps - OFF.**	**Perform the following:** __ a. **WHEN** CA no longer needed to feed S/G(s), **THEN** shutdown CA System following automatic start **AND** return CA System to standby readiness. **REFER TO** OP/1/A/6250/002 (Auxiliary Feedwater System). __ b. Re-establish S/G blowdown as required. **REFER TO** OP/1/A/6250/008 (Steam Generator Blowdown).

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 18 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 25. **Verify reactor power change - GREATER THAN <u>OR</u> EQUAL TO 15% IN A 1 HOUR PERIOD.**	__ **<u>GO</u> <u>TO</u> Step 27.**
26. **Notify the following sections to take appropriate samples:** __ • Radiation Protection to sample and analyze gaseous effluents. **<u>REFER</u> <u>TO</u>** Selected Licensee Commitments Manual, Section 16.11-6 __ • Primary Chemistry to sample for isotopic analysis of iodine. **<u>REFER</u> <u>TO</u>** Tech Specs 3.4.16 (Sample must be taken between 2 hours and 6 hours following last power change greater than or equal to 15% rated thermal power within a 1 hour period).	
27. **Ensure compliance with appropriate Tech Specs:** __ • 3.1.1 (Shutdown Margin (SDM)) __ • 3.1.6 (Control Bank Insertion Limits) __ • 3.8.1 (AC Sources - Operating) __ • 3.7.8 (Nuclear Service Water System (NSWS)) __ • 3.7.10 (Control Room Area Ventilation System (CRAVS)) __ • 3.7.11 (Control Room Area Chilled Water System (CRACWS)) __ • 3.7.12 (Auxiliary Building Filtered Ventilation Exhaust System(ABFVES)) __ • SLC 16.8-2 (230 KV Switchyard Systems).	**<u>TECH SPEC EVALUATION</u>** ***<u>See Attachment 13 for applicable Tech Specs.</u>*** **T.S. 3.1.6** **<u>Condition</u> <u>A</u>: (Verify SDM within 1 hour OR Initiate boration to resore SDM within 1 hour AND Restore Control Banks to within limits in 2 hours)** **T.S. 3.8.1** **<u>Condition</u> <u>A</u>: (Perform SR 3.8.1.1 for OPERABLE offsite circuit within 1 hour and Restore offsite circuit to OPERABLE status within 72 hours)** **T.S. 3.7.8** **<u>Condition</u> <u>A</u>: (Restore NSWS train to OPERABLE status within 72 hours)** **SLC 16.8-2** **<u>Condition</u> <u>A</u>: (Return switchyard equipment to normal Commitment alignment in accordance with ERAT)**
__ 28. **Notify Engineering of occurrence.**	

Op Test No.:	301	Scenario #	2	Event #	6	Page	62 of 142
Event Description:	Zone B Lockout / Auto Turbine Runback Failure						

CNS AP/1/A/5500/003	LOAD REJECTION Case I Generator Connected To Switchyard	PAGE NO. 19 of 56 Revision 46

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 29. **Determine long term plant status. <u>RETURN TO</u> OP/1/A/6100/003 (Controlling Procedure For Unit Operation).**	

<u>END</u>

<u>Note to Evaluator:</u>

This completes Event 6. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 7 (Multiple Control Rods Drop).

Op Test No.: 301	Scenario # 2	Event # 7	Page 63	of 142			
Event Description:	Multiple Control Rods Drop						

Control Room Indications
1AD-2, D/9 “RPI AT BOTTOM ROD DROP” - LIT
1AD-2, E/9 “RPI TWO OR MORE RODS AT BOTTOM” - LIT

Note To Evaluator:

The OATC will initiate a Reactor Trip based on Immediate Actions of AP/1/A/5500/014 (shown below) and the crew will transition to EP/1/A/5000/E-0.

CNS AP/1/A/5500/014	CONTROL ROD MISALIGNMENT Case I Control Rod Misalignment	PAGE NO. 2 of 10 Revision 16

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Verify only one rod - MISALIGNED.**	**IF two or more rods are misaligned by greater than 24 steps, THEN:** __ a. Manually trip Reactor. __ b. GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
__ 2. **Verify affected rod bottom light(s) - DARK.**	__ **IF rod is dropped, THEN GO TO Case II (Dropped Control Rod).**
__ 3. **Verify Unit Power - STABLE.**	**IF turbine runback in progress, THEN perform the following:** __ a. When target load reached, THEN perform Steps 4 through 6. __ b. Observe Note prior to Step 7 and GO TO Step 7.
__ 4. **Ensure "CRD BANK SELECT" switch - IN MANUAL.**	
__ 5. **Stop any turbine load changes in progress.**	
__ 6. **Adjust turbine load to maintain T-Avg within 1°F of T-Ref.**	

Op Test No.:	301	Scenario #	2	Event #	8, 9, 10	Page	65	of	142

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **4 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** **Enclosure 1 is included as Attachment 5.**
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
2. **Verify Reactor Trip:**	**Perform the following:**
__ • All rod bottom lights - LIT	__ a. Trip reactor.
__ • All reactor trip and bypass breakers - OPEN	N/A b. **IF** reactor will not trip, **THEN** concurrently perform the following:
__ • I/R power - DECREASING.	__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees)
	__ • **GO TO** EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS).
3. **Verify Turbine Trip:**	**Perform the following:**
__ • All turbine stop valves - CLOSED.	__ a. Trip turbine.
	b. **IF** turbine will not trip, **THEN** perform the following:
	__ 1) Depress "MANUAL" pushbutton on turbine control panel.
	__ 2) Rapidly CLOSE control valves by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons.
	3) **IF** control valves will not close, **THEN** CLOSE:
	__ • All MSIVs
	__ • All MSIV bypass valves.

Op Test No.:	301	Scenario #	2	Event #	8, 9, 10	Page	66	of	142

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 5 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 4. **Verify 1ETA and 1ETB - ENERGIZED.**	**Perform the following:** __ a. **IF** 1ETA **AND** 1ETB de-energized, **THEN GO TO** EP/1/A/5000/ECA-0.0 (Loss of All AC Power). __ b. **WHEN** time allows, **THEN** attempt to restore power to de-energized switchgear while continuing with this procedure. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power).

Op Test No.:	301	Scenario #	2	Event #	8, 9, 10	Page	67	of	142

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 6 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify S/I actuated:**	
__ a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.	a. Perform the following: 1) Verify conditions requiring S/I: __ • Pzr pressure - LESS THAN 1845 PSIG OR __ • Containment pressure - GREATER THAN 1.2 PSIG. __ 2) **IF** S/I required, **THEN** initiate S/I. N/A 3) **IF** S/I not required, **THEN** concurrently perform the following: • **IF** 1ETA **OR** 1ETB de-energized, **THEN** ensure the following pumps running on energized bus: __ • NV pump __ • KC pump __ • RN pump. __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ • **GO TO** EP/1/A/5000/ES-0.1 (Reactor Trip Response).
__ b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.	__ b. Initiate S/I.
__ 6. **Announce "Unit 1 Safety Injection".**	

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **7 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Determine required notifications:**	
__ • **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)	
__ • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).	
__ 8. **Verify all Feedwater Isolation status lights (1SI-5) - LIT.**	**Perform the following:** __ a. Initiate Feedwater Isolation. __ b. **IF** proper status light indication not obtained, **THEN** CLOSE valves.
	Note to Evaluator: **OATC will manually close 1CF-51.**
9. **Verify Phase A Containment Isolation status as follows:**	
__ a. Phase A "RESET" lights - DARK.	__ a. Initiate Phase A Isolation.
__ b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.	__ b. Align valves as necessary to ensure each penetration isolated by at least one isolation valve.

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **8 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Verify Phase B actuation status as follows:**	
__ a. Verify containment pressure - HAS REMAINED LESS THAN 3 PSIG.	a. Perform the following:
	1) Verify Phase B Isolation actuated as follows:
	__ a) Phase B Isolation "RESET" lights - DARK.
	__ b) IF Phase B Isolation "RESET" lights lit, **THEN** initiate Phase B Isolation.
	c) Verify following monitor light panel lights - LIT:
	__ • Group 1 Sp lights
	__ • Group 5 Sp lights
	__ • Group 5 St light L/11.
	__ d) IF monitor light panel not in correct alignment, **THEN** ensure correct alignment.
	__ 2) Stop all NC pumps.
	__ 3) Maintain seal injection flow.
	__ 4) Energize H_2 igniters.
	(RNO continued on next page)

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **9 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	5) Dispatch operator to perform the following: __ a) Secure all ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units). __ b) Place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems).
	__ 6) **WHEN** 9 minutes elapsed, **THEN** verify proper VX system operation. **REFER TO** Enclosure 5 (VX System Operation).
	__ 7) **GO TO** Step 11.
__ b. **IF AT ANY TIME** containment pressure exceeds 3 PSIG while in this procedure, **THEN** perform Step 10.a.	

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Event Description:	Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure						

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **10 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. **Verify proper CA pump status as follows:**	
__ a. Motor driven CA pumps - ON.	a. Perform the following for affected train(s): __ 1) Reset ECCS. __ 2) Reset D/G load sequencer(s). __ 3) Start affected pump(s). __ 4) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
__ b. 3 S/G N/R levels - GREATER THAN 11%.	b. Perform the following: __ 1) Place CA PMP #1 control switch to ON. __ 2) Ensure CA pump #1 - RUNNING.
12. **Verify all of the following S/I pumps - ON:** __ • NV pumps __ • ND pumps __ • NI pumps.	**Perform the following for affected train(s):** __ a. Reset ECCS. __ b. Reset D/G load sequencer(s). __ c. Start affected pump(s). __ d. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **11 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Verify all KC pumps - ON.**	**Perform the following for affected train(s):** __ a. Reset ECCS. __ b. Reset D/G load sequencer(s). __ c. Start affected pump(s). __ d. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on. __ e. **IF** KC flow cannot be established to NC pumps, **THEN** stop all NC pumps.
__ 14. **Verify all Unit 1 and Unit 2 RN pumps - ON.**	**Perform the following:** __ a. **IF** any Unit 2 RN pump off, **THEN** start affected pump(s). b. **IF** any Unit 1 RN pump off, **THEN** perform the following for affected train(s): __ 1) Reset ECCS. __ 2) Reset D/G load sequencer(s). __ 3) Start affected pump(s). __ 4) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
15. **Verify proper ventilation systems operation as follows:** __ • **REFER TO** Enclosure 2 (Ventilation System Verification) __ • Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).	**Note to Evaluator:** **Enclosure 2 is included as Attachment 6.**

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 12 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 16. **Verify all S/G pressures - GREATER THAN 775 PSIG.**	**Perform the following:** a. Verify Main Steam Isolation as follows: __ • All MSIVs - CLOSED __ • All MSIV bypass valves - CLOSED __ • All S/G PORVs - CLOSED. b. IF any valve open, THEN perform the following: __ 1) Initiate Main Steam Isolation. __ 2) IF any valve still open, THEN CLOSE valve.
17. **Verify proper S/I flow as follows:**	
__ a. "NV S/I FLOW" - INDICATING FLOW.	__ a. Start NV pump(s) and align valves.

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **13 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
__ b. NC pressure - LESS THAN 1620 PSIG.	b. Perform the following: __ 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN. 2) **IF** ND pump miniflow valve(s) cannot be opened, **THEN** perform the following for affected train(s): __ a) Reset ECCS. __ b) Reset D/G load sequencer. __ c) Stop ND pump. __ d) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on. __ e) **IF AT ANY TIME** NC pressure decreases to less than 285 PSIG in uncontrolled manner, **THEN** restart ND pump. __ 3) **GO TO** Step 18.
__ c. NI pumps - INDICATING FLOW.	__ c. Start NI pump(s) and align valves.

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **14 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
__ d. NC pressure - LESS THAN 285 PSIG.	d. Perform the following: __ 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN. N/A 2) **IF** ND pump miniflow valve(s) cannot be opened, **THEN** perform the following for affected train(s): __ a) Reset ECCS. __ b) Reset D/G load sequencer. __ c) Stop ND pump. __ d) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on. __ e) **IF AT ANY TIME** NC pressure decreases to less than 285 PSIG in uncontrolled manner, **THEN** restart ND pump. __ 3) **GO TO** Step 18.
__ e. ND pumps - INDICATING FLOW TO C-LEGS.	__ e. Start ND pump(s) and align valves.
__ 18. **WHEN time and manpower permit (within two hours of event), THEN monitor Spent Fuel Pool level and temperature. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).**	**Note to Evaluator:** **Enclosure 1 is included as Attachment 7.**

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **15 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. **Control S/G levels as follows:**	
__ a. Verify total CA flow - GREATER THAN 450 GPM.	a. Perform the following: 1) **IF** N/R level in all S/Gs less than 11% (29% ACC), **THEN** perform the following: __ • Start CA pumps __ • Ensure correct valve alignment. 2) **IF** N/R level in all S/Gs less than 11% (29% ACC) **AND** feed flow greater than 450 GPM cannot be established, **THEN** concurrently perform the following: __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees) __ • **GO TO** EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink).
__ b. **WHEN** each S/G N/R level greater than 11% (29% ACC), **THEN** control feed flow to maintain that S/G N/R level between 11% (29% ACC) and 50%.	
__ 20. **Verify all CA isolation valves - OPEN.**	__ **OPEN valve(s).**
__ 21. **Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.**	__ **Align equipment.**

Op Test No.: 301	Scenario # 2	Event #	8, 9, 10	Page	77	of	142

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **16 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.

__ 22. **Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).**

Note to Evaluator:

Enclosure 4 is included as Attachment 8.

23. **Verify Pzr PORV and Pzr Spray Valve status as follows:**

__ a. All Pzr PORVs - CLOSED.

a. **IF** Pzr pressure less than 2315 PSIG, **THEN** perform the following:

__ 1) CLOSE Pzr PORV(s).

__ 2) **IF** any Pzr PORV cannot be closed, **THEN** CLOSE its isolation valve.

3) **IF** 1NC-32B **OR** 1NC-34A cannot be closed **OR** isolated, **THEN** perform the following:

a) Align N_2 to PORVs by opening the following valves:

__ • 1NI-438A (Emer N2 From CLA A To 1NC-34A)

__ • 1NI-439B (Emer N2 From CLA B To 1NC-32B).

__ b) CLOSE affected Pzr PORV.

(RNO continued on next page)

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 17 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. (Continued)	4) **IF** any Pzr PORV cannot be closed **OR** isolated, **THEN** perform the following: __ a) Energize H_2 igniters. b) Dispatch operator to perform the following: __ (1) Secure all ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units). __ (2) Place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems). c) **IF AT ANY TIME** both the following conditions exist: __ • Containment pressure - HAS REMAINED LESS THAN 3 PSIG __ • Containment pressure - BETWEEN 1 PSIG **AND** 3 PSIG, __ **THEN** start one VX fan and secure normal containment ventilation. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 18 (VX and Containment Ventilation Control). (RNO continued on next page)

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **18 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. (Continued)	
	d) Concurrently perform the following: __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees) __ • <u>GO TO</u> EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).
__ b. Normal Pzr spray valves - CLOSED.	b. <u>IF</u> Pzr pressure less than 2150 PSIG, <u>THEN</u> perform the following: __ 1) CLOSE spray valve(s). 2) <u>IF</u> spray valve(s) cannot be closed, <u>THEN</u> perform the following: __ a) Stop NC pumps 1A and 1B. __ b) <u>IF</u> both 1C <u>AND</u> 1D NC pumps on, <u>THEN</u> stop one additional pump.
__ c. At least one Pzr PORV isolation valve - OPEN.	__ c. <u>IF</u> power available, <u>THEN</u> OPEN one Pzr PORV isolation valve unless it was closed to isolate an open Pzr PORV.
__ 24. **Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.**	**<u>IF</u> any NV <u>OR</u> NI pump on, <u>THEN</u> perform the following:** __ a. Ensure all NC pumps - OFF. __ b. Maintain seal injection flow.

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **19 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. **Verify main steamlines intact:** __ • All S/G pressures - STABLE OR INCREASING __ • ALL S/Gs - PRESSURIZED.	**IF any S/G faulted, THEN perform the following:** __ a. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ b. GO TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).
26. **Verify S/G tubes intact as follows:** • Verify the following EMF trip 1 lights - DARK: __ • 1EMF-33 (Condenser Air Ejector Exhaust) __ • 1EMF-26 (Steamline 1A) __ • 1EMF-27 (Steamline 1B) __ • 1EMF-28 (Steamline 1C) __ • 1EMF-29 (Steamline 1D). __ • All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.	**IF any EMF trip 1 light lit OR any S/G level increasing in uncontrolled manner, THEN concurrently:** __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ • GO TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture).

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **20 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

27. **Verify NC system intact as follows:**

- __ • Containment pressure - LESS THAN 1 PSIG.
- __ • **IF** normal off-site power available, **THEN** verify containment pressure less than 0.3 PSIG.
- • Containment high range EMFs - LESS THAN 3 R/HR:
  - __ • 1EMF-53A (Containment Trn A)
  - __ • 1EMF-53B (Containment Trn B).
- • Containment EMF trip 1 lights - DARK:
  - __ • 1EMF-38 (Containment Particulate)
  - __ • 1EMF-39 (L) (Containment Gas (Lo Range)).
- __ • Containment sump level - STABLE.

Note to Evaluator:

Enclosure 18 is included as Attachment 9.

Perform the following:

__ a. Energize H_2 igniters.

b. Dispatch operator to perform the following:

__ 1) Secure all ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units).

__ 2) Place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems).

c. **IF AT ANY TIME** both the following conditions exist:

- __ • Containment pressure - HAS REMAINED LESS THAN 3 PSIG
- __ • Containment pressure - BETWEEN 1 PSIG **AND** 3 PSIG,

__ **THEN** start one VX fan and secure normal containment ventilation. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 18 (VX and Containment Ventilation Control).

d. Concurrently:

- __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).
- __ • **GO TO** EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 2 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** **Enclosure 1 is included as Attachment 10.**
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
__ 2. **Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.**	**IF any NV OR NI pump on, THEN perform the following:** __ a. Ensure all NC pumps - OFF. __ b. Maintain seal injection flow.
3. **Verify main steamlines intact:** __ • All S/G pressures - STABLE **OR** TRENDING UP __ • All S/Gs - PRESSURIZED.	**IF pressure in any S/G trending down in uncontrolled manner OR depressurized, THEN perform the following:** a. **IF** any faulted S/G(s) feedlines **OR** steamlines not isolated, **THEN** perform the following: __ 1) **IF** EP/1/A/5000/E-2 (Faulted Steam Generator Isolation) has been performed for affected S/G, **THEN GO TO** Step 3, RNO b. __ 2) **GO TO** EP/1/A/5000/E-2 (Faulted Steam Generator Isolation). b. **IF** affected S/G(s) faulted outside containment, **THEN** request RP to perform the following: __ 1) Monitor area of steam fault for radiation. __ 2) Notify Control Room of any abnormal radiation conditions.

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 3 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Control intact S/G N/R levels as follows:**	
__ a. Verify N/R level in any intact S/Gs - GREATER THAN 11% (29% ACC).	__ a. Maintain total feed flow greater than 450 GPM until any intact S/G N/R level greater than 11% (29% ACC).
__ b. THROTTLE feed flow to maintain all intact S/G N/R levels between 11% (29% ACC) and 50%.	__ b. <u>IF</u> N/R level in any S/G continues to trend up in uncontrolled manner, <u>**THEN GO TO**</u> EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
5. **Reset the following:**	
__ a. ECCS.	__ a. Locally reset ECCS. <u>**REFER TO**</u> EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 4 (ECCS Master Reset).
__ b. D/G load sequencers.	b. Dispatch operator to open affected sequencer(s) control power breaker: __ • 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496) __ • 1EDF-F01F (Diesel Generator Load Sequencer Panel 1DGLSB) (AB-560, BB-46, Rm 372).
__ c. Phase A.	
__ d. Phase B.	
__ e. <u>**IF AT ANY TIME**</u> B/O occurs, <u>**THEN**</u> restart S/I equipment previously on.	

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 4 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Establish VI to Containment as follows:** __ • Ensure 1VI-77B (VI Cont Isol) - OPEN __ • Verify VI pressure - GREATER THAN 85 PSIG.	**Perform the following:** a. Align N_2 to Pzr PORVs by opening the following valves: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B). b. <u>IF</u> VI pressure less than 85 PSIG, <u>THEN</u> perform the following: __ 1) Dispatch operator to ensure proper VI compressor operation. __ 2) Restore VI while continuing with this procedure. <u>REFER TO</u> AP/0/A/5500/022 (Loss of Instrument Air).
7. **Verify secondary radiation - NORMAL:** a. Ensure the following signals - RESET: __ 1) CA System valve control. __ 2) KC NC NI NM St signals. __ b. Align all S/Gs for Chemistry sampling. c. Perform at least one of the following: __ • Notify Chemistry to sample all S/Gs for activity OR __ • Notify RP to frisk all cation columns for activity.	

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 5 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
d. Verify the following EMF trip 1 lights - DARK: __ • 1EMF-33 (Condenser Air Ejector Exhaust) __ • 1EMF-26 (Steamline 1A) __ • 1EMF-27 (Steamline 1B) __ • 1EMF-28 (Steamline 1C) __ • 1EMF-29 (Steamline 1D).	__ d. **GO TO** EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
e. Verify all S/Gs - INTACT: __ • All S/G pressures - STABLE **OR** TRENDING UP __ • All S/Gs - PRESSURIZED.	e. **IF** any S/G(s) faulted outside containment, **THEN** request RP to perform the following: __ • Monitor area of steam fault for radiation __ • Notify Control Room of any abnormal radiation conditions.
__ f. **WHEN** activity results reported, **THEN** verify all S/Gs indicate no activity.	f. Perform the following: __ 1) Notify Station Management to evaluate S/G(s) activity results. __ 2) **IF** S/G(s) activity indicate SGTR, **THEN GO TO** EP/1/A/5000/E-3 (Steam Generator Tube Rupture).

Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 6 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Verify Pzr PORVs and Isolation Valves:**	
__ a. Power to all Pzr PORV isolation valves - AVAILABLE.	__ a. Evaluate cause of power loss and initiate actions to restore power to affected isolation valve(s).
__ b. All Pzr PORVs - CLOSED.	b. **IF** Pzr pressure less than 2315 PSIG, **THEN** perform the following: __ 1) CLOSE Pzr PORV(s). __ 2) **IF** any Pzr PORV cannot be closed, **THEN** CLOSE its isolation valve. 3) **IF** 1NC-32B **OR** 1NC-34A cannot be closed **OR** isolated, **THEN** perform the following: a) Align N_2 to PORVs by opening the following valves: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B). __ b) CLOSE affected Pzr PORV.
__ c. Any Pzr PORV isolation valve - OPEN.	__ c. OPEN one Pzr PORV isolation valve unless it was closed to isolate an open Pzr PORV.
__ d. **IF AT ANY TIME** any Pzr PORV opens due to high pressure, **THEN** after Pzr pressure lowers to less than 2315 PSIG, ensure PORV closes or isolated.	

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 7 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Verify S/I termination criteria:**	
__ a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.	__ a. **GO TO** Step 9.f.
b. Secondary heat sink:	__ b. **GO TO** Step 9.f.
__ • Any intact S/G N/R level - GREATER THAN 11% (29% ACC) OR __ • Total feed flow to intact S/Gs - GREATER THAN 450 GPM.	
__ c. NC pressure - STABLE OR TRENDING UP.	__ c. **GO TO** Step 9.f.
__ d. Pzr level - GREATER THAN 11% (30% ACC).	d. Perform the following: __ 1) **IF** NC pressure trending up **AND** normal Pzr spray available, **THEN** attempt to stabilize NC pressure using normal Pzr spray. __ 2) **GO TO** Step 9.f.
__ e. **GO TO** EP/1/A/5000/ES-1.1 (Safety Injection Termination).	
__ f. Monitor S/I termination criteria. **REFER TO** Enclosure 2 (S/I Termination Criteria).	**Note to Evaluator:** **Enclosure 2 is included as Attachment 11.**
__ g. **IF AT ANY TIME** S/I termination criteria met while in this procedure, **THEN RETURN TO** Step 9.	

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 8 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Determine if ND pumps should be stopped:**	
__ a. NC pressure - GREATER THAN 285 PSIG.	__ a. <u>GO TO</u> Step 12.
__ b. NC pressure - STABLE OR TRENDING UP.	__ b. <u>GO TO</u> Step 11.
__ c. Any ND pump - ON.	__ c. <u>GO TO</u> Step 10.f.
__ d. Any running ND pump suction - ALIGNED TO FWST.	__ d. <u>GO TO</u> Step 11.
__ e. Stop ND pump(s) with suction aligned to FWST.	
__ f. <u>IF AT ANY TIME</u> NC pressure lowers to less than 285 PSIG in uncontrolled manner, <u>THEN</u> restart ND pumps.	
11. **Verify NC and S/G pressures as follows:**	
__ a. All S/G pressures - STABLE OR TRENDING UP.	__ a. <u>IF</u> S/G pressure trending down due to faulted S/G, <u>THEN RETURN TO</u> Step 1.
__ b. NC pressure - STABLE OR TRENDING DOWN.	__ b. <u>RETURN TO</u> Step 1.

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 9 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. **Verify D/Gs should be stopped:**	
__ a. Any D/G - ON.	__ a. <u>GO TO</u> Step 13.
b. Verify 1ETA energized by offsite power as follows: __ • "D/G 1A BKR TO ETA" - OPEN __ • 1ETA - ENERGIZED.	b. Perform the following: __ 1) Attempt to restore offsite power to affected switchgear. <u>REFER TO</u> AP/1/A/5500/007 (Loss of Normal Power). __ 2) <u>GO TO</u> Step 12.d.
__ c. Dispatch operator to stop 1A D/G and place in standby readiness. <u>REFER TO</u> OP/1/A/6350/002 (Diesel Generator Operation).	
d. Verify 1ETB energized by offsite power as follows: __ • "D/G 1B BKR TO ETB" - OPEN __ • 1ETB - ENERGIZED.	d. Perform the following: __ 1) Attempt to restore offsite power to affected switchgear. <u>REFER TO</u> AP/1/A/5500/007 (Loss of Normal Power). __ 2) <u>GO TO</u> Step 13.
__ e. Dispatch operator to stop 1B D/G and place in standby readiness. <u>REFER TO</u> OP/1/A/6350/002 (Diesel Generator Operation).	

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 10 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. **Obtain containment H_2 concentration as follows:**	
__ a. Ensure operator dispatched to secure all ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units).	
__ b. Verify containment H_2 analyzers - IN SERVICE.	b. Perform the following: __ 1) Dispatch operator to place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems). __ 2) **WHEN** H_2 analyzers in service, **THEN** perform Steps 13.c through 13.e. __ 3) **GO TO** Step 14.
__ c. Verify containment H_2 concentration - LESS THAN 6%.	c. Perform the following: __ 1) Obtain recommendation from Station Management for method to reduce H_2 concentration. __ 2) **GO TO** Step 14.
__ d. Verify H_2 Igniters - ON.	d. **WHEN** the following criteria met, **THEN** energize H_2 igniters (1MC-7): __ • Ice condenser air handling units - SECURED __ • H_2 concentration - LESS THAN 6%.
__ e. Verify containment H_2 concentration - LESS THAN 0.5%.	__ e. Dispatch operator to place H_2 recombiners in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems).

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 11 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. **Initiate evaluation of plant status as follows:**	
a. Verify Cold Leg Recirc capability from at least one train: • A Train: __ • 1A ND pump - AVAILABLE __ • 1NI-185A (ND Pump 1A Cont Sump Suct) - POWER AVAILABLE. OR • B Train: __ • 1B ND pump - AVAILABLE __ • 1NI-184B (ND Pump 1B Cont Sump Suct) - POWER AVAILABLE.	__ a. **IF** Cold Leg Recirc capability not available from either train, **THEN GO TO** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 12 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. (Continued)	
b. Determine if leak in auxiliary building as follows:	
1) Verify auxiliary building radiation: __ • All area monitor EMF trip 1 lights - DARK __ • EMF-41 (Aux Bldg Ventilation) trip 1 light - DARK.	1) Evaluate cause of abnormal conditions as follows: a) Monitor the following to determine location of activity: __ • OAC EMF alarms __ • OAC VA Graphic __ • Area monitor EMFs. __ b) Dispatch operator to locate potential leak. __ c) <u>IF</u> cause of alarm LOCA outside containment, <u>THEN</u> <u>GO TO</u> EP/1/A/5000/ECA-1.2 (LOCA Outside Containment).

NOTE The following step is checking for a significant NC leak into the ND System.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2) Verify NC to ND pressure boundary intact as follows: __ • ND Pressure - NORMAL __ • ND Temperature - NORMAL __ • ND Flow - NORMAL.	__ 2) <u>IF</u> ND System parameters indicate LOCA outside containment, <u>THEN</u> <u>GO TO</u> EP/1/A/5000/ECA-1.2 (LOCA Outside Containment).

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Event Description: Control Rod Ejection / Safety Injection Auto Initiate Failure / 1CF-51 Feedwater Isolation Failure

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 13 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. (Continued)	
c. Determine if NC leaking into KC System as follows:	c. Perform the following:
__ • 1EMF-46A (COMPONENT COOLING TRAIN A) trip 1 light - DARK	__ 1) Verify all NC pump KC thermal barrier flows on OAC (KC graph - turn on code "KCRX") - LESS THAN 60 GPM.
__ • 1EMF-46B (COMPONENT COOLING TRAIN B) trip 1 light - DARK.	__ 2) <u>IF</u> any NC pump KC thermal barrier flow greater than 60 gpm, <u>**THEN**</u> isolate failed NC pump thermal barrier. <u>**REFER TO**</u> Enclosure 3 (Thermal Barrier Leak Isolation).
__ d. Ensure KC NC NI NM St signals - RESET.	
__ e. <u>**WHEN**</u> TSC staffed, <u>**THEN**</u> notify TSC to perform Enclosure 4 (TSC Actions).	
15. **Determine if NC System cooldown and depressurization required as follows:**	
__ a. NC pressure - GREATER THAN 285 PSIG.	__ a. <u>IF</u> ND flow to C-Legs greater than 675 GPM, <u>**THEN GO TO**</u> Step 16.
__ b. <u>**GO TO**</u> EP/1/A/5000/ES-1.2 (POST LOCA Cooldown and Depressurization).	

<u>Note to Evaluator:</u>

Once the decision is made to transition to ES-1.2, the scenario may be terminated by instructing the booth operator to place the simulator in FREEZE.

Attachment List

Scenario 2

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 -	AP/1/A/5500/021 Enclosure 1 (Foldout Page)
ATTACHMENT 4 -	AP/1/A/5500/003 Enclosure 3 (Rod Insertion Limit Boration)
ATTACHMENT 5 -	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page)
ATTACHMENT 6 -	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification)
ATTACHMENT 7 -	EP/1/A/5000/G-1 Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring)
ATTACHMENT 8 -	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control)
ATTACHMENT 9 -	EP/1/A/5000/G-1 Enclosure 18 (VX and Containment Ventilation Control)
ATTACHMENT 10 -	EP/1/A/5000/E-1 Enclosure 1 (Foldout Page)
ATTACHMENT 11 -	EP/1/A/5000/E-1 Enclosure 2 (S/I Termination Criteria)
ATTACHMENT 12 -	AP/1/A/5500/008 Enclosure 1 (Foldout Page)
ATTACHMENT 13 -	Scenario Specific Technical Specifications

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		1	Manually re-open 1KC-424B (NC Pumps Ret Hdr Cont Isol) prior to reaching RCT motor bearing temperature of 195 degrees (RCP trip criteria).
		2	Manually decrease Main Turbine load prior to overcurrent trip of 1A Generator PCB.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	**Power History**	**NCS Boron**	**Xenon**
100 **%**	MOL	894 PPM	per OAC
Controlling Procedure			
• OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.3 (Unit Operation Between 85% and 100% Power) is complete.			
Other Information Needed to Assume the Shift			
Unit 1 is at 100% power at the MOL. Unit 2 is at 100% power. Unit 1 has previously entered AP/1/A/5500/037 due to a grid disturbance. Main generator voltage is currently less than the CNS Generator Voltage Operating Schedule due to this issue. All applicable actions have been completed. The SOC is working to restore grid voltage and will provide guidance, as required. Direction for the crew is to swap operating KC Pumps by starting 1B1 KC Pump and securing 1B2 KC Pump per OP/1/A/6400/005 (Component Cooling System), Enclosure 4.15 (Shifting KC Pumps). The SOC and site management have approved KC Pump swap. 1B1 KC Pump pre-start check is complete.			
AOs Available			
Seven AOs are available as listed on the status board			
METEOROLOGICAL CONDITIONS			
• Upper wind direction = 315 degrees, speed = 3 mph • Lower wind direction = 315 degrees, speed = 4.5 mph • Forecast calls for clear skies over the next 24 hours.			

ATTACHMENT 3

1. **SSF Manning Criteria:**

<u>CAUTION</u> **Failure to restore NC pump seal cooling via thermal barrier cooling or NV seal injection within ten minutes will cause damage to the NC pump seals resulting in NC System inventory loss.**

<u>IF AT ANY TIME</u> KC <u>AND</u> NV seal cooling for any NC pump lost, <u>THEN</u> perform the following:

__ a. Dispatch operator to SSF to establish NC pump seal injection. <u>REFER TO</u> EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 19 (Establishing NC Makeup/Seal Injection From The SSF).

b. <u>IF</u> 1EMXS de-energized, <u>THEN</u> perform the following:

__ 1) Dispatch operator to 1ETA switchgear room to align alternate power supply to 1EMXS. <u>REFER TO</u> EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 20 (Align Alternate Power Supply To 1EMXS).

__ 2) Notify operator at SSF (Ext. 5251 or 5212) operator has been dispatched to align alternate power supply to 1EMXS.

2. **NC Pump Trip Criteria:**

- <u>IF</u> any of the following NC pump trip criteria met:

__ • KC flow unavailable to NC pumps - GREATER THAN 10 MINUTES

<u>OR</u>

__ • #1 Seal outlet temperature - GREATER THAN 235°F

<u>OR</u>

__ • Lower bearing temperature - GREATER THAN 225°F

<u>OR</u>

__ • Motor bearing temperature - GREATER THAN 195°F,

__ <u>THEN GO TO</u> Enclosure 6 (Rx Trip Sequence).

ATTACHMENT 3

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING Enclosure 1 - Page 2 of 2 **Foldout Page**	PAGE NO. 20 of 36 Revision 43

NOTE The following step prevents damage to the 1B2 KC pump as a result of deadheading. (NCR #01406467)

3. **IF AT ANY TIME the following conditions met:**

__ • Train B KC non-essential header isolation valves - CLOSED

AND

__ • 1KC-81B (KC To ND Hx 1B Sup Isol) - CLOSED,

__ **THEN** ensure less than 2 Train B KC pumps - IN SERVICE.

NOTE Monitoring of the following steps must continue while KC malfunction exists even if a transition is made to the emergency procedures.

__ 4. **IF AT ANY TIME both trains of KC lost, THEN RETURN TO Section C. (Operator Actions), Step 2.**

5. **IF operators dispatched to align alternate cooling to NV pump 1A, THEN perform the following:**

__ a. **WHEN** alternate cooling aligned, **THEN** perform Enclosure 5 (Maximize NV Pump Run Time), Step 7.

6. **IF AT ANY TIME KC cooling to operating KF pump(s) lost, THEN perform the following:**

__ • **IF** annunciator 1AD-13, D/6 "KF PUMP A MTR CLR HI TEMP" lit, **THEN** secure 1A KF pump and **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).

__ • **IF** annunciator 1AD-13, D/7 "KF PUMP B MTR CLR HI TEMP" lit, **THEN** secure 1B KF pump and **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).

ATTACHMENT 4

CNS AP/1/A/5500/003	LOAD REJECTION Enclosure 3 - Page 1 of 2 **Rod Insertion Limit Boration**	PAGE NO. 54 of 56 Revision 46

CAUTION **Failure to initiate boration within one hour of exceeding rod insertion limits may violate Tech Spec 3.1.6.**

NOTE OAC point C1L4409 (Ctrl Bank Tech Spec Insertion Lmt Reached) and R.O.D Book (Section 2.2) provide rod insertion limit indication.

1. **IF control rods cannot be maintained above rod insertion limits, THEN perform the following:**

   a. Stop any dilutions in progress.

   b. Ensure control rods restored above insertion limits within 2 hours of exceeding limits.

   c. Ensure compliance with Tech Spec 3.1.6 (Control Bank Insertion Limits).

2. **Perform one of the following to restore control rods above insertion limits:**

   a. IF initial reactor power was 100%, THEN borate NC System as required to restore control rods above insertion limits. REFER TO Unit 1 R.O.D. book, section 4.8 (Reactivity Data Sheet).

ATTACHMENT 4

CNS AP/1/A/5500/003	LOAD REJECTION Enclosure 3 - Page 2 of 2 **Rod Insertion Limit Boration**	PAGE NO. 55 of 56 Revision 46

2. (Continued)

   b. **IF** initial reactor power was less than 100% **OR** Unit 1 R.O.D. book, section 4.8 (Reactivity Data Sheet) is **NOT** available, **THEN** perform the following as required to restore control rods above insertion limits:

NOTE OAC point C1P1448 (Low Bank Insertion Limit Margin) and R.O.D Book (Section 2.2) provide rod insertion limit indication.

1) Determine control rod insertion limit. ________.

2) Calculate "A" (reactivity difference between required rod position and current rod position). **REFER TO** Unit 1 R.O.D. book section 5.6.3.

   R = Required rod position IRW _________ PCM

   P = Current rod position IRW _________ PCM

   (R - P = A __________ PCM).

3) Determine "B" (differential boron worth). **REFER TO** Unit 1 R.O.D. book section 5.5 ______________ PCM/PPM.

4) Calculate "C" (difference in reactivity) as follows:

   A / B = C ______________ PPM.

5) Calculate "D" (required boron concentration) as follows:

   E = Current Boron concentration _________ PPM.

   E + C = D__________ PPM.

6) Determine required boric acid needed to raise NC System boron concentration to value "D" calculated in Step 2.b.5. **REFER TO** Unit 1 R.O.D. book table 4.1 or REACT Boration/Dilution module. ___________.

NOTE
- The boric acid added to the NC System should be added in several increments within the first hour of the runback.
- Due to the post transient Xenon build-in rate, the total boric acid value calculated in Step 2.b.6, may not need to be added to restore control rods above insertion limits.

7) Borate NC System as required to restore control rods above insertion limits.

ATTACHMENT 5

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 1 - Page 1 of 2** **Foldout Page**	PAGE NO. **34 of 49** **Revision 43**

1. **NC Pump Trip Criteria:**
   - IF the following conditions satisfied, **THEN** trip all NC pumps while maintaining seal injection flow:
     - Any NV or NI pump - DELIVERING S/I FLOW TO NC SYSTEM
     - NC subcooling based on core exit T/Cs - LESS THAN OR EQUAL TO 0°F
     - Reactor power - LESS THAN 5%.

2. **CA Suction Source Switchover Criterion:**
   - IF 1AD-8, B/1 "UST LO LEVEL" lit, **THEN** **REFER** **TO** AP/1/A/5500/006 (Loss of S/G Feedwater).

3. **Position Criteria for 1NV-202B and 1NV-203A (NV Pumps A&B Recirc Isol):**
   - IF NC pressure less than 1500 PSIG **AND** NV S/I flowpath aligned, **THEN** CLOSE 1NV-202B and 1NV-203A.
   - IF NC pressure greater than 2000 PSIG, **THEN** OPEN 1NV-202B and 1NV-203A.

4. **Ruptured S/G CA Isolation Criteria:**
   - IF both the following conditions met, **THEN** stop CA flow to affected S/G(s):
     - Level increasing in uncontrolled manner or radiation level in that S/G abnormal
     - N/R level - GREATER THAN 11% (29% ACC).

5. **Faulted S/G CA isolation Criteria:**
   - IF all the following conditions met, **THEN** stop CA flow to affected S/G:
     - S/G pressure decreasing in uncontrolled manner or completely depressurized
     - Only one S/G diagnosed as faulted
     - Secondary heat sink criteria met:
       - Total CA flow - GREATER THAN 450 GPM

         OR
       - ANY S/G(s) N/R level - GREATER THAN 11%(29% ACC).

ATTACHMENT 5

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 1 - Page 2 of 2** **Foldout Page**	PAGE NO. **35 of 49** **Revision 43**

6. **NS Pump Trip Criterion:**

- IF NS pump in recirc and S/I occurs, **THEN** perform one of the following:
  - IF train affected ECCS and D/G load sequencer - RESET, **THEN** stop NS pump

    OR

  - **WHEN** sequencer loading complete, **THEN** perform the following for affected train:

    a. Notify Control Room Supervisor.

    b. Reset ECCS.

    c. Reset D/G load sequencer.

    d. Secure NS pump.

    e. IF AT ANY TIME B/O occurs, **THEN** restart S/I equipment previously on.

ATTACHMENT 6

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify proper VC/YC operation as follows:**	
a. Verify one train of the following equipment in operation: __ • YC chiller __ • CR AHU-1 __ • CRA AHU-1 __ • CRA PFT-1.	a. Perform the following: __ 1) Shift operating VC/YC trains. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 17 (Shifting Operating VC/YC Trains). 2) **IF** no train can be properly aligned, **THEN** dispatch operator and IAE/Maintenance to restore at least one train of VC/YC. **REFER TO** the following: __ • OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System) __ • EM/0/A/5200/001 (Troubleshooting Cause For Improper Operation of VC/YC System).

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 2 of 7** **Ventilation System Verification**	PAGE NO. **37 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. (Continued)

b. Verify the following alarms - DARK:

__ • 1AD-18, A/8 "UNIT 1 INTAKE HI CHLORINE 1A"

__ • 1AD-18, B/8 "UNIT 1 INTAKE HI CHLORINE 1B"

__ • 1AD-18, D/8 "UNIT 2 INTAKE HI CHLORINE 2A"

__ • 1AD-18, E/8 "UNIT 2 INTAKE HI CHLORINE 2B".

b. **IF** chlorine odor detected in Control Room, **THEN** perform the following based on the status of given alarms:

1) **IF** detectors on both unit intakes in alarm, **THEN** perform the following:

a) Ensure the following VC intake dampers - CLOSED:

__ • 1VC-5B (CRA Filt Inlet)
__ • 1VC-6A (CRA Filt Inlet)
__ • 2VC-5B (CRA Filt Inlet)
__ • 2VC-6A (CRA Filt Inlet).

__ b) **GO TO** Step 1.d.

2) **IF** Unit 1 intake HI chlorine detector(s) in alarm, **THEN** perform the following:

a) Ensure the following VC dampers - CLOSED:

__ • 1VC-5B (CRA Filt Inlet)
__ • 1VC-6A (CRA Filt Inlet).

b) Ensure the following dampers - OPEN:

__ • 2VC-5B (CRA Filt Inlet)
__ • 2VC-6A (CRA Filt Inlet).

__ c) **GO TO** Step 1.d.

(RNO continued on next page)

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 3 of 7** **Ventilation System Verification**	PAGE NO. **38 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. (Continued)	
	3) <u>IF</u> Unit 2 intake Hi chlorine detector(s) in alarm, <u>**THEN**</u> perform the following: a) Ensure the following VC dampers - CLOSED: __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet). b) Ensure the following dampers - OPEN: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet). __ c) <u>GO TO</u> Step 1.d.
c. Ensure the following VC dampers - OPEN: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet) __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet). d. Repeat Step 1 of this enclosure until notified by station management as follows: __ • At least once every 8 hours OR __ • Any time VC/YC related annunciators on 1AD-18 actuate.	

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 4 of 7** **Ventilation System Verification**	PAGE NO. **39 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. **Ensure proper VA system operation as follows:**	
• Ensure the following fans - OFF:	
__ • ABUXF 1A __ • ABUXF 1B.	
• Ensure VA system filter in service as follows:	
__ • 1ABF-D-12 & 19 (VA Filter A Bypass Dampers) - CLOSED	
__ • 1ABF-D-5 & 20 (VA Filter B Bypass Dampers) - CLOSED.	
• Ensure the following fans - ON:	
__ • ABFXF-1A __ • ABFXF 1B.	
3. **Verify proper VE system operation as follows:**	
__ a. VE fans - ON.	__ a. Start fan(s).

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 5 of 7** **Ventilation System Verification**	PAGE NO. **40 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
__ b. Annulus pressure - BETWEEN -1.4 IN. WC AND -1.8 IN. WC.	b. Perform the following:

b. Perform the following:

1) **IF** annulus pressure more positive than -1.4 in. WC, **THEN** perform the following:

a) Verify flow indicated on the following indications:

__ • 1VEP5180 (VE 1A Flow To Stack)
__ • 1VEP5200 (VE 1B Flow To Stack).

b) **IF** flow not indicated, **THEN** dispatch operator to verify status of the following dampers based on their local indication or their operating piston rods being extended 4" to 6":

__ • 1AVS-D-2 (VE A Trn Recirc Damp) (AB-603, JJ-51, Rm 500) - CLOSED

__ • 1AVS-D-7 (VE B Trn Recirc Damp) (AB-603, HH-52, Rm 500) - CLOSED

__ • 1AVS-D-3 (VE A Trn Exh Damp) (AB-603, JJ-52, Rm 500) - OPEN

__ • 1AVS-D-8 (VE B Trn Exh Damp) (AB-603, HH-52, Rm 500) - OPEN.

__ c) Consult plant engineering staff and notify IAE/Maintenance to troubleshoot and repair. **REFER TO** EM/1/A/5200/002 (Troubleshooting Cause For VE System Hi/Lo Pressure).

__ d) **GO TO** Step 3.c.

(RNO continued on next page)

ATTACHMENT 6

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
	2) **IF** annulus pressure more negative than -1.8 in. WC, **THEN** perform the following: __ a) Determine which VE train indicates highest discharge flow to stack. __ b) Within 2 hours, ensure VE train that indicates highest discharge flow to stack secured. __ c) Consult plant engineering staff and notify IAE/Maintenance to troubleshoot and repair. **REFER TO** EM/1/A/5200/002 (Troubleshooting Cause For VE System Hi/Lo Pressure).
__ c. Repeat Step 3.b every 30 minutes until notified by station management.	

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 7 of 7** **Ventilation System Verification**	PAGE NO. **42 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Record time ventilation systems verified on following table:**

TIME	SYSTEM (VC, VE)	INITIALS

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 1 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 3 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Review the following considerations for Spent Fuel Pool monitoring:**	
__ • Control Room temperature indication 1KFP5130 is a non-safety instrument loop. Guidance is provided for local temperature verification if access to Spent Fuel Pool available.	
__ • Normal level indication 1KFP5120 is a non-safety instrument loop powered from 1RPA. Guidance is provided for local temperature verification if access to Spent Fuel Pool available.	
__ • If a loss of all AC Power is anticipated to last greater than 6 hrs, portable Spent Fuel Pool level and temperature instrumentation can be installed if access to Spent Fuel Pool available.	
__ • Seismic event may cause loss of Spent Fuel Pool inventory due to "splashing" of water.	
2. **Monitor Unit 1 KF pump motor cooling as follows:**	
a. Verify the following:	__ a. Ensure affected Unit 1 KF pump(s) - OFF.
__ • KF PUMP A MTR CLR HI TEMP (1AD-13 D/6) - DARK __ • KF PUMP B MTR CLR HI TEMP (1AD-13 D/7) - DARK.	
__ b. **<u>IF AT ANY TIME</u>** KF PUMP MTR CLR HI TEMP annunciator(s) lit, **<u>THEN</u>** perform Step 2.a.	
__ 3. **<u>IF AT ANY TIME</u> Spent Fuel Pool level <u>AND</u> temperature indications unavailable in Control Room, <u>THEN</u> dispatch operator to monitor Unit 1 Spent Fuel Pool. <u>REFER TO</u> Enclosure 24 (Local Spent Fuel Pool Monitoring).**	

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Steps 4 and 5 may be performed concurrently.	
4. **Monitor Unit 1 Spent Fuel Pool level as follows:**	
__ a. Verify Spent Fuel Pool level indication in Control Room - AVAILABLE.	__ a. **GO TO** Step 4.e.
__ b. Verify Spent Fuel Pool level greater than - 39 ft.	b. Notify Control Room Supervisor of the following: __ 1) Unit 1 Spent Fuel Pool level. __ 2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ c. Record Unit 1 Spent Fuel Pool level in the following table:	

Time	Unit 1 SFP Level	Time	Unit 1 SFP Level	Time	Unit 1 SFP Level

__ d. **GO TO** Step 5.

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
e. Determine Spent Fuel Pool level as follows:	
__ 1) Dispatch operator and RP to determine if Unit 1 Spent Fuel Pool area accessible.	
2) **WHEN** Unit 1 Spent Fuel Pool area accessibility determined, **THEN** perform the following:	
__ a) Verify Unit 1 Spent Fuel Pool area - ACCESSIBLE.	a) Notify Station Management to perform the following: __ (1) Evaluate alternate method to monitor Unit 1 Spent Fuel Pool level. __ (2) **IF AT ANY TIME** Unit 1 level estimated less than - 39 ft, **THEN REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level). __ (3) **GO TO** Step 5.
b) Notify dispatched operator to perform the following: (1) Determine Spent Fuel Pool level using the following reference points: __ • Top of skimmer trough is 40 Ft __ • 1 Ft below lip of skimmer trough is 39 Ft __ • Centerline of KF pump suction strainer is 37.5 Ft. __ (2) Report level determination to Control Room.	

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
c) **WHEN** operator reports level, **THEN** perform the following:	
__ (1) Verify level greater than - 39 ft.	(1) Notify Control Room Supervisor of the following: __ 1. Unit 1 Spent Fuel Pool level. __ 2. **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ (2) Record Unit 1 Spent Fuel Pool level in the following table:	

Time	Unit 1 SFP Level	Time	Unit 1 SFP Level	Time	Unit 1 SFP Level

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Monitor Unit 1 Spent Fuel Pool temperature as follows:**	
__ a. Verify Spent Fuel Pool temperature indication in Control Room - AVAILABLE.	__ a. **GO TO** Step 5.e.
__ b. Verify Spent Fuel Pool temperature less than - 125°F.	b. Notify Control Room Supervisor of the following: __ 1) Unit 1 Spent Fuel Pool temperature. __ 2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ c. Record Unit 1 Spent Fuel Pool temperature in the following table:	

Time	Unit 1 SFP Temp	Time	Unit 1 SFP Temp	Time	Unit 1 SFP Temp

__ d. **GO TO** Step 6.

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 6 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 8 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
e. Determine Spent Fuel Pool temperature as follows:	
__ 1) Verify access to Unit 1 Spent Fuel Pool area previously determined.	1) Perform the following: __ a) Dispatch operator and RP to determine if Unit 1 Spent Fuel Pool area accessible. __ b) **WHEN** Unit 1 Spent Fuel Pool area accessibility determined, **THEN** perform Steps 5.e.2 through 5.e.4. __ c) **GO TO** Step 6.
__ 2) Verify Unit 1 Spent Fuel Pool area - ACCESSIBLE.	2) Notify station management to perform the following: __ a) Evaluate alternate method to monitor Unit 1 Spent Fuel Pool temperature. __ b) **IF AT ANY TIME** Unit 1 temperature estimated greater than - 125°F, **THEN REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level). __ c) **GO TO** Step 6.
3) Notify dispatched operator to determine Unit 1 Spent Fuel Pool temperature as follows: __ a) Obtain infrared thermometer from OSC "Emergency Supply Cabinet". __ b) Scan Spent Fuel Pool surface for highest reading. __ c) Report temperature determination to Control Room.	

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 7 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 9 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
4) **WHEN** operator reports temperature, **THEN** perform the following:	
__ a) Verify Spent Fuel Pool temperature - LESS THAN 125°F.	a) Notify Control Room Supervisor of the following: __ (1) Unit 1 Spent Fuel Pool temperature. __ (2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ b) Record Unit 1 Spent Fuel Pool temperature in the following table:	

Time	Unit 1 SFP Temp		Time	Unit 1 SFP Temp		Time	Unit 1 SFP Temp

__ 6. **Notify Control Room Supervisor of Unit 1 Spent Fuel Pool level and temperature.**

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 8 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 10 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **Verify AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level) - IMPLEMENTED.**	**IF AT ANY TIME Unit 1 Spent Fuel Pool cooling NOT established prior to reaching either of the following conditions, THEN notify Control Room Supervisor, REFER TO AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level):** __ • Unit 1 Spent Fuel Pool greater than - 125°F. __ • Unit 1 Spent Fuel Pool level less than - 39 ft.
__ 8. **Repeat this enclosure every 2 hours until notified by station management.**	

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 1 of 5** **NC Temperature Control**	PAGE NO. **44 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify any NC pump - ON.**	**Perform the following:** a. Use NC T-Colds to determine NC temperature as required in subsequent steps. b. <u>GO TO</u> Step 4.
2. **Use NC T-Avg to determine NC temperature as required in subsequent steps.**	
3. **<u>IF AT ANY TIME</u> all NC pumps tripped, <u>THEN</u> use NC T-Colds to determine NC temperature as required in subsequent steps.**	
4. **Verify one of the following:** • NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F OR • NC temperature - TRENDING TO 557°F.	**<u>GO TO</u> Step 8.**
5. **Continue to monitor NC temperature.**	
6. **Notify Control Room Supervisor of NC temperature control status.**	

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 2 of 5** **NC Temperature Control**	PAGE NO. **45 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Do not continue in this enclosure until one of the following occurs:** • NC temperature - GREATER THAN 557°F AND INCREASING IN AN UNCONTROLLED MANNER OR • NC temperature - GREATER THAN 557°F AND STABLE OR • NC temperature - LESS THAN 557°F AND DECREASING IN AN UNCONTROLLED MANNER.	
8. **Verify NC temperature - LESS THAN 557°F AND DECREASING.**	**Perform the following:** a. IF NC temperature greater than 557°F AND increasing, THEN stabilize NC temperature at 557°F as follows: 1) IF steam dumps available, THEN use steam dumps. 2) IF steam dumps not available, THEN use S/G PORVs. b. IF the following conditions exist: • NC temperature greater than 557°F and stable • Time and manpower available, THEN stabilize NC temperature at 557°F as follows: 1) IF steam dumps available, THEN use steam dumps. 2) IF steam dumps not available, THEN use S/G PORVs. c. GO TO Step 10.

ATTACHMENT 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Attempt to stop the NC cooldown as follows:**	
a. Ensure all steam dumps - CLOSED.	
b. Ensure all S/G PORVs - CLOSED.	b. **IF** any S/G PORV cannot be closed, **THEN** CLOSE its isolation valve.
c. Ensure S/G blowdown isolated.	
d. CLOSE the following valves: • 1SM-77A (S/G 1A Otlt Hdr Bldwn C/V) • 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V) • 1SM-75A (S/G 1C Otlt Hdr Bldwn C/V) • 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V).	
e. Verify MSR Second Stage steam supply valves - CLOSED • 1HM-1 (MSRH 1A&1B SSRH Stm Source) • 1HM-2 (MSRH 1C&1D SSRH Stm Source).	e. Perform the following: 1) CLOSE MSR Second Stage steam supply valve(s). 2) **IF** steam flowpath cannot be isolated from Control Room, **THEN** CLOSE the following valves: • All MSIVs • All MSIV bypass valves.

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 4 of 5** **NC Temperature Control**	PAGE NO. **47 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
f. Depress and hold "S/V BEFORE SEAT DRN" "CLOSE" pushbutton (1MC-3) to close the following valves: • 1SM-41 (Stop Vlv #1 Before Seat Drn) • 1SM-44 (Stop Vlv #2 Before Seat Drn) • 1SM-43 (Stop Vlv #3 Before Seat Drn) • 1SM-42 (Stop Vlv #4 Before Seat Drn).	
g. Verify NC cooldown - STOPPED.	g. **IF** cooldown continues, **THEN** THROTTLE feed flow as follows: 1) **IF** S/G N/R level less than 11% (29% ACC) in all S/G's, **THEN** THROTTLE feed flow to achieve the following: • Minimize cooldown • Maintain total feed flow greater than 450 GPM. 2) **WHEN** N/R level greater than 11% (29% ACC) in any S/G, **THEN** THROTTLE feed flow further to achieve the following: • Minimize cooldown • Maintain at least one S/G N/R level greater than 11% (29% ACC). 3) **IF** cooldown continues, **THEN** CLOSE the following valves: • All MSIVs • All MSIV bypass valves.

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 5 of 5** **NC Temperature Control**	PAGE NO. **48 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Continue to perform actions of this enclosure as required to ensure one of the following:** • NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F OR • NC temperature - TRENDING TO 557°F.	
11. **Notify Control Room Supervisor of NC temperature control status.**	

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 18 - Page 1 of 5 **VX and Containment Ventilation Control**	PAGE NO. 51 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE
- One train of VX containment air return fan is manually started and cooling is isolated to containment ventilation to gain sump level margin and avoid sump dilution due to ventilation system drains during small LOCA events.
- Manual start of VX fan is not warranted to address a slow containment pressure increase due solely to loss of normal containment ventilation or VQ release capability.

__ 1. **IF containment pressure goes above 3 PSIG prior to performing this enclosure, THEN return this enclosure to Control Room Supervisor.**

__ 2. **IF NC leak exists, THEN GO TO Step 4.**

3. **IF high containment pressure due only to any of the following:**

   __ • Loss of normal containment ventilation

   OR

   __ • Loss of VQ

   OR

   __ • Secondary line break,

   __ **THEN** return this enclosure to Control Room Supervisor.

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 18 - Page 2 of 5 **VX and Containment Ventilation Control**	PAGE NO. 52 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Start one VX Containment Air Return Fan as follows:**	
__ a. Verify Train "A" containment air return fan and damper - AVAILABLE.	__ a. **GO TO** Step 4.e.
__ b. Place "ARF-1A CONT AIR RETURN FAN" to "ON".	
__ c. **WHEN** approximately 10 seconds have elapsed, **THEN** verify ARF-D-2 (ARF-1A Ret Fan Damper) - OPEN.	c. Perform the following: __ 1) OPEN damper ARF-D-2. __ 2) **IF** ARF-D-2 open, **THEN GO TO** Step 5. 3) **IF** ARF-D-2 remains closed, **THEN** perform the following: __ a) Stop "ARF-1A CONT AIR RETURN FAN". __ b) Do not attempt to start Train "B" containment air return fan. __ c) **WHEN** 9 minutes have elapsed, **THEN** ensure 1VX-1A (HSF-1A INLT ISOL) - CLOSED. __ d) **GO TO** Step 6.
__ d. **GO TO** Step 5.	
__ e. Place "ARF-1B CONT AIR RETURN FAN" to "ON".	

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 18 - Page 3 of 5 **VX and Containment Ventilation Control**	PAGE NO. 53 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
__ f. **WHEN** approximately 10 seconds have elapsed, **THEN** verify ARF-D-4 (ARF-1B Ret Fan Damper) - OPEN.	f. Perform the following: __ 1) OPEN damper ARF-D-4. __ 2) **IF** ARF-D-4 open, **THEN GO TO** Step 5. 3) **IF** ARF-D-4 remains closed, **THEN** perform the following: __ a) Stop "ARF-1B CONT AIR RETURN FAN". __ b) Do not attempt to start Train "A" containment air return fan. __ c) **WHEN** 9 minutes have elapsed, **THEN** ensure 1VX-2B (HSF-1B INLT ISOL) - CLOSED. __ d) **GO TO** Step 6.

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 18 - Page 4 of 5 **VX and Containment Ventilation Control**	PAGE NO. 54 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. **<u>WHEN</u> containment pressure less than 0.4 PSIG, <u>THEN</u> perform the following to prevent cycling of VX components:**

   a. Ensure the following switches - IN AUTO:

   __ • "ARF-1A CONT AIR RETURN FAN"

   __ • "ARF-1B CONT AIR RETURN FAN".

   b. Ensure the following dampers - CLOSED:

   __ • ARF-D-2 (ARF-1A Ret Fan Damper)

   __ • ARF-D-4 (ARF-1B Ret Fan Damper)

   __ • 1VX-1A (HSF-1A INLT ISOL)

   __ • 1VX-2B (HSF-1B INLT ISOL).

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 18 - Page 5 of 5 **VX and Containment Ventilation Control**	PAGE NO. 55 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Secure containment ventilation as follows:**	
a. Ensure the following Upper Containment Ventilation switches in "OFF": __ • VV-UCVU-1A __ • VV-UCVU-1B __ • VV-UCVU-1C __ • VV-UCVU-1D.	__ a. CLOSE 1RN-404B (Upper Cont Vent Unit Sup).
b. Ensure the following Lower Containment Ventilation switches in "OFF": __ • VV-LCVU-1A __ • VV-LCVU-1B __ • VV-LCVU-1C __ • VV-LCVU-1D.	b. Dispatch operator to trip affected AHU breaker: __ • 1MXQ-F03A (Lower Containment Ventilation Unit 1A Fan Motor) (AB-577, BB-50, Rm 496) __ • 1MXP-F03A (Lower Containment Ventilation Unit 1B Fan Motor) (AB-560, BB-52, Rm 370) __ • 1MXO-F03A (Lower Containment Ventilation Unit 1C Fan Motor) (AB-577, BB-52, Rm 494) __ • 1MXR-F03A (Lower Containment Ventilation Unit 1D Fan Motor) (AB-560, BB-50, Rm 372).

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT Enclosure 1 - Page 1 of 3 **Foldout Page**	PAGE NO. 24 of 35 Revision 32

1. **NC Pump Trip Criteria:**

   - IF the following conditions satisfied, **THEN** trip all NC pumps while maintaining seal injection flow:
     - Any NV or NI pump - DELIVERING S/I FLOW TO NC SYSTEM
     - NC subcooling based on core exit T/Cs - LESS THAN OR EQUAL TO 0°F.

2. **S/I Reinitiation Criteria:**

   - IF NC subcooling based on core exit T/Cs less than 0°F **OR** Pzr level cannot be maintained greater than 11% (30% ACC), **THEN** perform the following as necessary to restore subcooling and level:
     - Start one or more S/I pumps.
     - Realign NV S/I flow path. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 14 (NV Alignment To S/I Mode).

3. **Secondary Integrity Criteria:**

   - IF any unisolated S/G pressure trending down in uncontrolled manner **OR** completely depressurized, **THEN GO TO** EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).

4. **SGTR Transition Criteria:**

   - IF any SG level trends up in uncontrolled manner **OR** any SG has abnormal radiation, **THEN** perform the following:

     a. Perform the following as necessary to maintain NC subcooling based on core exit T/Cs greater than 0°F and Pzr level greater than 11% (30% ACC):
        - Start one or more S/I pumps
        - Realign NV S/I flow path. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 14 (NV Alignment To S/I Mode).

     b. **GO TO** EP/1/A/5000/E-3 (Steam Generator Tube Rupture).

ATTACHMENT 10

5. **1AD-9, C/8 "FWST PRE-LO LEVEL" (27%) LIT Alarm Actions:**

   a. Verify at least one of the following annunciators - LIT:

   - 1AD-20, B/2 "CONT. SUMP LEVEL >2.5 ft"

     OR

   - 1AD-21, B/2 "CONT. SUMP LEVEL >2.5 ft".

   b. **IF** both alarms dark, **THEN** perform the following for ND pumps with suction aligned to FWST or Containment Sump:

   1) Ensure the following - RESET:
      - ECCS
      - D/G Load Sequencers.

   2) Stop ND pumps.

   3) **IF** ND pump(s) will not stop, **THEN** perform the following for affected train(s):

      - ND Train 1A:

        a) Place "PWR DISCON FOR 1NI-173A" switch in "ENABLE".

        b) CLOSE 1NI-173A (ND Hdr 1A To Cold Legs C&D).

        c) CLOSE 1ND-32A (ND Train 1A Hot Leg Inj Isol).

      - ND Train 1B:

        a) Place "PWR DISCON FOR 1NI-178B" switch in "ENABLE".

        b) CLOSE 1NI-178B (ND Hdr 1B To Cold Legs A&B).

        c) CLOSE 1ND-65B (ND Train 1B Hot Leg Inj Isol).

   4) Do not restart either ND pump until at least one "CONT. SUMP LEVEL >2.5 ft" annunciator - LIT.

   5) Ensure "S/I Reinitiation Criteria" of this foldout page monitored to determine if additional NV or NI SI flow needed.

6. **Cold Leg Recirc Switchover Criterion:**

   - **IF** FWST level lowers to 20% (1AD-9, D/8 "FWST 2/4 LO LEVEL"), **THEN GO TO** EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation).

ATTACHMENT 10

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT Enclosure 1 - Page 3 of 3 **Foldout Page**	PAGE NO. 26 of 35 Revision 32

7. **CA Suction Source Switchover Criterion:**

   - **IF** 1AD-8, B/1 "UST LO LEVEL" lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).

8. **Position Criteria for 1NV-202B and 1NV-203A (NV Pumps A&B Recirc Isol):**

   - **IF** NC pressure less than 1500 PSIG **AND** NV S/I flowpath aligned, **THEN** CLOSE 1NV-202B and 1NV-203A.
   - **IF** NC pressure greater than 2000 PSIG, **THEN** OPEN 1NV-202B and 1NV-203A.

ATTACHMENT 11

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT Enclosure 2 - Page 1 of 1 **S/I Termination Criteria**	PAGE NO. 27 of 35 Revision 32

1. **Verify S/I termination criteria:**

   __ a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.

   b. Verify secondary heat sink as follows:

   __ • Total feed flow to intact S/Gs - GREATER THAN 450 GPM

   OR

   __ • N/R level in any intact S/G - GREATER THAN 11% (29% ACC).

   __ c. NC pressure - STABLE OR TRENDING UP.

   __ d. Pzr level - GREATER THAN 11% (30% ACC).

__ 2. **<u>WHEN</u> S/I termination criteria satisfied, <u>THEN</u> notify Control Room Supervisor to <u>RETURN TO</u> Section C. (Operator Actions), Step 9.**

ATTACHMENT 12

CNS AP/1/A/5500/008	MALFUNCTION OF REACTOR COOLANT PUMP Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 20 of 24 Revision 19

NOTE
- Monitoring of this step must continue while NC pump seal malfunction exists even if a transition is made to the emergency procedures.
- Failure of #2 and #3 NC pump seals may occur unless the affected NC pump seal return valve is closed immediately after the NC pump has coasted down to zero speed (3-5 min).

1. **NC Pump Seal Return Isolation Criteria:**

- **IF** immediate NC pump(s) trip required due to #1 seal leakoff flow outside of operating limits (0.8 - 6.0 gpm) per section C. (Operator Actions) of this procedure, **THEN** CLOSE affected NC pump(s) seal return isolation valve as follows:
  - **IF** any NC pump continues to run, **THEN** perform the following:
    - **WHEN** affected NC pump off for 3 minutes, **THEN** immediately CLOSE affected NC pump seal return valve:
      - __ • 1NV-52A (NC Pump 1A Seal Return)
      - __ • 1NV-63B (NC Pump 1B Seal Return)
      - __ • 1NV-74A (NC Pump 1C Seal Return)
      - __ • 1NV-85B (NC Pump 1D Seal Return).
  - **IF** all NC pumps off, **THEN** perform the following:
    - **WHEN** affected NC pump off for 5 minutes, **THEN** immediately CLOSE affected NC pump seal return valve:
      - __ • 1NV-52A (NC Pump 1A Seal Return)
      - __ • 1NV-63B (NC Pump 1B Seal Return)
      - __ • 1NV-74A (NC Pump 1C Seal Return)
      - __ • 1NV-85B (NC Pump 1D Seal Return).

ATTACHMENT 12

CNS AP/1/A/5500/008	MALFUNCTION OF REACTOR COOLANT PUMP Enclosure 1 - Page 2 of 2 **Foldout Page**	PAGE NO. 21 of 24 Revision 19

2. **NC Pump Trip Criteria:**

   IF any of the following NC pump trip criteria met:

   __ • #1 Seal outlet temperature - GREATER THAN 235°F

   OR

   __ • Lower bearing temperature - GREATER THAN 225°F

   OR

   __ • #1 Seal delta P - LESS THAN 200 PSID

   OR

   __ • Stator winding temperature - GREATER THAN 311°F

   OR

   __ • Motor bearing temperature - GREATER THAN 195°F,

   THEN perform the following:

   a. IF in Mode 1 or 2, **THEN** perform the following:

      1) IF all NC pumps affected, **THEN** perform the following:

         __ a) Place steam dumps in pressure mode.

         __ b) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.

      __ 2) Trip reactor.

      3) **WHEN** reactor power less than 5%, **THEN** perform the following:

         __ a) Trip affected NC pump(s).

         __ b) Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED.

      __ 4) **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

   __ b. Trip affected NC pump(s).

   __ c. Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED.

   __ d. **GO TO** AP/1/A/5500/004 (Loss of Reactor Coolant Pump).

ATTACHMENT 13

EVENT #3

1B ND Pump

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS — Operating

LCO 3.5.2 Two ECCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

------------------------------------NOTE------------------------------------
In MODE 3, both safety injection (SI) pump flow paths may be isolated by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable. AND At least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.	A.1 Restore train(s) to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours

ATTACHMENT 13

EVENT #5
Zone B Lockout

3.1 REACTIVITY CONTROL SYSTEMS

3.1.6 Control Bank Insertion Limits

LCO 3.1.6 Control banks shall be within the insertion, sequence, and overlap limits specified in the COLR.

APPLICABILITY: MODE 1,
MODE 2 with $k_{eff} \geq 1.0$.

-----------------------------NOTE-----------------------------
This LCO is not applicable while performing SR 3.1.4.2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Control bank insertion limits not met.	A.1.1 Verify SDM is within the limit specified in the COLR.	1 hour
	<u>OR</u>	
	A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	<u>AND</u>	
	A.2 Restore control bank(s) to within limits.	2 hours

(continued)

ATTACHMENT 13

EVENT #5
Zone B Lockout

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources—Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the Onsite Essential Auxiliary Power System; and

b. Two diesel generators (DGs) capable of supplying the Onsite Essential Auxiliary Power Systems;

AND

The automatic load sequencers for Train A and Train B shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

-----NOTE-----
LCO 3.0.4.b is not applicable to DGs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One offsite circuit inoperable.	A.1 Perform SR 3.8.1.1 for OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND	
	A.2 Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND	

(continued)

ATTACHMENT 13

EVENT #5
Zone B Lockout

AC Sources - Operating
3.8.1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore offsite circuit to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for the offsite circuit(s).	1 hour AND Once per 8 hours thereafter
	AND	
	B.2 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND	
	B.3.1 Determine OPERABLE DG is not inoperable due to common cause failure.	24 hours
	OR	
	B.3.2 Perform SR 3.8.1.2 for OPERABLE DG.	24 hours
	AND	
		(continued)

ATTACHMENT 13

EVENT #5
Zone B Lockout

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.4 Restore DG to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO
C. Two offsite circuits inoperable.	C.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND C.2 Restore one offsite circuit to OPERABLE status.	12 hours from discovery of Condition C concurrent with inoperability of redundant required features 24 hours

(continued)

ATTACHMENT 13

EVENT #5
Zone B Lockout

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One offsite circuit inoperable. AND One DG inoperable.	----------------NOTE---------------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems—Operating," when Condition D is entered with no AC power source to any train. -- D.1 Restore offsite circuit to OPERABLE status. OR D.2 Restore DG to OPERABLE status.	 12 hours 12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours
F. One automatic load sequencer inoperable.	F.1 Restore automatic load sequencer to OPERABLE status.	12 hours
G. Required Action and associated Completion Time of Condition A, B, C, D, E, or F not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 5.	6 hours 36 hours
H. Three or more AC sources inoperable.	H.1 Enter LCO 3.0.3.	Immediately

ATTACHMENT 13

EVENT #5
Zone B Lockout

3.7 PLANT SYSTEMS

3.7.8 Nuclear Service Water System (NSWS)

LCO 3.7.8 Two NSWS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ------------NOTE------------ Not applicable while in Condition C of this LCO unless entry is directed by Note 2 of Condition C. -------------------------------- One NSWS train inoperable.	A.1 ------------NOTES------------ 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources—Operating," for emergency diesel generator made inoperable by NSWS. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops—MODE 4," for residual heat removal loops made inoperable by NSWS. ----------------------------------- Restore NSWS train to OPERABLE status.	72 hours

(continued)

ATTACHMENT 13

EVENT #5
Zone B Lockout

16.8 ELECTRICAL POWER SYSTEMS

16.8-2 230 kV Switchyard Systems

COMMITMENT The following switchyard equipment shall be in its normal alignment:

a. Switchyard Unit 1 PCBs 14, 15, 17, and 18 including their associated manual disconnects, current transformers, interconnecting bus, and support structures (EBA system),

b. Switchyard Unit 2 PCBs 20, 21, 23, and 24 including their associated manual disconnects, current transformers, interconnecting bus, and support structures (EBA system),

c. Buslines 1A, 1B (from main stepup transformers to switchyard unit PCBs), including their associated motor operated disconnects, coupling capacitor voltage transformers, interconnecting bus, and support structures (EBA system),

d. Buslines 2A, 2B (from main stepup transformers to switchyard unit PCBs), including their associated motor operated disconnects, coupling capacitor voltage transformers, interconnecting bus, and support structures (EBA system),

e. Controls associated with the equipment above (EBE, ERE systems),

f. Protective relaying associated with the equipment above (EBD, ERD systems),

g. 480 VAC auxiliary power load centers STA for both units' Train A, STB for both units' Train B (EBI system), and

h. 125 VDC auxiliary power (EBH system) per SLC 16.8-3.

APPLICABILITY: At all times in accordance with Technical Specifications (all MODES) and Nuclear System Directive 403 (MODES 4, 5, 6, and No-MODE).

ATTACHMENT 13

EVENT #5
Zone B Lockout

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Switchyard equipment not in normal COMMITMENT alignment.	A.1 Return switchyard equipment to normal COMMITMENT alignment.	In accordance with the Electronic Risk Assessment Tool

TESTING REQUIREMENTS None

BASES

Effective implementation of the Maintenance Rule, 10 CFR 50.65, requires the continuous assessment of systems determined to be risk significant in the protection against core damage or radiation release. It has been determined through probabilistic risk assessment (PRA) numerical methods that switchyard systems are risk significant from the standpoint of causing or being able to recover from Loss of Offsite Power events. This SLC serves two purposes. It defines the risk significant portions of the switchyard. It also provides a method of tracking the switchyard systems for the purposes of supporting 10 CFR 50.65.

REFERENCES

1. 10 CFR 50.65, Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.
2. Deleted.
3. Deleted.
4. CNC-1535.00-00-0008, Severe Accident Analysis Report, CNS PRA Risk Significant SSCs for the Maintenance Rule.
5. CNS-010.01-EB-0001, Switchyard Design Basis Specification.
6. Technical Specification sections 3.8.1 and 3.8.2, LCOs for AC Power Sources during Operating and Shutdown MODES.
7. Nuclear System Directive 403, "Shutdown Risk Management (Modes 4, 5, 6, and No-Mode) per 10 CFR 50.65 (a)(4)."

2019 INITIAL LICENSE NRC EXAM
SCENARIO # 3

Facility: Catawba NRC Exam 2019	Scenario No.: 3	Op Test No.: 2019301	
Examiners:		Operators:	SRO
			RO
			BOP

Initial Conditions: Unit 1 is at 50% power at the EOL. Unit 2 is at 100% power.

Turnover: Unit 1 is stable at 50% power at the EOL while awaiting management direction. Unit 2 is at 100% power. Direction for the crew is to swap operating LH Pumps by placing 1A LH pump in service and securing 1B LH pump per OP/1/B/6300/008 (Main Turbine Hydraulic Oil System), Enclosure 4.3 (Shifting Operating Hydraulic Fluid Pumps). Initial Conditions are complete. Crew is to begin at step 3.1 of Enclosure 4.3.

Event No.	Malf. No.	Event Type*	Event Description
1		N – RO N – SRO	Shift Operating Main Turbine Hydraulic Oil (LH) Pumps
2	IPE003C	C – BOP C – SRO TS – SRO	PZR Spray Valve Fails Open / 1B PZR Heater Ground Fault
3	NC006	TS – SRO	1B RCS (NC) Flow Channel 3 Fails Low
4	NV012F	C – BOP C – SRO	Letdown Containment Isolation Valve (1NV-15B) Fails Closed
5	MT012	C – RO C – SRO	Steam Seal Regulating Valve (1TL-10) Fails Closed
6	IRX009	R – RO C – SRO	Spurious Main Turbine Trip / Auto Control Rod Failure
7	SM007C	M – ALL	1B S/G Fault Inside Containment
8	SM003A	C – RO C – SRO	1B MSIV (1SM-5) Auto Close Failure
9	KC028 KC001A KC001C KC001D	C – BOP C – SRO	Operating CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 3 – Summary

Initial Condition
Unit 1 is at 50% power at the EOL. Unit 2 is at 100% power.

Turnover:
Unit 1 is stable at 50% power at the EOL while awaiting management direction. Unit 2 is at 100% power. Direction for the crew is to swap operating LH Pumps by placing 1A LH pump in service and securing 1B LH pump per OP/1/B/6300/008 (Main Turbine Hydraulic Oil System), Enclosure 4.3 (Shifting Operating Hydraulic Fluid Pumps). Initial Conditions are complete. Crew is to begin at step 3.1 of Enclosure 4.3.

Event 1
Main Turbine Hydraulic Oil Pump swap. The crew will start 1A LH Pump and secure 1B LH pump in accordance with OP/1/B/6300/008.

Event History: New Control Evolution.

Event 2
PZR Spray Valve (1NC-29) will fail open. On decreasing pressure all backup PZR heaters will energize. 1B PZR Heater will develop a ground fault 30 seconds after spray valve failure. The crew will refer to AP/1/A/5500/11 (Pressurizer Pressure Anomalies) to address decreasing RCS pressure or utilize OMP 1-7 guidance to place the Spray Valve in Manual and closed. TS evaluation by the SRO is required.

Verifiable Action – BOP will manually close 1NC-29.

Event History: Spray Valve failure not used on previous 2 exams {13 (3)}. Heater Ground Fault is new.

Event 3
RCS Loop "B" flow Channel 3 will fail low. TS evaluation by the SRO is required.

Event History: Not used on previous 2 exams. Similar used {13 (3)} – Channel 2 vs. 3.

Event 4
1NV-15B (Letdown Isolation Valve) will fail closed. Crew will enter AP/1/A/5500/012 (Loss of Charging or Letdown). Crew will subsequently be informed that letdown isolation was caused by incorrect placement of a jumper (Catawba OE). Crew will re-open 1NV-15B and restore letdown.

Verifiable Action – The BOP will re-open 1NV-15B and restore letdown to service.

Event History: Not used on previous 2 exams {13 (2)}.

Event 5
1TL-10 (E Bleed Steam Seal Reg Valve) will fail closed. The Main Steam Seal Regulating Valve (1TL-3) will fail to open. This will cause Steam Seal header pressure, and subsequently Main Condenser Vacuum, to decrease. Crew will adjust 1TL-4 (Stm Seal Reg Byp) to increase steam seal pressure and recover main condenser vacuum. Crew may refer to AP/1/A/5500/023 (Loss of Condenser Vacuum) for guidance on restoring main condenser vacuum.

Verifiable Action – OATC will throttle 1TL-4 to increase steam seal pressure and recover condenser vacuum.

Event History: This exact malfunction is new. Similar malfunction requiring 1TL-4 operation not used on previous 2 exams {15 (2)} but was at low power and did not involve 1TL-10 failure.

Event 6
The Main Turbine will trip on spurious actuation signal. Following the Turbine trip, Control Rods will fail to automatically insert. The crew will enter AP/1/A/5500/002 (Turbine Generator Trip), manually insert control rods, and stabilize the unit.

Verifiable Action – RO will manually insert control rods to control RCS temperature.

Event History: Not used on previous 2 exams {15 (1)} with Manual Turbine trip from >50% power. Automatic rod failure is used on Audit (3) but is combined with Loss of Load runback from a different power level.

Event 7
A Main Steam Line break will occur, from 1B S/G, inside Containment. The crew will trip the reactor and initiate Safety Injection.

Event History: Not used on previous 2 exams {14 (2)}.

Event 8
Following automatic Main Steam Isolation caused by Phase B (3.0 psig in containment) signal, 1B MSIV (1SM-5) will fail to automatically close.

Verifiable Action – RO will manually close 1SM-5.

Event History: Not used on previous 2 exams {15 (1)}.

Event 9
Following Safety Injection, the running KC pump will trip and the remaining KC pumps will fail to auto start on the Safety Injection signal. This will require the BOP to start the 3 remaining KC pumps to supply KC loads that are in service.

Verifiable Action – The BOP will reset S/I and the D/G load sequencers and start the 3 available KC pumps.

Event History: Not used on previous 2 exams {15 (1)}.

Manual Control of Automatic Functions		
Event	**Position**	**Description**
5	RO	Manually control Main Turbine Steam Seal Supply via Regulating Valve Bypass (1TL-10)

***Critical Task 1* – Manually close Pzr spray valve prior to Low Pressurizer Pressure Reactor Trip at 1945 psig.**

Simulator validation reveals this criteria will be met in approximately 2 minutes.

***Critical Task 2* – Restore Sealing Steam prior to Low Vacuum Main Turbine Trip.**

Simulator validation reveals this criteria will be met in approximately 12 minutes.

***Critical Task 3* – Manually start at least the minimum number of CCW pumps required to provide adequate component cooling for the operating safeguards train(s) before loss of any ECCS component occurs.**

Simulator validation reveals 1A NV Pump will fail in approximately 15.5 minutes at a motor stator temperature of approximately 371 degrees.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	7
2. Malfunctions after EOP entry (1–2)	2
3. Abnormal events (2–4)	5
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	1
6. EOP contingencies requiring substantive actions (0–2)	0
7. Critical tasks (2–3)	3

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

    1.1 Reset to IC # 169 and load schedule file for NRC Scenario 3

START TIME:__________

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		1	OVR-MT016D (HYDR FLUID PMP 1B ON PB)	ON			:01	1
		2	MAL-IPE003C (PZR SPRAY VLV NC-29 FAIL, MAN CTRL)	100				2
		2	MAL-IPE002B (PZR BACK-UP HEATER B FAILURE)	OFF	:30			2
		3	XMT-NC006 (FNC_5050 NC LOOP B FLOW MTR (FI-426))	0				3
		4	VLV-NV012F (NV15B L/D ISOL OUTSIDE CNMT VLV FAIL TO POSITION)	0			:05	4
		5	MAL-MT012 (EXTRACTION STEAM SEAL REGULATOR FAILURE (1TL10))	0				5
			MAL-MT010 (GLAND STEAM REGULATOR FAILURE (TL3))	0				5
		6	MAL-EHC001 (INADVERTENT TURBINE TRIP)					6
			MAL-IRX009 (RODS FAIL TO MOVE)	AUTO				6
		7	MAL-SM007B (STM LINE BRK ISIDE CONTAINMENT LOOP B)	8.25e5				7
			VLV-SM003A (SM5 MSIV B FAIL AUTO ACTIONS)	ACTIVE				8
			MAL-KC001A (KC PUMP 1A1 FAILURE)	AUTO				9
			MAL-KC001C (KC PUMP 1B1 FAILURE)	AUTO				9
			MAL-KC001D (KC PUMP 1B2 FAILURE)	AUTO				9
		12	LOA-KC028 (RACKOUT KC PMP 1A2)	RACK-OUT				9
			ANN-AD11-B03 (TRANSFORMER A TROUBLE)	ON				
			ANN-AD11-E03 (TRANSFORMER B TROUBLE)	ON				
		10	LOA-NV078 (SEAL WATER LOW FLOW LCL REFLASH ACK (AD7,C4))	ACKN	2:00			
		13	LOA-CNT002 (H2 ANALYZERS)	BOTH	10:00			
		Ensure TRIGGER 12 = jppIsia | jppIsib (Safety Injection Either Train)						

		Ensure 1B LH Pump is in service
		Ensure 1A2 KC pump is in service

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

2.2 Give a copy of Attachment 2 (Shift Turnover Information) to the CRS.

3. EXERCISE PRESENTATION

3.1 Familiarization Period

A. Allow examinees time to familiarize themselves with the Control Board alignments.

3.2 **Scenario EVENT 1**, Shift Operating Main Turbine Hydraulic Oil (LH) Pumps

✓	BOOTH INSTRUCTOR ACTION
	WHEN AO is contacted to perform local actions, **REPORT** the following: Step 3.1.3: “1A LH Pump has started” “LH PUMP 1A RUNNING light is illuminated” “1LHPG5060 indicates 1700 psig”. Step 3.1.6: “1LHPG5070 indicates 0 psig”. Step 3.1.7: “1B LH Pump is completely stopped”. Step 3.1.9: After repeating instruction to Depress HFPM-B TEST - “1B LH Pump has started” “LH PUMP 1B RUNNING light is illuminated” “1LHPG5070 indicates 1700 psig”.

✓	BOOTH INSTRUCTOR ACTION
	WHEN contacted as AO to perform step 3.1.9, **THEN INSERT SIMULATOR Trigger 1** to start 1B LH Pump. Report the following: LH Pump 1B has started, “LH Pump 1B Running” red light is illuminated, LH discharge pressure is 1700 psig.

3.3 **Scenario EVENT 2**, PZR Spray Valve (1NC-29) Fails Open / 1B PZR Heater Ground Fault

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 2** to cause 1NC-29 to fail open..

✓	BOOTH INSTRUCTOR ACTION
	IF dispatched to locally check the 1B PZR Heater breaker at 1LXH-6C, **REPEAT** the information.
	After 3 minutes, contact the crew and **REPORT** “1B Pressurizer Heater Breaker 1LXH-6C is tripped open”.

✓	BOOTH INSTRUCTOR ACTION
	IF dispatched to locally check the 1B PZR Heater Ground Monitor Panel 1LCCP in the Turbine Building, **REPEAT** the information.
	After 3 minutes, contact the crew and **REPORT** “1LCCP indicates 1B pressurizer heater bank has a ground condition”.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR for 1NC-29 and/or 1B PZR Heater, **REPEAT** the information.

3.4 **Scenario EVENT 3**, 1B RCS (NC) Flow Channel 3 Fails Low

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause 1B NC Flow Channel 3 to fail low..

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1B NC Flow Channel 3, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF IAE is contacted to place bistable in trip, per Model W/O #00874531, **REPEAT** the information.

3.5 **Scenario EVENT 4**, Letdown Containment Isolation Valve (1NV-15B) Fails Closed

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 4** to cause an 1NV-15B to close.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1NV-15B, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	WHEN CREW determines that 1NV-15B is closed, **THEN CALL THE CONTROL ROOM AND STATE** “This is the WCC SRO. I have been informed that maintenance inadvertently installed test equipment on the wrong jumper in the cabinet that affects the letdown valves. The Unit Supervisor has verified that the test equipment has been removed. Letdown may be restored.”

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO to acknowledge seal water low flow alarm on reflash panel 1, **REPEAT** the information and **INSERT** **Trigger 10**.
	After 2 minutes, contact the crew and **REPORT** “Seal Water Low Flow alarm has been acknowledged”.

3.6 **Scenario EVENT 5**, Steam Seal Regulating Valve (1TL-10) Fails Closed

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR** **Trigger 5** to cause 1TL-10 to fail closed.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted to consult with Station Management to determine if actual low condenser vacuum condition exists, **REPORT** “No environmental conditions exist which would result in improper condenser vacuum indications. Station Management directs the crew to continue with required procedural actions.”

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1TL-10 and/or 1TL-3, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as AO to investigate 1TL-10 and/or 1TL-3 or to check for steam seal relief valve issues, **REPEAT** the information.
	After 10 minutes, contact the control room and **REPORT** no issues noted.

✓	BOOTH INSTRUCTOR ACTION
	IF dispatched to start the Main Vacuum Pumps per Enclosure 4, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF dispatched to perform Enclosures 2 and/or 3, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Engineering is contacted to evaluate, **REPEAT** the information.

3.7 **Scenario EVENT 6**, Spurious Main Turbine Trip / Auto Control Rod Failure

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR** **Trigger 6** to cause a spurious trip of the Main Turbine.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for Main Turbine Trip, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for Control Rod Auto failure, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF dispatched to Transformers 1A and 1B to secure every other cooling bank of oil pumps and fans, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF dispatched to perform AP/02 Enclosure 3 (Verification of Bleed Steam Piston Assisted Check Valves), **REPEAT** the information.

3.8 **Scenario EVENTS 7, 8, 9**, 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

✓	BOOTH INSTRUCTOR ACTION
	IF AO is dispatched to place the containment H_2 Analyzers in service per OP/1/A/6450/010, **REPEAT** the information and **INSERT** **Trigger 13**.
	After 10 minutes contact the crew and **REPORT** "Ice Condenser Air Handling Units have been secured per G-1 Enclosure 11, and the H_2 Analyzers have been placed in service per OP/1/A/6450/010".

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection to frisk all Unit 1 S/G cation columns for activity, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Secondary Chemistry to sample all Unit 1 S/Gs for activity, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO to secure both D/Gs and place them in standby readiness per the OP, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF dispatched to unlock and close 1SA-1, **REPEAT** the information.

Enclosure 4.3
Shifting Operating Hydraulic Fluid Pumps

OP/1/B/6300/008
Page 2 of 3

3. Procedure

_____ 3.1 **IF** switching to Hydraulic Fluid Pump 1A running with 1B in standby, perform the following:

_____ 3.1.1 Depress the "ON" pushbutton for "Hydr Fluid Pump 1A" (1MC1).

_____ 3.1.2 Depress the auto release "OFF" pushbutton for "Hydr Fluid Pump 1A" (1MC1).

3.1.3 At the power unit, verify the following occurs:

☐ Hydraulic Fluid Pump 1A starts.

☐ "LH PUMP 1A RUNNING" red light illuminates.

☐ Discharge pressure increases to 1550-1750 psig on 1LHPG5060 (Main Turb Hyd Oil Pump A Disch Press)(on LH Pump A manifold at TB-568, 1H-32).

_____ 3.1.4 Allow Hydraulic Fluid Pump 1A to run for at least 30 seconds.

_____ 3.1.5 Stop "Hydr Fluid Pump 1B" (1MC1).

_____ 3.1.6 Verify 1LHPG5070 (Main Turb Hyd Oil Pump B Disch Press) indicates zero. (on LH Pump B manifold at TB-568, 1H-31)

_____ 3.1.7 Verify Hydraulic Fluid Pump 1B is completely stopped.

_____ 3.1.8 Place "Hydr Fluid Pump 1B" in "AUTO" (1MC1)

3.1.9 At the power unit:

_____ 3.1.9.1 Depress "HFPM - B TEST" pushbutton.

3.1.9.2 Verify the following occurs:

☐ Hydraulic Fluid Pump 1B starts.

☐ "LH PUMP 1B RUNNING" red light illuminates.

☐ Discharge pressure increases to 1550-1750 psig on 1LHPG5070 (Main Turb Hyd Oil Pump B Disch Press).

_____ 3.1.10 Allow Hydraulic Fluid Pump 1B to run for at least 30 seconds.

_____ 3.1.11 Stop "Hydr Fluid Pump 1B" (1MC1).

_____ 3.1.12 Ensure that "Hydr Fluid Pump 1B" is in "AUTO" (1MC1).

NOTE: At this point, Hydraulic Fluid Pump 1B is in standby and Hydraulic Fluid Pump 1A is in service per Enclosure 4.1 (Startup).

Note to Evaluator:

This completes Event 1. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 2 (PZR Spray Valve Failure / 1B PZR Heater Ground Fault).

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Event Description: PZR Spray Valve (1NC-29) Fails Open / 1B PZR Heater Ground Fault

Control Room Indications
1AD-6, F/8 “PZR LO PRESS CONTROL” - LIT
OAC Alarm “NORMAL PZR SPRAY FLOW ACTIVATED”
Decreasing Pressurizer Pressure

Following Heater Trip

1AD-6, A/11 “PZR HTR PROTECTIVE TRIP” - LIT
1AD-6, B/11 “PZR HTR GROUND FAULT” - LIT

Op Test No.:	301	Scenario #	3	Event #	2	Page	15 of 147
Event Description:	PZR Spray Valve (1NC-29) Fails Open / 1B PZR Heater Ground Fault						

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 2 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Verify all Pzr PORVs - CLOSED.**	**Perform the following:** __ a. CLOSE Pzr PORV(s). b. IF any Pzr PORV cannot be closed, THEN: __ 1) CLOSE affected PORV(s) isolation valve. 2) IF Pzr PORV isolation valve cannot be closed, THEN perform the following: __ a) IF in Mode 3 with CLAs isolated OR in Mode 4, THEN GO TO AP/1/A/5500/027 (Shutdown LOCA). __ b) Trip Unit 1 reactor. __ c) WHEN reactor tripped OR S/I setpoint reached, THEN ensure S/I initiated. __ d) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

Op Test No.:	301	Scenario #	3	Event #	2	Page	16 of	147
Event Description:	PZR Spray Valve (1NC-29) Fails Open / 1B PZR Heater Ground Fault							

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 3 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Control rods may withdraw on decreasing NC pressure.	
__ 2. **Verify Pzr spray valve(s) - CLOSED.**	**Perform the following:**
	__ a. CLOSE affected spray valve(s).
CRITICAL TASK #1	N/A b. IF affected spray valve(s) will not close, THEN perform the following:
	1) Select "FAIL CLOSED" for affected spray valve(s) mode select switch:
	__ • "1 NC-27 PZR SPRAY VLV MODE SELECT"
	__ • "1 NC-29 PZR SPRAY VLV MODE SELECT".
	2) IF AT ANY TIME Control Room Supervisor determines that reactor trip required, THEN:
	__ a) Trip Unit 1 reactor.
	__ b) WHEN reactor power less than 5%, THEN stop NC Pumps 1A and 1B.
	__ c) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
	__ 3) IF NC pressure stable OR increasing, THEN GO TO Step 3.
	(RNO continued on next page)

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 4 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	
	4) IF NC pressure continues to decrease, THEN: a) IF in Modes 1 or 2, THEN: __ (1) Trip Unit 1 reactor. __ (2) WHEN reactor power less than 5%, THEN stop NC Pumps 1A and 1B. __ (3) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). __ b) Stop NC Pumps 1A and 1B. __ c) IF 1C and 1D NCPs on, THEN stop one additional NCP. __ d) REFER TO AP/1/A/5500/004 (Loss of Reactor Coolant Pump).
__ 3. **Verify all Pzr heaters - ENERGIZED.**	**Perform the following:** N/A a. IF Pzr pressure less than 2220 PSIG AND stable or decreasing, THEN ensure all Pzr heaters energized. __ b. IF Pzr pressure less than 2220 PSIG AND increasing, THEN operate Pzr heaters as required to stabilize Pzr pressure at 2235 PSIG. __ c. WHEN Pzr pressure returns to normal AND automatic Pzr pressure control desired, THEN place Pzr heaters in auto.

Op Test No.:	301	Scenario #	3	Event #	2	Page	18 of 147
Event Description:	PZR Spray Valve (1NC-29) Fails Open / 1B PZR Heater Ground Fault						

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 5 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 4. **Ensure 1NV-37A (NV Supply To Pzr Aux Spray) - CLOSED.**	

NOTE Positive reactivity is inserted during an increase in NC pressure which may cause auto rod insertion.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Verify NC pressure - STABLE OR INCREASING.**	__ **IF pressure continues to decrease, THEN REFER TO AP/1/A/5500/010 (REACTOR COOLANT LEAK).**
6. **WHEN NC pressure stable, THEN:** __ • Stabilize unit at appropriate power level. • Adjust the following as required to maintain T-Avg within 1°F of T-Ref: __ • Turbine load __ • Control rods __ • Boron concentration.	
N/A 7. **IF Pzr pressure channel failed, THEN perform following:**	
__ a. Verify "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) in required state for unit conditions.	__ a. Ensure compliance with Tech Spec 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation).
b. Notify IAE to fail following bistables for affected channel per Model W/O #00874531. Bistables shall be tripped within 72 hours: __ • Pzr low pressure S/I __ • OT Delta T __ • Pzr high pressure Reactor Trip __ • Pzr low pressure Reactor Trip.	

Op Test No.:	301	Scenario #	3	Event #	2	Page	19	of	147

Event Description: PZR Spray Valve (1NC-29) Fails Open / 1B PZR Heater Ground Fault

CNS AP/1/A/5500/011	PRESSURIZER PRESSURE ANOMALIES Case I Pressurizer Pressure Decreasing	PAGE NO. 6 of 9 Revision 23

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Ensure compliance with appropriate Tech Specs:** __ • 3.3.1 (Reactor Trip System (RTS) Instrumentation) __ • 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation) __ • 3.3.3 (Post Accident Monitoring (PAM) Instrumentation) __ • 3.3.4 (Remote Shutdown System) __ • 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits) __ • 3.4.4 (RCS Loops - MODES 1 and 2) __ • 3.4.5 (RCS Loops - MODE 3) __ • 3.4.6 (RCS Loops - MODE 4) __ • 3.4.9 (Pressurizer) __ • 3.4.10 (Pressurizer Safety Valves) __ • 3.4.11 (Pressurizer Power Operated Relief Valves (PORVs)) __ • 3.4.13 (RCS Operational Leakage).	**TECH SPEC EVALUATION** ***See Attachment 13 for applicable Tech Specs.*** **T.S. 3.4.1** **Condition A: (Restore DNB parameter to within limits in 2 hours)** **NOTE: This LCO may apply depending on RCS pressure. OAC alarm (PZR Low Press DNB limit) will notify operators of this condition. Condition will mostly likely be cleared prior to Tech Spec review.** **T.S. 3.4.9** **Condition B: (Restore required group of PZR heaters to OPERABLE withing 72 hours).**
__ 9. **Determine long term plant status.** **RETURN TO procedure in effect.**	

END

Note to Evaluator:

This completes Event 2. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 3 (1B RCS Flow Channel 3 Failure).

Op Test No.:	301	Scenario #	3	Event #	3	Page	20 of 147
Event Description:	1B RCS (NC) Flow Channel 3 Fails Low						

Control Room Indications
1AD-6, A/2 “LOOP B LO FLOW ALERT” - LIT
1AD-2, F/10 “DCS TROUBLE” - LIT
1B Loop RCS Flow indicates 0%

Op Test No.:	301	Scenario #	3	Event #	3	Page	21	of	147

Event Description: 1B RCS (NC) Flow Channel 3 Fails Low

OP/1/B/6100/010 G
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PANEL: 1AD-6

A/2

LOOP B LO FLOW ALERT

SETPOINT: 1/3 loop flow ≤ 90% of full load flow

ORIGIN:
1. 1NCFT5030 (NC Flow Loop B Ch. 1)
2. 1NCFT5040 (NC Flow Loop B Ch. 2)
3. 1NCFT5050 (NC Flow Loop B Ch. 3)

NOTE: All three of the flow transmitters share a common HP impulse line. A failure of the HP impulse line would cause all three transmitters to simultaneously read minimum flow.

PROBABLE CAUSE:
1. Testing
2. Channel failure
3. Reactor coolant leak
4. Reactor coolant pump malfunction or loss of reactor coolant pump

AUTOMATIC ACTIONS: None

NOTE: When ≥ P-8, Rx will trip on 2/3 lo flow on any loop.

IMMEDIATE ACTIONS:
1. Verify channel malfunction by checking other flow channels.
2. Verify reactor coolant leak by use of AP/1/A/5500/010 (Reactor Coolant Leak).
3. Verify reactor coolant pump malfunction by use of AP/1/A/5500/008 (Malfunction of Reactor Coolant Pump).
4. **IF** annunciator is due to NC Pump Trip, go to AP/1/A/5500/004 (Loss of Reactor Coolant Pump).

SUPPLEMENTARY ACTIONS: **IF** a channel failure has occurred, perform the following:
1. Refer to TS Table 3.3.1-1 for required number of channels.
2. Issue Model W/O #00874531 to have IAE trip the bistable.
3. Initiate a work request to have the channel repaired.

REFERENCES:
1. CNEE-0174-01.15

TECH SPEC EVALUATION

See Attachment 13 for applicable Tech Specs.

T.S. 3.3.1
Condition M: (Place channel in trip within 6 hours)

Note to Evaluator:

This completes Event 3. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 4 (Letdown Isolation Valve Fails Closed).

Event Description: Letdown Containment Isolation Valve (1NV-15B) Fails Closed

Control Room Indications
OAC Alarm "NV LETDOWN FLOW – LO LO"
Letdown Flow Indication – 0 gpm

Op Test No.:	301	Scenario #	3	Event #	4	Page	23 of 147
Event Description:	Letdown Containment Isolation Valve (1NV-15B) Fails Closed						

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 15 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Stop any power changes.**	
2. **Ensure the following letdown isolation valves - CLOSED:** __ • 1NV-10A (Letdn Orif 1B Otlt Cont Isol) __ • 1NV-11A (Letdn Orif 1C Otlt Cont Isol) __ • 1NV-13A (Letdn Orif 1A Otlt Cont Isol).	
__ 3. **Verify Pzr level - GREATER THAN 17%.**	**Perform the following:** __ a. IF Pzr level less than 17% due to NC leak, **THEN GO TO** AP/1/A/5500/010 (Reactor Coolant Leak). __ b. Maintain charging flow less than 180 GPM. __ c. Raise charging flow to restore Pzr level greater than 17%. __ d. Do not continue in this procedure until Pzr level greater than 17%.
__ 4. **Control charging to stabilize Pzr level at program level while maintaining seal injection flow.**	
__ 5. **Ensure "PZR HTR GROUP 1C" - ON.**	

Op Test No.:	301	Scenario #	3	Event #	4	Page	24	of 147

Event Description: Letdown Containment Isolation Valve (1NV-15B) Fails Closed

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 16 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Control VCT level as follows:**	
__ a. Verify NC System makeup - SET FOR DESIRED BORON CONCENTRATION.	__ a. Adjust NC System makeup controls for desired boron concentration.
__ b. Verify "NC MAKEUP MODE SELECT" - IN AUTO.	__ b. Makeup to VCT as required to maintain VCT level greater than 23%. **REFER TO** OP/1/A/6150/009 (Boron Concentration Control).
__ 7. **Determine and correct cause of loss of letdown.**	
__ 8. **IF AT ANY TIME excess letdown required, THEN establish excess letdown. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System).**	
__ 9. **Verify proper VC/YC System operation. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 16 (Control Room Ventilation Verification).**	**Note to Evaluator:** **Enclosure 16 is included as Attachment 4.**

Event Description: Letdown Containment Isolation Valve (1NV-15B) Fails Closed

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 17 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Ensure compliance with appropriate Tech Specs:** __ • 3.3.1 (Reactor Trip System (RTS) Instrumentation) __ • 3.3.3 (Post Accident Monitoring (PAM) Instrumentation) __ • 3.3.4 (Remote Shutdown System) __ • 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits) __ • 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) __ • 3.4.13 RCS (Operational Leakage) __ • 3.6.3 (Containment Isolation Valves).	
11. **Verify at least one of the following valves - CLOSED:** __ • 1NV-1A (NC Letdn To Regen Hx Isol) OR __ • 1NV-2A (NC Letdn To Regen Hx Isol).	__ **GO TO Step 16.**

Op Test No.: 301 Scenario # 3 Event # 4 Page 26 of 147

Event Description: Letdown Containment Isolation Valve (1NV-15B) Fails Closed

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 18 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. **Verify the following Letdn Orif Otlt Cont Isol valves - CLOSED:** __ • 1NV-10A (Letdn Orif 1B Otlt Cont Isol) __ • 1NV-11A (Letdn Orif 1C Otlt Cont Isol) __ • 1NV-13A (Letdn Orif 1A Otlt Cont Isol).	**Perform the following:** __ a. CLOSE affected valve(s). __ b. Establish excess letdown. **REFER TO** OP/1/A/6200/001 (Chemical and Volume Control System). **NOTE** Charging is maintained greater than 32 GPM to ensure charging line downstream of 1NV-309 (Seal Water Injection Flow) is pressurized. __ c. Ensure charging flow maintained greater than 32 GPM during letdown line pressurization. __ d. Dispatch operator(s) to pressurize normal letdown line. **REFER TO** Enclosure 1 (Pressurization Of Normal Letdown Line). __ e. **GO TO** Step 15.

Op Test No.:	301	Scenario #	3	Event #	4	Page	27 of 147

Event Description: Letdown Containment Isolation Valve (1NV-15B) Fails Closed

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 19 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE
- If either NC loop letdown valve (1NV-1A or 1NV-2A) closed before all orifice isolation valves (1NV-10A, 1NV-11A and 1NV-13A), the letdown line will require local repressurization.
- If all valves closed from automatic signal(s), it can be assumed the orifice valves reached the closed position first.

13. **Verify all the following valves - CLOSED BY AUTOMATIC SIGNAL(s).**
    - __ 1NV-1A (NC Letdn To Regen Hx Isol)
    - __ 1NV-2A (NC Letdn To Regen Hx Isol)
    - __ 1NV-10A (Letdn Orif 1B Otlt Cont Isol)
    - __ 1NV-11A (Letdn Orif 1C Otlt Cont Isol)
    - __ 1NV-13A (Letdn Orif 1A Otlt Cont Isol).

RESPONSE NOT OBTAINED:

Perform the following:

__ a. **IF** all orifice isolation valves are known to have been closed prior to either NC loop letdown valve closing, **THEN GO TO** Step 16.

__ b. Establish excess letdown. **REFER TO** OP/1/A/6200/001 (Chemical and Volume Control System).

NOTE Charging is maintained greater than 32 GPM to ensure charging line downstream of 1NV-309 (Seal Water Injection Flow) is pressurized.

__ c. Ensure charging flow maintained greater than 32 GPM during letdown line pressurization.

__ d. Dispatch operator(s) to pressurize the normal letdown line. **REFER TO** Enclosure 1 (Pressurization Of Normal Letdown Line).

__ e. **GO TO** Step 15.

__ 14. **GO TO Step 16.**

Op Test No.:	301	Scenario #	3	Event #	4	Page	28 of 147
Event Description:	Letdown Containment Isolation Valve (1NV-15B) Fails Closed						

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 20 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15. **Do not continue in this procedure until one of the following met:**	
__ • Notified by dispatched operator that letdown line pressurized OR __ • Station Management authorizes normal letdown restoration.	
16. **Establish letdown as follows:**	
__ a. Verify ability to establish normal letdown - RESTORED.	a. Perform the following: __ 1) Establish excess letdown. **REFER TO** OP/1/A/6200/001 (Chemical and Volume Control System). __ 2) Do not continue in this procedure until ability to establish normal letdown restored.
Note to Evaluator: **The crew will receive a phone call from the WCC stating that the loss of letdown was due to an improperly placed jumper. The jumper has been removed and letdown may be restored.**	
__ b. Ensure 1NV-849 (Letdn Flow Var Orif Ctrl) valve demand position - 0%.	
c. Verify the following valves - OPEN: __ • 1NV-1A (NC Letdn To Regen Hx Isol) __ • 1NV-2A (NC Letdn To Regen Hx Isol).	c. Perform the following: __ 1) OPEN affected valve(s). 2) **IF** affected valve(s) will not open, **THEN** perform the following: __ a) Establish excess letdown. **REFER TO** OP/1/A/6200/001 (Chemical and Volume Control System). __ b) **WHEN** normal letdown can be restored, **THEN RETURN TO** Step 11. __ c) **GO TO** Step 17.

Op Test No.:	301	Scenario #	3	Event #	4	Page	29	of 147

Event Description: Letdown Containment Isolation Valve (1NV-15B) Fails Closed

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 21 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. (Continued)	
d. OPEN the following valves: __ • 1NV-15B (Letdn Cont Isol) __ • 1NV-10A (Letdn Orif 1B Otlt Cont Isol).	d. Perform the following: __ 1) Ensure 1NV-10A (Letdn Orif 1B Otlt Cont Isol) - CLOSED. __ 2) Establish excess letdown. **REFER TO** OP/1/A/6200/001 (Chemical and Volume Control System). __ 3) **WHEN** normal letdown can be restored, **THEN RETURN TO** Step 11. __ 4) **GO TO** Step 17.
__ e. Adjust 1NV-294 (NV Pmps A&B Disch Flow Ctrl) as necessary to maintain letdown subcooled in the following steps.	
__ f. THROTTLE 1NV-148 (Letdn Press Control) to 45% demand.	
g. THROTTLE OPEN 1NV-849 (Letdn Flow Var Orif Ctrl) in 1% to 5% increments until one of the following conditions met: __ • Letdown flow and letdown pressure trending up OR __ • Valve demand position 60% open.	
__ h. Do not continue until one of the above conditions met.	

Op Test No.:	301	Scenario #	3	Event #	4	Page	30 of 147

Event Description: Letdown Containment Isolation Valve (1NV-15B) Fails Closed

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 22 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. (Continued)	
__ i. Verify letdown flow and letdown pressure - HAS TRENDED UP.	i. Perform the following: 1) CLOSE the following valves: __ • 1NV-849 (Letdn Flow Var Orif Ctrl) __ • 1NV-10A (Letdn Orif 1B Otlt Cont Isol). __ 2) Establish excess letdown. **REFER TO** OP/1/A/6200/001 (Chemical and Volume Control System). __ 3) **WHEN** normal letdown can be restored, **THEN RETURN TO** Step 11. __ 4) **GO TO** Step 17.
__ j. Adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure between 150 - 200 PSIG.	

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 23 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. (Continued)	**Note to Evaluator:** **Time compression may be used at the discretion of the lead examiner.**

k. **WHEN** 5 minutes elapsed, **THEN** perform the following:

__ 1) Adjust 1NV-849 (Letdn Flow Var Orif Ctrl) in 1% to 5% increments to desired letdown flow.

2) **WHEN** letdown at desired flow, **THEN** perform the following:

__ a) Adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG.

__ b) Ensure 1NV-148 (Letdn Press Control) - IN AUTO.

__ 3) **IF AT ANY TIME** additional letdown flow desired, **THEN** establish letdown with 45 or 75 GPM orifice. **REFER TO** OP/1/A/6200/001 (Chemical and Volume Control System).

l. **WHEN** Pzr level restored to programmed level, **THEN** perform the following:

__ 1) Ensure 1NV-294 (NV Pmps A&B Disch Flow Ctrl) - IN AUTO.

__ 2) Ensure "PZR Level Master" - IN AUTO.

17. **Determine required notifications:**

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

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

Op Test No.:	301	Scenario #	3	Event #	4	Page	32 of 147
Event Description:	Letdown Containment Isolation Valve (1NV-15B) Fails Closed						

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 24 of 32 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 18. **Verify excess letdown - ISOLATED.**	__ **WHEN normal letdown restored, THEN secure excess letdown. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System).**
__ 19. **Determine long term plant status. RETURN TO procedure in effect.**	

END

Note to Evaluator:

This completes Event 4. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 5 (Steam Seal Regulating Valve Failure).

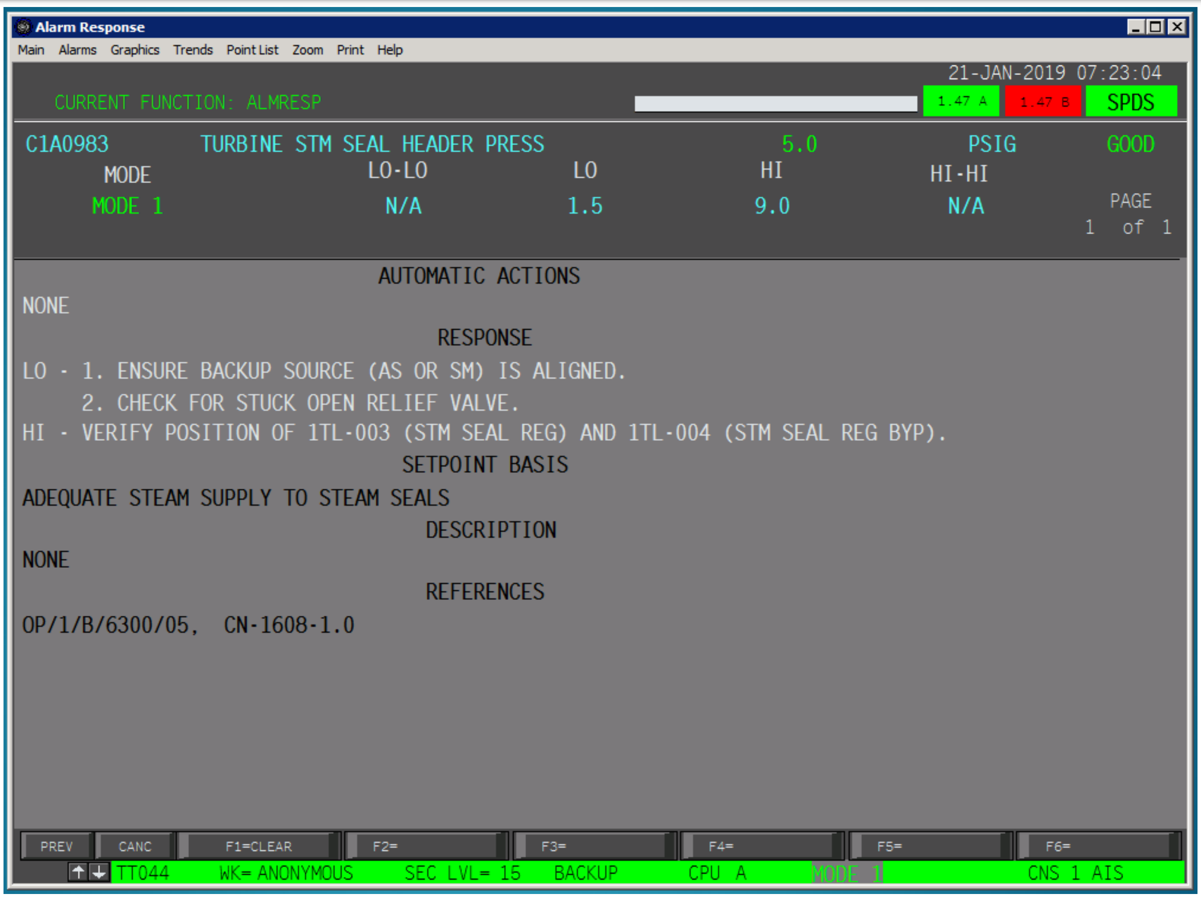
Op Test No.:	301	Scenario #	3	Event #	5	Page	33 of 147
Event Description:	Steam Seal Reg Valve (1TL-10) Fails Closed						

Control Room Indications
OAC Alarm for Turbine Steam Seal Header Pressure Low
1TLP5000 decreases to 0 psig
Main Condenser Vacuum begins to decrease

Note To Evaluator:

The crew may elect to throttle open 1TL-4 (Stm Seal Reg Byp) to restore steam seal header pressure per the OAC alarm response procedure or AP/1/A/5500/023.

Once steam seal header pressure is restored, and at Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 6 (Spurious Main Turbine Trip / Auto Control Rod Failure).



Op Test No.:	301	Scenario #	3	Event #	5	Page	34 of 147
Event Description:	Steam Seal Reg Valve (1TL-10) Fails Closed						

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 2 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** Enclosure 1 is included as Attachment 3.
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
NOTE **REFER TO** OAC Graphic "CMCOND".	
2. **Verify all of the following conditions exist:** __ • OAC point C1A1134 (Exhaust Hood A Metal Temp) - LESS THAN 136°F __ • OAC point C1A1135 (Exhaust Hood B Metal Temp) - LESS THAN 129°F __ • OAC point C1A1129 (Exhaust Hood C Metal Temp) - LESS THAN 124.5°F __ • OAC point C1A0484 (Hotwell Temperature) - LESS THAN 134°F.	__ **Observe Notes prior to Step 4 and GO TO Step 4.**
3. **Monitor actual vacuum conditions as follows:** __ a. Continue to monitor exhaust hood metal and hotwell temperatures. __ b. Consult with Station Management as required to determine if actual low condenser vacuum conditions exist. c. Do not continue in this procedure until at least one of the following: __ • Exhaust hood metal temperature indicates low condenser vacuum __ • Hotwell temperature indicates low condenser vacuum __ • As directed by Station Management.	

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 3 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE
- Reducing turbine generator load to stabilize vacuum is only effective when low vacuum is due to reduced RC cooling.
- CA System is inoperable when available Condensate Storage System water temperature is greater than 136°F.

4. **Lower turbine load as required to stabilize vacuum as follows:**

__ a. Verify vacuum loss due to reduced RC cooling.

a. Perform the following:

__ 1) **IF AT ANY TIME** vacuum loss due to reduced RC cooling, **THEN RETURN TO** Step 4.

__ 2) **GO TO** Step 5.

b. **IF** rapid power reduction required, **THEN** perform the following:

NOTE
- Any load reduction rate of greater than 25 MW/Min must be performed in manual mode.
- Unloading rates greater than 60 MW/Min (5%/minute) will meet C-7A interlock and may result in steam dump actuation.
- In manual mode, the control valves are capable of full travel within 3 minutes.

__ 1) Select "MANUAL" and "CONTROL VALVE LOWER" to reduce turbine load as required.

__ 2) **REFER TO** AP/1/A/5500/009 (Rapid Downpower).

__ 3) **GO TO** Step 5.

Op Test No.:	301	Scenario #	3	Event #	5	Page	36 of 147
Event Description:	Steam Seal Reg Valve (1TL-10) Fails Closed						

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 4 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued) c. Perform appropriate controlling procedure to reduce power: __ • OP/1/A/6100/003 (Controlling Procedure For Unit Operation) OR __ • OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown).	

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 5 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify proper RC System operation as follows:**	
__ a. Verify average condenser inlet temperature OAC point C1P1493 (Unit 1 C1 & C2 Average RC Inlet Temp) - LESS THAN 90°F.	a. Perform the following: __ 1) Start additional cooling tower fans as necessary to maintain condenser inlet temperature less than 90°F. **REFER TO** OP/1/B/6400/001A (Condenser Circulating Water System). __ 2) Start additional RC pump(s) as necessary to maintain condenser inlet temperature less than 90°F. **REFER TO** OP/1/B/6400/001A (Condenser Circulating Water System).
__ b. Verify 1AD-8, B/4 "COOLING TOWER BASIN HI/LO LEVEL" - DARK.	b. **IF** cooling tower level low, **THEN** perform the following: __ 1) Ensure 1RL-853 (Train A RL To RC Makeup Control) (1MC-13) - RESTORING NORMAL COOLING TOWER LEVEL. 2) **IF** 1RL-853 not maintaining cooling tower level, **THEN** perform the following: __ a) Contact Environmental Chemistry to secure cooling tower blowdown. __ b) THROTTLE open 1RL-855 (Train A RL To RC M/U Valve Bypass) (1MC-13) to maintain cooling tower level. __ c) Start additional RL pumps as needed. **REFER TO** OP/0/B/6400/003 (Low Pressure Service Water System).

Op Test No.: 301	Scenario # 3	Event # 5	Page 38 of 147				

Event Description: Steam Seal Reg Valve (1TL-10) Fails Closed

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 6 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 6. **IF AT ANY TIME cause of vacuum loss suspected to be air inleakage, THEN dispatch operator to start main vacuum pump(s) in preparation for aligning to condensers. REFER TO Enclosure 4 (Placing Main Vacuum Pumps in Service).**	

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 7 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **Verify 1SAP5010 "STM PRESS TO CSAE" - GREATER THAN 140 PSIG.**	**Perform the following:**
	__ a. Adjust 1AS-2 (Main Stm To Aux Steam) setpoint to maintain AS header pressure 165 PSIG.
	__ b. <u>IF</u> 1AS-2 will not control in auto, <u>THEN</u> manually adjust 1AS-2 to maintain AS header pressure 165 PSIG.
	__ c. <u>IF</u> 1AS-2 functional, <u>THEN GO TO</u> Step 8.
	<u>CAUTION</u> **Aligning the Unit 2 AS system to supply Unit 1 AS headers may cause small reactivity changes on Unit 2.**
	d. <u>IF</u> Unit 2 available to supply Unit 1 AS header, <u>THEN</u> perform the following:
	__ 1) Adjust 2AS-2 (Main Stm To Aux Stm) to maintain AS header pressure 165 PSIG.
	2) Dispatch operator to align Unit 2 AS as follows:
	__ a) Ensure 1AS-33 (Unit 1 AS Hdr Isol) (TB1-590, 1M-26) - OPEN.
	__ b) OPEN 1AS-59 (Unit 2 AS Hdr Isol) (TB2-584, 2N-26).
	__ 3) <u>WHEN</u> 1AS-59 open, <u>THEN</u> slowly CLOSE 1AS-2 (Main Stm To Aux Steam).

Op Test No.:	301	Scenario #	3	Event #	5	Page	40 of 147

Event Description: Steam Seal Reg Valve (1TL-10) Fails Closed

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 8 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Verify steam seal header conditions as follows:**	
a. Ensure at least one of the following valves - OPEN: __ • 1TL-2 (Main Stm To Stm Seal Reg) __ • 1TL-8 (Aux Stm To Stm Seal Reg).	__ a. **GO TO** Step 10. CRITICAL TASK #2
__ b. Adjust 1TL-4 (Stm Seal Reg Byp) as required to obtain steam seal header pressure between 4 psig and 6 psig.	
__ c. Verify OAC - AVAILABLE.	__ c. **GO TO** Step 9 RNO.

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 9 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Most TL valve positions can be displayed by OAC turn on code "TL-TF".	
9. **Verify supplemental steam flow into steam seal header by at least one of the following:** __ • Verify 1TL-3 (Steam Seal Reg Valve) - **NOT** CLOSED **OR** • Verify both the following: __ • Unit 1 - ON LINE __ • 1TL-10 (E Bleed Steam Seal Reg Valve) - **NOT** CLOSED.	**Ensure 1TL-9 (Steam Seal Packing Unloader Reg Valve) partially open by performing at least one of the following:** • Observe indirect indication of 1TL-9 position as follows: __ a. Observe current steam seal header pressure. b. THROTTLE open 1TL-4 (Stm Seal Reg Byp) until one of the following conditions met: __ • Steam seal pressure - GREATER THAN 6 PSIG OR __ • Steam seal pressure - **NOT** TRENDING UP IN RESPONSE TO 1TL-4 POSITION. **OR** • Coordinate local observation of 1TL-9 position as follows: __ a. Dispatch operator to observe 1TL-9 (Steam Seal Packing Unloader Reg Valve) (TB1-594, 1G-31). b. THROTTLE open 1TL-4 (Stm Seal Reg Byp) until one of the following conditions met: __ • Steam seal pressure - GREATER THAN 6 PSIG OR __ • Dispatched operator reports 1TL-9 - **NOT** CLOSED.

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 10 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Starting additional air ejectors or vacuum pump will not restore vacuum when high RC temperature is the reason for loss of vacuum.	
10. **Verify condenser vacuum status as follows:**	
__ a. Verify cause of vacuum loss suspected or identified to be condenser air in-leakage.	__ a. GO TO Step 11.
__ b. Condenser vacuum - STABLE OR TRENDING UP.	b. Perform the following: 1) IF additional air removal will raise vacuum, THEN perform the following: a) Dispatch operators to perform the following: __ • Align main vacuum pump(s) for service. REFER TO Enclosure 4 (Placing Main Vacuum Pumps in Service). __ • Align idle set of CSAE jet(s) for service. REFER TO OP/1/B/6300/006 (Main Vacuum). __ b) WHEN condenser vacuum trends down to less than 24.5 in. Hg., THEN align main vacuum pump(s) to condenser. REFER TO Enclosure 4 (Placing Main Vacuum Pumps in Service). __ 2) GO TO Step 11.
__ c. IF AT ANY TIME condenser vacuum trends down, THEN observe Note prior to Step 10 and perform Step 10.	

Op Test No.:	301	Scenario #	3	Event #	5	Page	43 of 147
Event Description:	Steam Seal Reg Valve (1TL-10) Fails Closed						

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 11 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 11. **Ensure proper operation of ZP System. REFER TO OP/0/B/6250/011 (Vacuum Priming System).**	
__ 12. **Dispatch operator(s) to ensure condenser seal troughs and UST seal loops operating properly. REFER TO Enclosure 2 (Verification Of Seal Flows).**	
__ 13. **Dispatch operator to ensure CFPT seal system and waterboxes operating properly. REFER TO Enclosure 3 (CFPT Stm Seal And Waterbox Vent Verification).**	
N/A 14. **IF cause of vacuum loss unknown, THEN dispatch operator to verify CSAE operation. REFER TO Enclosure 5 (Verification of CSAE Operation).**	
__ 15. **Determine and correct cause of loss of vacuum.**	
16. **Ensure compliance with appropriate Tech Specs:** __ • 3.7.5 (Auxiliary Feedwater (AFW) System) __ • 3.7.6 (Condensate Storage System (CSS)) __ • SLC 16.7-9 (Standby Shutdown System (SSS).	
17. **Determine required notifications:** __ • REFER TO RP/0/A/5000/001 (Classification Of Emergency) __ • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).	

Op Test No.:	301	Scenario #	3	Event #	5	Page	44 of 147
Event Description:	Steam Seal Reg Valve (1TL-10) Fails Closed						

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM	PAGE NO. 12 of 21 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 18. **Verify Steam Seal System - IN NORMAL ALIGNMENT.**	__ **__WHEN__ conditions permit, __THEN__ align steam seal system as required for current plant conditions. __REFER TO__ OP/1/B/6300/005 (Steam Seal System).**
__ 19. **Initiate AR for ENG to evaluate need to inspect condenser for potential damage due to the loss of vacuum event.**	
__ 20. **Determine long term plant status. __RETURN TO__ procedure in affect.**	

__END__

__Note to Evaluator:__

This completes Event 5. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 6 (Spurious Main Turbine Trip/Auto Control Rod Failure).

Op Test No.:	301	Scenario #	3	Event #	6	Page	45 of 147
Event Description:	Spurious Main Turbine Trip / Auto Control Rod Failure						

Control Room Indications
1AD-1, C/6 “EXT TRAIN A-B/NON TRAIN TURB TRIP” - LIT
1AD-1, C/7 “LOW ETS PRESS” - LIT
1AD-1, D/7 “TURB STOP VLVS CLOSED” - LIT
1AD-1, E/7 “TURB ETS HDR PRESS LO” - LIT
1AD-1,F/3 “EHC IN MANUAL MODE” - LIT

Op Test No.:	301	Scenario #	3	Event #	6	Page	46 of 147
Event Description:	Spurious Main Turbine Trip / Auto Control Rod Failure						

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 2 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. **Operator Actions**	
__ 1. **Verify reactor power - LESS THAN 69%.**	**Perform the following:** __ a. Ensure reactor - TRIPPED. __ b. GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
2. **Verify Turbine Trip:** __ • All turbine stop valves - CLOSED.	**Perform the following:** __ a. Trip turbine. b. IF turbine will not trip, THEN perform the following: __ 1) Depress "MANUAL" pushbutton on turbine control panel. __ 2) Rapidly CLOSE control valves by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons. 3) IF turbine will not runback, THEN perform the following: __ a) Trip reactor. b) CLOSE the following valves: __ • All MSIVs __ • All MSIV bypass valves. __ c) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 3 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Verify reactor response:** __ • Control rods - IN "AUTO" AND STEPPING IN __ • P/R neutron flux - TRENDING DOWN.	**IF T-Avg greater than 1.5°F higher than T-Ref, THEN perform the following:** __ a. Ensure "CRD BANK SELECT" switch - IN MANUAL. b. Operate control rods until one of the following met: __ • Reactor power less than 10% OR __ • T-Avg less than 560°F.
__ 4. **Ensure C heater drain pumps - OFF.**	**Note to Evaluator:** **Enclosure 4 is included as Attachment 5.**
__ 5. **Monitor Enclosure 4 (Rod Insertion Limit Boration).**	

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 4 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **<u>WHEN</u> reactor power less than 20%, <u>THEN</u> perform the following:**	
__ a. Place "CRD BANK SELECT" switch - IN MANUAL.	
__ b. Verify reactor power - GREATER THAN 5%.	b. Perform the following: 1) Continue rod insertion to shutdown reactor to Mode 3. **<u>REFER TO</u>** the following procedures: __ • OP/1/A/6150/008 (Rod Control) __ • OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown). __ 2) **<u>GO TO</u>** Step 7.
__ c. Maintain control rods above insertion limits.	
__ d. Operate control rods to stabilize reactor power between 6%-10%.	
e. **<u>IF AT ANY TIME</u>** reactor power less than or equal to 5%, **<u>THEN</u>** insert control rods to shutdown reactor to Mode 3. **<u>REFER TO</u>** the following procedures: __ • OP/1/A/6150/008 (Rod Control) __ • OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown).	

Op Test No.:	301	Scenario #	3	Event #	6	Page	49 of 147
Event Description:	Spurious Main Turbine Trip / Auto Control Rod Failure						

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 5 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Verify proper steam dump operation as follows:**	
__ a. "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.	a. Perform the following: 1) IF reactor power greater than or equal to 5%, **THEN** perform the following: __ a) Trip reactor. __ b) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). __ 2) Ensure S/G PORVs - MAINTAIN ALL S/G PRESSURES LESS THAN 1125 PSIG. __ 3) GO TO Step 8.

Op Test No.:	301	Scenario #	3	Event #	6	Page	50 of 147
Event Description:	Spurious Main Turbine Trip / Auto Control Rod Failure						

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 6 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ b. Steam dump valves - MODULATING.	b. **IF** steam dump valves closed **AND** T-Avg 3°F greater than T-Ref, **THEN** perform the following: __ 1) Place "STM DUMP CTRL" in manual. __ 2) Adjust "STM DUMP CTRL" to 0% demand. 3) Using "STEAM DUMP SELECT" switch, perform the following: __ • Ensure C-7A and C-7B - RESET __ • Place steam dumps in pressure mode. __ 4) Operate condenser steam dump valves to maintain T-Avg at 560°F. 5) **IF** steam dump valves fail to operate, **THEN** perform the following: a) **IF** reactor power greater than or equal to 5%, **THEN** perform the following: __ (1) Trip reactor. __ (2) **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). __ b) Ensure S/G PORVs - MAINTAIN ALL S/G PRESSURES LESS THAN 1125 PSIG. __ 6) **GO TO** Step 8.

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 7 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
__ c. T-Avg - TRENDING DOWN TO T-REF.	c. Perform the following: __ 1) Place "STM DUMP CTRL" in manual. __ 2) Adjust "STM DUMP CTRL" to 0% demand. 3) Using "STEAM DUMP SELECT" switch, perform the following: __ • Ensure C-7A and C-7B - RESET __ • Place steam dumps in pressure mode. __ 4) Operate condenser steam dump valves to maintain T-Avg at 560°F. 5) <u>IF</u> steam dump valves fail to operate, <u>**THEN**</u> perform the following: a) <u>IF</u> reactor power greater than or equal to 5%, <u>**THEN**</u> perform the following: __ (1) Trip reactor. __ (2) <u>**GO TO**</u> EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). __ b) Ensure S/G PORVs - MAINTAIN ALL S/G PRESSURES LESS THAN 1125 PSIG.

<u>Note to Evaluator:</u>

Once the crew has stabilized the unit, at Lead Evaluator discretion, the scenario may continue by instructing the booth operator to insert Trigger 7 (1B S/G Fault inside Containment).

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 8 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Ensure generator tripped as follows:**	
__ a. Verify turbine generator megawatt output - LESS THAN **OR** EQUAL TO ZERO MW.	a. Perform the following: __ 1) Determine and correct cause of continued turbine generator output. __ 2) **WHEN** turbine generator megawatt output less than or equal to zero MW, **THEN** perform Step 8.b and Step 8.c. __ 3) **GO TO** Step 8.d.
b. Ensure the following breakers and MODs - OPEN: __ • MOD 1BG and 1BT __ • MOD 1AG and 1AT __ • Generator Breaker 1A and 1B.	
__ c. Ensure main generator "EXCITATION" - OFF.	
__ d. Verify "MAN/AUTO REG" select switch "MAN" mode light - LIT.	__ d. Transfer to manual mode.

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 9 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Verify Pzr PORV and Pzr spray valve status as follows:**	
__ a. All Pzr PORVs - CLOSED.	a. <u>IF</u> Pzr pressure less than 2315 PSIG, <u>THEN</u> perform the following: __ 1) CLOSE Pzr PORV(s). 2) <u>IF</u> any Pzr PORV cannot be closed, <u>THEN</u> perform the following: __ a) CLOSE affected PORV(s) isolation valve. b) <u>IF</u> Pzr PORV isolation valve cannot be closed, <u>THEN</u> perform the following: __ (1) Trip Unit 1 reactor. __ (2) <u>WHEN</u> reactor tripped <u>OR</u> S/I setpoint reached, <u>THEN</u> ensure S/I initiated. __ (3) <u>GO TO</u> EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
__ b. Normal Pzr spray valves - CLOSED.	b. <u>IF</u> Pzr pressure less than 2150 PSIG, <u>THEN</u> perform the following: __ 1) CLOSE spray valve. __ 2) <u>IF</u> affected spray valve cannot be closed, <u>THEN REFER TO</u> AP/1/A/5500/011 (Pressurizer Pressure Anomalies).
__ 10. **Verify Pzr level - TRENDING TO PROGRAM.**	__ **Control charging and letdown to maintain program level.**

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Event Description: Spurious Main Turbine Trip / Auto Control Rod Failure

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 10 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 11. **Verify S/G N/R levels - TRENDING TO OR STABLE AT 39%.**	**Perform the following:** __ a. Control S/G N/R level(s) at 39%. b. <u>IF</u> any S/G N/R level trending down in uncontrolled manner, <u>**THEN**</u> perform the following: __ 1) Trip Unit 1 reactor. __ 2) <u>GO</u> <u>TO</u> EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
__ 12. **Verify reactor power - GREATER THAN 5%.**	__ **<u>GO</u> <u>TO</u> Step 14.**

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 11 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. **Stabilize reactor power as follows:**	
__ a. Maintain control rods above insertion limits.	
__ b. Operate control rods in manual to stabilize reactor power between 6%-10%.	
__ c. Verify all atmospheric steam dump valves - CLOSED.	c. **WHEN** T-Avg less than 11.5°F higher than T-Ref, **THEN** perform the following: __ 1) Ensure all atmospheric steam dump valves - CLOSED. __ 2) **IF** atmospheric steam dump valve(s) will not close, **THEN** CLOSE affected atmospheric steam dump(s) isolation valve.
__ d. Verify condenser steam dump valves - MODULATING.	d. **IF** steam dump valves closed **AND** T-Avg 3°F greater than T-Ref, **THEN** perform the following: __ 1) Place "STM DUMP CTRL" in manual. __ 2) Adjust "STM DUMP CTRL" to 0% demand. 3) Using "STEAM DUMP SELECT" switch, perform the following: __ • Ensure C-7A and C-7B - RESET __ • Place steam dumps in pressure mode. __ 4) Operate condenser steam dump valves to maintain T-Avg at 560°F.

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 12 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. **Align AS supply to CF pumps as follows:**	
__ a. Adjust 1AS-2 (Main Stm To Aux Steam) to maintain 165 psig.	
__ b. Ensure 1AS-12 (AS To CFPT Isol) - OPEN.	
__ c. Dispatch operator to close 1SP-3 (SC To CFPT 1A & 1B) (TB1-640, 1G-24).	
__ 15. **Verify feed flow - ALIGNED TO CA NOZZLES.**	**Perform the following:** **NOTE** CF temperatures will reach the low limit of 107°F approximately 3 hours after the Turbine Generator is off-line. a. IF both the following conditions met: __ • 1CA-151 (S/G 1C CF Byp To CA Nozzle) inoperable and **NOT** capable of being opened **AND** __ • Turbine Generator will **NOT** be restarted, THEN perform the following: __ 1) Initiate Unit 1 shutdown. **REFER TO** OP/1/A/6100/003 (Controlling Procedure For Unit Operation). __ 2) GO TO Step 16. __ b. Transfer feed flow to CA nozzles. REFER TO Enclosure 1 (Transferring Feed Flow From CF to CA Nozzles).

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 13 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **RC cold water temperatures below 55°F will cause RC piping damage.**

16. **Shut down the following unnecessary plant equipment:**

__ • CF pump. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System)

__ • Stop RC pumps and cooling tower fans as necessary to maintain condenser inlet temperature greater than 60°F to protect RC piping. REFER TO OP/1/B/6400/001A (Condenser Circulating Water System)

__ • Hotwell pumps

__ • Condensate booster pumps.

17. **Dispatch operator to panel at main step-up Transformers 1A and 1B to secure every other cooling bank of oil pumps and fans as follows:**

__ • Banks #1, 3, 5, 7, 9

OR

__ • Banks #2, 4, 8, 10.

__ 18. **Align steam supply and drain valves for turbine shutdown. REFER TO Enclosure 2 (Steam Supply and Drain Valve Alignments).**

__ 19. **Dispatch operator to ensure heater bleed check valves aligned. REFER TO Enclosure 3 (Verification of Bleed Steam Piston Assisted Check Valves).**

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP	PAGE NO. 14 of 29 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. **Maintain the following stable plant conditions:** __ • Pzr pressure at 2235 PSIG __ • Pzr level at program level __ • S/G N/R levels greater than or equal to 39%.	
__ 21. **Complete turbine generator shutdown. <u>REFER</u> <u>TO</u> OP/1/B/6300/001 (Turbine Generator).**	
__ 22. **Verify reactor power change - GREATER THAN <u>OR</u> EQUAL TO 15% IN A 1 HOUR PERIOD.**	__ **<u>GO</u> <u>TO</u> Step 24.**
23. **Notify the following sections to take appropriate samples:** __ • Radiation Protection to sample and analyze gaseous effluents. **<u>REFER</u> <u>TO</u>** Selected Licensee Commitments Manual, Section 16.11-6. __ • Primary Chemistry to sample for isotopic analysis of iodine. **<u>REFER</u> <u>TO</u>** Tech Specs 3.4.16 (Sample must be taken between 2 hours and 6 hours following last power change greater than or equal to 15% rated thermal power within a 1 hour period).	

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

Control Room Indications
1FO-1, C/6 "PZR LO PRESS RX TRIP" - LIT
1AD-3, C/6 "CF ISOL TRN A" - LIT
1AD-3, D/6 "CF ISOL TRN B" - LIT
1AD-4, A/5 "LO T-AVG & RX TRIP CF VLVS CLOSED" - LIT
1AD-13, A/4 "CONTAINMENT HI PRESS" - LIT
1AD-13, A/7 "ICE COND LOWER INLET DOORS OPEN" - LIT
Multiple other Alarms and Indications related to decreasing RCS temperature, Main Steam pressure, and Safety Injection

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 4 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** Enclosure 1 is included as Attachment 6.
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
2. **Verify Reactor Trip:**	**Perform the following:**
__ • All rod bottom lights - LIT	__ a. Trip reactor.
__ • All reactor trip and bypass breakers - OPEN	b. IF reactor will not trip, THEN concurrently perform the following:
__ • I/R power - DECREASING.	__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees) __ • GO TO EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS).
3. **Verify Turbine Trip:**	**Perform the following:**
__ • All turbine stop valves - CLOSED.	__ a. Trip turbine.
	b. IF turbine will not trip, THEN perform the following:
	__ 1) Depress "MANUAL" pushbutton on turbine control panel.
	__ 2) Rapidly CLOSE control valves by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons.
	3) IF control valves will not close, THEN CLOSE: __ • All MSIVs __ • All MSIV bypass valves.

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **5 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 4. **Verify 1ETA and 1ETB - ENERGIZED.**	**Perform the following:** __ a. **IF** 1ETA **AND** 1ETB de-energized, **THEN GO TO** EP/1/A/5000/ECA-0.0 (Loss of All AC Power). __ b. **WHEN** time allows, **THEN** attempt to restore power to de-energized switchgear while continuing with this procedure. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power).

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 6 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify S/I actuated:**	
__ a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.	a. Perform the following: 1) Verify conditions requiring S/I: __ • Pzr pressure - LESS THAN 1845 PSIG OR __ • Containment pressure - GREATER THAN 1.2 PSIG. __ 2) IF S/I required, THEN initiate S/I. 3) IF S/I not required, THEN concurrently perform the following: • IF 1ETA OR 1ETB de-energized, THEN ensure the following pumps running on energized bus: __ • NV pump __ • KC pump __ • RN pump. __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ • GO TO EP/1/A/5000/ES-0.1 (Reactor Trip Response).
__ b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.	__ b. Initiate S/I.
__ 6. **Announce "Unit 1 Safety Injection".**	

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **7 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Determine required notifications:**	
__ • <u>REFER TO</u> RP/0/A/5000/001 (Classification Of Emergency)	
__ • <u>REFER TO</u> RP/0/B/5000/013 (NRC Notification Requirements).	
__ 8. **Verify all Feedwater Isolation status lights (1SI-5) - LIT.**	**Perform the following:** __ a. Initiate Feedwater Isolation. __ b. <u>IF</u> proper status light indication not obtained, <u>**THEN**</u> CLOSE valves.
9. **Verify Phase A Containment Isolation status as follows:**	
__ a. Phase A "RESET" lights - DARK.	__ a. Initiate Phase A Isolation.
__ b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.	__ b. Align valves as necessary to ensure each penetration isolated by at least one isolation valve.

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 8 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Verify Phase B actuation status as follows:**	
__ a. Verify containment pressure - HAS REMAINED LESS THAN 3 PSIG.	a. Perform the following: 1) Verify Phase B Isolation actuated as follows: __ a) Phase B Isolation "RESET" lights - DARK. N/A b) IF Phase B Isolation "RESET" lights lit, THEN initiate Phase B Isolation. c) Verify following monitor light panel lights - LIT: __ • Group 1 Sp lights __ • Group 5 Sp lights __ • Group 5 St light L/11. N/A d) IF monitor light panel not in correct alignment, THEN ensure correct alignment. __ 2) Stop all NC pumps. __ 3) Maintain seal injection flow. __ 4) Energize H_2 igniters. (RNO continued on next page)

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 9 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	5) Dispatch operator to perform the following:
	__ a) Secure all ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units).
	__ b) Place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems).
Note to Evaluator: Enclosure 5 is included as Attachment 7.	__ 6) **WHEN** 9 minutes elapsed, **THEN** verify proper VX system operation. **REFER TO** Enclosure 5 (VX System Operation).
	__ 7) **GO TO** Step 11.
__ b. **IF AT ANY TIME** containment pressure exceeds 3 PSIG while in this procedure, **THEN** perform Step 10.a.	

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **10 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. **Verify proper CA pump status as follows:**	
__ a. Motor driven CA pumps - ON.	a. Perform the following for affected train(s): __ 1) Reset ECCS. __ 2) Reset D/G load sequencer(s). __ 3) Start affected pump(s). __ 4) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
__ b. 3 S/G N/R levels - GREATER THAN 11%.	b. Perform the following: __ 1) Place CA PMP #1 control switch to ON. __ 2) Ensure CA pump #1 - RUNNING.
12. **Verify all of the following S/I pumps - ON:** __ • NV pumps __ • ND pumps __ • NI pumps.	**Perform the following for affected train(s):** __ a. Reset ECCS. __ b. Reset D/G load sequencer(s). __ c. Start affected pump(s). __ d. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **11 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Verify all KC pumps - ON.** →	**Perform the following for affected train(s):**
CRITICAL TASK #3	__ a. Reset ECCS.
	__ b. Reset D/G load sequencer(s).
	__ c. Start affected pump(s).
	__ d. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
	N/A e. **IF** KC flow cannot be established to NC pumps, **THEN** stop all NC pumps.
__ 14. **Verify all Unit 1 and Unit 2 RN pumps - ON.**	**Perform the following:**
	__ a. **IF** any Unit 2 RN pump off, **THEN** start affected pump(s).
	b. **IF** any Unit 1 RN pump off, **THEN** perform the following for affected train(s):
	__ 1) Reset ECCS.
	__ 2) Reset D/G load sequencer(s).
	__ 3) Start affected pump(s).
	__ 4) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
15. **Verify proper ventilation systems operation as follows:**	
__ • **REFER TO** Enclosure 2 (Ventilation System Verification)	**Note to Evaluator:** **Enclosure 2 is included as Attachment 8.**
__ • Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).	

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 16. **Verify all S/G pressures - GREATER THAN 775 PSIG.**	**Perform the following:** a. Verify Main Steam Isolation as follows: __ • All MSIVs - CLOSED __ • All MSIV bypass valves - CLOSED __ • All S/G PORVs - CLOSED. b. **IF** any valve open, **THEN** perform the following: __ 1) Initiate Main Steam Isolation. __ 2) **IF** any valve still open, **THEN** CLOSE valve.
17. **Verify proper S/I flow as follows:**	
__ a. "NV S/I FLOW" - INDICATING FLOW.	__ a. Start NV pump(s) and align valves.

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **13 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
__ b. NC pressure - LESS THAN 1620 PSIG.	b. Perform the following:
	__ 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN.
	N/A 2) <u>IF</u> ND pump miniflow valve(s) cannot be opened, <u>THEN</u> perform the following for affected train(s):
	__ a) Reset ECCS.
	__ b) Reset D/G load sequencer.
	__ c) Stop ND pump.
	__ d) <u>IF AT ANY TIME</u> B/O occurs, <u>THEN</u> restart S/I equipment previously on.
	__ e) <u>IF AT ANY TIME</u> NC pressure decreases to less than 285 PSIG in uncontrolled manner, <u>THEN</u> restart ND pump.
	__ 3) <u>GO TO</u> Step 18.
__ c. NI pumps - INDICATING FLOW.	__ c. Start NI pump(s) and align valves.

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 14 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
__ d. NC pressure - LESS THAN 285 PSIG.	d. Perform the following: __ 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN. 2) **IF** ND pump miniflow valve(s) cannot be opened, **THEN** perform the following for affected train(s): __ a) Reset ECCS. __ b) Reset D/G load sequencer. __ c) Stop ND pump. __ d) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on. __ e) **IF AT ANY TIME** NC pressure decreases to less than 285 PSIG in uncontrolled manner, **THEN** restart ND pump. __ 3) **GO TO** Step 18.
__ e. ND pumps - INDICATING FLOW TO C-LEGS.	__ e. Start ND pump(s) and align valves.
__ 18. **WHEN time and manpower permit (within two hours of event), THEN monitor Spent Fuel Pool level and temperature. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).**	**Note to Evaluator:** **Enclosure 1 is included as Attachment 9.**

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **15 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. **Control S/G levels as follows:**	
__ a. Verify total CA flow - GREATER THAN 450 GPM.	a. Perform the following: 1) **IF** N/R level in all S/Gs less than 11% (29% ACC), **THEN** perform the following: __ • Start CA pumps __ • Ensure correct valve alignment. 2) **IF** N/R level in all S/Gs less than 11% (29% ACC) **AND** feed flow greater than 450 GPM cannot be established, **THEN** concurrently perform the following: __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees) __ • **GO TO** EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink).
__ b. **WHEN** each S/G N/R level greater than 11% (29% ACC), **THEN** control feed flow to maintain that S/G N/R level between 11% (29% ACC) and 50%.	
__ 20. **Verify all CA isolation valves - OPEN.**	__ **OPEN valve(s).**
__ 21. **Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.**	__ **Align equipment.**

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 16 of 49 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.

__ 22. **Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).**

Note to Evaluator:

Enclosure 4 is included as Attachment 10.

23. **Verify Pzr PORV and Pzr Spray Valve status as follows:**

__ a. All Pzr PORVs - CLOSED.

a. **IF** Pzr pressure less than 2315 PSIG, **THEN** perform the following:

__ 1) CLOSE Pzr PORV(s).

__ 2) **IF** any Pzr PORV cannot be closed, **THEN** CLOSE its isolation valve.

3) **IF** 1NC-32B **OR** 1NC-34A cannot be closed **OR** isolated, **THEN** perform the following:

a) Align N_2 to PORVs by opening the following valves:

__ • 1NI-438A (Emer N2 From CLA A To 1NC-34A)

__ • 1NI-439B (Emer N2 From CLA B To 1NC-32B).

__ b) CLOSE affected Pzr PORV.

(RNO continued on next page)

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **17 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. (Continued)

4) **IF** any Pzr PORV cannot be closed **OR** isolated, **THEN** perform the following:

__ a) Energize H_2 igniters.

b) Dispatch operator to perform the following:

__ (1) Secure all ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units).

__ (2) Place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems).

c) **IF AT ANY TIME** both the following conditions exist:

__ • Containment pressure - HAS REMAINED LESS THAN 3 PSIG

__ • Containment pressure - BETWEEN 1 PSIG **AND** 3 PSIG,

__ **THEN** start one VX fan and secure normal containment ventilation. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 18 (VX and Containment Ventilation Control).

(RNO continued on next page)

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **18 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. (Continued)	d) Concurrently perform the following: __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees) __ • <u>GO TO</u> EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).
__ b. Normal Pzr spray valves - CLOSED.	b. <u>IF</u> Pzr pressure less than 2150 PSIG, <u>THEN</u> perform the following: __ 1) CLOSE spray valve(s). 2) <u>IF</u> spray valve(s) cannot be closed, <u>THEN</u> perform the following: __ a) Stop NC pumps 1A and 1B. __ b) <u>IF</u> both 1C <u>AND</u> 1D NC pumps on, <u>THEN</u> stop one additional pump.
__ c. At least one Pzr PORV isolation valve - OPEN.	__ c. <u>IF</u> power available, <u>THEN</u> OPEN one Pzr PORV isolation valve unless it was closed to isolate an open Pzr PORV.
__ 24. **Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.**	**<u>IF</u> any NV <u>OR</u> NI pump on, <u>THEN</u> perform the following:** __ a. Ensure all NC pumps - OFF. __ b. Maintain seal injection flow.

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **19 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. **Verify main steamlines intact:**	**IF any S/G faulted, THEN perform the following:**
__ • All S/G pressures - STABLE OR INCREASING	__ a. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).
__ • ALL S/Gs - PRESSURIZED.	__ b. GO TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).
26. **Verify S/G tubes intact as follows:**	**IF any EMF trip 1 light lit OR any S/G level increasing in uncontrolled manner, THEN concurrently:**
• Verify the following EMF trip 1 lights - DARK:	__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).
__ • 1EMF-33 (Condenser Air Ejector Exhaust)	__ • GO TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
__ • 1EMF-26 (Steamline 1A)	
__ • 1EMF-27 (Steamline 1B)	
__ • 1EMF-28 (Steamline 1C)	
__ • 1EMF-29 (Steamline 1D).	
__ • All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.	

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 2 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** Enclosure 1 is included as Attachment 11.
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
__ 2. **Maintain any faulted S/G or secondary break isolated during subsequent recovery actions unless needed for NC System cooldown.**	
3. **Verify the following valves - CLOSED:** __ • All MSIVs __ • All MSIV bypass valves.	__ **CLOSE valve(s).**
4. **WHEN TSC staffed, THEN notify TSC of the following:** N/A • IF feedline OR steamline break has occurred inside doghouse, THEN ensure affected doghouse curtains are opened within 24 hours of rupture inside of the doghouse.	
__ 5. **Verify any S/G pressure - STABLE OR INCREASING.**	__ **IF all S/Gs faulted, THEN GO TO EP/1/A/5000/ECA-2.1 (Uncontrolled Depressurization Of All Steam Generators).**

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 3 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Identify faulted S/G(s) as follows:** __ • Verify any S/G pressure - DECREASING IN AN UNCONTROLLED MANNER OR __ • Verify any S/G - DEPRESSURIZED.	**Perform the following:** a. Dispatch operators to search for initiating break at the following locations: __ • Main steamlines __ • Main feedlines __ • Other secondary piping. __ b. GO TO Step 11.
__ 7. **Maintain at least one S/G available for NC System cooldown in subsequent steps.**	
__ 8. **Verify faulted S/G(s) PORV - CLOSED.**	**Perform the following:** __ a. CLOSE faulted S/G(s) PORV. __ b. IF S/G PORV cannot be closed, THEN CLOSE S/G PORV isolation valve. __ c. IF S/G PORV isolation valve cannot be closed, THEN dispatch operator to close valve.
__ 9. **Ensure CA System valve control - RESET.**	

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 4 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. **Isolate all faulted S/G(s) as follows:**

- S/G 1A:

__ a. Verify S/G 1A Feedwater Isolation status light (1SI-5) - LIT.

a. Perform the following:

1) Ensure the following valves - CLOSED:
   - __ • 1CF-28 (S/G 1A CF Ctrl)
   - __ • 1CF-30 (S/G 1A CF Byp Ctrl)
   - __ • 1CF-33 (S/G 1A CF Cont Isol)
   - __ • 1CF-90 (S/G 1A CF Cont Isol Byp)
   - __ • 1CA-149 (S/G 1A CF Byp To CA Nozzle)
   - __ • 1CA-185 (S/G 1A CA Nozz Tempering Isol).
2) IF 1CA-185 (S/G 1A CA Nozz Tempering Isol) cannot be closed, THEN perform the following:
   a) CLOSE the following valves:
      - __ • 1CF-100 (S/G CA Nozz Tempering Ctrl)
      - __ • 1CF-156 (Byp Valve For 1CF-100).
   b) IF 1CF-100 OR 1CF-156 cannot be closed, THEN dispatch operator to close affected valve(s):
      - __ • 1CF-100 (S/G CA Nozz Tempering Ctrl) (TB1-580, 1H-33) (Ladder needed)
      - __ • 1CF-156 (Byp Valve For 1CF-100) (TB1-577, 1H-33) (Ladder needed).

(RNO continued on next page)

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 9 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
• S/G 1B:	
__ a. Verify S/G 1B Feedwater Isolation status light (1SI-5) - LIT.	a. Perform the following:
	1) Ensure the following valves - CLOSED:
	__ • 1CF-37 (S/G 1B CF Ctrl)
	__ • 1CF-39 (S/G 1B CF Byp Ctrl)
	__ • 1CF-42 (S/G 1B CF Cont Isol)
	__ • 1CF-89 (S/G 1B CF Cont Isol Byp)
	__ • 1CA-150 (S/G 1B CF Byp To CA Nozzle)
	__ • 1CA-186 (S/G 1B CA Nozz Tempering Isol).
	2) **IF** 1CA-186 (S/G 1B CA Nozz Tempering Isol) cannot be closed, **THEN** perform the following:
	a) CLOSE the following valves:
	__ • 1CF-100 (S/G CA Nozz Tempering Ctrl)
	__ • 1CF-156 (Byp Valve For 1CF-100).
	b) **IF** 1CF-100 **OR** 1CF-156 cannot be closed, **THEN** dispatch operator to close affected valve(s):
	__ • 1CF-100 (S/G CA Nozz Tempering Ctrl) (TB1-580, 1H-33) (Ladder needed)
	__ • 1CF-156 (Byp Valve For 1CF-100) (TB1-577, 1H-33) (Ladder needed).
	(RNO continued on next page)

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 10 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	__ 3) IF more than one Feedwater Isolation valve above open AND CM still aligned to feed faulted S/G, THEN evaluate alternate means to stop CM flow to faulted S/G.
b. CLOSE the following valves:	
__ 1) 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V).	__ 1) Dispatch operator to close 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V) (DH-583, FF-53, Rm 572).
__ 2) 1CA-58A (CA Pmp A Disch To S/G 1B Isol).	2) Perform the following: __ a) CLOSE 1CA-56 (CA Pump 1A Flow To S/G 1B). __ b) Dispatch operator to close 1CA-58A (CA Pmp A Disch To S/G 1B Isol) (DH-586, DD-EE, 52-53, Rm 572). __ c) IF interior doghouse not accessible OR CA cannot be isolated, THEN dispatch operator to unlock and close 1CA-55 (CA Pump 1A Disch To S/G 1B Inlet Isol) (AB-550, DD-52, Rm 250) (Key #633).
__ c. Verify CA Pump 1A or 1B - AVAILABLE.	c. IF CA Pump #1 only source of feedwater, THEN perform the following: __ 1) Maintain at least one S/G available to supply steam to CA Pump #1.

(RNO continued on next page)

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 11 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	__ 2) Ensure feed flow maintained available to S/G used to supply steam to CA Pump #1.
	__ 3) IF desired to isolate CA Pump #1 from 1B S/G, THEN GO TO Step 10.d.
	__ 4) GO TO Step 10.f.
__ d. CLOSE 1CA-54B (CA Pmp 1 Disch To S/G 1B Isol).	d. Perform the following:
	__ 1) CLOSE 1CA-52 (CA Pump #1 Flow To S/G 1B).
	__ 2) Dispatch operator to close 1CA-54B (CA Pmp 1 Disch To S/G 1B Isol) (DH-584, DD-EE, 52-53, Rm 572).
	__ 3) IF interior doghouse not accessible OR CA cannot be isolated, THEN dispatch operator to unlock and close 1CA-51 (CA Pump No 1 Disch To S/G 1B Inlet Isol) (AB-552, DD-52, Rm 250) (Key #633).
__ e. Dispatch operator to unlock and close 1SA-1 (1B S/G Main Steam to CAPT Maintenance Isol) (DH-624, FF-53, Rm 572) (Breakaway lock).	__ e. Dispatch operator to unlock and close 1SA-3 (1B S/G Main Steam to CAPT Stop Check) (AB-551, DD-53, Rm 217) (Breakaway lock).
f. Verify the following blowdown isolation valves - CLOSED:	
__ 1) 1BB-19A (S/G 1B Bldwn Cont Isol Insd).	__ 1) CLOSE valve.

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 12 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 2) 1BB-150B (S/G 1B Bldwn Cont Isol Byp).	2) Perform the following: __ a) CLOSE valve. b) <u>IF</u> valve will not close <u>AND</u> 1BB-19A open, <u>THEN</u> perform the following: __ (1) Ensure "S/G B BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-150B (S/G 1B Bldwn Cont Isol Byp) (DH-580, FF, 52-53, Rm 572) __ • 1BB-83 (1B S/G Blowdown Penetration Valve Test Isol) (DH-580, FF-53, Rm 572).

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 13 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 3) 1BB-21B (S/G 1B Bldwn Cont Isol Otsd).	3) Perform the following: __ a) CLOSE valve. b) <u>IF</u> valve will not close <u>AND</u> 1BB-19A open, <u>THEN</u> perform the following: __ (1) Ensure "S/G B BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-21B (S/G 1B Bldwn Cont Isol Otsd) (DH-580, FF, 52-53, Rm 572) __ • 1BB-83 (1B S/G Blowdown Penetration Valve Test Isol) (DH-580, FF-53, Rm 572).

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 23 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 3) 1BB-10B (S/G 1D Bldwn Cont Isol Otsd).	3) Perform the following: __ a) CLOSE valve. b) <u>IF</u> valve will not close <u>AND</u> 1BB-8A open, <u>THEN</u> perform the following: __ (1) Ensure "S/G D BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-10B (S/G 1D Bldwn Cont Isol Otsd) (DH-582, EE-FF, 44, Rm 591) __ • 1BB-80 (1D S/G Blowdown Penetration Valve Test Isol) (DH-583,EE-FF, 44, Rm 591).
__ 11. **<u>WHEN</u> NC T-Hots start to increase, <u>THEN</u> dump steam from intact S/G PORVs to stabilize NC T-Hots.**	**<u>Note to Evaluator:</u>** **The operator will align S/Gs for sampling by opening the following valves:** **1NM-191B** **1NM-201A** **1NM-211B** **1NM-221A** **1NM-190A** **1NM-200B** **1NM-210A** **1NM-220B**
12. **Verify secondary radiation normal as follows:** a. Ensure the following signals - RESET: __ 1) Phase A Containment Isolations. __ 2) CA System valve control. __ 3) KC NC NI NM St signals. __ b. Align all S/Gs for Chemistry sampling.	

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 24 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. (Continued)	
c. Perform at least one of the following: __ • Notify Chemistry to sample all S/Gs for activity OR __ • Notify RP to frisk all cation columns for activity.	
d. Verify the following EMF trip 1 lights - DARK: __ • 1EMF-33 (Condenser Air Ejector Exhaust) __ • 1EMF-26 (Steamline 1A) __ • 1EMF-27 (Steamline 1B) __ • 1EMF-28 (Steamline 1C) __ • 1EMF-29 (Steamline 1D).	__ d. <u>GO TO</u> EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
__ e. Verify S/G(s) fault - INSIDE CONTAINMENT.	e. Request RP to perform the following: __ 1) Monitor area of steam fault for radiation. __ 2) Notify Control Room of any abnormal radiation conditions.
__ f. <u>WHEN</u> activity results reported, <u>THEN</u> notify station management to evaluate S/G(s) activity results.	

Op Test No.:	301	Scenario #	3	Event #	7, 8, 9	Page	86 of 147

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION	PAGE NO. 25 of 26 Revision 15

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. **Verify S/I termination criteria:**	
__ a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.	__ a. GO TO Step 14.
b. Verify secondary heat sink as follows:	__ b. GO TO Step 14.
__ • Any intact S/G N/R level - GREATER THAN 11% (29% ACC) OR __ • Total feed flow to intact S/Gs - GREATER THAN 450 GPM.	
__ c. NC pressure - STABLE OR INCREASING.	__ c. GO TO Step 14.
__ d. Pzr level - GREATER THAN 11% (30% ACC).	__ d. GO TO Step 14.
__ e. GO TO EP/1/A/5000/ES-1.1 (Safety Injection Termination).	**Note to Evaluator:** **Depending on plant conditions, the crew may briefly enter E-1 prior to transition to ES-1.1.** **E-1 is included as Attachment 14.**
__ 14. GO TO EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant).	

END

Op Test No.:	301	Scenario #	3	Event #	7, 8, 9	Page	87 of 147

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 2 of 58 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** Enclosure 1 is included as Attachment 12.
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
2. **Reset the following:**	
__ a. ECCS.	__ a. Locally reset ECCS. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 4 (ECCS Master Reset).
__ b. D/G load sequencers.	b. Dispatch operator to open affected sequencer(s) control power breaker: __ • 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496) __ • 1EDF-F01F (Diesel Generator Load Sequencer Panel 1DGLSB) (AB-560, BB-46, Rm 372).
__ c. Phase A.	
__ d. Phase B.	
__ e. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.	

Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 3 of 58 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Establish VI to Containment as follows:** __ • Ensure 1VI-77B (VI Cont Isol) - OPEN __ • Verify VI pressure - GREATER THAN 85 PSIG.	**Perform the following:** a. Align N_2 to Pzr PORVs by opening the following valves: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B). b. IF VI pressure less than 85 PSIG, THEN perform the following: __ 1) Dispatch operator to ensure proper VI compressor operation. __ 2) Restore VI while continuing with this procedure. REFER TO AP/0/A/5500/022 (Loss of Instrument Air).
__ 4. **Ensure only one NV pump - ON.**	
__ 5. **Verify NC pressure - STABLE OR TRENDING UP.**	**Perform the following:** __ a. Ensure Pzr spray valves - CLOSED. __ b. IF NC pressure continues to trend down, THEN GO TO EP/1/A/5000/ES-1.2 (POST LOCA Cooldown and Depressurization).
__ 6. **Verify VI pressure - GREATER THAN 50 PSIG.**	**In subsequent steps, Control Room control is lost for the following valves and local operation will be required:** __ • 1NV-294 (NV Pmps A&B Disch Flow Ctrl) __ • 1NV-309 (Seal Water Injection Flow).

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Event Description:	1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 4 of 58 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Isolate NV S/I flowpath as follows:**	
a. Verify the following valves - OPEN: __ • 1NV-252A (NV Pumps Suct From FWST) __ • 1NV-253B (NV Pumps Suct From FWST).	a. <u>IF</u> NV pump suction aligned to discharge of ND pumps in Cold Leg Recirc, <u>**THEN**</u> perform the following: __ 1) Align charging with NV miniflow isolated. <u>GO</u> <u>TO</u> EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 13 (Aligning Charging With NV Miniflow Valves Closed). __ 2) <u>GO</u> <u>TO</u> Step 9.
b. Verify the following valves - OPEN: __ • 1NV-203A (NV Pumps A&B Recirc Isol) __ • 1NV-202B (NV Pmps A&B Recirc Isol).	b. Perform the following: __ 1) OPEN affected valve(s). __ 2) <u>IF</u> 1NV-203A <u>**AND**</u> 1NV-202B open, <u>**THEN**</u> <u>GO</u> <u>TO</u> Step 7.c. 3) Dispatch operator to open affected valve(s): __ • 1NV-203A (NV Pumps A&B Recirc Isol) (AB-554, HH-JJ, 54-55, Rm 231) (Ladder needed) __ • 1NV-202B (NV Pmps A&B Recirc Isol) (AB-554, HH-JJ, 54-55, Rm 231) (Ladder needed). __ 4) Align charging with NV miniflow isolated. <u>GO</u> <u>TO</u> EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 13 (Aligning Charging With NV Miniflow Valves Closed). __ 5) <u>**WHEN**</u> 1NV-203A <u>**AND**</u> 1NV-202B open, <u>**THEN**</u> charging flow may be reduced below 80 GPM. __ 6) <u>GO</u> <u>TO</u> Step 9.

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Event Description: 1B S/G Fault Inside Containment / 1B MSIV (1SM-5) Auto Close Failure / Running CCW (KC) Pump Trips, all other KC Pumps Fail to Auto Start on SI

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 5 of 58 Revision 35

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
c. CLOSE the following valves: __ • 1NI-9A (NV Pmp C/L Inj Isol) __ • 1NI-10B (NV Pmp C/L Inj Isol).	c. Perform the following: 1) Dispatch operator to close affected valve(s). **REFER TO** the following enclosure(s) for affected valve(s): __ • EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 5 (Locally Close 1NI-9A) __ • EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 7 (Locally Close 1NI-10B). __ 2) Do not continue until both 1NI-9A and 1NI-10B - CLOSED.
Note to Evaluator: **Once Safety Injection has been isolated, the scenario may be terminated by instructing the booth operator to place the simulator in FREEZE.**	
8. **Establish charging as follows:**	
a. Verify all of the following valves - OPEN: __ • 1NV-44A (NC Pmp A Seal Supply Cont Isol) __ • 1NV-55A (NC Pmp B Seal Supply Cont Isol) __ • 1NV-66A (NC Pmp C Seal Supply Cont Isol) __ • 1NV-77A (NC Pmp D Seal Supply Cont Isol).	a. **IF** all valves closed, **THEN** perform the following: __ 1) OPEN 1NV-309 (Seal Water Injection Flow). __ 2) **IF** control of 1NV-309 lost from Control Room, **THEN** dispatch operator with radio to open 1NV-311 (Seal Wtr Inj Flow Ctrl Byp) (AB-555, JJ-54, Rm 233). 3) OPEN the following valves: __ • 1NV-312A (Chrg Line Cont Isol) __ • 1NV-314B (Chrg Line Cont Isol). (RNO continued on next page)

Attachment List

Scenario 3

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 -	AP/1/A/5500/023 Enclosure 1 (Foldout Page)
ATTACHMENT 4 -	EP/1/A/5000/G-1 Enclosure 16 (Control Room Ventilation Verification)
ATTACHMENT 5 -	AP/1/A/5500/002 Enclosure 4 (Rod Insertion Limit Boration)
ATTACHMENT 6 -	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page)
ATTACHMENT 7 -	EP/1/A/5000/E-0 Enclosure 5 (VX System Operation)
ATTACHMENT 8 -	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification)
ATTACHMENT 9 -	EP/1/A/5000/G-1 Enclosure 1 (Unit1 Spent Fuel Pool Monitoring)
ATTACHMENT 10 -	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control)
ATTACHMENT 11 -	EP/1/A/5000/E-2 Enclosure 1 (Foldout Page)
ATTACHMENT 12 -	EP/1/A/5000/ES-1.1 Enclosure 1 (Foldout Page)
ATTACHMENT 13 -	Scenario Specific Technical Specifications
ATTACHMENT 14 -	EP/1/A/5000/E-1

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		1	Manually close Pzr spray valve prior to Low Pressurizer Pressure Reactor Trip at 1945 psig.
		2	Restore Sealing Steam prior to Low Vacuum Main Turbine Trip.
		3	Manually start at least the minimum number of CCW pumps required to provide adequate component cooling for the operating safeguards train(s) before loss of any ECCS component occurs.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	**Power History**	**NCS Boron**	**Xenon**
50 **%**	EOL	244 PPM	per OAC

Controlling Procedure

- OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.2 (Power Decrease). The steps up to step 3.24 are complete.

Other Information Needed to Assume the Shift

- Unit 1 is stable at 50% power at the EOL while awaiting management direction. Unit 2 is at 100% power. Direction for the crew is to swap operating LH Pumps by placing 1A LH pump in service and securing 1B LH pump per OP/1/B/6300/008 (Main Turbine Hydraulic Oil System), Enclosure 4.3 (Shifting Operating Hydraulic Fluid Pumps). Initial Conditions are complete. Crew is to begin at step 3.1 of Enclosure 4.3.

AOs Available

Seven AOs are available as listed on the status board

METEOROLOGICAL CONDITIONS

- Upper wind direction = 315 degrees, speed = 3 mph
- Lower wind direction = 315 degrees, speed = 4.5 mph
- Forecast calls for clear skies over the next 24 hours.

ATTACHMENT 3

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 13 of 21 Revision 24

NOTE If trend down in vacuum is rapid, using the reactor trip guidance for loss of CF pumps may be more appropriate.

1. **Reactor Trip Criteria:**

- **IF** reactor power greater than or equal to 69% **AND** main condenser vacuum trending down to 22 in. Hg in any condenser section imminent, **THEN** perform the following:

  a. Trip reactor.

  b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

- **IF** in Mode 1 or 2 **AND** vacuum trending down to 16.9 in. Hg in both CF pump condensers imminent, **THEN** perform the following:

  a. Trip reactor.

  b. **WHEN** reactor trip verified, **THEN** trip CF pumps.

  c. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

2. **Turbine Trip Criteria:**

- **IF** reactor power less than 69% **AND** main condenser vacuum trending down to 22 in. Hg in any condenser section imminent, **THEN** perform the following:

  a. Trip turbine.

  b. **REFER TO** AP/1/A/5500/002 (Turbine Generator Trip).

- **IF** turbine impulse pressure less than or equal to 370 psig **AND** exhaust hood temperature trending up to 225°F imminent, **THEN** perform the following:

  a. Trip turbine.

  b. **REFER TO** AP/1/A/5500/002 (Turbine Generator Trip).

- **IF** turbine load less than or equal to 360 MWs **AND** main condenser vacuum trending down to 24.3 in. Hg in any condenser section imminent, **THEN** perform the following:

  a. Trip turbine.

  b. **REFER TO** AP/1/A/5500/002 (Turbine Generator Trip).

ATTACHMENT 3

CNS AP/1/A/5500/023	LOSS OF CONDENSER VACUUM Enclosure 1 - Page 2 of 2 **Foldout Page**	PAGE NO. 14 of 21 Revision 24

3. **CF Pump Trip Criteria:**

- **IF** in Mode 1 or 2 **AND** vacuum trending down to 16.9 in. Hg in both CF pump condensers imminent, **THEN** perform the following:

  a. Trip reactor.

  b. **WHEN** reactor trip verified, **THEN** trip CF pumps.

  c. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

- **IF** vacuum trending down to 16.9 in. Hg in one CF pump condenser imminent, **THEN** perform the following:

  a. Trip affected CF pump.

  b. **IF** load rejection occurred **OR** required, **THEN REFER TO** AP/1/A/5500/003 (Load Rejection).

  c. Ensure turbine load - REDUCED TO LESS THAN 65%.

ATTACHMENT 4

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 16 - Page 1 of 3 **Control Room Ventilation Verification**	PAGE NO. 46 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify one train of the following equipment in operation:** __ • YC chiller __ • CR AHU-1 __ • CRA AHU-1 __ • CRA PFT-1.	**Perform the following:** __ a. Shift operating VC/YC trains. **REFER TO** Enclosure 17 (Shifting Operating VC/YC Trains). b. **IF** no train can be properly aligned, **THEN** dispatch operator and IAE/Maintenance to restore at least one train of VC/YC. **REFER TO** the following: __ • OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System) __ • EM/0/A/5200/001 (Troubleshooting Cause For Improper Operation of VC/YC System).
2. **Verify the following annunciators - DARK:** __ • 1AD-18, A/8 "UNIT 1 INTAKE HI CHLORINE 1A" __ • 1AD-18, B/8 "UNIT 1 INTAKE HI CHLORINE 1B" __ • 1AD-18, D/8 "UNIT 2 INTAKE HI CHLORINE 2A" __ • 1AD-18, E/8 "UNIT 2 INTAKE HI CHLORINE 2B".	**IF chlorine odor is detected in Control Room, THEN perform the following based on status of given alarms:** a. **IF** detectors on both unit intakes in alarm, **THEN** perform the following: 1) Ensure the following VC intake dampers - CLOSED: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet) __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet). __ 2) **GO TO** Step 4. (RNO continued on next page)

ATTACHMENT 4

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 16 - Page 2 of 3 **Control Room Ventilation Verification**	PAGE NO. 47 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	b. **IF** Unit 1 intake HI chlorine detector(s) in alarm, **THEN** perform the following: 1) Ensure the following VC dampers - CLOSED: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet). 2) Ensure the following dampers - OPEN: __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet). __ 3) **GO TO** Step 4. c. **IF** Unit 2 intake Hi chlorine detector(s) in alarm, **THEN** perform the following: 1) Ensure the following VC dampers - CLOSED: __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet). 2) Ensure the following dampers - OPEN: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet). __ 3) **GO TO** Step 4.
3. **Ensure the following VC dampers - OPEN:** __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet) __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet).	

ATTACHMENT 4

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 16 - Page 3 of 3 **Control Room Ventilation Verification**	PAGE NO. 48 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Repeat this enclosure until notified by Station Management as follows:** __ • At least once every 8 hours OR __ • Any time VC/YC related annunciators on 1AD-18 actuate.	

ATTACHMENT 5

CNS AP/1/A/5500/002	TURBINE GENERATOR TRIP Enclosure 4 - Page 1 of 1 **Rod Insertion Limit Boration**	PAGE NO. 29 of 29 Revision 34

CAUTION **Failure to initiate boration within one hour of exceeding rod insertion limits may violate Tech Spec 3.1.6.**

NOTE
- OAC point C1L4409 (Ctrl Bank Tech Spec Insertion Lmt Reached) and R.O.D Book (Section 2.2) provide rod insertion limit indication.
- The "Reactivity Data Sheet" provides boration data to restore control rods above rod insertion limits.

1. **IF the control rods cannot be maintained above the rod insertion limits, THEN perform the following:**

__ a. Stop any dilutions in progress.

__ b. Borate NC System as required, to restore rods above insertion limits.

__ c. Ensure control rods restored above insertion limits within 2 hours of exceeding limits.

__ d. Ensure compliance with Tech Spec 3.1.6 (Control Bank Insertion Limits).

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 1 - Page 1 of 2** **Foldout Page**	PAGE NO. **34 of 49** **Revision 43**

1. **NC Pump Trip Criteria:**
   - **IF** the following conditions satisfied, **THEN** trip all NC pumps while maintaining seal injection flow:
     - Any NV or NI pump - DELIVERING S/I FLOW TO NC SYSTEM
     - NC subcooling based on core exit T/Cs - LESS THAN OR EQUAL TO 0°F
     - Reactor power - LESS THAN 5%.
2. **CA Suction Source Switchover Criterion:**
   - **IF** 1AD-8, B/1 "UST LO LEVEL" lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).
3. **Position Criteria for 1NV-202B and 1NV-203A (NV Pumps A&B Recirc Isol):**
   - **IF** NC pressure less than 1500 PSIG **AND** NV S/I flowpath aligned, **THEN** CLOSE 1NV-202B and 1NV-203A.
   - **IF** NC pressure greater than 2000 PSIG, **THEN** OPEN 1NV-202B and 1NV-203A.
4. **Ruptured S/G CA Isolation Criteria:**
   - **IF** both the following conditions met, **THEN** stop CA flow to affected S/G(s):
     - Level increasing in uncontrolled manner or radiation level in that S/G abnormal
     - N/R level - GREATER THAN 11% (29% ACC).
5. **Faulted S/G CA isolation Criteria:**
   - **IF** all the following conditions met, **THEN** stop CA flow to affected S/G:
     - S/G pressure decreasing in uncontrolled manner or completely depressurized
     - Only one S/G diagnosed as faulted
     - Secondary heat sink criteria met:
       - Total CA flow - GREATER THAN 450 GPM

         OR
       - ANY S/G(s) N/R level - GREATER THAN 11%(29% ACC).

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 1 - Page 2 of 2** **Foldout Page**	PAGE NO. **35 of 49** **Revision 43**

6. **NS Pump Trip Criterion:**

- **IF** NS pump in recirc and S/I occurs, **THEN** perform one of the following:
  - **IF** train affected ECCS and D/G load sequencer - RESET, **THEN** stop NS pump

    OR
  - **WHEN** sequencer loading complete, **THEN** perform the following for affected train:

    a. Notify Control Room Supervisor.

    b. Reset ECCS.

    c. Reset D/G load sequencer.

    d. Secure NS pump.

    e. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify the following containment air return fan dampers - OPEN:** __ • ARF-D-2 (ARF-1A Ret Fan Damper) (1MD-4, I/5) __ • ARF-D-4 (ARF-1B Ret Fan Damper) (1MD-4, I/8).	__ **IF equipment not in proper alignment, THEN align equipment.**
2. **Verify the following equipment alignment:** __ • 1VX-1A (HSF-1A Inlt Isol) (1MD-4, I/6) - OPEN __ • 1VX-2B (HSF-1B Inlt Isol) (1MD-4, I/7) - OPEN __ • ARF-1A (Cont Air Return Fan) (1MD-4, I/3) - ON __ • ARF-1B (Cont Air Return Fan) (1MD-4, I/10) - ON __ • HSF-1A (H_2 Skimmer Fan) (1MD-4, I/4) - ON __ • HSF-1B (H_2 Skimmer Fan) (1MD-4, I/9) - ON.	**IF equipment not in proper alignment, THEN perform the following:** a. IF containment pressure less than 0.3 PSIG, THEN verify the following Monitor Light Panel Group 1 Sp lights - DARK: __ • I/3 __ • I/10. __ b. Align or start affected component(s). __ c. IF any VX system equipment cannot be started, THEN REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems), for further actions.
3. **Verify containment air return fans operate as containment pressure changes as follows:** __ • IF AT ANY TIME containment pressure greater than 0.9 PSIG, THEN ensure containment air return fans - ON. __ • IF AT ANY TIME containment pressure less than 0.3 PSIG, THEN ensure containment air return fans - OFF.	

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 1 of 7** **Ventilation System Verification**	PAGE NO. **36 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify proper VC/YC operation as follows:**	
a. Verify one train of the following equipment in operation: __ • YC chiller __ • CR AHU-1 __ • CRA AHU-1 __ • CRA PFT-1.	a. Perform the following: __ 1) Shift operating VC/YC trains. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 17 (Shifting Operating VC/YC Trains). 2) **IF** no train can be properly aligned, **THEN** dispatch operator and IAE/Maintenance to restore at least one train of VC/YC. **REFER TO** the following: __ • OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System) __ • EM/0/A/5200/001 (Troubleshooting Cause For Improper Operation of VC/YC System).

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 2 of 7** **Ventilation System Verification**	PAGE NO. **37 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. (Continued)	
b. Verify the following alarms - DARK: __ • 1AD-18, A/8 "UNIT 1 INTAKE HI CHLORINE 1A" __ • 1AD-18, B/8 "UNIT 1 INTAKE HI CHLORINE 1B" __ • 1AD-18, D/8 "UNIT 2 INTAKE HI CHLORINE 2A" __ • 1AD-18, E/8 "UNIT 2 INTAKE HI CHLORINE 2B".	b. **IF** chlorine odor detected in Control Room, **THEN** perform the following based on the status of given alarms: 1) **IF** detectors on both unit intakes in alarm, **THEN** perform the following: a) Ensure the following VC intake dampers - CLOSED: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet) __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet). __ b) **GO TO** Step 1.d. 2) **IF** Unit 1 intake HI chlorine detector(s) in alarm, **THEN** perform the following: a) Ensure the following VC dampers - CLOSED: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet). b) Ensure the following dampers - OPEN: __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet). __ c) **GO TO** Step 1.d. (RNO continued on next page)

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 3 of 7** **Ventilation System Verification**	PAGE NO. **38 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. (Continued)	
	3) **IF** Unit 2 intake Hi chlorine detector(s) in alarm, **THEN** perform the following: a) Ensure the following VC dampers - CLOSED: __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet). b) Ensure the following dampers - OPEN: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet). __ c) **GO TO** Step 1.d.
c. Ensure the following VC dampers - OPEN: __ • 1VC-5B (CRA Filt Inlet) __ • 1VC-6A (CRA Filt Inlet) __ • 2VC-5B (CRA Filt Inlet) __ • 2VC-6A (CRA Filt Inlet).	
d. Repeat Step 1 of this enclosure until notified by station management as follows: __ • At least once every 8 hours OR __ • Any time VC/YC related annunciators on 1AD-18 actuate.	

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 4 of 7** **Ventilation System Verification**	PAGE NO. **39 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. **Ensure proper VA system operation as follows:**	
• Ensure the following fans - OFF:	
__ • ABUXF 1A __ • ABUXF 1B.	
• Ensure VA system filter in service as follows:	
__ • 1ABF-D-12 & 19 (VA Filter A Bypass Dampers) - CLOSED	
__ • 1ABF-D-5 & 20 (VA Filter B Bypass Dampers) - CLOSED.	
• Ensure the following fans - ON:	
__ • ABFXF-1A __ • ABFXF 1B.	
3. **Verify proper VE system operation as follows:**	
__ a. VE fans - ON.	__ a. Start fan(s).

ATTACHMENT 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
__ b. Annulus pressure - BETWEEN -1.4 IN. WC AND -1.8 IN. WC.	b. Perform the following: 1) <u>IF</u> annulus pressure more positive than -1.4 in. WC, **<u>THEN</u>** perform the following: a) Verify flow indicated on the following indications: __ • 1VEP5180 (VE 1A Flow To Stack) __ • 1VEP5200 (VE 1B Flow To Stack). b) <u>IF</u> flow not indicated, **<u>THEN</u>** dispatch operator to verify status of the following dampers based on their local indication or their operating piston rods being extended 4" to 6": __ • 1AVS-D-2 (VE A Trn Recirc Damp) (AB-603, JJ-51, Rm 500) - CLOSED __ • 1AVS-D-7 (VE B Trn Recirc Damp) (AB-603, HH-52, Rm 500) - CLOSED __ • 1AVS-D-3 (VE A Trn Exh Damp) (AB-603, JJ-52, Rm 500) - OPEN __ • 1AVS-D-8 (VE B Trn Exh Damp) (AB-603, HH-52, Rm 500) - OPEN. __ c) Consult plant engineering staff and notify IAE/Maintenance to troubleshoot and repair. <u>REFER TO</u> EM/1/A/5200/002 (Troubleshooting Cause For VE System Hi/Lo Pressure). __ d) <u>GO TO</u> Step 3.c.

(RNO continued on next page)

ATTACHMENT 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
	2) **IF** annulus pressure more negative than -1.8 in. WC, **THEN** perform the following:
	__ a) Determine which VE train indicates highest discharge flow to stack.
	__ b) Within 2 hours, ensure VE train that indicates highest discharge flow to stack secured.
	__ c) Consult plant engineering staff and notify IAE/Maintenance to troubleshoot and repair. **REFER TO** EM/1/A/5200/002 (Troubleshooting Cause For VE System Hi/Lo Pressure).
__ c. Repeat Step 3.b every 30 minutes until notified by station management.	

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 7 of 7** **Ventilation System Verification**	PAGE NO. **42 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Record time ventilation systems verified on following table:**

TIME	SYSTEM (VC, VE)	INITIALS

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 1 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 3 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Review the following considerations for Spent Fuel Pool monitoring:**	
__ • Control Room temperature indication 1KFP5130 is a non-safety instrument loop. Guidance is provided for local temperature verification if access to Spent Fuel Pool available.	
__ • Normal level indication 1KFP5120 is a non-safety instrument loop powered from 1RPA. Guidance is provided for local temperature verification if access to Spent Fuel Pool available.	
__ • If a loss of all AC Power is anticipated to last greater than 6 hrs, portable Spent Fuel Pool level and temperature instrumentation can be installed if access to Spent Fuel Pool available.	
__ • Seismic event may cause loss of Spent Fuel Pool inventory due to "splashing" of water.	
2. **Monitor Unit 1 KF pump motor cooling as follows:**	
a. Verify the following: __ • KF PUMP A MTR CLR HI TEMP (1AD-13 D/6) - DARK __ • KF PUMP B MTR CLR HI TEMP (1AD-13 D/7) - DARK.	__ a. Ensure affected Unit 1 KF pump(s) - OFF.
__ b. <u>**IF AT ANY TIME**</u> KF PUMP MTR CLR HI TEMP annunciator(s) lit, <u>**THEN**</u> perform Step 2.a.	
__ 3. **<u>IF AT ANY TIME</u> Spent Fuel Pool level <u>AND</u> temperature indications unavailable in Control Room, <u>THEN</u> dispatch operator to monitor Unit 1 Spent Fuel Pool. <u>REFER TO</u> Enclosure 24 (Local Spent Fuel Pool Monitoring).**	

ATTACHMENT 9

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Steps 4 and 5 may be performed concurrently.	
4. **Monitor Unit 1 Spent Fuel Pool level as follows:**	
__ a. Verify Spent Fuel Pool level indication in Control Room - AVAILABLE.	__ a. **GO TO** Step 4.e.
__ b. Verify Spent Fuel Pool level greater than - 39 ft.	b. Notify Control Room Supervisor of the following: __ 1) Unit 1 Spent Fuel Pool level. __ 2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ c. Record Unit 1 Spent Fuel Pool level in the following table:	

Time	Unit 1 SFP Level	Time	Unit 1 SFP Level	Time	Unit 1 SFP Level

__ d. **GO TO** Step 5.

ATTACHMENT 9

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
e. Determine Spent Fuel Pool level as follows:	
__ 1) Dispatch operator and RP to determine if Unit 1 Spent Fuel Pool area accessible.	
2) **WHEN** Unit 1 Spent Fuel Pool area accessibility determined, **THEN** perform the following:	
__ a) Verify Unit 1 Spent Fuel Pool area - ACCESSIBLE.	a) Notify Station Management to perform the following: __ (1) Evaluate alternate method to monitor Unit 1 Spent Fuel Pool level. __ (2) **IF AT ANY TIME** Unit 1 level estimated less than - 39 ft, **THEN REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level). __ (3) **GO TO** Step 5.
b) Notify dispatched operator to perform the following: (1) Determine Spent Fuel Pool level using the following reference points: __ • Top of skimmer trough is 40 Ft __ • 1 Ft below lip of skimmer trough is 39 Ft __ • Centerline of KF pump suction strainer is 37.5 Ft. __ (2) Report level determination to Control Room.	

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 4 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 6 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued) c) **WHEN** operator reports level, **THEN** perform the following: __ (1) Verify level greater than - 39 ft.	(1) Notify Control Room Supervisor of the following: __ 1. Unit 1 Spent Fuel Pool level. __ 2. **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ (2) Record Unit 1 Spent Fuel Pool level in the following table:	

Time	Unit 1 SFP Level	Time	Unit 1 SFP Level	Time	Unit 1 SFP Level

ATTACHMENT 9

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Monitor Unit 1 Spent Fuel Pool temperature as follows:**	
__ a. Verify Spent Fuel Pool temperature indication in Control Room - AVAILABLE.	__ a. **GO TO** Step 5.e.
__ b. Verify Spent Fuel Pool temperature less than - 125°F.	b. Notify Control Room Supervisor of the following: __ 1) Unit 1 Spent Fuel Pool temperature. __ 2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ c. Record Unit 1 Spent Fuel Pool temperature in the following table:	

Time	Unit 1 SFP Temp	Time	Unit 1 SFP Temp	Time	Unit 1 SFP Temp

__ d. **GO TO** Step 6.

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 6 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 8 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
e. Determine Spent Fuel Pool temperature as follows:	
__ 1) Verify access to Unit 1 Spent Fuel Pool area previously determined.	1) Perform the following: __ a) Dispatch operator and RP to determine if Unit 1 Spent Fuel Pool area accessible. __ b) **WHEN** Unit 1 Spent Fuel Pool area accessibility determined, **THEN** perform Steps 5.e.2 through 5.e.4. __ c) **GO TO** Step 6.
__ 2) Verify Unit 1 Spent Fuel Pool area - ACCESSIBLE.	2) Notify station management to perform the following: __ a) Evaluate alternate method to monitor Unit 1 Spent Fuel Pool temperature. __ b) **IF AT ANY TIME** Unit 1 temperature estimated greater than - 125°F, **THEN REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level). __ c) **GO TO** Step 6.
3) Notify dispatched operator to determine Unit 1 Spent Fuel Pool temperature as follows: __ a) Obtain infrared thermometer from OSC "Emergency Supply Cabinet". __ b) Scan Spent Fuel Pool surface for highest reading. __ c) Report temperature determination to Control Room.	

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 7 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 9 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
4) **WHEN** operator reports temperature, **THEN** perform the following:	
__ a) Verify Spent Fuel Pool temperature - LESS THAN 125°F.	a) Notify Control Room Supervisor of the following: __ (1) Unit 1 Spent Fuel Pool temperature. __ (2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ b) Record Unit 1 Spent Fuel Pool temperature in the following table:	

Time	Unit 1 SFP Temp		Time	Unit 1 SFP Temp		Time	Unit 1 SFP Temp

__ 6. **Notify Control Room Supervisor of Unit 1 Spent Fuel Pool level and temperature.**

ATTACHMENT 9

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 8 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 10 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **Verify AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level) - IMPLEMENTED.**	**<u>IF AT ANY TIME</u> Unit 1 Spent Fuel Pool cooling <u>NOT</u> established prior to reaching either of the following conditions, <u>THEN</u> notify Control Room Supervisor, <u>REFER TO</u> AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level):** __ • Unit 1 Spent Fuel Pool greater than - 125°F. __ • Unit 1 Spent Fuel Pool level less than - 39 ft.
__ 8. **Repeat this enclosure every 2 hours until notified by station management.**	

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify any NC pump - ON.**	**Perform the following:** a. Use NC T-Colds to determine NC temperature as required in subsequent steps. b. <u>GO TO</u> Step 4.
2. **Use NC T-Avg to determine NC temperature as required in subsequent steps.**	
3. **<u>IF AT ANY TIME</u> all NC pumps tripped, <u>THEN</u> use NC T-Colds to determine NC temperature as required in subsequent steps.**	
4. **Verify one of the following:** • NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F OR • NC temperature - TRENDING TO 557°F.	**<u>GO TO</u> Step 8.**
5. **Continue to monitor NC temperature.**	
6. **Notify Control Room Supervisor of NC temperature control status.**	

ATTACHMENT 10

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 2 of 5** **NC Temperature Control**	PAGE NO. **45 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Do not continue in this enclosure until one of the following occurs:** • NC temperature - GREATER THAN 557°F AND INCREASING IN AN UNCONTROLLED MANNER OR • NC temperature - GREATER THAN 557°F AND STABLE OR • NC temperature - LESS THAN 557°F AND DECREASING IN AN UNCONTROLLED MANNER.	
8. **Verify NC temperature - LESS THAN 557°F AND DECREASING.**	**Perform the following:** a. <u>IF</u> NC temperature greater than 557°F <u>**AND**</u> increasing, <u>**THEN**</u> stabilize NC temperature at 557°F as follows: 1) <u>IF</u> steam dumps available, <u>**THEN**</u> use steam dumps. 2) <u>IF</u> steam dumps not available, <u>**THEN**</u> use S/G PORVs. b. <u>IF</u> the following conditions exist: • NC temperature greater than 557°F and stable • Time and manpower available, <u>**THEN**</u> stabilize NC temperature at 557°F as follows: 1) <u>IF</u> steam dumps available, <u>**THEN**</u> use steam dumps. 2) <u>IF</u> steam dumps not available, <u>**THEN**</u> use S/G PORVs. c. <u>GO TO</u> Step 10.

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Attempt to stop the NC cooldown as follows:**	
a. Ensure all steam dumps - CLOSED.	
b. Ensure all S/G PORVs - CLOSED.	b. <u>**IF**</u> any S/G PORV cannot be closed, <u>**THEN**</u> CLOSE its isolation valve.
c. Ensure S/G blowdown isolated.	
d. CLOSE the following valves: • 1SM-77A (S/G 1A Otlt Hdr Bldwn C/V) • 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V) • 1SM-75A (S/G 1C Otlt Hdr Bldwn C/V) • 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V).	
e. Verify MSR Second Stage steam supply valves - CLOSED • 1HM-1 (MSRH 1A&1B SSRH Stm Source) • 1HM-2 (MSRH 1C&1D SSRH Stm Source).	e. Perform the following: 1) CLOSE MSR Second Stage steam supply valve(s). 2) <u>**IF**</u> steam flowpath cannot be isolated from Control Room, <u>**THEN**</u> CLOSE the following valves: • All MSIVs • All MSIV bypass valves.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
f. Depress and hold "S/V BEFORE SEAT DRN" "CLOSE" pushbutton (1MC-3) to close the following valves: • 1SM-41 (Stop Vlv #1 Before Seat Drn) • 1SM-44 (Stop Vlv #2 Before Seat Drn) • 1SM-43 (Stop Vlv #3 Before Seat Drn) • 1SM-42 (Stop Vlv #4 Before Seat Drn).	
g. Verify NC cooldown - STOPPED.	g. <u>IF</u> cooldown continues, <u>THEN</u> THROTTLE feed flow as follows: 1) <u>IF</u> S/G N/R level less than 11% (29% ACC) in all S/G's, <u>THEN</u> THROTTLE feed flow to achieve the following: • Minimize cooldown • Maintain total feed flow greater than 450 GPM. 2) <u>WHEN</u> N/R level greater than 11% (29% ACC) in any S/G, <u>THEN</u> THROTTLE feed flow further to achieve the following: • Minimize cooldown • Maintain at least one S/G N/R level greater than 11% (29% ACC). 3) <u>IF</u> cooldown continues, <u>THEN</u> CLOSE the following valves: • All MSIVs • All MSIV bypass valves.

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Continue to perform actions of this enclosure as required to ensure one of the following:** • NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F OR • NC temperature - TRENDING TO 557°F.	
11. **Notify Control Room Supervisor of NC temperature control status.**	

ATTACHMENT 11

CNS EP/1/A/5000/E-2	FAULTED STEAM GENERATOR ISOLATION Enclosure 1 - Page 1 of 1 **Foldout Page**	PAGE NO. 26 of 26 Revision 15

1. **Cold Leg Recirc Switchover Criterion:**

__ • IF FWST level decreases to 20% 1AD-9, D/8 "FWST 2/4 LO LEVEL" lit), **THEN GO TO** EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirculation).

2. **CA Suction Source Switchover Criterion:**

__ • IF 1AD-8, B/1 "UST LO LEVEL" lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).

3. **Position Criteria for 1NV-202B and 1NV-203A (NV Pumps A&B Recirc Isol):**

__ • IF NC pressure less than 1500 PSIG **AND** NV S/I flowpath aligned, **THEN** CLOSE 1NV-202B and 1NV-203A.

__ • IF NC pressure greater than 2000 PSIG, **THEN** OPEN 1NV-202B and 1NV-203A.

ATTACHMENT 12

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION Enclosure 1 - Page 1 of 1 **Foldout Page**	PAGE NO. 38 of 58 Revision 35

1. **S/I Reinitiation Criteria:**

   - **IF** NC subcooling based on core exit T/Cs less than 0°F **OR** Pzr level cannot be maintained greater than 11% (30% ACC), **THEN** perform the following:

     a. Start one or more S/I pumps.

     b. Realign NV S/I flow path. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 14 (NV Alignment To S/I Mode).

     c. **IF** Step 11 has been completed, **THEN GO TO** EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).

2. **Secondary Integrity Criteria:**

   - **IF** any unisolated S/G pressure trending down in uncontrolled manner **OR** completely depressurized, **THEN GO TO** EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).

3. **Cold Leg Recirc Switchover Criterion:**

   - **IF** FWST level lowers to 20% (1AD-9, D/8 "FWST 2/4 LO LEVEL"), **THEN GO TO** EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation).

4. **CA Suction Source Switchover Criterion:**

   - **IF** 1AD-8, B/1 "UST LO LEVEL" lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).

ATTACHMENT 13

EVENT #2
PZR Spray Valve / Heater Failure

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

LCO 3.4.1 RCS DNB parameters for pressurizer pressure, RCS average temperature, and RCS total flow rate shall be within the limits specified in Table 3.4.1-1.

APPLICABILITY: MODE 1.

------------------------------NOTE------------------------------
Pressurizer pressure limit does not apply during:

a. THERMAL POWER ramp > 5% RTP per minute; or

b. THERMAL POWER step > 10% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Pressurizer pressure or RCS average temperature DNB parameters not within limits.	A.1 Restore DNB parameter(s) to within limit.	2 hours
B. RCS total flow rate ≥ 99%, but < 100% of the limit specified in the COLR.	B.1 Reduce THERMAL POWER to ≤ 98% RTP.	2 hours
	AND	
	B.2 Reduce the Power Range Neutron Flux – High Trip Setpoint below the nominal setpoint by 2% RTP.	6 hours

(continued)

Note to Evaluator:

Violation of these limits will be indicated by OAC Alarm (PZR Low Press DNB Limit). This condition may NOT be entered based on pressure decrease and , if entered, will clear soon.

ATTACHMENT 13

EVENT #2
PZR Spray Valve / Heater Failure

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. RCS total flow rate < 99% of the value specified in the COLR.	C.1 Restore RCS total flow rate to ≥ 99% of the value specified in the COLR.	2 hours
	OR	
	C.2.1 Reduce THERMAL POWER to < 50% RTP.	2 hours
	AND	
	C.2.2 Reduce the Power Range Neutron Flux - High Trip Setpoint to ≤ 55% RTP.	6 hours
	AND	
	C.2.3 Restore RCS total flow rate to ≥ 99% of the value specified in the COLR.	24 hours
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 2.	6 hours

ATTACHMENT 13

EVENT #2

PZR Spray Valve / Heater Failure

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.9 Pressurizer

LCO 3.4.9 The pressurizer shall be OPERABLE with:

a. Pressurizer water level $\leq$ 92% (1656 ft^3); and

b. Two groups of pressurizer heaters OPERABLE with the capacity of each group $\geq$ 150 kW and capable of being powered from an emergency power supply.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Pressurizer water level not within limit.	A.1 Be in MODE 3 with reactor trip breakers open.	6 hours
	<u>AND</u>	
	A.2 Be in MODE 4.	12 hours
B. One required group of pressurizer heaters inoperable.	B.1 Restore required group of pressurizer heaters to OPERABLE status.	72 hours
C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	C.2 Be in MODE 4.	12 hours

ATTACHMENT 13

EVENT #2
PZR Spray Valve / Heater Failure

APPLICABLE SAFETY ANALYSES

In MODES 1, 2, and 3, the LCO requirement for pressurizer level to remain within the required range is consistent with the accident analyses. Safety analyses performed for lower MODES are not limiting. All analyses performed from a critical reactor condition assume the existence of a steam bubble and saturated conditions in the pressurizer. In making this assumption, the analyses neglect the small fraction of noncondensible gases normally present.

Safety analyses presented in the UFSAR (Ref. 1) do not take credit for pressurizer heater operation; however, an initial condition assumption of the safety analyses is that the RCS is operating at normal pressure.

The maximum pressurizer water level limit satisfies Criterion 2 of 10 CFR 50.36 (Ref. 2). Although the heaters are not specifically used in accident analysis, the need to maintain subcooling in the long term during loss of offsite power, as indicated in NUREG-0737 (Ref. 3), is the reason for providing an LCO.

LCO

The LCO requirement for the pressurizer to be OPERABLE with a water volume ≤ 1656 cubic feet, which is equivalent to 92%, ensures that a steam bubble exists. Limiting the LCO maximum operating water level preserves the steam space for pressure control. The LCO has been established to ensure the capability to establish and maintain pressure control for steady state operation and to minimize the consequences of potential overpressure transients. Requiring the presence of a steam bubble is also consistent with safety analysis analytical assumptions.

The LCO requires two groups of OPERABLE pressurizer heaters, each with a capacity ≥ 150 kW, capable of being powered from the emergency power supply. Only heater groups A and B are capable of being powered from the emergency power supply. Each of these heater groups receives power from the emergency power supply by the transfer of that train of the 4160 VAC Blackout Auxiliary Power System to be fed from the 4160 VAC Essential Auxiliary Power System. OPERABILITY of the associated diesel generator is not required to meet the LCO. The minimum heater capacity required is sufficient to maintain the RCS near normal operating pressure when accounting for heat losses through the pressurizer insulation. By maintaining the pressure near the operating conditions, a wide margin to subcooling can be obtained in the loops. The amount needed to maintain pressure is dependent on the heat losses.

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

3.3 INSTRUMENTATION

3.3.1 Reactor Trip System (RTS) Instrumentation

LCO 3.3.1 The RTS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.1-1.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.1-1 for the channel(s).	Immediately
B. One Manual Reactor Trip channel inoperable.	B.1 Restore channel to OPERABLE status. <u>OR</u> B.2 Be in MODE 3.	48 hours 54 hours
C. One channel or train inoperable.	C.1 Restore channel or train to OPERABLE status. <u>OR</u> C.2 Open reactor trip breakers (RTBs).	48 hours 49 hours

(continued)

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One channel inoperable.	----------------NOTE---------------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing and setpoint adjustment of other channels. --	
	D.1.1 ------------NOTE------------ Only required to be performed when the Power Range Neutron Flux input to QPTR is inoperable. -------------------------------- Perform SR 3.2.4.2.	12 hours from discovery of THERMAL POWER > 75% RTP AND Once per 12 hours thereafter
	AND	
	D.1.2 Place channel in trip.	72 hours
	OR	
	D.2 Be in MODE 3.	78 hours

(continued)

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One channel inoperable.	----------------NOTE---------------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. ------------------------------------	
	E.1 Place channel in trip.	72 hours
	OR	
	E.2 Be in MODE 3.	78 hours
F. THERMAL POWER > P-6 and < P-10, one Intermediate Range Neutron Flux channel inoperable.	F.1 Reduce THERMAL POWER to < P-6.	24 hours
	OR	
	F.2 Increase THERMAL POWER to > P-10.	24 hours
G. THERMAL POWER > P-6 and < P-10, two Intermediate Range Neutron Flux channels inoperable.	G.1 -------------NOTE------------- Limited boron concentration changes associated with RCS inventory control or limited plant temperature changes are allowed. ------------------------------	
	Suspend operations involving positive reactivity additions.	Immediately
	AND	
	G.2 Reduce THERMAL POWER to < P-6.	2 hours

(continued)

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. THERMAL POWER < P-6, one or two Intermediate Range Neutron Flux channels inoperable.	H.1 Restore channel(s) to OPERABLE status.	Prior to increasing THERMAL POWER to > P-6
I. One Source Range Neutron Flux channel inoperable.	I.1 -------------NOTE------------ Limited boron concentration changes associated with RCS inventory control or limited plant temperature changes are allowed. -------------------------------- Suspend operations involving positive reactivity additions.	Immediately
J. Two Source Range Neutron Flux channels inoperable.	J.1 Open RTBs.	Immediately
K. One Source Range Neutron Flux channel inoperable.	K.1 Restore channel to OPERABLE status. OR K.2 Open RTBs.	48 hours 49 hours

(continued)

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
L. One channel inoperable.	---------------NOTE--------------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. --	
	L.1 Place channel in trip.	72 hours
	<u>OR</u>	
	L.2 Reduce THERMAL POWER to < P-7.	78 hours
M. One Reactor Coolant Flow - Low (Single Loop) channel inoperable.	---------------NOTE--------------- The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. --	
	M.1 Place channel in trip.	6 hours
	<u>OR</u>	
	M.2 Reduce THERMAL POWER to < P-8.	10 hours
N. One Turbine Trip - Stop Valve EH Pressure Low channel inoperable.	---------------NOTE--------------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. --	
	N.1 Place channel in trip.	72 hours
	<u>OR</u>	
	N.2 Reduce THERMAL POWER to < P-9.	76 hours

(continued)

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

RTS Instrumentation
3.3.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
O. One or more Turbine Trip - Turbine Stop Valve Closure channels inoperable.	O.1 Place channel(s) in trip.	72 hours
	OR	
	O.2 Reduce THERMAL POWER to < P-9.	76 hours
P. One train inoperable.	-----------------NOTE----------------- One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. --	
	P.1 Restore train to OPERABLE status.	24 hours
	OR	
	P.2 Be in MODE 3.	30 hours

(continued)

ATTACHMENT 13

EVENT #3
1B RCS Flow Channel 3

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
Q. One RTB train inoperable.	----------------NOTE---------------- One train may be bypassed for up to 4 hours for surveillance testing, provided the other train is OPERABLE. --	
	Q.1 Restore train to OPERABLE status.	24 hours
	OR	
	Q.2 Be in MODE 3.	30 hours
R. One or more channel(s) inoperable.	R.1 Verify interlock is in required state for existing unit conditions.	1 hour
	OR	
	R.2 Be in MODE 3.	7 hours

(continued)

ATTACHMENT 13

EVENT #3
1B RCS Flow Channel 3

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
S. One or more channel(s) inoperable.	S.1 Verify interlock is in required state for existing unit conditions.	1 hour
	OR	
	S.2 Be in MODE 2.	7 hours
T. One trip mechanism inoperable for one RTB.	T.1 Restore inoperable trip mechanism to OPERABLE status.	48 hours
	OR	
	T.2 Be in MODE 3.	54 hours
U. Two RTS trains inoperable.	U.1 Enter LCO 3.0.3.	Immediately

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

Table 3.3.1-1 (page 1 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA	NA
	$3^{(a)}, 4^{(a)}, 5^{(a)}$	2	C	SR 3.3.1.14	NA	NA
2. Power Range Neutron Flux						
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 110.9% RTP	109% RTP
b. Low	$1^{(b)}, 2$	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ 27.1% RTP	25% RTP
3. Power Range Neutron Flux						
High Positive Rate	1,2	4	D	SR 3.3.1.7 SR 3.3.1.11	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

Table 3.3.1-1 (page 2 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Intermediate Range Neutron Flux	$1^{(b)}$, $2^{(c)}$	2	F,G	SR 3.3.1.1 SR 3.3.1.8$^{(l)(m)}$ SR 3.3.1.11$^{(l)(m)}$	≤ 38% RTP	25% RTP
	$2^{(d)}$	2	H	SR 3.3.1.1 SR 3.3.1.8$^{(l)(m)}$ SR 3.3.1.11$^{(l)(m)}$	≤ 38% RTP	25% RTP
5. Source Range Neutron Flux	$2^{(d)}$	2	I,J	SR 3.3.1.1 SR 3.3.1.8$^{(l)(m)}$ SR 3.3.1.11$^{(l)(m)}$	≤ 1.44 E5 cps	1.0 E5 cps
	$3^{(a)}$, $4^{(a)}$, $5^{(a)}$	2	J,K	SR 3.3.1.1 SR 3.3.1.7$^{(l)(m)}$ SR 3.3.1.11$^{(l)(m)}$	≤ 1.44 E5 cps	1.0 E5 cps
6. Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 1 (Page 3.3.1-19)	Refer to Note 1 (Page 3.3.1-19)

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(l) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(m) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the NOMINAL TRIP SETPOINT (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

ATTACHMENT 13

EVENT #3
1B RCS Flow Channel 3

Table 3.3.1-1 (page 3 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
7. Overpower ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 2 (Page 3.3.1-20)	Refer to Note 2 (Page 3.3.1-20)
8. Pressurizer Pressure						
a. Low	1(e)	4	L	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 1938(f) psig	1945(f) psig
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ 2399 psig	2385 psig
9. Pressurizer Water Level - High	1(e)	3	L	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 93.8%	92%
10. Reactor Coolant Flow - Low						
a. Single Loop	1(g)	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 89.7%	91%
b. Two Loops	1(h)	3 per loop	L	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 89.7%	91%

(continued)

(e) Above the P-7 (Low Power Reactor Trips Block) interlock.

(f) Time constants utilized in the lead-lag controller for Pressurizer Pressure - Low are 2 seconds for lead and 1 second for lag.

(g) Above the P-8 (Power Range Neutron Flux) interlock.

(h) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

RTS Instrumentation
3.3.1

Table 3.3.1-1 (page 4 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
11. Undervoltage RCPs	1(e)	1 per bus	L	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 5016 V	5082 V
12. Underfrequency RCPs	1(e)	1 per bus	L	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 55.9 Hz	56.4 Hz
13. Steam Generator (SG) Water Level - Low Low	1,2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 9% (Unit 1) ≥ 35.1% (Unit 2) of narrow range span	10.7% (Unit 1) 36.8% (Unit 2) of narrow range span
14. Turbine Trip						
a. Stop Valve EH Pressure Low	1(j)	4	N	SR 3.3.1.10 SR 3.3.1.15	≥ 500 psig	550 psig
b. Turbine Stop Valve Closure	1(j)	4	O	SR 3.3.1.10 SR 3.3.1.15	≥ 1% open	NA
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	P	SR 3.3.1.5 SR 3.3.1.14	NA	NA

(continued)

(e) Above the P-7 (Low Power Reactor Trips Block) interlock.

(i) Not used.

(j) Above the P-9 (Power Range Neutron Flux) interlock.

ATTACHMENT 13

EVENT #3

1B RCS Flow Channel 3

Table 3.3.1-1 (page 5 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2(d)	2	R	SR 3.3.1.11 SR 3.3.1.13	≥ 6.6E-6% RTP	1E-5% RTP
b. Low Power Reactor Trips Block, P-7	1	1 per train	S	SR 3.3.1.5	NA	NA
c. Power Range Neutron Flux, P-8	1	4	S	SR 3.3.1.11 SR 3.3.1.13	≤ 50.2% RTP	48% RTP
d. Power Range Neutron Flux, P-9	1	4	S	SR 3.3.1.11 SR 3.3.1.13	≤ 70% RTP	69% RTP
e. Power Range Neutron Flux, P-10	1,2	4	R	SR 3.3.1.11 SR 3.3.1.13	≥ 7.8% RTP and ≤ 12.2% RTP	10% RTP
f. Turbine Impulse Pressure, P-13	1	2	S	SR 3.3.1.12 SR 3.3.1.13	≤ 12.2% RTP turbine impulse pressure equivalent	10% RTP turbine impulse pressure equivalent
17. Reactor Trip Breakers(k)	1,2	2 trains	Q,U	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.4	NA	NA
18. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	T	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	1 each per RTB	C	SR 3.3.1.4	NA	NA
19. Automatic Trip Logic	1,2	2 trains	P,U	SR 3.3.1.5	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.5	NA	NA

(continued)

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(k) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

ATTACHMENT 14

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 2 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
__ 2. **Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.**	**IF any NV OR NI pump on, THEN perform the following:** __ a. Ensure all NC pumps - OFF. __ b. Maintain seal injection flow.
3. **Verify main steamlines intact:** __ • All S/G pressures - STABLE **OR** TRENDING UP __ • All S/Gs - PRESSURIZED.	**IF pressure in any S/G trending down in uncontrolled manner OR depressurized, THEN perform the following:** a. **IF** any faulted S/G(s) feedlines **OR** steamlines not isolated, **THEN** perform the following: __ 1) **IF** EP/1/A/5000/E-2 (Faulted Steam Generator Isolation) has been performed for affected S/G, **THEN GO TO** Step 3, RNO b. __ 2) **GO TO** EP/1/A/5000/E-2 (Faulted Steam Generator Isolation). b. **IF** affected S/G(s) faulted outside containment, **THEN** request RP to perform the following: __ 1) Monitor area of steam fault for radiation. __ 2) Notify Control Room of any abnormal radiation conditions.

ATTACHMENT 14

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 3 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Control intact S/G N/R levels as follows:**	
__ a. Verify N/R level in any intact S/Gs - GREATER THAN 11% (29% ACC).	__ a. Maintain total feed flow greater than 450 GPM until any intact S/G N/R level greater than 11% (29% ACC).
__ b. THROTTLE feed flow to maintain all intact S/G N/R levels between 11% (29% ACC) and 50%.	__ b. **IF** N/R level in any S/G continues to trend up in uncontrolled manner, **THEN GO TO** EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
5. **Reset the following:**	
__ a. ECCS.	__ a. Locally reset ECCS. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 4 (ECCS Master Reset).
__ b. D/G load sequencers.	b. Dispatch operator to open affected sequencer(s) control power breaker: __ • 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496) __ • 1EDF-F01F (Diesel Generator Load Sequencer Panel 1DGLSB) (AB-560, BB-46, Rm 372).
__ c. Phase A.	
__ d. Phase B.	
__ e. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.	

ATTACHMENT 14

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 4 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Establish VI to Containment as follows:** __ • Ensure 1VI-77B (VI Cont Isol) - OPEN __ • Verify VI pressure - GREATER THAN 85 PSIG.	**Perform the following:** a. Align N_2 to Pzr PORVs by opening the following valves: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B). b. **IF** VI pressure less than 85 PSIG, **THEN** perform the following: __ 1) Dispatch operator to ensure proper VI compressor operation. __ 2) Restore VI while continuing with this procedure. **REFER TO** AP/0/A/5500/022 (Loss of Instrument Air).
7. **Verify secondary radiation - NORMAL:** a. Ensure the following signals - RESET: __ 1) CA System valve control. __ 2) KC NC NI NM St signals. __ b. Align all S/Gs for Chemistry sampling. c. Perform at least one of the following: __ • Notify Chemistry to sample all S/Gs for activity OR __ • Notify RP to frisk all cation columns for activity.	

ATTACHMENT 14

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. (Continued)	
d. Verify the following EMF trip 1 lights - DARK: __ • 1EMF-33 (Condenser Air Ejector Exhaust) __ • 1EMF-26 (Steamline 1A) __ • 1EMF-27 (Steamline 1B) __ • 1EMF-28 (Steamline 1C) __ • 1EMF-29 (Steamline 1D).	__ d. **<u>GO TO</u>** EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
e. Verify all S/Gs - INTACT: __ • All S/G pressures - STABLE **<u>OR</u>** TRENDING UP __ • All S/Gs - PRESSURIZED.	e. **<u>IF</u>** any S/G(s) faulted outside containment, **<u>THEN</u>** request RP to perform the following: __ • Monitor area of steam fault for radiation __ • Notify Control Room of any abnormal radiation conditions.
__ f. **<u>WHEN</u>** activity results reported, **<u>THEN</u>** verify all S/Gs indicate no activity.	f. Perform the following: __ 1) Notify Station Management to evaluate S/G(s) activity results. __ 2) **<u>IF</u>** S/G(s) activity indicate SGTR, **<u>THEN</u> <u>GO TO</u>** EP/1/A/5000/E-3 (Steam Generator Tube Rupture).

ATTACHMENT 14

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 6 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Verify Pzr PORVs and Isolation Valves:**	
__ a. Power to all Pzr PORV isolation valves - AVAILABLE.	__ a. Evaluate cause of power loss and initiate actions to restore power to affected isolation valve(s).
__ b. All Pzr PORVs - CLOSED.	b. **IF** Pzr pressure less than 2315 PSIG, **THEN** perform the following: __ 1) CLOSE Pzr PORV(s). __ 2) **IF** any Pzr PORV cannot be closed, **THEN** CLOSE its isolation valve. 3) **IF** 1NC-32B **OR** 1NC-34A cannot be closed **OR** isolated, **THEN** perform the following: a) Align N_2 to PORVs by opening the following valves: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B). __ b) CLOSE affected Pzr PORV.
__ c. Any Pzr PORV isolation valve - OPEN.	__ c. OPEN one Pzr PORV isolation valve unless it was closed to isolate an open Pzr PORV.
__ d. **IF AT ANY TIME** any Pzr PORV opens due to high pressure, **THEN** after Pzr pressure lowers to less than 2315 PSIG, ensure PORV closes or isolated.	

ATTACHMENT 14

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 7 of 35 Revision 32

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Verify S/I termination criteria:**	
__ a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.	__ a. **GO TO** Step 9.f.
b. Secondary heat sink: __ • Any intact S/G N/R level - GREATER THAN 11% (29% ACC) OR __ • Total feed flow to intact S/Gs - GREATER THAN 450 GPM.	__ b. **GO TO** Step 9.f.
__ c. NC pressure - STABLE OR TRENDING UP.	__ c. **GO TO** Step 9.f.
__ d. Pzr level - GREATER THAN 11% (30% ACC).	d. Perform the following: __ 1) **IF** NC pressure trending up **AND** normal Pzr spray available, **THEN** attempt to stabilize NC pressure using normal Pzr spray. __ 2) **GO TO** Step 9.f.
__ e. **GO TO** EP/1/A/5000/ES-1.1 (Safety Injection Termination).	
__ f. Monitor S/I termination criteria. **REFER TO** Enclosure 2 (S/I Termination Criteria).	
__ g. **IF AT ANY TIME** S/I termination criteria met while in this procedure, **THEN RETURN TO** Step 9.	

2019 INITIAL LICENSE NRC EXAM
SCENARIO # 4

Facility:	Catawba NRC Exam 2019	Scenario No.: 4	Op Test No.: 2019301
Examiners:		Operators:	SRO
			RO
			BOP

Initial Conditions: Unit 1 is at 1 x 10^{-3} % power at BOL. Unit 2 is at 100% power.

Turnover: Unit 1 is at 1 x 10^{-3} % power at BOL. Unit 2 is at 100% power. Direction for the crew is to place 1A NV Pump in service and secure 1B NV pump per OP/1/A/6200/001 (Chemical and Volume Control System), Enclosure 4.13 (Shifting the Operating Charging Pump). Pre-start check of 1A NV Pump is complete. Operator is standing by for post start check. Initial Conditions are complete. Crew is to begin at step 3.1 of Enclosure 4.13. Following NV Pump swap the crew is to withdraw control rods to increase reactor power to ~14% in preparation for placing the Main Turbine online.

Event No.	Malf. No.	Event Type*	Event Description
1		N – BOP N – SRO	Swap Centrifugal Charging (NV) Pumps
2		R – RO	Withdraw Control Rods to Increase Reactor Power
3	RN002A	C – BOP C – SRO TS – SRO	1A Nuclear Service Water (RN) Strainer Hi D/P
4	SG094 SG095	C – BOP C – SRO	1B S/G W/R Signal Fails Low / Feed Reg Bypass Valve Opens
5	FW002	TS – SRO	FWST Channel 2 Fails Low
6	IDE003C IDE003H	C – RO C – SRO	Condenser Steam Dumps (1SB-9 and 1SB-24) Fail Intermediate
7	NCP002B	C – RO C – SRO	1B Reactor Coolant (NC) Pump Shaft Shear
8	IPX003A IPX003B	M – ALL	ATWS
9	ND009C	M – ALL	LOCA Outside Containment
10	ISE007A ISE007B	C – RO C – SRO	Auto Main Feedwater (CF) Isolation Failure
11	NI001F NI002A	C – BOP C – SRO	Cold Leg Injection Isolation (1NI-9A) Fails to Closed Position, Cold Leg Injection Isolation (1NI-10B) Auto Open Fails

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 4 – Summary

Initial Condition
Unit 1 is at 1 x 10^{-3} % power at BOL. Unit 2 is at 100% power.

Turnover:
Unit 1 is at 1 x 10^{-3} % power at BOL. Unit 2 is at 100% power. Direction for the crew is to place 1A NV Pump in service and secure 1B NV pump per OP/1/A/6200/001 (Chemical and Volume Control System), Enclosure 4.13 (Shifting the Operating Charging Pump). Pre-start check of 1A NV Pump is complete. Operator is standing by for post start check. Initial Conditions are complete. Crew is to begin at step 3.1 of Enclosure 4.13. Following NV Pump swap the crew is to withdraw control rods to increase reactor power to ~14% in preparation for placing the Main Turbine online.

Event History: Similar reactivity evolution used 17 (4). Slightly different power level.

Event 1
Shift NV Pumps by starting 1A NV pump and securing 1B NV Pump.

Event History: Exact NV pump swap evolution is new. Similar used on 16 (2) – start 1B vs. starting 1A NV pump.

Event 2
Raise reactor power to 14%. Crew will withdraw control rods to increase Reactor Power.

Event History: This reactivity evolution used 17 (4). Additionally, power increase via control rod withdrawal used on Audit (4) but from a different power level (>POAH).

Event 3
1A RN (Nuclear Service Water) strainer Hi D/P. Crew will enter AP/0/A/5500/020 (Loss of Nuclear Service Water), start another RN Pump and secure 1A RN Pump. TS evaluation by the SRO is required.

Verifiable Action – BOP will start an alternate RN Pump and secure 1A RN Pump.

Event History: This exact malfunction not previously used. Similar malfunction used on 16 (1). 1B RN Pump Strainer on only RN pump in service. This scenario includes two operating RN Pumps.

Event 4
1B S/G W/R level signal fails LOW causing the associated Feed Reg. Bypass Valve to open. Crew will enter AP/1/A/5500/006 (Loss of SG Feedwater).

Verifiable Action – RO will take manual control of 1B FRV/Bypass valve and control S/G level.

Event History: This exact malfunction not used on previous 2 exams. Similar malfunction used on 16 (4) – D S/G W/R signal failure.

Event 5
FWST level channel 2 will fail low. TS evaluation by the SRO is required.

Event History: This malfunction not used on previous 2 exams. Similar malfunction {13 (3)} – Channel 1.

Event 6
1SB-9 (SM Byp to Cond Ctrl #9) and 1SB-24 (SM Byp to Cond Ctrl #24) will fail intermediate. Crew may enter AP/1/A/5500/028 (Secondary Steam Leak) for guidance to isolate the leak. Alternatively, the crew may use OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines) guidance to address failure.

Verifiable Action – The RO will place Steam Dump Control switches to "Off-Reset".

Event History: This exact malfunction not used on previous 2 exams. Similar Steam Dump failure used on 17 (3) – 1SB-27.

Event 7
The 1B RCP will experience a shaft shear. There is no "Low Loop Flow" Reactor Trip at the present power level. The RO will attempt to trip the reactor based on Immediate Action step of AP/1/A/5500/004 (Loss of Reactor Coolant Pump). The Reactor will fail to trip manually.

Verifiable Action – RO will manually insert control rods.

Event History: New Malfunction.

Event 8
The reactor will fail to trip from the control room requiring entry into FR-S.1. Once emergency boration flowpath is aligned (1NV-236B open), the reactor will trip.

Verifiable Action – RO will manually insert control rods and BOP will initiate emergency boration.

Event History: This major event used 16 (2) with a different entry – loss of all feed vs. loss of RCP.

Event 9
Following the Reactor Trip, a LOCA outside containment will occur. The crew will transition from EP/1/A/5000/FR-S.1 to EP/1/A/5000/E-0, initiate Safety Injection, and then to EP/1/A/5000/ECA-1.2. The crew will isolate the leak by closing 1NI-173A (ND Hdr 1A To Cold Legs C&D).

Verifiable Action – BOP will close 1NI-173A.

Event History: New Major event not previously used.

Event 10
Both trains of Automatic Feedwater Isolation will fail to actuate on Safety Injection.

Verifiable Action – RO will manually actuate A and B Train Main Feedwater Isolation.

Event History: This malfunction used 17 (3) combined with a S/G Tube Rupture.

Event 11
1NI-9A (Cold Leg Injection Valve) will not open. 1NI-10B (Cold Leg Injection Valve) fails to open in Auto. Manual opening of 1NI-10B will be successful.

Verifiable Action – BOP will manually open 1NI-10B.

Event History: This malfunction not used on previous 2 exams. Similar malfunction {14 (2)} – Opposing valves.

Manual Control of Automatic Functions		
Event	**Position**	**Description**
4	RO/BOP	Manually control Automatic Feed Reg Bypass Valve for 1B S/G

***Critical Task 1* – Manually control 1B S/G level to prevent Hi-Hi S/G Level (P-14) at 83% or S/G Lo-Lo Reactor Trip at 11%.**

***Critical Task 2* – Insert negative reactivity, via manual control rod insertion, within 50 seconds of receipt of valid Reactor Trip "First Out" Annunciator.**

The following information is contained within CNS Action Request #01423553-01 (Engineering determine validity of "Drive Control Rods if Reactor Does Not Trip (ATWS)"):

The PRA Group has confirmed that the action "Drive Control Rods if Reactor Does Not Trip (ATWS)" (QRODSINDHE) is a valid, time critical operator action. Time critical actions are those actions whose failure would result in an increase in core damage frequency (CDF) or Large Early Release Frequency (LERF) corresponding to the NRC definition of a "white" finding in the Significance Determination Process (SDP). Scenario Details. If the reactor fails to trip due to a failure of the trip breakers to open, the operator would first attempt to manually scram the reactor. If this failed, then he may be able to shut down the reactor by driving in the control rods. Engineering has calculated that this action must be accomplished within 50 seconds to prevent core damage (Time Available). The PRA Human Error calculation has input a median Operator Action Time of 30 seconds (Median Response Time). This is the time from the start of the event until the operator has begun driving in the control rods.

***Critical Task 3* – Isolate the LOCA outside containment before transition out of ECA-1.2.**

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	7
2. Malfunctions after EOP entry (1–2)	3
3. Abnormal events (2–4)	5
4. Major transients (1–2)	2
5. EOPs entered/requiring substantive actions (1–2)	2
6. EOP contingencies requiring substantive actions (0–2)	2
7. Critical tasks (2–3)	3

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

   1.1 Reset to IC # 171

START TIME:__________

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		3	MAL-RN002A (RN STRAINER 1A HI D/P)	100				3
		4	XMT-SG095 [XCF_5621 S/G B W/R LVL CH 1 TO DCS/ELSEWHERE (CFAA5621)]	40		3:00		4
		4	XMT-SG094 [XCF_5620 S/G B W/R LVL CH 2 TO DCS/ELSEWHERE (CFAA5620)]	40		3:00		4
		5	XMT-FW002 (LFW_5010 WR FWST LVL CH 2 TO DCS (FWAA5010))	0				5
		6	MAL-IDE003H (STEAM DUMP VLV SB24 FAIL TO POSITION)	30				6
		6	MAL-IDE003C (STEAM DUMP VLV SB9 FAIL TO POSITION)	30				6
		13	LOA-IDE003 (SB8–INLET ISOL)	0	5:00			6
		13	LOA-IDE008 (SB23–INLET ISOL)	0	5:00			6
		11	MAL-IDE003H (STEAM DUMP VLV SB24 FAIL TO POSITION)	50			:01	6
		11	MAL-IDE003C (STEAM DUMP VLV SB9 FAIL TO POSITION)	100			:01	3
		7	MAL-NCP002B (NCP B SHAFT BREAK)					7
			MAL-IPX003A (REACTOR TRIP BKR A FAILURE)	ACTIVE				8
			MAL-IPX003B (REACTOR TRIP BKR B FAILURE)	ACTIVE				8
		12	MAL-IPX003A (REACTOR TRIP BKR A FAILURE)	ACTIVE			:01	8
		12	MAL-IPX003B (REACTOR TRIP BKR B FAILURE)	ACTIVE			:02	8
		9	MAL-ND004A (ND SYS TRN A DISCH LINE RUPTURE)	2500		:05		9
		9	MAL-ND009C (ND TO NC CHK VLV 1NI175 AND 82 LEAKAGE)	15		:05		9
		9	MAL-EMF1.01 (AUX BLDG COR EL 522 FF 57 FALSE READING)	20	:10	4:00		
			MAL-ISE007A (AUTO CF ISOL SIGNAL TRN A)	BLOCK				10
			MAL-ISE007B (AUTO CF ISOL SIGNAL TRN B)	BLOCK				10
			VLV-NI001F (NI9A B.I.T. DISCHARGE ISOL VLV FAIL TO POSITION)	0				11

			VLV-NI002A (NI10B B.I.T. DISCHARGE ISOL VLV FAIL AUTO ACTIONS)					11
			ANN-AD11-B03 (TRANSFORMER A TROUBLE)	ON				
			ANN-AD11-E03 (TRANSFORMER B TROUBLE)	ON				
		10	LOA-VC039 (MNL RST LATCH FOR CHILLER B HI COND PRESS TRP DUE TO LOSS RN)	RESET	10:00			
		Ensure EVENT 11 = x02i184l │ x02i186l (Steam Dump Select OFF Either Train)						
		Ensure Event 12 = x10i247o (1NV-236B Open)						
		Ensure 1B NV Pump is in service						
		Provide copy of OP/1/A/6100/001, Encl. 4.1 open to step 3.184						

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

2.2 Give a copy of Attachment 2 (Shift Turnover Information) to the CRS.

3. EXERCISE PRESENTATION

3.1 Familiarization Period

A. Allow examinees time to familiarize themselves with the Control Board alignments.

3.2 **Scenario EVENT 1**, Centrifugal Charging (NV) Pump Swap. Start 1A NV and secure 1B NV Pump

✓	BOOTH INSTRUCTOR ACTION
	Following start of 1A NV pump, wait one minute and **REPORT** "1A NV Pump is good for continued operation".

✓	BOOTH INSTRUCTOR ACTION
	WHEN dispatched to evaluate NV Pump Vibration Panel alarms per OP/0/A/6500/115, **REPORT** "No alarm present on NV Pump Vibration Panel".

3.3 **Scenario EVENT 2**, Withdraw Control Rods to Increase Reactor Power to 1%

3.4 **Scenario EVENT 3**, 1A Nuclear Service Water (RN) Pump Strainer Hi D/P

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause 1A RN Strainer Hi D/P.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1A RN Strainer and/or breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator and/or Maintenance are dispatched to investigate the 1A RN Strainer and/or breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator is dispatched to reset VC/YC, **THEN INSERT SIMULATOR Trigger 10**.
	After 10 minutes has elapsed, **REPORT** VC/YC has been reset.

✓	BOOTH INSTRUCTOR ACTION
	WHEN contacted concerning Unit 2 RN valve position**, REPORT** 2RN-67A and 69B are Open.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator is dispatched to perform post start check of RN Pump, **REPEAT** back the information.
	After 5 minutes has elapsed, **REPORT** RN Pump ____ is good for continued operation.

✓	BOOTH INSTRUCTOR ACTION
	IF Environmental Chemistry is contacted, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF indication of 2AD-12 C/2 and C/5 are requested, **REPORT** that both annunciators are dark.

3.5 **Scenario EVENT 4**, 1B S/G W/R Signal Fails Low / Feed Reg Bypass Valve Opens

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 4** to cause a failure of the 1B S/G WR Level.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for the 1B S/G WR level channel, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to verify S/G level indication on the Aux Shutdown Panels, **REPORT** 1B S/G Level is reading 40%.

3.6 **Scenario EVENT 5**, FWST Channel 2 Fails Low

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 5** to cause FWST Channel 2 to fail low.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for Channel 2 FWST level, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF IAE is contacted to issue Model W/O 01069040, **REPEAT** the information.

3.7 **Scenario EVENT 6**, Condenser Steam Dumps (1SB-9 & 1SB-24) Fail Intermediate

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 6** to cause Condenser Dump Valves (1SB-9 and 1SB-24) to fail intermediate.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO or Unit Supervisor to create a clearance to isolate 1SB-9 and 1SB-24, **REPEAT** the information and **INSERT Trigger 13**.
	After 5 minutes, contact the control room and **REPORT** "1SB-8 and 1SB-23 are manually closed to isolate 1SB-9 and 1SB-24."

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate a W/R and NCR for 1SB-9 and 1SB-24, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection notifying of steam leak from 1SB-9 and 1SB-24 failing open, **REPEAT** the information.

3.8 **Scenario EVENTS 7, 8**, 1B Reactor Coolant (NC) Pump Shaft Shear / ATWS

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 7** to cause a shaft shear of the 1B NCP.

✓	BOOTH INSTRUCTOR ACTION
	IF AO is contacted to locally open RX Trip Breakers and MG Set Output Breakers, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Chemistry with instruction to sample for NC System Boron, **REPEAT** the information.

3.9 **Scenario EVENTS 9, 10, 11**, LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-10B) Fails to Closed Position, Cold Leg Injection (1NI-9A) Auto Open Fails

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 9** to cause a LOCA Outside Containment.

✓	BOOTH INSTRUCTOR ACTION
	IF Secondary Chemistry is notified to sample all S/Gs for activity, **REPEAT** the order.

✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified to frisk all cation columns for activity, **REPEAT** the order.

✓	BOOTH INSTRUCTOR ACTION
	IF an AO is dispatched to locate a potential Unit 1 NC System leak, **REPEAT** the information.
	After 10 minutes, contact the control room and **REPORT** "The 522' Elevation is full of water and steam".

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to check both ND and NS pumps for seal leaks, **REPEAT** the order.

Enclosure 4.13
Shifting The Operating Charging Pump

OP/1/A/6200/001
Page 2 of 4

3. Procedure

NOTE: This enclosure will affect reactivity of the core and is therefore designated important to Reactivity Management per the guidelines of AD-OP-ALL-0203 (Reactivity Management). (R.M.)

N/A 3.1 IF shifting from 1A NV Pump in service to 1B NV Pump in service, perform the following:

CAUTION:
- If an NV Pump has been idle for an extended period of time, a boron transient may be initiated when it is placed in service. The volume of 1B NV Pump and associated piping is 65 gallons; the magnitude of the transient will be minimal.
- Shifting charging pumps at low NC System pressures (< 1000 psig) with NC Pump(s) in service will result in hydraulic transients being placed on the NC Pump seal packages. Operating experience shows that these transients will affect seal return flow. (PIP 09-2596)

NOTE: A loss of 1EPD with only the 1B NV Pump running will isolate normal letdown due to an indicated loss of both charging pumps; the loss of 1EPD will also disable the LTOP function of 1NC-32B (PZR PORV) creating a challenge to LTOP. This challenge does **NOT** occur if either the 1A NV Pump is in service or ND Letdown is in service. (PIP C-12-1241)

_____ 3.1.1 IF Unit 1 is in Mode 4 with any RCS cold leg ≤ 210°F, or Mode 5, or Mode 6 when the reactor vessel head on, make log entry for 1NC-32B (PZR PORV) per the applicable:

_____ SRO 3.1.1.1 IF only normal letdown is in service, log 1NC-32B (PZR PORV) as inoperable for Tech. Spec. 3.4.12 (LTOP).

_____ SRO 3.1.1.2 IF ND Letdown is in service, log 1NC-32B (PZR PORV) as a tracking item for being inoperable for Tech. Spec. 3.4.12 (LTOP).

_____ 3.1.2 Ensure VCT pressure is between 18-40 psig as read on 1NVP5500 (VCT Vent Press) (1MC5).

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Event Description:	Centrifugal Charging (NV) Pump Swap								

Enclosure 4.13 OP/1/A/6200/001

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NOTE:	If in an emergency situation, the 30 second delay after starting the Aux Oil Pump is NOT required before starting the NV pump.

_____ 3.1.3 30 seconds prior to starting 1B NV pump, place "NV PUMP 1B AUX OIL PUMP" in the "ON" position.

_____ 3.1.4 Start "NV PUMP 1B". (R.M.)

_____ 3.1.5 Place "NV PUMP 1B AUX OIL PUMP" in "AUTO".

_____ 3.1.6 Stop "NV PUMP 1A".

_____ 3.1.7 Verify proper charging flow rate.

_____ 3.1.8 Dispatch an AO to evaluate the NV Pump Vibration Panel for any alarms per OP/0/A/6500/115 (Operator Rounds).

_____ 3.2 IF shifting from 1B NV Pump in service to 1A NV Pump in service, perform the following:

CAUTION:

- If an NV Pump has been idle for an extended period of time, a boron transient may be initiated when it is placed in service. The volume of 1A NV Pump and associated piping is 103 gallons; the magnitude of the transient will be minimal.
- Shifting charging pumps at low NC System pressures (< 1000 psig) with NC Pump(s) in service will result in hydraulic transients being placed on the NC Pump seal packages. Operating experience shows that these transients will affect seal return flow. (PIP 09-2596)

_____ 3.2.1 Ensure VCT pressure is between 18-40 psig as read on 1NVP5500 (VCT Vent Press) (1MC5).

NOTE:	If in an emergency situation, the 30 second delay after starting the Aux Oil Pump is NOT required before starting the NV pump.

_____ 3.2.2 30 seconds prior to starting 1A NV pump, place "NV PUMP 1A AUX OIL PUMP" in the "ON" position.

_____ 3.2.3 Start "NV PUMP 1A". (R.M.)

_____ 3.2.4 Place "NV PUMP 1A AUX OIL PUMP" in "AUTO".

_____ 3.2.5 Stop "NV PUMP 1B".

_____ 3.2.6 Verify proper charging flow rate.

Op Test No.:	301	Scenario #	4	Event #	1	Page 15 of	140
Event Description:	Centrifugal Charging (NV) Pump Swap						

Enclosure 4.13 OP/1/A/6200/001

Shifting The Operating Charging Pump Page 4 of 4

____ 3.2.7 Dispatch an AO to evaluate the NV Pump Vibration Panel for any alarms per OP/0/A/6500/115 (Operator Rounds).

NOTE: A loss of 1EPD with only the 1B NV Pump running will isolate normal letdown due to an indicated loss of both charging pumps; the loss of 1EPD will also disable the LTOP function of 1NC-32B (PZR PORV) creating a challenge to LTOP. This challenge does **NOT** occur if either the 1A NV Pump is in service or ND Letdown is in service. (PIP C-12-1241)

N/A
SRO 3.2.8 **IF** Unit 1 is in Mode 4 with any RCS cold leg ≤ 210°F, or Mode 5, or Mode 6 when the reactor vessel head on, log 1NC-32B (PZR PORV) as a tracking item for being inoperable for Tech. Spec. 3.4.12 (LTOP).

3.3 File this enclosure in the Control Copy folder of this procedure.

Op Test No.: 301	Scenario # 4	Event # 2	Page 16 of 140
Event Description:	Withdraw Control Rods to Increase Reactor Power to 14%		

Enclosure 4.1
Unit Startup

OP/1/A/6100/001
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CAUTION: Per SOER 07-1 (Reactivity Management) Reactor Operations at low power for extended periods of time is **NOT** recommended. Station Management shall carefully consider the risk of operations in off-normal conditions such as low power. (R.M.)

NOTE:

1. Control rod withdrawal shall **NOT** exceed the temporary rod withdrawal limits specified in Unit One R.O.D. Section 2.3.
2. Refer to Unit One R.O.D. Section 2.4 for the rate at which reactor power can be changed.
3. The throttling of a S/G bypass reg valve affects the other S/G bypass reg valves. Therefore, SM/CF ΔP needs to be monitored as the unit approaches POAH.
4. If NC boron concentration is greater than 1000 ppmB, T-AVG control may be very sensitive above the POAH due to a positive MTC. Unit One R.O.D. Section 5.10 provides MTC at the current conditions.
5. When approaching the beginning of the Power Range NI indication (.1% on the PR), a startup rate of < 0.2 dpm is required. The < .2 dpm rate shall **NOT** be exceeded, except when performing PT/0/A/4150/001 J (Zero Power Physics Testing), until the turbine is placed on line. (AD-OP-ALL-0203 (Reactivity Management)). (R.M.)
6. Per SOER 07-01 (Reactivity Management) it is recommended that Plant Operators monitor multiple indications such as Thermal Power Best Estimate, Nuclear Instrumentation, Steam Pressure, ΔT's, CF Flowrate, and Turbine Load when making at power reactivity changes. (R.M.)

_____ 3.184 Increase reactor power to 1%. (R.M.)

_____ 3.185 Begin performance of Enclosure 4.15 (Determination of Xe-133 Equivalent Activity During Power Increase) to begin updating the value for OAC point C1K0186 (TOTAL NC XE-133 EQ. ACTIVITY (MAN. ENTRY)).

_____ 3.186 Begin reviewing the items listed in Step 3.195 so that Unit 1 will **NOT** enter Mode 1 until all substeps of 3.195 are signed off.

_____ 3.187 **IF** necessary, continue heatup to no load T-AVG (557°F).

_____ 3.188 Maximize S/G blowdown flowrate within the guidelines of OP/1/A/6250/008 (Steam Generator Blowdown). (R.M.)

_____ 3.189 **WHILE** increasing reactor power coordinate with Chemistry to determine when blowdown flowrate can be subsequently reduced.

Note to Evaluator:

This step from the "Controlling Procedure for Unit Startup" provides guidance to increase Reactor power. The following procedure provides guidance for use on Control Rods.

Enclosure 4.4 OP/1/A/6150/008

Rod Withdrawal Page 2 of 7

2. Initial Conditions

AA 2.1 Verify Unit Startup is in progress per OP/1/A/6100/001 (Controlling Procedure for Unit Startup) or Unit Fast Recovery in progress per OP/1/A/6100/005 (Unit Fast Recovery).

NOTE:	The following LED lights can indicate a fault or power supply swap that must be addressed prior to rod withdrawal. CNS-2013-03999

AA 2.2 **<u>IF</u>** this is the initial rod withdrawal, complete Enclosure 4.17 (Circuit Cards LED Status Lights Verification) to verify the following:

- Fault status lights are extinguished.
- Firing Circuit Card power supply LEDs (4 per card) for cards A1, A2, D1, D2 and G1 are lit.

3. Procedure

NOTE:	• This enclosure will affect reactivity of the core and is therefore designated important to Reactivity Management per the guidelines of AD-OP-ALL-0203 (Reactivity Management). (R.M.) • The SDM boron concentration at 400°F is always greater than the critical boron concentration at 212°F.

N/A 3.1 **<u>IF</u>** < P-11 **<u>AND</u>** cycle burnup (C1P1457) > 350 EFPD, prior to withdrawing shutdown banks, verify K-eff will remain < 0.99 with shutdown banks withdrawn for one of the following: {PIP 04-6307}

☐ **<u>IF</u>** NC temperature ≥ 400°F, verify SDM per OP/0/A/6100/006 (Reactivity Balance Calculation) using 400°F.

☐ **<u>IF</u>** NC temperature < 400°F, verify SDM per OP/0/A/6100/006 (Reactivity Balance Calculation) using current NC temperature.

AA 3.2 **<u>IF</u>** > P-11 **<u>OR</u>** cycle burnup (C1P1457) ≤ 350 EFPD, prior to withdrawing shutdown banks, verify K-eff will remain < 0.99 with shutdown banks withdrawn. Refer to OP/0/A/6100/006 (Reactivity Balance Calculation).

Enclosure 4.4
Rod Withdrawal

OP/1/A/6150/008
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NOTE: If in Mode 4 or shutdown banks are being withdrawn for trippable rod worth, withdraw only shutdown banks A and B. {PIP 97-0693}

3.3 Withdraw shutdown banks in accordance with OP/1/A/6100/001 (Controlling Procedure for Unit Startup) or OP/1/A/6100/005 (Unit Fast Recovery) as follows:

AA 3.3.1 Dispatch operator to Rod Control Power Cabinets to verify selected banks "GRP SELECT" lights illuminate per Enclosure 4.13 (Rod Control Power Cabinet GRP Select Lights).

AA 3.3.2 **IF NOT** fully withdrawn, withdraw Shutdown Bank A as follows:

CAUTION: Failure to pause at each bank position with the "CRD BANK SELECT" switch may result in dropping rods.

AA 3.3.2.1 Place "CRD BANK SELECT" in the "SBA" position on 1MC1.

AA 3.3.2.2 Verify that "GRP SELECT" light "C" illuminates on Rod Control Cabinets 1AC and 2AC per Enclosure 4.13 (Rod Control Power Cabinet GRP Select Lights).

AA 3.3.2.3 **WHILE** moving rods in the following step, verify proper rod movement by the following indications:

- Proper "RODS IN/RODS OUT" direction light
- Proper step demand counter movement
- DRPI indication
- Reactor power changes
- T-Avg changes.

AA 3.3.2.4 Using the "IN-OUT" switch, withdraw shutdown bank rods to position specified by COLR (T.S. 3.1.5). (R.M.)

AA 3.3.2.5 Observe "S/D BANK A GROUP 1" and "S/D BANK A GROUP 2" counters indicate withdrawal steps within one step of each other.

AA 3.3.2.6 Verify that the shutdown bank mechanisms are moving on the DRPI display.

Enclosure 4.4
Rod Withdrawal

OP/1/A/6150/008
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AA 3.3.3 **IF NOT** fully withdrawn, withdraw Shutdown Bank B as follows:

AA 3.3.3.1 Place "CRD BANK SELECT" in the "SBB" position on 1MC1.

AA 3.3.3.2 Verify that the selected banks "GRP SELECT" light "C" illuminates on Rod Control Cabinets 1BD and 2BD per Enclosure 4.13 (Rod Control Power Cabinet GRP Select Lights).

AA 3.3.3.3 **WHILE** moving rods in the following step, verify proper rod movement by the following indications:

- Proper "RODS IN/RODS OUT" direction light
- Proper step demand counter movement
- DRPI indication
- Reactor power changes
- T-Avg changes.

AA 3.3.3.4 Using the "IN-OUT" switch, withdraw shutdown bank rods to position specified by COLR (T.S. 3.1.5). (R.M.)

AA 3.3.3.5 Observe "S/D BANK B GROUP 1" and "S/D BANK B GROUP 2" counters indicate withdrawal steps within one step of each other.

AA 3.3.3.6 Verify that the shutdown bank mechanisms are moving on the DRPI display.

N/A 3.3.4 **IF** shutdown banks A and B have been withdrawn for trippable rod worth only, then proceed to Step 3.12.

AA 3.3.5 Withdraw Shutdown Bank C as follows:

AA 3.3.5.1 Place "CRD BANK SELECT" in the "SBC" position on 1MC1.

AA 3.3.5.2 Verify that the selected banks "GRP SELECT" light "A" illuminates on Rod Control Cabinet SCDE per Enclosure 4.13 (Rod Control Power Cabinet GRP Select Lights).

AA 3.3.5.3 **WHILE** moving rods in the following step, verify proper rod movement by the following indications:

- Proper "RODS IN/RODS OUT" direction light
- Proper step demand counter movement
- DRPI indication
- Reactor power changes
- T-Avg changes.

AA 3.3.5.4 Using the "IN-OUT" switch, withdraw shutdown bank rods to position specified by COLR (T.S. 3.1.5). (R.M.)

AA 3.3.5.5 Verify that the shutdown bank mechanisms are moving on the DRPI display.

Enclosure 4.4
Rod Withdrawal

OP/1/A/6150/008
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AA 3.3.6 Withdraw Shutdown Bank D as follows:

AA 3.3.6.1 Place "CRD BANK SELECT" in the "SBD" position on 1MC1.

AA 3.3.6.2 Verify that the selected banks "GRP SELECT" light "B" illuminates on Rod Control Cabinet SCDE per Enclosure 4.13 (Rod Control Power Cabinet GRP Select Lights).

AA 3.3.6.3 **WHILE** moving rods in the following step, verify proper rod movement by the following indications:

- Proper "RODS IN/RODS OUT" direction light
- Proper step demand counter movement
- DRPI indication
- Reactor power changes
- T-Avg changes.

AA 3.3.6.4 Using the "IN-OUT" switch, withdraw shutdown bank rods to position specified by COLR (T.S. 3.1.5). (R.M.)

AA 3.3.6.5 Verify that the shutdown bank mechanisms are moving on the DRPI display.

AA 3.3.7 Withdraw Shutdown Bank E as follows:

AA 3.3.7.1 Place "CRD BANK SELECT" in the "SBE" position on 1MC1.

AA 3.3.7.2 Verify that the selected banks "GRP SELECT" light "C" illuminates on Rod Control Cabinet SCDE per Enclosure 4.13 (Rod Control Power Cabinet GRP Select Lights).

AA 3.3.7.3 **WHILE** moving rods in the following step, verify proper rod movement by the following indications:

- Proper "RODS IN/RODS OUT" direction light
- Proper step demand counter movement
- DRPI indication
- Reactor power changes
- T-Avg changes.

AA 3.3.7.4 Using the "IN-OUT" switch, withdraw shutdown bank rods to position specified by COLR (T.S. 3.1.5). (R.M.)

AA 3.3.7.5 Verify that the shutdown bank mechanisms are moving on the DRPI display.

Enclosure 4.4
Rod Withdrawal

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> **NOTE:** If the A206 circuit card "ALM" light is lit , there is the possibility that the wrong bank may move.

AA 3.4 Verify the "ALM" LED on circuit card A206 in the left side of 1ERCC0006 (Rod Control Logic Cabinet) is **NOT** illuminated.

> **CAUTION:** Failure to pause at each bank position with the "CRD BANK SELECT" switch may result in dropping rods.

AA 3.5 Place the "CRD BANK SELECT " switch in the "MAN" position.

AA 3.6 **WHILE** moving rods in the following Step, verify proper rod movement by the following indications:

- Proper "RODS IN/RODS OUT" direction light
- Proper step demand counter movement
- DRPI indication
- Reactor power changes
- T-Avg changes.

N/A AA 3.7 **IF AT ANY TIME** during Unit Startup a rod has dropped on an approach to criticality, or a dropped rod results in a return to subcriticality from a critical condition, perform one of the following: (R.M.)

____ 3.7.1 **IF** the malfunction is in the Control banks, reinsert ONLY the Control banks.

____ 3.7.2 **IF** the malfunction is in the Shutdown banks, reinsert Control and Shutdown banks

N/A AA 3.8 **IF AT ANY TIME** a stable startup rate of > 1.0 DPM is achieved during rod motion, manually trip the reactor. (R.M.)

AA 3.9 Withdraw control banks to achieve criticality as directed by OP/1/A/6100/001 (Controlling Procedure for Unit Startup) or OP/1/A/6100/005 (Unit Fast Recovery). (R.M.)

> **NOTE:** Per SOER 07-01 (Reactivity Management) it is recommended that Plant Operators monitor multiple indications such as Thermal Power Best Estimate, Nuclear Instrumentation, Steam Pressure. ΔT's, CF Flowrate, and Turbine Load when making at power reactivity changes. (R.M.)

____ 3.10 For power operation, ensure control rods maintain their proper insertion limits by use of curves on Unit One Reactor Operating Data Book.

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Event Description:	Withdraw Control Rods to Increase Reactor Power to 14%						

Enclosure 4.4 OP/1/A/6150/008

Rod Withdrawal Page 7 of 7

3.11 WHEN greater than 15% Impulse pressure (1SI-18.9-01 "C5 LO TURB IMPULSE PRESS ROD BLOCK" status light cleared), perform the following:

_____ 3.11.1 Adjust T-Avg within ± 1°F of T-Ref (rod motion demand signal meters shall be used for comparison). (R.M.)

_____ 3.11.2 Place "CRD BANK SELECT" switch in "AUTO". (R.M.)

_____ 3.12 Verify the following:

- ☐ OAC and control board demand indication for all shutdown and control rod banks agree within ± 1 step. (Control Rod Position Information, RODS)
- ☐ OAC and control board DRPI indication for each shutdown and control rod agrees within ± 1 step. (Control Rod Position Information, RODS)
- ☐ Rod position indication system and demand position indication system shall agree on rod position within ± 12 steps.

3.13 File this enclosure in the Control Copy folder of this procedure.

Note to Evaluator:

Once the crew has withdrawn control rods and established a positive startup rate, Event 2 is complete. At the discretion of the Lead Evaluator, the scenario may continue by instructing the booth operator to insert Trigger 3 (1A RN Strainer Hi D/P).

Event Description: 1A Nuclear Service Water (RN) Pump Strainer Hi D/P

Control Room Indications
1AD-12, A/1 “RN PUMP A FLOW HI/LO” - LIT
1AD-12, C/2 “RN PMP A STRAINER HI D/P” - LIT
1A RN Flow indication indicates 0 gpm

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Event Description:	1A Nuclear Service Water (RN) Pump Strainer Hi D/P						

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Case I Loss of RN Train	PAGE NO. 6 of 117 Revision 44

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. <u>Operator Actions</u>	
__ 1. **Start idle RN pump(s) as required.**	**<u>Note to Evaluator:</u>** **<u>Enclosure 1 is included as Attachment 4.</u>**
__ 2. **Ensure Unit 1 and Unit 2 OATC monitors Enclosure 1 (Foldout Page).**	
3. **Verify RN System in normal alignment as follows:** __ • Both RN Supply headers - ALIGNED <u>AND</u> __ • Both RN Discharge headers - ALIGNED.	**Perform the following:** __ a. **<u>IF</u>** RN aligned for single supply header operation with "A" train supply header isolated, **<u>THEN</u> <u>GO TO</u>** Case III (Loss of RN With "A" Supply Header Isolated). __ b. **<u>IF</u>** RN aligned for single supply header operation with "B" train supply header isolated, **<u>THEN</u> <u>GO TO</u>** Case IV (Loss of RN With "B" Supply Header Isolated). __ c. **<u>IF</u>** RN aligned for single discharge header operation with "A" train discharge header isolated, **<u>THEN</u> <u>GO TO</u>** Case V (Loss of RN With "A" Discharge Header Isolated). __ d. **<u>IF</u>** RN aligned for single discharge header operation with "B" train discharge header isolated, **<u>THEN</u> <u>GO TO</u>** Case VI (Loss of RN With "B" Discharge Header Isolated). __ e. **<u>IF</u>** RN aligned for single SNSWP discharge header operation with "A" train discharge header isolated, **<u>THEN</u> <u>GO TO</u>** Case VII (Loss of RN With "A" Pond Return Header Isolated). __ f. **<u>IF</u>** RN aligned for single SNSWP discharge header operation with "B" train discharge header isolated, **<u>THEN</u> <u>GO TO</u>** Case VIII (Loss of RN With "B" Pond Return Header Isolated).

Event Description: 1A Nuclear Service Water (RN) Pump Strainer Hi D/P

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Case I Loss of RN Train	PAGE NO. 7 of 117 Revision 44

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 4. **Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.**	**Perform the following:** __ a. Stop any RN pump(s) not required to support system operation. b. Ensure the following suction valves to Lake - OPEN: __ • 1RN-1A (RN P/H Pit A Isol From Lake) __ • 1RN-2B (RN P/H Pit A Isol From Lake) __ • 1RN-5A (RN P/H Pit B Isol From Lake) __ • 1RN-6B (RN P/H Pit B Isol From Lake). c. Ensure the following essential header isolation valves for required trains - OPEN: __ • 1RN-67A (RN Hdr 1A Supply Isol) __ • 1RN-69B (RN Hdr 1B Supply Isol) __ • 2RN-67A (RN Hdr 2A Supply Isol) __ • 2RN-69B (RN Hdr 2B Supply Isol). d. Ensure the following RN to RL discharge valves - OPEN: __ • 1RN-57A (Station RN Disch To RL Sys) __ • 1RN-843B (Station RN Disch To RL Sys). (RNO continued on next page)

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Event Description:	1A Nuclear Service Water (RN) Pump Strainer Hi D/P						

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Case I Loss of RN Train	PAGE NO. 8 of 117 Revision 44

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	e. Ensure one of the following RL discharge valves - OPEN: __ • 1RL-54 (RN System Disch To A RL Header) OR __ • 1RL-62 (RN System Disch To B RL Header). f. Ensure the following station RN discharge header crossover valves - OPEN: __ • 1RN-54A (Station RN Disch Hdr X-Over) __ • 1RN-53B (Station RN Disch Hdr X-Over). N/A g. **IF** either of the following conditions met: __ • RN cannot be aligned to Lake **OR** __ • No flow indicated on operating RN pump(s), (RNO continued on next page)

Event Description: 1A Nuclear Service Water (RN) Pump Strainer Hi D/P

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Case I Loss of RN Train	PAGE NO. 9 of 117 Revision 44

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	**THEN** align RN to SNSWP as follows: __ 1) Align valves for RN swap to SNSWP. **REFER TO** Enclosure 2 (RN Valve Alignment for RN Swap to SNSWP). __ 2) **IF** WL discharge in progress, **THEN** coordinate with Radwaste Chemistry to secure all controlled WL discharges. __ 3) **IF** any RN chemical addition in progress, **THEN** notify Chemistry to secure it. __ 4) **WHEN** corrective action has been taken, **THEN** restore RN to normal alignment. **REFER TO** Enclosure 3 (Returning RN alignment To Normal After Transfer To SNSWP). h. Verify the following alarms - DARK: __ • 1AD-12, C/2 "RN PMP A STRAINER HI D/P" __ • 1AD-12, C/5 "RN PMP B STRAINER HI D/P" __ • 2AD-12, C/2 "RN PMP A STRAINER HI D/P" __ • 2AD-12, C/5 "RN PMP B STRAINER HI D/P". __ i. **IF** any of the previous alarms lit, **THEN** backflush affected strainer. **REFER TO** OP/0/A/6400/006C (Nuclear Service Water System).

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Event Description: 1A Nuclear Service Water (RN) Pump Strainer Hi D/P

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Case I Loss of RN Train	PAGE NO. 10 of 117 Revision 44

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Verify each operating RN pump discharge flow - LESS THAN 23,000 GPM.**	**Perform the following:** **<u>CAUTION</u> The following steps may result in loss of an essential header until an opposite train pump is started.** a. Ensure the following RN isolation valves - CLOSED: __ • 1RN-47A (RN Supply X-Over Isol) __ • 1RN-48B (RN Supply X-Over Isol) __ • 2RN-47A (RN Supply X-Over Isol) __ • 2RN-48B (RN Supply X-Over Isol). __ • 1RN-51A (Non-Ess Ret Hdr Isol) __ • 1RN-52B (Non-Ess Ret Hdr Isol) __ • 2RN-51A (Non-Ess Ret Hdr Isol) __ • 2RN-52B (Non-Ess Ret Hdr Isol). __ b. Ensure 1RN-58B (RN Hdr B Ret To SNSWP) - OPEN. c. **<u>WHEN</u>** 1RN-58B open, **<u>THEN</u>** CLOSE the following valves: __ • 1RN-54A (Station RN Disch Hdr X-Over) __ • 1RN-53B (Station RN Disch Hdr X-Over). __ d. **<u>IF</u>** flow returning to normal, **<u>THEN GO TO</u>** Step 6. (RNO continued on next page)

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Case I Loss of RN Train	PAGE NO. 11 of 117 Revision 44

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
	e. **IF** flow still excessive, **THEN** perform the following: __ 1) Ensure both RN pump(s) on affected train - OFF. __ 2) Dispatch operators to locate any piping leaks. **REFER TO** AP/0/A/5500/030 (Plant Flooding).
__ 6. **Ensure RN pumps - IN OPERATION AS NEEDED.**	
7. **Ensure proper alignment of RN to KC Hx(s) as follows:**	
__ a. Verify RN - ALIGNED TO IN SERVICE KC HX(s).	a. Shift KC train in service as needed. **REFER TO** the following procedures: __ • OP/1/A/6400/005 (Component Cooling Water System) __ • OP/2/A/6400/005 (Component Cooling Water System).
__ b. Ensure KC Hx Otlt Mode switches - PROPERLY ALIGNED.	
__ 8. **Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.**	**Perform the following:** __ a. Do not exceed 4650 GPM through an NS Hx. __ b. Align RN flow through NS Hx(s) as needed to raise each operating RN pump's discharge flow to greater than 8,600 GPM. **REFER TO** OP/0/A/6400/006C (Nuclear Service Water System).

Op Test No.:	301	Scenario #	4	Event #	3	Page	30 of 140
Event Description:	1A Nuclear Service Water (RN) Pump Strainer Hi D/P						

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Case I Loss of RN Train	PAGE NO. 12 of 117 Revision 44

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 9. **Verify RN - AVAILABLE TO ALL UNIT 1 AND UNIT 2 D/G(s).**	**Dispatch operator to remove any D/G(s) without cooling water supply from standby readiness. <u>REFER TO</u> the following procedures:** __ • OP/1/A/6350/002 (Diesel Generator Operation) __ • OP/2/A/6350/002 (Diesel Generator Operation).
10. **Determine VC/YC status as follows:** __ • Verify VC/YC - ALIGNED TO OPERATING RN TRAIN __ • Verify YC Chiller - RUNNING.	__ **Align VC/YC to operating RN train. <u>REFER TO</u> OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System).**
__ 11. **Determine and correct cause of loss of RN train.**	

Op Test No.:	301	Scenario #	4	Event #	3	Page	31 of 140
Event Description:	1A Nuclear Service Water (RN) Pump Strainer Hi D/P						

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Case I Loss of RN Train	PAGE NO. 13 of 117 Revision 44

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. **Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:**

- __ SLC 16.7-6 (RN Discharge Instrumentation)
- __ 3.6.5 (Containment Air Temperature)
- __ 3.6.6 (Containment Spray System)
- __ 3.6.17 (Containment Valve Injection Water System (CVIWS))
- __ 3.7.5 (Auxiliary Feedwater (AFW) System)
- __ 3.7.7 (Component Cooling Water (CCW) System)
- __ 3.7.8 (Nuclear Service Water System (NSWS))
- __ 3.7.10 (Control Room Area Ventilation System (CRAVS))
- __ 3.7.11 (Control Room Area Chilled Water System (CRACWS))
- __ 3.8.1 (A.C. Sources - Operating)
- __ 3.8.2 (A.C. Sources - Shutdown).

TECH SPEC EVALUATION

See Attachment 9 for applicable Tech Specs.

T.S. 3.7.8
Condition A: (Restore NSWS train to OPERABLE status within 72 hours)

13. **Determine required notifications:**

- __ **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)
- __ **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).

__ 14. **Notify Environmental Chemistry of any RN pump shifts.**

__ 15. **Determine long term plant status. RETURN TO procedure in effect.**

Note to Evaluator:

This completes Event 3. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 4 (Feed Reg Bypass Valve Opens).

END

Control Room Indications
1CF-39 (S/G 1B CF BYP CTRL) begins to open
CA Flow to S/G 1B indication increases to top of scale
S/G 1B level begins to increase
1AD-4 E/5 “CFCV ISOL VLVS CLSD” - LIT
1AD-2 F/10 “DCS TROUBLE” - LIT
1AD-2 B/2 “S/G B LEVEL DEVIATION” – Will alarm if S/G level deviates from program by 5%

Event Description: 1B S/G W/R Signal Fails Low / Feed Reg Bypass Valve Opens

CNS AP/1/A/5500/006	LOSS OF S/G FEEDWATER Case III CF Control Not in Auto	PAGE NO. 15 of 21 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. **Operator Actions**	
1. **IF AT ANY TIME S/G levels approaching:** __ • 83% N/R level (S/G HI-HI Level Turb Trip) OR __ • 11% N/R level (S/G LO-LO Level Rx Trip), THEN perform the following: __ a. Trip reactor. __ b. GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).	
2. **Verify the following:** __ • At least one CF pump - IN SERVICE __ • 1AD-3, C/6 "CF ISOL TRN A" - DARK __ • 1AD-3, D/6 "CF ISOL TRN B" - DARK.	__ **GO TO Case I (Loss of CF Supply To S/Gs).**
__ 3. **IF AT ANY TIME any CF main feed reg valve in manual, THEN ensure associated feed reg bypass valve in manual.**	

Op Test No.:	301	Scenario #	4	Event #	4	Page	34 of 140
Event Description:	1B S/G W/R Signal Fails Low / Feed Reg Bypass Valve Opens						

CNS AP/1/A/5500/006	LOSS OF S/G FEEDWATER Case III CF Control Not in Auto	PAGE NO. 16 of 21 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Verify CF pump speed controller for in service CF pump(s):** __ • IN AUTO __ • RESPONDING ADEQUATELY.	**Perform the following:** __ a. Ensure affected CF pump speed controller(s) - IN MANUAL **OR** LOCAL. **NOTE** It is not essential to achieve program CF/SM D/P at this point. b. Control CF pump speed as required to ensure the following: __ • CF/SM D/P adequate to provide sufficient CF flow. __ • CF/SM D/P low enough to avoid high discharge pressure pump trip when feed reg valves throttled.
5. **Verify all S/G CF control valves:** __ • IN AUTO __ • RESPONDING ADEQUATELY. CRITICAL TASK #1	**Perform the following for the affected S/G(s):** __ a. Ensure affected controller(s) - IN MANUAL **OR** LOCAL. __ b. **IF AT ANY TIME** S/G level not on program, **THEN** adjust CF flow to obtain slight trend in appropriate direction. __ c. **IF AT ANY TIME** control valve adjustment required, **THEN** attempt to maintain CF/SM D/P constant during CF control valve adjustments.

Op Test No.:	301	Scenario #	4	Event #	4	Page	35	of	140

Event Description: 1B S/G W/R Signal Fails Low / Feed Reg Bypass Valve Opens

CNS AP/1/A/5500/006	LOSS OF S/G FEEDWATER Case III CF Control Not in Auto	PAGE NO. 17 of 21 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Verify the following:**	**Perform the following:**
__ • S/G level(s) - STABLE	__ a. Continue to control CF/SM D/P and S/G CF flow rates to stabilize level in affected S/G(s) approximately at program level.
__ • S/G level(s) - APPROXIMATELY AT PROGRAM	b. **WHEN** all the following conditions met:
__ • Malfunction - CORRECTED.	__ • S/G level(s) - STABLE __ • S/G level(s) - APPROXIMATELY AT PROGRAM __ • Malfunction - CORRECTED, __ **THEN GO TO** Step 7.
	__ c. Do not continue in this procedure until all conditions met.
__ 7. **WHEN malfunction corrected, THEN return affected controller(s) to auto. REFER TO OP/1/A/6750/010 (Distributed Control System (DCS) Operations).**	
__ 8. **Determine long term plant status. RETURN TO procedure and step in effect.**	

END

Note to Evaluator:

Once the crew has established control of 1B S/G level the verifiable action of this event has been satisfied. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 5 (FWST Channel 2 Fails Low).

Op Test No.:	301	Scenario #	4	Event #	5	Page	36 of 140
Event Description:	FWST Channel 2 Fails Low						

Control Room Indications
1AD-9, B/4 "FWST LO LEVEL" - LIT
1AD-9, C/8 "FWST PRE-LO LEVEL" - LIT
1AD-9, E/8 "FWST LO-LO LEVEL" - LIT

Note To Evaluator:

This event is provided only as a Tech Spec determination by the CRS. The ARP for 1AD-9 B/4 is provided below. However, all three listed ARPs contain the same guidance to refer to T.S. 3.3.2.

OP/1/A/6100/010 J
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Panel 1AD-9

B/4

FWST LO LEVEL

SETPOINT: 19.6% on 1/4 channels

ORIGIN:

Instrument	DCS	Description
1FWLT5000	1FWAA5000	FWST WR LEVEL CH 1
1FWLT5010	1FWAA5010	FWST WR LEVEL CH 2
1FWLT5120	1FWAA5120	FWST WR LEVEL CH 3
1FWLT5130	1FWAA5130	FWST WR LEVEL CH 4

NOTE: The indication for any FWST Level Channel which is being affected by lightning may be lost while its associated Surge Protective Device (SPD) shunts the high voltage. The signal is expected to automatically return once the transient has cleared.

PROBABLE CAUSE:

1. Filling refueling cavity
2. Safety Injection
3. Leak in system
4. Inadvertent draining of FWST
5. Instrument malfunction

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS: Verify low level by checking against the other channels.

SUPPLEMENTARY ACTIONS:

1. IF low level due to leak OR failure of related piping, isolate if possible.
2. IF low level due to leak AND level CANNOT be maintained, refer to Catawba Tech 3.5.4, SLC 16.9-11 and SLC 16.9-12 for operability.
3. Refer to OP/1/A/6200/014 (Refueling Water System) for makeup.
4. IF a channel failure has occurred, perform the following:
   - 4.1 Refer to Tech Spec 3.3.2 for minimum operable channel requirements.
   - 4.2* Issue the appropriate Model W/Os to have IAE provide emergency repairs on the affected channel(s):
     - 01069039 - 1FWLT5000: Repair CH 1 FWST Level
     - 01069040 - 1FWLT5010: Repair CH 2 FWST Level
     - 01069041 - 1FWLT5120: Repair CH 3 FWST Level
     - 01069042 - 1FWLT5130: Repair CH 4 FWST Level
   - 4.3 Initiate a work request to have the channel repaired.

CONTINUED ON THE NEXT PAGE

* The status light for a failed channel "FWST LO LEVEL" located on SI-12 will remain dark when the failed channel is bypassed.

Op Test No.:	301	Scenario #	4	Event #	5	Page	38 of 140
Event Description:	FWST Channel 2 Fails Low						

OP/1/A/6100/010 J
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Panel 1AD-9

B/4

<u>FWST LO LEVEL</u> (Cont.)

REFERENCES:
1. CNEE-0173-03.15
2. CE-9668
3. CNM 1399.03-0629.001 Drop 5 Sheet 395
4. CNM 1399.03-0629.001 Drop 8 Sheet 313
5. CNM 1399.03-0629.001 Drop 12 Sheet 315
6. CNM 1399.03-0629.001 Drop 7 Sheet 319

<u>TECH SPEC EVALUATION</u>

See Attachment 9 for applicable Tech Specs.

T.S. 3.3.2
<u>Condition</u> <u>N</u>: (Place channel in bypass within 6 hours)

Additionally, a tracking entry for T.S 3.3.3 Condition B may be specified.

<u>Note to Evaluator:</u>

TS Evaluation completes Event 5. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 6 (Condenser Dump Valves Fail Intermediate).

Op Test No.:	301	Scenario #	4	Event #	6	Page	39 of 140

Event Description: Condenser Steam Dumps (1SB-9 & 1SB-24) Fail Open

Control Room Indications
OAC Alarm for 1SB-24 - OPEN
Main Steam Header Pressure - DECREASING
Reactor Power - INCREASING
RED OPEN light for 1SB-24 - LIT

Note To Evaluator:

Once the failure is identified, the crew may elect to invoke OMP 1-7 guidance to isolate a known leak by placing the "STEAM DUM INTLK BYP" switches to the "OFF RESET" position and/or enter AP/28.

Op Test No.:	301	Scenario #	4	Event #	6	Page	40	of	140
Event Description:	Condenser Steam Dumps (1SB-9 & 1SB-24) Fail Open								

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 2 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** Enclosure 1 is included as Attachment 3.
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
__ 2. **Verify turbine - ONLINE.**	__ **GO TO Step 6.**
3. **Verify the following:** __ • Reactor power - LESS THAN OR EQUAL TO 100% POWER __ • T-Avg - WITHIN 1.5°F OF T-Ref.	**Perform the following:** __ a. Select "MANUAL" on turbine control panel. b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load to maintain: __ • Reactor power - LESS THAN OR EQUAL TO 100% POWER __ • T-Avg - WITHIN 1.5°F OF T-Ref.
4. **Verify proper reactor response as follows:** __ • Control rods - IN AUTO AND STEPPING IN __ • P/R neutron flux - DECREASING.	__ **IF T-Avg greater than 1.5°F higher than T-Ref, THEN insert control rods as required to maintain T-Avg within 1°F of T-Ref.**
__ 5. **IF AT ANY TIME reactor power greater than 100%, THEN perform Step 3 RNO.**	
__ 6. **Verify Pzr level - STABLE OR INCREASING.**	**Perform the following:** __ a. Maintain charging flow less than 180 GPM. (RNO continued on next page)

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 3 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

__ b. THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to stabilize Pzr level.

__ c. IF Pzr level stable OR increasing, THEN GO TO Step 7.

d. IF Pzr level continues to decrease, THEN perform the following:

1) Reduce letdown flow to 45 GPM as follows:

a) IF 1NV-10A (Letdn Orif 1B Otlt Cont Isol) open, THEN perform the following:

__ (1) Control 1NV-148 (Letdn Press Control) to establish letdown pressure between 375 - 400 PSIG.

__ (2) THROTTLE 1NV-849 (Letdn Flow Var Orif Ctrl) for 45 GPM letdown flow.

__ (3) WHEN 45 GPM letdown flow established, THEN adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG.

__ (4) WHEN letdown pressure stable at 350 PSIG, THEN place 1NV-148 (Letdn Press Control) in auto.

(RNO continued on next page)

Event Description: Condenser Steam Dumps (1SB-9 & 1SB-24) Fail Open

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 4 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued)	
	b) IF 1NV-13A (Letdn Orif 1A Otlt Cont Isol) open, THEN perform the following:
	__ (1) Control 1NV-148 (Letdn Press Control) to establish letdown pressure between 150 - 200 PSIG.
	__ (2) OPEN 1NV-11A (Letdn Orif 1C Otlt Cont Isol).
	__ (3) Adjust 1NV-148 (Letdn Press Control) to establish letdown pressure between 375 - 400 PSIG.
	__ (4) CLOSE 1NV-13A (Letdn Orif 1A Otlt Cont Isol).
	__ (5) Adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG.
	__ (6) WHEN letdown pressure stable at 350 PSIG, THEN place 1NV-148 (Letdn Press Control) in auto.
	__ 2) IF Pzr level stable OR increasing, THEN GO TO Step 7.
	(RNO continued on next page)

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 5 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued)	3) IF Pzr level continues to decrease OR Pzr level cannot be maintained greater than 11%, THEN perform the following: __ a) Trip Unit 1 reactor. b) CLOSE the following valves: __ • All MSIVs __ • All MSIV bypass valves. __ c) Initiate S/I. __ d) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
__ 7. **IF AT ANY TIME while in this procedure Pzr level decreasing in an uncontrolled manner, THEN RETURN TO Step 6.**	
8. **IF AT ANY TIME VCT level goes below 23%, THEN align NV pump suction to FWST as follows:** a. OPEN the following valves: __ • 1NV-252A (NV Pumps Suct From FWST) __ • 1NV-253B (NV Pumps Suct From FWST). b. CLOSE the following valves: __ • 1NV-188A (VCT Otlt Isol) __ • 1NV-189B (VCT Otlt Isol).	

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 6 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Attempt to identify and isolate leak as follows:**	
a. Verify the following conditions - NORMAL: __ • Containment temperature __ • Containment pressure __ • Containment humidity __ • Containment floor & equipment sump level.	a. Perform the following: __ 1) Evacuate containment. 2) Perform the following: __ a) Start all lower containment ventilation units in low speed. __ b) Start all upper containment ventilation units. __ c) Place all upper and lower containment ventilation units in "MAX" cooling. 3) <u>IF AT ANY TIME</u> containment pressure reaches 1.2 PSIG, <u>**THEN**</u> perform the following: __ a) Ensure Unit 1 reactor tripped. __ b) Ensure S/I initiated. c) CLOSE the following valves: __ • All MSIVs __ • All MSIV bypass valves. __ d) <u>GO TO</u> EP/1/A/5000/E-0 (Reactor Trip or Safety Injection). __ 4) <u>GO TO</u> Step 10.
__ b. Dispatch operators to locate and identify source of steam leak.	

Event Description: Condenser Steam Dumps (1SB-9 & 1SB-24) Fail Open

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 7 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
__ c. Verify S/G PORVs - CLOSED.	c. IF S/G pressure less than 1090 PSIG, THEN perform the following: __ 1) CLOSE affected S/G PORV. 2) IF S/G PORV still open, THEN perform the following: __ a) CLOSE affected S/G PORV isolation valve. __ b) IF S/G PORV isolation valve still open, THEN dispatch operator to close S/G PORV isolation valve.
__ d. Verify condenser dump valves - CLOSED.	d. IF steam dumps required to be closed, THEN perform the following: 1) Select "OFF RESET" on the following switches: __ • "STEAM DUMP INTLK BYP TRN A" __ • "STEAM DUMP INTLK BYP TRN B". N/A 2) IF valve will not close, THEN dispatch operator to close affected condenser dump valve isolation valve. (RNO continued on next page)

Note to Evaluator:

Applicants may chose not place steam dumps in "OFF RESET"due to current plant conditions.

Note to Evaluator:

Placing Steam Dump Interlock Switches to "OFF RESET" isolates the leak and completes the verifiable action of this event. At Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 7 (1B RCP Shaft Shear / ATWS).

Op Test No.:	301	Scenario #	4	Event #	6	Page	46 of 140
Event Description:	Condenser Steam Dumps (1SB-9 & 1SB-24) Fail Open						

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 8 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
	3) **WHEN** leaking condenser dump valve isolated **OR** repaired, **THEN** return the following switches to "ON": __ • "STEAM DUMP INTLK BYP TRN A" __ • "STEAM DUMP INTLK BYP TRN B".
__ e. Verify atmospheric dump valves - CLOSED.	e. **IF** steam dumps required to be closed, **THEN** perform the following: 1) Select "OFF RESET" on the following switches: __ • "STEAM DUMP INTLK BYP TRN A" __ • "STEAM DUMP INTLK BYP TRN B". __ 2) **IF** valve will not close, **THEN** CLOSE affected atmospheric dump valve isolation valve. __ 3) **IF** isolation valve will not close, **THEN** dispatch operator to fail air to affected atmospheric dump valve. 4) **WHEN** leaking atmospheric dump valve isolated **OR** repaired, **THEN** return the following switches to "ON": __ • "STEAM DUMP INTLK BYP TRN A" __ • "STEAM DUMP INTLK BYP TRN B".

Op Test No.:	301	Scenario #	4	Event #	6	Page	47 of 140
Event Description:	Condenser Steam Dumps (1SB-9 & 1SB-24) Fail Open						

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 9 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
__ f. Verify CA PMP #1 - OFF.	__ f. IF operation of CA PMP #1 causing uncontrolled cooldown AND flow from CA PMP #1 not required, THEN stop CA PMP #1.
N/A g. IF leak suspected to be in a doghouse, THEN CLOSE the following valves: • Outside DH: __ • 1SM-77A (S/G 1A Otlt Hdr Bldwn C/V) __ • 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V). OR • Inside DH: __ • 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V) __ • 1SM-75A (S/G 1C Otlt Hdr Bldwn C/V).	
10. **Determine required notifications:** __ • REFER TO RP/0/A/5000/001 (Classification Of Emergency) __ • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).	
__ 11. **Notify RP of leak.**	
__ 12. **Verify - LEAK ISOLATED.**	__ GO TO **Step 14.**

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK	PAGE NO. 10 of 41 Revision 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Determine long term plant status. <u>RETURN TO</u> procedure and step in effect.**	
__ 14. **Verify UST level - STABLE OR INCREASING.**	**Perform the following:** __ a. Initiate makeup to UST. __ b. Notify Secondary Chemistry of increased makeup.
15. **Evaluate unit shutdown as follows:**	
__ a. Verify Unit 1 status - IN MODE 1 <u>OR</u> 2.	__ a. <u>GO TO</u> Step 18.
b. Determine if Unit 1 shutdown or load reduction warranted based on the following criteria: __ • Size of leak __ • Location of leak __ • Rate of depletion of secondary inventory __ • Steam leak cannot be isolated or repaired at power __ • OSM judgment __ • <u>IF</u> steam leaking from secondary heater relief <u>OR</u> MSR relief valve, <u>THEN</u> reducing turbine load may reduce pressure enough to close relief valve. __ • <u>IF</u> turbine trip will isolate steam leak, <u>THEN</u> it may be desirable to perform an orderly shutdown of the turbine and maintain reactor power in Mode 1.	

Op Test No.:	301	Scenario #	4	Event #	7, 8	Page	49 of 140
Event Description:	1B Reactor Coolant (NC) Pump Shaft Shear / ATWS						

Control Room Indications
1AD-6 A/2 "LOOP B LO FLOW ALERT" - LIT
1AD-6 A/5 "NCP HI VIBRATION" - LIT
1AD-6 B/5 "NCP HI-HI VIBRATION" - LIT
All 1B NC Loop flow indications decreasing
1B NCP Amperage indicates near zero

Note To Evaluator:

The crew will initiate a Reactor Trip, and transition to E-0, based on Immediate Actions of AP/04 (below). The crew will then transition to FR-S.1 due to failed Reactor Trip.

Op Test No.:	301	Scenario #	4	Event #	7, 8	Page	50	of	140
Event Description:	1B Reactor Coolant (NC) Pump Shaft Shear / ATWS								

CNS AP/1/A/5500/004	LOSS OF REACTOR COOLANT PUMP	PAGE NO. 2 of 2 Revision 16

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Verify all control banks - INSERTED.**	**Perform the following:** __ a. Ensure reactor - TRIPPED. __ b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
__ 2. **Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED.**	
__ 3. **Stop any dilutions in progress.**	
4. **Ensure compliance with appropriate Tech Specs:** __ • 3.4.5 (RCS Loops - MODE 3) __ • 3.4.6 (RCS Loops - MODE 4).	
5. **Determine required notifications:** __ • **REFER TO** RP/0/A/5000/001 (Classification Of Emergency) __ • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).	
__ 6. **Determine and correct cause of loss of NC pump(s).**	
__ 7. **Determine long term plant status. RETURN TO procedure in effect.**	

END

Op Test No.:	301	Scenario #	4	Event #	7, 8	Page	51 of 140
Event Description:	1B Reactor Coolant (NC) Pump Shaft Shear / ATWS						

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **4 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. **Operator Actions**

Note to Evaluator:

Enclosure 1 is included as Attachment 5.

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

2. **Verify Reactor Trip:**

__ • All rod bottom lights - LIT

__ • All reactor trip and bypass breakers - OPEN

__ • I/R power - DECREASING.

Perform the following:

__ a. Trip reactor.

b. IF reactor will not trip, THEN concurrently perform the following:

__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees)

__ • GO TO EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS).

3. **Verify Turbine Trip:**

__ • All turbine stop valves - CLOSED.

Perform the following:

__ a. Trip turbine.

b. IF turbine will not trip, THEN perform the following:

__ 1) Depress "MANUAL" pushbutton on turbine control panel.

__ 2) Rapidly CLOSE control valves by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons.

3) IF control valves will not close, THEN CLOSE:

__ • All MSIVs

__ • All MSIV bypass valves.

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 2 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

CAUTION **NC pumps should NOT be tripped with reactor power greater than 5% to prevent fuel damage.**

CRITICAL TASK #2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify Reactor Trip:**	**Perform the following:**
__ • All rod bottom lights - LIT	__ a. Trip reactor.
__ • All reactor trip and bypass breakers - OPEN	__ b. **IF** reactor will not trip, **THEN** insert rods.
__ • I/R power - TRENDING DOWN.	
2. **Verify Turbine Trip:**	**Perform the following:**
__ • All turbine stop valves - CLOSED	__ a. Trip turbine.
	b. **IF** turbine will not trip, **THEN** perform the following:
	__ 1) Depress "MANUAL" pushbutton on turbine control panel.
	__ 2) Rapidly CLOSE control valves by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons.
	3) **IF** control valves will not close, **THEN** CLOSE the following:
	__ • All MSIVs __ • All MSIV bypass valves.

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 3 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Verify CA pumps running as follows:**	
__ a. Motor driven CA pumps - ON. →	__ a. Start motor driven CA pump(s).
__ b. 3 S/G N/R levels - GREATER THAN 11%.	__ b. Ensure CA Pump #1 - RUNNING.
4. **Initiate Emergency Boration of NC System as follows:**	
__ a. Ensure at least one NV pump - ON.	
__ b. OPEN 1NV-236B (Boric Acid To NV Pumps Suct).	**<u>Note to Evaluator:</u>** **The Reactor Trip Breakers will open once the Open pushbutton for 1NV-236B is depressed.**
__ c. Ensure both boric acid transfer pump switches - IN THE "ON" POSITION.	
__ d. Verify emergency boration flow - GREATER THAN OR EQUAL TO 30 GPM.	d. Align NV pump suction to FWST as follows: 1) OPEN the following valves: __ • 1NV-252A (NV Pumps Suct From FWST) __ • 1NV-253B (NV Pumps Suct From FWST). 2) CLOSE the following valves: __ • 1NV-188A (VCT Otlt Isol) __ • 1NV-189B (VCT Otlt Isol).

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 4 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
e. Verify the following charging line isolation valves - OPEN: __ • 1NV-312A (Chrg Line Cont Isol) __ • 1NV-314B (Chrg Line Cont Isol).	e. Perform the following: 1) Align NV pump suction to FWST as follows: a) OPEN the following valves: __ • 1NV-252A (NV Pumps Suct From FWST) __ • 1NV-253B (NV Pumps Suct From FWST). b) CLOSE the following valves: __ • 1NV-188A (VCT Otlt Isol) __ • 1NV-189B (VCT Otlt Isol). 2) Ensure the following valves - OPEN: __ • 1NI-9A (NV Pmp C/L Inj Isol) __ • 1NI-10B (NV Pmp C/L Inj Isol).
__ f. Verify Pzr pressure - LESS THAN 2335 PSIG.	f. Perform the following: 1) Verify the following valves - OPEN. __ • All Pzr PORVs __ • All Pzr PORV isolation valves. __ 2) **IF** any Pzr PORV(s) **OR** isolation valves closed, **THEN** OPEN Pzr PORV(s) and isolation valves as required to reduce Pzr pressure to less than 2135 PSIG.

Op Test No.:	301	Scenario #	4	Event #	7, 8	Page	55 of 140
Event Description:	1B Reactor Coolant (NC) Pump Shaft Shear / ATWS						

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 5 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify the following Monitor Light Panel Group 5 St lights on energized train - LIT:**	**Ensure the following VQ isolation valves - CLOSED:**
__ • I/2	__ • 1VQ-2A (VQ Fan Suct From Cont Isol)
__ • I/3	__ • 1VQ-3B (VQ Fan Suct From Cont Isol)
__ • I/10	__ • 1VQ-15B (Cont Air Add Cont Isol)
__ • H/11.	__ • 1VQ-16A (Cont Air Add Cont Isol).
6. **Verify S/I status as follows:**	
__ a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.	a. Perform the following: __ 1) **IF AT ANY TIME** S/I signal exists **OR** occurs while in this procedure, **THEN** perform Step 6.b. __ 2) **GO TO** Step 7.
b. **WHEN** manpower **AND** time permits, **THEN** verify proper system alignments as follows: __ • **REFER TO** Enclosure 1 (System Verification Following S/I Actuation) __ • Notify Unit 2 operator to perform Enclosure 2 (Opposite Unit Ventilation Verification).	

Op Test No.:	301	Scenario #	4	Event #	7, 8	Page	56 of 140
Event Description:	1B Reactor Coolant (NC) Pump Shaft Shear / ATWS						

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 6 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Verify the following trips occurred:**	
__ a. Reactor Trip.	a. Dispatch operator to open the following Unit 1 breakers: __ • Reactor trip breakers __ • Reactor trip bypass breakers • The following breakers for CRD M/G sets: __ • "MOTOR" Breaker __ • "GENERATOR" Breaker.
__ b. Turbine Trip.	__ b. Dispatch operator to trip Unit 1 turbine.
8. **Verify reactor subcritical as follows:**	
a. All of the following conditions exist: __ • P/R channels - LESS THAN 5% __ • I/R channels - LESS THAN 5% __ • W/R NEUTRON POWER channels - LESS THAN 5% __ • I/R SUR - NEGATIVE.	a. Perform the following: 1) **WHEN** the following conditions exist: __ • P/R channels - LESS THAN 5% __ • I/R channels - LESS THAN 5% __ • W/R NEUTRON POWER channels - LESS THAN 5% __ • I/R SUR - NEGATIVE, __ **THEN GO TO** Step 16. __ 2) **GO TO** Step 9.
__ b. **GO TO** Step 16.	

Event Description: 1B Reactor Coolant (NC) Pump Shaft Shear / ATWS

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 7 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Control S/G levels as follows:**	
__ a. Verify N/R level in at least one S/G - GREATER THAN 11% (29% ACC).	a. Perform the following: __ 1) **IF** total CA flow less than 1000 GPM, **THEN** start pumps and align valves as required. __ 2) Maintain total CA flow greater than 1000 GPM until N/R level greater than 11% (29% ACC) in at least one S/G. __ 3) **WHEN** N/R level greater than 11% (29% ACC) in at least one S/G, **THEN** perform Step 9.b. __ 4) **GO TO** Step 9.c.
__ b. THROTTLE feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.	
__ c. **WHEN** 1AD-8, B/1 "UST LO LEVEL" lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).	
10. **Ensure all dilution paths isolated as follows:**	
__ a. Place NC makeup control switch to "STOP".	
__ b. Place reactor makeup water pumps to "OFF".	

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 8 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. **Verify main steamlines intact as follows:**	
a. Verify the following: __ • All S/G pressures - STABLE OR TRENDING UP __ • All S/Gs - PRESSURIZED.	a. **IF** any S/G depressurized **OR** pressure trending down in uncontrolled manner, **THEN** perform the following: 1) Ensure the following valves - CLOSED: __ • All MSIVs __ • All MSIV bypass valves. __ 2) **IF** any S/G depressurized **OR** pressure in any S/G still trending down in uncontrolled manner, **THEN GO TO** Enclosure 3 (Faulted S/G Isolation).
__ b. **GO TO** Step 13.	
__ 12. **WHEN NC T-Hots start to trend up, THEN dump steam from intact S/G PORVs to stabilize NC T-Hots.**	
__ 13. **Verify all NC T-Colds - STABLE OR TRENDING UP.**	**Stop any controlled cooldown in progress as follows:** • THROTTLE feed flow to stop cooldown while maintaining adequate heat sink as follows: __ • At least one S/G N/R level greater than 11% (29% ACC) OR __ • Total feed flow greater than 450 GPM. __ • THROTTLE steam dumps or S/G PORVs as needed to stop cooldown.

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Event Description:	1B Reactor Coolant (NC) Pump Shaft Shear / ATWS						

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 9 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 14. **Verify Core Exit T/Cs - LESS THAN 1200°F.**	__ **IF Core Exit temperatures greater than 1200°F AND trending up, THEN GO TO EG/1/A/SAMG/SAG-1 (Main Control Room Severe Accident Guideline Initial Response).**
15. **Verify reactor subcritical as follows:** __ • P/R channels - LESS THAN 5% __ • I/R channels - LESS THAN 5% __ • W/R NEUTRON POWER channels - LESS THAN 5% __ • I/R SUR - NEGATIVE.	**Perform the following:** __ a. Continue to borate. __ b. **IF** boration not available, **THEN** allow NC System to heat up. __ c. Concurrently perform actions of any other Critical Safety Function procedures in effect that do not cooldown NC System or add positive reactivity to the core. __ d. **RETURN TO** Step 4.
__ 16. **Ensure all malfunctioning NC pumps - STOPPED.**	

CNS EP/1/A/5000/FR-S.1	RESPONSE TO NUCLEAR POWER GENERATION/ATWS	PAGE NO. 10 of 33 Revision 24

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

17. **Ensure adequate shutdown margin as follows:**

   a. Ensure the following signals - RESET:

   __ 1) Phase A Containment Isolations.

   __ 2) KC NC NI NM St signals.

   __ b. Obtain current Unit 1 NC boron concentration from Primary Chemistry.

   __ c. **WHEN** current NC boron concentration obtained, **THEN** perform shutdown margin calculation. **REFER TO** OP/0/A/6100/006 (Reactivity Balance Calculation).

   d. **WHEN** the following conditions satisfied, **THEN** stop NC System boration:

   __ • Adequate shutdown margin obtained

   __ • Uncontrolled cooldown stopped.

18. **Determine required notifications:**

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

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

__ 19. **RETURN TO procedure and step in effect.**

Note to Evaluator:

Upon confirmation of the Reactor Trip and transition back to E-0, or based on Lead Evaluator discretion, the scenario may continue by directing the booth operator to insert Trigger 9 for Events 9, 10, 11 (LOCA Outside Cnt, Auto CF Isolation failure, Cold Leg Injection auto failure). Depending on discovery time of the leak, the crew may transition to E-0 and then to ES-0.1 (Reactor Trip Response) prior to return to E-0 for Safety Injection initiation. The following page illustrates the re-entry to E-0 following Safety Injection.

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	**Note to Evaluator:** **Enclosure 1 is included as Attachment 5.**
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
2. **Verify Reactor Trip:**	**Perform the following:**
__ • All rod bottom lights - LIT	__ a. Trip reactor.
__ • All reactor trip and bypass breakers - OPEN	b. **IF** reactor will not trip, **THEN** concurrently perform the following:
__ • I/R power - DECREASING.	__ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees)
	__ • **GO TO** EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS).
3. **Verify Turbine Trip:**	**Perform the following:**
__ • All turbine stop valves - CLOSED.	__ a. Trip turbine.
	b. **IF** turbine will not trip, **THEN** perform the following:
	__ 1) Depress "MANUAL" pushbutton on turbine control panel.
	__ 2) Rapidly CLOSE control valves by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons.
	3) **IF** control valves will not close, **THEN** CLOSE:
	__ • All MSIVs
	__ • All MSIV bypass valves.

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 4. **Verify 1ETA and 1ETB - ENERGIZED.**	**Perform the following:** __ a. <u>**IF**</u> 1ETA <u>**AND**</u> 1ETB de-energized, <u>**THEN GO TO**</u> EP/1/A/5000/ECA-0.0 (Loss of All AC Power). __ b. <u>**WHEN**</u> time allows, <u>**THEN**</u> attempt to restore power to de-energized switchgear while continuing with this procedure. <u>**REFER TO**</u> AP/1/A/5500/007 (Loss of Normal Power).

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify S/I actuated:**	
__ a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.	a. Perform the following: 1) Verify conditions requiring S/I: __ • Pzr pressure - LESS THAN 1845 PSIG OR __ • Containment pressure - GREATER THAN 1.2 PSIG. __ 2) IF S/I required, THEN initiate S/I. 3) IF S/I not required, THEN concurrently perform the following: • IF 1ETA OR 1ETB de-energized, THEN ensure the following pumps running on energized bus: __ • NV pump __ • KC pump __ • RN pump. __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ • GO TO EP/1/A/5000/ES-0.1 (Reactor Trip Response).
__ b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.	__ b. Initiate S/I.
__ 6. **Announce "Unit 1 Safety Injection".**	

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Determine required notifications:**	
__ • <u>REFER TO</u> RP/0/A/5000/001 (Classification Of Emergency)	
__ • <u>REFER TO</u> RP/0/B/5000/013 (NRC Notification Requirements).	
__ 8. **Verify all Feedwater Isolation status lights (1SI-5) - LIT.**	**Perform the following:**
	__ a. Initiate Feedwater Isolation.
	N/A b. <u>IF</u> proper status light indication not obtained, <u>THEN</u> CLOSE valves.
9. **Verify Phase A Containment Isolation status as follows:**	
__ a. Phase A "RESET" lights - DARK.	__ a. Initiate Phase A Isolation.
__ b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.	__ b. Align valves as necessary to ensure each penetration isolated by at least one isolation valve.

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **8 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Verify Phase B actuation status as follows:**	
__ a. Verify containment pressure - HAS REMAINED LESS THAN 3 PSIG.	a. Perform the following: 1) Verify Phase B Isolation actuated as follows: __ a) Phase B Isolation "RESET" lights - DARK. __ b) <u>IF</u> Phase B Isolation "RESET" lights lit, <u>**THEN**</u> initiate Phase B Isolation. c) Verify following monitor light panel lights - LIT: __ • Group 1 Sp lights __ • Group 5 Sp lights __ • Group 5 St light L/11. __ d) <u>IF</u> monitor light panel not in correct alignment, <u>**THEN**</u> ensure correct alignment. __ 2) Stop all NC pumps. __ 3) Maintain seal injection flow. __ 4) Energize H_2 igniters. (RNO continued on next page)

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

5) Dispatch operator to perform the following:

__ a) Secure all ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units).

__ b) Place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems).

__ 6) **WHEN** 9 minutes elapsed, **THEN** verify proper VX system operation. **REFER TO** Enclosure 5 (VX System Operation).

__ 7) **GO TO** Step 11.

__ b. **IF AT ANY TIME** containment pressure exceeds 3 PSIG while in this procedure, **THEN** perform Step 10.a.

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **10 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. **Verify proper CA pump status as follows:**	
__ a. Motor driven CA pumps - ON.	a. Perform the following for affected train(s): __ 1) Reset ECCS. __ 2) Reset D/G load sequencer(s). __ 3) Start affected pump(s). __ 4) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
__ b. 3 S/G N/R levels - GREATER THAN 11%.	b. Perform the following: __ 1) Place CA PMP #1 control switch to ON. __ 2) Ensure CA pump #1 - RUNNING.
12. **Verify all of the following S/I pumps - ON:** __ • NV pumps __ • ND pumps __ • NI pumps.	**Perform the following for affected train(s):** __ a. Reset ECCS. __ b. Reset D/G load sequencer(s). __ c. Start affected pump(s). __ d. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **11 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Verify all KC pumps - ON.**	**Perform the following for affected train(s):** __ a. Reset ECCS. __ b. Reset D/G load sequencer(s). __ c. Start affected pump(s). __ d. <u>IF</u> <u>AT</u> <u>ANY</u> <u>TIME</u> B/O occurs, <u>THEN</u> restart S/I equipment previously on. __ e. <u>IF</u> KC flow cannot be established to NC pumps, <u>THEN</u> stop all NC pumps.
__ 14. **Verify all Unit 1 and Unit 2 RN pumps - ON.** <u>Note to Evaluator:</u> **The crew may elect to reset ECCS and D/G load sequencer and secure 1A RN Pump due to previous strainer issue.**	**Perform the following:** __ a. <u>IF</u> any Unit 2 RN pump off, <u>THEN</u> start affected pump(s). b. <u>IF</u> any Unit 1 RN pump off, <u>THEN</u> perform the following for affected train(s): __ 1) Reset ECCS. __ 2) Reset D/G load sequencer(s). __ 3) Start affected pump(s). __ 4) <u>IF</u> <u>AT</u> <u>ANY</u> <u>TIME</u> B/O occurs, <u>THEN</u> restart S/I equipment previously on.
15. **Verify proper ventilation systems operation as follows:** __ • <u>REFER</u> <u>TO</u> Enclosure 2 (Ventilation System Verification) __ • Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).	<u>Note to Evaluator:</u> **Enclosure 2 is included as Attachment 6.**

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **12 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 16. **Verify all S/G pressures - GREATER THAN 775 PSIG.**	**Perform the following:** a. Verify Main Steam Isolation as follows: __ • All MSIVs - CLOSED __ • All MSIV bypass valves - CLOSED __ • All S/G PORVs - CLOSED. b. **IF** any valve open, **THEN** perform the following: __ 1) Initiate Main Steam Isolation. __ 2) **IF** any valve still open, **THEN** CLOSE valve.
17. **Verify proper S/I flow as follows:**	
__ a. "NV S/I FLOW" - INDICATING FLOW.	__ a. Start NV pump(s) and align valves.

Note to Evaluator:

Cold Leg Injection Isolations (1NI-9A & 1NI-10B) indications will not be lit. 1NI-10B will open manually. 1NI-9A will remain closed.

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Event Description:	LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
__ b. NC pressure - LESS THAN 1620 PSIG.	b. Perform the following:
	__ 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN.
	2) **IF** ND pump miniflow valve(s) cannot be opened, **THEN** perform the following for affected train(s):
	__ a) Reset ECCS.
	__ b) Reset D/G load sequencer.
	__ c) Stop ND pump.
	__ d) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
	__ e) **IF AT ANY TIME** NC pressure decreases to less than 285 PSIG in uncontrolled manner, **THEN** restart ND pump.
	__ 3) **GO TO** Step 18.
__ c. NI pumps - INDICATING FLOW.	__ c. Start NI pump(s) and align valves.

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
__ d. NC pressure - LESS THAN 285 PSIG.	d. Perform the following: __ 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN. N/A 2) IF ND pump miniflow valve(s) cannot be opened, THEN perform the following for affected train(s): __ a) Reset ECCS. __ b) Reset D/G load sequencer. __ c) Stop ND pump. __ d) IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on. __ e) IF AT ANY TIME NC pressure decreases to less than 285 PSIG in uncontrolled manner, THEN restart ND pump. __ 3) GO TO Step 18.
__ e. ND pumps - INDICATING FLOW TO C-LEGS.	__ e. Start ND pump(s) and align valves.
__ 18. **WHEN time and manpower permit (within two hours of event), THEN monitor Spent Fuel Pool level and temperature. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).**	**Note to Evaluator:** **Enclosure 1 is included as Attachment 7.**

Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **15 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. **Control S/G levels as follows:**	
__ a. Verify total CA flow - GREATER THAN 450 GPM.	a. Perform the following: 1) **IF** N/R level in all S/Gs less than 11% (29% ACC), **THEN** perform the following: __ • Start CA pumps __ • Ensure correct valve alignment. 2) **IF** N/R level in all S/Gs less than 11% (29% ACC) **AND** feed flow greater than 450 GPM cannot be established, **THEN** concurrently perform the following: __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees) __ • **GO TO** EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink).
__ b. **WHEN** each S/G N/R level greater than 11% (29% ACC), **THEN** control feed flow to maintain that S/G N/R level between 11% (29% ACC) and 50%.	
__ 20. **Verify all CA isolation valves - OPEN.**	__ **OPEN valve(s).**
__ 21. **Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.**	__ **Align equipment.**

Note to Evaluator:

1NI-9A will not be in proper alignment.

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.	
__ 22. **Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).**	**Note to Evaluator:** **Enclosure 4 is included as Attachment 8.**
23. **Verify Pzr PORV and Pzr Spray Valve status as follows:**	
__ a. All Pzr PORVs - CLOSED.	a. IF Pzr pressure less than 2315 PSIG, THEN perform the following: __ 1) CLOSE Pzr PORV(s). __ 2) IF any Pzr PORV cannot be closed, THEN CLOSE its isolation valve. 3) IF 1NC-32B OR 1NC-34A cannot be closed OR isolated, THEN perform the following: a) Align N_2 to PORVs by opening the following valves: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B). __ b) CLOSE affected Pzr PORV. (RNO continued on next page)

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. **18 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. (Continued)	d) Concurrently perform the following: __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees) __ • <u>GO TO</u> EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).
__ b. Normal Pzr spray valves - CLOSED.	b. <u>IF</u> Pzr pressure less than 2150 PSIG, <u>THEN</u> perform the following: __ 1) CLOSE spray valve(s). 2) <u>IF</u> spray valve(s) cannot be closed, <u>THEN</u> perform the following: __ a) Stop NC pumps 1A and 1B. __ b) <u>IF</u> both 1C <u>AND</u> 1D NC pumps on, <u>THEN</u> stop one additional pump.
__ c. At least one Pzr PORV isolation valve - OPEN.	__ c. <u>IF</u> power available, <u>THEN</u> OPEN one Pzr PORV isolation valve unless it was closed to isolate an open Pzr PORV.
__ 24. **Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.**	**<u>IF</u> any NV <u>OR</u> NI pump on, <u>THEN</u> perform the following:** __ a. Ensure all NC pumps - OFF. __ b. Maintain seal injection flow.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. **Verify main steamlines intact:** __ • All S/G pressures - STABLE OR INCREASING __ • ALL S/Gs - PRESSURIZED.	**IF any S/G faulted, THEN perform the following:** __ a. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ b. GO TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).
26. **Verify S/G tubes intact as follows:** • Verify the following EMF trip 1 lights - DARK: __ • 1EMF-33 (Condenser Air Ejector Exhaust) __ • 1EMF-26 (Steamline 1A) __ • 1EMF-27 (Steamline 1B) __ • 1EMF-28 (Steamline 1C) __ • 1EMF-29 (Steamline 1D). __ • All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.	**IF any EMF trip 1 light lit OR any S/G level increasing in uncontrolled manner, THEN concurrently:** __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ • GO TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture).

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

27. **Verify NC system intact as follows:**

- __ • Containment pressure - LESS THAN 1 PSIG.
- __ • **IF** normal off-site power available, **THEN** verify containment pressure less than 0.3 PSIG.
- • Containment high range EMFs - LESS THAN 3 R/HR:
  - __ • 1EMF-53A (Containment Trn A)
  - __ • 1EMF-53B (Containment Trn B).
- • Containment EMF trip 1 lights - DARK:
  - __ • 1EMF-38 (Containment Particulate)
  - __ • 1EMF-39 (L) (Containment Gas (Lo Range)).
- __ • Containment sump level - STABLE.

Perform the following:

__ a. Energize H_2 igniters.

b. Dispatch operator to perform the following:

__ 1) Secure all ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units).

__ 2) Place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems).

c. **IF AT ANY TIME** both the following conditions exist:

- __ • Containment pressure - HAS REMAINED LESS THAN 3 PSIG
- __ • Containment pressure - BETWEEN 1 PSIG **AND** 3 PSIG,

__ **THEN** start one VX fan and secure normal containment ventilation. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 18 (VX and Containment Ventilation Control).

d. Concurrently:

- __ • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).
- __ • **GO TO** EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).

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Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
28. **Verify S/I termination criteria:**	
__ a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.	__ a. <u>GO TO</u> Step 39.
b. Verify secondary heat sink as follows:	__ b. <u>GO TO</u> Step 39.
__ • N/R level in any S/G - GREATER THAN 11%	
OR	
__ • Total feed flow to S/Gs - GREATER THAN 450 GPM.	
__ c. NC pressure - STABLE OR INCREASING.	__ c. <u>GO TO</u> Step 39.
__ d. Pzr level - GREATER THAN 11%.	d. Perform the following:
	__ 1) <u>IF</u> NC pressure increasing <u>**AND**</u> normal Pzr spray available, <u>**THEN**</u> attempt to stabilize NC pressure using normal Pzr spray.
	__ 2) <u>**RETURN TO**</u> Step 28.a.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29. **Reset the following:**	
__ a. ECCS.	__ a. Locally reset ECCS. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 4 (ECCS Master Reset).
__ b. D/G load sequencers.	b. Dispatch operator to open affected sequencer(s) control power breaker: __ • 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496) __ • 1EDF-F01F (Diesel Generator Load Sequencer Panel 1DGLSB) (AB-560, BB-46, Rm 372).
__ c. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.	
__ 30. **Ensure only one NV pump - ON.**	
__ 31. **Verify NC pressure - STABLE OR INCREASING.**	**Perform the following:** __ a. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ b. **GO TO** EP/1/A/5000/ES-1.2 (POST LOCA Cooldown and Depressurization).
__ 32. **Verify VI pressure - GREATER THAN 50 PSIG.**	**In subsequent steps, Control Room control lost for the following valves and local operation will be required:** __ • 1NV-294 (NV Pmps A&B Disch Flow Ctrl) __ • 1NV-309 (Seal Water Injection Flow).

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
33. **Isolate NV S/I flowpath as follows:**	
a. Verify the following valves - OPEN:	a. Perform the following:
__ • 1NV-203A (NV Pumps A&B Recirc Isol)	__ 1) OPEN affected valve(s).
__ • 1NV-202B (NV Pmps A&B Recirc Isol).	__ 2) <u>IF</u> 1NV-203A <u>**AND**</u> 1NV-202B open, <u>**THEN**</u> <u>**GO TO**</u> Step 33.b.
	3) Dispatch operator to open affected valve(s):
	__ • 1NV-203A (NV Pumps A&B Recirc Isol) (AB-554, HH-JJ, 54-55, Rm 231) (Ladder needed)
	__ • 1NV-202B (NV Pmps A&B Recirc Isol) (AB-554, HH-JJ, 54-55, Rm 231) (Ladder needed).
	__ 4) Align charging with NV miniflow isolated. <u>**GO TO**</u> EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 13 (Aligning Charging With NV Miniflow Valves Closed).
	__ 5) <u>**WHEN**</u> 1NV-203A <u>**AND**</u> 1NV-202B open, <u>**THEN**</u> charging flow may be reduced below 80 GPM.
	__ 6) <u>**GO TO**</u> Step 35.

Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
33. (Continued)	
b. CLOSE the following valves: __ • 1NI-9A (NV Pmp C/L Inj Isol) __ • 1NI-10B (NV Pmp C/L Inj Isol).	b. Perform the following: • Dispatch operator to close affected valve(s). **REFER TO** the following enclosure(s) for affected valve(s): __ • EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 5 (Locally Close 1NI-9A) __ • EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 7 (Locally Close 1NI-10B).
34. **Establish charging as follows:**	
__ a. THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) for 32 GPM charging line flow.	a. Perform the following: __ 1) Place controller for 1NV-294 in 100% demand position. __ 2) Dispatch operator with radio to throttle 1NV-295 (NV Pmps A & B Disch Ctrl Isol) (AB-551, JJ-55, Rm 231) for 32 GPM charging line flow. __ 3) THROTTLE 1NV-295 to control charging flow as required in subsequent steps.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
34. (Continued)	
__ b. CLOSE 1NV-309 (Seal Water Injection Flow).	b. Dispatch operator with radio to perform the following: __ 1) CLOSE 1NV-308 (Seal Wtr Inj Flow Ctrl Isol) (AB-554, JJ-54, Rm 233) (Ladder needed). __ 2) Do not continue until 1NV-308 - CLOSED. __ 3) THROTTLE 1NV-311 (Seal Wtr Inj Flow Ctrl Byp) (AB-555, JJ-54, Rm 233) to maintain 32 GPM seal water flow in subsequent steps.
c. Ensure one of the following valves - OPEN: __ • 1NV-32B (NV Supply To Loop A Isol) OR __ • 1NV-39A (NV Supply To Loop D Isol).	
__ d. Ensure 1NV-37A (NV Supply To Pzr Aux Spray) - CLOSED.	
e. OPEN the following valves: __ • 1NV-312A (Chrg Line Cont Isol) __ • 1NV-314B (Chrg Line Cont Isol).	e. Dispatch operator to open affected valve(s). <u>**REFER TO**</u> the following enclosure(s) for affected valve(s): __ • EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 6 (Locally Open 1NV-312A) __ • EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 8 (Locally Open 1NV-314B).

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
34. (Continued)	
__ f. Verify 1NV-309 - ABLE TO BE OPERATED FROM THE CONTROL ROOM.	__ f. **GO TO** Step 34.h.
__ g. Place 1NV-309 in auto.	
h. Perform the following: __ • Maintain charging flow less than 180 GPM __ • Maintain 32 GPM seal water flow.	
35. **Control charging as follows:**	
__ a. Control charging flow to maintain Pzr level stable.	
__ b. Verify Pzr level - STABLE OR INCREASING.	b. **IF** Pzr level continues to decrease with maximum charging, **THEN** perform the following: 1) OPEN the following valves: __ • 1NI-9A (NV Pmp C/L Inj Isol) __ • 1NI-10B (NV Pmp C/L Inj Isol). 2) CLOSE the following valves: __ • 1NV-312A (Chrg Line Cont Isol) __ • 1NV-314B (Chrg Line Cont Isol). __ 3) Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ 4) **GO TO** EP/1/A/5000/ES-1.2 (POST LOCA Cooldown and Depressurization).

Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
36. **Ensure the following containment isolation signals - RESET:** __ • Phase A __ • Phase B.	
37. **Establish VI to containment as follows:** __ • Ensure 1VI-77B (VI Cont Isol) - OPEN __ • Verify VI pressure - GREATER THAN 85 PSIG.	**Perform the following:** a. Align N_2 to Pzr PORVs by opening the following valves: __ • 1NI-438A (Emer N2 From CLA A To 1NC-34A) __ • 1NI-439B (Emer N2 From CLA B To 1NC-32B). b. <u>IF</u> VI pressure less than 85 PSIG, <u>THEN</u> perform the following: __ 1) Dispatch operator to ensure proper VI compressor operation. __ 2) Restore VI while continuing with this procedure. <u>REFER TO</u> AP/0/A/5500/022 (Loss of Instrument Air).
38. **Transition to EP/1/A/5000/ES-1.1 (Safety Injection Termination) as follows:** __ a. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ b. Monitor EP/1/A/5000/ES-1.1 (Safety Injection Termination), Enclosure 1 (Foldout Page). __ c. <u>GO TO</u> EP/1/A/5000/ES-1.1 (Safety Injection Termination) Step 10.	
__ 39. **Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).**	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40. **Control S/G levels as follows:**	
__ a. Verify N/R level in any S/G - GREATER THAN 11%.	__ a. Maintain total feed flow greater than 450 GPM until any S/G N/R level greater than 11%.
__ b. THROTTLE feed flow to maintain all S/G N/R levels between 11% and 50%.	__ b. <u>IF</u> N/R level in any S/G continues to increase in uncontrolled manner, <u>THEN</u> <u>GO TO</u> EP/1/A/5000/E-3 (Steam Generator Tube Rupture).

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
41. **Verify secondary radiation normal as follows:**	
a. Ensure the following signals - RESET:	
__ 1) Phase A containment isolations.	
__ 2) CA system valve control.	
__ 3) KC NC NI NM St signals.	
__ b. Align all S/Gs for chemistry sampling.	
c. Perform at least one of the following:	
__ • Notify Chemistry to sample all S/Gs for activity	
OR	
__ • Notify RP to frisk all cation columns for activity.	
d. Verify the following EMF trip 1 lights - DARK:	__ d. <u>GO TO</u> EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
__ • 1EMF-33 (Condenser Air Ejector Exhaust)	
__ • 1EMF-26 (Steamline 1A)	
__ • 1EMF-27 (Steamline 1B)	
__ • 1EMF-28 (Steamline 1C)	
__ • 1EMF-29 (Steamline 1D).	
__ e. **<u>WHEN</u>** activity results reported, **<u>THEN</u>** verify all S/Gs indicate no activity.	e. Perform the following: __ 1) Notify station management to evaluate S/G(s) activity results. __ 2) <u>IF</u> S/G(s) activity indicate SGTR, **<u>THEN</u>** <u>GO TO</u> EP/1/A/5000/E-3 (Steam Generator Tube Rupture).

Event Description: LOCA Outside Containment / Auto Main Feedwater (CF) Isolation Failure / Cold Leg Injection (1NI-9A) Fails to Closed Position, Cold Leg Injection (1NI-10B) Auto Open Fails

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
42. **Verify potential leak in auxiliary building as follows:**	
a. Verify aux bldg radiation: __ • EMF-41 (Aux Bldg Ventilation) trip 1 light - DARK __ • All area monitor EMF trip 1 lights - DARK.	a. Evaluate cause of abnormal conditions as follows: __ 1) Monitor OAC EMF alarms, OAC VA Graphic and area monitor EMFs to determine location of activity. __ 2) Dispatch operator to locate potential Unit 1 leak. __ 3) **IF** cause of alarm LOCA outside containment, **THEN GO TO** EP/1/A/5000/ECA-1.2 (LOCA Outside Containment).

NOTE The following step is checking for a significant NC leak into the ND system.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
b. Verify NC to ND pressure boundary intact as follows: __ • ND temperature - NORMAL __ • ND flow - NORMAL __ • ND pressure - NORMAL.	__ b. **IF** ND system parameters indicate LOCA outside containment, **THEN GO TO** EP/1/A/5000/ECA-1.2 (LOCA Outside Containment).
43. **Verify PRT conditions normal as follows:** __ • PRT pressure - LESS THAN 8 PSIG __ • PRT level - LESS THAN 89% __ • PRT temperature - LESS THAN 130°F.	**Evaluate the following possible causes of abnormal PRT conditions:** __ • Pzr safety temperatures __ • Pzr safety relief flow indicated __ • Pzr PORVs __ • Rx head vents __ • NC pump seal return header relief __ • Letdown orifice header relief.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

1. **Verify proper valve alignment as follows:**

a. Verify all of the following ND suction valves - CLOSED:

- __ • 1ND-2A (ND Pump 1A Suct Frm Loop B)
- __ • 1ND-37A (ND Pump 1B Suct Frm Loop C)
- __ • 1ND-1B (ND Pump 1A Suct Frm Loop B)
- __ • 1ND-36B (ND Pump 1B Suct Frm Loop C).

a. Perform the following:

__ 1) CLOSE affected valve(s).

2) IF valve(s) cannot be closed **AND** containment accessible, **THEN** dispatch operator to close the affected valve(s):

- __ • 1ND-2A (ND Pump 1A Suct Frm Loop B) (CV-567, 50'-176, FNBC)
- __ • 1ND-37A (ND Pump 1B Suct Frm Loop C) (CV-567, 50'-184, FNBC)
- __ • 1ND-1B (ND Pump 1A Suct Frm Loop B) (CV-568, 25'-176, LC)
- __ • 1ND-36B (ND Pump 1B Suct Frm Loop C) (CV-564, 24'-181, LC).

b. Verify following NI valves - CLOSED:

__ 1) 1NI-121A (NI Pump 1A To H-Legs B&C).

1) Perform the following:

__ a) Place "PWR DISCON FOR 1NI-121A" in "ENABLE".

__ b) CLOSE 1NI-121A.

__ c) Place "PWR DISCON FOR 1NI-121A" in "DISCON".

__ d) IF valve cannot be closed, **THEN** dispatch operator to close 1NI-121A (NI Pump 1A To H-Legs B&C) (AB-572, FF-GG, 52, Rm 318).

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. (Continued)	
__ 2) 1NI-152B (NI Pump 1B To H-Legs A&D).	2) Perform the following: __ a) Place "PWR DISCON FOR 1NI-152B" in "ENABLE". __ b) CLOSE 1NI-152B. __ c) Place "PWR DISCON FOR 1NI-152B" in "DISCON". __ d) **IF** valve cannot be closed, **THEN** dispatch operator to close 1NI-152B (NI Pump 1B To H-Legs A&D) (AB-580, GG-HH, 52-53, Rm 419).
__ 3) 1NI-183B (ND Hdr A&B Hot Leg Inj Isol).	3) Perform the following: __ a) Place "PWR DISCON FOR 1NI-183B" in "ENABLE". __ b) CLOSE 1NI-183B. __ c) Place "PWR DISCON FOR 1NI-183B" in "DISCON". __ d) **IF** valve cannot be closed, **THEN** dispatch operator to close 1NI-183B (ND Hdr A&B Hot Leg Inj Isol) (AB-571, EE-FF, 52-53, Rm 333A).
__ c. Verify 1NV-857 (Pressurizer Aux Spray Ctrl) - CLOSED.	c. Perform the following: __ 1) CLOSE valve. __ 2) **IF** 1NV-857 cannot be closed, **THEN** dispatch operator to close 1NV-862 (ND To Pzr Spray Isol Outside Containment) (AB-552, DD-EE-52, Rm 217).

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE If NC System is saturated, NC System pressure may not be a good diagnostic of leak isolation. NC System pressure will respond very slowly after leak is isolated, or may continue to drop if cooldown is in progress, until subcooling is restored.	
2. **Attempt to identify and isolate break as follows:**	
a. Isolate ND header 1A to cold legs as follows:	
__ 1) Place "PWR DISCON FOR 1NI-173A" in "ENABLE".	**CRITICAL TASK #3**
__ 2) CLOSE 1NI-173A (ND Hdr 1A To Cold Legs C&D).	
3) Evaluate the following to determine if NC System leak isolated:	
__ • NC System pressure	
__ • RVLIS	
__ • Pzr level.	
__ 4) Verify NC System leak - ISOLATED.	4) Perform the following: __ a) OPEN 1NI-173A. __ b) Place "PWR DISCON FOR 1NI-173A" in "DISCON". __ c) <u>GO TO</u> Step 2.b.
__ 5) <u>GO TO</u> Step 3.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	
b. Isolate ND header 1B to cold legs as follows:	
__ 1) Place "PWR DISCON FOR 1NI-178B" in "ENABLE".	
__ 2) CLOSE 1NI-178B (ND Hdr 1B To Cold Legs A&B).	
3) Evaluate the following to determine if NC System leak isolated:	
__ • NC System pressure	
__ • RVLIS	
__ • Pzr level.	
__ 4) Verify NC System leak - ISOLATED.	4) Perform the following: __ a) OPEN 1NI-178B. __ b) Place "PWR DISCON FOR 1NI-178B" in "DISCON". __ c) **<u>GO TO</u>** Step 2.c.
__ 5) **<u>GO TO</u>** Step 3.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	
c. Isolate NI header to cold legs as follows:	
1) Verify following NI pump miniflow valves - OPEN:	__ 1) Stop NI pumps.
__ • 1NI-115A (NI Pump 1A Miniflow Isol)	
__ • 1NI-144A (NI Pump 1B Miniflow Isol)	
__ • 1NI-147B (NI Miniflow Hdr To FWST Isol).	
__ 2) Place "PWR DISCON FOR 1NI-162A" in "ENABLE".	
__ 3) CLOSE 1NI-162A (NI To C-Legs Inj Hdr Isol).	
4) Evaluate the following to determine if NC System leak isolated:	
__ • NC System pressure	
__ • RVLIS	
__ • Pzr level.	
__ 5) Verify NC System leak - ISOLATED.	5) Perform the following: __ a) OPEN 1NI-162A. __ b) Place "PWR DISCON FOR 1NI-162A" in "DISCON". __ c) **IF** NI pumps were stopped, **THEN** start NI pumps.
__ 6) Initiate actions as required to complete leak isolation.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Verify leak path isolated as follows:**	
a. Evaluate the following to determine if NC System leak isolated:	__ a. <u>GO TO</u> EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).
__ • NC System pressure	
__ • RVLIS	
__ • Pzr level	
__ • ND System pressure	
__ • Local observation.	
__ b. Initiate actions as required to complete leak isolation.	
__ c. <u>GO TO</u> EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).	

<u>END</u>

<u>Note to Evaluator:</u>

Once the leak has been isolated, the scenario may be terminated by instructing the booth operator to place the simulator in FREEZE.

Attachment List

Scenario 4

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 -	AP/1/A/5500/028 Enclosure 1 (Foldout Page)
ATTACHMENT 4 -	AP/0/A/5500/020 Enclosure 1 (Foldout Page)
ATTACHMENT 5 -	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page)
ATTACHMENT 6 -	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification)
ATTACHMENT 7 -	EP/1/A/5000/G-1 Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring)
ATTACHMENT 8 -	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control)
ATTACHMENT 9 -	Scenario Specific Technical Specifications

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		1	Manually control 1B S/G level to prevent Hi-Hi S/G Level (P-14) at 83% or S/G Lo-Lo Reactor Trip at 11%.
		2	Insert negative reactivity, via manual control rod insertion, within 50 seconds of receipt of valid Reactor Trip “First Out” Annunciator.
		3	Isolate the LOCA outside containment before transition out of ECA-1.2.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	**Power History**	**NCS Boron**	**Xenon**
$1x10^{-3}$ %	BOL	1937 PPM	per OAC

Controlling Procedure

- OP/1/A/6100/001 (Controlling Procedure for Unit Startup), Enclosure 4.1 (Unit Startup). The steps up to 3.184 are complete.

Other Information Needed to Assume the Shift

- Unit 1 is at 1×10^{-3} % power at BOL. Unit 2 is at 100% power. Direction for the crew is to place 1A NV Pump in service and secure 1B NV pump per OP/1/A/6200/001 (Chemical and Volume Control System), Enclosure 4.13 (Shifting the Operating Charging Pump). Pre-start check of 1A NV Pump is complete. Operator is standing by for post start check. Initial Conditions are complete. Crew is to begin at step 3.1 of Enclosure 4.13. Following NV Pump swap the crew is to withdraw control rods to increase reactor power to ~14% in preparation for placing the Main Turbine online.

AOs Available

Seven AOs are available as listed on the status board

METEOROLOGICAL CONDITIONS

- Upper wind direction = 315 degrees, speed = 3 mph
- Lower wind direction = 315 degrees, speed = 4.5 mph
- Forecast calls for clear skies over the next 24 hours.

ATTACHMENT 3

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 24 of 41 Revision 8

1. **Reactor trip criteria:**

   IF any of the following conditions exist:

   __ • Steam leak endangering personnel or jeopardizing plant equipment

   __ • S/G levels - DECREASING IN AN UNCONTROLLED MANNER

   __ • Tavg 5°F less than T-Ref **AND** decreasing in an uncontrolled manner

   __ • Reactor power - INCREASING IN AN UNCONTROLLED MANNER

   __ • Secondary condensate inventory - DECREASING IN AN UNCONTROLLED MANNER.

   THEN perform the following:

   __ a. Trip Unit 1 reactor.

   b. CLOSE the following valves:

   __ • All MSIVs

   __ • All MSIV bypass valves.

   __ c. GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

ATTACHMENT 3

CNS AP/1/A/5500/028	SECONDARY STEAM LEAK Enclosure 1 - Page 2 of 2 **Foldout Page**	PAGE NO. 25 of 41 Revision 8

2. **Uncontrolled cooldown:**

   IF Tavg less than 554°F AND decreasing, THEN perform one of the following:

   - IF reactor power less than 1%, THEN perform the following:

     a. CLOSE the following valves:

     ___ • All MSIVs

     ___ • All MSIV bypass valves.

     b. IF cooldown continues, THEN perform the following:

     ___ 1) Trip Unit 1 reactor.

     ___ 2) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

   - IF reactor power less than 69%, THEN perform the following:

   ___ a. Trip Unit 1 turbine.

     b. IF cooldown continues, THEN perform the following:

     ___ 1) Trip Unit 1 reactor.

     2) CLOSE the following valves:

     ___ • All MSIVs

     ___ • All MSIV bypass valves.

     ___ 3) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

   ___ c. REFER TO AP/1/A/5500/002 (Turbine Generator Trip).

___ 3. **IF steam leak size increases, THEN RETURN TO C. (Operator Actions), Step 2.**

ATTACHMENT 4

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 46 of 86 Revision 43

1. **SSF Manning Criteria:**

   - IF AT ANY TIME 1EMXS OR 2EMXS is de-energized, THEN perform the following:

     a. Dispatch operator to align alternate power supply(s). REFER TO Enclosure 4 (Align Alternate Power Supply To 1EMXS OR 2EMXS).

     b. Notify operator at SSF (Ext. 5251 or 5212) operator has been dispatched to align alternate power supply to 1EMXS (2EMXS).

   CAUTION **Increased KC System temperature due to loss of RN could result in a loss of KC and NV pumps supplying NC pump seal cooling. Failure to restore NC pump seal cooling via thermal barrier cooling or NV seal injection within ten minutes will cause damage to NC pump seals resulting in NC System inventory loss.**

   - IF AT ANY TIME RN cooling to operating KC Hx is lost, THEN dispatch operator to SSF to standby at the SSF to establish seal injection.

   - IF AT ANY TIME KC AND NV seal cooling for any NC pump is lost, THEN ensure operator dispatched to SSF to establish NC pump seal injection. REFER TO Enclosure 5 (Establishing NC Makeup/Seal Injection From The SSF) for the affected Unit(s).

2. **Alternate Cooling to NV Pump Criteria:**

   a. IF S/I is actuated on either Unit, THEN discontinue monitoring this criterion.

   b. IF RN is not available to KC, THEN perform the following:

      CAUTION **YD can only supply one Unit's NV pump at a time.**

      1) Determine which unit will receive alternate NV pump cooling from YD.

      2) IF Unit 1 selected, THEN align alternate YD cooling to 1A NV pump. REFER TO Enclosure 8 (Maximize NV Pump 1A Run Time).

      3) IF Unit 2 selected, THEN align alternate YD cooling to 2A NV pump. REFER TO Enclosure 9 (Maximize NV Pump 2A Run Time).

CNS AP/0/A/5500/020	LOSS OF NUCLEAR SERVICE WATER Enclosure 1 - Page 2 of 2 **Foldout Page**	PAGE NO. 47 of 86 Revision 43

3. **Spent Fuel Pool Criteria:**

- IF AT ANY TIME RN cooling to operating KC Hx is lost, THEN perform the following:

  a. IF either of the following Unit 1 annunciators lit, THEN secure KF pump(s) and REFER TO AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).

  - 1AD-13, D/6 "KF PUMP A MTR CLR HI TEMP"

  OR

  - 1AD-13, D/7 "KF PUMP B MTR CLR HI TEMP"

  b. IF either of the following Unit 2 annunciators lit, THEN secure KF pump and REFER TO AP/2/A/5500/041 (Loss of Spent Fuel Cooling or Level).

  - 2AD-13, D/6 "KF PUMP A MTR CLR HI TEMP"

  OR

  - 2AD-13, D/7 "KF PUMP B MTR CLR HI TEMP"

ATTACHMENT 5

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 1 - Page 1 of 2** **Foldout Page**	PAGE NO. **34 of 49** **Revision 43**

1. **NC Pump Trip Criteria:**
   - IF the following conditions satisfied, THEN trip all NC pumps while maintaining seal injection flow:
     - Any NV or NI pump - DELIVERING S/I FLOW TO NC SYSTEM
     - NC subcooling based on core exit T/Cs - LESS THAN OR EQUAL TO 0°F
     - Reactor power - LESS THAN 5%.
2. **CA Suction Source Switchover Criterion:**
   - IF 1AD-8, B/1 "UST LO LEVEL" lit, THEN REFER TO AP/1/A/5500/006 (Loss of S/G Feedwater).
3. **Position Criteria for 1NV-202B and 1NV-203A (NV Pumps A&B Recirc Isol):**
   - IF NC pressure less than 1500 PSIG AND NV S/I flowpath aligned, THEN CLOSE 1NV-202B and 1NV-203A.
   - IF NC pressure greater than 2000 PSIG, THEN OPEN 1NV-202B and 1NV-203A.
4. **Ruptured S/G CA Isolation Criteria:**
   - IF both the following conditions met, THEN stop CA flow to affected S/G(s):
     - Level increasing in uncontrolled manner or radiation level in that S/G abnormal
     - N/R level - GREATER THAN 11% (29% ACC).
5. **Faulted S/G CA isolation Criteria:**
   - IF all the following conditions met, THEN stop CA flow to affected S/G:
     - S/G pressure decreasing in uncontrolled manner or completely depressurized
     - Only one S/G diagnosed as faulted
     - Secondary heat sink criteria met:
       - Total CA flow - GREATER THAN 450 GPM

         OR
       - ANY S/G(s) N/R level - GREATER THAN 11%(29% ACC).

ATTACHMENT 5

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 1 - Page 2 of 2** **Foldout Page**	PAGE NO. **35 of 49** **Revision 43**

6. **NS Pump Trip Criterion:**

- IF NS pump in recirc and S/I occurs, **THEN** perform one of the following:
  - IF train affected ECCS and D/G load sequencer - RESET, **THEN** stop NS pump

    OR

  - **WHEN** sequencer loading complete, **THEN** perform the following for affected train:

    a. Notify Control Room Supervisor.

    b. Reset ECCS.

    c. Reset D/G load sequencer.

    d. Secure NS pump.

    e. IF AT ANY TIME B/O occurs, **THEN** restart S/I equipment previously on.

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 1 of 7** **Ventilation System Verification**	PAGE NO. **36 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify proper VC/YC operation as follows:**	
a. Verify one train of the following equipment in operation: __ • YC chiller __ • CR AHU-1 __ • CRA AHU-1 __ • CRA PFT-1.	a. Perform the following: __ 1) Shift operating VC/YC trains. <u>**REFER TO**</u> EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 17 (Shifting Operating VC/YC Trains). 2) <u>**IF**</u> no train can be properly aligned, <u>**THEN**</u> dispatch operator and IAE/Maintenance to restore at least one train of VC/YC. <u>**REFER TO**</u> the following: __ • OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System) __ • EM/0/A/5200/001 (Troubleshooting Cause For Improper Operation of VC/YC System).

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 2 of 7** **Ventilation System Verification**	PAGE NO. **37 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. (Continued)

b. Verify the following alarms - DARK:

__ • 1AD-18, A/8 "UNIT 1 INTAKE HI CHLORINE 1A"

__ • 1AD-18, B/8 "UNIT 1 INTAKE HI CHLORINE 1B"

__ • 1AD-18, D/8 "UNIT 2 INTAKE HI CHLORINE 2A"

__ • 1AD-18, E/8 "UNIT 2 INTAKE HI CHLORINE 2B".

RESPONSE NOT OBTAINED:

b. IF chlorine odor detected in Control Room, THEN perform the following based on the status of given alarms:

1) IF detectors on both unit intakes in alarm, THEN perform the following:

a) Ensure the following VC intake dampers - CLOSED:

__ • 1VC-5B (CRA Filt Inlet)
__ • 1VC-6A (CRA Filt Inlet)
__ • 2VC-5B (CRA Filt Inlet)
__ • 2VC-6A (CRA Filt Inlet).

__ b) GO TO Step 1.d.

2) IF Unit 1 intake HI chlorine detector(s) in alarm, THEN perform the following:

a) Ensure the following VC dampers - CLOSED:

__ • 1VC-5B (CRA Filt Inlet)
__ • 1VC-6A (CRA Filt Inlet).

b) Ensure the following dampers - OPEN:

__ • 2VC-5B (CRA Filt Inlet)
__ • 2VC-6A (CRA Filt Inlet).

__ c) GO TO Step 1.d.

(RNO continued on next page)

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 3 of 7** **Ventilation System Verification**	PAGE NO. **38 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. (Continued)

3) **IF** Unit 2 intake Hi chlorine detector(s) in alarm, **THEN** perform the following:

a) Ensure the following VC dampers - CLOSED:

__ • 2VC-5B (CRA Filt Inlet)
__ • 2VC-6A (CRA Filt Inlet).

b) Ensure the following dampers - OPEN:

__ • 1VC-5B (CRA Filt Inlet)
__ • 1VC-6A (CRA Filt Inlet).

__ c) **GO TO** Step 1.d.

c. Ensure the following VC dampers - OPEN:

__ • 1VC-5B (CRA Filt Inlet)
__ • 1VC-6A (CRA Filt Inlet)
__ • 2VC-5B (CRA Filt Inlet)
__ • 2VC-6A (CRA Filt Inlet).

d. Repeat Step 1 of this enclosure until notified by station management as follows:

__ • At least once every 8 hours

OR

__ • Any time VC/YC related annunciators on 1AD-18 actuate.

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 4 of 7** **Ventilation System Verification**	PAGE NO. **39 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. **Ensure proper VA system operation as follows:**	
• Ensure the following fans - OFF:	
__ • ABUXF 1A __ • ABUXF 1B.	
• Ensure VA system filter in service as follows:	
__ • 1ABF-D-12 & 19 (VA Filter A Bypass Dampers) - CLOSED	
__ • 1ABF-D-5 & 20 (VA Filter B Bypass Dampers) - CLOSED.	
• Ensure the following fans - ON:	
__ • ABFXF-1A __ • ABFXF 1B.	
3. **Verify proper VE system operation as follows:**	
__ a. VE fans - ON.	__ a. Start fan(s).

ATTACHMENT 6

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
__ b. Annulus pressure - BETWEEN -1.4 IN. WC AND -1.8 IN. WC.	b. Perform the following: 1) **IF** annulus pressure more positive than -1.4 in. WC, **THEN** perform the following: a) Verify flow indicated on the following indications: __ • 1VEP5180 (VE 1A Flow To Stack) __ • 1VEP5200 (VE 1B Flow To Stack). b) **IF** flow not indicated, **THEN** dispatch operator to verify status of the following dampers based on their local indication or their operating piston rods being extended 4" to 6": __ • 1AVS-D-2 (VE A Trn Recirc Damp) (AB-603, JJ-51, Rm 500) - CLOSED __ • 1AVS-D-7 (VE B Trn Recirc Damp) (AB-603, HH-52, Rm 500) - CLOSED __ • 1AVS-D-3 (VE A Trn Exh Damp) (AB-603, JJ-52, Rm 500) - OPEN __ • 1AVS-D-8 (VE B Trn Exh Damp) (AB-603, HH-52, Rm 500) - OPEN. __ c) Consult plant engineering staff and notify IAE/Maintenance to troubleshoot and repair. **REFER TO** EM/1/A/5200/002 (Troubleshooting Cause For VE System Hi/Lo Pressure). __ d) **GO TO** Step 3.c.

(RNO continued on next page)

ATTACHMENT 6

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
	2) **IF** annulus pressure more negative than -1.8 in. WC, **THEN** perform the following:
	__ a) Determine which VE train indicates highest discharge flow to stack.
	__ b) Within 2 hours, ensure VE train that indicates highest discharge flow to stack secured.
	__ c) Consult plant engineering staff and notify IAE/Maintenance to troubleshoot and repair. **REFER TO** EM/1/A/5200/002 (Troubleshooting Cause For VE System Hi/Lo Pressure).
__ c. Repeat Step 3.b every 30 minutes until notified by station management.	

ATTACHMENT 6

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 2 - Page 7 of 7** **Ventilation System Verification**	PAGE NO. **42 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Record time ventilation systems verified on following table:**

TIME	SYSTEM (VC, VE)	INITIALS

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 1 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 3 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Review the following considerations for Spent Fuel Pool monitoring:**	
__ • Control Room temperature indication 1KFP5130 is a non-safety instrument loop. Guidance is provided for local temperature verification if access to Spent Fuel Pool available.	
__ • Normal level indication 1KFP5120 is a non-safety instrument loop powered from 1RPA. Guidance is provided for local temperature verification if access to Spent Fuel Pool available.	
__ • If a loss of all AC Power is anticipated to last greater than 6 hrs, portable Spent Fuel Pool level and temperature instrumentation can be installed if access to Spent Fuel Pool available.	
__ • Seismic event may cause loss of Spent Fuel Pool inventory due to "splashing" of water.	
2. **Monitor Unit 1 KF pump motor cooling as follows:**	
a. Verify the following:	__ a. Ensure affected Unit 1 KF pump(s) - OFF.
__ • KF PUMP A MTR CLR HI TEMP (1AD-13 D/6) - DARK __ • KF PUMP B MTR CLR HI TEMP (1AD-13 D/7) - DARK.	
__ b. **IF AT ANY TIME** KF PUMP MTR CLR HI TEMP annunciator(s) lit, **THEN** perform Step 2.a.	
__ 3. **IF AT ANY TIME Spent Fuel Pool level AND temperature indications unavailable in Control Room, THEN dispatch operator to monitor Unit 1 Spent Fuel Pool. REFER TO Enclosure 24 (Local Spent Fuel Pool Monitoring).**	

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Steps 4 and 5 may be performed concurrently.	
4. **Monitor Unit 1 Spent Fuel Pool level as follows:**	
__ a. Verify Spent Fuel Pool level indication in Control Room - AVAILABLE.	__ a. **GO TO** Step 4.e.
__ b. Verify Spent Fuel Pool level greater than - 39 ft.	b. Notify Control Room Supervisor of the following: __ 1) Unit 1 Spent Fuel Pool level. __ 2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ c. Record Unit 1 Spent Fuel Pool level in the following table:	

Time	Unit 1 SFP Level	Time	Unit 1 SFP Level	Time	Unit 1 SFP Level

__ d. **GO TO** Step 5.

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 3 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 5 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
e. Determine Spent Fuel Pool level as follows:	
__ 1) Dispatch operator and RP to determine if Unit 1 Spent Fuel Pool area accessible.	
2) **WHEN** Unit 1 Spent Fuel Pool area accessibility determined, **THEN** perform the following:	
__ a) Verify Unit 1 Spent Fuel Pool area - ACCESSIBLE.	a) Notify Station Management to perform the following: __ (1) Evaluate alternate method to monitor Unit 1 Spent Fuel Pool level. __ (2) **IF AT ANY TIME** Unit 1 level estimated less than - 39 ft, **THEN REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level). __ (3) **GO TO** Step 5.
b) Notify dispatched operator to perform the following: (1) Determine Spent Fuel Pool level using the following reference points: __ • Top of skimmer trough is 40 Ft __ • 1 Ft below lip of skimmer trough is 39 Ft __ • Centerline of KF pump suction strainer is 37.5 Ft. __ (2) Report level determination to Control Room.	

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 4 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 6 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. (Continued)

c) **WHEN** operator reports level, **THEN** perform the following:

__ (1) Verify level greater than - 39 ft.

RESPONSE NOT OBTAINED:

(1) Notify Control Room Supervisor of the following:

__ 1. Unit 1 Spent Fuel Pool level.

__ 2. **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).

__ (2) Record Unit 1 Spent Fuel Pool level in the following table:

Time	Unit 1 SFP Level	Time	Unit 1 SFP Level	Time	Unit 1 SFP Level

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 5 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 7 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Monitor Unit 1 Spent Fuel Pool temperature as follows:**	
__ a. Verify Spent Fuel Pool temperature indication in Control Room - AVAILABLE.	__ a. **GO TO** Step 5.e.
__ b. Verify Spent Fuel Pool temperature less than - 125°F.	b. Notify Control Room Supervisor of the following: __ 1) Unit 1 Spent Fuel Pool temperature. __ 2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ c. Record Unit 1 Spent Fuel Pool temperature in the following table:	

Time	Unit 1 SFP Temp		Time	Unit 1 SFP Temp		Time	Unit 1 SFP Temp

__ d. **GO TO** Step 6.

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 6 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 8 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
e. Determine Spent Fuel Pool temperature as follows:	
__ 1) Verify access to Unit 1 Spent Fuel Pool area previously determined.	1) Perform the following: __ a) Dispatch operator and RP to determine if Unit 1 Spent Fuel Pool area accessible. __ b) **WHEN** Unit 1 Spent Fuel Pool area accessibility determined, **THEN** perform Steps 5.e.2 through 5.e.4. __ c) **GO TO** Step 6.
__ 2) Verify Unit 1 Spent Fuel Pool area - ACCESSIBLE.	2) Notify station management to perform the following: __ a) Evaluate alternate method to monitor Unit 1 Spent Fuel Pool temperature. __ b) **IF AT ANY TIME** Unit 1 temperature estimated greater than - 125°F, **THEN REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level). __ c) **GO TO** Step 6.
3) Notify dispatched operator to determine Unit 1 Spent Fuel Pool temperature as follows: __ a) Obtain infrared thermometer from OSC "Emergency Supply Cabinet". __ b) Scan Spent Fuel Pool surface for highest reading. __ c) Report temperature determination to Control Room.	

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 7 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 9 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
4) **WHEN** operator reports temperature, **THEN** perform the following:	
__ a) Verify Spent Fuel Pool temperature - LESS THAN 125°F.	a) Notify Control Room Supervisor of the following: __ (1) Unit 1 Spent Fuel Pool temperature. __ (2) **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).
__ b) Record Unit 1 Spent Fuel Pool temperature in the following table:	

Time	Unit 1 SFP Temp		Time	Unit 1 SFP Temp		Time	Unit 1 SFP Temp

__ 6. **Notify Control Room Supervisor of Unit 1 Spent Fuel Pool level and temperature.**

ATTACHMENT 7

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 8 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 10 of 109 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **Verify AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level) - IMPLEMENTED.**	**<u>IF AT ANY TIME</u> Unit 1 Spent Fuel Pool cooling <u>NOT</u> established prior to reaching either of the following conditions, <u>THEN</u> notify Control Room Supervisor, <u>REFER TO</u> AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level):** __ • Unit 1 Spent Fuel Pool greater than - 125°F. __ • Unit 1 Spent Fuel Pool level less than - 39 ft.
__ 8. **Repeat this enclosure every 2 hours until notified by station management.**	

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 1 of 5** **NC Temperature Control**	PAGE NO. **44 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify any NC pump - ON.**	**Perform the following:** a. Use NC T-Colds to determine NC temperature as required in subsequent steps. b. GO TO Step 4.
2. **Use NC T-Avg to determine NC temperature as required in subsequent steps.**	
3. **IF AT ANY TIME all NC pumps tripped, THEN use NC T-Colds to determine NC temperature as required in subsequent steps.**	
4. **Verify one of the following:** • NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F OR • NC temperature - TRENDING TO 557°F.	**GO TO Step 8.**
5. **Continue to monitor NC temperature.**	
6. **Notify Control Room Supervisor of NC temperature control status.**	

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 2 of 5** **NC Temperature Control**	PAGE NO. **45 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Do not continue in this enclosure until one of the following occurs:** • NC temperature - GREATER THAN 557°F AND INCREASING IN AN UNCONTROLLED MANNER OR • NC temperature - GREATER THAN 557°F AND STABLE OR • NC temperature - LESS THAN 557°F AND DECREASING IN AN UNCONTROLLED MANNER.	
8. **Verify NC temperature - LESS THAN 557°F AND DECREASING.**	**Perform the following:** a. IF NC temperature greater than 557°F AND increasing, THEN stabilize NC temperature at 557°F as follows: 1) IF steam dumps available, THEN use steam dumps. 2) IF steam dumps not available, THEN use S/G PORVs. b. IF the following conditions exist: • NC temperature greater than 557°F and stable • Time and manpower available, THEN stabilize NC temperature at 557°F as follows: 1) IF steam dumps available, THEN use steam dumps. 2) IF steam dumps not available, THEN use S/G PORVs. c. GO TO Step 10.

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 3 of 5** **NC Temperature Control**	PAGE NO. **46 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Attempt to stop the NC cooldown as follows:**	
a. Ensure all steam dumps - CLOSED.	
b. Ensure all S/G PORVs - CLOSED.	b. <u>IF</u> any S/G PORV cannot be closed, <u>THEN</u> CLOSE its isolation valve.
c. Ensure S/G blowdown isolated.	
d. CLOSE the following valves: • 1SM-77A (S/G 1A Otlt Hdr Bldwn C/V) • 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V) • 1SM-75A (S/G 1C Otlt Hdr Bldwn C/V) • 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V).	
e. Verify MSR Second Stage steam supply valves - CLOSED • 1HM-1 (MSRH 1A&1B SSRH Stm Source) • 1HM-2 (MSRH 1C&1D SSRH Stm Source).	e. Perform the following: 1) CLOSE MSR Second Stage steam supply valve(s). 2) <u>IF</u> steam flowpath cannot be isolated from Control Room, <u>THEN</u> CLOSE the following valves: • All MSIVs • All MSIV bypass valves.

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 4 of 5** **NC Temperature Control**	PAGE NO. **47 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
f. Depress and hold "S/V BEFORE SEAT DRN" "CLOSE" pushbutton (1MC-3) to close the following valves: • 1SM-41 (Stop Vlv #1 Before Seat Drn) • 1SM-44 (Stop Vlv #2 Before Seat Drn) • 1SM-43 (Stop Vlv #3 Before Seat Drn) • 1SM-42 (Stop Vlv #4 Before Seat Drn).	
g. Verify NC cooldown - STOPPED.	g. <u>IF</u> cooldown continues, <u>**THEN**</u> THROTTLE feed flow as follows: 1) <u>IF</u> S/G N/R level less than 11% (29% ACC) in all S/G's, <u>**THEN**</u> THROTTLE feed flow to achieve the following: • Minimize cooldown • Maintain total feed flow greater than 450 GPM. 2) <u>**WHEN**</u> N/R level greater than 11% (29% ACC) in any S/G, <u>**THEN**</u> THROTTLE feed flow further to achieve the following: • Minimize cooldown • Maintain at least one S/G N/R level greater than 11% (29% ACC). 3) <u>IF</u> cooldown continues, <u>**THEN**</u> CLOSE the following valves: • All MSIVs • All MSIV bypass valves.

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION **Enclosure 4 - Page 5 of 5** **NC Temperature Control**	PAGE NO. **48 of 49** **Revision 43**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. **Continue to perform actions of this enclosure as required to ensure one of the following:**

    - NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F

    OR

    - NC temperature - TRENDING TO 557°F.

11. **Notify Control Room Supervisor of NC temperature control status.**

ATTACHMENT 9

EVENT #3
RN Strainer Hi D/P

3.7 PLANT SYSTEMS

3.7.8 Nuclear Service Water System (NSWS)

LCO 3.7.8 Two NSWS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ------------NOTE------------ Not applicable while in Condition C of this LCO unless entry is directed by Note 2 of Condition C. -------------------------------- One NSWS train inoperable.	A.1 ------------NOTES------------ 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources—Operating," for emergency diesel generator made inoperable by NSWS. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops—MODE 4," for residual heat removal loops made inoperable by NSWS. -------------------------------- Restore NSWS train to OPERABLE status.	 72 hours

(continued)

EVENT #3

RN Strainer Hi D/P

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. ------------NOTES------------ 1. Entry into this Condition shall only be allowed for pre-planned activities as described in the Bases of this Specification. 2. Immediately enter Condition A of this LCO if one or more NSWS components become inoperable while in this Condition and one NSWS train remains OPERABLE. 3. Immediately enter LCO 3.0.3 if one or more NSWS components become inoperable while in this Condition and no NSWS train remains OPERABLE. ------------------------------------ One NSWS supply header inoperable due to NSWS being aligned for single supply header operation.	B.1 Restore NSWS supply header to OPERABLE status.	30 days

(continued)

ATTACHMENT 9

EVENT #3
RN Strainer Hi D/P

NSWS
3.7.8

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. ------------NOTES------------ 1. Entry into this Condition shall only be allowed for Unit 1 and for pre-planned activities as described in the Bases of this Specification. Entry into this Condition shall not be allowed while Unit 2 is in MODE 1, 2, 3, or 4. 2. Immediately enter Condition A of this LCO if one or more Unit 1 required NSWS components become inoperable while in this Condition and one NSWS train remains OPERABLE. 3. Immediately enter LCO 3.0.3 if one or more Unit 1 required NSWS components become inoperable while in this Condition and no NSWS train remains OPERABLE. ------------------------------- One NSWS train inoperable due to NSWS being aligned for single Auxiliary Building discharge header operation.	C.1 Restore NSWS train to OPERABLE status.	14 days

(continued)

ATTACHMENT 9

EVENT #3

RN Strainer Hi D/P

NSWS
3.7.8

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.8.1	-----NOTE----- Isolation of NSWS flow to individual components does not render the NSWS inoperable. ---------- Verify each NSWS manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.2	-----NOTE----- Not required to be met for valves that are maintained in position to support NSWS single supply or discharge header operation. ---------- Verify each NSWS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.3	Verify each NSWS pump starts automatically on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

3.3 INSTRUMENTATION

3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

LCO 3.3.2 The ESFAS instrumentation for each Function in Table 3.3.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.2-1.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels or trains inoperable.	A.1 Enter the Condition referenced in Table 3.3.2-1 for the channel(s) or train(s).	Immediately
B. One channel or train inoperable.	B.1 Restore channel or train to OPERABLE status.	48 hours
	<u>OR</u>	
	B.2.1 Be in MODE 3.	54 hours
	<u>AND</u>	
	B.2.2 Be in MODE 5.	84 hours

(continued)

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

ESFAS Instrumentation
3.3.2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One train inoperable.	C.1 ------------NOTE------------ One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. -------------------------------- Restore train to OPERABLE status.	 24 hours
	OR	
	C.2.1 Be in MODE 3.	30 hours
	AND	
	C.2.2 Be in MODE 5.	60 hours
D. * One channel inoperable.	D.1 ------------NOTE------------ The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. -------------------------------- Place channel in trip.	 72 hours
	OR	
	D.2.1 Be in MODE 3.	78 hours
	AND	
	D.2.2 Be in MODE 4.	84 hours

*[For the function Auxiliary Feedwater Loss of Offsite Power proposed changes to this Condition will be evaluated in a future amendment. *The existing Technical Specification requirements for Bypass test time of 4 hours and Required Action D:1 Place channel in trip time of 6 hours and Required Action D.2.1 Be in MODE 3 in 12 hours and Action D.2.2 Be in MODE 4 in 18 hours in remains in effect]*

(continued)

ATTACHMENT 9

EVENT #4
FWST Channel 2 Failure

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One Containment Pressure channel inoperable.	E.1 ------------NOTE------------ One additional channel may be bypassed for up to 12 hours for surveillance testing. ---------------------------------- Place channel in bypass.	72 hours
	OR	
	E.2.1 Be in MODE 3.	78 hours
	AND	
	E.2.2 Be in MODE 4.	84 hours
F. One channel or train inoperable.	F.1 Restore channel or train to OPERABLE status.	48 hours
	OR	
	F.2.1 Be in MODE 3.	54 hours
	AND	
	F.2.2 Be in MODE 4.	60 hours
G. One Steam Line Isolation Manual Initiation - individual channel inoperable.	G.1 Restore channel to OPERABLE status.	48 hours
	OR	
	G.2 Declare associated steam line isolation valve inoperable.	48 hours

(continued)

ATTACHMENT 9

EVENT #4
FWST Channel 2 Failure

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. One train inoperable.	H.1 ------------NOTE------------ One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. --------------------------------	
	Restore train to OPERABLE status.	24 hours
	OR	
	H.2.1 Be in MODE 3.	30 hours
	AND	
	H.2.2 Be in MODE 4.	36 hours
I. One train inoperable.	I.1 ------------NOTE------------ One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. --------------------------------	
	Restore train to OPERABLE status.	24 hours
	OR	
	I.2 Be in MODE 3.	30 hours

(continued)

ATTACHMENT 9

EVENT #4
FWST Channel 2 Failure

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
J. One channel inoperable.	J.1 ------------NOTE------------ The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. --------------------------------	
	Place channel in trip.	72 hours
	<u>OR</u>	
	J.2 Be in MODE 3.	78 hours
K. One Main Feedwater Pumps trip channel inoperable.	K.1 Place channel in trip.	1 hour
	<u>OR</u>	
	K.2 Be in MODE 3.	7 hours

(continued)

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

ESFAS Instrumentation
3.3.2

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
L. One channel inoperable.	L.1	-------------NOTE------------ The inoperable channel may be bypassed for up to 2 hours for surveillance testing of other channels. -------------------------------	
		Place channel in trip.	6 hours
	<u>OR</u>		
	L.2	Be in MODE 3.	12 hours

(continued)

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
M. One channel inoperable.	M.1 Place channel in trip.	1 hour
	OR	
	M.2.1 Be in MODE 3.	7 hours
	AND	
	M.2.2 Be in MODE 4.	13 hours
N. One channel inoperable.	N.1 -------------NOTE------------- One additional channel may be bypassed for up to 2 hours for surveillance testing. ------------------------------------	
	Place channel in bypass.	6 hours
	OR	
	N.2.1 Be in MODE 3.	12 hours
	AND	
	N.2.2 Be in MODE 5.	42 hours

(continued)

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
O. One channel inoperable.	O.1 Verify interlock is in required state for existing unit condition.	1 hour
	OR	
	O.2.1 Be in MODE 3.	7 hours
	AND	
	O.2.2 Be in MODE 4.	13 hours
P. One or more Containment Pressure Control System channel(s) inoperable.	P.1 Declare affected supported system inoperable.	Immediately
Q. One Nuclear Service Water Suction Transfer-Low Pit Level channel in one or more pits inoperable.	Q.1 -------------NOTE------------- The inoperable channel may be bypassed for up to 2 hours for surveillance testing of other channels. ------------------------------------- Place channel in trip.	4 hours
	OR	
	Q.2 Align the Nuclear Service Water System for Standby Nuclear Service Water Pond recirculation.	4 hours
	OR	
	Q.3.1 Be in MODE 3.	10 hours
	AND	
	Q.3.2 Be in MODE 5.	40 hours

(continued)

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

ESFAS Instrumentation
3.3.2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
R. Two or more Nuclear Service Water Suction Transfer-Low Pit Level channels in one or more pits inoperable.	R.1 Align the Nuclear Service Water System for Standby Nuclear Service Water Pond recirculation.	4 hours
	<u>OR</u>	
	R.2.1 Be in MODE 3.	10 hours
	<u>AND</u>	
	R.2.2 Be in MODE 5.	40 hours

Catawba Units 1 and 2 3.3.2-9 Amendment Nos. 249/243

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

Table 3.3.2-1 (page 1 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Safety Injection[b]						
a. Manual initiation	1,2,3,4	2	B	SR 3.3.2.8	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High	1,2,3	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 1.4 psig	1.2 psig
d. Pressurizer Pressure - Low	1,2,3(a)	4	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 1839 psig	1845 psig
2. Deleted.						
3. Containment Isolation[b]						
a. Phase A Isolation						
(1) Manual Initiation	1,2,3,4	2	B	SR 3.3.2.8	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

(b) The requirements of this Function are not applicable to Containment Purge Ventilation System and Hydrogen Purge System components, since the system containment isolation valves are sealed closed in MODES 1, 2, 3, and 4.

EVENT #4

FWST Channel 2 Failure

ESFAS Instrumentation
3.3.2

Table 3.3.2-1 (page 2 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3. Containment Isolation (continued)						
b. Phase B Isolation						
(1) Manual Initiation	1,2,3,4	1 per train, 2 trains	B	SR 3.3.2.8	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
(3) Containment Pressure - High High	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 3.2 psig	3.0 psig
4. Steam Line Isolation						
a. Manual Initiation						
(1) System	1,2(b),3(b)	2 trains	F	SR 3.3.2.8	NA	NA
(2) Individual	1,2(b),3(b)	1 per line	G	SR 3.3.2.8	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2(b),3(b)	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High High	1,2(b),3(b)	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 3.2 psig	3.0 psig
d. Steam Line Pressure						
(1) Low	1,2(b),3(a)(b)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 744 psig	775 psig

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

(b) Except when all MSIVs are closed and de-activated.

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

Table 3.3.2-1 (page 3 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Steam Line Isolation (continued)						
(2) Negative Rate - High	3(b)(c)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 122.8(d) psi	100(d) psi
5. Turbine Trip and Feedwater Isolation						
a. Turbine Trip						
(1) Automatic Actuation Logic and Actuation Relays	1,2	2 trains	I	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
(2) SG Water Level-High-High (P-14)	1,2	4 per SG	J	SR 3.3.2.1 SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.5 SR 3.3.2.6 SR 3.3.2.9 SR 3.3.2.10	≤ 85.6% (Unit 1) ≤ 78.9% (Unit 2)	83.9% (Unit 1) 77.1% (Unit 2)
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements. See Item 5.a.(1) for Applicable MODES.					
b. Feedwater Isolation						
(1) Automatic Actuation Logic and Actuation Relays	1,2(e),3(e)	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA

(continued)

(b) Except when all MSIVs are closed and de-activated.

(c) Trip function automatically blocked above P-11 (Pressurizer Pressure) interlock and may be blocked below P-11 when Steam Line Isolation Steam Line Pressure - Low is not blocked.

(d) Time constant utilized in the rate/lag controller is ≥ 50 seconds.

(e) Except when all MFIVs, MFCVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

EVENT #4

FWST Channel 2 Failure

ESFAS Instrumentation
3.3.2

Table 3.3.2-1 (page 4 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
(2) SG Water Level- High High (P-14)	1,2(e),3(e)	4 per SG	D	SR 3.3.2.1 SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.5 SR 3.3.2.6 SR 3.3.2.9 SR 3.3.2.10	≤ 85.6% (Unit 1) ≤ 78.9% (Unit 2)	83.9% (Unit 1) 77.1% (Unit 2)
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements. See Item 5.b.(1) for Applicable MODES.					
(4) Tavg-Low	1,2(e)	4	J	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9	≥ 561°F	564°F
coincident with Reactor Trip, P-4	Refer to Function 8.a (Reactor Trip, P-4) for all initiation functions and requirements.					
(5) Doghouse WaterLevel - High High	1,2(e)	3 per train per doghouse	L	SR 3.3.2.8 SR 3.3.2.9 SR 3.3.2.12	≤ 12 inches above 577 ft floor level	11 inches above 577 ft floor level

(continued)

(e) Except when all MFIVs, MFCVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

Table 3.3.2-1 (page 5 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays	1,2,3	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. SG Water Level - Low Low	1,2,3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 9% (Unit 1) ≥ 35.1% (Unit 2)	10.7% (Unit 1) 36.8% (Unit 2)
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. Loss of Offsite Power	1,2,3	3 per bus	D	SR 3.3.2.3(f)(g) SR 3.3.2.9(f)(g) SR 3.3.2.10	≥ 3396 V	3450 V
e. Trip of all Main Feedwater Pumps	1,2	3 per pump	K	SR 3.3.2.8 SR 3.3.2.10	NA	NA
f. Auxiliary Feedwater Pump Train A and Train B Suction Transfer on Suction Pressure - Low	1,2,3	3 per train	M	SR 3.3.2.8 SR 3.3.2.10	A) ≥ 9.5 psig B) ≥ 5.2 psig (Unit 1) ≥ 5.0 psig (Unit 2)	A) 10.5 psig B) 6.2 psig (Unit 1) 6.0 psig (Unit 2)

(continued)

(f) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(g) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

ATTACHMENT 9

EVENT #4

FWST Channel 2 Failure

Table 3.3.2-1 (page 6 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
7. Automatic Switchover to Containment Sump						
a. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. Refueling Water Storage Tank (RWST) Level – Low	1,2,3,4	4	N	SR 3.3.2.1 SR 3.3.2.7[(a)(b)] SR 3.3.2.9[(a)(b)] SR 3.3.2.10	≥ 91.9 inches	95 inches
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1,2,3	1 per train, 2 trains	F	SR 3.3.2.8	NA	NA
b. Pressurizer Pressure, P-11	1,2,3	3	O	SR 3.3.2.5 SR 3.3.2.9	≥ 1944 and ≤ 1966 psig	1955 psig
c. T_{avg} - Low Low, P-12	1,2,3	1 per loop	O	SR 3.3.2.5 SR 3.3.2.9	≥ 550°F	553°F
9. Containment Pressure Control System						
a. Start Permissive	1,2,3,4	4 per train	P	SR 3.3.2.1 SR 3.3.2.7 SR 3.3.2.9	≤ 1.0 psid	0.9 psid
b. Termination	1,2,3,4	4 per train	P	SR 3.3.2.1 SR 3.3.2.7 SR 3.3.2.9	≥ 0.25 psid	0.35 psid
10. Nuclear Service Water Suction Transfer - Low Pit Level	1,2,3,4	3 per pit	Q,R	SR 3.3.2.1 SR 3.3.2.9 SR 3.3.2.11 SR 3.3.2.12	≥ El. 555.4 ft	El. 557.5 ft

(a) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(b) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

Catawba Nuclear Station
JPM A
September 2019 NRC Exam

JPM A

Catawba Nuclear Station
JPM A
September 2019 NRC Exam

EVALUATION SHEET

Task: Initiate RCS Bleed and Feed following loss of Secondary Heat Sink.

Alternate Path: Yes

Facility JPM #: New

Safety Function: 4P **Title:** Establish NC System Bleed and Feed

K/A EPE E05 EA1.1 Ability to operate and/or monitor the following as they apply to the (Loss of Secondary Heat Sink); Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Rating(s): 4.1 / 4.0 **CFR:** 41.7 / 45.5 / 45.6

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

Simulator __X__ In-**Pl**ant ________ **P**erform __X__ **S**imulate ________

References: EP/1/A/5000/FR-H.1

Task Standard: Applicant aligns RCS for bleed and feed in accordance with EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) by actuating at least one train of Safety Injection and opening PZR PORVs 1NC-34A and 1NC-36B.

Validation Time: 5 minutes **Time Critical:** Yes ______ No __X__

===

Applicant: Time Start: ____________
NAME________________________ Docket #______________ Time Finish: ____________

Performance Rating: Performance Time ______

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

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COMMENTS

Catawba Nuclear Station
JPM A
September 2019 NRC Exam

SIMULATOR OPERATOR INSTRUCTIONS:

1. ENSURE NRC Examination Security has been established.
2. Reset to IC # 150
3. Enter the password.
4. Select "Yes" on the INITIAL CONDITION RESET pop-up window.
5. Ensure simulator setup per table below.
6. Place simulator in RUN and acknowledge any alarms.
7. ENSURE "Extra Operator" is present in the simulator.
8. Place simulator in FREEZE until Examiner cue is given.

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event
	MAL-CA003A, CAPT SA2 FAILS TO START	**Active**				
	MAL-CA003B, CAPT SA5 FAILS TO START	**Active**				
	MAL-CA004A, FAILURE OF CA PUMP A TO START	**Both**				
	MAL-CA004B, FAILURE OF CA PUMP B TO START	**Both**				
	VLV-NC005F, NC32B PZR PORV FAIL TO POSITION	**0**				

Catawba Nuclear Station
JPM A
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

A Reactor Trip has occurred due to a loss of both main feedwater pumps. The CA System will not function. Attempts to restart the CFPT's and align RY system flow have been unsuccessful. EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) has been entered following a validated Heat Sink "RED PATH" encountered while performing EP/1/A/5000/ES-0.1 (Reactor Trip Response). Bleed and feed initiation criteria has been met.

INITIATING CUES:

The Control Room Supervisor has directed you to initiate NC System bleed and feed beginning at step 21 of EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink). Inform the Control Room Supervisor when the bleed and feed path has been initiated and verified.

EXAMINER NOTE: After reading Initiating Cue, provide the applicant with a copy of EP/1/A/5000/FR-H.1, Pages 42-49

START TIME: _______

STEP/STANDARD	SAT/UNSAT
STEP 1: 21 Perform Steps 22 through 26 quickly to establish NC heat removal by NC bleed and feed. STANDARD: Acknowledges step and proceeds. COMMENTS:	___ SAT ___ UNSAT
STEP 2 22 Ensure all NC Pumps - OFF STANDARD: Verifies OFF indications for 1A, 1B, 1C, and 1D NC Pumps (1MC-10). COMMENTS:	___ SAT ___UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 3 23 Initiate S/I. STANDARD: Depresses Train A and B “SAFETY INJECTION INITIATE” pushbuttons. Verifies “SAFETY INJECTION ACTUATED” status light lit (1SI-13) or “ECCS TRN A (B)” YELLOW “RESET” lights dark (1MC-11). **Examiner Note:** **This step is critical to ensure that high pressure S/I flow is available to the NC system and to ensure that containment is isolated to ensure that reactor coolant released from Pzr PORV operation in the following steps is confined to containment. Only one train of S/I is required to meet this requirement.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP 4 24 Verify "NV S/I FLOW - INDICATING FLOW. STANDARD: Verifies flow on 1NVP6080, (1MC-3). COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 25. Establish NC System bleed path as follows: a. Ensure all Pzr PORV isolation valves - OPEN STANDARD: Verifies the red 'OPEN' lights lit and green “CLSD” lights dark for 1NC-31B, 1NC-33A and 1NC-35B. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 6 25.b. Select "OPEN" on the following PZR PORVs: • 1NC34A (PZR PORV) • 1NC32B (PZR PORV) STANDARD: Rotates the switches for 1NC-32B and 1NC-34A to the 'OPEN' position. **Examiner Note: This begins the alternate path of this JPM.** **Examiner Note: Although 1NC-32B will not open, this step is critical to provide one bleed path via 1NC-34A.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7 25.c. Align N_2 to the Pzr PORVs by opening the following valves: • 1NI-438A (Emer N2 FROM CLA A To 1NC-34A) • 1NI-439B (Emer N2 FROM CLA B To 1NC-32B) STANDARD: Depresses the 'OPEN' pushbuttons for 1NI-438A and 1NI-439B. Verifies the red 'OPEN' lights lit and the green "CLSD" lights dark. COMMENTS:	___ SAT ___ UNSAT

STEP 8 25.d. Verify power to all Pzr PORV isolation valves - AVAILABLE. STANDARD: Verifies red "OPEN' lights lit for 1NC-31B, 1NC-33A, and 1NC-35B on 1MC-10. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 9 26. Verify the following valves - OPEN: • 1NC-31B (PZR PORV Isol) • 1NC-32B (PZR PORV) • 1NC-33A (PZR PORV Isol) • 1NC-34A (PZR PORV) STANDARD: Verifies all listed valves are open except 1NC-32B. Transitions to RNO. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 10 26 RNO a. Ensure Phase B containment isolation signals - RESET. STANDARD: Verifies Train A & B Phase B Containment Isolation Reset lights lit. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 11 26 RNO b. Ensure 1VI-77B (VI Cont Isol) -OPEN.. STANDARD: Verifies red 'OPEN' lights lit and green “CLSD” lights dark for 1VI-77B. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 12 26 RNO c. **IF** VI pressure less than 85 PSIG, **THEN** dispatch operator to ensure proper VI compressor operation. **REFER TO** AP/0/A/5500/022 (Loss of Instrument Air).. STANDARD: Verifies VI pressure is greater than 85 psig and determines this step is N/A. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 13 26 RNO d. Ensure the following valves – OPEN: • 1NC-35B (PZR PORV Isol) • 1NC-36B (PZR PORV) STANDARD: Rotates the switch for 1NC-36B to the 'OPEN' position. **Examiner Note:** **This step is critical to provide the additional required bleed path via 1NC-36B. This may be accomplished per this step or subsequent step.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 14 26 RNO e. Ensure two Pzr PORVs and associated Pzr PORV isolation valves - OPEN. STANDARD: Verifies 1NC-34A, 1NC-36B and associated PORV Isolation valves are open. COMMENTS:	___ SAT ___ UNSAT
STEP 15 26 RNO f. **IF** two Pzr PORV flow paths open, **THEN GO TO** Step 27. STANDARD: Verifies that two PZR PORV flow paths are available and continues to Step 27. **Examiner Cue:** Upon determination that two PZR PORV flow paths have been established, **"This JPM is complete."** COMMENTS:	___ SAT ___ UNSAT

STOP TIME________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

A Reactor Trip has occurred due to a loss of both main feedwater pumps. The CA System will not function. Attempts to restart the CFPT's and align RY system flow have been unsuccessful. EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) has been entered following a validated Heat Sink "RED PATH" encountered while performing EP/1/A/5000/ES-0.1 (Reactor Trip Response). Bleed and feed initiation criteria has been met.

INITIATING CUES:

The Control Room Supervisor has directed you to initiate NC System bleed and feed beginning at step 21 of EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink). Inform the Control Room Supervisor when the bleed and feed path has been initiated and verified.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. (Continued)	
bb. Align CA control valves as follows to ensure CA flow will be reestablished in a controlled manner:	
__ 1) Reset CA System valve control.	
__ 2) CLOSE all CA flow control valves.	
__ cc. **WHEN** other feedwater source available, **THEN** review Enclosure 17 (Align Additional Feedwater Source After RY Feeds S/Gs) prior to aligning other source.	
20. **Verify NC System feed and bleed should be initiated as follows:**	
__ a. Steps 22 through 26 - HAVE BEEN PREVIOUSLY PERFORMED.	__ a. **GO** **TO** Step 20.c.
__ b. **GO** **TO** Step 37.	
__ c. W/R level in at least three S/Gs - LESS THAN 24% (36% ACC).	__ c. **RETURN** **TO** Step 1.
__ 21. **Perform Steps 22 through 26 quickly to establish NC heat removal by NC System feed and bleed.**	
__ 22. **Ensure all NC pumps - OFF.**	
__ 23. **Initiate S/I.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 24. **Verify "NV S/I FLOW" - INDICATING FLOW.**	**Perform the following:**

a. Perform the following for affected train(s):

NOTE Following S/I actuation, 60 seconds must elapse prior to reseting ECCS.

__ 1) Reset ECCS.

__ 2) Reset D/G load sequencer.

3) Ensure the following pumps - ON:

- __ NV Pumps
- __ NI Pumps.

__ 4) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

24. (Continued)

b. **IF** at least one NV pump in service, **THEN** perform the following:

1) Ensure the following valves - OPEN:

__ • 1NV-252A (NV Pumps Suct From FWST)

__ • 1NV-253B (NV Pumps Suct From FWST).

2) Ensure the following valves - CLOSED:

__ • 1NV-188A (VCT Otlt Isol)

__ • 1NV-189B (VCT Otlt Isol).

3) Ensure the following valves - OPEN:

__ • 1NI-9A (NV Pmp C/L Inj Isol)

__ • 1NI-10B (NV Pmp C/L Inj Isol).

__ 4) **IF** any NV pump in service **AND** S/I flowpath established, **THEN** **GO TO** Step 25.

c. **IF** NI Pump 1A in service, **THEN** ensure the following valves - OPEN:

__ • 1NI-103A (NI Pump 1A Suct)

__ • 1NI-118A (NI Pump 1A C-Leg Inj Isol)

__ • 1NI-162A (NI To C-Legs Inj Hdr Isol)

__ • 1NI-100B (NI Pmps Suct From FWST).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

24. (Continued)

d. **IF** NI Pump 1B in service, **THEN** ensure the following valves - OPEN:

__ • 1NI-135B (NI Pump 1B Suct)

__ • 1NI-150B (NI Pump 1B C-Leg Inj Isol)

__ • 1NI-162A (NI To C-Legs Inj Hdr Isol)

__ • 1NI-100B (NI Pmps Suct From FWST).

e. **IF** both of the following conditions exist, **THEN GO TO** Step 25:

__ • Any NI pump in service **AND** S/I flowpath established

AND

__ • Time between reactor trip and implementation of this procedure - GREATER THAN 90 MINUTES.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

24. (Continued)

f. **IF** no feed path can be aligned, **THEN** perform the following:

__ 1) Continue attempts to restore ECCS flow.

__ 2) Continue attempts to restore feed flow to S/Gs.

3) **IF AT ANY TIME** both the following conditions exist:

- __ Containment pressure - GREATER THAN 20 PSIG
- __ FWST level - GREATER THAN 20% (1AD-9, D/8 "FWST 2/4 LO LEVEL"),

__ **THEN** contact Station Management for guidance to mitigate containment pressure.

4) **IF** any of the following procedures have been previously implemented, **THEN RETURN TO** Step 6:

- __ EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS)
- __ EP/1/A/5000/FR-C.1 (Response to Inadequate Core Cooling).

__ 5) Energize H_2 Igniters (1MC-7).

__ 6) Ensure operator dispatched to secure all Unit 1 ice condenser air handling units. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units).

__ 7) **RETURN TO** Step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

25. **Establish NC System bleed path as follows:**

__ a. Ensure all Pzr PORV isolation valves - OPEN.

b. Select "OPEN" on the following PZR PORVs:

__ • 1NC-34A (PZR PORV)
__ • 1NC-32B (PZR PORV).

c. Align N_2 to Pzr PORVs by opening the following valves:

__ • 1NI-438A (Emer N2 From CLA A To 1NC-34A)

__ • 1NI-439B (Emer N2 From CLA B To 1NC-32B).

RESPONSE NOT OBTAINED:

c. Perform the following:

__ 1) Ensure Phase B containment isolation signals - RESET.

__ 2) Ensure 1VI-77B (VI Cont Isol) - OPEN.

__ 3) **IF** VI pressure less than 85 PSIG, **THEN** dispatch operator to ensure proper VI compressor operation. **REFER TO** AP/0/A/5500/022 (Loss of Instrument Air).

__ d. Verify power to all Pzr PORV isolation valves - AVAILABLE.

RESPONSE NOT OBTAINED:

d. Perform the following:

__ 1) Evaluate cause of power loss and initiate actions to restore power to affected isolation valve(s).

2) **WHEN** power restored, **THEN** perform the following:

__ a) OPEN Pzr PORV isolation valves.

__ b) Ensure two Pzr PORVs and associated Pzr PORV isolation valves - OPEN.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26. **Verify the following valves - OPEN:** __ • 1NC-31B (PZR PORV Isol) __ • 1NC-32B (PZR PORV) __ • 1NC-33A (PZR PORV Isol) __ • 1NC-34A (PZR PORV).	**Perform the following:** __ a. Ensure Phase B containment isolation signals - RESET. __ b. Ensure 1VI-77B (VI Cont Isol) - OPEN. __ c. **IF** VI pressure less than 85 PSIG, **THEN** dispatch operator to ensure proper VI compressor operation. **REFER TO** AP/0/A/5500/022 (Loss of Instrument Air). d. Ensure the following valves - OPEN: __ • 1NC-35B (PZR PORV Isol) __ • 1NC-36B (PZR PORV). __ e. Ensure two Pzr PORVs and associated Pzr PORV isolation valves - OPEN. __ f. **IF** two Pzr PORV flow paths open, **THEN GO TO** Step 27. g. Align train A head vent path by opening the following valves: __ • 1NC-250A (Rx Head Vent Block) __ • 1NC-251B (Rx Head Vent). (RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

26. (Continued)

h. **IF** train A head vent path cannot be aligned, **THEN** align train B head vent path as follows:

1) Ensure the following valves - CLOSED:

__ • 1NC-250A (Rx Head Vent Block)
__ • 1NC-251B (Rx Head Vent).

2) Dispatch operator to close the following breakers:

__ • 1EMXL-F10C (Reactor Vessel Head Vent Motor (1NC252B)) (AB-560, BB-47, Rm 372)

__ • 1EMXS-F03E (Reactor Vessel Head Vent Motor (1NC253A)) (AB-577, BB-49, Rm 496).

3) OPEN the following valves:

__ • 1NC-252B (Rx Head Vent Block)

__ • 1NC-253A (Rx Head Vent).

27. **Isolate NV Recirc flowpath as follows:**

a. CLOSE the following valves:

__ • 1NV-202B (NV Pmps A&B Recirc Isol)

__ • 1NV-203A (NV Pumps A&B Recirc Isol).

__ b. Maintain NV recirc valves closed unless directed to open by subsequent steps.

JPM B

Catawba Nuclear Station
JPM B
September 2019 NRC Exam

EVALUATION SHEET

Task: Loss of KC AP-21 step 8 (Reactor Trip Sequence)

Alternate Path: Yes

Facility JPM #: PSS-KC-083

Safety Function: 8 **Title:** Component Cooling Water System

K/A 008 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of CCW pump

Rating(s): 3.3 / 3.6 **CFR:** 41.5 / 43.5 / 45.3 / 45.13

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

Simulator __X__ In-**P**lant ________ **P**erform __X__ **S**imulate ________

References: AP/1/A/5500/021 (Loss of Component Cooling) rev. 42

Task Standard: Aligns steam dumps to pressure mode, trips the reactor and when reactor power is < 5%, trips all NC pumps per AP/1/A/5500/021 (Loss of Component Cooling) step 8.

Validation Time: 5 minutes **Time Critical:** Yes _____ No __X__

==

Applicant: Time Start: __________
NAME______________________________ Docket #________________ Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

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COMMENTS

Catawba Nuclear Station
JPM B
September 2019 NRC Exam

SIMULATOR OPERATOR INSTRUCTIONS:

1. ENSURE NRC Examination Security has been established.
2. Reset to IC # 151.
3. Enter the password.
4. Select "Yes" on the INITIAL CONDITION RESET pop-up window.
5. Ensure simulator setup per table below.
6. Place simulator in RUN and acknowledge any alarms.
7. ENSURE "Extra Operator" is present in the simulator.
8. Place simulator in FREEZE until Examiner cue is given.

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event
	VLV-KC024F (KC425A Rtn Hdr Cont Isol Outside VLV Fail To Position)	0				
	Manually close 1KC-338B & 1KC-424B					
	Perform actions of AP-21 up to step 8.					

Catawba Nuclear Station
JPM B
September 2019 NRC Exam

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INITIAL CONDITIONS:

- **Unit 1 is at 100% power.**
- **AP/1/A/5500/021 (Loss of Component Cooling) has been entered.**

INITIATING CUES:

- **The CRS instructs you to perform step 8 of AP/1/A/5500/021.**

EXAMINER NOTE: After reading cue, provide the applicant with a copy of AP/1/A/5500/021 (Loss of Component Cooling) completed through step 7.

START TIME: _______

STEP/STANDARD	SAT/UNSAT
CAUTION A loss of KC cooling to the NC pumps results in a gradual approach to an overheated condition in approximately 10 minutes which will result in shaft seizure.	
STEP 1 8. Verify KC flow to NC pumps as follows: • 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" – DARK • 1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK STANDARD: Applicant determines that the listed alarms are lit and transitions to the RNO. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 2 8.RNO.a. Ensure the following valves – OPEN: • 1KC-425A (NC Pumps Ret Hdr Cont Isol) • 1KC-338B (NC Pumps Sup Hdr Cont Isol) • 1KC-424B (NC Pumps Ret Hdr Cont Isol) STANDARD: Applicant determines all three valves are closed and depresses the red OPEN pushbutton for 1KC-425A, 1KC-338B, & 1KC-424B. Applicant determines that 1KC-425A will not open. **EXAMINER NOTE: This begins the alternate path of this JPM.** COMMENTS:	___ **SAT** ___**UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3 8.RNO.b. **IF AT ANY TIME** any of the following conditions are met: • Time since loss of KC – GREATER THAN 10 MINUTES **OR** • Any NC pump trip criteria from Enclosure 1 (Foldout Page) is met **THEN** perform the following: **EXAMINER CUE:** **"Loss of KC occurred greater than 10 minutes ago."** STANDARD: Applicant determines that it has been > 10 minutes since loss of KC per examiner cue and continues with step b.1) of the RNO. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 4 8.RNO.b.1) **IF** letdown is isolated, **THEN** perform the following: STANDARD: Applicant determines that letdown is in service and that this step is N/A. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 8.RNO.b.2) Ensure steam dumps – IN PRESSURE MODE. STANDARD: Applicant places steam dump select switch to “PRESS”. **Examiner Note: This step is critical to ensure proper temperature control following trip of the NC pumps in subsequent steps.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP 6 8.RNO.b.3) Ensure “STM DUMP CTRL”– SET AT 1090 PSIG STEAM HEADER PRESSURE. STANDARD: Applicant adjusts Steam Dump Controller setpoint to 1090 psig. COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7 8.RNO.b.4) Ensure the Reactor – TRIPPED. STANDARD: Applicant rotates the reactor trip breaker pistol grips counter-clockwise to the trip position. **EXAMINER CUE: If the applicant starts to perform actions to verify reactor trip, give the following cue – "Another operator will perform the immediate actions of E-0."** **Examiner Note: This step is critical to ensure reactor power is < 5% prior to tripping the NC pumps in subsequent steps.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 8 8.RNO.b.5) **WHEN** reactor power less than 5%, **THEN** perform the following: a) Trip all NC pumps. b) Ensure normal spray valve associated with tripped NC pump(s) – IN MANUAL AND CLOSED STANDARD: Applicant depresses the green OFF pushbutton for NC pumps 1A, 1B, 1C, and 1D and verifies the green OFF light lit and red ON light dark for each NC pump. Applicant will depress the [M] button on 1NC-27 & 1NC-29 controllers and depress the [↓] demand pushbutton on each valve until the demand is reading 0%. **Examiner Note:** **This step is critical to protect the NC pumps from failure due to a loss of cooling water supply. It is also critical to place the normal spray valves in manual and closed to align the system for future option of using NV aux spray for NC system pressure reduction.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP 9 8.RNO.b.6) Secure any dilutions in progress. STANDARD: Applicant determines that no dilutions are in progress and continues to the next step. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 10 8.RNO.b.7) **IF** reactor trip breakers were closed, **THEN** perform one of the following while continuing with this procedure as time and conditions allow: • **IF** above P-11, **THEN GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) OR • **IF** below P-11, **THEN GO TO** AP/1/A/5500/005 (Reactor Trip or Inadvertent S/I Below P-11) STANDARD: Applicant determines the need to go to E-0. **EXAMINER CUE: "The CRS has pulled E-0 and another RO will perform the immediate actions of E-0. This JPM is complete."** COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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INITIAL CONDITIONS:

- **Unit 1 is at 100% power.**
- **AP/1/A/5500/021 (Loss of Component Cooling) has been entered.**

INITIATING CUES:

- **The CRS instructs you to perform step 8 of AP/1/A/5500/021.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

CAUTION **Failure to restore NC pump seal cooling via thermal barrier cooling or NV seal injection within 10 minutes will cause damage to the NC pump seals resulting in NC inventory loss.**

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

2. **Verify the following:**

✓ • At least one KC pump - ON

AND

✓ • Flow to KC loads presently in service.

Perform the following:

__ a. Start additional KC pump(s) as necessary.

b. **IF** no KC pump can be started, **THEN** perform the following:

__ 1) **IF** S/I has actuated on either unit, **THEN GO TO** Step 4.

CAUTION **YD can only supply one Unit's NV pump at a time.**

__ 2) Determine which unit will receive alternate NV pump cooling from YD.

__ 3) **IF** Unit 2 selected to receive YD cooling to 2A NV pump, **THEN GO TO** Step 4.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	
	NOTE • NV pumps may be started without regard to cooling water alignment. • Operating NV Pump will reach high temperature conditions in approximately 15 minutes with no cooling water.
	__ 4) Dispatch operator to align YD cooling to NV pump 1A. **REFER TO** Enclosure 2 (Alternate Cooling To NV Pump 1A).
	__ 5) Maximize NV pump run time. **REFER TO** Enclosure 5 (Maximize NV Pump Run Time).
	__ 6) **IF AT ANY TIME** S/I occurs on either unit, **THEN** notify dispatched operator to realign NV Pump 1A cooling to normal. **REFER TO** Enclosure 2 (Alternate Cooling To NV Pump 1A).
	__ 7) **GO TO** Step 4.
__ 3. **IF AT ANY TIME all KC pumps lost, THEN RETURN TO STEP 2.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Uncooled letdown may result in loss of NV pumps within a matter of minutes.

4. **Verify the following:**

✓ • 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK

AND

✓ • At least one KC pump - ON.

IF KC flow unavailable to letdown HX, THEN isolate letdown as follows:

a. Ensure the following valves - CLOSED:

__ • 1NV-10A (Letdn Orif 1B Otlt Cont Isol)
__ • 1NV-11A (Letdn Orif 1C Otlt Cont Isol)
__ • 1NV-13A (Letdn Orif 1A Otlt Cont Isol).

__ b. Control charging to stabilize Pzr level at program level while maintaining seal injection flow.

__ c. Ensure 1NV-153A (Letdn Hx Otlt 3-Way Valve) - ALIGNED TO VCT.

__ d. Ensure 1NV-172A (3-Way Divert To VCT-RHT) - ALIGNED TO RHT.

__ e. Ensure VCT makeup - IN AUTO.

__ f. **WHEN** time and manpower permit, **THEN REFER TO** AP/1/A/5500/012 (Loss of Charging or Letdown).

g. **IF AT ANY TIME** the following conditions exist:

__ • VCT level - LESS THAN 23%

OR

__ • PZR level - GREATER THAN 85% **AND** TRENDING UP,

__ **THEN GO TO** Enclosure 6 (Rx Trip Sequence).

__ h. **GO TO** Step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **IF AT ANY TIME 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" lit, THEN perform Step 4 RNO.**	
✓ 6. **Verify both KC surge tank levels - 50% - 90% AND STABLE.**	__ **Observe Caution prior to Step 8 and GO TO Step 8.**
✓ 7. **Start additional KC pump(s) as necessary to supply any KC loads presently in service.**	__ **IF KC pump(s) damaged by fire, THEN notify IAE to repair cables to pumps needed for recovery. REFER TO IP/1/A/3890/027A (Fire Damage Control Procedure).**

CAUTION **A loss of KC cooling to the NC pumps results in a gradual approach to an overheated condition in approximately 10 minutes which will result in shaft seizure.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Verify KC flow to NC pumps as follows:** __ • 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK __ • 1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK.	**Perform the following:** a. Ensure the following valves - OPEN: __ • 1KC-425A (NC Pumps Ret Hdr Cont Isol) __ • 1KC-338B (NC Pumps Sup Hdr Cont Isol) __ • 1KC-424B (NC Pumps Ret Hdr Cont Isol). (RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

b. **IF AT ANY TIME** any of the following conditions met:

__ • Time since loss of KC - GREATER THAN 10 MINUTES

OR

__ • Any NC pump trip criteria from Enclosure 1 (Foldout Page) met,

THEN perform the following:

1) **IF** letdown isolated, **THEN** perform the following:

a) Ensure NV pump suction aligned to FWST as follows:

__ (1) 1NV-252A (NV Pumps Suct From FWST) - OPEN

__ (2) 1NV-253B (NV Pumps Suct From FWST) - OPEN

__ (3) 1NV-188A (VCT Otlt Isol) - CLOSED

__ (4) 1NV-189B (VCT Otlt Isol) - CLOSED.

__ b) **WHEN** reactor tripped, **THEN** attempt to establish and maintain slow cooldown as required to maintain PZR level.

__ 2) Ensure steam dumps - IN PRESSURE MODE.

__ 3) Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.

__ 4) Ensure reactor - TRIPPED.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

8. (Continued)

5) **WHEN** reactor power less than 5%, **THEN** perform the following:

__ a) Trip all NC pumps.

__ b) Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED.

__ 6) Secure any dilutions in progress.

7) **IF** reactor trip breakers were closed, **THEN** perform one of the following while continuing with this procedure as time and conditions allow:

__ • **IF** above P-11, **THEN GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)

OR

__ • **IF** below P-11, **THEN GO TO** AP/1/A/5500/005 (Reactor Trip or Inadvertent S/I Below P-11).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Verify KC available as follows:**	
	NOTE The KC non-essential header valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC surge tank level.
a. Verify the following Train A KC non-essential header isolation valves - OPEN: __ • 1KC-230A (Rx Bldg Non-Ess Hdr Isol) __ • 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol) __ • 1KC-50A (Aux Bldg Non-Ess Hdr Isol) __ • 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol).	__ a. **WHEN** OAC alarm C1D2215 (KC Train A Low-Low Level Surge Tank Isol) "**NOT** ACTUATED" **AND** cause of valve closure known, **THEN** ensure affected valve(s) open.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
	NOTE The KC non-essential header valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC surge tank level.
b. Verify the following Train B KC non-essential header isolation valves - OPEN: __ • 1KC-228B (Rx Bldg Non-Ess Hdr Isol) __ • 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol) __ • 1KC-53B (Aux Bldg Non-Ess Hdr Isol) __ • 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).	__ b. **WHEN** OAC alarm C1D2214 (KC Train B Low-Low Level Surge Tank Isol) "**NOT** ACTUATED" **AND** cause of valve closure known, **THEN** ensure affected valve(s) open.
__ c. Start additional KC pump(s) as necessary to supply any KC loads presently in service.	__ c. **IF** KC pump(s) damaged by fire, **THEN** notify IAE to repair cables to pumps needed for recovery. **REFER TO** IP/1/A/3890/027A (Fire Damage Control Procedure).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Verify KC surge tank levels normal as follows:**	
__ a. Verify both KC surge tank levels - 50% - 90% AND STABLE.	a. Perform the following: 1) Dispatch operator to initiate makeup to surge tank(s) by opening appropriate valve(s): __ • 1KC-107 (1A KC Surge Tank YM M/U) (AB-601, PP-59, Rm 500) OR __ • 1KC-111 (1B KC Surge Tank YM M/U) (AB-601, PP-59, Rm 500). __ 2) Dispatch operators to locate and isolate KC System leakage. __ 3) **WHEN** affected KC surge tank(s) level greater than or equal to 90%, **THEN** notify dispatched operator to secure makeup. __ 4) **GO TO** Step 11.
__ b. **GO TO** Step 14.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. **Verify at least one KC surge tank above lo-lo level as follows:**

__ • 1AD-10, A/1 "KC SURGE TANK A LO-LO LEVEL" - DARK

OR

__ • 1AD-10, A/2 "KC SURGE TANK B LO-LO LEVEL" - DARK.

Perform the following:

a. Verify the following:

__ 1) Both Unit 1 RN essential headers - PRESSURIZED.

__ 2) **IF** only one RN essential header pressurized, **THEN** use it for surge tank makeup.

__ 3) **IF** at any time RN essential header being used for makeup becomes depressurized, **THEN** notify dispatched operator to secure makeup from RN.

NOTE Preference should be given to the surge tank with the highest stable level and available pumps.

__ b. Dispatch operator to makeup to available train of KC from YM and RN. **REFER TO** Enclosure 3 (Surge Tank Makeup).

__ c. Dispatch operators to locate and isolate KC System leakage.

__ d. Notify Chemistry of RN makeup to KC System.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. (Continued)

e. **WHEN** KC surge tank level above lo-lo level setpoint, **THEN** perform the following:

__ 1) Ensure KC pumps on affected train - ON.

NOTE The KC non-essential header valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC surge tank level.

2) OPEN non-essential header isolation valves for affected train as follows:

- Train A:
  - __ 1KC-230A (Rx Bldg Non-Ess Hdr Isol)
  - __ 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol)
  - __ 1KC-50A (Aux Bldg Non-Ess Hdr Isol)
  - __ 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol).

  OR

- Train B:
  - __ 1KC-228B (Rx Bldg Non-Ess Hdr Isol)
  - __ 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol)
  - __ 1KC-53B (Aux Bldg Non-Ess Hdr Isol)
  - __ 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. (Continued)	
	__ f. **<u>WHEN</u>** one train's non-essential header isolation valves open, **<u>THEN</u>** perform Steps 12 and 13.
	__ g. **<u>GO</u> <u>TO</u>** Step 14.
__ 12. **Verify 1AD-10, A/1 "KC SURGE TANK A LO-LO LEVEL" - DARK.**	**Perform the following:** a. Ensure the following valves - CLOSED: __ • 1KC-230A (Rx Bldg Non-Ess Hdr Isol) __ • 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol) __ • 1KC-50A (Aux Bldg Non-Ess Hdr Isol) __ • 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol). __ b. Ensure both Train B KC pumps - ON.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. (Continued)

c. **<u>IF</u>** KC Surge Tank 1A level continues to trend down **<u>OR</u>** is empty, **<u>THEN</u>** perform the following:

1) Ensure the following Train B essential equipment - IN SERVICE AS NEEDED:

__ • NV Pump 1B
__ • NI Pump 1B
__ • ND Pump 1B
__ • ND Hx 1B
__ • CA Pump 1B
__ • NS Pump 1B
__ • KF Pump 1B.

2) Ensure the following Train A essential equipment - OFF:

__ • NV Pump 1A
__ • NI Pump 1A
__ • ND Pump 1A
__ • CA Pump 1A
__ • NS Pump 1A
__ • KF Pump 1A.

__ 3) Ensure both Train A KC pumps - OFF.

__ 4) Locate and isolate leak on Train A essential header.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 13. **Verify 1AD-10, A/2 "KC SURGE TANK B LO-LO LEVEL" - DARK.**

Perform the following:

a. Ensure the following valves - CLOSED:

- __ • 1KC-228B (Rx Bldg Non-Ess Hdr Isol)
- __ • 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol)
- __ • 1KC-53B (Aux Bldg Non-Ess Hdr Isol)
- __ • 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).

__ b. Ensure both Train A KC pumps - ON.

c. **<u>IF</u>** KC Surge Tank 1B level continues to trend down **<u>OR</u>** is empty, **<u>THEN</u>** perform the following:

1) Ensure the following Train A essential equipment - IN SERVICE AS NEEDED:

- __ • NV Pump 1A
- __ • NI Pump 1A
- __ • ND Pump 1A
- __ • ND Hx 1A
- __ • CA Pump 1A
- __ • NS Pump 1A
- __ • KF Pump 1A.

2) Ensure the following Train B essential equipment - OFF:

- __ • NV Pump 1B
- __ • NI Pump 1B
- __ • ND Pump 1B
- __ • CA Pump 1B
- __ • NS Pump 1B
- __ • KF Pump 1B.

__ 3) Ensure both Train B KC pumps - OFF.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. (Continued)	__ 4) Locate and isolate leak on Train B essential header.
__ 14. **Ensure KC heat exchanger outlet mode switches - PROPERLY ALIGNED.**	
__ 15. **Determine and correct cause of loss of KC.**	
16. **Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:**	
__ • SLC 16.9-7 (Boration Systems Flow Path - Shutdown)	
__ • SLC 16.9-8 (Boration Systems Flow Path - Operating)	
__ • SLC 16.9-9 (Boration Systems Pumps - Shutdown)	
__ • SLC 16.9-10 (Boration Systems Charging Pumps - Operating)	
__ • 3.5.2 (ECCS - Operating)	
__ • 3.5.3 (ECCS - Shutdown)	
__ • 3.6.6 (Containment Spray System)	
__ • 3.7.5 (Auxiliary Feedwater (AFW) System)	
__ • 3.7.7 (Component Cooling Water (CCW) System).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. **Determine required notifications:**	
__ • **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)	
__ • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).	
18. **IF KC Hx leak to RN suspected, THEN perform the following:**	
__ • Notify Radiation Protection that a potential unmonitored release may have occurred.	
__ • Notify Station Management to evaluate a KC Hx to RN leak.	
19. **Verify KC surge tanks level as follows:**	__ **RETURN TO Step 9.**
__ • Greater than 50%	
__ • Stable or trending up.	
20. **WHEN plant conditions permit, THEN perform the following:**	
__ • Return KC pumps to normal operation. **REFER TO** OP/1/A/6400/005 (Component Cooling Water System).	
__ • Return NV Pump 1A to normal cooling as applicable. **REFER TO** Enclosure 2 (Alternate Cooling To NV Pump 1A).	
21. **Verify the following:**	**Perform the following:**
__ • 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK	__ a. **IF** letdown isolated, **THEN REFER TO** AP/1/A/5500/012 (Loss of Charging or Letdown).
__ • 1AD-7, H/3 "VCT HI TEMP" - DARK	__ b. Do not continue in this procedure until Step 21 conditions met.
__ • Normal letdown - IN SERVICE.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. **Ensure VCT and letdown path aligned as follows:**

    a. **IF** desired to align NV pump suction to VCT, **THEN** perform the following:

    1) OPEN the following valves:

    __ • 1NV-188A (VCT Otlt Isol)

    __ • 1NV-189B (VCT Otlt Isol).

    2) CLOSE the following valves:

    __ • 1NV-252A (NV Pumps Suct From FWST)

    __ • 1NV-253B (NV Pumps Suct From FWST).

    __ b. **WHEN** NV suction aligned to VCT, **THEN** momentarily place 1NV-172A (3-Way Divert To VCT-RHT) to "VCT" position and return to "AUTO".

    __ c. **IF** desired to restore letdown flow through NV demineralizers, **THEN** momentarily place 1NV-153A (Letdn Hx Otlt 3-Way Valve) to "DEMIN" position and return to "AUTO".

__ 23. **Determine long term plant status. RETURN TO procedure in affect.**

END

1. **SSF Manning Criteria:**

CAUTION **Failure to restore NC pump seal cooling via thermal barrier cooling or NV seal injection within ten minutes will cause damage to the NC pump seals resulting in NC System inventory loss.**

IF AT ANY TIME KC **AND** NV seal cooling for any NC pump lost, **THEN** perform the following:

__ a. Dispatch operator to SSF to establish NC pump seal injection. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 19 (Establishing NC Makeup/Seal Injection From The SSF).

b. **IF** 1EMXS de-energized, **THEN** perform the following:

__ 1) Dispatch operator to 1ETA switchgear room to align alternate power supply to 1EMXS. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 20 (Align Alternate Power Supply To 1EMXS).

__ 2) Notify operator at SSF (Ext. 5251 or 5212) operator has been dispatched to align alternate power supply to 1EMXS.

2. **NC Pump Trip Criteria:**

- **IF** any of the following NC pump trip criteria met:

__ • KC flow unavailable to NC pumps - GREATER THAN 10 MINUTES

OR

__ • #1 Seal outlet temperature - GREATER THAN 235°F

OR

__ • Lower bearing temperature - GREATER THAN 225°F

OR

__ • Motor bearing temperature - GREATER THAN 195°F,

__ **THEN GO TO** Enclosure 6 (Rx Trip Sequence).

NOTE The following step prevents damage to the 1B2 KC pump as a result of deadheading. (NCR #01406467)

3. **IF AT ANY TIME the following conditions met:**

__ • Train B KC non-essential header isolation valves - CLOSED

AND

__ • 1KC-81B (KC To ND Hx 1B Sup Isol) - CLOSED,

__ **THEN** ensure less than 2 Train B KC pumps - IN SERVICE.

NOTE Monitoring of the following steps must continue while KC malfunction exists even if a transition is made to the emergency procedures.

__ 4. **IF AT ANY TIME both trains of KC lost, THEN RETURN TO Section C. (Operator Actions), Step 2.**

5. **IF operators dispatched to align alternate cooling to NV pump 1A, THEN perform the following:**

__ a. **WHEN** alternate cooling aligned, **THEN** perform Enclosure 5 (Maximize NV Pump Run Time), Step 7.

6. **IF AT ANY TIME KC cooling to operating KF pump(s) lost, THEN perform the following:**

__ • **IF** annunciator 1AD-13, D/6 "KF PUMP A MTR CLR HI TEMP" lit, **THEN** secure 1A KF pump and **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).

__ • **IF** annunciator 1AD-13, D/7 "KF PUMP B MTR CLR HI TEMP" lit, **THEN** secure 1B KF pump and **REFER TO** AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level).

NOTE The following sequence involves components on both units, many with very similar numbers and nomenclature.

1. **CLOSE the following valves:**

__ • 1KC-E31 (YD B/U To 1A NV Pump Mtr Tell-Tale) (AB-545, JJ-56, Rm 200)

__ • 2KC-E31 (YD B/U To 2A NV Pump Mtr Inlet Tell-Tale) (AB-546, HH-58, Rm 200)

CAUTION **Attempting additional valve movement after reaching the mechanical end stop may damage the valve operator of the following valves.**

__ • 1KC-E29 (1A NV Pump Motor Inlet Isol) (AB-551, JJ-56, Rm 200)

__ • 1KC-A53 (1A NV Pump Motor Cooler Outlet Isol) (AB-551, HH-56, Rm 200)

__ • 1KC-A59 (1A NV Pump Oil Coolers Outlet Isol) (AB-550, JJ-KK, 56, Rm 200).

2. **OPEN the following valves:**

__ a. 1YD-431 (YD Alternate Cooling to 1A & 2A NV Pumps Isol) (AB-549, JJ-56, Rm 200).

__ b. 1KC-E30 (YD B/U To 1A NV Pump Mtr Isol) (AB-549, JJ-56, Rm 200).

__ c. 1KC-E32 (1A NV Pump Mtr Clr YD Outlet Isol) (AB-546, HH-56, Rm 200).

__ d. 1KC-E33 (1A NV Pump Oil Clrs YD Outlet Isol) (AB-547, JJ-56, Rm 200).

3. **THROTTLE YD flow to 1A NV pump as follows (ladder needed):**

__ • Unlock and THROTTLE 1KC-A52 (1A NV Pump Motor Cooler Outlet Throttle) (AB-551, HH-56, Rm 200) to obtain 30-35 GPM on 1KCPG8280 "1A NV PUMP MOTOR COOLER KC FLOW" (AB-548, HH, 55-56, Rm 200).

__ • Unlock and THROTTLE 1KC-A58 (1A NV Pump Oil Coolers Outlet Throttle) (AB-551, JJ-56, Rm 200) to obtain 32-35 GPM on 1KCPS8330 "1A NV PUMP OIL COOLERS KC FLOW" (AB-543 HH, 55-56, Rm 200) .

4. **Notify Control Room Supervisor of the following:**

__ • Status of alternate cooling

__ • Enter 1A NV pump in TSAIL.

__ 5. **Notify Radwaste Chemistry (Ext. 5558) of YD flow to ND/NS sump.**

NOTE The following step is to reduce YD drainage to the ND/NS sump and thereby minimize radwaste.

6. **WHEN time and conditions permit, THEN perform the following:**

   a. Reduce motor cooler flow as follows:

   __ 1) Notify Control Room to monitor Unit 1 OAC graphic NVPMP1A while performing the following steps.

   __ 2) In the following step, do not exceed 160°F on motor bearings and 240°F on stator.

   NOTE Adequate time should be allotted between adjustments to allow motor bearing and stator temperatures to stabilize.

   3) Slowly THROTTLE closed 1KC-A52 (1A NV Pump Motor Cooler Outlet Throttle) to maintain the following temperatures:

   __ • Motor bearings 150°F
   __ • Stator 230°F.

   b. Reduce oil cooler flow as follows:

   __ 1) Monitor 1A NV pump gear drive and outboard thrust bearing temperatures locally.

   __ 2) In the following step, do not exceed 155°F on pump bearings.

   NOTE Adequate time should be allotted between adjustments to allow pump bearing temperatures to stabilize.

   __ 3) Slowly THROTTLE closed 1KC-A58 (1A NV Pump Oil Coolers Outlet Throttle) to maintain bearing temperatures at 150°F.

__ 7. **Return this Enclosure to Control Room Supervisor.**

__ 8. **Do not continue in this enclosure until notified by Control Room to realign 1A NV pump cooling water to normal.**

9. **<u>WHEN</u> notified by Control Room to realign 1A NV pump cooling water to normal, <u>THEN</u> obtain the following:**

__ • 2 10 inch pipe wrenches

__ • 30 feet of air line

__ • 1/2" female fitting

__ • 1/4" female fitting.

<u>CAUTION</u> The following sequence involves components on both units, many with very similar numbers and nomenclature.

10. **CLOSE the following valves:**

__ • 1YD-431 (YD Alternate Cooling to 1A & 2A NV Pumps Isol) (AB-549, JJ-56, Rm 200)

__ • 1KC-E30 (YD B/U To 1A NV Pump Mtr Isol) (AB-549, JJ-56, Rm 200)

__ • 1KC-A51 (1A NV Pump Motor Cooler Inlet) (AB-551, HH,JJ-56, Rm 200) (Ladder needed)

__ • 1KC-A56 (1A NV Pump Speed Reducer Oil Cooler Inlet) (AB-545, HH-56, Rm 230)

__ • 1KC-A57 (1A NV Pump Bearing Oil Cooler Inlet) (AB-545, JJ-56, Rm 230).

<u>**NOTE**</u> YD water is purged to the ND/NS sump to minimize chloride contamination of the KC System.

__ 11. **Attach air line to 1VI-2293 (Available VI Isol) (AB-549, HH-56, Rm 200).**

12. **Perform the following:**

__ a. Remove pipe cap from 1KCPX8310 (AB-551, JJ-56, Rm 200) (Ladder Needed).

__ b. Attach air line.

__ c. OPEN root valve for 1KCPX8310.

__ 13. **OPEN 1VI-2293 (Available VI Isol).**

__ 14. **OPEN 1KC-A51 (1A NV Pump Motor Cooler Inlet) for 5 minutes.**

__ 15. **CLOSE 1KC-A51 (1A NV Pump Motor Cooler Inlet).**

__ 16. **OPEN 1KC-A56 (1A NV Pump Speed Reducer Oil Cooler Inlet) for 5 minutes.**

__ 17. **CLOSE 1KC-A56 (1A NV Pump Speed Reducer Oil Cooler Inlet).**

__ 18. **OPEN 1KC-A57 (1A NV Pump Bearing Oil Cooler Inlet).**

__ 19. **<u>WHEN</u> 5 minutes elapsed, <u>THEN</u> CLOSE 1VI-2293 (Available VI Isol).**

__ 20. **Remove air line from 1VI-2293 (Available VI Isol).**

21. **Perform the following:**

    __ a. CLOSE root valve for 1KCPX8310.

    __ b. Remove air line.

    __ c. Replace pipe cap on 1KCPX8310.

22. **CLOSE the following valves:**

    __ • 1KC-E32 (1A NV Pump Mtr Clr YD Outlet Isol)

    __ • 1KC-E33 (1A NV Pump Oil Clrs YD Outlet Isol).

23. **Align and drain YD supply section as follows:**

__ a. Connect drain tubing to pipe downstream of 2KC-E31 (YD B/U To 2A NV Pump Mtr Inlet Tell-Tale) (AB-546,HH-58,Rm 200).

__ b. Route tubing to collection bucket.

__ c. OPEN 2KC-E31.

__ d. **WHEN** drainage stops, **THEN** remove tubing from pipe at 2KC-E31.

__ e. Connect drain tubing to the pipe downstream of 1KC-E31 (YD B/U To 1A NV Pump Mtr Tell-Tale) (AB-545, JJ-56, Rm 200).

__ f. Route tubing to collection bucket.

__ g. OPEN 1KC-E31.

__ h. **WHEN** drainage stops, **THEN** remove tubing from pipe at 1KC-E31.

24. **OPEN the following valves:**

__ • 1KC-A51 (1A NV Pump Motor Cooler Inlet)

__ • 1KC-A56 (1A NV Pump Speed Reducer Oil Cooler Inlet).

CAUTION **Attempting additional valve movement after reaching the mechanical end stop may damage the valve operator of the following valve.**

__ 25. **Slowly OPEN 1KC-E29 (1A NV Pump Motor Inlet Isol) to initiate fill of 1A NV pump motor and oil coolers.**

26. **Vent 1A NV pump coolers as follows:**

a. Vent motor cooler as follows:

__ 1) Ensure 1KC-A54 (1A NV Pump Motor Cooler Inlet Vent) (AB-553, HH-56, Rm 230) (ladder needed) - CLOSED.

__ 2) Remove pipe cap from 1KC-A54.

__ 3) Attach vent hose assembly to vent.

__ 4) Crack open 1KC-A54.

__ 5) **WHEN** solid stream of water issues from vent, **THEN** CLOSE 1KC-A54.

__ 6) Remove vent hose assembly.

__ 7) Install pipe cap on 1KC-A54.

__ 8) Ensure 1KC-A55 (1A NV Pump Motor Cooler Outlet Vent) (AB-553, HH-56, Rm 230) (ladder needed) - CLOSED.

__ 9) Remove pipe cap from 1KC-A55.

__ 10) Attach vent hose assembly to vent.

__ 11) Crack open 1KC-A55.

__ 12) **WHEN** solid stream of water issues from vent, **THEN** CLOSE 1KC-A55.

__ 13) Remove vent hose assembly.

__ 14) Install pipe cap on 1KC-A55.

b. Vent oil coolers as follows:

__ 1) Ensure 1KC-C23 (1A NV Pump Oil Coolers Inlet Vent) (AB-551, JJ-56, Rm 230) - CLOSED.

__ 2) Remove pipe cap from 1KC-C23.

__ 3) Attach vent hose assembly to vent.

__ 4) Crack open 1KC-C23.

__ 5) **WHEN** solid stream of water issues from vent, **THEN** CLOSE 1KC-C23.

__ 6) Remove vent hose assembly.

__ 7) Install pipe cap on 1KC-C23.

CAUTION **Attempting additional valve movement after reaching the mechanical end stop may damage the valve operator of the following valves.**

27. **OPEN the following valves:**

__ • 1KC-A53 (1A NV Pump Motor Cooler Outlet Isol)

__ • 1KC-A59 (1A NV Pump Oil Coolers Outlet Isol).

28. **THROTTLE KC flow to 1A NV pump as follows:**

__ a. THROTTLE 1KC-A52 (1A NV Pump Motor Cooler Outlet Throttle) to obtain 30 - 60 GPM on 1KCPG8280 "1A NV PUMP MOTOR COOLER KC FLOW".

__ b. Lock 1KC-A52.

__ c. THROTTLE 1KC-A58 (1A NV Pump Oil Coolers Outlet Throttle) to obtain 32 - 48 GPM on 1KCPS8330 "1A NV PUMP OIL COOLERS KC FLOW".

__ d. Lock 1KC-A58.

__ 29. **Notify Control Room Supervisor to make appropriate TSAIL entry that PT/1/A/4400/003I (KC System Essential Header Flow Balance) must be completed prior to entry into Mode 4.**

__ 30. **Return this Enclosure to Control Room Supervisor.**

__ 1. **Establish communications with Control Room.**

2. **Initiate makeup to affected KC surge tank by ensuring the following valves - OPEN:**

- KC Surge Tank 1A:
  - __ 1RN-E81 (1A KC Surge Tank Assured M/U Supply Isol) (AB-589, KK-56, Rm 400) (Ladder needed)
  - __ 1RN-E99 (1A KC Surge Tank Assured M/U Isol) (AB-585, KK-56, Rm 400) (Ladder needed)
  - __ 1KC-107 (1A KC Surge Tank YM M/U) (AB-601, PP-59, Rm 500)
  - __ 1KC-494 (1A KC Surge Tank Emergency RN M/U) (AB-601, NN-59, Rm 500)
  - __ 1KC-496 (1A KC Surge Tank Emergency RN M/U) (AB-601, NN-59, Rm 500).

OR

- KC Surge Tank 1B:
  - __ 1RN-E83 (1B KC Surge Tank Assured M/U Supply Isol) (AB-588, KK-56, Rm 400) (Ladder needed)
  - __ 1RN-E43 (1B KC Surge Tank Assured M/U Isol) (AB-589, KK-55, Rm 400) (Ladder needed)
  - __ 1KC-111 (1B KC Surge Tank YM M/U) (AB-601, PP-59, Rm 500)
  - __ 1KC-497 (1B KC Surge Tank Emergency RN M/U) (AB-601, MM-59, Rm 500)
  - __ 1KC-499 (1B KC Surge Tank Emergency RN M/U) (AB-598, MM-59, Rm 500).

3. **Perform the following:**

__ a. Notify Control Room to monitor affected KC surge tank level.

__ b. Monitor the Emergency RN makeup line for leaks.

c. **IF** either of the following occurs, **THEN** secure RN makeup to affected KC surge tank:

- __ Leak develops on the Emergency RN makeup line.
- __ Affected KC surge tank level does not trend up.

__ 4. **WHEN notified by Control Room, THEN secure makeup to KC surge tank.**

__ 5. **Return this Enclosure to Control Room Supervisor.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 1. **OPEN 1NV-309 (Seal Water Injection Flow) to full open.**	
__ 2. **CLOSE 1NV-294 (NV Pmps A&B Disch Flow Ctrl).**	
__ 3. **Start NV pump 1A aux oil pump.**	
__ 4. **Start NV pump 1A.**	
__ 5. **Stop NV pump 1A aux oil pump.**	
6. **Verify charging header aligned to NC loop as follows:**	
__ a. 1NV-312A (Chrg Line Cont Isol) - OPEN.	__ a. OPEN valve.
__ b. 1NV-314B (Chrg Line Cont Isol) - OPEN.	__ b. OPEN valve.
c. Verify one of the following valves - OPEN: __ • 1NV-32B (NV Supply To Loop A Isol) OR __ • 1NV-39A (NV Supply To Loop D Isol).	__ c. OPEN either valve.
__ 7. **THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to establish greater than 32 GPM "N/R CHRG LN FLOW".**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Verify the following:**	**Perform the following:**
__ • "TOTAL SEAL WTR FLOW" - GREATER THAN 32 GPM	__ a. Slowly THROTTLE 1NV-309 (Seal Water Injection Flow) to establish 32 GPM "TOTAL SEAL WTR FLOW".
__ • 1NV-309 (Seal Water Injection Flow) - IN AUTO.	__ b. Place 1NV-309 in auto.
__ 9. **Verify Pzr level - GREATER THAN 17%.**	**Perform the following:**
	__ a. **IF** Pzr level less than 17% due to NC leak, **THEN GO TO** AP/1/A/5500/010 (Reactor Coolant Leak).
	__ b. Maintain charging flow less than 180 GPM.
	__ c. Raise charging flow to restore Pzr level greater than 17%.
	__ d. Do not continue in this procedure until Pzr level greater than 17%.
__ 10. **Control charging to stabilize Pzr level greater than 17%.**	
__ 11. **Return this enclosure to Control Room Supervisor.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 1. **Record approximate time of loss of KC to NV pumps:**
_________________________.

NOTE NV pumps may be started without regard to cooling water alignment.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 2. **Ensure NV pump 1B - ON.**	**Perform the following:** __ a. Ensure NV pump 1A - ON. __ b. Monitor OAC graphic NVPMP1A. **NOTE** NV Pump thrust bearing will reach high temperature conditions in approximately 15 minutes with no cooling water. __ c. **IF AT ANY TIME** Hi-Hi temperatures on NV pump 1A motor reached, **THEN** stop NV pump 1A. d. **WHEN** 10 minutes elapsed from time recorded above, **THEN** perform the following: __ 1) **IF** alternate cooling aligned to NV pump 1A, **THEN** return this enclosure to Control Room Supervisor. __ 2) **IF** alternate cooling **NOT** aligned to NV pump 1A, **THEN** stop NV pump 1A. __ e. **GO TO** Step 7.
__ 3. **Ensure NV pump 1A - OFF.**	
__ 4. **Monitor OAC graphic NVPMP1B.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE NV Pump thrust bearing will reach high temperature conditions in approximately 15 minutes with no cooling water.

5. **WHEN 10 minutes elapsed from time recorded above OR Hi-Hi temperatures on NV pump 1B motor reached, THEN perform the following:**

   a. Start NV pump 1A as follows:

   __ 1) Start NV pump 1A aux oil pump.

   __ 2) Start NV pump 1A.

   __ 3) Stop NV pump 1A aux oil pump.

   __ b. Stop NV pump 1B.

6. **WHEN NV pump 1A in service, THEN perform the following:**

   __ a. Record approximate time NV pump 1A started: ________________________.

   __ b. Monitor OAC graphic NVPMP1A.

NOTE NV Pump thrust bearing will reach high temperature conditions in approximately 15 minutes with no cooling water.

   __ c. **IF AT ANY TIME** Hi-Hi temperatures on NV pump 1A reached, **THEN** stop NV pump 1A.

   __ d. **WHEN** 10 minutes elapsed from time recorded above, **THEN** verify alternate cooling aligned to NV pump 1A.

RESPONSE NOT OBTAINED:

   __ d. Stop NV pump 1A.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **WHEN alternate cooling aligned to NV pump 1A, THEN perform the following:**

__ a. **IF** NV pump 1A in service, **THEN** return this enclosure to Control Room Supervisor.

b. **IF** NV pump 1B in service, **THEN** perform the following:

1) Start NV pump 1A as follows:

__ a) Start NV pump 1A aux oil pump.

__ b) Start NV pump 1A.

__ c) Stop NV pump 1A aux oil pump.

__ 2) Stop NV pump 1B.

__ 3) Return this enclosure to Control Room Supervisor.

__ c. **IF** no NV pump in service, **THEN** restart NV pump 1A. **REFER TO** Enclosure 4 (NV Pump 1A Controlled Restart).

__ 8. **IF AT ANY TIME S/I occurs on either unit, THEN notify dispatched operator to realign NV Pump 1A cooling to normal. REFER TO Enclosure 2 (Alternate Cooling To NV Pump 1A).**

9. **WHEN the following conditions met:**

__ • KC restored to service

__ • NV pump 1B in service

__ • NV pump 1A is off,

__ **THEN** notify dispatched operator to return NV pump 1A cooling to normal. **REFER TO** Enclosure 2 (Alternate Cooling To NV Pump 1A).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 1. **Verify normal letdown - ISOLATED**	__ **GO TO Step 4.**
2. **Ensure NV pump suction aligned to FWST as follows:** __ a. 1NV-252A (NV Pumps Suct From FWST) - OPEN __ b. 1NV-253B (NV Pumps Suct From FWST) - OPEN __ c. 1NV-188A (VCT Otlt Isol) - CLOSED __ d. 1NV-189B (VCT Otlt Isol) - CLOSED.	
__ 3. **WHEN reactor tripped, THEN attempt to establish and maintain a slow cooldown as required to maintain PZR level.**	
__ 4. **Secure any dilutions in progress.**	
__ 5. **Ensure steam dumps - IN PRESSURE MODE.**	
__ 6. **Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.**	
__ 7. **Ensure reactor - TRIPPED.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **Verify at least one of the following conditions exist:**	__ **GO TO Step 10.**
__ • KC flow unavailable to NC pumps	
OR	
__ • #1 Seal outlet temperature - GREATER THAN 235°F	
OR	
__ • Lower bearing temperature - GREATER THAN 225°F	
OR	
__ • Motor bearing temperature - GREATER THAN 195°F.	
9. **WHEN reactor power less than 5%, THEN perform the following:**	
__ a. Trip all NC pumps.	
__ b. Ensure normal spray valve associated with tripped NC pump(s) - IN MANUAL AND CLOSED.	
10. **IF reactor trip breakers were closed, THEN perform one of the following while continuing with this procedure as time and conditions allow:**	
__ • **IF** above P-11, **THEN GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)	
OR	
__ • **IF** below P-11, **THEN GO TO** AP/1/A/5500/005 (Reactor Trip or Inadvertent S/I Below P-11).	

JPM C

Catawba Nuclear Station
JPM C
September 2019 NRC Exam

EVALUATION SHEET

Task: Isolate faulted S/G 1A in accordance with EP/1/A/5000/E-2.

Alternate Path: Yes

Facility JPM #: New

Safety Function: 4S **Title:** Auxiliary / Emergency Feedwater System

K/A 035 A4.06 Ability to manually operate and/or monitor in the control room: S/G isolation on steam leak or tube rupture/leak

Rating(s): 4.5 / 4.6 **CFR:** 41.7 / 45.5

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

Simulator __X__ In-**P**lant ________ **P**erform __X__ **S**imulate ________

References: EP/1/A/5000/E-2

Task Standard: Applicant completes isolation of faulted S/G 1A by closing 1CF-100, 1CF-156, 1CA-60, and 1CA-66B in accordance with EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).

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

===

Applicant: Time Start: __________
NAME______________________ Docket #____________ Time Finish: __________

Performance Rating: Performance Time ______

SAT ____ UNSAT ____

Examiner: ________________________ ________________________/________
NAME SIGNATURE DATE

===

COMMENTS

Catawba Nuclear Station
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SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **Reset to IC # 152**
3. **Enter the password.**
4. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
5. **Ensure simulator setup per table below.**
6. **Place simulator in RUN and acknowledge any alarms.**
7. **ENSURE "Extra Operator" is present in the simulator.**
8. **Place simulator in FREEZE until Examiner cue is given.**

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event
	VLV-CA026F, CA185 S/G 1A CF TEMPERING FLOW FAIL TO POSITION	1				
	VLV-CA015F, CA62A CA PMP A DISCH TO S/G A ISOL FAIL TO POSITION	1				
	MAL-SM007A, STM LIN BRK INSIDE CONTAINMENT LOOP A	2.25e6				

Catawba Nuclear Station
JPM C
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **A Reactor Trip and Safety Injection has occurred due to a fault of the 1A S/G inside Containment.**
- **The crew has completed applicable steps of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and transitioned to EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).**

INITIATING CUES:

- **The Control Room Supervisor has directed you to isolate 1A S/G, in accordance with E-2, beginning at Step 10.**

EXAMINER NOTE: After reading Initiating Cue, provide the applicant with a copy of EP/1/A/5000/E-2 completed through step 9

Catawba Nuclear Station
JPM C
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START TIME: _______

STEP/STANDARD	SAT/UNSAT
STEP 1: 10 **Isolate all faulted S/G(s) as follows:** • S/G 1A: **a.** Verify S/G 1A Feedwater Isolation status light (1SI-5) - LIT. STANDARD: Applicant determines that the 1A Feedwater Isolation Status light is dark and transitions to the RNO. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 2: 10 RNO a. Perform the following: 1) Ensure the following valves -CLOSED: • 1CF-28 (S/G 1A CF Ctrl) • 1CF-30 (S/G 1A CF Byp Ctrl) • 1CF-33 (S/G 1A CF Cont Isol) • 1CF-90 (S/G 1A CF Cont Isol Byp) • 1CA-149 (S/G 1A CF Byp To CA Nozzle) • 1CA-185 (S/G 1A CA Nozz Tempering Isol). STANDARD: Applicant determines that all listed valves are closed, except 1CA-185. Depresses CLOSE pushbutton for 1CA-185, determines the valve will not close, and continues with RNO steps. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3: 10 RNO a. 2) **IF** 1CA-185 (S/G 1A CA Nozz Tempering Isol) cannot be closed, **THEN** perform the following: a) CLOSE the following valves: • 1CF-100 (S/G CA Nozz Tempering Ctrl) • 1CF-156 (Byp Valve For 1CF-100). STANDARD: Applicant closes 1CF-100 and 1CF-156. **Examiner Note: This step is critical to isolate Auxiliary Feed flow into the faulted S/G.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**
STEP 4: 10 RNO a. b) **IF** 1CF-100 **OR** 1CF-156 cannot be closed, **THEN** dispatch operator to close affected valve(s): STANDARD: Applicant determines that valves have closed and this step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5: 10 RNO a. 3) **IF** more than one Feedwater Isolation valve above open **AND** CM still aligned to feed faulted S/G, **THEN** evaluate alternate means to stop CM flow to faulted S/G.: STANDARD: Applicant determines that this step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 6: 10b. CLOSE the following valves: 1) 1SM-77A (S/G 1A Otlt Hdr Bldwn C/V). STANDARD: Applicant closes 1SM-77A. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7: 10b. 2) 1CA-62A (CA Pmp A Disch To S/G 1A Isol). STANDARD: Applicant depresses the CLOSED pushbutton for 1CA-62A and determines this valve will not close. Transitions to RNO. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 8: 10b. RNO 2) Perform the following: a) CLOSE 1CA-60 (CA Pump 1A Flow To S/G 1A). STANDARD: Applicant closes 1CA-60 by rotating the knob in the counterclockwise direction until demand is ~0% (NOTE: <35% demand will close the valve). **Examiner Note: This begins the alternate path of this JPM.** **Examiner Note: This step is critical to isolate Auxiliary Feed flow into the faulted S/G.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 9: 10b. RNO 2) b) Dispatch operator to close 1CA-62A (CA Pmp A Disch To S/G 1A Isol) (DH-587, DD-EE, 44-45, Rm 591). STANDARD: Applicant dispatches operator to locally close 1CA-62A. **Examiner Cue:** "Operator has been dispatched to close 1CA-62A." COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 10: 10b. RNO 2) c) **IF** exterior doghouse not accessible **OR** CA cannot be isolated, **THEN** dispatch operator to unlock and close 1CA-59 (CA Pump 1A Disch To S/G 1A Ctrl Inlet Isol) (AB-551, BB,49-50, Rm 250) (Ladder needed) (Key #633). STANDARD: Applicant determines that this step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 11: 10b. 3) 1CA-66B (CA Pmp 1 Disch To S/G 1A Isol). STANDARD: Applicant closes 1CA-66B. **Examiner Note:** **At this point all critical steps are complete. If desired, examiner can allow the applicant to complete step 10 by verifying blowdown isolation valves 1BB-56A, 1BB-148B, and 1BB-57B are closed and then provide the following cue.** **Examiner Cue:** Upon completion of this step, **"This JPM is complete."** **Examiner Note:** **This step is critical to isolate Auxiliary Feed flow into the faulted S/G.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STOP TIME________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **A Reactor Trip and Safety Injection has occurred due to a fault of the 1A S/G inside Containment.**
- **The crew has completed applicable steps of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and transitioned to EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).**

INITIATING CUES:

- **The Control Room Supervisor has directed you to isolate 1A S/G, in accordance with E-2, beginning at Step 10.**

Duke Energy Catawba Nuclear Station **Faulted Steam Generator Isolation**	Procedure No. **EP/1/A/5000/E-2**
	Revision No. **015**
Continuous Use	Electronic Reference No. **CP0094CZ**

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

(ISSUED) - PDF Format

A. Purpose

This procedure provides actions to identify and isolate a faulted S/G.

B. Symptoms or Entry Conditions

This procedure is entered from:

a. EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection), Step 25, with the following symptoms:

1) Any S/G pressure decreasing in an uncontrolled manner.

2) Any S/G completely depressurized.

b. EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant), Step 3, EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired), Step 9, EP/1/A/5000/ECA-3.2 (SGTR With Loss Of Reactor Coolant - Saturated Recovery Desired), Step 6
with the following symptoms and/or conditions:

1) Any S/G pressure decreasing in an uncontrolled manner.

2) Any S/G completely depressurized.

3) Faulted S/G isolation not verified.

c. EP/1/A/5000/FR-H.5 (Response To Steam Generator Low Level), Step 4, when affected S/G is identified as faulted.

d. Foldout page of other procedures whenever a faulted S/G is identified.

e. EP/1/A/5000/ECA-2.1 (Uncontrolled Depressurization Of All Steam Generators), Enclosure 1 (Foldout Page), Step 3, if any S/G pressure increases.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
✓ 1. **Monitor Enclosure 1 (Foldout Page).**	
✓ 2. **Maintain any faulted S/G or secondary break isolated during subsequent recovery actions unless needed for NC System cooldown.**	
3. **Verify the following valves - CLOSED:** ✓ • All MSIVs ✓ • All MSIV bypass valves.	__ **CLOSE valve(s).**
4. **<u>WHEN</u> TSC staffed, <u>THEN</u> notify TSC of the following:** __ • **<u>IF</u>** feedline **<u>OR</u>** steamline break has occurred inside doghouse, **<u>THEN</u>** ensure affected doghouse curtains are opened within 24 hours of rupture inside of the doghouse.	
✓ 5. **Verify any S/G pressure - STABLE OR INCREASING.**	__ **<u>IF</u> all S/Gs faulted, <u>THEN</u> <u>GO TO</u> EP/1/A/5000/ECA-2.1 (Uncontrolled Depressurization Of All Steam Generators).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Identify faulted S/G(s) as follows:**	**Perform the following:**
✓ • Verify any S/G pressure - DECREASING IN AN UNCONTROLLED MANNER OR __ • Verify any S/G - DEPRESSURIZED.	a. Dispatch operators to search for initiating break at the following locations: __ • Main steamlines __ • Main feedlines __ • Other secondary piping. __ b. **<u>GO</u> <u>TO</u>** Step 11.
✓ 7. **Maintain at least one S/G available for NC System cooldown in subsequent steps.**	
✓ 8. **Verify faulted S/G(s) PORV - CLOSED.**	**Perform the following:** __ a. CLOSE faulted S/G(s) PORV. __ b. **<u>IF</u>** S/G PORV cannot be closed, **<u>THEN</u>** CLOSE S/G PORV isolation valve. __ c. **<u>IF</u>** S/G PORV isolation valve cannot be closed, **<u>THEN</u>** dispatch operator to close valve.
✓ 9. **Ensure CA System valve control - RESET.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. **Isolate all faulted S/G(s) as follows:**	
• S/G 1A:	
__ a. Verify S/G 1A Feedwater Isolation status light (1SI-5) - LIT.	a. Perform the following: 1) Ensure the following valves - CLOSED: __ • 1CF-28 (S/G 1A CF Ctrl) __ • 1CF-30 (S/G 1A CF Byp Ctrl) __ • 1CF-33 (S/G 1A CF Cont Isol) __ • 1CF-90 (S/G 1A CF Cont Isol Byp) __ • 1CA-149 (S/G 1A CF Byp To CA Nozzle) __ • 1CA-185 (S/G 1A CA Nozz Tempering Isol). 2) **IF** 1CA-185 (S/G 1A CA Nozz Tempering Isol) cannot be closed, **THEN** perform the following: a) CLOSE the following valves: __ • 1CF-100 (S/G CA Nozz Tempering Ctrl) __ • 1CF-156 (Byp Valve For 1CF-100). b) **IF** 1CF-100 **OR** 1CF-156 cannot be closed, **THEN** dispatch operator to close affected valve(s): __ • 1CF-100 (S/G CA Nozz Tempering Ctrl) (TB1-580, 1H-33) (Ladder needed) __ • 1CF-156 (Byp Valve For 1CF-100) (TB1-577, 1H-33) (Ladder needed).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	__ 3) **IF** more than one Feedwater Isolation valve above open **AND** CM still aligned to feed faulted S/G, **THEN** evaluate alternate means to stop CM flow to faulted S/G.
b. CLOSE the following valves:	
__ 1) 1SM-77A (S/G 1A Otlt Hdr Bldwn C/V).	__ 1) Dispatch operator to close 1SM-77A (S/G 1A Otlt Hdr Bldwn C/V) (DH-583, FF-GG, 43-44, Rm 591).
__ 2) 1CA-62A (CA Pmp A Disch To S/G 1A Isol).	2) Perform the following: __ a) CLOSE 1CA-60 (CA Pump 1A Flow To S/G 1A). __ b) Dispatch operator to close 1CA-62A (CA Pmp A Disch To S/G 1A Isol) (DH-587, DD-EE, 44-45, Rm 591). __ c) **IF** exterior doghouse not accessible **OR** CA cannot be isolated, **THEN** dispatch operator to unlock and close 1CA-59 (CA Pump 1A Disch To S/G 1A Ctrl Inlet Isol) (AB-551, BB,49-50, Rm 250) (Ladder needed) (Key #633).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 3) 1CA-66B (CA Pmp 1 Disch To S/G 1A Isol).	3) Perform the following: __ a) CLOSE 1CA-64 (CA Pump #1 Flow To S/G 1A). __ b) Dispatch operator to close 1CA-66B (CA Pmp 1 Disch To S/G 1A Isol) (DH-584, DD-EE, 44-45, Rm 591). __ c) **IF** exterior doghouse not accessible **OR** CA cannot be isolated, **THEN** dispatch operator to unlock and close 1CA-63 (CA Pump No 1 Disch To S/G 1A Ctrl Inlet Isol) (AB-556, BB-50, Rm 250) (Ladder needed) (Key #633).
c. Verify the following blowdown isolation valves - CLOSED:	
__ 1) 1BB-56A (S/G 1A Bldwn Cont Isol Insd).	__ 1) CLOSE valve.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 2) 1BB-148B (S/G 1A Bldwn Cont Isol Byp).	2) Perform the following: __ a) CLOSE valve. b) **<u>IF</u>** valve will not close **<u>AND</u>** 1BB-56A open, **<u>THEN</u>** perform the following: __ (1) Ensure "S/G A BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-148B (S/G 1A Bldwn Cont Isol Byp) (DH-580, EE-FF, 44-45, Rm 591) __ • 1BB-81 (1A S/G Blowdown Penetration Valve Test Isol) (DH-583, EE-FF, 44, Rm 591).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 3) 1BB-57B (S/G 1A Bldwn Cont Isol Otsd).	3) Perform the following: __ a) CLOSE valve. b) **<u>IF</u>** valve will not close **<u>AND</u>** 1BB-56A open, **<u>THEN</u>** perform the following: __ (1) Ensure "S/G A BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-57B (S/G 1A Bldwn Cont Isol Otsd) (DH-580, EE-FF, 44-45, Rm 591) __ • 1BB-81 (1A S/G Blowdown Penetration Valve Test Isol) (DH-583, EE-FF, 44, Rm 591).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
• <u>S/G 1B</u>:	
__ a. Verify S/G 1B Feedwater Isolation status light (1SI-5) - LIT.	a. Perform the following: 1) Ensure the following valves - CLOSED: __ • 1CF-37 (S/G 1B CF Ctrl) __ • 1CF-39 (S/G 1B CF Byp Ctrl) __ • 1CF-42 (S/G 1B CF Cont Isol) __ • 1CF-89 (S/G 1B CF Cont Isol Byp) __ • 1CA-150 (S/G 1B CF Byp To CA Nozzle) __ • 1CA-186 (S/G 1B CA Nozz Tempering Isol). 2) <u>**IF**</u> 1CA-186 (S/G 1B CA Nozz Tempering Isol) cannot be closed, <u>**THEN**</u> perform the following: a) CLOSE the following valves: __ • 1CF-100 (S/G CA Nozz Tempering Ctrl) __ • 1CF-156 (Byp Valve For 1CF-100). b) <u>**IF**</u> 1CF-100 <u>**OR**</u> 1CF-156 cannot be closed, <u>**THEN**</u> dispatch operator to close affected valve(s): __ • 1CF-100 (S/G CA Nozz Tempering Ctrl) (TB1-580, 1H-33) (Ladder needed) __ • 1CF-156 (Byp Valve For 1CF-100) (TB1-577, 1H-33) (Ladder needed).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	__ 3) **IF** more than one Feedwater Isolation valve above open **AND** CM still aligned to feed faulted S/G, **THEN** evaluate alternate means to stop CM flow to faulted S/G.
b. CLOSE the following valves:	
__ 1) 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V).	__ 1) Dispatch operator to close 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V) (DH-583, FF-53, Rm 572).
__ 2) 1CA-58A (CA Pmp A Disch To S/G 1B Isol).	2) Perform the following: __ a) CLOSE 1CA-56 (CA Pump 1A Flow To S/G 1B). __ b) Dispatch operator to close 1CA-58A (CA Pmp A Disch To S/G 1B Isol) (DH-586, DD-EE, 52-53, Rm 572). __ c) **IF** interior doghouse not accessible **OR** CA cannot be isolated, **THEN** dispatch operator to unlock and close 1CA-55 (CA Pump 1A Disch To S/G 1B Inlet Isol) (AB-550, DD-52, Rm 250) (Key #633).
__ c. Verify CA Pump 1A or 1B - AVAILABLE.	c. **IF** CA Pump #1 only source of feedwater, **THEN** perform the following: __ 1) Maintain at least one S/G available to supply steam to CA Pump #1.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	__ 2) Ensure feed flow maintained available to S/G used to supply steam to CA Pump #1.
	__ 3) **IF** desired to isolate CA Pump #1 from 1B S/G, **THEN GO TO** Step 10.d.
	__ 4) **GO TO** Step 10.f.
__ d. CLOSE 1CA-54B (CA Pmp 1 Disch To S/G 1B Isol).	d. Perform the following:
	__ 1) CLOSE 1CA-52 (CA Pump #1 Flow To S/G 1B).
	__ 2) Dispatch operator to close 1CA-54B (CA Pmp 1 Disch To S/G 1B Isol) (DH-584, DD-EE, 52-53, Rm 572).
	__ 3) **IF** interior doghouse not accessible **OR** CA cannot be isolated, **THEN** dispatch operator to unlock and close 1CA-51 (CA Pump No 1 Disch To S/G 1B Inlet Isol) (AB-552, DD-52, Rm 250) (Key #633).
__ e. Dispatch operator to unlock and close 1SA-1 (1B S/G Main Steam to CAPT Maintenance Isol) (DH-624, FF-53, Rm 572) (Breakaway lock).	__ e. Dispatch operator to unlock and close 1SA-3 (1B S/G Main Steam to CAPT Stop Check) (AB-551, DD-53, Rm 217) (Breakaway lock).
f. Verify the following blowdown isolation valves - CLOSED:	
__ 1) 1BB-19A (S/G 1B Bldwn Cont Isol Insd).	__ 1) CLOSE valve.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 2) 1BB-150B (S/G 1B Bldwn Cont Isol Byp).	2) Perform the following: __ a) CLOSE valve. b) **<u>IF</u>** valve will not close **<u>AND</u>** 1BB-19A open, **<u>THEN</u>** perform the following: __ (1) Ensure "S/G B BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-150B (S/G 1B Bldwn Cont Isol Byp) (DH-580, FF, 52-53, Rm 572) __ • 1BB-83 (1B S/G Blowdown Penetration Valve Test Isol) (DH-580, FF-53, Rm 572).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 3) 1BB-21B (S/G 1B Bldwn Cont Isol Otsd).	3) Perform the following: __ a) CLOSE valve. b) **<u>IF</u>** valve will not close **<u>AND</u>** 1BB-19A open, **<u>THEN</u>** perform the following: __ (1) Ensure "S/G B BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-21B (S/G 1B Bldwn Cont Isol Otsd) (DH-580, FF, 52-53, Rm 572) __ • 1BB-83 (1B S/G Blowdown Penetration Valve Test Isol) (DH-580, FF-53, Rm 572).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

- S/G 1C:

__ a. Verify S/G 1C Feedwater Isolation status light (1SI-5) - LIT.

a. Perform the following:

1) Ensure the following valves - CLOSED:

__ • 1CF-46 (S/G 1C CF Ctrl)

__ • 1CF-48 (S/G 1C CF Byp Ctrl)

__ • 1CF-51 (S/G 1C CF Cont Isol)

__ • 1CF-88 (S/G 1C CF Cont Isol Byp)

__ • 1CA-151 (S/G 1C CF Byp To CA Nozzle)

__ • 1CA-187 (S/G 1C CA Nozz Tempering Isol).

2) **IF** 1CA-187 (S/G 1C CA Nozz Tempering Isol) cannot be closed, **THEN** perform the following:

a) CLOSE the following valves:

__ • 1CF-100 (S/G CA Nozz Tempering Ctrl)

__ • 1CF-156 (Byp Valve For 1CF-100).

b) **IF** 1CF-100 **OR** 1CF-156 cannot be closed, **THEN** dispatch operator to close affected valve(s):

__ • 1CF-100 (S/G CA Nozz Tempering Ctrl) (TB1-580, 1H-33) (Ladder needed)

__ • 1CF-156 (Byp Valve For 1CF-100) (TB1-577, 1H-33) (Ladder needed).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	__ 3) **<u>IF</u>** more than one Feedwater Isolation valve above open **<u>AND</u>** CM still aligned to feed faulted S/G, **<u>THEN</u>** evaluate alternate means to stop CM flow to faulted S/G.
b. CLOSE the following valves:	
__ 1) 1SM-75A (S/G 1C Otlt Hdr Bldwn C/V).	__ 1) Dispatch operator to close 1SM-75A (S/G 1C Otlt Hdr Bldwn C/V) (DH-580, GG-52/53, Rm 572).
__ 2) 1CA-46B (CA Pmp B Disch To S/G 1C Isol).	2) Perform the following: __ a) CLOSE 1CA-44 (CA Pump 1B Flow To S/G 1C). __ b) Dispatch operator to close 1CA-46B (CA Pmp B Disch To S/G 1C Isol) (DH-586, DD, 53-54, Rm 572). __ c) **<u>IF</u>** interior doghouse not accessible **<u>OR</u>** CA cannot be isolated, **<u>THEN</u>** dispatch operator to unlock and close 1CA-43 (CA Pump 1B Disch To S/G 1C Ctrl Inlet Isol) (AB-552, DD-52, Rm 250) (Key #633).
__ c. Verify CA Pump 1A or 1B - AVAILABLE.	c. **<u>IF</u>** CA Pump #1 only source of feedwater, **<u>THEN</u>** perform the following: __ 1) Maintain at least one S/G available to supply steam to CA Pump #1.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	__ 2) Ensure feed flow maintained available to S/G used to supply steam to CA Pump #1.
	__ 3) **<u>IF</u>** desired to isolate CA Pump #1 from 1C S/G, **<u>THEN</u> <u>GO</u> <u>TO</u>** Step 10.d.
	__ 4) **<u>GO</u> <u>TO</u>** Step 10.f.
__ d. CLOSE 1CA-50A (CA Pmp 1 Disch To S/G 1C Isol).	d. Perform the following:
	__ 1) CLOSE 1CA-48 (CA Pump #1 Flow To S/G 1C).
	__ 2) Dispatch operator to close 1CA-50A (CA Pmp 1 Disch To S/G 1C Isol) (DH-584, EE-53, Rm 572).
	__ 3) **<u>IF</u>** interior doghouse not accessible **<u>OR</u>** CA cannot be isolated, **<u>THEN</u>** dispatch operator to unlock and close 1CA-47 (CA Pump No 1 Disch To S/G 1C Ctrl Inlet Isol) (AB-552, DD-53, Rm 250) (Key #633).
__ e. Dispatch operator to unlock and close 1SA-4 (1C S/G Main Steam to CAPT Maintenance Isol) (DH-624, FF-53, Rm 572) (Breakaway lock installed).	__ e. Dispatch operator to unlock and close 1SA-6 (1C S/G Main Steam to CAPT Stop Check) (AB-551, DD-53, Rm 217) (Breakaway lock) (Ladder needed).
f. Verify the following blowdown isolation valves - CLOSED:	
__ 1) 1BB-60A (S/G 1C Bldwn Cont Isol Insd).	__ 1) CLOSE valve.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 2) 1BB-149B (S/G 1C Bldwn Cont Isol Byp).	2) Perform the following: __ a) CLOSE valve. b) **<u>IF</u>** valve will not close **<u>AND</u>** 1BB-60A open, **<u>THEN</u>** perform the following: __ (1) Ensure "S/G C BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-149B (S/G 1C Bldwn Cont Isol Byp) (DH-578, FF-GG, 52, Rm 572) __ • 1BB-82 (1C S/G Blowdown Penetration Valve Test Isol) (DH-583, FF-53, Rm 572).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 3) 1BB-61B (S/G 1C Bldwn Cont Isol Otsd).	3) Perform the following: __ a) CLOSE valve. b) **IF** valve will not close **AND** 1BB-60A open, **THEN** perform the following: __ (1) Ensure "S/G C BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-61B (S/G 1C Bldwn Cont Isol Otsd) (DH-578, FF-GG, 52, Rm 572) __ • 1BB-82 (1C S/G Blowdown Penetration Valve Test Isol) (DH-583, FF-53, Rm 572).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
• <u>S/G 1D</u>:	
__ a. Verify S/G 1D Feedwater Isolation status light (1SI-5) - LIT.	a. Perform the following: 1) Ensure the following valves - CLOSED: __ • 1CF-55 (S/G 1D CF Ctrl) __ • 1CF-57 (S/G 1D CF Byp Ctrl) __ • 1CF-60 (S/G 1D CF Cont Isol) __ • 1CF-87 (S/G 1D CF Cont Isol Byp) __ • 1CA-152 (S/G 1D CF Byp To CA Nozzle) __ • 1CA-188 (S/G 1D CA Nozz Tempering Isol). 2) <u>**IF**</u> 1CA-188 (S/G 1D CA Nozz Tempering Isol) cannot be closed, <u>**THEN**</u> perform the following: a) CLOSE the following valves: __ • 1CF-100 (S/G CA Nozz Tempering Ctrl) __ • 1CF-156 (Byp Valve For 1CF-100). b) <u>**IF**</u> 1CF-100 <u>**OR**</u> 1CF-156 cannot be closed, <u>**THEN**</u> dispatch operator to close affected valve(s): __ • 1CF-100 (S/G CA Nozz Tempering Ctrl) (TB1-580, 1H-33) (Ladder needed) __ • 1CF-156 (Byp Valve For 1CF-100) (TB1-577, 1H-33) (Ladder needed).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
	__ 3) **<u>IF</u>** more than one Feedwater Isolation valve above open **<u>AND</u>** CM still aligned to feed faulted S/G, **<u>THEN</u>** evaluate alternate means to stop CM flow to faulted S/G.
b. CLOSE the following valves:	
__ 1) 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V).	__ 1) Dispatch operator to close 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V) (DH-583, FF-GG, 44-45, Rm 591).
__ 2) 1CA-42B (CA Pmp B Disch To S/G 1D Isol).	2) Perform the following: __ a) CLOSE 1CA-40 (CA Pump 1B Flow To S/G 1D). __ b) Dispatch operator to close 1CA-42B (CA Pmp B Disch To S/G 1D Isol) (DH-586, DD-EE, 43-44, Rm 591). __ c) **<u>IF</u>** exterior doghouse not accessible **<u>OR</u>** CA cannot be isolated, **<u>THEN</u>** dispatch operator to unlock and close 1CA-39 (CA Pump 1B Disch To S/G 1D Ctrl Inlet Isol) (AB-551, BB, 49-50, Rm 250) (Ladder needed) (Key #633).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 3) 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol).	3) Perform the following: __ a) CLOSE 1CA-36 (CA Pump #1 Flow To S/G 1D). __ b) Dispatch operator to close 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol) (DH-584, DD-EE, 43-44, Rm 591). __ c) **IF** exterior doghouse not accessible **OR** CA cannot be isolated, **THEN** dispatch operator to unlock and close 1CA-35 (CA Pump No 1 Disch To S/G 1D Ctrl Inlet Isol) (AB-555, BB-50, Rm 250) (Ladder needed) (Key #633).
c. Verify the following blowdown isolation valves - CLOSED:	
__ 1) 1BB-8A (S/G 1D Bldwn Cont Isol Insd).	__ 1) CLOSE valve.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 2) 1BB-147B (S/G 1D Bldwn Cont Isol Byp).	2) Perform the following: __ a) CLOSE valve. b) **<u>IF</u>** valve will not close **<u>AND</u>** 1BB-8A open, **<u>THEN</u>** perform the following: __ (1) Ensure "S/G D BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-147B (S/G 1D Bldwn Cont Isol Byp) (DH-582, EE-FF, 44, Rm 591) __ • 1BB-80 (1D S/G Blowdown Penetration Valve Test Isol) (DH-583,EE-FF, 44, Rm 591).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ 3) 1BB-10B (S/G 1D Bldwn Cont Isol Otsd).	3) Perform the following: __ a) CLOSE valve. b) **<u>IF</u>** valve will not close **<u>AND</u>** 1BB-8A open, **<u>THEN</u>** perform the following: __ (1) Ensure "S/G D BLDWN FLOW CTRL" - CLOSED. (2) Dispatch operators to ensure the following valves - CLOSED: __ • 1BB-10B (S/G 1D Bldwn Cont Isol Otsd) (DH-582, EE-FF, 44, Rm 591) __ • 1BB-80 (1D S/G Blowdown Penetration Valve Test Isol) (DH-583,EE-FF, 44, Rm 591).
__ 11. **<u>WHEN</u> NC T-Hots start to increase, <u>THEN</u> dump steam from intact S/G PORVs to stabilize NC T-Hots.**	
12. **Verify secondary radiation normal as follows:** a. Ensure the following signals - RESET: __ 1) Phase A Containment Isolations. __ 2) CA System valve control. __ 3) KC NC NI NM St signals. __ b. Align all S/Gs for Chemistry sampling.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. (Continued)	
c. Perform at least one of the following:	
__ • Notify Chemistry to sample all S/Gs for activity	
OR	
__ • Notify RP to frisk all cation columns for activity.	
d. Verify the following EMF trip 1 lights - DARK:	__ d. **<u>GO</u> <u>TO</u>** EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
__ • 1EMF-33 (Condenser Air Ejector Exhaust)	
__ • 1EMF-26 (Steamline 1A)	
__ • 1EMF-27 (Steamline 1B)	
__ • 1EMF-28 (Steamline 1C)	
__ • 1EMF-29 (Steamline 1D).	
__ e. Verify S/G(s) fault - INSIDE CONTAINMENT.	e. Request RP to perform the following: __ 1) Monitor area of steam fault for radiation. __ 2) Notify Control Room of any abnormal radiation conditions.
__ f. **<u>WHEN</u>** activity results reported, **<u>THEN</u>** notify station management to evaluate S/G(s) activity results.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. **Verify S/I termination criteria:**	
__ a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.	__ a. **<u>GO</u> <u>TO</u>** Step 14.
b. Verify secondary heat sink as follows: __ • Any intact S/G N/R level - GREATER THAN 11% (29% ACC) OR __ • Total feed flow to intact S/Gs - GREATER THAN 450 GPM.	__ b. **<u>GO</u> <u>TO</u>** Step 14.
__ c. NC pressure - STABLE OR INCREASING.	__ c. **<u>GO</u> <u>TO</u>** Step 14.
__ d. Pzr level - GREATER THAN 11% (30% ACC).	__ d. **<u>GO</u> <u>TO</u>** Step 14.
__ e. **<u>GO</u> <u>TO</u>** EP/1/A/5000/ES-1.1 (Safety Injection Termination).	
__ 14. **<u>GO</u> <u>TO</u> EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant).**	

<u>END</u>

1. **Cold Leg Recirc Switchover Criterion:**

__ • **IF** FWST level decreases to 20% 1AD-9, D/8 "FWST 2/4 LO LEVEL" lit), **THEN GO TO** EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirculation).

2. **CA Suction Source Switchover Criterion:**

__ • **IF** 1AD-8, B/1 "UST LO LEVEL" lit, **THEN REFER TO** AP/1/A/5500/006 (Loss of S/G Feedwater).

3. **Position Criteria for 1NV-202B and 1NV-203A (NV Pumps A&B Recirc Isol):**

__ • **IF** NC pressure less than 1500 PSIG **AND** NV S/I flowpath aligned, **THEN** CLOSE 1NV-202B and 1NV-203A.

__ • **IF** NC pressure greater than 2000 PSIG, **THEN** OPEN 1NV-202B and 1NV-203A.

JPM D

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EVALUATION SHEET

Task: Transfer the Emergency Core Coolant System to the Cold Leg Recirculation

Alternate Path: Yes

Facility JPM #: NI-088

Safety Function: 2 **Title:** Emergency Core Cooling System (ECCS)

K/A 006 A4.07 Ability to manually operate and/or monitor in the control room: ECCS pumps and valves.

Rating(s): 4.4 / 4.4 **CFR:** 41.7 / 45.5 to 45.8

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

Simulator __X__ In-**P**lant ________ **P**erform __X__ **S**imulate ________

References: EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) rev. 29

Task Standard: EP/1/A/5000/ES-1.3 Transfer to Cold Leg Recirculation) step 6 is performed and the 1A and 1B NV (Chemical Volume and Control System) and NI (Safety Injection System) pumps are secured.

Validation Time: 12 minutes **Time Critical:** Yes _____ No __X__

==

Applicant: Time Start: __________
NAME_____________________________ Docket #_______________ Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

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COMMENTS

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SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **Reset to IC #153**
3. **Enter the password.**
4. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
5. **Ensure simulator setup per table below.**
6. **Place simulator in RUN and acknowledge any alarms.**
7. **ENSURE "Extra Operator" is present in the simulator.**
8. **Place simulator in FREEZE until Examiner cue is given.**

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event
	VLV-NI037F (NI184B CNMT SUMP LINE 1B ISOL (STEM) FAIL TO POSITION)	0				
	MAL-NC013A (NC COLD LEG A LEAK)	27.5				
	VLV-ND005F (ND28A ND HX A OUTLET TO CHARG AB FAIL TO POSITION.	0				

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READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **A LOCA has occurred on Unit 1.**

INITIATING CUES:

- **1AD-9, E/8 'FWST LO-LO LEVEL' annunciator is lit and the Control Room Supervisor instructs you, as the BOP, to transfer to Cold Leg Recirculation using EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) step 6.**

EXAMINER NOTE: After reading the cue, provide the applicant with a copy of EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) complete through step 8 with step 6 flagged.

START TIME: _______

STEP/STANDARD	SAT/UNSAT
STEP 1: 6. **WHEN FWST level decreases to 5% (1AD-9, E/8 "FWST LO-LO LEVEL"), THEN align NV and NI Systems for recirc as follows:** a. Ensure Enclosure 1 (Foldout Page) is monitored. STANDARD: Applicant reads the step. **Examiner Cue: "The OATC will monitor Enclosure 1"** COMMENTS:	___ **SAT** ___ **UNSAT**

NOTE CSF should not be implemented until directed by this procedure. STEP 2 b. Verify at least one of the following annunciators - LIT: • 1AD-20, B/2 "CONT. SUMP LEVEL >2.5 ft" OR • 1AD-21, B/2 "CONT. SUMP LEVEL >2.5 ft". STANDARD: Applicant determines that one or both annunciators are lit. COMMENTS:	___ **SAT** ___**UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3 c. Verify both ND pumps - ON. STANDARD: Applicant determines that only 1 ND pump is running and transitions to the RNO COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 4 6.c. RNO c. Perform the following: 1) **IF** 1NI-185A (ND Pump 1A Cont Sump Suct) is open, **THEN** start ND pump 1A. STANDARD: Applicant determines that ND PUMP 1A is on by verifying the red ON light is lit on 1MC-11. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 5 2) **IF** 1NI-184B (ND Pump 1B Cont Sump Suct) is open, **THEN** start ND pump 1B. STANDARD: Applicant determines that 1NI-184B is not open by verifying the green CLSD light is lit on 1MC-11 and determines that the step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 6 3) **IF** any ND pump running with suction aligned to sump, **THEN GO TO** Step 6.d. STANDARD: Applicant determines that ND Pump 1A is running with suction aligned to the sump and proceeds to step 6.d. COMMENTS:	___ SAT ___ UNSAT

STEP 7 6.d. Ensure the following valves - CLOSED: • 1ND-32A (ND Train 1A Hot Leg Inj Isol) • 1ND-65B (ND Train 1B Hot Leg Inj Isol). STANDARD: Applicant depresses the green CLOSE pushbuttons for 1ND-32A and 1ND-65B on 1MC-11. **Examiner Note:** **This step is critical to prevent pump run out should only one ND pump be running. Only one of the valves need to be closed to satisfy the critical step since the valves are in series.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 8 6.e. Isolate NI Pump Miniflow as follows: 1) Verify NC pressure - LESS THAN 1620 PSIG. STANDARD: Applicant determines that NC (Reactor Coolant System) pressure is less than 1620 psig. COMMENTS:	___ SAT ___ UNSAT
STEP 9 2) Ensure the following valves - CLOSED: • 1NI-115A (NI Pump 1A Miniflow Isol) • 1NI-144A (NI Pump 1B Miniflow Isol). STANDARD: Applicant determines that the green CLSD lights are lit for 1NI-115A and 1NI-144A on 1MC-11. COMMENTS:	___ SAT ___ UNSAT
STEP 10 3) Ensure "PWR DISCON FOR 1NI-147B" switch in "ENABLE". STANDARD: Applicant determines that the “PWR DISCON FOR 1NI-147B” is in “ENABLE” on 1MC-11. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 11 4) Ensure 1NI-147B (NI Miniflow Hdr To FWST Isol) - CLOSED. STANDARD: Applicant determines that the green CLSD light is lit for 1NI-147B on 1MC-11. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 12 6.f. Verify at least one of the following NV pumps miniflow valves - CLOSED: • 1NV-203A (NV Pumps A&B Recirc Isol) OR • 1NV-202B (NV Pmps A&B Recirc Isol). STANDARD: Applicant determines that the green CLSD lights are lit for 1NV-203A & 1NV-202B on 1MC-10. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 13 g. Ensure 1NI-334B (NI Pump Suct X-Over From ND) - OPEN. STANDARD: Applicant determines the red OPEN light is lit for 1NI-334B on 1MC-11. COMMENTS:	___ SAT ___ UNSAT
STEP 14 h. OPEN the following valves: • 1NI-332A (NI Pump Suct X-Over From ND) • 1NI-333B (NI Pump Suct From ND). STANDARD: Applicant depresses the red OPEN pushbuttons for 1NI-332A and 1NI-333B on 1MC-11. **Examiner Note: This step is critical to align a flowpath from 1A ND pump to the suction of the NV and NI pumps.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 15 i. Align ND discharge to suction of NI and NV pumps as follows: 1) OPEN 1ND-28A (ND Supply To NV & 1A NI Pmps). STANDARD: Applicant depresses the red OPEN pushbutton for 1ND-28A on 1MC-11 and determines that the valve will not open and continues. **Examiner Note: This step is critical to align a flowpath from 1A ND pump to the suction of the NV and NI pumps.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP 16 2) OPEN 1NI-136B (ND Supply To NI Pump 1B). STANDARD: Applicant depresses the red OPEN pushbutton for 1NI-136B on 1MC-11, determines that the valve will not open and proceeds to the next step. **Examiner Note: 1NI-136B will not open due to an interlock with 1NI-184B** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT

STEP 17 j. Verify at least one ND train aligned to provide suction to NV and NI as follows:
• A Train:
  • 1A ND pump running
  • 1ND-28A (ND Supply To NV & 1A NI Pmps) - OPEN.
 	
STANDARD:
Applicant determines no train can be aligned to provide suction to NV and NI and proceeds to the RNO.
 	
EXAMINER Note: This begins the alternate path of this JPM.
 	
COMMENTS:
	___ **SAT**
	___ **UNSAT**

STEP 18 6.j. RNO j. Perform the following: 1) **IF** either valve is in intermediate position, **THEN** allow 20 seconds for valve to open. STANDARD: Applicant determines that this step does not apply. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 19 2) **IF** either valve is open **AND** its associated ND pump on, **THEN GO TO** Step 6.k. STANDARD: Applicant determines that this step does not apply. COMMENTS:	___ SAT ___ UNSAT

	CRITICAL STEP
STEP 20 3) **IF** both A train and B train unavailable, **THEN** trip all NV and NI pumps. STANDARD: Applicant determines both A train and B train are unavailable and depresses the green OFF pushbuttons for NV PMP 1A, NV PUMP 1B, NI PMP 1A and NI PUMP 1B. **Examiner Note:** **This step is critical to protect the NV and NI pumps from damage from loss of suction and allow them to be available later when the FWST has been refilled.** **EXAMINER CUE:** **"Another operator will complete ES-1.3. This JPM is complete."** COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **A LOCA has occurred on Unit 1.**

INITIATING CUES:

- **1AD-9, E/8 'FWST LO-LO LEVEL' annunciator is lit and the Control Room Supervisor instructs you, as the BOP, to transfer to Cold Leg Recirculation using EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) step 6.**

A. <u>Purpose</u>

This procedure provides the necessary instructions for transferring the safety injection system and containment spray system to the recirculation mode.

B. <u>Symptoms or Entry Conditions</u>

This procedure is entered from:

- EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant), Step 17, on low FWST level.
- EP/1/A/5000/ECA-2.1 (Uncontrolled Depressurization of All Steam Generators), Step 11, on low FWST level.
- Other procedures whenever FWST level reaches the switchover setpoint (1AD-9, D/8 "FWST 2/4 LO LEVEL").

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

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

NOTE CSF should not be implemented until directed by this procedure.

2. **Verify at least one of the following annunciators - LIT:**

   ✓ • 1AD-20, B/2 "CONT. SUMP LEVEL >2.5 ft"

   OR

   ✓ • 1AD-21, B/2 "CONT. SUMP LEVEL >2.5 ft".

RNO:

IF both alarms dark, THEN perform the following:

a. Ensure S/I - RESET:

   __ 1) ECCS.

   __ 2) D/G load sequencers.

__ b. Ensure ND pumps - OFF.

c. IF either ND pump continues to run, THEN isolate affected trains discharge path as follows:

   1) IF train "A" affected, THEN CLOSE:

      __ • 1NI-173A (ND Hdr 1A To Cold Legs C&D)

      __ • 1ND-32A (ND Train 1A Hot Leg Inj Isol).

   2) IF train "B" affected, THEN CLOSE:

      __ • 1NI-178B (ND Hdr 1B To Cold Legs A&B)

      __ • 1ND-65B (ND Train 1B Hot Leg Inj Isol).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. (Continued)

d. Verify ND suction alignment:

1) Ensure the following valves - CLOSED:

__ • 1FW-27A (ND Pump 1A Suct From FWST)

__ • 1FW-55B (ND Pump 1B Suct From FWST).

2) **IF** 1FW-27A or 1FW-55B will not close, **THEN** perform the following:

a) Depress the following "DEFEAT" pushbutton(s) for affected train(s):

__ • "C-LEG RECIR FWST TO CONT SUMP SWAP TRN A"

__ • "C-LEG RECIR FWST TO CONT SUMP SWAP TRN B".

__ b) CLOSE associated ND pump(s) containment sump suction valve(s).

__ e. **IF** FWST level less than 20% (1AD-9, D/8 "FWST 2/4 LO LEVEL" - LIT) due to FWST puncture, **THEN RETURN TO** procedure and step in effect.

f. **IF** LOCA inside containment has occurred, **THEN** perform the following:

__ 1) Do **NOT** start ND pump(s) until at least one "CONT. SUMP LEVEL >2.5 ft" annunciator - LIT.

__ 2) **GO TO** Step 3.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	
	__ g. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).
	__ h. **GO TO** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).
3. **Reset the following:**	
✓ a. ECCS.	__ a. Locally reset ECCS. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 4 (ECCS Master Reset).
✓ b. D/G load sequencers.	b. Dispatch operator to open affected sequencer(s) control power breaker: __ • 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496) __ • 1EDF-F01F (Diesel Generator Load Sequencer Panel 1DGLSB) (AB-560, BB-46, Rm 372).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Align ND System for recirc as follows:**	
a. Verify following valves - OPEN:	a. Perform the following:
✓ • 1NI-185A (ND Pump 1A Cont Sump Suct)	N/A 1) **IF** all affected valve(s) intentionally closed by previous guidance, **THEN GO TO** Step 4.b.
__ • 1NI-184B (ND Pump 1B Cont Sump Suct).	✓ 2) OPEN affected containment sump suction valve(s).
	3) **IF** affected containments sump valve(s) not open, **THEN** perform the following:
	✓ a) Stop ND pump(s) associated with closed containment sump suction valve(s).
	b) CLOSE associated ND pump(s) suction valve from the FWST:
	__ • 1FW-27A (ND Pump 1A Suct From FWST)
	✓ • 1FW-55B (ND Pump 1B Suct From FWST).
	c) **WHEN** ND pump(s) suction valve from FWST closed, **THEN** OPEN affected containment sump suction valve(s):
	__ • 1NI-185A (ND Pump 1A Cont Sump Suct)
	✓ • 1NI-184B (ND Pump 1B Cont Sump Suct).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. (Continued)

N/A d) **IF** all the following criteria met, **THEN** start ND pump previously running:

__ • ND pump secured by this step

__ • Affected containment sump suction valve - OPEN

__ • Adequate sump level exists.

N/A 4) **IF** both containment sump suction valves closed, **THEN** perform the following:

__ a) Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

__ b) **GO TO** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. (Continued)

b. Verify following valves - CLOSED:

✓ • 1FW-27A (ND Pump 1A Suct From FWST)

✓ • 1FW-55B (ND Pump 1B Suct From FWST).

b. Perform the following:

__ 1) CLOSE affected valve(s).

__ 2) **IF** associated containment sump valve closed by previous guidance, **THEN GO TO** Step 4.c.

3) **IF** valve(s) will not close, **THEN** perform the following:

__ a) Stop associated ND pump(s).

b) Depress the following "DEFEAT" pushbutton(s) for affected train(s):

__ • "C-LEG RECIR FWST TO CONT SUMP SWAP TRN A"

__ • "C-LEG RECIR FWST TO CONT SUMP SWAP TRN B".

__ c) CLOSE associated ND pump(s) containment sump suction valve(s).

d) **IF** both containment sump suction valves closed, **THEN** perform the following:

__ (1) Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

__ (2) **GO TO** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
__ c. Verify ND pumps - ON.	c. Perform the following:
	__ 1) **<u>IF</u>** any ND pump aligned to sump **<u>AND</u>** available to start after adequate sump level exists, **<u>THEN</u> <u>GO</u> <u>TO</u>** Step 5.
	N/A 2) **<u>IF</u>** no ND pump available **<u>OR</u>** no ND train can be aligned for recirc, **<u>THEN</u>** perform the following:
	__ a) Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).
	__ b) **<u>GO</u> <u>TO</u>** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).
5. **Verify FWST LO-LO level as follows:**	**Perform the following:**
__ • 1AD-9, E/8 "FWST LO-LO LEVEL" - LIT OR __ • FWST level - LESS THAN 5%.	**<u>CAUTION</u>** **The following step takes priority over any other EP guidance if sump recirc capabilities exist.**
	__ a. **<u>WHEN</u>** FWST level at 5% (1AD-9, E/8 "FWST LO-LO LEVEL" - LIT), **<u>THEN</u>** immediately **<u>GO</u> <u>TO</u>** Step 6 to align NV and NI pumps for cold leg recirc.
	✓ b. Ensure Step 6 flagged to complete later.
	✓ c. **<u>GO</u> <u>TO</u>** Step 7.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. **WHEN FWST level decreases to 5% (1AD-9, E/8 "FWST LO-LO LEVEL" - LIT), THEN align NV and NI Systems for recirc as follows:**

__ a. Ensure Enclosure 1 (Foldout Page) monitored.

NOTE CSF should not be implemented until directed by this procedure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
b. Verify at least one of the following annunciators - LIT: __ • 1AD-20, B/2 "CONT. SUMP LEVEL >2.5 ft" OR __ • 1AD-21, B/2 "CONT. SUMP LEVEL >2.5 ft".	b. **IF** both annunciators dark, **THEN** perform the following: __ 1) Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ 2) **GO TO** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued)	
__ c. Verify both ND pumps - ON.	c. Perform the following: __ 1) **<u>IF</u>** 1NI-185A (ND Pump 1A Cont Sump Suct) open, **<u>THEN</u>** start ND pump 1A. __ 2) **<u>IF</u>** 1NI-184B (ND Pump 1B Cont Sump Suct) open, **<u>THEN</u>** start ND pump 1B. __ 3) **<u>IF</u>** any ND pump running with suction aligned to sump, **<u>THEN</u>** **<u>GO TO</u>** Step 6.d. 4) **<u>IF</u>** no ND pump running with suction aligned to sump, **<u>THEN</u>** perform the following: __ a) Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). __ b) **<u>GO TO</u>** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).
d. Ensure the following valves - CLOSED: __ • 1ND-32A (ND Train 1A Hot Leg Inj Isol) __ • 1ND-65B (ND Train 1B Hot Leg Inj Isol).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued)	
e. Isolate NI pump miniflow as follows:	
__ 1) Verify NC pressure - LESS THAN 1620 PSIG.	__ 1) Stop NI pumps.
2) Ensure the following valves - CLOSED: __ • 1NI-115A (NI Pump 1A Miniflow Isol) __ • 1NI-144A (NI Pump 1B Miniflow Isol).	
__ 3) Ensure "PWR DISCON FOR 1NI-147B" switch in "ENABLE".	
__ 4) Ensure 1NI-147B (NI Miniflow Hdr To FWST Isol) - CLOSED.	
f. Verify at least one of the following NV pumps miniflow valves - CLOSED: __ • 1NV-203A (NV Pumps A&B Recirc Isol) OR __ • 1NV-202B (NV Pmps A&B Recirc Isol).	f. Perform the following: __ 1) **IF** 1NI-9A (NV Pmp C/L Inj Isol) **AND** 1NI-10B (NV Pmp C/L Inj Isol) closed, **THEN** maintain charging flow greater than 80 GPM. 2) CLOSE the following valves: __ • 1NV-203A (NV Pumps A&B Recirc Isol) __ • 1NV-202B (NV Pmps A&B Recirc Isol).
__ g. Ensure 1NI-334B (NI Pump Suct X-Over From ND) - OPEN.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

h. OPEN the following valves:

__ • 1NI-332A (NI Pump Suct X-Over From ND)

__ • 1NI-333B (NI Pump Suct From ND).

i. Align ND discharge to suction of NI and NV pumps as follows:

__ 1) OPEN 1ND-28A (ND Supply To NV & 1A NI Pmps).

__ 2) OPEN 1NI-136B (ND Supply To NI Pump 1B).

j. Verify at least one ND train aligned to provide suction to NV and NI as follows:

• A Train:

__ • 1A ND pump running

__ • 1ND-28A (ND Supply To NV & 1A NI Pmps) - OPEN.

OR

• B Train:

__ • 1B ND pump running

__ • 1NI-136B (ND Supply To NI Pump 1B) - OPEN.

RESPONSE NOT OBTAINED:

j. Perform the following:

__ 1) **IF** either valve in intermediate position, **THEN** allow 20 seconds for valve to open.

__ 2) **IF** either valve open **AND** associated ND pump on, **THEN** **GO TO** Step 6.k.

__ 3) **IF** both A train and B train unavailable, **THEN** trip all NV and NI pumps.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued)	
k. Isolate FWST from NV and NI pumps as follows:	
__ 1) Place "PWR DISCON FOR 1NI-100B" switch in "ENABLE".	
__ 2) CLOSE 1NI-100B (NI Pmps Suct From FWST).	
3) CLOSE the following valves:	
__ • 1NV-252A (NV Pumps Suct From FWST)	
__ • 1NV-253B (NV Pumps Suct From FWST).	
	NOTE An invalid SPDS orange path may briefly exist between opening NS suction valve from sump and starting NS pump. FR-Z.1 should not be entered unless NS pump fails to start.
__ 7. **Verify Enclosure 2 (Aligning NS for Recirculation) - PREVIOUSLY COMPLETED.**	✓ **Align NS for recirc. <u>REFER TO</u> Enclosure 2 (Aligning NS for Recirculation).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 8. **Verify NV and NI aligned for recirc - STEP 6 PREVIOUSLY COMPLETED.**

Perform the following while NV and NI pumps lower FWST level to 5% (1AD-9, E/8 "FWST LO-LO LEVEL" - LIT):

✓ a. Ensure continuous action of Step 5 RNO monitored **AND** takes priority over any other EP guidance.

b. Isolate NI pump miniflow in preparation for swap to cold leg recirc as follows:

N/A 1) **IF** NC pressure greater than 1620 PSIG, **THEN** stop NI pumps.

2) CLOSE the following valves:

- ✓ 1NI-115A (NI Pump 1A Miniflow Isol)
- ✓ 1NI-144A (NI Pump 1B Miniflow Isol).

✓ 3) Place "PWR DISCON FOR 1NI-147B" switch in "ENABLE".

✓ 4) CLOSE 1NI-147B (NI Miniflow Hdr To FWST Isol).

c. Establish KC flow to ND Hx(s) as follows:

1) Ensure the following valves open:

- ✓ 1KC-56A (KC To ND Hx 1A Sup Isol)
- ✓ 1KC-81B (KC To ND Hx 1B Sup Isol).

N/A 2) **IF** KC flow path not established, **THEN** evaluate local actions to establish KC flow to ND train(s) in service.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

d. **IF** ND flow to NC loops established, **THEN** perform the following:

✓ 1) Monitor ND pumps for proper operation.

__ 2) **IF AT ANY TIME** loss of all ND flow to NC loops occurs, **THEN GO TO** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).

__ e. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.

✓ f. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

✓ g. **RETURN TO** procedure and step in effect.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION
- **If a B/O occurs after aligning to Cold Leg Recirc, NV pumps will sequence on without adequate suction and void ND piping. If the only running ND pump trips while in Cold Leg Recirc, ND piping will void. The step sequence below will minimize water hammer when ND pump(s) restarted.**
- **This guidance takes priority over other EP steps that restart equipment previously on after a B/O.**

9. **IF AT ANY TIME B/O occurs, THEN perform the following:**

__ a. Wait for sequencer to start RN pump on bus energized by D/G.

__ b. Reset D/G sequencer(s).

c. **IF** both ND pumps off, **THEN** perform the following:

__ 1) Ensure all NV and NI pumps - OFF.

__ 2) Wait one minute to allow ND discharge piping to refill.

__ 3) Restart ND pump(s).

__ d. Restart S/I equipment previously on.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- **S/I recirculation flow to NC System must be maintained at all times.**
- **Aux Bldg radiation may be higher due to Cold Leg Recirc alignment.**

10. **Verify proper Cold Leg Recirc flow and valve alignment as follows:**

a. Verify proper recirc flow as follows:

__ • "NV S/I FLOW" - INDICATING FLOW

__ • Both NI pumps - INDICATING FLOW

__ • Both ND pumps - INDICATING FLOW.

RESPONSE NOT OBTAINED:

a. Perform the following:

__ 1) **IF** any S/I pump on without suction flowpath, **THEN** stop affected pump(s).

2) **IF** at least one flow path cannot be established from containment sump to NC System, **THEN** perform the following:

__ a) Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

__ b) **GO TO** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).

__ 3) **WHEN** time and manpower permit, **THEN** continue attempts to establish maximum Cold Leg Recirc capability.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
__ b. Verify KC flow to ND heat exchangers - GREATER THAN 5000 GPM.	b. Establish KC flow to affected ND Hx(s) as follows: 1) Ensure the following valves open: __ • 1KC-56A (KC To ND Hx 1A Sup Isol) __ • 1KC-81B (KC To ND Hx 1B Sup Isol). __ 2) **<u>IF</u>** KC flow path not established, **<u>THEN</u>** evaluate local actions to establish KC flow to ND train(s) in service.
c. Verify the following valves - CLOSED: __ • 1NI-100B (NI Pmps Suct From FWST) __ • 1NV-252A (NV Pumps Suct From FWST) __ • 1NV-253B (NV Pumps Suct From FWST).	c. **<u>IF</u>** accessible, **<u>THEN</u>** dispatch operator to close affected valve(s): __ • 1NI-100B (NI Pmps Suct From FWST) (AB-552, HH-JJ, 53-54, Rm 234) __ • 1NV-252A (NV Pumps Suct From FWST) (AB-554, HH-53, Rm 234) (Ladder needed) __ • 1NV-253B (NV Pumps Suct From FWST) (AB-554, HH-JJ, 53-54, Rm 234) (Ladder needed).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
d. Verify the following valves - CLOSED: __ • 1NV-89A (NC Pmps Seal Ret Cont Isol) __ • 1NV-91B (NC Pmps Seal Ret Cont Isol).	d. **<u>IF</u>** both valves open, **<u>THEN</u>** perform the following: 1) **<u>IF</u>** NC System pressure less than 385 PSIG, **<u>THEN</u>** perform the following: __ a) Stop NC pump(s). __ b) Wait 5 minutes for NC pump coastdown. 2) CLOSE the following valves: __ • 1NV-89A (NC Pmps Seal Ret Cont Isol) __ • 1NV-91B (NC Pmps Seal Ret Cont Isol).

<u>CAUTION</u> **Monitoring the following pumps must be performed as long as ECCS pumps are aligned to sump.**

11. **Monitor Cold Leg Recirc capability as follows:**

    a. Monitor the following pumps for proper operation:

    __ • NV pumps
    __ • ND pumps
    __ • NI pumps
    __ • NS pumps.

    __ b. **<u>IF</u> <u>AT</u> <u>ANY</u> <u>TIME</u>** loss of S/I recirc flow to NC System occurs, **<u>THEN</u> <u>GO</u> <u>TO</u>** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).

__ 12. **Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. **Monitor ECCS leakage normal as follows:**	**Identify and isolate leak as follows:**
a. Verify auxiliary building radiation normal:	a. Monitor the following to determine location of activity:
__ • All area monitor EMF trip 1 lights - DARK	__ • OAC EMF alarms
__ • EMF-41 (Aux Bldg Ventilation) trip 1 light - DARK.	__ • OAC VA graphic
	__ • Area monitor EMFs.
__ b. **<u>IF</u> <u>AT</u> <u>ANY</u> <u>TIME</u>** Unit 1 ECCS leakage into auxiliary building suspected, **<u>THEN</u>** perform Step 13.	__ b. Dispatch operator to locate potential Unit 1 leak.
	<u>NOTE</u> EP/1/A/5000/ECA-1.2 (LOCA Outside Containment) should not be entered once the transfer to cold leg recirculation has occurred because it may isolate the recirc flowpath. Core cooling is the overriding concern.
	c. **<u>IF</u>** Unit 1 ECCS leakage into auxiliary building identified, **<u>THEN</u>** notify TSC to determine leak isolation using the following guidance:
	__ • At least one train of ECCS must remain in service to provide core cooling
	__ • Local area habitability and off site dose rates should be evaluated
	__ • Sufficient containment sump inventory must be maintained
	__ • **<u>IF</u>** leak on only available ECCS train, **<u>THEN</u>** restoring redundant train is high priority.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. **Initiate makeup to FWST as follows:**	
a. Verify the following valves - CLOSED:	a. Perform the following:
__ • 1NV-252A (NV Pumps Suct From FWST)	__ 1) **WHEN** time and manpower permit, **THEN** coordinate with TSC as required to close affected valve(s).
__ • 1NV-253B (NV Pumps Suct From FWST)	__ 2) **WHEN** all valves closed, **THEN** perform Step 14.
__ • 1FW-27A (ND Pump 1A Suct From FWST)	__ 3) **GO TO** Step 15.
__ • 1FW-55B (ND Pump 1B Suct From FWST).	
__ • 1NI-100B (NI Pmps Suct From FWST)	
__ • 1NS-20A (NS Pump 1A Suct From FWST)	
__ • 1NS-3B (NS Pump 1B Suct From FWST).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. (Continued)

CAUTION
- **Makeup to FWST greater than 50,000 gallons may violate containment flooding assumptions.**
- **Makeup to FWST at concentrations other than the minimum Tech Spec value may violate containment sump chemistry assumptions.**

b. Initiate makeup to FWST as follows:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 1) Verify Unit 1 RMWST available for FWST makeup.	1) Perform the following: __ a) Initiate makeup of 50,000 gallons to FWST at minimum Tech Spec boron concentration. **REFER TO** OP/1/A/6200/014 (Refueling Water System). __ b) **GO TO** Step 15.
__ 2) Initiate makeup of 50,000 gallons to FWST at minimum Tech Spec boron concentration. **REFER TO** Enclosure 3 (FWST Makeup).	
__ 15. **Verify procedure entered from EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).**	__ **Consult station management to evaluate the potential need for transfer to hot leg recirc.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. **Verify ND & NS rooms sump pump interlock status as follows:**	
a. Verify "ON" released on the following switches: __ • "ND & NS ROOM SMP PMP 1A" __ • "ND & NS ROOM SMP PMP 1B" __ • "ND & NS ROOM SMP PMP 2A" (2MC11) __ • "ND & NS ROOM SMP PMP 2B" (2MC11).	__ a. Depress "LCL" on affected switch(s) to release "ON" button.
b. Verify "RESET" lights dark. __ • "ND & NS ROOM SMP PMP 1A" __ • "ND & NS ROOM SMP PMP 1B" __ • "ND & NS ROOM SMP PMP 2A" (2MC11) __ • "ND & NS ROOM SMP PMP 2B" (2MC11).	__ b. Dispatch operator to place local control switch for affected pump(s) to "STDBY" on 1ELCP0243 (AB-547, MM-53, Rm 212).
c. Place protective shrouds over the following control switches to prevent inadvertent reset: __ • "ND & NS ROOM SMP PMP 1A" __ • "ND & NS ROOM SMP PMP 1B" __ • "ND & NS ROOM SMP PMP 2A" (2MC11) __ • "ND & NS ROOM SMP PMP 2B" (2MC11).	
__ d. Consult station management for recommendation and concurrence prior to resetting interlocks.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE
- The SNSWP is not analyzed for KF System heat load during a Cold Leg Recirc alignment.
- RN is considered aligned to the SNSWP when both RN suction and discharge are aligned to the SNSWP.

17. **IF AT ANY TIME Unit 1 aligned for Cold Leg Recirc AND RN aligned to SNSWP, THEN secure opposite unit Spent Fuel Pool Cooling System as follows:**

__ a. Shutdown Unit 2 KF System. **REFER TO** OP/2/A/6200/005 (Spent Fuel Cooling System).

__ b. Monitor Unit 2 Spent Fuel Pool level and temperature. **REFER TO** AP/2/A/5500/041 (Loss of Spent Fuel Cooling or Level).

__ 18. **RETURN TO procedure and step in effect.**

END

1. **1AD-9, E/8 "FWST LO-LO LEVEL" (5%) LIT Alarm Actions:**

- **WHEN** FWST level reaches 5% "FWST LO-LO LEVEL", **THEN** perform the following:

  a. Record time of "FWST LO-LO LEVEL" ____________.

  b. Ensure any ND or NS pump(s) aligned to FWST - OFF.

  c. **IF** NV or NI pump run for more than 5 minutes after going below 5% "FWST LO-LO LEVEL" with suction only from FWST, **THEN** stop NV and NI pumps.

  d. **IF** FWST level goes below 2% (use OAC indication if available) with suction only from FWST, **THEN** stop NV and NI pumps.

  e. **IF** NV or NI pump(s) stopped per guidance above, **THEN** restart available NV and NI pumps tripped by this step after alignment to cold leg recirculation.

2. **Loss Of Emergency Coolant Recirculation:**

- **IF** Section C. (Operator Actions), Step 4, has been completed **AND** recirc flow cannot be aligned or maintained, **THEN** perform the following:

  a. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

  b. **GO TO** EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation).

3. **S/I Reinitiation Criteria:**

- **IF** NC subcooling based on core exit T/Cs less than 0°F **OR** Pzr level cannot be maintained greater than 11% (30% ACC), **THEN** perform the following to restore subcooling and level:

  - Start one or more S/I pumps.

  - Realign NV S/I flow path. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 14 (NV Alignment To S/I Mode).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 1. **Verify both NS pumps - OFF.**	**Perform the following:** a. <u>**IF**</u> all the following conditions met: __ • NS in service __ • NS suction aligned to containment sump __ • RN established to associated NS Hx, __ <u>**THEN**</u> <u>**RETURN**</u> <u>**TO**</u> procedure section and step in effect. __ b. Ensure both NS pumps - OFF.
2. **CLOSE the following valves:** __ • 1NS-20A (NS Pump 1A Suct From FWST) __ • 1NS-3B (NS Pump 1B Suct From FWST).	
__ 3. **Verify containment pressure - GREATER THAN 3 PSIG.**	**Perform the following:** __ a. Wait up to 20 seconds for 1NS-20A and 1NS-3B to close. __ b. OPEN 1NS-18A (NS Pmp A Suct From Cont Sump). __ c. OPEN 1NS-1B (NS Pmp B Suct From Cont Sump). __ d. <u>**IF**</u> <u>**AT**</u> <u>**ANY**</u> <u>**TIME**</u> containment pressure goes above 3 PSIG, <u>**THEN**</u> perform Enclosure 2 (Aligning NS for Recirculation). __ e. <u>**RETURN**</u> <u>**TO**</u> procedure section and step in effect.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Verify at least one of the following annunciators - LIT:** __ • 1AD-20, B/3 "CONT. SUMP LEVEL >3.3 ft" OR __ • 1AD-21, B/3 "CONT. SUMP LEVEL >3.3 ft".	**Perform the following:** __ a. **<u>WHEN</u>** at least one "CONT. SUMP LEVEL >3.3 ft" annunciator - LIT, **<u>THEN</u> <u>GO</u> <u>TO</u>** Step 5. __ b. Do not continue in this enclosure until at least one annunciator - LIT.
5. **Align NS train 1A to containment sump as follows:**	
__ a. Verify NS pump 1A - AVAILABLE TO RUN.	__ a. **<u>GO</u> <u>TO</u>** Step 6.
__ b. Verify 1NI-185A (ND Pump 1A Cont Sump Suct) - OPEN.	__ b. **<u>GO</u> <u>TO</u>** Step 6.
__ c. Verify NS pump 1B - OFF.	c. **<u>IF</u>** NS pump 1B running **<u>AND</u>** RN established to NS Hx 1B, **<u>THEN</u>** perform the following: __ 1) Ensure 1NS-20A (NS Pump 1A Suct From FWST) - CLOSED. __ 2) Ensure 1NS-18A (NS Pmp A Suct From Cont Sump) - OPEN. __ 3) **<u>GO</u> <u>TO</u>** Step 7.
__ d. OPEN 1NS-29A (NS Spray Hdr 1A Cont Isol).	__ d. **<u>GO</u> <u>TO</u>** Step 6.
__ e. OPEN 1NS-32A (NS Spray Hdr 1A Cont Isol).	__ e. **<u>GO</u> <u>TO</u>** Step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
__ f. Verify 1NS-20A (NS Pump 1A Suct From FWST) - CLOSED.	__ f. **<u>IF</u>** 1NS-20A remained OPEN or INTERMEDIATE for over 20 seconds, **<u>THEN</u> <u>GO</u> <u>TO</u>** Step 6.
__ g. OPEN 1NS-18A (NS Pmp A Suct From Cont Sump).	
h. Verify the following valves - OPEN: __ • 1NS-29A (NS Spray Hdr 1A Cont Isol) __ • 1NS-32A (NS Spray Hdr 1A Cont Isol) __ • 1NS-18A (NS Pmp A Suct From Cont Sump).	__ h. **<u>IF</u>** any valve remains CLOSED or INTERMEDIATE for over 25 seconds, **<u>THEN</u> <u>GO</u> <u>TO</u>** Step 6.
__ i. Verify containment pressure - GREATER THAN 1 PSIG.	i. Perform the following: 1) CLOSE the following valves: __ • 1NS-29A (NS Spray Hdr 1A Cont Isol) __ • 1NS-32A (NS Spray Hdr 1A Cont Isol). __ 2) **<u>IF</u> <u>AT</u> <u>ANY</u> <u>TIME</u>** containment pressure exceeds 1 PSIG, **<u>THEN</u> <u>RETURN</u> <u>TO</u>** Step 4. __ 3) **<u>GO</u> <u>TO</u>** Step 7.
__ j. Start NS pump 1A.	__ j. **<u>GO</u> <u>TO</u>** Step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
CAUTION **Exceeding 4650 GPM RN flow through an NS Hx will cause damage to the Hx tubes.**	
k. Align RN to NS Hx 1A as follows:	
1) Verify at least one of the following: __ • All Unit 1 and Unit 2 RN pumps - ON **OR** __ • RN System - ALIGNED FOR SINGLE SUPPLY HEADER OPERATION.	1) Perform the following to support NS Hx cooling flow: __ a) **IF** only one A train RN pump on, **THEN** CLOSE Unit 2 2RN-48B (RN Supply X-Over Isol). b) **IF** only A train RN pumps on, **THEN** CLOSE one of the following Unit 2 valves: __ • 2RN-47A (RN Supply X-Over Isol) OR __ • 2RN-48B (RN Supply X-Over Isol).
__ 2) OPEN 1RN-144A (NS Hx 1A Inlet Isol).	
__ 3) **WHEN** 1RN-144A begins to open, **THEN** OPEN 1RN-148A (NS Hx 1A Otlt Isol).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Align NS train 1B to containment sump as follows:**	
__ a. Verify 1NI-184B (ND Pump 1B Cont Sump Suct) - OPEN.	__ a. **GO TO** Step 7.
__ b. Verify NS pump 1A - OFF.	b. **IF** NS pump 1A running **AND** RN established to NS Hx 1A, **THEN** perform the following: __ 1) Ensure 1NS-3B (NS Pump 1B Suct From FWST) - CLOSED. __ 2) Ensure 1NS-1B (NS Pmp B Suct From Cont Sump) - OPEN. __ 3) **GO TO** Step 7.
__ c. OPEN 1NS-15B (NS Spray Hdr 1B Cont Isol).	__ c. **GO TO** Step 7.
__ d. OPEN 1NS-12B (NS Spray Hdr 1B Cont Isol).	__ d. **GO TO** Step 7.
__ e. Verify 1NS-3B (NS Pump 1B Suct From FWST) - CLOSED.	__ e. **IF** 1NS-3B remained OPEN or INTERMEDIATE for over 20 seconds, **THEN GO TO** Step 7.
__ f. OPEN 1NS-1B (NS Pmp B Suct From Cont Sump).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued)	
g. Verify the following valves - OPEN: __ • 1NS-15B (NS Spray Hdr 1B Cont Isol) __ • 1NS-12B (NS Spray Hdr 1B Cont Isol) __ • 1NS-1B (NS Pmp B Suct From Cont Sump).	__ g. **<u>IF</u>** any valve remains CLOSED or INTERMEDIATE for over 25 seconds, **<u>THEN</u> <u>GO</u> <u>TO</u>** Step 7.
__ h. Verify containment pressure - GREATER THAN 1 PSIG.	h. Perform the following: 1) CLOSE the following valves: __ • 1NS-15B (NS Spray Hdr 1B Cont Isol) __ • 1NS-12B (NS Spray Hdr 1B Cont Isol). __ 2) **<u>IF</u> <u>AT</u> <u>ANY</u> <u>TIME</u>** containment pressure exceeds 1 PSIG, **<u>THEN</u> <u>RETURN</u> <u>TO</u>** Step 4. __ 3) **<u>GO</u> <u>TO</u>** Step 7.
__ i. Start NS pump 1B.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

CAUTION **Exceeding 4650 GPM RN flow through an NS Hx will cause damage to the Hx tubes.**

j. Align RN to NS Hx 1B as follows:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1) Verify at least one of the following: __ • All Unit 1 and Unit 2 RN pumps - ON **OR** __ • RN System - ALIGNED FOR SINGLE SUPPLY HEADER OPERATION.	1) Perform the following to support NS Hx cooling flow: __ a) **IF** only one B train RN pump on, **THEN** CLOSE Unit 2 2RN-47A (RN Supply X-Over Isol). b) **IF** only B Train RN pumps on, **THEN** CLOSE one of the following Unit 2 valves: __ • 2RN-48B (RN Supply X-Over Isol) OR __ • 2RN-47A (RN Supply X-Over Isol).
__ 2) OPEN 1RN-225B (NS Hx 1B Inlet Isol).	
__ 3) **WHEN** 1RN-225B begins to open, **THEN** OPEN 1RN-229B (NS Hx 1B Otlt Isol).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Verify proper NS alignment as follows:**	
__ a. Verify1NS-18A (NS Pmp A Suct From Cont Sump) - OPEN.	a. Perform the following: __ 1) **<u>IF</u>** 1NI-185A (ND Pump 1A Cont Sump Suct) open **<u>AND</u>** 1NS-20A (NS Pump 1A Suct From FWST) closed, **<u>THEN</u>** OPEN 1NS-18A. __ 2) DO **<u>NOT</u>** start 1A NS pump until aligned to containment sump.
__ b. Verify1NS-1B (NS Pmp B Suct From Cont Sump) - OPEN.	b. Perform the following: __ 1) **<u>IF</u>** 1NI-184B (ND Pump 1B Cont Sump Suct) open **<u>AND</u>** 1NS-3B (NS Pump 1B Suct From FWST) closed, **<u>THEN</u>** OPEN 1NS-1B. __ 2) DO **<u>NOT</u>** start 1B NS pump until aligned to containment sump.
__ c. Verify NS pump 1A - ON.	c. Ensure the following valves - CLOSED: __ • 1NS-29A (NS Spray Hdr 1A Cont Isol) __ • 1NS-32A (NS Spray Hdr 1A Cont Isol).
__ d. Verify NS pump 1B - ON.	d. Ensure the following valves - CLOSED: __ • 1NS-15B (NS Spray Hdr 1B Cont Isol) __ • 1NS-12B (NS Spray Hdr 1B Cont Isol).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. **IF AT ANY TIME NS flow lost OR RN flow lost to operating NS Hx, THEN start other NS pump as follows:**	
__ a. Ensure affected NS pump - OFF.	
b. CLOSE the following valves for affected train: • A Train: __ • 1NS-29A (NS Spray Hdr 1A Cont Isol) __ • 1NS-32A (NS Spray Hdr 1A Cont Isol) __ • 1RN-148A (NS Hx 1A Otlt Isol) __ • 1RN-144A (NS Hx 1A Inlet Isol). • B Train: __ • 1NS-12B (NS Spray Hdr 1B Cont Isol) __ • 1NS-15B (NS Spray Hdr 1B Cont Isol) __ • 1RN-229B (NS Hx 1B Otlt Isol) __ • 1RN-225B (NS Hx 1B Inlet Isol).	
c. Verify both the following Unit 2 valves - OPEN: __ • 2RN-47A (RN Supply X-Over Isol) __ • 2RN-48B (RN Supply X-Over Isol).	__ c. **IF** affected valve closed to support NS Hx cooling flow, **THEN** ensure valve - RETURNED TO PREVIOUS ALIGNMENT.
__ d. **RETURN TO** Step 4 in this enclosure.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Verify adequate RN heat sink as follows:**	**Perform the following:**
__ • RN System - SUCTION ALIGNED TO LAKE WYLIE	a. Ensure the following valves - OPEN: __ • 1RN-3A (RN P/H Pit A Isol From SNSWP) __ • 1RN-4B (RN P/H Pit B Isol From SNSWP)
• RN essential header temperatures at one of the following locations - LESS THAN OR EQUAL TO 93°F: __ • 1MC-9 OR __ • RO Logbook.	__ • 1RN-58B (RN Hdr B Ret To SNSWP) __ • 1RN-63A (RN Hdr A Ret To SNSWP) __ • 1RN-846A (D/G 1A Hx Ret To SNSWP) __ • 1RN-848B (D/G 1B Hx Ret To SNSWP) __ • 2RN-846A (D/G 2A Hx Ret To SNSWP) __ • 2RN-848B (D/G 2B Hx Ret To SNSWP).
	(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
	b. Ensure the following valves - CLOSED: __ • 1RN-1A (RN P/H Pit A Isol From Lake) __ • 1RN-2B (RN P/H Pit A Isol From Lake) __ • 1RN-5A (RN P/H Pit B Isol From Lake) __ • 1RN-6B (RN P/H Pit B Isol From Lake) __ • 1RN-53B (Station RN Disch Hdr X-Over) __ • 1RN-54A (Station RN Disch Hdr X-Over) __ • 1RN-57A (Station RN Disch To RL Sys) __ • 1RN-843B (Station RN Disch To RL Sys) __ • 1RN-847A (D/G 1A Hx Ret To Lake) __ • 1RN-849B (D/G 1B Hx Ret To Lake) __ • 2RN-847A (D/G 2A Hx Ret To Lake) __ • 2RN-849B (D/G 2B Hx Ret To Lake).
__ 10. **Verify any NS pump - ON.**	__ **Exit this enclosure.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 11. **Notify Control Room Supervisor this enclosure shall remain in effect until current or subsequent procedures provide alternate guidance.**

12. **<u>IF</u> <u>AT</u> <u>ANY</u> <u>TIME</u> containment pressure less than 1 PSIG, <u>THEN</u> perform the following:**

__ a. Ensure NS pump - OFF.

b. CLOSE the following valves for affected train:

- <u>A Train</u>:
  - __ 1NS-29A (NS Spray Hdr 1A Cont Isol)
  - __ 1NS-32A (NS Spray Hdr 1A Cont Isol)
  - __ 1RN-148A (NS Hx 1A Otlt Isol)
  - __ 1RN-144A (NS Hx 1A Inlet Isol).
- <u>B Train</u>:
  - __ 1NS-12B (NS Spray Hdr 1B Cont Isol)
  - __ 1NS-15B (NS Spray Hdr 1B Cont Isol)
  - __ 1RN-229B (NS Hx 1B Otlt Isol)
  - __ 1RN-225B (NS Hx 1B Inlet Isol).

c. Verify both the following Unit 2 valves - OPEN:

- __ 2RN-47A (RN Supply X-Over Isol)
- __ 2RN-48B (RN Supply X-Over Isol).

RESPONSE NOT OBTAINED: __ c. **<u>IF</u>** affected valve closed to support NS Hx cooling flow, **<u>THEN</u>** ensure valve - RETURNED TO PREVIOUS ALIGNMENT.

__ d. **<u>IF</u> <u>AT</u> <u>ANY</u> <u>TIME</u>** containment pressure exceeds 3 PSIG, **<u>THEN</u> <u>RETURN</u> <u>TO</u>** Step 4 in this enclosure.

__ 1. **Verify boron concentration control systems available.**

__ 2. **Do not continue in this enclosure until boron concentration control available.**

3. **Coordinate with Primary Chemistry to ensure proper blend for duration of makeup as follows:**

   __ a. Have Primary Chemistry sample blender outlet immediately when blended makeup initiated **AND** once an hour thereafter during makeup.

   __ b. **WHEN** sample results known, **THEN** adjust makeup flow as necessary to ensure proper boron concentration obtained for duration of makeup.

4. **Ensure S/I - RESET:**

   __ a. ECCS.

   __ b. D/G load sequencers.

__ 5. **Record current boron concentration in Boric Acid Tank ________ = Ca.**

__ 6. **Record required minimum FWST boron concentration (from Tech Spec) ________ = Cf.**

__ 7. **Record boron concentration of water in RMWST __________ = Cw.**

8. **Determine amount of boric acid and reactor makeup water to add to produce a 50,000 gallon makeup at required concentration (Cf) as follows:**

   __ a. Determine amount of boric acid to be added (Va):

$$Va = \frac{50{,}000\ (Cf - Cw)}{Ca - Cw} = \frac{50{,}000\ (\qquad - \qquad)}{(\qquad - \qquad)} = \underline{\qquad\qquad}\ \text{gal.}$$

   b. Determine amount of RMWST water to be added (Vw):

   __ Vw = 50,000 - Va   Vw = ________ gal.

9. **Determine final counter readings as follows:**

__ a. Record initial "TOTAL MAKEUP COUNTER" reading ________ = TMi.

__ b. Record initial "BORIC ACID COUNTER" reading ________ = TBi.

c. Determine final "TOTAL MAKEUP COUNTER" reading (TMf):

__ TMf = TMi + 50,000 TMf = _________

d. Determine final "BORIC ACID COUNTER" reading (TBf) using Va obtained in Step 8.a:

__ TBf = TBi + Va TBf = _________

10. **Set the following blender flow controllers to achieve desired boron concentration and volume:**

__ • 1NV-238A (B/A To Blender Ctrl Vlv)

__ • 1NV-242A (RMWST To B/A Blender Ctrl).

11. **Ensure selector switches for the following valves - IN AUTO:**

__ • 1NV-238A (B/A To Blender Ctrl Vlv)

__ • 1NV-242A (RMWST To B/A Blender Ctrl).

12. **Set the following counters to achieve desired boron concentration and volume:**

__ • "BORIC ACID COUNTER"

__ • "TOTAL MAKEUP COUNTER".

__ 13. **Ensure 1NI-96B (C-Leg Accum Chk Vlv Tst Isol) - CLOSED.**

14. **Dispatch operator to perform the following:**

__ • CLOSE 1NB-5 (Unit 1 VCT To NB Evap Feed Demin Isol) (1ELCC0024) (AB-560, MM-52)

__ • OPEN 1NV-183 (Boric Acid Blender Outlet To FWST & RHT Isol) (AB-585, KK-51, Rm 419)

__ • OPEN 1NV-185 (Boric Acid To FWST Isol) (AB-581, KK-51, Rm 419).

15. **Place switches for the following valves in "CLOSE":**

__ • 1NV-181A (B/A Blender Otlt To VCT)

__ • 1NV-186A (B/A Blender Otlt To VCT Otlt).

__ 16. **Place "NC MAKEUP MODE SELECT" switch in manual.**

17. **Ensure the following switches - IN AUTO:**

__ • "RX M/U WTR PUMP 1A"

__ • "RX M/U WTR PUMP 1B"

__ • "B/A XFER PUMP 1A"

__ • "B/A XFER PUMP 1B".

18. **Ensure the following reset:**

__ • "B/A XFER PUMP 1A RESET"

__ • "B/A XFER PUMP 1B RESET".

__ 19. **Do not continue until Step 14 complete.**

__ 20. **Place "NC MAKEUP CONTROL" switch in "START".**

21. **Ensure the following:**

__ • Selected Reactor Makeup Water Pump(s) start

__ • Selected Boric Acid Transfer Pump(s) start

__ • 1NV-238A (B/A To Blender Ctrl Vlv) positions to produce desired boric acid flow

__ • 1NV-242A (RMWST To B/A Blender Ctrl) positions to produce desired total makeup flow.

22. **Request TSC to periodically (every 2-4 hours) monitor FWST makeup as part of long term recovery as follows:**

__ • Verify total makeup volume added to FWST

__ • Verify corresponding FWST level increase

__ • Verify FWST makeup at required minimum FWST boron concentration

__ • Secure FWST makeup at 50,000 gallons.

__ 23. **<u>WHEN</u> 50,000 gallons of makeup added to FWST, <u>THEN</u> place "NC MAKEUP CONTROL" switch in "STOP".**

24. **Ensure the following:**

__ • Selected Reactor Makeup Water pump(s) stop

__ • Selected Boric Acid Transfer pump(s) stop

__ • 1NV-238A (B/A To Blender Ctrl Vlv) closes

__ • 1NV-242A (RMWST To B/A Blender Ctrl) closes.

25. **Dispatch operator to close the following valves:**

__ • 1NV-183 (Boric Acid Blender Outlet To FWST & RHT Isol) (AB-585, KK-51, Rm 419)

__ • 1NV-185 (Boric Acid To FWST Isol) (AB-581, KK-51, Rm 419).

26. **<u>IF</u> needed to support plant conditions, <u>THEN</u> place desired switch in "ON":**

__ • "RX M/U WTR PUMP 1A"

__ • "RX M/U WTR PUMP 1B"

__ • "B/A XFER PUMP 1A"

__ • "B/A XFER PUMP 1B".

27. **Place switches for the following valves in auto:**

__ • 1NV-181A (B/A Blender Otlt To VCT)

__ • 1NV-186A (B/A Blender Otlt To VCT Otlt).

__ 28. **Align for makeup to the VCT. <u>REFER</u> <u>TO</u> OP/1/A/6150/009 (Boron Concentration Control).**

JPM E

Catawba Nuclear Station
JPM E
September 2019 NRC Exam

EVALUATION SHEET

Task: Restore Normal Power to 1ETA From The Control Room

Alternate Path: No

Facility JPM #: DG3-003

Safety Function: 6 **Title:** Emergency Diesel Generator (ED/G) System

K/A 064 A4.07 Ability to manually operate and/or monitor in the control room: Transfer ED/G (with load) to grid.

Rating(s): 3.4 / 3.4 **CFR:** 41.7 / 45.5 to 45.8

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

Simulator __X__ In-**P**lant ________ **P**erform __X__ **S**imulate ________

References: OP/1/A/6350/002 Rev 189

Task Standard: 1ETA power being supplied from offsite through 1ATC and 1A D/G secured from the control room without a reverse power trip in accordance with OP/1/A/6350/002 (Diesel Generator Operation) Enclosure 4.17 (Shutdown of D/G 1A After An Automatic Start).

Validation Time: 12.5 minutes **Time Critical:** Yes _____ No __X__

==

Applicant: Time Start: __________
NAME____________________________ Docket #_______________ Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

==

COMMENTS

____

Catawba Nuclear Station
JPM E
September 2019 NRC Exam

SIMULATOR OPERATOR INSTRUCTIONS:

1. ENSURE NRC Examination Security has been established.
2. Reset to IC #154
3. Enter the password.
4. Select "Yes" on the INITIAL CONDITION RESET pop-up window.
5. Ensure simulator setup per table below.
6. Place simulator in RUN and acknowledge any alarms.
7. ENSURE "Extra Operator" is present in the simulator.
8. Place simulator in FREEZE until Examiner cue is given.

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event

Catawba Nuclear Station
JPM E
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is recovering from a blackout per AP/1/A/5500/007 Case I (Loss of Normal Power to an Essential Train).**
- **1ATC is energized and available to supply 1ETA.**
- **D/G 1A Mode Select Switch is in the "CTRL-RM" position.**
- **D/G 1A Load Sequencer has been reset.**

INITIATING CUES:

- **The Control Room Supervisor instructs you to parallel D/G 1A to 1ETA's normal power source (1ATC) and shutdown D/G 1A per OP/1/A/6350/002 (Diesel Generator Operation) Enclosure 4.17 (Shutdown of D/G 1A After an Automatic Start) Step 3.4.**
- **Initial Conditions are complete.**
- **Concurrent Verification has been waived.**

EXAMINER NOTE: After reading cue, provide the applicant with a copy of OP/1/A/6350/002 Enclosure 4.17 complete through step 3.3.

START TIME: _______

STEP/STANDARD	SAT/UNSAT
STEP 1: 3.4 **IF** shutting down the diesel from the Control Room, perform the following: 3.4.1 **IF** both the normal (ETA Norm Fdr Frm ATC) **AND** alternate (ETA Alt Fdr Frm SATA) incoming feeder breakers are open, perform the following: **CAUTION:** It is essential for the Operator to read and understand the following steps before attempting to re-synchronize the D/G and bus to the normal or alternate power source. Quick response to any changes in load and power factor when the breaker closes is required to reduce the likelihood of a reverse power D/G Breaker trip. 3.4.1.1 Adjust voltage using "D/G 1A Volt Adjust" to allow "D/G 1A Volts" to be one half to two divisions (50 to 200 volts) higher than "Line Volts". STANDARD: Applicant uses the D/G voltage control pushbuttons to set D/G 1A VOLTS 50 to 200 volts higher than LINE VOLTS on 1MC-8. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 2: 3.4.1.2 Place the "D/G 1A Sync" Switch in the "ON" position. STANDARD: Applicant rotates the D/G 1A Sync switch clockwise to the ON position. **Examiner Note: This step is critical to ensure that D/G 1A is in sync with the grid prior to closing the 1ETA normal incoming breaker.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP 3 3.4.1.3 Adjust D/G speed using "D/G 1A Gov Ctrl" such that the Synchroscope is moving slowly in the "FAST" direction, (approximately 1 revolution per 30 seconds). STANDARD: Applicant uses the D/G 1A Gov Ctrl pushbuttons to ensure that the Synchroscope is rotating slowly in the FAST direction. **Examiner Note: This step is critical to prevent a reverse power trip once the Normal Feeder breaker to 1ETA is closed.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 4 **CAUTION:** The following three steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip. 3.4.1.4 As the indicator reaches 1.5 min. before the vertical (synchronized) position, close one of the following breakers: o ETA Norm Fdr Frm ATC OR o ETA Alt Fdr Frm SATA STANDARD: Once the Synchroscope indicator reaches the 1.5 min. before the vertical position, the applicant will depress the red CLOSE pushbutton and verify the red CLSD light lit and green OPEN light dark on the “ETA Norm Fdr Frm ATC” breaker. The applicant will then immediately perform the next step to prevent a reverse power D/G Breaker trip. **Examiner Note: This step is critical to parallel 1A D/G to the normal offsite circuit to meet the task standard.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 3.4.1.5 Stabilize the D/G with a positive load and a lagging power factor. STANDARD: Applicant depresses the D/G 1A Gov Ctrl RAISE pushbutton to ensure that D/G 1A picks up a positive load. **Examiner Note: This step is critical to ensure the 1A D/G is stabilized with a positive load to prevent a reverse power D/G Breaker trip.** **Examiner Note: As long as the applicant ensured that D/G 1A volts were 50 to 200 volts higher than line volts, power factor will be lagging, and depending on how much higher D/G 1A volts were than line volts, may be severely lagging.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 6 3.4.1.6 **IF** the power factor meter indicates severely leading, (pegs high) **AND** power output decreases to 0 KW (pegs low), **THEN** IMMEDIATELY trip D/G 1A Bkr To ETA. STANDARD: Applicant determines that this step is not applicable and continues. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 7 3.4.1.7 Place the "D/G 1A Sync" Switch in the "OFF" position. Record time _____________ STANDARD: Applicant rotates the D/G 1A Sync Switch counterclockwise to the OFF position. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 8 3.4.2 Verify one of the following breakers is closed: o ETA Norm Fdr Frm ATC OR o ETA Alt Fdr Frm SATA STANDARD: Applicant verifies the red CLSD light lit for the ETA Norm Fdr Frm ATC breaker. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 9 3.4.3 **IF** D/G 1A Bkr To ETA is open, go to Step 3.4.7. STANDARD: Applicant determines that D/G 1A Bkr To ETA is closed by verifying the red CLSD light lit and this step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**

<table>
<tr><th>STEP/STANDARD</th><th>SAT/UNSAT</th></tr>
<tr><td>

STEP 10 3.4.4 **IF** D/G load is < 2000 KW, **WHILE** maintaining power factor at approximately .95 lagging using “D/G 1A Volt Adjust”, adjust generator load using “D/G 1A Gov Ctrl” per the following: {PIP 96-1185}

CAUTION: The following two steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip.

3.4.4.1 Reduce D/G load to 200 KW

3.4.4.2 Trip D/G 1A Bkr To ETA.

STANDARD:

Applicant depresses the D/G 1A Gov Ctrl LOWER pushbutton to decrease D/G 1A load to 200 KW while depressing the D/G 1A Volt Adjust LOWER pushbutton to maintain power factor at .95 lagging. Once 200 KW load is attained, the applicant depresses the green OPEN pushbutton for D/G 1A Bkr To ETA and verifies the green OPEN light is lit.

Examiner Note: If applicant loaded 1A D/G to > 2000 KW, step 3.2.5 will have them lower load to 2000 KW and after 15 minutes at this load, will have them decrease load to 200 KW and trip the D/G 1A breaker. If this is the case, once the applicant decreases D/G 1A load to 2000 KW, provide the following cue: “15 minutes have elapsed”.

Examiner Note: Steps 3.4.5 and 3.4.6 should be not applicable.

COMMENTS:

</td><td>

CRITICAL STEP

___ SAT

___ UNSAT

</td></tr>
</table>

STEP/STANDARD	SAT/UNSAT
STEP 11 3.4.7 Allow diesel to idle unloaded for a minimum of 5 minutes or until the following conditions are met: ○ Jacket water outlet temperature is $\leq$ 170°F. ○ Lube oil temperature is $\leq$ 170°F. ○ Turbocharger exhaust temperatures have stabilized. STANDARD: Applicant acknowledges step and continues. **Examiner Cue: "5 minutes has elapsed."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 12 3.4.8 Ensure one of the following conditions is met: ○ The D/G Sequencer is "RESET". OR ○ Power has been removed from the D/G Sequencer. STANDARD: Applicant determines based off the initiating cue that D/G 1A load sequencer has been RESET and continues with the procedure. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 13 3.4.9 Depress D/G 1A "OFF" pushbutton. Record time _________ STANDARD: Applicant depresses the D/G 1A green OFF pushbutton. **Examiner Note: This step is critical to shutdown 1A D/G to meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP 14 3.4.10 **WHEN** the engine stops, dispatch Operators as necessary to verify the following: STANDARD: Applicant describes contacting and dispatching an AO to perform this step. **Examiner Cue: "An AO has been dispatched. Another operator will complete the remaining steps. This JPM is complete."** COMMENTS: **END OF TASK**	___ **SAT** ___ **UNSAT**

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is recovering from a blackout per AP/1/A/5500/007 Case I (Loss of Normal Power to an Essential Train).**
- **1ATC is energized and available to supply 1ETA.**
- **D/G 1A Mode Select Switch is in the “CTRL-RM” position.**
- **D/G 1A Load Sequencer has been reset.**

INITIATING CUES:

- **The Control Room Supervisor instructs you to parallel D/G 1A to 1ETA’s normal power source (1ATC) and shutdown D/G 1A per OP/1/A/6350/002 (Diesel Generator Operation) Enclosure 4.17 (Shutdown of D/G 1A After an Automatic Start) Step 3.4.**
- **Initial Conditions are complete.**
- **Concurrent Verification has been waived.**

1. Limits and Precautions

1.1 Maximum exhaust temperature on turbochargers is 1200°F.

1.2 Lube oil and cooling water at the engine inlets and outlets shall be 120-190°F while the engine is in standby.

1.3 If loading the D/G onto an isolated bus (D/G only on the bus), the voltage control button has no effect on power factor, only voltage.

1.4 Observe Tech Spec limits of TS 3.8.1, 3.8.2, 3.8.3 & SLC 16.8-5.

1.5 Starting air pressure shall be $\geq$ 160 psig before auto starts.

1.6 A diesel generator will **NOT** start manually within 2 minutes of a manual stop.

1.7 Both diesels shall **NOT** be run simultaneously under normal conditions.

1.8 Do **NOT** operate D/G parallel to the bus during inclement weather (e.g. lightning or heavy winds) when run can be postponed to prevent jeopardizing operability.

1.9 Running a D/G only as long and at as much load as is necessary will aid in extending time between D/G overhauls.

1.10 Starting a D/G will trip the FD Recirc Pump if it is running and block it from starting until the D/G is shutdown. Plans shall be made to restart the pump If required after the D/G is secured (e.g. Open Item).

1.11 If a step calls for a parameter to be taken on the OAC, and the same parameter is also measured on the 1A (1B) D/G Alarm Monitor Panel 1ELMC0029 (1ELMC0030), the Alarm Monitor Panel may be used to satisfy the intent of the step.

1.12 Starting an RN Pump while its associated D/G is paralleled to the grid may result in an overcurrent trip of the D/G breaker. {PIP 99-1648}

1.13 If loading the D/G onto an isolated bus (D/G only on the bus), loading one or more pumps onto the bus helps to stabilize the D/G.

1.14 When paralleling a D/G to the Essential Switchgear, the in-service KC and/or NV Pumps are aligned to the opposite train to prevent the simultaneous loss of NC Pump Seal Injection and Thermal Barrier Cooling if a D/G failure results in the loss of the Essential Switchgear. If both KC and NV in-service Pumps are powered from the same bus as the D/G being tested, KC is swapped to the opposite train. (PIP 99-3510)

1.15 The Diesel Battery Enclosure Ventilation System shall remain in operation to provide cooling for the batteries and to prevent accumulation of hydrogen gas in the D/G Battery Enclosure.

1.16 Do **NOT** operate the D/G at no load or light loads for long periods of time to prevent buildup of carbon and sludge in the engine

2. Initial Conditions

AA 2.1 Verify D/G 1A is in operation and was started by an automatic signal.

BB (SRO) 2.2 Verify the following:

☑ 1A Sequencer is reset.

☑ Plant conditions allow the following:

- Transfer of 1ETA to its normal or alternate source
- Shutdown of D/G 1A

3. Procedure

AA 3.1 Have operator obtain the following:

☑ Key #207 (1A/1B Diesel Generator Control Panel) (for thermography of voltage regulator diodes)

☑ FLIR Thermal Image Camera

☑ A container to sample fuel oil for water.

☑ An appropriate container to hold waste sample oil.

NOTE:
- The following item shall be performed just prior to shut down of the D/G.
- Once the DGCP right door is open, immediately perform thermography measurement of the diodes, CR1 - CR6, to observe maximum diode temperature.
- All of the diodes temperature readings may be captured in a single thermography scan.

AA 3.2 Prior to shut down of the D/G have local operator perform thermography on the D/G voltage regulator diodes as follows:

☑ 3.2.1 Open the Diesel Generator Control Panel right side door.

☑ 3.2.2 Take the thermography reading on diodes CR1-CR6.

☑ 3.2.3 Close the Diesel Generator Control Panel right side door.

NOTE:	Diode temperatures are expected to range between 230°F and 285°F.

☑ 3.2.4 Document the highest temperature from the voltage regulator diodes thermography scan.

Highest Temperature 240 °F

N/A AA 3.2.5 **IF** a diode temperature was greater than 300 °F, **THEN** immediately notify the SM to contact ENG to discuss any required actions for the diode temperature.

N/A AA 3.3 **IF** shutting down D/G 1A LOCALLY, perform the following:

_____ 3.3.1 Close 1VN-1 (1A D/G Eng Exhaust Silencer Drain) (DB-557, CC-38).

3.3.2 Transfer starting control to the local control panel per one of the following:

_____ 3.3.2.1 **IF** possible, have the Control Room Operator transfer control as follows:

_____ A. Place the "D/G 1A Ctrl Location" Switch on 1MC11 in the "LOCAL" position.

_____ B. Verify 1SI-15, A/3 "ETA INCOMING BKRS CONTROL LOCAL" is lit.

_____ 3.3.2.2 **IF** there is an emergency **OR** remote circuitry malfunction preventing Step 3.3.2.1 from being performed, actuate the "Control Room Override" at the break glass station on 1DGCPA.

_____ 3.3.3 **IF** both the normal (Normal Bkr 1ETA3) **AND** alternate (Stand-By Bkr 1ETA4) feeder breakers are open, perform the following:

CAUTION: It is essential for the Operator to read and understand the following steps before attempting to re-synchronize the D/G and bus to the normal or alternate power source. Quick response to any changes in load and power factor when the breaker closes is required to reduce the likelihood of a reverse power D/G Breaker trip.

_____ 3.3.3.1 Adjust voltage using "Voltage Control" to allow "D/G Voltage" to be one half to two divisions (50 to 200 volts) higher than "Line Voltage".

_____ 3.3.3.2 Place the "Synchroscope Selector Switch" in the "ON" position.

_____ 3.3.3.3 Adjust D/G speed such that the synchroscope is moving slowly in the "FAST" direction, (approximately 1 revolution per 30 seconds.)

CAUTION: The following three steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip.

_____ 3.3.3.4 As the indicator reaches 1.5 min. before the vertical (synchronized) position and the "Synchronized" light is lit, close one of the following breakers:

☐ Normal Bkr 1ETA3

OR

☐ Stand-By Bkr 1ETA4

_____ 3.3.3.5 Stabilize the D/G with a positive load and a lagging power factor.

_____ 3.3.3.6 **IF** the power factor meter indicates severely leading, (pegs clockwise)
AND power output decreases to 0 KW,
THEN IMMEDIATELY trip Diesel Gen Bkr 1ETA18.

_____ 3.3.3.7 Place the "Synchroscope Selector Switch" in the "OFF" position.

_____ 3.3.4 Verify one of the following breakers is closed:

☐ Normal Bkr 1ETA3

OR

☐ Stand-By Bkr 1ETA4

_____ 3.3.5 **IF** Diesel Gen Bkr 1ETA18 is open, go to Step 3.3.9.

_____ 3.3.6 **IF** D/G load is < 2000 KW, **WHILE** maintaining power factor at approximately .95 lagging using "Voltage Control", adjust generator load using "Speed Control" per the following: {PIP 96-1185}

CAUTION: The following two steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip.

_____ 3.3.6.1 Reduce D/G load to 200 KW.

_____ _____ 3.3.6.2 Trip Diesel Gen Bkr 1ETA18.

_____ 3.3.7 **IF** D/G load is between 2000 KW to 3000 KW, **WHILE** maintaining power factor at approximately .95 lagging using "Voltage Control", adjust generator load using "Speed Control" per the following: {PIP 96-1185}

_____ 3.3.7.1 Slowly reduce D/G load to 2000 KW (1850-2150 KW). {PIP 97-2796}

Record time____________

NOTE: When using the D/G to transfer Essential Bus power supplies, the 5 minute time limit specified in the following step may be extended as needed.

3.3.7.2 **AFTER** 15 minutes, perform the following within 5 minutes:

CAUTION: The following two steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip.

_____ A. Reduce D/G load to 200 KW.

_____ _____ B. Trip Diesel Gen Bkr 1ETA18.

_____ 3.3.8 **IF** D/G load is > 3000 KW, **WHILE** maintaining power factor at approximately .95 lagging using "Voltage Control", adjust generator load using "Speed Control" per the following: {PIP 96-1185}

_____ 3.3.8.1 Reduce load to 4800 KW (4650-4950 KW). {PIP 97-2796}

Record time____________

_____ 3.3.8.2 **AFTER** 5 minutes, reduce load to 3850 KW (3700-4000 KW).

Record time____________

_____ 3.3.8.3 **AFTER** 5 minutes, reduce load to 2900 KW (2750-3050 KW).

Record time____________

_____ 3.3.8.4 **AFTER** 5 minutes, reduce load to 2000 KW (1850-2150 KW).

Record time____________

_____ 3.3.8.5 Ensure total load reduction time is ≥ 15 minutes, prior to performing Step 3.3.8.6.

NOTE: When using the D/G to transfer Essential Bus power supplies, the 5 minute time limit specified in the following step may be extended as needed.

3.3.8.6 **AFTER** 5 minutes, perform the following within 5 minutes:

CAUTION: The following two steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip

_____ A. Reduce D/G load to 200 KW.

_____ _____ B. Trip Diesel Gen Bkr 1ETA18.

_____ 3.3.9 Allow diesel to idle unloaded for a minimum of 5 minutes or until the following conditions are met:

- ☐ Jacket water outlet temperature is ≤ 170°F.
- ☐ Lube oil outlet temperature is ≤ 170°F.
- ☐ Turbocharger exhaust temperatures have stabilized.

_____ 3.3.10 Ensure one of the following conditions is met:

- ☐ The D/G Sequencer is "RESET".

  OR

- ☐ Power has been removed from the D/G Sequencer.

_____ 3.3.11 Depress "STOP" pushbutton on the control panel.

_____ 3.3.12 **WHEN** the diesel stops, verify the following:

- ☐ The "L.O. Pump & Heater" light indicates "ON".
- ☐ The "J.W. Pump & Heater" light indicates "ON".
- ☐ 1RN-232A (1A D/G Hx Inlet Isol) (DB-565, EE-38) closes.

_____ 3.3.13 Have the Control Room Operator place D/G 1A control in the "CTRL RM" position on 1MC11.

_____ 3.4 **IF** shutting down the diesel from the Control Room, perform the following:

_____ 3.4.1 **IF** both the normal (ETA Norm Fdr Frm ATC) **AND** alternate (ETA Alt Fdr Frm SATA) incoming feeder breakers are open, perform the following:

CAUTION:	It is essential for the Operator to read and understand the following steps before attempting to re-synchronize the D/G and bus to the normal or alternate power source. Quick response to any changes in load and power factor when the breaker closes is required to reduce the likelihood of a reverse power D/G Breaker trip.

_____ 3.4.1.1 Adjust voltage using "D/G 1A Volt Adjust" to allow "D/G 1A Volts" to be one half to two divisions (50 to 200 volts) higher than "Line Volts".

_____ 3.4.1.2 Place the "D/G 1A Sync" Switch in the "ON" position.

_____ 3.4.1.3 Adjust D/G speed using "D/G 1A Gov Ctrl" such that the Synchroscope is moving slowly in the "FAST" direction, (approximately 1 revolution per 30 seconds).

CAUTION:	The following three steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip.

_____ 3.4.1.4 As the indicator reaches 1.5 min. before the vertical (synchronized) position, close one of the following breakers:

☐ ETA Norm Fdr Frm ATC

OR

☐ ETA Alt Fdr Frm SATA

_____ 3.4.1.5 Stabilize the D/G with a positive load and a lagging power factor.

_____ 3.4.1.6 **IF** the power factor meter indicates severely leading, (pegs high) **AND** power output decreases to 0 KW (pegs low), **THEN** IMMEDIATELY trip D/G 1A Bkr To ETA.

_____ 3.4.1.7 Place the "D/G 1A Sync" Switch in the "OFF" position.

Record time____________

_____ 3.4.2 Verify one of the following breakers is closed:

☐ ETA Norm Fdr Frm ATC

OR

☐ ETA Alt Fdr Frm SATA

_____ 3.4.3 **IF** D/G 1A Bkr To ETA is open, go to Step 3.4.7.

_____ 3.4.4 **IF** D/G load is < 2000 KW, **WHILE** maintaining power factor at approximately .95 lagging using "D/G 1A Volt Adjust", adjust generator load using "D/G 1A Gov Ctrl" per the following: {PIP 96-1185}

CAUTION: The following two steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip

_____ 3.4.4.1 Reduce D/G load to 200 KW.

_____ _____ 3.4.4.2 Trip D/G 1A Bkr To ETA.

_____ 3.4.5 **IF** D/G load is between 2000 KW to 3000 KW, **WHILE** maintaining power factor at approximately .95 lagging using "D/G 1A Volt Adjust", adjust generator load using "D/G 1A Gov Ctrl" per the following: {PIP 96-1185}

_____ 3.4.5.1 Slowly reduce D/G load to 2000 KW (1850-2150 KW). {PIP 97-2796}

Record time_______________

NOTE: When using the D/G to transfer Essential Bus power supplies, the 5 minute time limit specified in the following step may be extended as needed.

3.4.5.2 **AFTER** 15 minutes, perform the following within 5 minutes:

CAUTION: The following two steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip

_____ A. Reduce D/G load to 200 KW.

_____ _____ B. Trip D/G 1A Bkr To ETA.

_____ 3.4.6 **IF** D/G load is > 3000 KW, **WHILE** maintaining power factor at approximately .95 lagging using "D/G 1A Volt Adjust", adjust generator load using "D/G 1A Gov Ctrl" per the following: {PIP 96-1185}

_____ 3.4.6.1 Reduce load to 4800 KW (4650-4950 KW). {PIP 97-2796}

Record time_____________

_____ 3.4.6.2 **AFTER** 5 minutes, reduce load to 3850 KW (3700-4000 KW).

Record time_____________

_____ 3.4.6.3 **AFTER** 5 minutes, reduce load to 2900 KW (2750-3050 KW).

Record time_____________

_____ 3.4.6.4 **AFTER** 5 minutes, reduce load to 2000 KW (1850-2150 KW).

Record time_____________

_____ 3.4.6.5 Ensure total load reduction time is ≥ 15 minutes, prior to performing Step 3.4.6.6.

NOTE: When using the D/G to transfer Essential Bus power supplies, the 5 minute time limit specified in the following step may be extended as needed.

3.4.6.6 **AFTER** 5 minutes, perform the following within 5 minutes:

CAUTION: The following two steps shall be performed prior to signing off either step to reduce the likelihood of a reverse power D/G Breaker trip.

_____ A. Reduce D/G load to 200 KW.

_____ _____ B. Trip D/G 1A Bkr To ETA.

_____ 3.4.7 Allow diesel to idle unloaded for a minimum of 5 minutes or until the following conditions are met:

- ☐ Jacket water outlet temperature is ≤ 170°F.
- ☐ Lube oil outlet temperature is ≤ 170°F.
- ☐ Turbocharger exhaust temperatures have stabilized.

_____ 3.4.8 Ensure <u>one</u> of the following conditions is met:

☐ The D/G Sequencer is "RESET".

OR

☐ Power has been removed from the D/G Sequencer.

_____ 3.4.9 Depress D/G 1A "OFF" pushbutton.

Record time _______________

_____ 3.4.10 **<u>WHEN</u>** the engine stops, dispatch Operators as necessary to verify the following:

☐ The "L.O. Pump & Heater" light indicates "ON".

☐ The "J.W. Pump & Heater" light indicates "ON".

☐ 1RN-232A (1A D/G Hx Inlet Isol) (DB-565, EE-38) closes.

_____ 3.5 Record total time D/G 1A was run (min) ___________.

_____ 3.6 Start the Diesel Building Normal Vent Fan 1A.

_____ 3.7 **<u>IF</u>** the "Control Room Override" break glass station on 1DGCPA was used, ensure it is returned to normal as follows:

_____ 3.7.1 Reset the switch.

_____ 3.7.2 Initiate a Work Request to replace the break glass.

_____ 3.8 **<u>IF</u>** the D/G was in operation for $\geq$ 1 hour, drain any accumulated water from the Fuel Oil Day Tank by performing the following:

☐ 3.8.1 Place a container downstream of 1FD-96 (1A D/G Eng Fuel Oil Day Tank 1A Sample Outside Isol) (DB-557, DD-38).

_____ 3.8.2 Open 1FD-95 (1A D/G Eng Fuel Oil Day Tank 1A Sample Inside Isol) (DB-557, DD-38).

_____ 3.8.3 Slowly open 1FD-96 (1A D/G Eng Fuel Oil Day Tank 1A Sample Outside Isol).

_____ 3.8.4 **<u>WHEN</u>** the sample has been obtained, close 1FD-96 (1A D/G Eng Fuel Oil Day Tank 1A Sample Outside Isol).

☐ 3.8.5 **<u>AFTER</u>** allowing the sample to settle for approximately 10 minutes, inspect the container for water.

NOTE:	All used oil shall be disposed of per Nuclear Environmental Work Practice 2.8 (Used Oil).

☐ 3.8.6 Dump container contents in waste oil container.

_____ 3.8.7 **IF** sample is **NOT** free of water, repeat Step 3.8.1 through Step 3.8.6.

3.8.8 Ensure the following valves are closed:

- _____ 1FD-95 (1A D/G Eng Fuel Oil Day Tank 1A Sample Inside Isol)
- _____ 1FD-96 (1A D/G Eng Fuel Oil Day Tank 1A Sample Outside Isol)

_____ 3.9 Ensure 1VN-1 (1A D/G Eng Exhaust Silencer Drain) (DB-557, CC-38) is open.

3.10 Drain any accumulated oil out of the crankcase vent drip leg as follows:

_____ 3.10.1 Verify 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain) (DB-556, DD-39) is closed.

_____ 3.10.2 Remove pipe cap downstream of 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain).

_____ 3.10.3 Place the waste oil container downstream of 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain).

_____ 3.10.4 Open 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain) to drain any accumulated oil.

_____ 3.10.5 **WHEN** oil has drained, close 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain).

_____ 3.10.6 Replace pipe cap downstream of 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain).

_____ 3.11 **IF** the D/G run was normal **AND** the D/G did **NOT** trip, perform the following at the Alarm Monitor Panel (1ELMC0029):

☐ 3.11.1 Depress and hold the "Alarm Ack" button for 1 second.

☐ 3.11.2 Verify that any "A" or "B" alarm lights that were flashing are now illuminated solid.

3.12 Complete the following enclosures:

_____ • Enclosure 4.6 (D/G 1A Checklist for ES Actuation)

_____ • Enclosure 4.7 (D/G 1A Independent Verification Checklist for ES Actuation)

3.13 **WHEN** the D/G has been shutdown for at least 45 minutes, verify the lube oil strainer discharge check valves do **NOT** indicate back leakage as follows: {PIP 00-3598}

_____ 3.13.1 Verify LD pre-lube pump is running.

_____ 3.13.2 Measure and record the temperature of the piping approximately 6" upstream and downstream of each of the following:

☐ 1LD-17 (1A D/G Eng Lube Oil Strainer 1A1 Check)

Upstream ________°F Downstream ________°F

☐ 1LD-18 (1A D/G Eng Lube Oil Strainer 1A2 Check)

Upstream ________°F Downstream ________°F

_____ 3.13.3 Verify the delta T across each is > 5°F.

☐ 1LD-17 delta T ________°F

☐ 1LD-18 delta T ________°F

_____ 3.13.4 **IF** the delta T across 1LD-17 **OR** 1LD-18 is ≤ 5°F, contact Engineering for an operability determination.

Person notified ________________________________

_____ 3.13.5 **IF** the delta T across either valve is ≤ 5°F, initiate a CR for tracking.

NOTE: All used oil shall be disposed of per Nuclear Environmental Work Practice 2.8 (Used Oil).

_____ 3.14 Ensure any used oil generated during this test (as a result of sampling, etc.) is properly disposed of.

_____ 3.15 Place the ES Checklist and the IV Checklist in the Control Copy folder of this procedure and route the outdated enclosures with this enclosure.

_____ 3.16 Complete D/G Logbook entries per OMP 2-28 (Diesel Generator Logbook).

NOTE: D/G 1A is now aligned per Enclosure 4.1(Diesel Alignment for ES Actuation).

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

JPM F

Catawba Nuclear Station
JPM F
September 2019 NRC Exam

EVALUATION SHEET

Task: Shift Lower Containment Vent Units

Alternate Path: No

Facility JPM #:

Safety Function: 5 **Title:** Containment Cooling System

K/A 022 A4.01 Ability to manually operate and/or monitor in the control room: CCS Fans

Rating(s): 3.6 / 3.6 **CFR:** 41.7 / 45.5 to 45.8

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

Simulator __X__ Control Room ________ **P**erform _________ **S**imulate __X__

References: OP/1/A/6450/001 (Containment Ventilation (VV) Systems rev.040

Task Standard: 1B LCVU running and 1A LCVU off.

Validation Time: 8 minutes **Time Critical:** Yes _____ No __X__

==

Applicant:
NAME______________________________ Docket #________________ Time Start: __________
Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

==

COMMENTS

Catawba Nuclear Station
JPM F
September 2019 NRC Exam

SIMULATOR OPERATOR INSTRUCTIONS:

1. ENSURE NRC Examination Security has been established.
2. Reset to IC 155
3. Enter the password.
4. Select “Yes” on the INITIAL CONDITION RESET pop-up window.
5. Ensure simulator setup per table below.
6. Place simulator in RUN and acknowledge any alarms.
7. ENSURE “Extra Operator” is present in the simulator.
8. Place simulator in FREEZE until Examiner cue is given.

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event

Catawba Nuclear Station
JPM F
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

Unit 1 is in MODE 1.

INITIATING CUES:

- **The Control Room Supervisor has instructed you to shift Lower Containment Vent Units in accordance with OP/1/A/6450/001 (Containment Ventilation Systems), Enclosure 4.13 (Shifting Operating Lower Containment Ventilation Units and Pipe Tunnel Booster Fans)**
- **You are directed to secure the 1A LCVU and start the 1B LCVU.**
- **Steps 3.1 and 3.3 were marked N/A during the pre-job brief.**
- **Peer checks have been waived.**

EXAMINER NOTE: After reading cue, provide the applicant with a copy of OP/1/A/6450/001 Containment Ventilation (VV) Systems, Enclosure 4.13.

START TIME: _______

<table>
<tr><th>STEP/STANDARD</th><th>SAT/UNSAT</th></tr>
<tr><td>STEP 1: 3.2 IF three LCVUs are operating AND it is desired, shift the operating units as follows:

3.2.1 IF the LCVUs are operating in "LOW" speed, perform the following:

3.2.1.1 Stop the LCVU to be removed from service by placing its control switch in the "OFF" position:

• "VV LCVU 1A"

STANDARD:

Applicant places the switch for VV LCVU 1A to the OFF position.

This step is critical to shut down the desired Lower Containment Vent Unit

COMMENTS:</td><td>CRITICAL STEP

___ SAT

___ UNSAT</td></tr>
</table>

<table>
<tr><td>NOTE: The procedure may continue up to and including Step 3.2.1.8 before completing the following step.

STEP 2 3.2.1.2 Verify the green indicating light illuminates for the LCVU stopped.
STANDARD:

Applicant determines the green indicating light is LIT for VV LCVU 1A.

COMMENTS:</td><td>___ SAT

___UNSAT</td></tr>
</table>

STEP/STANDARD	SAT/UNSAT
STEP 3 3.2.1.3 Verify the red "MAX" indicating light extinguishes for the LCVU stopped. STANDARD: Applicant determines the red “MAX” indicating light for VV LCVU 1A MAX is DARK. COMMENTS:	___ SAT ___ UNSAT

STEP 4 3.2.1.4 Verify the green "CLOSED" indicating light illuminates for the LCVU damper associated with the LCVU stopped. STANDARD: Applicant determines the green “CLOSED” indicating light for 1LCVU-D-1 LWR CONT VENT DAMPER is LIT. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
NOTE: If Unit 1 is in Mode 1 and LCVU 1C or 1D is the idle unit that is being placed in service, a delay of approximately 15 to 30 minutes may be needed before starting LCVU 1C or 1D to allow lower containment air temperature to increase. This will prevent exceeding the Tech Spec low limit for air temperature. {PIP 00-0763, PIP 05-3785} Adequate margin of VQ pressure may be required to allow containment temperature increase if waiting 15 to 30 minutes to start LCVU 1C or 1D.	**CRITICAL STEP**
STEP 5 3.2.1.5 Start the idle LCVU by placing its control switch in the "LOW" position: • "VV LCVU 1B" STANDARD: Applicant places the switch for VV LCVU 1B in the LOW position. **This step is critical to start the desired LCVU.** COMMENTS:	**___ SAT** **___ UNSAT**

STEP 6 3.2.1.6 Verify the red indicating light illuminates for the LCVU placed in service. STANDARD: Applicant determines the red (middle) indicating light for VV LCVU 1B is LIT. COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7 3.2.1.7 Verify the red "OPEN" indicating light illuminates for the LCVU damper associated with the LCVU started. STANDARD: Applicant determines the red "OPEN" indicating light for 1LCVU-D-2 LWR CONT VENT DAMPER. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 8 3.2.1.8 Verify the red "MAX" indicating light illuminates for the LCVU placed in service. STANDARD: Applicant determines the red light for VV LCVU 1B MAX is LIT COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 9 3.2.2 **IF** the LCVUs are operating in "HIGH" speed, perform the following: STANDARD: Applicant determines that this step does not apply. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 10 3.4 Indicate below the operating Pipe Tunnel Booster Fan: • "PIPE TUNNEL BSTR FAN 1A" • "PIPE TUNNEL BSTR FAN 1B" STANDARD: Applicant marks the box for the operating Pipe Tunnel Booster Fan. COMMENTS:	___ SAT ___ UNSAT
STEP 11 3.5 Indicate below the operating LCVUs: • "VV LCVU 1A" • "VV LCVU 1B" • "VV LCVU 1C" • "VV LCVU 1D" STANDARD: Applicant marks the blocks for the 1B, 1C and 1D LCVUs. COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

Unit 1 is in MODE 1.

INITIATING CUES:

- **The Control Room Supervisor has instructed you to shift Lower Containment Vent Units in accordance with OP/1/A/6450/001 (Containment Ventilation Systems), Enclosure 4.13 (Shifting Operating Lower Containment Ventilation Units and Pipe Tunnel Booster Fans)**
- **You are directed to secure the 1A LCVU and start the 1B LCVU.**
- **Steps 3.1 and 3.3 were marked N/A during the pre-job brief.**
- **Peer checks have been waived.**

Duke Energy Catawba Nuclear Station **Containment Ventilation (VV) Systems**	Procedure No. OP/**1**/A/6450/001
	Revision No. 043
Continuous Use	Electronic Reference No. CN005FM9

Shifting Operating Lower Containment Ventilation Units And Pipe Tunnel Booster Fans

1. Limits and Precautions

1.1 Observe the upper and lower containment temperature limits of Tech Spec 3.6.5.

1.2 All operating lower containment ventilation units, and the operating pipe tunnel booster fan, are normally operated at the same speed.

1.3 When CLAs are pressurized above 175 psig, lower containment temperature shall be maintained greater than 60°F to maintain accumulator temperature greater than 60°F due to brittle fracture concerns of the accumulator vessel.

2. Initial Conditions

None

3. Procedure

N/A AA 3.1 **IF** two LCVUs are operating **AND** it is desired, shift the operating units as follows:

_____ 3.1.1 **IF** the LCVUs are operating in "LOW" speed, perform the following:

NOTE:	If two LCVUs are to remain in service, it is preferable to run a vent unit in each fan room (A/D, B/C) in order to maximize air distribution in the lower containment. Due to the temperature characteristics in lower containment and the Digital Rod Position Indication (DRPI) Panels area, use of the 1D LCVU is preferred. Failure to operate with at least one vent unit in each fan room during Modes 1 - 3 can result in high pressurizer and/or steam generator cavity air temperatures.

3.1.1.1 Start an idle LCVU by placing its control switch in the "LOW" position:

- _____ "VV LCVU 1A"
- _____ "VV LCVU 1B"
- _____ "VV LCVU 1C"
- _____ "VV LCVU 1D"

_____ 3.1.1.2 Verify the red indicating light illuminates for the LCVU placed in service.

_____ 3.1.1.3 Verify the red "OPEN" indicating light illuminates for the LCVU dampers associated with the LCVU placed in service.

_____ 3.1.1.4 Verify the red "MAX" indicating light illuminates for the LCVU placed in service.

3.1.1.5 Stop the LCVU to be removed from service by placing its control switch in the "OFF" position:

_____ • "VV LCVU 1A"
_____ • "VV LCVU 1B"
_____ • "VV LCVU 1C"
_____ • "VV LCVU 1D"

NOTE: The procedure may continue up to and including Step 3.1.1.8 before completing the following step.

_____ 3.1.1.6 Verify the green indicating light illuminates for the LCVU stopped.

_____ 3.1.1.7 Verify the red "MAX" indicating light extinguishes for the LCVU stopped.

_____ 3.1.1.8 Verify the green "CLOSED" indicating light illuminates for the LCVU damper associated with the LCVU stopped.

_____ 3.1.2 **<u>IF</u>** the LCVUs are operating in "HIGH" speed, perform the following:

CAUTION: Operating the lower containment vent units in "HIGH" speed for more than 24 hours will cause bearing problems in the fans.

NOTE:

- It is preferable to run a vent unit in each fan room (A/D, B/C) in order to maximize air distribution in the lower containment. Due to the temperature characteristics in lower containment and the Digital Rod Position Indication (DRPI) Panels area, use of the 1D LCVU is preferred. Failure to operate with at least one vent unit in each fan room during Modes 1 - 3 can result in high pressurizer and/or steam generator cavity air temperatures.
- Operating the lower containment vent units in "HIGH" speed will fail the bypass chilled water valves open.

3.1.2.1 Start an idle LCVU by placing its control switch in the "HIGH" position:

_____ • "VV LCVU 1A"
_____ • "VV LCVU 1B"
_____ • "VV LCVU 1C"
_____ • "VV LCVU 1D"

_____ 3.1.2.2 Verify the red indicating light illuminates for the LCVU placed in service.

_____ 3.1.2.3 Verify the red "OPEN" indicating light illuminates for the LCVU damper associated with the LCVU started.

_____ 3.1.2.4 Verify the red "OPEN" light illuminates for the valve corresponding to the LCVU started (rear of 1MC3):

- ☐ "1RN-473 LWR CONT VENT UNT 1A FULL FLOW"
- ☐ "1RN-455 LWR CONT VENT UNT 1B FULL FLOW"
- ☐ "1RN-447 LWR CONT VENT UNT 1C FULL FLOW"
- ☐ "1RN-481 LWR CONT VENT UNT 1D FULL FLOW"

3.1.2.5 Stop the LCVU to be removed from service by placing its control switch in the "OFF" position:

- _____ "VV LCVU 1A"
- _____ "VV LCVU 1B"
- _____ "VV LCVU 1C"
- _____ "VV LCVU 1D"

NOTE:	The procedure may continue up to and including Step 3.1.2.8 before completing the following step.

_____ 3.1.2.6 Verify the green indicating light illuminates for the LCVU stopped.

_____ 3.1.2.7 Verify the green "CLOSED" indicating light illuminates for the LCVU damper associated with the LCVU stopped.

_____ 3.1.2.8 Verify the green "CLOSED" light illuminates for the valve corresponding to the LCVU stopped (rear of 1MC3):

- ☐ "1RN-473 LWR CONT VENT UNT 1A FULL FLOW"
- ☐ "1RN-455 LWR CONT VENT UNT 1B FULL FLOW"
- ☐ "1RN-447 LWR CONT VENT UNT 1C FULL FLOW"
- ☐ "1RN-481 LWR CONT VENT UNT 1D FULL FLOW"

_____ 3.1.2.9 Inform Engineering that lower containment vent units have been placed in "HIGH" speed.

Engineer notified ____

_____ 3.2 **IF** three LCVUs are operating **AND** it is desired, shift the operating units as follows:

_____ 3.2.1 **IF** the LCVUs are operating in "LOW" speed, perform the following:

3.2.1.1 Stop the LCVU to be removed from service by placing its control switch in the "OFF" position:

- _____ "VV LCVU 1A"
- _____ "VV LCVU 1B"
- _____ "VV LCVU 1C"
- _____ "VV LCVU 1D"

NOTE:	The procedure may continue up to and including Step 3.2.1.8 before completing the following step.

_____ 3.2.1.2 Verify the green indicating light illuminates for the LCVU stopped.

_____ 3.2.1.3 Verify the red "MAX" indicating light extinguishes for the LCVU stopped.

_____ 3.2.1.4 Verify the green "CLOSED" indicating light illuminates for the LCVU damper associated with the LCVU stopped.

NOTE:	• If Unit 1 is in Mode 1 and LCVU 1C or 1D is the idle unit that is being placed in service, a delay of approximately 15 to 30 minutes may be needed before starting LCVU 1C or 1D to allow lower containment air temperature to increase. This will prevent exceeding the Tech Spec low limit for air temperature. {PIP 00-0763, PIP 05-3785} • Adequate margin of VQ pressure may be required to allow containment temperature increase if waiting 15 to 30 minutes to start LCVU 1C or 1D.

3.2.1.5 Start the idle LCVU by placing its control switch in the "LOW" position:

- _____ "VV LCVU 1A"
- _____ "VV LCVU 1B"
- _____ "VV LCVU 1C"
- _____ "VV LCVU 1D"

_____ 3.2.1.6 Verify the red indicating light illuminates for the LCVU placed in service.

_____ 3.2.1.7 Verify the red "OPEN" indicating light illuminates for the LCVU damper associated with the LCVU started.

_____ 3.2.1.8 Verify the red "MAX" indicating light illuminates for the LCVU placed in service.

_____ 3.2.2 **IF** the LCVUs are operating in "HIGH" speed, perform the following:

3.2.2.1 Stop the lower containment vent unit to be removed from service by placing its control switch in the "OFF" position:

- _____ "VV LCVU 1A"
- _____ "VV LCVU 1B"
- _____ "VV LCVU 1C"
- _____ "VV LCVU 1D"

NOTE:	The procedure may continue up to and including Step 3.2.2.8 before completing the following step.

_____ 3.2.2.2 Verify the green indicating light illuminates for the LCVU stopped.

_____ 3.2.2.3 Verify the green "CLOSED" indicating light illuminates for the LCVU damper associated with the LCVU stopped.

_____ 3.2.2.4 Verify the green "CLOSED" light illuminates for the valve corresponding to the LCVU stopped (rear of 1MC3):

- ☐ "1RN-473 LWR CONT VENT UNT 1A FULL FLOW"
- ☐ "1RN-455 LWR CONT VENT UNT 1B FULL FLOW"
- ☐ "1RN-447 LWR CONT VENT UNT 1C FULL FLOW"
- ☐ "1RN-481 LWR CONT VENT UNT 1D FULL FLOW"

CAUTION:	Operating the lower containment vent units in "HIGH" speed for more than 24 hours will cause bearing problems in the fans.

NOTE:	Operating the lower containment vent units in "HIGH" speed will fail the bypass chilled water valves open.

3.2.2.5 Start the idle lower containment vent unit by placing its control switch in the "HIGH" position:

- _____ "VV LCVU 1A"
- _____ "VV LCVU 1B"
- _____ "VV LCVU 1C"
- _____ "VV LCVU 1D"

_____ 3.2.2.6 Verify the red indicating light illuminates for the LCVU placed in service.

_____ 3.2.2.7 Verify the red "OPEN" indicating light illuminates for the LCVU damper associated with the LCVU started.

_____ 3.2.2.8 Verify the red "OPEN" light illuminates for the valve corresponding to the LCVU started (rear of 1MC3):

- ☐ "1RN-473 LWR CONT VENT UNT 1A FULL FLOW"
- ☐ "1RN-455 LWR CONT VENT UNT 1B FULL FLOW"
- ☐ "1RN-447 LWR CONT VENT UNT 1C FULL FLOW"
- ☐ "1RN-481 LWR CONT VENT UNT 1D FULL FLOW"

_____ 3.2.2.9 Inform Engineering that lower containment vent units have been placed in "HIGH" speed.

Engineer notified ______________________________________

N/A AA 3.3 **IF** shifting the operating pipe tunnel booster fan, perform the following:

3.3.1 Stop the operating fan by placing its control switch in the "OFF" position:

_____ • "PIPE TUNNEL BSTR FAN 1A"
_____ • "PIPE TUNNEL BSTR FAN 1B"

_____ 3.3.2 Verify the green indicating light illuminates for the pipe tunnel booster fan stopped.

_____ 3.3.3 **IF** the operating lower containment ventilation units are running in "LOW" speed, start the pipe tunnel booster fan to be placed in service by placing its control switch in the "LOW" speed position:

_____ • "PIPE TUNNEL BSTR FAN 1A"
_____ • "PIPE TUNNEL BSTR FAN 1B"

_____ 3.3.4 **IF** the operating lower containment ventilation units are running in "HIGH" speed, start the pipe tunnel booster fan to be placed in service by placing its control switch in the "HIGH" speed position:

_____ • "PIPE TUNNEL BSTR FAN 1A"
_____ • "PIPE TUNNEL BSTR FAN 1B"

_____ 3.3.5 Verify that the red indicating light illuminates for the pipe tunnel booster fan placed in service.

_____ 3.4 Indicate below the operating Pipe Tunnel Booster Fan:

- ☐ "PIPE TUNNEL BSTR FAN 1A"
- ☐ "PIPE TUNNEL BSTR FAN 1B"

_____ 3.5 Indicate below the operating LCVUs:

- ☐ "VV LCVU 1A"
- ☐ "VV LCVU 1B"
- ☐ "VV LCVU 1C"
- ☐ "VV LCVU 1D"

3.6 File this enclosure in the Control Copy folder of this procedure.

Catawba Nuclear Station
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EVALUATION SHEET

Task:	Initiate a VQ (Containment Air Release And Addition System) release per OP/1/A/6450/017 Enclosure 4.2 steps 3.5 through 3.12.
Alternate Path:	None
Facility JPM #:	N/A
Safety Function:	7 **Title:** Process Radiation Monitoring System
K/A	073 A4.02 Ability to manually operate and/or monitor in the control room: Radiation monitoring system control panel
Rating(s):	3.7 / 3.7 **CFR:** 41.7/45.5 to 45.8

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

Simulator __X__ In-**P**lant ____ **P**erform __X__ **S**imulate ____

References: OP/1/A/6450/017 Encl. 4.2, OP/0/A/6500/080 Encl. 4.3.

Task Standard: Applicant aligns VQ valves for release and initiates a Containment Air release.

Validation Time: 10 minutes **Time Critical:** Yes ____ No __X__

==

Applicant: Time Start: ________

NAME_ __ Docket #__ Time Finish: ________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________ ______________________/________

NAME SIGNATURE DATE

==

COMMENTS

Catawba Nuclear Station
JPM G
September 2019 NRC Exam

SIMULATOR OPERATOR INSTRUCTIONS:

1. ENSURE NRC Examination Security has been established.
2. Reset to IC # 156
3. Enter the password.
4. Select “Yes” on the INITIAL CONDITION RESET pop-up window.
5. Ensure simulator setup per table below.
6. Place simulator in RUN and acknowledge any alarms.
7. ENSURE “Extra Operator” is present in the simulator.
8. Place simulator in FREEZE until Examiner cue is given.

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event
	Ensure 1VQ-10 is at 350 and on setpoint					

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JPM G
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is operating at 100% power.**

INITIATING CUES:

- **The Unit 2 BOP has performed OP/1/A/6450/017 (Containment Air Release and Addition System) Enclosure 4.2 (Air Release Mode) steps 2.1 through step 3.4. You have been tasked to initiate a Containment Air Release by performing steps 3.5 through 3.12 using 'A' Train equipment. All Peer Checks have been waived.**

EXAMINER NOTE: After reading Initiating Cue, provide the applicant with a copy of OP/1/A/6450/017 Enclosure 4.2 and OP/0/A/6500/080, Enclosure 4.3.

Catawba Nuclear Station
JPM G
September 2019 NRC Exam

START TIME: _______

<table>
<tr><th>STEP/STANDARD</th><th>SAT/UNSAT</th></tr>
<tr><td>

NOTE: The person performing Step 3.5 or 3.6 shall **NOT** be the same individual who originally performed the associated actions in Steps 3.2.1.3, 3.2.1.4 or 3.4.3.

STEP 1: 3.5 **IF** 1EMF-39L is functional, perform the following:

3.5.1 Independently verify trip setpoints are set to the values as specified in "SETPOINT DATA" section on the Gaseous Waste Release Permit Report using OP/0/A/6500/080 (EMF RP86A Output Modules).

STANDARD:

Applicant will verify trip setpoints (Trip 1 – 870 cpm, Trip 2 – 1240 cpm) on 1EMF-39L per procedure.

Examiner NOTE: OP/0/A/6500/080 Enclosure 4.3 is available on the rear of panel 1MC-13.

COMMENTS:

</td><td>

___ SAT

___ UNSAT

</td></tr>
</table>

STEP/STANDARD	SAT/UNSAT
OP/0/A/6500/080 Enclosure 4.3 **NOTE:** 1. The setpoints given on release permits are already rounded to 3 significant digits and are entered into the EMF as is. Setpoints for non-release conditions are rounded up or down to 3 significant digits using standard mathematical rules for rounding. 2. Necessary setpoint adjustments are made per Enclosure 4.2 (EMF RP86A Trip Setpoint Adjustment). STEP 2 3.1 Press the function key [FUN] to bring up the "SELECT FUNCTION" screen. STANDARD: Applicant will press the [FUN] key on 1EMF-39L. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 3 3.2 Press [4] to bring up the data screen. STANDARD: Applicant will press the [4] key on 1EMF-39L COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 4 3.3 Verify the Trip 1 and Trip 2 setpoints are the same as the desired setpoints. STANDARD: Applicant will verify the trip setpoints are set correctly. COMMENTS:	___ SAT ___ UNSAT
STEP 5 3.4 Press the clear key [CLR] twice to return to the normal display screen. STANDARD: Applicant will depress the [CLR] key twice on 1EMF-39L COMMENTS:	___ SAT ___ UNSAT
STEP 6 3.5 Verify that the correct EMF setpoints are documented in the Control Room EMF Setpoint Logbook. STANDARD: Applicant will verify the correct EMF setpoints are documented in the Control Room EMF Setpoint Logbook. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 7 3.6. If required for IV purposes, ensure that the IV block is signed on Control Room EMF Setpoint Log. STANDARD: Applicant will sign the IV block. COMMENTS:	___ SAT ___ UNSAT

OP/1/A/6450/017 Enclosure 4.2 STEP 8 3.5.2 Sign off the "Independent Verification (IV)" blank on the "VQ release monitored by EMF 39L" sheet of the Gaseous Waste Release (GWR) Record STANDARD: Applicant will sign off the "EMF39L Operable and Source Checked" IV blank on the "VQ release monitored by EMF 39L" sheet of the Gaseous Waste Release (GWR) Record COMMENTS:	___ SAT ___ UNSAT

STEP 9 3.6 Independently verify "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller is set to $\leq$ the "Recommended Release Rate (cfm)" on the Gaseous Waste Release Permit Report. STANDARD: Applicant will verify "1VQ-10 controller is set to $\leq$ the "Recommended Release Rate (350 cfm) on the Gaseous Waste Release Permit Report. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 10 3.7 Reset Totalizer on "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller (1MC5) by performing the following: 3.7.1 Depress the "D" pushbutton until "VQ0100.T" appears in the display window. STANDARD: Applicant will depress the “D” pushbutton on 1VQ-10 controller until VQ100T appears in the display window. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 11 3.7.2 Depress the "Reset Total" pushbutton and verify a "0" appears in the display window. STANDARD: Applicant will depress the “Reset Total” pushbutton on the 1VQ-10 controller and verify that 0 appears in the display window. **This step is critical to ensure that amount of the release is properly quantified.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 12 3.8 **IF AT ANY TIME** during the release using 1EMF-39 the following conditions are met, immediately terminate the release. STANDARD: Applicant will determine this is a continuous action step and leave it unsigned. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 13 3.9 **IF AT ANY TIME** during the release using 1EMF-36 the following conditions are met, immediately terminate the release. STANDARD: Applicant will determine that this step does not apply. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 14 3.10 Open the following valves (1MC5): Record time first valve is opened _________ • 1VQ-2A (VQ Fan Suct From Cont Isol) • 1VQ-3B (VQ Fan Suct From Cont Isol) STANDARD: Applicant will open valves and document the time the first valve is opened. **This step is critical to align a flow path for the air release.** **Examiner NOTE: Recording of the time is not part of the critical step.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP 15 3.11 **IF** 1EMF-39L **AND** 1EMF-36L are non-functional, independently verify the following valves are open: STANDARD: Applicant will determine that this step does not apply. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
CAUTION: Operation of VQ Fans below 120 cfm will produce surge noise and vibration. Operation below 50 cfm results in heat buildup and may lead to fan failure. STEP 16 3.12 Place one VQ train in service as follows (1MC5): 3.12.1 **IF** placing A train in service, perform the following: 3.12.1.1 Place "VQ Filt Htr A" in the "AUTO" position. STANDARD: Applicant will place "VQ Filt Htr A" in the "AUTO" position. COMMENTS:	___ SAT ___ UNSAT

STEP 17 3.12.1.2 Start "Cont Air Rel Fan 1A". STANDARD: Applicant will start "Cont Air Release Fan 1A" by depressing the Red "ON" pushbutton and verifying the Red "ON" light is lit. **This step is critical to initiate the air release.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 18 3.12.2 **IF** placing B train in service, perform the following: STANDARD: Applicant will determine that this step does not apply. COMMENTS: **END OF TASK**	___ **SAT** ___ **UNSAT**

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is operating at 100% power.**

INITIATING CUES:

- **The Unit 2 BOP has performed OP/1/A/6450/017 Enclosure 4.2 steps 2.1 through step 3.4. You have been tasked to initiate a Containment Air Release by performing steps 3.5 through 3.12 using 'A' Train equipment. All Peer Checks have been waived.**

1. Limits and Precautions

1.1 Do **NOT** exceed Containment Pressure Limits of -0.08 psig and +0.25 psig. Tech Spec Containment Pressure Limits are -0.1 psig to +0.3 psig.

1.2 When manually operating any motor operated valve, minimize the torque applied to the handwheel.

1.3 After manual operation, maintenance, or packing adjustment of any motor operated Safety Related valve, it shall be cycled electrically to ensure reliable automatic operation.

1.4 Pressure switches for valve operation shall **NOT** be manually overridden since ice condenser doors are very sensitive to over or under pressure conditions.

1.5 When Containment Air Release Filter unit pre-filter or absolute filter differential pressure reaches 2.5 inches H_2O, the standby fan is placed in service and action initiated to replace the dirty filter(s).

1.6 A new Gaseous Waste Release (GWR) sample is required if:

- 24 hours has elapsed since the last sample.
- VQ release is automatically terminated due to a valid controlling EMF actuation. If actuation is due to an EMF spike, the release may be re-attempted twice before a new sample is required.

1.7 A VP, VQ, or Unit Vent Sample is required if:

- Rx Trip or Startup occurs.
- Rated Thermal Power change of ≥ 15% in one hour occurs followed by a Thermal Power Stabilization (power level constant at desired power level).

1.8 If in Modes 5 or 6 and automatic termination of a release is **NOT** available, actions of SLC 16.11-7 apply.

2. Initial Conditions

AA 2.1 Verify Containment Pressure > 0.09 psig.

AA 2.2 Verify Control Room Supervisor has signed and dated the appropriate sheet of the Gaseous Waste Release (GWR) Record authorizing releases:

☑ "VQ release monitored by EMF 39(L)"
☐ "VQ release monitored by EMF 36(L)"

AA 2.3 Verify Containment pressure increase is **NOT** due to a LOCA or steam line break.

AA 2.4 Verify EMF is aligned per the "SPECIAL INSTRUCTIONS FOR RELEASE" section on the Gaseous Waste Release Permit Report.

3. Procedure

AA 3.1 Ensure the following enclosures are complete:

- ☑ Enclosure 4.4 (Auxiliary Building Valve Checklist)
- ☑ Enclosure 4.5 (Reactor Building Valve Checklist)
- ☑ Enclosure 4.6 (Auxiliary Building Independent Verification Valve Checklist)
- ☑ Enclosure 4.7 (Reactor Building Independent Verification Valve Checklist)

NOTE:	Enclosure 4.3 (Initiation and Termination of a Gaseous Waste Release Permit Report) provides information on initiation and termination of a GWR Permit Report.

3.2 Perform <u>one</u> of the following:

AA 3.2.1 **<u>IF</u>** 1EMF-39 (low range) is functional, perform the following:

AA 3.2.1.1 Verify 1EMF-39L is specified for use on the Gaseous Waste Release Permit Report.

AA 3.2.1.2 Verify 1EMF-39L is functional per SLC 16.11-7 using OP/0/A/6500/080 (EMF Output Modules).

AA 3.2.1.3 Set 1EMF-39 (low range) setpoints to the value specified in the "SETPOINT DATA" section on the Gaseous Waste Release Permit Report using OP/0/A/6500/080 (EMF Output Modules).

AA 3.2.1.4 Sign off the "EMF39(L) Functional and Source Checked" blank on the "VQ release monitored by EMF 39(L)" sheet of the Gaseous Waste Release (GWR) Record.

N/A AA 3.2.2 **IF** 1EMF-39 (low range) is non-functional **AND** 1EMF-36 (low range) is to be used to monitor this release, perform the following:

_____ 3.2.2.1 Verify 1EMF-36L is specified for use on the Gaseous Waste Release Permit Report.

_____ 3.2.2.2 Verify 1EMF-36L is functional using OP/0/A/6500/080 (EMF Output Modules).

NOTE: 1EMF-36 (low range) trip setpoints are pre-established for offsite dose.

_____ 3.2.2.3 Verify trip setpoints are set to the values as specified in "SETPOINT DATA" section on the Gaseous Waste Release Permit Report using OP/0/A/6500/080 (EMF Output Modules).

_____ 3.2.2.4 Sign off the "EMF36(L) Functional and Source Checked" blank on the "VQ release monitored by EMF 36(L)" sheet of the Gaseous Waste Release (GWR) Record.

_____ 3.2.2.5 N/A the "Independent Verification (IV)" blank on the "VQ release monitored by EMF 36(L)" sheet of the Gaseous Waste Release (GWR) Record.

N/A AA 3.2.3 **IF** 1EMF-39L **AND** 1EMF-36L are non-functional, perform the following:

_____ 3.2.3.1 Verify EMF39L **AND** EMF36L are N/A'd on the Gaseous Waste Release Permit Report.

_____ 3.2.3.2 Verify RP has obtained grab samples per HP/0/B/1004/005 (Radioactive Gaseous Waste Release - VQ & VP System).
RP contact ______________________________

_____ 3.2.3.3 N/A the "EMF36(L) **AND** EMF39(L) are both non-functional" blank on the "VQ release with EMF 39(L) **AND** EMF 36(L) Non-functional" sheet of the Gaseous Waste Release (GWR) Record.

_____ 3.2.3.4 N/A the "IV" blank on the "VQ release with EMF 39(L) **AND** EMF 36(L) Non-functional" sheet of the Gaseous Waste Release (GWR) Record.

_____ 3.2.3.5 N/A steps 3.3 and 3.23.4.

NOTE:	• Monitoring for highest count rate during release using a digital EMF chart recorder does **NOT** require an initial setup. • The procedure may continue while performing the following step.	

AA ____ 3.3 **IF** using the OAC to obtain the highest count rate during release, monitor the applicable OAC point:

✓• C1E0155 (EMF39L Containment Gas Monitor)

• C1E0135 (EMF36L Unit Vent Gas Monitor)

3.4 Adjust "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller (1MC5) by performing the following:

AA ____ 3.4.1 Depress the "A/M" pushbutton until the "A" light (auto) is illuminated.

AA ____ 3.4.2 Verify "VQ0100.S" appears in the display window.

AA ____ 3.4.3 Rotate the manual loader in the clockwise direction to open the valve to ≤ the "Recommended Release Rate (cfm)" on the Gaseous Waste Release Permit Report.

NOTE:	The person performing Step 3.5 or 3.6 shall **NOT** be the same individual who originally performed the associated actions in Steps 3.2.1.3, 3.2.1.4 or 3.4.3.

_____ 3.5 **IF** 1EMF-39L is functional, perform the following:

_____ IV 3.5.1 Independently verify trip setpoints are set to the values as specified in "SETPOINT DATA" section on the Gaseous Waste Release Permit Report using OP/0/A/6500/080 (EMF Output Modules).

_____ IV 3.5.2 Sign off the "Independent Verification (IV)" blank on the "VQ release monitored by EMF 39(L)" sheet of the Gaseous Waste Release (GWR) Record.

_____ IV 3.6 Independently verify "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller is set to ≤ the "Recommended Release Rate (cfm)" on the Gaseous Waste Release Permit Report.

3.7 Reset Totalizer on "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller (1MC5) by performing the following:

_____ 3.7.1 Depress the "D" pushbutton until "VQ0100.T" appears in the display window.

_____ 3.7.2 Depress the "Reset Total" pushbutton and verify a "0" appears in the display window.

_____ 3.8 **IF AT ANY TIME** during the release using 1EMF-39 all of the following conditions are met, immediately terminate the release.

- OAC point C1E0155 (EMF39L Containment Gas Monitor) is being used to monitor release per Step 3.3.
- 1EMF-39 digital chart recorder 1MICR6640 is out of service.
- Loss of Unit 1 OAC.

_____ 3.9 **IF AT ANY TIME** during the release using 1EMF-36 all of the following conditions are met, immediately terminate the release.

- OAC point C1E0135 (EMF36L Unit Vent Gas Monitor) is being used to monitor release per Step 3.3.
- 1EMF-36 digital chart recorder 1MICR6650 is out of service.
- Loss of Unit 1 OAC.

3.10 Open the following valves (1MC5):
Record time first valve is opened ________

_____ • 1VQ-2A (VQ Fan Suct From Cont Isol)
_____ • 1VQ-3B (VQ Fan Suct From Cont Isol)

_____ 3.11 **IF** 1EMF-39L **AND** 1EMF-36L are non-functional, independently verify the following valves are open:

_____ IV • 1VQ-2A (VQ Fan Suct From Cont Isol)
_____ IV • 1VQ-3B (VQ Fan Suct From Cont Isol)

CAUTION:	Operation of VQ Fans below 120 cfm will produce surge noise and vibration. Operation below 50 cfm results in heat buildup and may lead to fan failure.

3.12 Place one VQ train in service as follows (1MC5):

_____ 3.12.1 **IF** placing A train in service, perform the following:

_____ 3.12.1.1 Place "VQ Filt Htr A" in the "AUTO" position.

_____ 3.12.1.2 Start "Cont Air Rel Fan 1A".

_____ 3.12.2 **IF** placing B train in service, perform the following:

_____ 3.12.2.1 Place "VQ Filt Htr B" in the "AUTO" position.

_____ 3.12.2.2 Start "Cont Air Rel Fan 1B".

3.13 Perform the following:

NOTE:	Step 3.13.2 may be performed prior to Step 3.13.1.

_____ 3.13.1 Record the VQ start date/time on the following:

- ☐ Appropriate Gaseous Waste Release (GWR) Record
- ☐ Control Room Log

_____ 3.13.2 Enter "0" in the "Initial Integrator Reading" blank of the appropriate Gaseous Waste Release (GWR) Record.

NOTE:	Containment pressure is monitored to ensure 1VQ-10 (VQ Fans Disch To Unit Vent) closes at 0 psig to prevent a negative pressure inside containment.

_____ 3.14 **IF AT ANY TIME** during the release the OAC **OR** Computer Point C1P1112 (Average Containment Pressure, Best) is out of service, record containment pressure as read on 1VQP5040 (Containment Pressure) on 1MC5 every 30 minutes in the Control Room Log for the duration of the VQ Release. {PIP 93-0074}

_____ 3.15 **IF** the VQ fan does **NOT** automatically shutdown at approximately 0 psig, perform the following:

- N/A Step 3.16.
- Perform Step 3.17.

3.16 **WHEN** Containment pressure decreases to approximately 0 psig, verify that "1VQ-10 VQ FANS DISCH TO UNIT VENT" closes by performing the following:

_____ 3.16.1 Depress the "D" pushbutton until "VQ0100.P" appears in the display window.

_____ 3.16.2 Verify no flow indicated on the controller display window.

NOTE:	Solenoid 1VQSV0100 (VQ Containment Purge Flow Sol) will **NOT** reset 1VQSS0100 (VQ Fans Disch To Unit Vent) until a low containment pressure (lower containment pressure greater than 0 psig) or high radiation signal condition (EMF35 or EMF36) is no longer present.

3.17 Reset solenoid 1VQSV0100 (VQ Containment Purge Flow Sol) by performing the following at"1VQ-10 VQ FANS DISCH TO UNIT VENT" controller:

_____ 3.17.1 Depress the "A/M" pushbutton until the "M" light (manual) is illuminated.

_____ 3.17.2 Verify "VQ0100.V" appears in the display window.

_____ 3.17.3 Rotate the manual loader counterclockwise until the display reads ≤ 0.

3.18 Secure the VQ train placed in service in Step 3.12 as follows:

_____ 3.18.1 **<u>IF</u>** securing A train, perform the following:

_____ 3.18.1.1 Ensure "Cont Air Rel Fan 1A" has stopped.

_____ 3.18.1.2 Place "VQ Filt Htr A" in the "OFF" position.

_____ 3.18.2 **<u>IF</u>** securing B train, perform the following:

_____ 3.18.2.1 Ensure "Cont Air Rel Fan 1B" has stopped.

_____ 3.18.2.2 Place "VQ Filt Htr B" in the ""OFF" position.

3.19 Close the following valves:
Record time both valves are closed ________

_____ • 1VQ-2A (VQ Fan Suct From Cont Isol)
_____ • 1VQ-3B (VQ Fan Suct From Cont Isol)

_____ 3.20 **<u>IF</u>** 1EMF-39L **<u>AND</u>** 1EMF-36L are non-functional, independently verify the following valves are closed:

_____ IV • 1VQ-2A (VQ Fan Suct From Cont Isol)

_____ IV • 1VQ-3B (VQ Fan Suct From Cont Isol)

3.21 Obtain the totalized flow by performing the following:

_____ 3.21.1 On "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller, depress the display ("D") pushbutton until "VQ0100.T" (Totalized Flow) is displayed.

_____ 3.21.2 Record the totalizer reading _______________

_____ 3.22 Record the VQ terminate date/time on the Control Room Log.

NOTE:	Enclosure 4.3 (Initiation and Termination of a Gaseous Waste Release Permit Report) provides information on initiation and termination of a GWR Permit Report.

3.23 Perform the following on the appropriate Gaseous Waste Release (GWR) Record:

_____ 3.23.1 Record the VQ terminate date/time.

_____ 3.23.2 Record totalizer value from Step 3.21.2 in "Final Integrator Reading" blank.

_____ 3.23.3 Record the "Final Integrator Reading" value in the 'Volume" blank.

3.23.4 Enter the "Highest EMF Reading" during the release from <u>one</u> of the following:

_____ 3.23.4.1 Highest reading from the OAC.

<u>OR</u>

3.23.4.2 Perform the following on the applicable digital EMF chart recorder:

_____ A. Depress the "Historical" icon. (Located at bottom of screen, left of keyboard icon)

_____ B. Select "Memory".

_____ C. Select "Start of History". (Binocular icon)

_____ D. Select "Search by Time".

_____ E. Enter the start date and start time.

_____ F. Select "Search".

NOTE:	Time intervals per inch can be changed by depressing the "+" or "-" buttons.

_____ G. While viewing the digital values on the left side of the screen, scroll across the trend by depressing the ">" or ">>" buttons and obtain the highest reading.

_____ H. Depress the "Historical" icon to exit history.

_____ 3.23.5 Sign the "Control Room Operator" blank.

_____ 3.24 **<u>IF</u>** the OAC was used to monitor release per Step 3.3, ensure Step 3.3 has been signed off.

_____ 3.25 **IF** 1EMF-39L was used for this release, perform the following to reset EMF trip setpoints:

_____ 3.25.1 **IF** in Mode 5, 6, or No Mode **AND** 1EMF39L reading ≤ 6.96E+2 cpm, the trip setpoints shall be as follows:

- Trip 2 = 1.16E+3 cpm
- Trip 1 = 8.12E+2 cpm

_____ 3.25.2 **IF** in Mode 5, 6, or No Mode **AND** 1EMF39L reading > 6.96E+2 cpm, contact RP for the trip setpoints.

_____ 3.25.3 **IF** in Mode 1, 2, 3, or 4, the trip setpoints shall be set and recorded as follows:

- Trip 2 = 3 X (Containment Atmosphere Activity as indicated by the EMF) = ________ cpm
- Trip 1 = Trip 2 X .70 = ________ cpm

_____ 3.25.4 Reset 1EMF-39 (low range) trip setpoints using OP/0/A/6500/080 (EMF Output Modules).

_____ 3.25.5 Signoff "EMF39(L) Setpoints reset to non-release value" blank on the "VQ release monitored by EMF 39(L)" sheet of the Gaseous Waste Release (GWR) Record.

NOTE:	The person performing Step 3.26 or 3.27 shall **NOT** be the same individual who originally performed the associated actions in steps 3.17.3 or 3.25.

_____ IV 3.26 **IF** 1EMF-39L is functional, independently verify trip setpoints are reset as described in Step 3.25 using OP/0/A/6500/080 (EMF Output Modules).

3.27 Independently verify "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller is reset by performing the following:

_____ IV 3.27.1 On "1VQ-10 VQ FANS DISCH TO UNIT VENT" controller depress the "D" pushbutton until "VQ0100.V" appears in the display window.

_____ IV 3.27.2 Display reads ≤ 0.

_____ 3.28 **IF** 1EMF-36L was used for this release, perform the following:

_____ 3.28.1 The 1EMF-36L trip setpoints shall be as follows:

- Trip 2 = 1.50E+2 cpm plus existing reading **NOT** to exceed 8.36E+3 cpm
- Trip 1 = Trip 2 times 0.7 cpm
  OR
- Setpoints as provided by RP

_____ 3.28.2 Sign the "EMF36(L) Setpoints per OPS Setpoint Log" blank on the "VQ release monitored by EMF 36(L)" sheet of the Gaseous Waste Release (GWR) Record.

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

Verification of EMF RP86A and RM1000 Trip Setpoints
Information Use

1. Limits and Precautions

1.1 The EMF RP86A and RM1000 green "OPERATE" light goes dark and the failure relay de-energizes under any of the following conditions:

- The operate/calibrate switch is set to calibrate
- Loss of high voltage
- Loss of signal (0 counts in 2 minutes)
- Safety loop open
- Loss of power

1.2 If an EMF RP86A and RM1000 Trip 1 is set higher than Trip 2, the entered value will be accepted.

2. Initial Conditions

Verify a need to check the EMF trip setpoints.

3. Procedure

NOTE: 1. The setpoints given on release permits are already rounded to 3 significant digits and are entered into the EMF as is. Setpoints for non-release conditions are rounded up or down to 3 significant digits using standard mathematical rules for rounding.

2. Necessary setpoint adjustments are made per Enclosure 4.2 (EMF RP86A and RM1000 Trip Setpoint Adjustment).

3.1 Press the function key [FUN] to bring up the "SELECT FUNCTION" screen.

3.2 Press [4] to bring up the data screen.

3.3 Verify the Trip 1 and Trip 2 setpoints are the same as the desired setpoints.

3.4 Press the clear key [CLR] twice to return to the normal display screen.

3.5 Verify that the correct EMF setpoints are documented in the Control Room EMF Setpoint Logbook.

3.6 **<u>IF</u>** required for IV purposes, ensure that the IV block is signed on Control Room EMF Setpoint Log.

Enclosure 4.6

Control Room EMF Setpoint Log

Use Enclosure 4.7 for EMF35 or EMF38 and Enclosure 4.8 for EMF-71, EMF-72, EMF-73, or EMF-74.

Unit # 1 **EMF #** 39L

DATE/TIME	**Present Reading** Circle one: cpm, mrem/hr, rem/hr, gpd	**TRIP 2**	**TRIP 1**	PERFORMED BY (SIGNATURE)	IV BY (SIGNATURE)	COMMENTS (or RP name):
Today/5 min ago	350	1240	870	*Operator AA*		

IV = Independent Verification

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

RETDAS v3.5.1 <DPCCNS Rev.4.0> CANBERRA

GASEOUS WASTE RELEASE PERMIT REPORT

GWR Number: 2019020
Release ID: Unit 1 Cont Air Release & Addition(VQ)

=== ALLOWABLE FLOWRATES (cfm) ===

	1 Unit Releasing 2/2 Station Limit (U=1)	2 Units Releasing 1/2 Station Limit (U=2)
Total body dose release rate (cfm)	1.82E+06	9.08E+05
Skin and Gamma air dose release rate (cfm)	7.45E+06	3.72E+06
Food, Ground, Inhalation dose release rate (cfm)	3.01E+10	1.51E+10

Most restrictive release rate (cfm).................................. 9.08E+05
Recommended release rate (cfm).................................. 3.50E+02

=== MULTIPLE RELEASE CALCULATION ===
Sum of calculated release rate divided by
allowable release rate for all concurrent releases.................. 1.19E-03

=== SETPOINT DATA ===
EMF39L Monitor Operable?.................................. YES
EMF39L Entered Background (cpm).................................. 1.79E+02
EMF39L Expected CPM.................................. 3.24E+02

EMF36L Monitor Operable?.................................. NA
EMF86L Entered Background (cpm).................................. NA
EMF36L Expected CPM.................................. NA
Entered Unit Vent Flowrate (cfm).................................. NA

Xe-133 Equivalence (uCi/cc).................................. 5.46E-06

Trip 1 Setpoint (cpm).................................. 8.70E+02
Trip 2 Setpoint (cpm).................................. 1.24E+03

erformed by: ____________ Date: 09/01/19
Signature

erified by: ____________ Date: 09/01/19
Signature

=== SPECIAL INSTRUCTIONS FOR RELEASE ===
GWR INSTRUCTIONS FOR 1VQ WITH 1 EMF 39 FUNCTIONAL AND CONTROLLING RELEASE:
*Align 1 EMF 38 & 39 to lower cont & incore rm during releases & non-release per
This GWR may be used for consecutive 24-hour periods with RP approval.
RP may request alternate EMF alignments.
Notify RP of any Trip 1 or Trip 2 alarms

INFORMATION ONLY

Enclosure 5.3

Gaseous Waste Release (GWR) Record (VQ Release by EMF 39(L))

Reference Use

Unit __1__ VQ release monitored by EMF 39(L)

Control Room Supervisor or Designee authorizing GWR release (signature required): Control Room Supervisor Date/Time 09/01/19 / 0400 GWR 2019020

(1) Date/Time VQ Release Initiated (Notify RP)	Initial Integrator Reading	Final Integrator Reading	(2) EMF 39(L) Functional and Source Checked / Independent Verification (IV)	(5) Highest EMF 39(L) reading during release	(3) EMF 39(L) setpoints reset to non-release value	Date/Time Release Suspended or Terminated (Notify RP)	(4) VQ volume	(2) Control Room Operator (signature required)
			Operator AA (IV)					
			(IV)					
			(IV)					
			(IV)					
			(IV)					
			(IV)					
			(IV)					
			(IV)					

Total volume released: ______________ ft^3

Note 1 **IF** used, ensure EMF chart recorder is stamped at start of release and at completion of each release.

Note 2 **IF** consecutive VQ releases are made ensure GWR record is updated for each release. **IF** EMF 39(L) is removed from service **AND** EMF 36(L) is used to monitor the release, request a new GWR from RP Compliance. Not Applicable (N/A) may be used on this GWR record.

Note 3 Reset EMF 39(L) Trip 1 and 2 setpoints to non-release setpoints when VQ System is **NOT** in service. Update Control Room EMF Setpoint Log.

Note 4 Volume for each VQ release = Final Integrator Reading

Note 5 **IF** both the OAC and the EMF chart recorder are simultaneously out of service AND the Trip 1 setpoint was not exceeded during the release, document < [Trip 1 setpoint value] for the Highest EMF reading during release.

"This copy has been compared with Control Copy and verified correct"	Initial	Date/Time	Initial	Date/Time	Initial	Date/Time

Termination of GWR release acknowledged by Control Room Supervisor or Designee (signature required) ____________________ Date/Time ________ / ____

JPM H

Catawba Nuclear Station
JPM H
September 2019 NRC Exam

EVALUATION SHEET

Task: Perform a Manual Makeup to the VCT

Alternate Path: No

Facility JPM #: NV-121

Safety Function: 1 **Title:** Chemical and Volume Control System

K/A 004 A4.12 Ability to operate and/or monitor in the control room: Boration/dilution batch control

Rating(s): 3.8 / 3.3 **CFR:** 41.7 / 45.5 / 45.8

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

Simulator ___X___ In-**P**lant ________ **P**erform ___X___ **S**imulate __________

References: OP/1/A/6150/009 (Boron Concentration Control)

Task Standard: Volume Control Tank level is increased to approximately 55% (± 1%) using the correct boron concentration.

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

==

Applicant: Time Start: ____________

NAME________________________ Docket #______________ Time Finish: ____________

Performance Rating: Performance Time ______

SAT ____ UNSAT ____

Examiner: ________________________________ ________________________________/_________

NAME SIGNATURE DATE

==

COMMENTS

Catawba Nuclear Station
JPM H
September 2019 NRC Exam

SIMULATOR OPERATOR INSTRUCTIONS:

1. ENSURE NRC Examination Security has been established.
2. Reset to IC # 157
3. Enter the password.
4. Select “Yes” on the INITIAL CONDITION RESET pop-up window.
5. Ensure simulator setup per table below.
6. Place simulator in RUN and acknowledge any alarms.
7. ENSURE “Extra Operator” is present in the simulator.
8. Place simulator in FREEZE until Examiner cue is given.

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event

Catawba Nuclear Station
JPM H
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **The unit is at 100% power, steady state condition.**
- **The Reactor Coolant System boron concentration is 860 PPM.**
- **The Volume Control Tank level is 35%.**
- **VCT automatic makeup is out of service for calibration by IAE.**

INITIATING CUES:

- **The Control Room Supervisor directs you to perform a manual blended makeup to increase the VCT level to 55% per OP/1/A/6150/009 Boron Concentration Control, Enclosure 4.5. Initial conditions have been completed. Begin at step 3.2.**
- **The OATC is monitoring the control boards.**
- **Independent verification and peer checks have been waived.**

EXAMINER NOTE: **After reading initiating cue, provide examinee a copy of OP/1/A/6150/009 Boron Concentration Control, Enc. 4.5.**

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START TIME: _______

STEP/STANDARD	SAT/UNSAT
STEP 1: 3.2 **IF** the blender is set up for automatic makeup per Enclosure 4.1 (Automatic Makeup), record the setpoint of the following controllers: 1NV-238A (B/A Xfer Pmp To Blender Ctrl) ____gpm 1NV-242A (RMWST To B/A Blender Ctrl) _____gpm STANDARD: Determines step does not apply. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 2 3.3 Determine the volume of makeup desired. Total desired makeup: __________ gal STANDARD: Uses Databook curve on OAC or “thumb rule” of 20 gals / percent to determine amount of make-up. Operator should determine 380-400 gals. **Examiner Note: Amount required is 381.2 gal per databook** **Examiner Note: This step is critical to meet the JPM standard for final VCT level.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___**UNSAT**

STEP/STANDARD	SAT/UNSAT
NOTE: The RMWST boron concentration has an insignificant effect on the calculation at higher outlet concentrations. The RMWST boron concentration term may be considered "0" when the desired concentration is greater than 100 ppm. If performing a large blended makeup for demin saturation during BOL, the boric acid should be blended in evenly over the entire makeup to preclude changes in NC temperature and reactor power. **Examiner Cue: If asked, "RMWST [B] = 0 ppm, BAT [B] = 7500 ppm"**	**CRITICAL STEP**
STEP 3 3.4 **IF** the NC system boron concentration is greater than 25 ppm, calculate the amount of boric acid to be added as follows: (R.M.) _____ 3.4.1 Determine the volume of boric acid required to achieve the desired concentration: Boric acid gal $= \frac{V_f\ (C_f\ -\ C_w)}{(C_a\ -\ C_w)} =$ ____________ $=$ ________ gallons where V_f is the total makeup volume from Step 3.3 C_f is the desired boron concentration C_w is the RMWST boron concentration C_a is the BAT boron concentration STANDARD: Correctly calculates the boron volume dependent on amount of makeup. A 380 gal makeup requires 43.6 gal of boric acid. A 400 gal makeup requires 45.8 gal of boric acid. (42 – 47 gals is acceptable). **Examiner Note: Critical to ensure correct blend for reactivity management.** COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
NOTE: The intent of the following step is to account for known inaccuracies. The Control Room Supervisor shall be involved in determining the amount of correction to apply. STEP 4 3.4.2 **IF** previous makeups have demonstrated an inability to achieve the desired boric acid volume, determine the amount of correction needed. __________ gallons STANDARD: Applicant determines step is not applicable. **Examiner Cue:** If asked, **"CRS has determined NO amount of correction needed."** COMMENTS:	___ **SAT** ___ **UNSAT**

NOTE: The intent of the following step is to adjust the blend concentration to intentionally change NC System Tavg. The Control Room Supervisor shall be involved in determining the amount of adjustment to apply. Adjustment is limited to $\pm$ 5 gallons of Boric Acid per 100 gallons of total makeup volume. STEP 5 3.4.3 **IF** desired to adjust blend concentration for the purpose of changing Tavg, determine the amount of adjustment to be made. _______ gallons STANDARD: Applicant determines step is not applicable. **Examiner Cue:** If asked, **"CRS has determined NO adjustment is needed."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 6 3.4.4 Determine the volume of boric acid to be added as follows: Volume = Boric Acid gal (Step 3.4.1) + correction (Step 3.4.2) + adjustment (Step 3.4.3) = _______ gallons STANDARD: Correctly calculates the boric acid addition dependent upon the amount of makeup. (42 - 47 gals). **Examiner Note: This step is critical to ensure correct blend for reactivity management.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP 7 3.5 **IF** boric acid is to be added, ensure one boric acid transfer pump is in "ON". STANDARD: Starts at least one boric acid transfer pump by placing the switch to “ON” and verifying the red light LIT. **Examiner Note: This step is critical to ensure boron is added.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 8 3.6 **IF** reactor makeup water is to be added, ensure one reactor makeup water pump is in "ON". STANDARD: Starts at least one reactor makeup water pump by placing the switch(es) to "ON" and verifying the red light(s) LIT. **Examiner Note:** **This step is critical to ensure reactor make-up water is added.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

NOTE: Normally 1NV-186A (B/A Blender Otlt To VCT Otlt) is the preferred makeup flowpath. 1NV-181A (B/A Blender Otlt To VCT) may be used to limit oxygen addition from the makeup source. STEP 9 3.7 Place one of the following in the "OPEN" position to align a flowpath to the VCT. (R.M.) • 1NV-186A (B/A Blender Otlt To VCT Otlt) OR • 1NV-181A (B/A Blender Otlt To VCT) STANDARD: Opens either 1NV-186A or 1NV-181A. **Examiner Note:** **This step is critical to establish flowpath for make-up.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 10 3.8 **IF** NC System boron concentration will be changed by ≥ 50 ppm, initiate PZR spray to equalize the boron concentration throughout the system by operating backup heaters per OP/0/A/6200/055 (Miscellaneous Component Operation). STANDARD: Applicant determines step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 11 3.9. **IF AT ANY TIME** a dilution is in progress with the reactor subcritical the Nuclear Instrumentation increases by a factor of two, perform the following: STANDARD: Applicant determines step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 12 3.10 **IF AT ANY TIME** it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows: STANDARD: Applicant notes this step and moves on. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 13 3.11 **WHILE** makeup is in progress, monitor the following for expected results: ☐ Control rod motion ☐ NC System Tavg ☐ Reactor Power STANDARD: Monitors control rods, T-Avg, and reactor power during makeup. COMMENTS:	___ **SAT** ___ **UNSAT**

NOTE: Steps 3.12 and 3.13 may be performed concurrently, as required, to achieve the proper blend STEP 14 3.12 **IF** reactor makeup water is to be added, perform the following: **NOTE:** If blended makeup is being added, 1NV-242A (RMWST To B/A Blender Ctrl) may be manually controlled to allow proper blending of makeup. 3.12.1 Operate 1NV-242A (RMWST To B/A Blender Ctrl) as required. (R.M.) STANDARD: Operates 1NV-242A as required to achieve correct blend. **Examiner Note:** **This step is critical to ensure correct blend for reactivity management.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 15 3.12.2 Monitor the total makeup counter. STANDARD: Monitors the total makeup counter. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 16 3.13 **IF** boric acid is to be added, perform the following: **NOTE:** If blended makeup is being added, 1NV-238A (B/A To Blender Ctrl Vlv) may be manually controlled to allow proper blending of makeup. 3.12.1 Operate 1NV-238A (B/A To Blender Ctrl Vlv) as required. (R.M.) STANDARD: Operates 1NV-238A as required for correct blend. **Examiner Note: This step is critical to ensure correct blend for reactivity management.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 17 3.13.2 Monitor the boric acid counter. STANDARD: Monitors the boric acid counter. COMMENTS:	___ SAT ___ UNSAT

NOTE: The boric acid and/or total makeup counter may count up 1 - 5 gallons after termination. STEP 18 3.14 **WHEN** the desired volume(s) as determined in Step 3.3 **AND IF** applicable, Step 3.4.4 is(are) reached on the total makeup counter and/or the boric acid counter, ensure the following valves are closed to secure manual makeup: (R.M.) • 1NV-242A (RMWST To B/A Blender Ctrl) OR • 1NV-238A (B/A To Blender Ctrl Vlv) STANDARD: Closes 1NV-242A and 1NV-238A by placing their control switches to the "CLOSE" or "AUTO" position and verifying the green light LIT. **Examiner Note: This step is critical to secure make-up flow.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 19 3.15 Close the valve opened in Step 3.7. • 1NV-186A (B/A Blender Otlt To VCT Otlt) OR • 1NV-181A (B/A Blender Otlt To VCT) STANDARD: Closes valve opened in step 3.7 by placing the switch to the "CLOSE" or "AUTO" position and verifying the green light LIT. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 20 3.16 **IF NOT** required for current plant conditions, place switch for boric acid transfer pump started in Step 3.5, in "OFF". STANDARD: Secures pump started in step 3.5 by placing the respective control switch to "OFF" and verifying the green light LIT. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 21 3.17 **IF NOT** required for current plant conditions, place switch for reactor makeup water pump started in Step 3.6, in "OFF". STANDARD: Secures pump started in step 3.6 by placing the respective control switch to "OFF" and verifying the green light LIT. COMMENTS:	___ **SAT** ___ **UNSAT**

NOTE: If additional boric acid additions will be performed over the course of the shift, flushing the makeup line is **NOT** recommended. STEP 22 3.18 **IF** boric acid only was added **AND** it is desired, flush the makeup line as follows: STANDARD: Applicant determines step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 23 3.19 Reset the following: • Total Makeup Counter • Boric Acid Counter STANDARD: Resets the Total Makeup Counter and the Boric Acid Counter by depressing the "F1/RST" pushbuttons and verifying the counter indication goes to 0. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 24 3.20 **IF** automatic makeup is desired, perform one of the following: STANDARD: Applicant determines step is not applicable. **Examiner Cue:** **"Automatic makeup is not desired."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 25 3.21 **IF** initiated in Step 3.8, terminate PZR spray by securing backup heaters per OP/0/A/6200/055 (Miscellaneous Component Operation). STANDARD: Applicant determines step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 26 3.22 Do **NOT** file this enclosure in the Control Copy folder of this procedure. STANDARD: Procedure should be routed. **Examiner Cue:** **"The CRS will review this procedure. JPM is complete."** COMMENTS:	___ **SAT** ___ **UNSAT**

STOP TIME________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **The unit is at 100% power, steady state condition.**
- **The Reactor Coolant System boron concentration is 860 PPM.**
- **The Volume Control Tank level is 35%.**
- **VCT automatic makeup is out of service for calibration by IAE.**

INITIATING CUES:

- **The Control Room Supervisor directs you to perform a manual blended makeup to increase the VCT level to 55% per OP/1/A/6150/009 Boron Concentration Control, Enclosure 4.5. Initial conditions have been completed. Begin at step 3.2.**
- **The OATC is monitoring the control boards.**
- **Independent verification and peer checks have been waived.**

1. Limits and Precautions

1.1 This procedure is Reactivity Management related because it controls activities that can affect core reactivity by changing boron concentration. (R.M.)

1.2 The following Limits and Precautions are Reactivity Management related: (R.M.)

1.2.1 When performing dilutions at or near 100% power, batch additions to the VCT (instead of continuous dilution at low flow rates) are the preferred method. {PIP C99-0587}

1.2.2 If the NC System is filled and vented and the boron concentration is being reduced in the NC System, at least one NC pump shall be in operation, recirculating the NC System. {PIP C99-2510}

1.2.3 If the boron concentration is being increased in the NC System, at least one NC pump or one ND pump shall be in operation, recirculating the NC System.

1.2.4 If the unit has operated continuously for several months, significant Boron 10 depletion may have occurred. The effective boron concentration of the NC System may be lower than indicated by Chemistry samples.

1.3 Continuous dilution operations will affect the NC System H_2 concentration.

1.4 With BAT boron concentration greater than or equal to 7200 ppm, it is recommended that only manual makeup be performed when the NC System boron concentration is $\geq$ 1300 ppm. Automatic or manual makeup can be used when NC System boron concentration is < 1300 ppm. {PIP 03-7305}

1.5 With BAT boron concentration less than 7200 ppm, it is recommended that only manual makeup be performed when the NC System boron concentration is $\geq$ 1250 ppm. Automatic or manual makeup can be used when NC System boron concentration is < 1250 ppm. {PIP 03-7305}

1.6 With a reactor makeup water pump running following an auto start, repositioning its control switch to "ON" can cause the pump motor breaker to trip. Therefore, the control switches for these pumps shall only be repositioned with the associated pump off.

1.7 Maintaining VCT pressure as low as practical during large makeups will minimize gas absorption. VCT pressure can be reduced by diverting letdown or by VCT purge.

1.8 Due to Electromagnetic Interference within the Unit 1 Reactor Makeup Control System, the Unit 1 Boric Acid Counter may sporadically count up during dilution activities. OFF indications for the Boric Acid Xfer Pumps and Closed indication for valve 1NV-238A can be used by the Reactor Operators to validate that sporadic counts are indication only. (NCR 02081372).

2. Initial Conditions

AA 2.1 **IF** in Mode 1, 2 or 3 **AND** a blended makeup is being performed with the intention of maintaining current NC System boron concentration, ensure R3 reactivity management controls established per AD-OP-ALL-0203 (Reactivity Management). (R.M.)

N/A AA 2.2 **IF** in Mode 1, 2 or 3 **AND** a makeup is being performed with the intention of changing NC System boron concentration, ensure R2 reactivity management controls established per AD-OP-ALL-0203 (Reactivity Management). (R.M.)

AA 2.3 Verify the NB System is in operation per OP/1/A/6200/012 (Reactor Makeup Water).

AA 2.4 Verify the NV System is in operation per OP/1/A/6200/001 (Chemical and Volume Control System).

3. Procedure

NOTE:	This enclosure will affect reactivity of the core and is therefore designated important to Reactivity Management per the guidelines of AD-OP-ALL-0203 (Reactivity Management). (R.M.)

AA 3.1 Ensure valves are aligned per Enclosure 4.8 (Valve Checklist).

_____ 3.2 **IF** the blender is set up for automatic makeup per Enclosure 4.1 (Automatic Makeup), record the setpoint of the following controllers:

☐ 1NV-238A (B/A Xfer Pmp To Blender Ctrl) __________gpm

☐ 1NV-242A (RMWST To B/A Blender Ctrl) __________gpm

_____ _____ 3.3 Determine the volume of makeup desired.
IV
Total desired makeup: __________ gal

NOTE:
- The RMWST boron concentration has an insignificant effect on the calculation at higher outlet concentrations. The RMWST boron concentration term may be considered "0" when the desired concentration is greater than 100 ppm.
- If performing a large blended makeup for demin saturation during BOL, the boric acid should be blended in evenly over the entire makeup to preclude changes in NC temperature and reactor power.

_____ _____ 3.4 **IF** the NC system boron concentration is greater than 25 ppm, calculate the amount of boric acid to be added as follows: (R.M.).
IV

_____ _____ 3.4.1 Determine the volume of boric acid required to achieve the desired concentration:
IV

$$\text{Boric acid gal} = \frac{V_f\ (C_f - C_w)}{(C_a - C_w)} = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_ \text{ gallons}$$

where V_f is the total makeup volume from Step 3.3
C_f is the desired boron concentration
C_w is the RMWST boron concentration
C_a is the BAT boron concentration

NOTE: The intent of the following step is to account for known inaccuracies. The Control Room Supervisor shall be involved in determining the amount of correction to apply.

_____ _____ 3.4.2 **IF** previous makeups have demonstrated an inability to achieve the desired boric acid volume, determine the amount of correction needed. _________ gallons
IV

NOTE: The intent of the following step is to adjust the blend concentration to intentionally change NC System Tavg. The Control Room Supervisor shall be involved in determining the amount of adjustment to apply. Adjustment is limited to ± 5 gallons of Boric Acid per 100 gallons of total makeup volume.

_____ _____ 3.4.3 **IF** desired to adjust blend concentration for the purpose of changing Tavg, determine the amount of adjustment to be made. _________ gallons
IV

_____ _____ 3.4.4 Determine the volume of boric acid to be added as follows:
IV

Volume = Boric acid gal (Step 3.4.1) + correction (Step 3.4.2) + adjustment (Step 3.4.3) = ________ gallons

_____ 3.5 **IF** boric acid is to be added, ensure one boric acid transfer pump is in "ON".

_____ 3.6 **IF** reactor makeup water is to be added, ensure one reactor makeup water pump is in "ON".

NOTE:	Normally 1NV-186A (B/A Blender Otlt To VCT Otlt) is the preferred makeup flowpath. 1NV-181A (B/A Blender Otlt To VCT) may be used to limit oxygen addition from the makeup source.

3.7 Place one of the following in the "OPEN" position to align a flowpath to the VCT. (R.M.)

_____ • 1NV-186A (B/A Blender Otlt To VCT Otlt)
OR
_____ • 1NV-181A (B/A Blender Otlt To VCT)

_____ 3.8 **IF** NC System boron concentration will be changed by ≥ 50 ppm, initiate PZR spray to equalize the boron concentration throughout the system by operating backup heaters per OP/0/A/6200/055 (Miscellaneous Component Operation).

_____ 3.9 **IF AT ANY TIME** a dilution is in progress with the reactor subcritical the Nuclear Instrumentation increases by a factor of two, perform the following:

3.9.1 Ensure the following valves are closed:

_____ • 1NV-242A (RMWST To B/A Blender Ctrl)

_____ • 1NV-238A (B/A To Blender Ctrl Vlv)

3.9.2 Continue with this enclosure at Step 3.15.

_____ 3.10 **IF AT ANY TIME** it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows:

_____ 3.10.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position.

_____ 3.10.2 Ensure VCT level is monitored continuously while diverting to the RHT.

NOTE:	Procedure may continue while performing the following step.

3.10.3 **WHEN** desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows:

_____ 3.10.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.

_____ 3.10.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.

_____ 3.11 **WHILE** makeup is in progress, monitor the following for expected results:

- ☐ Control rod motion
- ☐ NC System Tavg
- ☐ Reactor Power

NOTE:	Steps 3.12 and 3.13 may be performed concurrently, as required, to achieve the proper blend.

_____ 3.12 **IF** reactor makeup water is to be added, perform the following:

NOTE:	If blended makeup is being added, 1NV-242A (RMWST To B/A Blender Ctrl) may be manually controlled to allow proper blending of makeup.

_____ 3.12.1 Operate 1NV-242A (RMWST To B/A Blender Ctrl) as required. (R.M.)

3.12.2 Monitor the total makeup counter.

_____ 3.13 **IF** boric acid is to be added, perform the following:

NOTE:	If blended makeup is being added, 1NV-238A (B/A To Blender Ctrl Vlv) may be manually controlled to allow proper blending of makeup.

_____ 3.13.1 Operate 1NV-238A (B/A To Blender Ctrl Vlv) as required. (R.M.)

3.13.2 Monitor the boric acid counter.

NOTE:	The boric acid and/or total makeup counter may count up 1 - 5 gallons after termination.

3.14 **WHEN** the desired volume(s) as determined in Step 3.3 **AND IF** applicable, Step 3.4.4 is(are) reached on the total makeup counter and/or the boric acid counter, ensure the following valves are closed to secure manual makeup: (R.M.)

_____ • 1NV-242A (RMWST To B/A Blender Ctrl)

_____ • 1NV-238A (B/A To Blender Ctrl Vlv)

3.15 Close the valve opened in Step 3.7.

_____ • 1NV-186A (B/A Blender Otlt To VCT Otlt)
OR
_____ • 1NV-181A (B/A Blender Otlt To VCT)

_____ 3.16 **IF NOT** required for current plant conditions place switch for boric acid transfer pump started in Step 3.5, in "OFF".

_____ 3.17 **IF** **NOT** required for current plant conditions, place switch for reactor makeup water pump started in Step 3.6, in "OFF".

NOTE:	If additional boric acid additions will be performed over the course of the shift, flushing the makeup line is **NOT** recommended.

_____ 3.18 **IF** boric acid only was added **AND** it is desired, flush the makeup line as follows:

_____ 3.18.1 Ensure controller for 1NV-242A (RMWST To B/A Blender Ctrl) is in manual.

_____ 3.18.2 Increase demand on controller for 1NV-242A (RMWST To B/A Blender Ctrl) to full open

_____ 3.18.3 Open 1NV-242A (RMWST To B/A Blender Ctrl).

3.18.4 Open valve which was opened in Step 3.7:

_____ • 1NV-186A (B/A Blender Otlt To VCT Otlt)
OR
_____ • 1NV-181A (B/A Blender Otlt To VCT)

_____ 3.18.5 Ensure one reactor makeup water pump is in "ON".

3.18.6 **WHEN** ~ 20 gallons of makeup water have been flushed through the makeup line, ensure the following valves are closed:

_____ 3.18.6.1 1NV-242A (RMWST To B/A Blender Ctrl)

_____ 3.18.6.2 1NV-186A (B/A Blender Otlt To VCT Otlt)

_____ 3.18.6.3 1NV-181A (B/A Blender Otlt To VCT)

_____ 3.18.7 Ensure controller for 1NV-242A (RMWST To B/A Blender Ctrl) is set to the value recorded in Step 3.2.

_____ 3.18.8 Place controller for 1NV-242A (RMWST To B/A Blender Ctrl) in auto.

_____ 3.18.9 **IF** **NOT** required for current plant conditions, place switch for reactor makeup water pump started in Step 3.18.5, in "OFF".

_____ 3.18.10 **IF** reactor makeup water pump started in Step 3.18.5, was in "AUTO", **THEN** place switch for reactor makeup water pump started in Step 3.18.5, in "AUTO".

3.19 Reset the following:

_____ • Total Makeup Counter

_____ • Boric Acid Counter

_____ 3.20 **<u>IF</u>** automatic makeup is desired, perform one of the following:

_____ 3.20.1 **<u>IF</u>** it is desired to change the blender outlet boron concentration, refer to Enclosure 4.1 (Automatic Makeup).

OR

_____ 3.20.2 **<u>IF</u>** makeup at the previous concentration is acceptable **<u>AND</u>** the system was previously aligned per Enclosure 4.1 (Automatic Makeup), perform the following:

3.20.2.1 Ensure the following valve control switches in "AUTO":

_____ • 1NV-181A (B/A Blender Otlt To VCT)

_____ • 1NV-186A (B/A Blender Otlt To VCT Otlt)

_____ • 1NV-238A (B/A To Blender Ctrl Vlv)

_____ • 1NV-242A (RMWST To B/A Blender Ctrl)

_____ 3.20.2.2 Ensure the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) is set to the value recorded in Step 3.2. (R.M.)

_____ 3.20.2.3 Ensure the controller for 1NV-242A (RMWST To B/A Blender Ctrl) is set to the value recorded in Step 3.2. (R.M.)

3.20.2.4 Ensure the following valve controllers in auto:

_____ • 1NV-242A (RMWST To B/A Blender Ctrl)

_____ • 1NV-238A (B/A Xfer Pmp To Blender Ctrl)

_____ 3.20.2.5 **<u>IF</u>** a boric acid transfer pump was placed in "OFF" in Step 3.16, ensure it is returned to "AUTO".

_____ 3.20.2.6 **<u>IF</u>** a reactor makeup water pump was placed in "OFF" in Step 3.17, ensure it is returned to "AUTO".

_____ 3.20.2.7 Ensure the "NC MAKEUP MODE SELECT" switch in "AUTO".

NOTE:	If automatic makeup has been disabled per Enclosure 4.1 step 3.1.1, then N/A step 3.20.2.8 .

_____ 3.20.2.8 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)

_____ 3.21 **IF** initiated in Step 3.8, terminate PZR spray by securing backup heaters per OP/0/A/6200/055 (Miscellaneous Component Operation).

3.22 Do **NOT** file this enclosure.

JPM I

Catawba Nuclear Station
JPM I
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EVALUATION SHEET

Task: Break Condenser Vacuum Locally

Alternate Path: No

Facility JPM #: CA-084

Safety Function: 4S **Title:** Main Turbine Generator (MT/G) System

K/A 045 A1.06 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MT/G system controls including: Expected response of secondary plant parameters following T/G trip

Rating(s): 3.3 / 3.7 **CFR:** 41.5 / 45.5

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

Simulator ______ In-**P**lant __X__ **P**erform __X__ **S**imulate ________

References: AP/2/A/5500/006 (Loss of S/G Feedwater) Enclosure 3

Task Standard: Enclosure 3 has been completed with the first vacuum breaker opened within 10 minutes.

Validation Time: 8 minutes **Time Critical:** Yes __X__ No ______

===

Applicant:
NAME________________________ Docket #______________

Time Start: ____________
Time Finish: ____________

Time Critical (<10 minutes)
Time Start: ___________
Time Finish: ___________

Performance Rating:

SAT ____ UNSAT ____

Performance Time ______

Examiner: _______________________________ _______________________________/_________
NAME SIGNATURE DATE

===

COMMENTS

____

____

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____

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____

Catawba Nuclear Station
JPM I
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 2 is in Mode 3 following a reactor trip.**

INITIATING CUES:

- **The Control Room Supervisor instructs you to perform AP/2/A/5500/006 (Loss of S/G Feedwater) Enclosure 3 (Local Actions to Break Condenser Vacuum).**

This JPM is TIME CRITICAL; time begins when you acknowledge the task.

EXAMINER NOTE: **Provide applicant with a copy of AP/2/A/5500/006, Enclosure 3.**

Critical Time Start: Record Time that applicant acknowledges the task _________.

STEP/STANDARD	SAT/UNSAT
CAUTION **High air flow rates will exist when vacuum breakers are first opened. Stay clear of pipe end.**	**CRITICAL STEP**
STEP 1: 1 **Break condenser vacuum by opening the following valves:** • 2CM-368 (2A Main Cond Shell Vacuum Bkr) (TB2-600,2F-2G, 26) (Ladder needed) • 2CM-369 (2B Main Cond Shell Vacuum Bkr) (TB2-600, 2F, 24-25) (Ladder needed) • 2CM-370 (2C Main Cond Shell Vacuum Bkr) (TB2-609, 2F-22) (Ladder needed). **Examiner Note:** **The critical end time is when the applicant describes opening the first valve. Due to the height of the valves, no fall protection will be required.** **Examiner Cue:** **When** applicant describes engaging lever and rotating handwheel counter clockwise to open the following valve then: "**A large volume of airflow is heard.**" **Examiner Note:** **This step is critical in order to open correct valves for breaking vacuum.** **Critical Time End: ________________** STANDARD: Applicant will describe opening the valves: 2CM-368, 2CM-369, 2CM-370. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 2 2 **Secure steam to CSAEs as follows:** a. Close the following valves: • 2SA-22 (Main Steam To CSAE) (TB2-614, 2M-32) • 2SA-27 (Aux Steam To CSAE) (TB-614, 2L-2M, 27). STANDARD: Applicant will describe closing 2SA-22 and 2SA-27. **Examiner Cue:** As applicant properly describes closing the valves give cue as appropriate, "**Valve turns until resistance is felt.**" **Examiner Note:** **This step is critical, because if it is not performed, the CSAEs will continue to pull vacuum** COMMENTS:	**CRITICAL STEP** **___ SAT** **___UNSAT**

STEP 3 b. **WHEN** time and manpower permit, **THEN** complete the shutdown of the CSAEs. **REFER TO** OP/2/B/6300/006 (Main Vacuum). STANDARD: Applicant will read the step **Examiner Cue:** **The Control Room Supervisor has instructed another operator to complete the shutdown of the CSAEs.** COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 4 3. **WHEN requested by Control Room Supervisor, THEN verify condenser vacuum broken as follows:** a. Inspect each vacuum breaker for absence of air flow into condenser. b. Notify Control Room Supervisor of results. STANDARD: Applicant will inspect each vacuum breaker for the absence of air flow into the condenser and will report to the Control Room Supervisor. **Examiner Cue:** After each inspection, **"No air flow into condenser."** COMMENTS:	___ SAT ___ UNSAT

STOP TIME________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

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INITIAL CONDITIONS:

- **Unit 2 is in Mode 3 following a reactor trip.**

INITIATING CUES:

- **The Control Room Supervisor instructs you to perform AP/2/A/5500/006 (Loss of S/G Feedwater) Enclosure 3 (Local Actions to Break Condenser Vacuum).**

This JPM is TIME CRITICAL; time begins when you acknowledge the task.

CAUTION **High air flow rates will exist when vacuum breakers are first opened. Stay clear of pipe end.**

1. **Break condenser vacuum by opening the following valves:**

__ • 2CM-368 (2A Main Cond Shell Vacuum Bkr) (TB2-600, 2F-2G, 26) (Ladder needed)

__ • 2CM-369 (2B Main Cond Shell Vacuum Bkr) (TB2-600, 2F, 24-25) (Ladder needed)

__ • 2CM-370 (2C Main Cond Shell Vacuum Bkr) (TB2-609, 2F-22) (Ladder needed).

2. **Secure steam to CSAEs as follows:**

a. CLOSE the following valves:

__ • 2SA-22 (Main Steam To CSAE) (TB2-614, 2M-32)

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

__ b. **WHEN** time and manpower permit, **THEN** complete shutdown of CSAEs. **REFER TO** OP/2/B/6300/006 (Main Vacuum).

3. **WHEN requested by Control Room Supervisor, THEN verify condenser vacuum broken as follows:**

__ a. Inspect each vacuum breaker for absence of air flow into condenser.

__ b. Notify Control Room Supervisor of results.

JPM J

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EVALUATION SHEET

Task: Transfer Control to Standby Shutdown System

Alternate Path: No

Facility JPM #: AD-001

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

K/A APE 068 AA1.21 Ability to operate and/or monitor the following as they apply to the Control Room Evacuation: Transfer of controls from control room to shutdown panel or local control

Rating(s): 3.9 / 4.1 **CFR:** 41.7 / 45.5 / 45.6

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

Simulator ______ In-**P**lant __X__ **P**erform __X__ **S**imulate ______

References: OP/0/B/6100/013 (Standby Shutdown Facility Operation)

Task Standard: Control is transferred to the Standby Shutdown System, solenoid isolation valve disconnects transferred, CAPT T&T valve power is transferred and Train A Neutron Monitoring System power is transferred.

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

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Applicant:
NAME________________________ Docket #______________ Time Start: ____________
Time Finish: ____________

Performance Rating: Performance Time ______

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

==

COMMENTS

Catawba Nuclear Station
JPM J
September 2019 NRC Exam

READ TO APPLICANT

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INITIAL CONDITIONS:

Unit 2 has just suffered a fire that results in evacuation of the control room.

INITIATING CUES:

Transfer control to the Standby Shutdown System per OP/0/B/6100/013 Enclosure 4.2 steps 3.1 through 3.4. All initial conditions have been satisfied.

EXAMINER NOTE: **After reading Initiating Cue, provide the examinee with copy of OP/0/B/6100/013 (Standby Shutdown Facility Operation), Enclosure 4.2 with initial conditions completed.**

EXAMINER NOTE: **Pictures of cabinet interior components are included to allow the candidate to describe necessary actions without opening cabinets.**

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<u>Critical Time Start:</u> Record Time that applicant acknowledges the task _________.

STEP/STANDARD	SAT/UNSAT
NOTE: 1. NC System will **<u>NOT</u>** be able to be cooled down below approximately 567°F, because the lowest steam line safety valve is set at 1175 psig. 2. Steps 3.1 through 3.5 may be in progress per AP/2/A/5500/017 (Loss of Control Room), Enclosure 8 (Transfer Control to SSF) and AP/1/A/5500/017 (Loss of Control Room), Enclosure 10 (SSF D/G Startup). 3. Steps 3.1 through 3.4 may be performed concurrently with Steps 3.5 through 3.8. 4. For a list of valves affected by the transfer, see Enclosure 4.6 (Equipment Affected on Transfer).	**CRITICAL STEP**
<u>STEP 1</u>: 3.1 Transfer control to the Standby Shutdown System (SSS) as follows: **NOTE:** These breakers are kirk-key interlocked to prevent both feeders from being closed at the same time. 3.1.1 Open 2EMXS-F01A (Normal Incoming Breaker Fed From Motor Control Center 2EMXA) (AB-577, BB-65, Rm 486). <u>STANDARD</u>: Applicant simulates inserting the locking tab and rotating 2EMXS-F01A in the counter clockwise direction until a click is heard and breaker indication points to "OFF'. **Examiner Cue:** Once proper demonstration of breaker operation is satisfied, **"2EMXS-F01A is OFF"** **Examiner Note:** **This step is critical to provide power to vital plant components from an available and controlled power source (SSF).** <u>COMMENTS:</u>	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 2 3.1.2 Close 2EMXS-F03A (Alternate Incoming Bkr Fed From Motor Control Center SMXG) STANDARD: Applicant simulates rotating Kirk-Key in 2EMXS-F01A and removes. Then inserts Kirk-Key in 2EMXS-F03A and rotates. Inserts tab and rotates 2EMXS-F03A clockwise until a click is heard and breaker indication points to "ON". **Examiner Cue:** Once proper demonstration of breaker operation is satisfied, **"2EMXS-F03A is ON"** **Examiner Note:** **This step is critical to provide power to vital plant components from an available and controlled power source (SSF).** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___**UNSAT**

STEP 3 3.1.3 Close 2EMXS-F03E (Reactor Vessel Head Vent Motor (2NC253A) to restore power to 2NC-253A (Rx Head Vent). STANDARD: Applicant simulates inserting the locking tab and rotating 2EMXS-F03E in the clockwise direction until a click is heard and breaker indication points to "ON'. **Examiner Cue:** Once proper demonstration of breaker operation is satisfied, **"2EMXS-F03E is ON"** **Examiner Note:** **This step is critical to ensure Rx Head vents are aligned to an available power source (SSF).** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___**UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 4: 3.2 Ensure significant solenoid isolation valves are closed by transferring disconnects as follows: **CAUTION:** The plugs shall be inserted squarely and the ring tightened to ensure proper connection of all pins. 3.2.1 Remove Train A Plug 1 disconnect from the "PLUG 1: PLANT MODE" receptacle and connect to the " PLUG 1: SSF MODE" receptacle located in terminal box 2TBOX0396 (Train A SSF Disconnect Enclosure) (AB-577, BB-69, Rm 486). STANDARD: Applicant simulates rotation of the lock ring and removal of Train "A" Plug 1 from "PLUG 1: PLANT MODE" and places it in "PLUG 1: SSF MODE" receptacle and tightens lock ring. **Examiner Cue:** Once the proper terminal box is located, present a copy of Picture #1 and Picture #2 and allow the applicant to demonstrate proper completion of this step. TBOX door should not be opened. **Examiner Cue:** Once proper demonstration is satisfied, **"Train "A" Plug 1 is installed in "SSF Mode"** **Examiner Note:** **This step is critical to ensure proper control of primary system components via SSF power.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

<table>
<tr><th>STEP/STANDARD</th><th>SAT/UNSAT</th></tr>
<tr><td>STEP 5 3.2.2 Remove Train A Plug 2 disconnect from the " PLUG 2: PLANT MODE" receptacle and connect to the " PLUG 2: SSF MODE" receptacle located in terminal box 2TBOX0396 (Train A SSF Disconnect Enclosure) (AB-577, BB-69, Rm 486).

STANDARD:

Applicant simulates rotation of the lock ring and removal of Train “A” Plug 2 from “PLUG 2: PLANT MODE” and places it in “PLUG 2: SSF MODE” receptacle and tightens lock ring.

Examiner Cue: Once the proper terminal box is located, present a copy of Picture #1 and Picture #2 and allow the applicant to demonstrate proper completion of this step. TBOX door should not be opened.

Examiner Cue: Once proper demonstration is satisfied, “Train “A” Plug 2 is installed in “SSF Mode”

Examiner Note: This step is critical to ensure proper control of primary system components via SSF power.

COMMENTS:</td><td>CRITICAL STEP

___ SAT

___UNSAT</td></tr>
</table>

STEP/STANDARD	SAT/UNSAT
STEP 6 3.2.3 Remove Train B disconnect from the "PLANT OPERATION" receptacle and connect to the "SSF OPERATION" receptacle located in 2TBOX0395 (Train B SSF Disconnect Enclosure) (inside small door "Unit 2 Auxiliary Building SSF Disconnect") (AB-577, BB-69, Rm 486). STANDARD: Applicant simulates rotation of the locking ring and removal of Train "B" disconnect from "PLANT OPERATION" and places it in "SSF OPERATION" receptacle and tightens lock ring. **Examiner Cue:** Once the proper enclosure is located, present a copy of Picture #3 and allow the applicant to demonstrate proper completion of this step. Enclosure door should not be opened. **Examiner Cue:** Once proper demonstration is satisfied, **"Train "B" disconnect is installed in "SSF OPERATION"** **Examiner Note:** **This step is critical to ensure proper control of primary system components via SSF power.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___UNSAT**

STEP/STANDARD	SAT/UNSAT
NOTE: The power disconnect breaker for 2NC-252B (Rx Head Vent Block) is located in 2TBOX0395 (Train B SSF Disconnect Enclosure) (inside small door "Unit 2 Auxiliary Building SSF Disconnect") (AB-577, BB-69, Rm 486). STEP 7 3.2.4 Ensure the 600V power disconnect breaker (SSF Pwr Disconnect For 2NC-252B) for 2NC-252B (Rx Head Vent Block) is in the "OFF" position. STANDARD: Ensures 2NC-252B disconnect BKR in "OFF" position. **Examiner Cue:** Once the proper terminal box is located, present a copy of Picture #4 and allow the applicant to demonstrate proper completion of this step. TBOX door should not be opened. **Examiner Cue:** **"2NC-252 disconnect BKR is in the OFF position"** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 8: 3.3 Transfer power for CAPT Trip and Throttle valve as follows: **NOTE:** • Breakers are Kirk-Key interlocked to prevent both feeders from being closed at the same time. • Breakers are on 2ELCP0250 (125 VDC CAPT Trip And Throttle Valve Power Transfer Panel) (AB-577, BB-64, Rm 486). 3.3.1 Open 2ELCP0250-F01B (Incoming Line From 2EDE 125 VDC 1E) (AB-577, BB-64, Rm 486). STANDARD: Rotate 2ELCP0250-F01B, switch to ”OFF”. **Examiner Cue:** Once proper demonstration is satisfied, **“2ELCP0250-F01B is OFF”** **Examiner Note:** **This step is critical to ensure CAPT control is aligned to an available power source (SSF).** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 9 3.3.2 Close 2ELCP0250-F01C (Incoming Line From SDSP2 125 VDC NE). STANDARD: Rotate Kirk-Key in 2ELCP0250-F01B and remove. Insert Kirk-Key in 2ELCP0250-F01C and rotate. Rotate 2ELCP0250-F01C switch to "ON" **Examiner Cue:** Once proper demonstration is satisfied, **"2ELCP0250-F01C switch to "ON"** **Examiner Note:** Kirk Key must be obtained from 2ELCP0250-F01B to be inserted into 2ELCP0250-F01C. **Examiner Note:** **This step is critical to ensure CAPT control is aligned to an available power source (SSF).** COMMENTS:	**CRITICAL STEP** ___ SAT ___UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 10 3.4 Transfer power to Train A Neutron Monitoring System as follows: (2TBOX0603,(SSF/Plant Power Transfer Enclosure For ENC Monitor), AB-577, BB-62, Rm 486) 3.4.1 Disconnect the power plug from the "NORMAL IE OPERATION" receptacle. STANDARD: Rotate lock ring and remove plug from "NORMAL IE OPERATION" **Examiner Cue:** Once the proper terminal box is located, present a copy of Picture #5 and allow the applicant to demonstrate proper completion of this step. TBOX door should not be opened. **Examiner Cue:** Once proper demonstration is satisfied, **"Power Plug is disconnected"** **Examiner Note:** **This step is critical to ensure Source Range indication is aligned to an available power supply (SSF).** COMMENTS:	**CRITICAL STEP** ___ SAT ___UNSAT

STEP/STANDARD	SAT/UNSAT
CAUTION: The plug shall be inserted squarely and the ring tightened to ensure proper connection of all pins. STEP 11 3.4.2 Connect the power plug to the "SSF NE OPERATION" receptacle. STANDARD: Acknowledges caution and Installs power plug in "SSF NE OPERATION" receptacle and tighten lock ring. **Examiner Cue:** Once the proper terminal box is located, present a copy of Picture #5 and allow the applicant to demonstrate proper completion of this step. TBOX door should not be opened. **Examiner Cue:** Once proper demonstration is satisfied, **"Power Plug is connected"** **Examiner Note:** **This step is critical to ensure Source Range indication is aligned to an available power supply (SSF).** COMMENTS:	**CRITICAL STEP** ___ SAT ___UNSAT

STOP TIME________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

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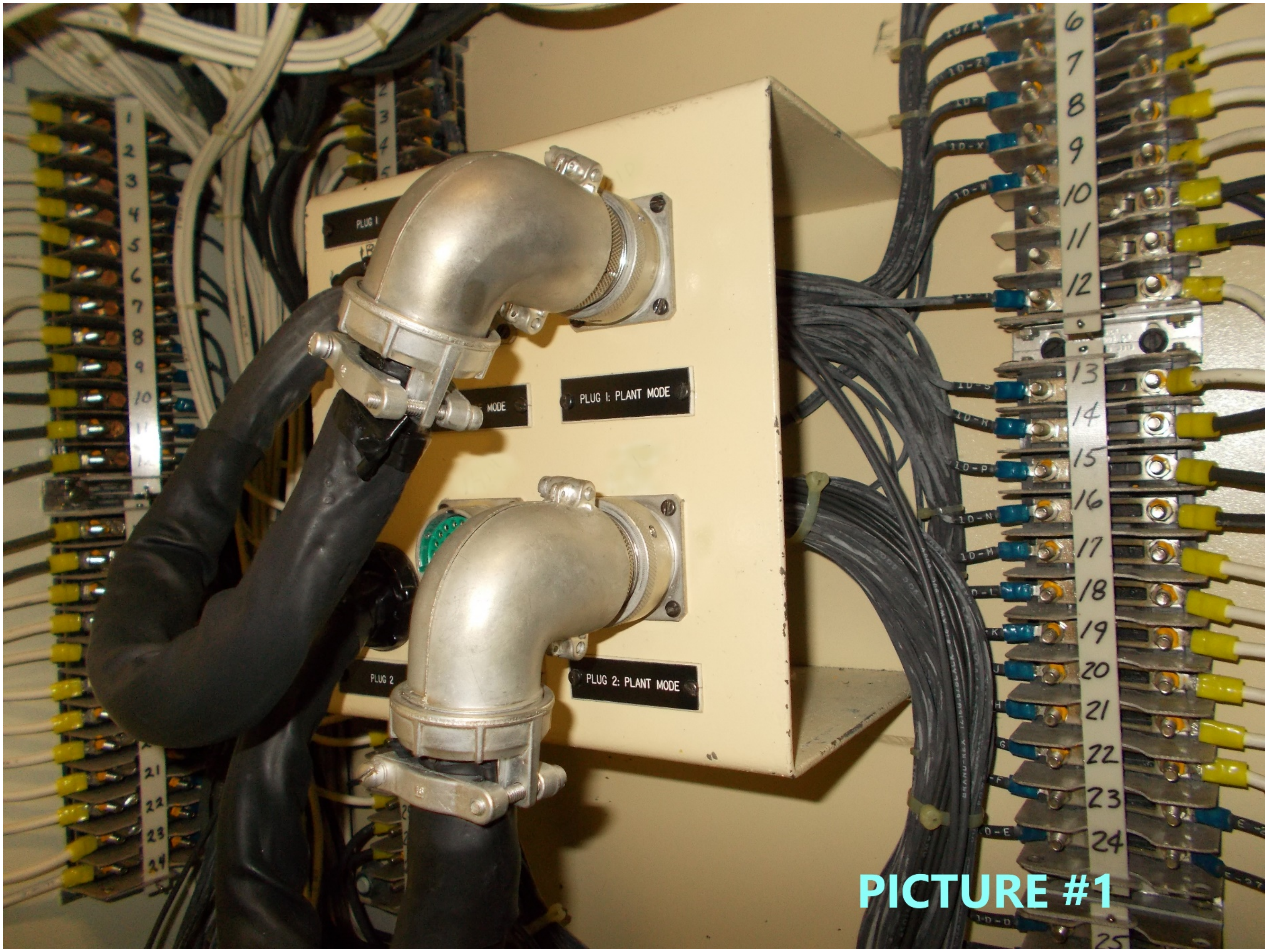
INITIAL CONDITIONS:

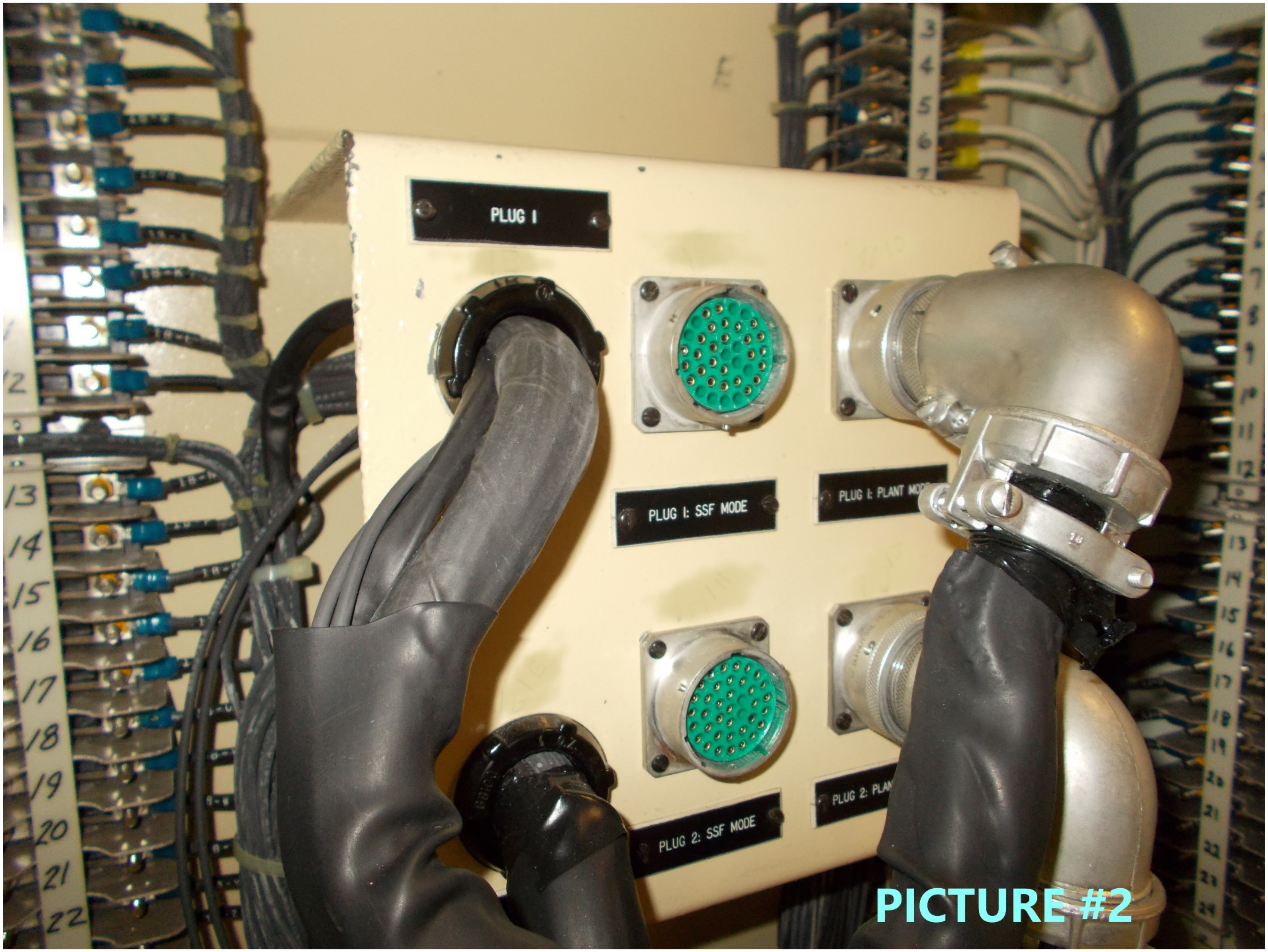
Unit 2 has just suffered a fire that results in evacuation of the control room.

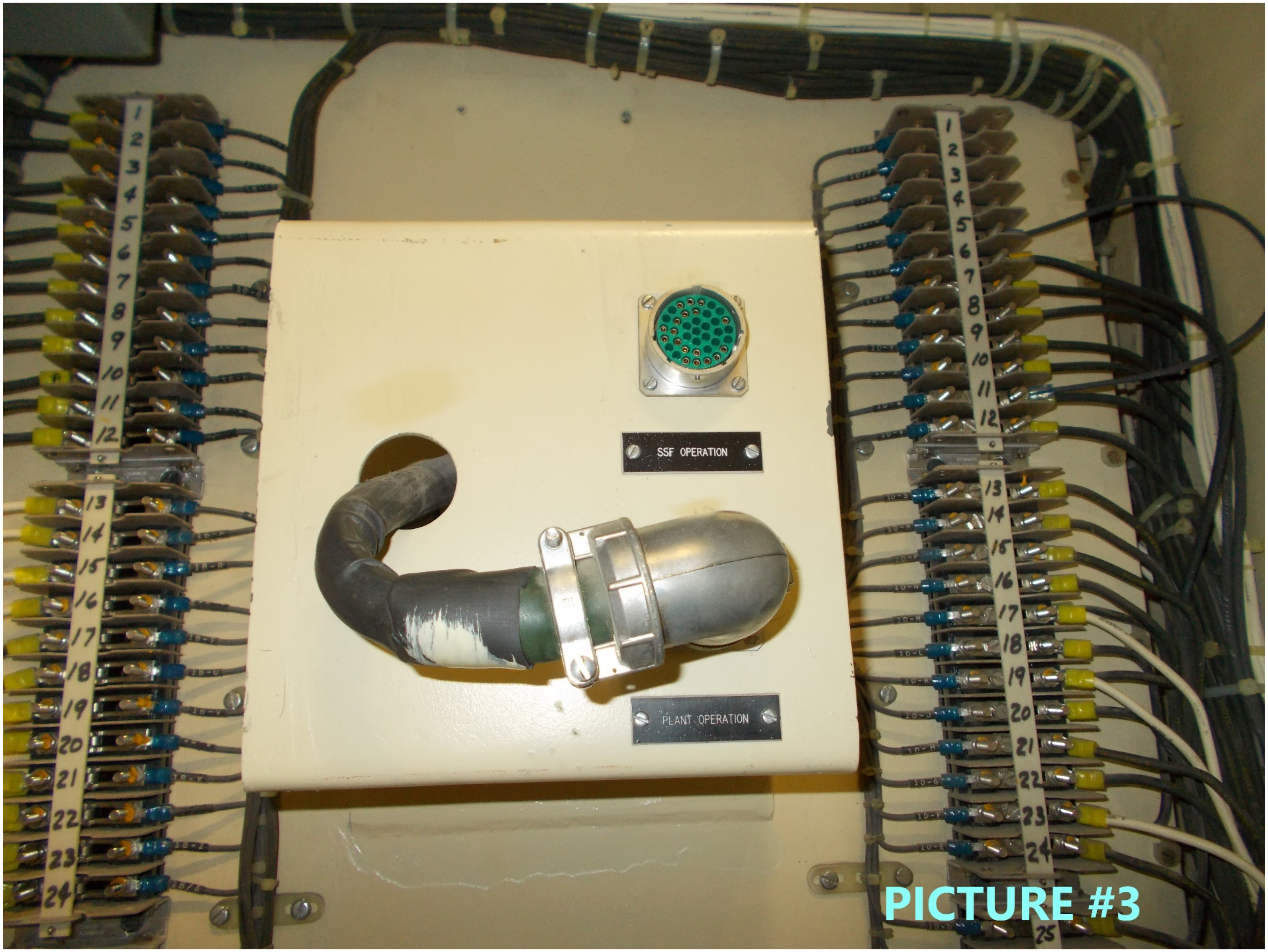
INITIATING CUES:

Transfer control to the Standby Shutdown System per OP/0/B/6100/013 Enclosure 4.2 steps 3.1 through 3.4. All initial conditions have been satisfied.

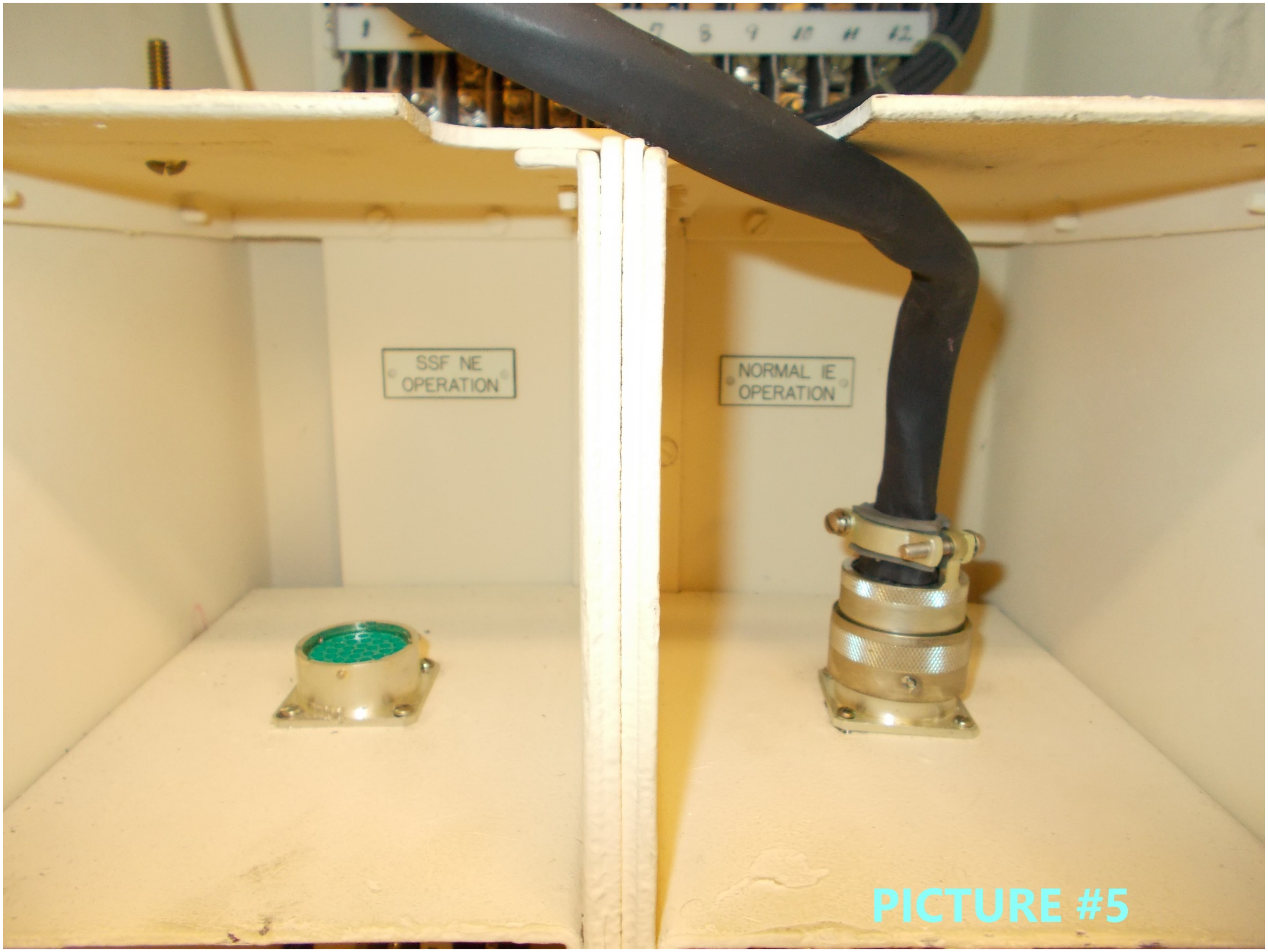


PICTURE #1


PLUG I
PLUG I: SSF MODE
PLUG I: PLANT MODE
PLUG 2: SSF MODE
PICTURE #2


SSF OPERATION
PLANT OPERATION
PICTURE #3


2NC20A
CAUTION
600 VOLTS
ON
OFF
SSF PWR DISCONNECT
FOR 2NC-252B
NUCLEAR
SAFETY RELATED
PICTURE #4



PICTURE #5

1. Limits and Precautions

1.1 Standby makeup pump is started within 10 minutes of losing seal injection to re-establish seal injection to NC pumps so that integrity of NC pump seals is **NOT** lost.

1.2 CA Room sump pumps running continuously may be indicative of a RC to CA pump suction pipe break. If normal suction supply sources are available to the CAPT, the below RC supply sources are closed as required:

- 1CA-178 (RC Supply To CA Pumps Isol)
- 2CA-178 (RC Supply To CA Pumps Isol)

1.3 The PZR Heater Group D is energized within 15 hours of reactor trip to ensure the bubble remains in the PZR. The PZR heaters in Group D controlled from the SSF will **NOT** de-energize on Lo PZR level.

1.4 If an ongoing fire or security event causes equipment or components required to maintain Hot Standby to become inoperable, then operators are sent to the SSF and ETA switchgear room to establish communications in preparation for quickly transferring control to SSF if Control Room and Auxiliary Shutdown Controls become unavailable.

1.5 Due to time and manpower considerations, independent verification is **NOT** required by this procedure.

1.6 In a loss of all AC power handheld "EMERGENCY USE ONLY", flashlights available in Control Room can be used to reach the SSF since outdoor lights may **NOT** be available. The recommended pathway is via 594 Elevation Electrical Penetration Room through exterior door SEC1. Security is contacted if use of this door is anticipated.

1.7 When the CAPT is stopped, it is **NOT** restarted for two minutes. This will allow the CAPT to coast down to zero speed. If a start attempt is made prior to reaching zero speed, the CAPT may trip on overspeed.

2. Initial Conditions

NOTE:	The Auxiliary Shutdown Panels are **NOT** designed to address a fire event.

AA 2.1 Verify the preferred controls necessary to maintain Hot Standby (Control Room) are unresponsive or **NOT** accessible due to fire.

AA 2.2 Verify the following actions have been completed by AP/2/A/5500/017 (Loss of Control Room).

- ☑ Reactor tripped
- ☑ Turbine tripped
- ☑ All NC pumps tripped
- ☑ CFPTs tripped

3. Procedure

NOTE:	1. NC System will **NOT** be able to be cooled down below approximately 567°F, because the lowest steam line safety valve is set at 1175 psig. 2. Steps 3.1 through 3.5 may be in progress per AP/2/A/5500/017 (Loss of Control Room), Enclosure 8 (Transfer Control to SSF) and AP/1/A/5500/017 (Loss of Control Room), Enclosure 10 (SSF D/G Startup). 3. Steps 3.1 through 3.4 may be performed concurrently with Steps 3.5 through 3.8. 4. For a list of valves affected by the transfer, see Enclosure 4.6 (Equipment Affected on Transfer).

_____ 3.1 Transfer control to the Standby Shutdown System (SSS) as follows:

NOTE:	These breakers are kirk-key interlocked to prevent both feeders from being closed at the same time.

☐ 3.1.1 Open 2EMXS-F01A (Normal Incoming Breaker Fed From Motor Control Center 2EMXA) (AB-577, BB-65, Rm 486).

☐ 3.1.2 Close 2EMXS-F03A (Alternate Incoming Bkr Fed From Motor Control Center SMXG).

☐ 3.1.3 Close 2EMXS-F03E (Reactor Vessel Head Vent Motor (2NC253A)) to restore power to 2NC-253A (Rx Head Vent).

_____ 3.2 Ensure significant solenoid isolation valves are closed by transferring disconnects as follows:

CAUTION:	The plugs shall be inserted squarely and the ring tightened to ensure proper connection of all pins.

☐ 3.2.1 Remove Train A Plug 1 disconnect from the "PLUG 1: PLANT MODE" receptacle and connect to the " PLUG 1: SSF MODE" receptacle located in terminal box 2TBOX0396 (Train A SSF Disconnect Enclosure) (AB-577, BB-69, Rm 486).

☐ 3.2.2 Remove Train A Plug 2 disconnect from the " PLUG 2: PLANT MODE" receptacle and connect to the " PLUG 2: SSF MODE" receptacle located in terminal box 2TBOX0396 (Train A SSF Disconnect Enclosure) (AB-577, BB-69, Rm 486).

☐ 3.2.3 Remove Train B disconnect from the "PLANT OPERATION" receptacle and connect to the "SSF OPERATION" receptacle located in 2TBOX0395 (Train B SSF Disconnect Enclosure) (inside small door "Unit 2 Auxiliary Building SSF Disconnect") (AB-577, BB-69, Rm 486).

NOTE:	The power disconnect breaker for 2NC-252B (Rx Head Vent Block) is located in 2TBOX0395 (Train B SSF Disconnect Enclosure) (inside small door "Unit 2 Auxiliary Building SSF Disconnect") (AB-577, BB-69, Rm 486).

☐ 3.2.4 Ensure the 600V power disconnect breaker (SSF Pwr Disconnect For 2NC-252B) for 2NC-252B (Rx Head Vent Block) is in the "OFF" position.

_____ 3.3 Transfer power for CAPT Trip and Throttle valve as follows:

NOTE:	• Breakers are Kirk-Key interlocked to prevent both feeders from being closed at the same time. • Breakers are on 2ELCP0250 (125 VDC CAPT Trip And Throttle Valve Power Transfer Panel) (AB-577, BB-64, Rm 486).

☐ 3.3.1 Open 2ELCP0250-F01B (Incoming Line From 2EDE 125 VDC 1E).

☐ 3.3.2 Close 2ELCP0250-F01C (Incoming Line From SDSP2 125 VDC NE).

_____ 3.4 Transfer power to Train A Neutron Monitoring System as follows: (2TBOX0603 (SSF/Plant Power Transfer Enclosure For ENC Monitor), AB-577, BB-62, Rm 486)

☐ 3.4.1 Disconnect the power plug from the "NORMAL IE OPERATION" receptacle.

CAUTION: The plug shall be inserted squarely and the ring tightened to ensure proper connection of all pins.

☐ 3.4.2 Connect the power plug to the "SSF NE OPERATION" receptacle.

_____ 3.5 **<u>IF AT ANY TIME</u>** power is lost to 1SLXG as indicated by "LINE VOLTS" voltmeter (located on SSF Control Console panel), place SSF diesel in operation as follows:

☐ 3.5.1 Ensure all material that may be drawn into the SSF D/G radiator fan by its suction is removed from its inlet area. (i.e. oil pads, rags, paper, plastic)

CAUTION: The emergency mode overrides the SSF Diesel Generator "High Jacket Water Temperature" and "Low Lube Oil Pressure" trips.

☐ 3.5.2 Ensure the "SSF D/G MODE" switch is in the "EMERG" position on the SSF console.

☐ 3.5.3 Place the "SSF D/G" switch in the "ON" position.

_____ 3.5.4 **<u>IF</u>** the engine does **<u>NOT</u>** start within 30 seconds, perform the following:

☐ 3.5.4.1 Place the "SSF D/G" switch in the "OFF" position.

_____ 3.5.4.2 **<u>IF</u>** D/G turned over but did **<u>NOT</u>** fire during the D/G start attempt, turn the manual override knob on the shutdown valve (shown in Enclosure 4.7, Top View of Fuel Oil Pump) <u>clockwise</u> to permit fuel flow through the valve.

☐ 3.5.4.3 After 1 to 2 minutes has passed, return to Step 3.5.3 to attempt to re-start the D/G.

☐ 3.5.5 Adjust "SSF D/G VOLT ADJUST" until generator voltage is 600 -660 volts.

☐ 3.5.6 Adjust the "SSF D/G GOV CTRL" to bring frequency to 60 - 61.2 Hz.

☐ 3.5.7 Press the "TRIP" pushbutton on "1SLXG NORM FDR FRM 1TA" on the SSF console.

3.5.8 Open the following breakers on 1SLXG:

☐ 1SLXG-4C (Motor Control Center SMXG Supply)

☐ 1SLXG-4D (SSF Normal Battery Charger SDSC1 Feeder)

☐ 1SLXG-5C (SSF Normal Battery Charger SDSC2 Feeder)

☐ 1SLXG-5D (SSF Standby Battery Charger SDSCS Feeder)

☐ 3.5.9 Press the "CLOSE" pushbutton for the "SSF D/G BKR" on the SSF Control Console panel.

☐ 3.5.10 After allowing the diesel generator to run for 10 seconds, close 1SLXG-4C (Motor Control Center SMXG Supply).

3.5.11 Close the following breakers on 1SLXG at 10 second intervals:

☐ 1SLXG-4D (SSF Normal Battery Charger SDSC1 Feeder)

☐ 1SLXG-5C (SSF Normal Battery Charger SDSC2 Feeder)

☐ 1SLXG-5D (SSF Standby Battery Charger SDSCS Feeder)

☐ 3.5.12 **WHEN** another operator arrives, have the operator refer to OP/0/B/6350/011 (Standby Shutdown Facility Diesel Operations), Enclosure 4.5 (Emergency Operation) for continued operation of the SSF diesel.

_____ 3.6 Verify "UNIT 2 SSF CONTROLS ENGAGED" light is lit.

NOTE: Valves 2ND-2A (ND Pump 2A Suct Frm Loop B) and 2ND-37A (ND Pump 2B Suct Frm Loop C) are normally closed with their breakers in the "OFF" position. If no indication is seen at the SSF, the 2A and 2B ND Pump Suction Pressure gauges can be used to determine ND suction source. If ND suction pressure is < NC pressure, the associated ND train loop suction isolation is closed.

- 2NDPG5100 (2A ND Pump Suction Pressure) (AB-522, FF-60, Rm 112)
- 2NDPG5110 (2B ND Pump Suction Pressure) (AB-523, GG-61, Rm 112)

_____ 3.7 Ensure the following valves are closed:

☐ 2ND-2A (ND Pump 2A Suct Frm Loop B)

☐ 2ND-37A (ND Pump 2B Suct Frm Loop C)

☐ 2NV-89A (NC Pmps Seal Ret Cont Isol)

☐ 2NV-876 (Stdby M/U To Cont Equip Smp 2A)

_____ 3.8 Ensure the following valves are open:

- ☐ 2NV-865A (Stdby M/U Pmp Suct Frm Xfr Tube)
- ☐ 2NV-872A (Stdby M/U Pmp Filt Otlt)
- ☐ 2NV-877 (Stdby M/U To NC Pmp Seal Inj)

_____ 3.9 Start Standby Makeup Pump #2. (Stdby M/U Pump #2)

NOTE:
- Operator dispatched to transfer control to the SSF in AP/2/A/5500/017 (Loss of Control Room), Enclosure 8 (Transfer Control to SSF) has guidance on how to perform Step 3.10.
- The procedure may continue while Step 3.10 is in progress.

_____ 3.10 Pull all control power fuses and manually "TRIP" the following 4160V breakers:

- ☐ 2ETA-12 (2A NV Pump Motor)
- ☐ 2ETA-13 (2A CA Pump Motor)
- ☐ 2ETB-12 (2B NV Pump Motor)
- ☐ 2ETB-13 (2B CA Pump Motor)

NOTE:
1. Give operator option to close and disable either valve based on accessibility to valve and its associated breaker.
2. The procedure may continue while Step 3.11 is in progress.

_____ 3.11 Dispatch operator to isolate FWST makeup to Spent Fuel Pool with <u>one</u> of the listed valves as follows:

_____ 3.11.1 Locally, ensure selected valve is closed:

- ☐ 2KF-103A (FWST to Spent Fuel Pool) (AB-589, JJ-61, Rm 400)
- ☐ 2KF-101B (FWST to Spent Fuel Pool) (AB-583, JJ-61, Rm 400)

_____ 3.11.2 Ensure selected valve supply breaker is open:

- ☐ 2EMXI F03D (Spent Fuel Pool M/U from FWST Motor (2KF103A)) (AB-577, EE-60, Rm 469)
- ☐ 2EMXB F03D (Spent Fuel Pool M/U from FWST Motor (2KF101B)) (AB-560, FF-58, Rm 320)

3.12 **WHILE** Standby Makeup Pump #2 is in service, perform the following:

3.12.1 Periodically dispatch operator to read 2NVPG6160 (Standby Makeup Pump Filter D/P) (Annul 559', 153°-59').

_____ 3.12.2 **IF AT ANY TIME** 2NVPG6160 (Standby Makeup Pump Filter D/P) exceeds 25 psig, contact supervisor.

_____ 3.13 In the compartment (Incore Thermocouple Transfer (NC)) on the left hand side of the SSF Control Console panel, transfer the incore thermocouples indication to the SSF Control Console panel by disconnecting the cable from the "ICS INCORE THERMOCOUPLE" receptacle and connecting the cable to the "SSF INCORE THERMOCOUPLE" receptacle.

_____ 3.14 Verify transfer to SSF control is complete by the following indicating lights being lit:

☐ "UNIT 2 SSF CONTROLS ENGAGED"

☐ "UNIT 2 SSF DISCONNECT ENGAGED"

CAUTION: The PZR heaters in Group D controlled from the SSF will **NOT** de-energize on Low PZR level. Operator action will be required to prevent the loss of the heaters if PZR level goes below 17%.

_____ 3.15 Select "LOCAL" on "PZR HTR GRP 2D MODE".

_____ 3.16 **IF** W/R level in two S/Gs is less than 45%, depress "ON" for 2SA-5 (S/G 2C To CAPT).

_____ 3.17 Ensure "CAPT #2 RM SUMP PMP 2A" in "AUTO".

NOTE:
1. Control switches and indicating lights for 2WL-847 and 2WL-848 are located on the Auxiliary Waste Processing Control Panel (1ELCC0013) (AB-543, MM-53, Rm 200).
2. 2WL-847 will fail open and 2WL-848 will fail closed on loss of VI air pressure.
3. Procedure may continue while performing the following step.

_____ 3.17.1 As time permits (within 2 hrs), ensure one of the following valves is open:

☐ 2WL-847 (Floor Drain Sump C Disch To ND / NS Sump) (AB-555, BB-62, Rm 260)

☐ 2WL-848 (Floor Drain Sump C Disch To Turbine Building Sump) (AB-551, CC-62, Rm 260)

_____ 3.18 Ensure "SSF SUMP PUMP" in "AUTO".

NOTE: Natural Circulation is occurring if the NC System is subcooled and primary to secondary heat transfer is occurring.

3.19 **WHILE** performing this enclosure now and every hour after, record NC System subcooled condition by completing a column in table below per the following:

NOTE: Indication for the five core exit thermocouples is provided on Chart Recorder 2ENCR9005. These thermocouple temperature signals are automatically compensated for any changes in reference junction temperature. {CNCE 61598}

3.19.1 Determine NC Saturation Pressure from highest core temperature using Unit 2 Revised Data Book Figure 57 (Reactor Coolant Saturation Curve, Wide Range).

3.19.2 Subcooling margin (PSAT MAR) is Loop B Pressure minus NC Saturation Pressure

3.19.3 **IF** Loop B Pressure is greater than NC Saturation Pressure then NC System is subcooled.

Time									
Unit 2 Highest Core Temperature from 2ENCR9005									
NC Saturation Pressure (from table)									
Unit 2 Loop B Pressure									
Subcooling Margin									
Subcooled (✓)									

3.20 **WHILE** performing this enclosure, maintain NC System subcooled as follows:

3.20.1 **IF AT ANY TIME** losing subcooling margin is indicated by a decreasing NC System pressure, establish larger subcooling margin by increasing NC System pressure per Step 3.24.1.

3.20.2 **IF AT ANY TIME** losing subcooling margin is indicated by an increasing NC temperature, establish better heat sink conditions by increasing secondary side inventory per Step 3.25 and Step 3.26.

NOTE:	• S/G pressure is controlled by S/G safeties while operating at the SSF. The lowest S/G Safety setpoint is 1175 psig. If actual S/G pressure is **NOT** known, use 1175 psig in the following step. • Revised Data Book Figure 57 (Reactor Coolant Saturation Curve, Wide Range) can be used to determine saturation temperature of steam even-though the X axis is labeled NC System Temperature and the Y axis is labeled NC System Pressure.

3.21 **WHILE** performing this enclosure now and every hour after, record primary to secondary heat transfer condition by completing a column in table below as follows:

NOTE:	Cold leg temperatures near S/G saturation temperatures (derived from pressure) indicate heat transfer is occurring.

3.21.1 Determine if heat transfer is occurring by comparing UNIT 2 C-LEG TEMP for LOOP 2B **AND/OR** LOOP 2C with saturation temperature for their S/G pressure using Unit 2 Revised Data Book Figure 57 (Reactor Coolant Saturation Curve, Wide Range), indicate results in table below.

Time									
Unit 2 C-Leg Temp Loop 2B									
S/G 2B Pressure									
Heat transfer (✓)									
Unit 2 C-Leg Temp Loop 2C									
S/G 2C Pressure									
Heat transfer (✓)									

3.22 **WHILE** performing this enclosure, maintain primary to secondary heat transfer as follows:

3.22.1 **IF AT ANY TIME** losing heat transfer is indicated by decreasing C-Leg temperature(s), compress any flow inhibiting primary system steam bubbles by increasing NC System pressure per Step 3.24.1.

3.22.2 **IF AT ANY TIME** losing heat transfer is indicated by decreasing S/G pressure(s), establish better heat sink conditions by increasing secondary side inventory per Step 3.25 and Step 3.26.

NOTE:	Steps 3.23 (PZR level), 3.24 (NC pressure), and 3.25 (S/G levels) are continuous actions to maintain plant parameters and are referred to as needed.

3.23 Maintain Pzr level between 25% and 92% (2NCP5154 (Unit 2 PZR Level)) as follows:

3.23.1 **IF** PZR level needs to be decreased, perform the following:

3.23.1.1 Open the following valves:

- 2NC-250A (Rx Head Vent Block)
- 2NC-253A (Rx Head Vent)

3.23.1.2 **WHEN** one of the following is met close the above head vents:

- Desired level is reached
- NCS pressure is approaching saturation pressure as determined from Unit 2 Revised Data Book Figure 57 (Reactor Coolant Saturation Curve, Wide Range) in Step 3.19.1.

3.23.2 **IF** PZR level is continuously decreasing, dispatch operator to ensure 2NV-101A (NC Pumps #1 Seal Bypass) is closed by failing air locally to the valve (CV-557, 56'-181°).

3.23.3 **IF** PZR level decreases to 17%, de-energize "PZR HTR GROUP 2D" on SSF Control Console panel.

3.24 Maintain NC System pressure (2NCP5121 (Unit 2 Loop B Press)) as needed to meet the below listed conditions per the following steps:

- NC System pressure ≤ 2250 psig
- Natural circulation exists and NC System subcooled, recorded in Step 3.19
- Primary to secondary heat transfer exists, recorded in Step 3.21

3.24.1 **IF** NC System pressure needs to be increased, perform the following:

3.24.1.1 **IF** PZR level > 17%, energize "PZR HTR GROUP 2D" on SSF Control Console panel.

NOTE: Valves 2ND-2A (ND Pump 2A Suct Frm Loop B) and 2ND-37A (ND Pump 2B Suct Frm Loop C) are normally closed with their breakers in the "OFF" position. If no indication is seen at the SSF, the 2A and 2B ND Pump Suction Pressure gauges can be used to determine ND suction source. If ND suction pressure is < NC pressure, the associated ND train loop suction isolation is closed.

- 2NDPG5100 (2A ND Pump Suction Pressure) (AB-522, FF-60, Rm 112)
- 2NDPG5110 (2B ND Pump Suction Pressure) (AB-523, GG-61, Rm 112)

3.24.1.2 **IF** NC pressure continues to decrease, ensure the following valves are closed:

- 2ND-2A (ND Pump 2A Suct Frm Loop B)
- 2ND-37A (ND Pump 2B Suct Frm Loop C)
- 2NV-89A (NC Pmps Seal Ret Cont Isol)
- 2NC-250A (Rx Head Vent Block)
- 2NC-253A (Rx Head Vent)

3.24.2 **IF** NC System pressure needs to be decreased, perform the following:

3.24.2.1 Ensure "PZR HTR GROUP 2D" are de-energized on SSF Control Console panel.

3.24.2.2 **IF** NC System pressure continues to increase uncontrollably, dispatch operator to ensure the following breakers are open:

- 2LXI-6C (2A NC Pzr Heater Power Panel (PHP2A) Feeder)
- 2LXH-6C (2B NC Pzr Heater Power Panel (PHP2B) Feeder)
- 2LXC-5C (2C Reactor Coolant Pressurizer Heater Power Panel (PHP2C))
- 2LXD-5C (2D Reactor Coolant Pressurizer Heater Power Panel (PHP2D))

NOTE: If suction supply sources to the CAPT #2 are lost, 2CA-174 (RC To CA Suct Isol) will open and align the pump to the embedded RC pipe provided 2CA-178 (RC Supply To CA Pumps Isol) and 2CA-175 (RC To CA Suct Isol) are open.

3.25 Maintain S/G levels between 65% and 70% WR (as read on SSF gauges) by controlling CA using one or more of the four (4) following methods, as conditions warrant:

NOTE: If either of the below conditions exist, depressing "OFF" on the switch for 2SA-5 (S/G 2C SM To CAPT) on the SSF Control Console panel will **NOT** secure steam to CAPT #2:

- An auto start signal has failed open 2SA-2 (S/G 2B SM To CAPT) providing an alternate steam supply from S/G 2B,
- Any two S/Gs reach their Lo-Lo level setpoint (less than 45% WR Indicated) failing open 2SA-5 (S/G 2C SM To CAPT).

- Start and stop CAPT #2 by pressing "ON" or "OFF" on the switch for 2SA-5 (S/G 2C SM To CAPT) on the SSF Control Console panel.
- Manually throttle CA flow to each S/G with one valve from each pair of the following valves:

  ☐ 2CA-48 (CA Pump #2 Flow To S/G 2C) (AB-552, DD-61, Rm 227) OR
  ☐ 2CA-50A (CA Pmp 2 Disch To S/G 2C Isol) (DH-585, DD-61, Rm 562)

  ☐ 2CA-52 (CA Pump #2 Flow To S/G 2B) (AB-550, DD-62, Rm 227) OR
  ☐ 2CA-54B (CA Pmp 2 Disch To S/G 2B Isol) (DH-585, DD-61, Rm 562)

  ☐ 2CA-36 (CA Pump #2 Flow To S/G 2D) (AB-554, BB-65, Rm 260) OR
  ☐ 2CA-38A (CA Pmp 2 Disch To S/G 2D Isol) (DH-585, DD-70, Rm 581)

  ☐ 2CA-64 (CA Pump #2 Flow To S/G 2A) (AB-557, BB-64, Rm 260) OR
  ☐ 2CA-66B (CA Pmp 2 Disch To S/G 2A Isol) (DH-585, DD-69, Rm 581)

- Manually throttle steam flow to CAPT #2 by removing breakaway locks and throttling the following valves:

  ◊ 2SA-6 (2C S/G Main Steam to Unit 2 CAPT Stop Check) (AB-553, DD-61, Rm 227)
  ◊ 2SA-3 (2B S/G Main Steam to Unit 2 CAPT Stop Check) (AB-553, DD-60, Rm 227)

NOTE: The use of the CAPT Trip and Throttle valve shall only be as a last resort. If it is used to start the pump, there is a possibility that the CAPT will overspeed.

- Start and stop the CAPT #2 by pressing "OPEN" or "CLS/TRIP" on the "CAPT 2 TRIP T/V CTRL" switch on the SSF Control Console panel.

_____ 3.26 **IF** S/G levels continue to decrease, ensure an available CA flowpath to S/Gs as follows:

3.26.1 Ensure the following valves are open by locally failing air to the valves:

- _____ 2CA-48 (CA Pump #2 Flow To S/G 2C) (AB-552, DD-61, Rm 227)
- _____ 2CA-52 (CA Pump #2 Flow To S/G 2B) (AB-550, DD-62, Rm 227)
- _____ 2CA-36 (CA Pump #2 Flow To S/G 2D) (AB-554, BB-65, Rm 260)
- _____ 2CA-64 (CA Pump #2 Flow To S/G 2A) (AB-557, BB-64, Rm 260)

3.26.2 Ensure the following valves are open by locally opening the valves:

- _____ 2CA-50A (CA Pmp 2 Disch To S/G 2C Isol) (DH-585, DD-61, Rm 562)
- _____ 2CA-54B (CA Pmp 2 Disch To S/G 2B Isol) (DH-585, DD-61, Rm 562)
- _____ 2CA-38A (CA Pmp 2 Disch To S/G 2D Isol) (DH-585, DD-70, Rm 581)
- _____ 2CA-66B (CA Pmp 2 Disch To S/G 2A Isol) (DH-585, DD-69, Rm 581)

_____ 3.27 **IF** accessible, close the following valves to prevent the possible exposure of personnel in the Auxiliary Building:

- _____ 2WL-869B (Unit 2 Vent Unit Condensate Drain Tank Containment Isol) (AB-553, CC-62, Rm 260)
- _____ 2WL-827B (Cont Smp Pmps Disch Cont Isol) (AB-554, JJ-63, Rm 227)

CAUTION: Use borated water only to makeup to the spent fuel pool.

NOTE: It takes approximately 10 hours for the Standby Makeup pump to pump the Fuel Pool down 1 foot.

3.28 **WHILE** performing this enclosure periodically (about every 8 hours) check the spent fuel pool level and makeup to it as necessary to maintain level between approximately 2 ft. below and equal to the skimmer trough elevation. Makeup per OP/2/A/6200/005 (Spent Fuel Cooling System).

_____ 3.29 Perform OP/2/A/6100/020 (Operational Guidelines For Achieving Cold Shutdown Following a Fire in the Plant) in conjunction with one of the following for guidance on accessing systems as required:

- OP/2/A/6100/002 (Controlling Procedure for Unit Shutdown)

  OR

- OP/2/A/6100/004 (Shutdown Outside the Control Room From Hot Standby To Cold Shutdown)

NOTE:	This enclosure is kept at the Unit Control Center until normal shutdown conditions are achieved.

3.30 File this enclosure in the Control Copy folder of this procedure.

JPM K

Catawba Nuclear Station
JPM K
September 2019 NRC Exam

EVALUATION SHEET

Task: 1B D/G local start using AP/1/A/5500/007 (Loss of Normal Power).

Alternate Path: Yes

Facility JPM #: DG3-009

Safety Function: 6 **Title:** Emergency Diesel Generators

K/A 064 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure modes of water, oil, and air valves.

Rating(s): 3.1 / 3.3 **CFR:** 41.5 / 43.5 / 45.3 to 45.13

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

Simulator __X__ In-**P**lant ________ **P**erform __X__ **S**imulate ________

References: AP/1/A/5500/007 (Loss of Normal Power) Encl. 11

Task Standard: 1B D/G started locally. When it is recognized that no cooling water is available, the D/G is shutdown.

Validation Time: 16 minutes **Time Critical:** Yes _____ No __X__

==

Applicant: Time Start: ____________
NAME________________________ Docket #______________ Time Finish: ____________

Performance Rating: Performance Time _______

SAT ____ UNSAT ____

Examiner: ________________________________ ________________________________/_________
NAME SIGNATURE DATE

==

COMMENTS

Catawba Nuclear Station
JPM K
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 has experienced a loss of all AC power to 1ETB.**
- **The reason for the loss of AC power has been corrected.**
- **1ETB load shed is complete.**

INITIATING CUES:

- **You are to energize 1ETB from 1B D/G by performing AP/1/A/5500/007 (Loss of Normal Power) Enclosure 11.**
- **Peer checks have been waived for this task.**

EXAMINER NOTE: After reading initiating cue, provide applicant with a copy of AP/1/A/5500/007 (Loss of Normal Power) Enclosure 11.

START TIME: _______

STEP/STANDARD	SAT/UNSAT
STEP 1: 1 Obtain the following: ☐ Key #746 (1A/1B D/G Test Start Switch) from WCC Key Locker ☐ Flashlight. STANDARD: Applicant states that they would obtain key #746 from the WCC and a flashlight. **Examiner Cue: "Key #746 and flashlight have been obtained."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 2: 2 Do not continue in this enclosure until notified that load shed of 1ETB is complete. STANDARD: Applicant determines from initiating cue that the load shed is complete. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3 3 Start D/G 1B as follows: a. Notify Control Room Operator to place the "D/G 1B CTRL LOCATION" switch on 1MC11 in "LOCAL" position. STANDARD: Applicant notifies the control room to place 1B D/G control location to the LOCAL position. **Examiner Cue:** When requested **"Control room operator reports that 1B D/G control location is in the LOCAL position."** **Examiner Note:** **This step is critical because it must be performed in order for the D/G to be started locally.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___**UNSAT**

STEP 4: 3.b **IF** unable to transfer diesel to Local Control, **THEN** actuate "CONTROL ROOM OVERRIDE" at breakglass station on 1DGCPB. STANDARD: Applicant determines that this step is N/A. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 3.c Place key in "MANUAL TEST START" keyswitch and turn to "START" position. STANDARD: Applicant places key in the MANUAL TEST START keyswitch and rotates the key clockwise to the START position. Applicant listens for the D/G to start and come up to normal rated speed. **Examiner Cue:** **"The Diesel has started"** **Examiner Note:** **This step is critical because it must be performed to locally start the D/G and meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP 6 3.d Ensure "SPEED CONTROL" is adjusted to obtain frequency of between 58.8 and 61.2 Hz. STANDARD: Applicant locates the D/G frequency meter and indicates they are looking for between 58.8 and 61.2 Hz. **Examiner Cue:** **"Frequency is reading 60 Hz."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7 3.e Ensure "VOLTAGE CONTROL" is adjusted to obtain "D/G VOLTAGE" between 4160 and 4580 Volts. STANDARD: Applicant locates the D/G voltage meter and explains that he is looking for voltage to be between 4160 and 4600 Volts. **Examiner Cue:** **"Voltage is 4000 Volts."** STANDARD: After examiner cue is given, applicant uses the VOLTAGE CONTROL RAISE pushbutton to increase voltage into the desired band. **Examiner Cue:** **"Voltage is 4200 Volts."** **Examiner Note:** **This step is critical to provide proper voltage to the essential bus following D/G alignment.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP 8 4 **WHEN** D/G is running, **THEN** close "DIESEL GEN BKR 1ETB18" breaker. STANDARD: Applicant indicates that the D/G is running at proper frequency and voltage, and closes 1B D/G breaker by depressing the red CLOSE pushbutton and verifying the red CLSD light is lit and green OPEN light is dark on DIESEL GEN BKR 1ETB18 CLOSE/TRIP switch. **Examiner Cue:** **"Red CLSD light is lit."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 9 5 **IF** D/G breaker will not close, **THEN**: STANDARD: Applicant determines that this step is N/A. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 10 6 Close the following essential load center normal incoming breakers: ☐ 1ELXB-4B (Normal Incoming Breaker Fed From Xfmr 1ETXB) (AB-560, AA-47, Rm 372) ☐ 1ELXD-4B (Normal Incoming Breaker Fed from Xfmr 1ETXD) (AB-560, AA-46, Rm 372). STANDARD: Applicant closes breakers 1ELXB-4B and 1ELXD-4B by rotating the CLOSE/TRIP handles clockwise to the CLOSE position and verifying the red light is lit and green light dark for these breakers and hearing the breaker closing. **Examiner Cue:** **"Breakers are closed."** **Examiner Note:** **This step is critical to align power to 600V loads.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 11 7 Ensure RN flow through the KD Hx as follows: a. Verify 1RN-292B (1B D/G Hx Inlet Isol) (D1B-566, AA-38) - OPEN. STANDARD: Applicant checks the position indicator on 1RN-292B pointing to OPEN. **Examiner Cue:** **"Position indicator is pointing to CLOSED."** **Examiner Note:** **This begins the alternate path of this JPM.** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 12 7.b **IF** 1RN-292B (1B D/G Hx Inlet Isol) does not open, **THEN** perform the following: 1) Open 1EMXF-F01A (1B Diesel Generator Hx Inlet Isol Motor (1RN292B)) (DB-556, AA-39). STANDARD: Applicant explains inserting locking tab, rotating the breaker handle counter-clockwise to the OFF position, and pulling the locking tab back out on 1EMXF-F01A. **Examiner Cue:** **"Breaker switch is pointing to the OFF position."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 13 7.b2) Open 1RN-292B (1B D/G Hx Inlet Isol). STANDARD: Applicant explains obtaining a ladder, engages the manual operation clutch, and turns valve handwheel on 1RN-292B counter-clockwise direction to open the valve. **Examiner Cue:** **"Valve is NOT moving. 1RN-292B position indicator still shows CLOSED."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 14 8 **IF** RN flow cannot be established, **THEN**: a. Stop D/G 1B by depressing "STOP" on 1DECPB. STANDARD: Applicant depresses the STOP pushbutton on 1DECPB to stop the D/G. **Examiner Cue:** **"D/G has been secured."** **Examiner Note:** **This step is critical because it prevents damaging the D/G due to a lack of cooling water supply.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 15 8.b. Notify the Control Room Supervisor of status. STANDARD: Applicant calls the CRS at x5164 and informs him that 1B D/G has been secured due to no cooling water flow being available. **Examiner Cue:** **Examiner repeats back information given** COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 16 8.c. Return this enclosure to the Control Room Supervisor. STANDARD: Applicant explains returning the enclosure to the CRS. **Examiner Cue:** **"The CRS has taken the enclosure. This JPM is complete."** COMMENTS:	___ **SAT** ___ **UNSAT**

STOP TIME________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 has experienced a loss of all AC power to 1ETB.**
- **The reason for the loss of AC power has been corrected.**
- **1ETB load shed is complete.**

INITIATING CUES:

- **You are to energize 1ETB from 1B D/G by performing AP/1/A/5500/007 (Loss of Normal Power) Enclosure 11.**
- **Peer checks have been waived for this task.**

1. **Obtain the following:**

   __ • Key #746 (1A/1B D/G Test Start Switch) from WCC Key Locker

   __ • Flashlight.

__ 2. **Do not continue in this enclosure until notified load shed of 1ETB complete.**

3. **Start D/G 1B as follows:**

   __ a. Notify Control Room Operator to place "D/G 1B CTRL LOCATION" switch on 1MC11 in "LOCAL" position.

   __ b. **IF** unable to transfer diesel to Local Control, **THEN** actuate "CONTROL ROOM OVERRIDE" at breakglass station on 1DGCPB.

   __ c. Place key in "MANUAL TEST START" keyswitch and turn to "START" position.

   __ d. Ensure "SPEED CONTROL" adjusted to obtain frequency of between 58.8 and 61.2 Hz.

   __ e. Ensure "VOLTAGE CONTROL" adjusted to obtain "D/G VOLTAGE" between 4160 and 4580 Volts.

__ 4. **WHEN D/G running, THEN CLOSE "DIESEL GEN BKR 1ETB18" breaker.**

5. **IF D/G breaker will not close, THEN perform the following:**

   __ a. Stop D/G 1B by depressing "STOP" on 1DECPB.

   b. Coordinate following with Control Room Supervisor:

      __ • Inform Control Room Supervisor of D/G 1B status

      __ • Inform Control Room Supervisor of intention to perform Enclosure 18 (D/G 1B Local Breaker Closure)

      __ • **IF** manpower available, **THEN** arrange for additional operator(s) to staff diesel panel.

   __ c. **GO TO** Enclosure 18 (D/G 1B Local Breaker Closure).

   __ d. Do not continue in this enclosure.

6. **CLOSE the following essential load center normal incoming breakers:**

__ • 1ELXB-4B (Normal Incoming Breaker Fed From Xfmr 1ETXB) (AB-560, AA-47, Rm 372)
__ • 1ELXD-4B (Normal Incoming Breaker Fed From Xfmr 1ETXD) (AB-560, AA-46, Rm 372).

7. **Ensure RN flow through KD Hx as follows:**

__ a. Verify 1RN-292B (1B D/G Hx Inlet Isol) (D1B-566, AA-38) - OPEN.

b. <u>IF</u> 1RN-292B (1B D/G Hx Inlet Isol) does not open, <u>THEN</u> perform the following:

__ 1) OPEN 1EMXF-F01A (1B Diesel Generator Hx Inlet Isol Motor (1RN292B)) (DB-556, AA-39).

__ 2) OPEN 1RN-292B (1B D/G Hx Inlet Isol).

8. **<u>IF</u> RN flow cannot be established, <u>THEN</u> perform the following:**

__ a. Stop D/G 1B by depressing "STOP" on 1DECPB.

__ b. Notify Control Room Supervisor of status.

__ c. Return this enclosure to Control Room Supervisor.

__ 9. **Notify Control Room Operator to place "D/G 1B CTRL LOCATION" switch on 1MC11 in "CTRL-RM" position.**

__ 10. **CLOSE 1VN-2 (1B D/G Exhaust Silencer Drain) (DB-557, BB-39).**

11. **Ensure the following:**

__ • "LO PUMP & HEATER" indicating light - OFF

__ • "JW PUMP & HEATER" indication light - OFF

__ • "DIESEL BLDG GEN VENT FAN 1B1" - ON

__ • "DIESEL BLDG GEN VENT FAN 1B2" - ON.

__ 12. **Monitor D/G operating parameters. <u>REFER TO</u> OP/1/A/6350/002 (Diesel Generator Operation).**

JPM A.1-1R

RO

NOTE
This JPM is to be administered on the same day as SRO JPM A.1-1S

Catawba Nuclear Station
Admin. JPM A.1-1R
September 2019 NRC Exam

EVALUATION SHEET

Task: Perform a Manual NC System Leakage Calculation

Alternate Path: N/A

Facility JPM #: NC-094 Modified

Safety Function: N/A

K/A G 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Importance: 4.4 / 4.7 **CFR:** 41.5 / 43.5 / 45.12 / 45.13

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ________

References: PT/1/A/4150/001 D (NC System Leakage Calculation) rev 86

Task Standard: A manual NC System Leakage Calculation is performed per PT/1/A/4150/001 D (NC System Leakage Calculation) and the following results reported: Unidentified Leakage 8.628 – 8.828 gpm, Identified Leakage 2.272 – 2.372 gpm, Total Accumulated Leakage 21.664 – 21.91 gpm. Determines that LCOs of T.S. 3.4.13 and SLC 16.7-9 are not currently met.

Validation Time: 30 minutes **Time Critical:** Yes _____ No __X__

Applicant: Time Start: __________
NAME____________________________ Docket #_______________ Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

COMMENTS

____

____

____

____

____

____

Catawba Nuclear Station
Admin. JPM A.1-1R
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READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is in Mode 1 at 100% power.**
- **The OAC is out of service due to emergent system failures and will not be returned to service for 24 hours.**
- **Other operators are performing PT/1/A/4600/009 (Loss of Operator Aid Computer) and OP/1/A/6700/003 (Operation With the Operator Aid Computer Out of Service).**

INITIATING CUES:

- **The CRS directs you to perform an NC System Leakage Calculation per PT/1/A/4150/001 D (NC System Leakage Calculation).**
- **Steps are complete through 12.12.**
- **You are to perform step 12.13.**
- **The Open Item Summary has been updated. The background leakage is .072 gpm (Orbisphere flow reported by Primary Chemistry).**
- **Using the attached Data Sheet and PT/1/A/4150/001 D, calculate and report the following information back to the CRS:**

Identified Leakage ____________ gpm

Unidentified Leakage ____________ gpm

Total Accumulated Leakage ____________ gpm

List all applicable TS / SLCs (if any) in which the LCO is not currently met. State the reason (if LCO is not met):

Catawba Nuclear Station
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<u>EXAMINER NOTE</u>: Each applicant should receive a copy of attached Data Sheets and a copy of PT/1/A/4150/001 D (Rev 86) body signed off through step 12.12 and Enclosure 13.3.

STEP / STANDARD	SAT / UNSAT

START TIME: _______

STEP 1 12.13 **IF** the OAC is partially or wholly unavailable **OR** Unit 1 is **NOT** at or near normal operating temperature and pressure (i.e. Tavg $\leq$ 550°F and W/R pressure $\leq$ 2200 psig), perform Enclosure 13.3 (Manual Leakage Calculation).	
STANDARD:	___ SAT
Applicant determines that this step is applicable and goes to Enclosure 13.3 for a manual leakage calculation.	___UNSAT
COMMENTS:	

STEP 2 Enclosure 13.3 step 1.1 Verify the following valves are closed: • 1NC-56B (RMW Pump Disch Cont Isol) • 1NV-181A (B/A Blender Otlt to VCT) • 1NV-186A (B/A Blender Otlt to VCT Outlet) • 1NV-236B (Boric Acid to NV Pumps Suct) • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST) • 1NI-9A (NV Pump C/L Inj Isol) • 1NI-10B (NV Pump C/L Inj Isol)	___ SAT
STANDARD:	___ UNSAT
Applicant determines from the data sheet provided that all of the listed valves are closed.	
COMMENTS:	

STEP / STANDARD	SAT / UNSAT
STEP 3 1.2 Record "Initial Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available). STANDARD: Applicant records initial data on Enclosure 13.3.1 using the provided data sheet. COMMENTS:	___ SAT ___ UNSAT
NOTE: Calculation accuracy improves as the time between initial and final data increases.	
STEP 4 1.3 Wait at least 60 minutes prior to obtaining final data. STANDARD: Applicant is given data for 64 minutes after initial data. COMMENTS:	___ SAT ___ UNSAT

STEP 5 1.4 Record "Final Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available). STANDARD: Applicant records final data on Enclosure 13.3.1 using the provided data sheet. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 6 1.5 Using data from Enclosure 13.3.1 (Manual Leakage Data), calculate change in T-Avg: ______________ - _______________ = __________ °F NC Average temp initial NC Average temp final STANDARD: Applicant calculates change in T-Avg to be **.2°F**. COMMENTS:	___ SAT ___ UNSAT

NOTE:
- Procedure may continue while performing the following step.
- If change in T-Avg is greater than 0.25°F (0.1°F if using OAC), calculation is invalid and must be repeated.

STEP / STANDARD	SAT / UNSAT
STEP 7 1.6 **IF** change in T-Avg is less than or equal to 0.25°F (0.1°F if using OAC), perform all calculations on Enclosure 13.3.2 (Manual Calculation). STANDARD: Applicant determines from previous step that T-Avg is 0.2°F and performs calculations from Enclosure 13.3.2. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 8 Enclosure 13.3.2 (Manual Calculation) STANDARD: Applicant performs the required calculations and comes up with the following results: VCT Leakage Rate = 11.042 gpm (Allowable range 11.0 – 11.1 gpm) PZR Leakage Rate = 0 gpm Total Leakage = 11.042 gpm (Allowable range 11.0 – 11.1 gpm) NCDT Leakage Rate = 0 gpm PRT Leakage Rate = 2.216 gpm (Allowable range 2.2 – 2.3 gpm) **Identified Leakage = 2.288 gpm (Allowable range 2.272 – 2.372 gpm)** **Unidentified Leakage = 8.754 gpm (Allowable range 8.628 – 8.828 gpm)** **Total Accumulated Leakage = 21.752 gpm (Allowable range 21.6 – 21.91 gpm)** **These steps are critical to ensure accurate leakage values will be used to determine compliance with Technical Specifications/Selected License Commitments for NC system leakage.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 9 Determine TS/SLCs in which LCO is not currently met. STANDARD: Tech Spec 3.4.13 SLC 16.7-9 Applicant determines that T.S. 3.4.13 is not met due to unidentified leakage > 1 gpm. Applicant determines that SLC 16.7-9 is not met due to total accumulated leakage being > 20 gpm. **This step is critical to meet the task and standard of this JPM.** COMMENTS: **END OF TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is in Mode 1 at 100% power.**
- **The OAC is out of service due to emergent system failures and will not be returned to service for 24 hours.**
- **Other operators are performing PT/1/A/4600/009 (Loss of Operator Aid Computer) and OP/1/A/6700/003 (Operation With the Operator Aid Computer Out of Service).**

INITIATING CUES:

- **The CRS directs you to perform an NC System Leakage Calculation per PT/1/A/4150/001 D (NC System Leakage Calculation).**
- **Steps are complete through 12.12.**
- **You are to perform step 12.13.**
- **The Open Item Summary has been updated. The background leakage is .072 gpm (Orbisphere flow reported by Primary Chemistry).**
- **Using the attached Data Sheet and PT/1/A/4150/001 D, calculate and report the following information back to the CRS:**

Identified Leakage	**____________ gpm**
Unidentified Leakage	**____________ gpm**
Total Accumulated Leakage	**____________ gpm**

List all applicable TS / SLCs (if any) in which the LCO is not currently met. State the reason (if LCO is not met):

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DATA SHEET

The following valves are closed:

- **1NC-56B (RMW Pump Disch Cont Isol)**
- **1NV-181A (B/A Blender Otlt to VCT)**
- **1NV-186A (B/A Blender Otlt to VCT Outlet)**
- **1NV-236B (Boric Acid to NV Pumps Suct)**
- **1NV-252A (NV Pumps Suct From FWST)**
- **1NV-253B (NV Pumps Suct From FWST)**
- **1NI-9A (NV Pump C/L Inj Isol)**
- **1NI-10B (NV Pump C/L Inj Isol)**

Parameter	Instrument	2000 hours Data	2104 hours Data
NC Avg. Temp.	1NCCR5421	584.7 °F	584.5 °F
VCT Level	1NVP5761	66%	29%
PZR Level	1NCP5164	55%	55%
NCDT Level	1WLP5630	50%	50%
PRT Level	1NCP5131	69%	70%

1A NC Pump #1 Seal Leakoff Flow	2.46 GPM
1B NC Pump #1 Seal Leakoff Flow	2.77 GPM
1C NC Pump #1 Seal Leakoff Flow	2.60 GPM
1D NC Pump #1 Seal Leakoff Flow	2.88 GPM

1EMF-71 Leakage	1 GPD
1EMF-72 Leakage	84 GPD
1EMF-73 Leakage	77 GPD
1EMF-74 Leakage	1 GPD

Background leakage: .072 gpm (Orbisphere flow)

KEY

Duke Energy Catawba Nuclear Station **NC System Leakage Calculation** **Continuous Use**	Procedure No. PT/**1**/A/4150/001 D
	Revision No. 086
	Electronic Reference No. CN005FZZ

KEY

☐ N. **WHEN** the current background leakage has been determined and documented **OR** the source of inleakage has been isolated, start a new PT/1/A/4150/001 D (NC System Leakage Calculation).

☐ O. N/A the remaining steps of this procedure.

_____ 12.12.7 Record the individual NC Pump seal leakoff flows:

- NC Pump 1A: ________ gpm
- NC Pump 1B: ________ gpm
- NC Pump 1C: ________ gpm
- NC Pump 1D :________ gpm

Total NC Pump seal leakoff: ________ gpm

_____ 12.12.8 Record total NC Pump seal leakoff on Enclosure 13.1 (Data Sheet).

_____ 12.12.9 Calculate Total Accumulative Leakage on Enclosure 13.1 (Data Sheet).

_____ 12.12.10 Document primary to secondary leakage on Enclosure 13.1 (Data Sheet).

_____ 12.12.11 Determine PZR steam leak rate to PRT on Enclosure 13.1 (Data Sheet).

_____ 12.12.12 **IF** a value was inserted for OAC Point C1P0203 (Average NCDT Level) in Step 12.12.1.1, restore that point to processing.

NOTE:	The calculation will stop after 180 minutes. It is **NOT** necessary to abort the calculation in the following step.

_____ 12.12.13 Exit the NC System Leakage Calculations program.

_____ 12.13 **IF** the OAC is partially or wholly unavailable **OR** Unit 1 is **NOT** at or near normal operating temperature and pressure (i.e. Tavg ≤ 550°F and W/R pressure ≤ 2200 psig), perform Enclosure 13.3 (Manual Leakage Calculation).

_____ 12.14 Return the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the position recorded in Step 12.9.1.

12.15 Realign the NCDT as follows:

_____ 12.15.1 Ensure 1WL-807B (NCDT Pumps Disch Cont Isol) is open.

_____ 12.15.2 Ensure 1WL-805A (NCDT Pump Disch Cont Isol) is open.

NOTE:	If unable to reduce NCDT level in the following step, the in-service NB evaporator feed filter may need to be swapped / replaced due to high DP. (NCR 01515934)

_____ 12.15.3 **IF** NCDT level is greater than setpoint, perform the following:

_____ 12.15.3.1 Throttle open "NCDT LVL CTRL" to slowly reduce level.

_____ 12.15.3.2 **WHEN** NCDT level is at the desired value, close "NCDT LVL CTRL".

_____ 12.15.4 Place "NCDT LVL CTRL" in "AUTO".

_____ 12.15.5 Ensure "NCDT LVL CTRL" is set for 50%.

_____ 12.15.6 **IF** 1WL-807B (NCDT Pumps Disch Cont Isol) is being maintained closed per OP/1/A/6500/014 (Operations Controlled Liquid Waste Systems), close 1WL-807B (NCDT Pumps Disch Cont Isol).

NOTE:

- NM automation flow, as documented in Step 12.10, is classified as Non-RCPB (Reactor Coolant Pressure Boundary) leakage per WCAP-16423-NP (Reference 2.6). NM sample flow is manually routed and shall **NOT** count as Identified Leakage. The NM sample flow shall still be included in Total Leakage. (PIP M-12-5474).
- The Net Identified Leakage rate will be entered in the Control Room log Leakage Data stamp and the OAC Manual Value Update. It is **NOT** used for determining Total Accumulative Leakage for the purpose of verifying SSF capabilities in Enclosure 13.1 (Data Sheet) or 13.3.2 (Manual Calculation).

_____ 12.16 Calculate Net Identified Leakage rate:

2.288 gpm -	0.072 gpm =	2.216 gpm
Identified Leakage Best (Step 12.12.5.2) or Identified Leakage in Enclosure 13.3.2 (Manual Calculation)	NM automation flow (Step 12.10)	Net Identified Leakage

1. Procedure

✓ 1.1 Verify the following valves are closed:

- ☑ 1NC-56B (RMW Pump Disch Cont Isol)
- ☑ 1NV-181A (B/A Blender Otlt To VCT)
- ☑ 1NV-186A (B/A Blender Otlt To VCT Outlet)
- ☑ 1NV-236B (Boric Acid To NV Pumps Suct)
- ☑ 1NV-252A (NV Pumps Suct From FWST)
- ☑ 1NV-253B (NV Pumps Suct From FWST)
- ☑ 1NI-9A (NV Pump C/L Inj Isol)
- ☑ 1NI-10B (NV Pump C/L Inj Isol)

✓ 1.2 Record "Initial Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available).

NOTE: Calculation accuracy improves as the time between initial and final data increases.

✓ 1.3 Wait at least 60 minutes prior to obtaining final data.

✓ 1.4 Record "Final Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available).

✓ 1.5 Using data from Enclosure 13.3.1 (Manual Leakage Data), calculate change in T-Avg:

584.7 (NC Average temp initial) - 584.5 (NC Average temp final) = 0.2 °F

NOTE:
- Procedure may continue while performing the following step.
- If change in T-Avg is greater than 0.25°F (0.1°F if using OAC), calculation is invalid and must be repeated.

_____ 1.6 **IF** change in T-Avg is less than or equal to 0.25°F (0.1°F if using OAC), perform all calculations on Enclosure 13.3.2 (Manual Calculation).

_____ 1.7 Return to Step 12.13.

KEY

Enclosure 13.3.1

Manual Leakage Data

NOTE:
- If available, OAC points can be used.
- Where applicable, the same instrument channel (meter) shall be used for obtaining the initial and final data.
- When using OAC Point indication for NCDT and PRT level changes, minor instrument fluctuations that result in a indicated level decrease may be treated as zero level change.

Parameter	Units	Instrument / OAC Point Used	Initial Data (Step 1.2)	Final Data (Step 1.4)
NC Average Temperature	°F	1NCCR5421	584.7	584.5
VCT Level	%	1NVP5761	66	29
PZR Level	%	1NCP5164	55	55
NCDT Level	%	1NCP5630	50	50
PRT Level	%	1NCP5131	69	70

Record time Initial Data obtained 2000

Record time Final Data obtained 2104

Elapsed time 64 minutes

KEY

VCT

VCT Leakage Rate = [Initial Level (%) - Final Level (%)] x 19.1 gal/% / Elapsed time

= [(66) - (29)] x 19.1 gal/% / (64) min

= 11.042 gal/min

(Acceptable Range 11.0 - 11.1)

PZR

PZR Leakage Rate = [Initial Level (%) - Final Level (%)] x (124.7 Gal/%) x (0.5983[a]) / Elapsed time

= [(55) - (55)] x (124.7 Gal/%) x (0.5983) / (64) min

= 0 gal/min

Total Leakage = (VCT Leakage Rate) + (Pzr Leakage Rate)

= (11.042) + (0)

= 11.042 gpm

(Acceptable Range 11.0 - 11.1)

[a] This is the density ratio to normalize leakage at PZR conditions to leakage at 100°F

NCDT

Initial NCDT Volume 50 % = 177.254 Gal (OAC point C1P5079 (U1 NCDT Volume) or Enclosure 13.3.3 (NCDT Level Conversion))

Final NCDT Volume 50 % = 177.254 Gal (OAC point C1P5079 (U1 NCDT Volume) or Enclosure 13.3.3 (NCDT Level Conversion))

NCDT Leakage Rate = Final Volume (Gal) - Initial Volume (Gal) / Elapsed time

= (177.254) - (177.254) / (64) min

= 0 gpm

PRT

Initial PRT Volume 69 % = 9496.66 Gal (OAC point C1P5078 (U1 PRT Volume) or Enclosure 13.3.4 (PRT Level Conversion))

Final PRT Volume 70 % = 9638.47 Gal (OAC point C1P5078 (U1 PRT Volume) or Enclosure 13.3.4 (PRT Level Conversion))

PRT Leakage Rate = Final Volume (Gal) - Initial Volume (Gal) / Elapsed time

= (9638.47) - (9496.66) / (64) min

= 2.216 gpm

(Acceptable Range 2.2 - 2.3)

Background Leakage = Any quantified/measured leakage

= 0.072 gpm

Identified Leakage = NCDT Leakage Rate + PRT Leakage Rate + Background Leakage

= 0 gpm + 2.216 gpm + 0.072 gpm

= 2.288 gpm (Acceptable Range 2.272 - 2.372)

Unidentified Leakage = Total Leakage - Identified Leakage

= 11.042 gpm - 2.288 gpm

= 8.754 gpm[b]

(Acceptable Range 8.628 -8.828)

---

[b] This value is an acceptance criteria of this procedure.

Total NC Pump Seal Leakoff

- 1A NC Pump #1 Seal Leakoff = 2.46 gpm
- 1B NC Pump #1 Seal Leakoff = 2.77 gpm
- 1C NC Pump #1 Seal Leakoff = 2.60 gpm
- 1D NC Pump #1 Seal Leakoff = 2.88 gpm

Total NC Pump Seal Leakoff: 10.71 gpm

Total Accumulative Leakage = Sum of Identified Leakage, Unidentified, and NC Pumps #1 Seal Leakoffs

Identified Leakage 2.288 gpm

Unidentified Leakage 8.754 gpm

Total NC Pump Seal Leakoff 10.71 gpm

_____ **IF** any Identified or Unidentified value is negative, enter "0" below in its applicable space.

Identified + Unidentified + Total NC Pump Seal Leakoff = Total Accumulative Leakage

2.288 + 8.754 + 10.71 = 21.752

(Acceptable Range 21.664 - 21.91)

Verify Total Accumulative Leakage:

☐ ≤ 20 gpm {PIP C-99-0606}

OR

☑ > 20 gpm, refer to Step 12.19.

Performed By ______________________ Date: __________ Time:________

Verified By ______________________ Date: __________ Time:________

Primary to Secondary Leakage as determined by one of the following:

N/A **IF** in Mode 1 **AND** 1EMF-33 is functional[c] **AND** the OAC is available, record the reading of OAC Point C1P0189 (Pri To Sec Leakrate 15 Min Running Avg). ____________ gpd

OR

✓ **IF** in Mode 1 **AND** the OAC is **NOT** available **AND** Unit 1 is ≥ 40% RTP, record the readings from the N-16 Leakage Monitors:

- 1EMF-71 ____1____ gpd
- 1EMF-72 ____84____ gpd
- 1EMF-73 ____77____ gpd
- 1EMF-74 ____1____ gpd

OR

N/A **IF** in Mode 1 **AND** 1EMF-33 is non-functional[c] **AND** Unit 1 is ≥ 40% RTP, record the readings from the N-16 Leakage Monitors:

- 1EMF-71 __________ gpd
- 1EMF-72 __________ gpd
- 1EMF-73 __________ gpd
- 1EMF-74 __________ gpd

OR

N/A **IF** in Mode 1 **AND** 1EMF-33 is non-functional[c] **AND** Unit 1 is < 40% RTP, record the primary to secondary leak rate as determined by Chemistry. _____________ gpd

OR

N/A **IF** in Mode 2, 3, 4 or Pre-Mode 4, record the primary to secondary leak rate value as determined by Chemistry. ___________ gpd

[c] For the purposes of this procedure, OAC Point C1P0189 (Pri To Sec Leakrate 15 Minute Running Avg) must be functional for 1EMF-33 to be considered functional.

KEY

Enclosure 13.3.3

NCDT Level Conversion

%	Gal	%	Gal	%	Gal	%	Gal	%	Gal
1	19.897	21	74.240	41	143.787	61	218.067	81	286.505
2	22.085	22	77.410	42	147.478	62	221.721	82	289.571
3	24.343	23	80.613	43	151.178	63	225.360	83	292.600
4	26.669	24	83.871	44	154.888	64	228.983	84	295.590
5	29.058	25	87.176	45	158.604	65	232.587	85	298.539
6	31.509	26	90.517	46	162.327	66	236.173	86	301.447
7	34.019	27	93.894	47	166.055	67	239.738	87	304.312
8	36.585	28	97.304	48	169.786	68	243.281	88	307.131
9	39.206	29	100.743	49	173.519	69	246.801	89	309.904
10	41.880	30	104.212	50	177.254	70	250.296	90	312.628
11	44.604	31	107.706	51	180.989	71	253.765	91	315.302
12	47.376	32	111.226	52	184.722	72	257.204	92	317.923
13	50.196	33	114.770	53	188.453	73	260.614	93	320.489
14	53.060	34	118.335	54	192.181	74	263.990	94	322.999
15	55.968	35	121.921	55	195.904	75	267.332	95	325.450
16	58.918	36	125.525	56	199.620	76	270.636	96	327.839
17	61.908	37	129.148	57	203.329	77	273.894	97	330.164
18	64.937	38	132.787	58	207.030	78	277.098	98	332.423
19	68.003	39	136.440	59	210.720	79	280.267	99	334.611
20	71.104	40	140.108	60	214.400	80	283.403	100	336.726

KEY

KEY

%	Gal	%	Gal	%	Gal	%	Gal	%	Gal
1	383.572	21	2476.15	41	5302.48	61	8328.88	81	11109.4
2	458.035	22	2605.43	42	5452.77	62	8477.55	82	11233.2
3	536.720	23	2736.38	43	5603.50	63	8625.56	83	11355.0
4	619.374	24	2868.93	44	5754.61	64	8772.86	84	11474.8
5	705.776	25	3003.00	45	5906.04	65	8919.40	85	11592.4
6	795.729	26	3138.52	46	6057.74	66	9065.10	86	11707.7
7	889.054	27	3275.43	47	6209.65	67	9209.92	87	11820.7
8	985.589	28	3413.66	48	6361.73	68	9353.79	88	11931.3
9	1085.19	29	3553.15	49	6513.91	69	9496.66	89	12039.3
10	1187.70	30	3693.82	50	6666.17	70	9638.47	90	12144.6
11	1293.02	31	3835.63	51	6818.38	71	9779.14	91	12247.1
12	1401.00	32	3978.50	52	6970.56	72	9918.63	92	12346.7
13	1511.55	33	4122.37	53	7122.64	73	10056.9	93	12443.2
14	1624.54	34	4267.19	54	7274.55	74	10193.8	94	12536.6
15	1739.89	35	4412.89	55	7426.25	75	10329.3	95	12626.5
16	1857.49	36	4559.43	56	7577.68	76	10463.4	96	12712.9
17	1977.25	37	4706.73	57	7728.79	77	10595.9	97	12795.6
18	2099.08	38	4854.74	58	7879.51	78	10726.9	98	12874.3
19	2222.89	39	5003.40	59	8029.81	79	10856.1	99	12948.7
20	2348.61	40	5152.67	60	8179.92	80	10983.7	100	13018.7

KEY

<table>
<tr><td rowspan="2">Duke Energy
Catawba Nuclear Station

NC System Leakage Calculation</td><td>Procedure No.
PT/1/A/4150/001 D</td></tr>
<tr><td>Revision No.
086</td></tr>
<tr><td>Continuous Use</td><td>Electronic Reference No.
CN005FZZ</td></tr>
</table>

REVISION SUMMARY
Reference AR(s): 02248976; 02229228; 02179037; 02178839 Added new step 12.3 to notify chemistry to determine the primary to secondary leak rate and report the value to the control room. In step 12.6.1 added OP NC LEAK1 and OP NC LEAK2 to the bulleted items to match the radio buttons on the NC LEAKAGE graphic if accessing the point list from the graphics. Added a note prior to step 12.15.3 stating that the NB feed filter may need to be swapped if unable to reduce NCDT level. Deleted old step 12.17 to attach the OAC printout to the PT. Per ENG there is no need to attach this data to the PT.

NC System Leakage Calculation

1. Purpose

To ensure that NC System leakage is calculated at least once per 72 hours. (TS SR 3.4.13.1 and SR 3.4.13.2)

2. References

2.1 Technical Specifications:

- TS SR 3.4.13.1
- TS SR 3.4.13.2
- TS LCO 3.4.15, REQUIRED ACTION A.1, B.1, C.1.1 and E.1
- SLC 16.7-9, Remedial Action Condition B

2.2 Catawba Nuclear Station Operator Aid Computer Documentation

2.3 UFSAR Table 18-1, Reactor Coolant Operational Leakage Monitoring Program

2.4 Catawba Nuclear Station License Renewal Basis Specification CNS-1274.00-00-0016, Section 4.27

2.5 WCAP-16465-NP (Pressurized Water Reactors Owners Group Standard RCS Leakage Action Levels and Response Guidelines for Pressurized Water Reactors)

2.6 WCAP-16423-NP (Pressurized Water Reactors Owners Group Standard Process and Methods for Calculating RCS Leak Rate for Pressurized Water Reactors)

3. Time Required

3.1 Manpower - Two Operators

3.2 Time - 3 hours

3.3 Frequency -

- Once per 72 hours in Modes 1, 2, 3 and 4 per SR 3.4.13.1 during steady state operation.
- Once per 24 hours if required by TS LCO 3.4.15, REQUIRED ACTION A.1, B.1, C.1.1 or E.1.

4. Prerequisite Test

None

5. Test Equipment

None

6. Limits and Precautions

6.1 If more than twelve hours of grace time have elapsed and this PT has **NOT** been completed, then contact the OWPM Group.

6.2 Changing Lower Containment Ventilation Unit alignments can affect indicated NCDT and PRT levels by changing reference leg temperatures on the associated transmitters.

7. Required Unit Status

AA Verify the following parameters are being maintained steady:

- ☑ NC System temperature
- ☑ NC System pressure

8. Prerequisite System Conditions

AA Verify the NCDT capacity is adequate to receive leakage for duration of run.

9. Test Method

9.1 At least once per 72 hours with the OAC available, the OAC NC System Leakage Calculation will be initiated. The calculation will automatically run for 3 hours. During the first 15 minutes of the calculation, no correlation coefficient will be displayed. Calculation results may be used for the leakage calculation when elapsed time of the calculation reaches 60 minutes and the correlation coefficient for total leakage is greater than or equal to 0.75 OR when elapsed time of the calculation reaches 120 minutes and Total Leakage Best is less than or equal to 0.2 gpm. If plant stability **CANNOT** be maintained and elapsed time reaches 30 minutes and the correlation coefficient for total leakage is greater than or equal to 0.5, then the program data may be used.

9.2 At least once per 72 hours with the OAC partially or wholly unavailable, NC System leakage will be calculated manually. Using Control Room indications (or OAC if partially available), initial and final data will be recorded, separated by at least a 60 minute interval. Recorded data will be used in leakage calculations. Tank volume / gallon conversions and water densities are used in equations to determine NC System leakage.

9.3 Primary to secondary leakage will be verified to be less than or equal to 150 gpd through any steam generator by either EMF indications or Chemistry grab samples.

9.4 NC Pump seal leak-off will be recorded and "TOTAL ACCUMULATIVE LEAKAGE" will be calculated.

9.5 The NCS Unidentified Leakage result will be evaluated to verify an acceptably low leakage rate.

10. Data Required

10.1 If the OAC is available, complete Enclosures 13.1 (Data Sheet) and 13.2 (Evaluation of NCS Unidentified Leakage Results).

10.2 If the OAC is partially or wholly unavailable, complete Enclosure 13.3 (Manual Leakage Calculation).

11. Acceptance Criteria

NOTE:
- Negative values of Unidentified Leakage more negative than -0.10 gpm invalidates the current OAC leakage calculation.
- If a negative leakage value of less than (more negative than) -0.10 gpm is due to plant stability issues then a manual leakage calculation per Enclosure 13.3 (Manual Leakage Calculation) may be necessary.
- Negative values of Unidentified Leakage between 0.000 gpm and -0.020 gpm are considered zero leakage.

11.1 NC System leakage is calculated and the values are: (SR 3.4.13.1)

- Unidentified Leakage less than or equal to 1 gpm
- Identified Leakage (net) less than or equal to 10 gpm (Step 12.16)

11.2 Primary to secondary leakage is determined to be less than or equal to 150 gpd through any steam generator. (SR 3.4.13.2)

11.3 If in Mode 1, 2, 3 or Pre-Mode 3, Total Accumulative Leakage is determined to be less than or equal to 20 gpm. {PIP C-99-0606}

12. Procedure

AA 12.1 Ensure that the Identified Leakage associated with any system condition changes (NV Pump swap, seal injection filter swap, etc.) has been updated in the open item summary.

N/A AA 12.2 **IF** Unidentified Leakage is more negative than -0.020 gpm on the previous 3 NC System leakage calculations, then re-measure background leakage.

N/A AA 12.3 **IF** in Mode 2, 3, 4, or Pre-Mode 4, notify Chemistry to determine the primary to secondary leak rate **AND** report value to the control room.

Person Notified ________________________

NOTE: All leakage calculation results, valid and invalid, shall be entered into the Control Room log.

N/A AA 12.4 **IF** more than one leakage calculation performed per shift, enter a brief explanation into the Control Room log indicating the reason for repeating the calculation.

AA 12.5 Ensure > 60 minutes has elapsed since any makeup to NCP standpipes.

NOTE: OAC points C1P1023, C1P1024, C1P1025, and C1P1026 will indicate NCAL until the leakage program is started.

N/A AA 12.6 **IF** the OAC is available for performing the leakage calculation, perform the following:

_____ 12.6.1 Examine values and quality codes of OAC points in the following Group Displays:

- OPNCLEK1 (OP NC LEAK1 if accessing from NC LEAKAGE graphic)
- OPNCLEK2 (OP NC LEAK2 if accessing from NC LEAKAGE graphic)

_____ 12.6.2 **IF** any obvious erroneous or invalid value or quality code for OAC points in group displays OPNCLEK1 or OPNCLEK2 are found that have **NOT** been previously addressed, they shall be investigated and resolved prior to the start of the calculation.

N/A AA 12.7 **IF** desired to lower NCDT level due to known high inputs, perform the following:

_____ 12.7.1 **IF** 1WL-807B (NCDT Pumps Disch Cont Isol) is being maintained closed per OP/1/A/6500/014 (Operations Controlled Liquid Waste Systems), perform the following:

_____ 12.7.1.1 Place "NCDT LVL CTRL" in "MANUAL".

_____ 12.7.1.2 Close "NCDT LVL CTRL".

_____ 12.7.1.3 Open 1WL-807B (NCDT Pumps Disch Cont Isol).

_____ 12.7.2 Ensure "NCDT LVL CTRL" is in "MANUAL".

_____ 12.7.3 Throttle open "NCDT LVL CTRL".

12.7.4 **WHEN** NCDT level is ≈ 30%, perform the following:

_____ 12.7.4.1 Close "NCDT LVL CTRL".

_____ 12.7.4.2 **IF** Step 12.7.1 was performed, close 1WL-807B (NCDT Pumps Disch Cont Isol).

_____ 12.7.4.3 Return "NCDT LVL CTRL" to "AUTO".

12.8 Align the NCDT as follows:

NOTE:	1WL-802 is the NCDT level control valve.

AA 12.8.1 Ensure 1WL-802 (NCDT Level Control) is closed as follows:

AA 12.8.1.1 Place "NCDT LVL CTRL" in "MANUAL".

AA 12.8.1.2 Close "NCDT LVL CTRL".

N/A AA 12.8.2 **IF** necessary due to known or suspected leakage past 1WL-802 (NCDT Level Control), close 1WL-807B (NCDT Pumps Disch Cont Isol).

N/A AA 12.8.3 **IF** necessary due to known or suspected leakage past 1WL-807B (NCDT Pumps Disch Cont Isol), close 1WL-805A (NCDT Pump Disch Cont Isol).

12.9 Align 1NV-172A (3-Way Divert To VCT-RHT) as follows:

AA 12.9.1 Record the position of the control switch for 1NV-172A (3-Way Divert To VCT-RHT). AUTO / VCT

AA 12.9.2 Place 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.

AA 12.10 Contact Primary Chemistry to perform the following:

- Inform them that an NC System leakage calculation is being initiated.
- Ensure that sampling is **NOT** performed while the calculation is in progress.
- Verify current NM automation flowrate for entry into background leakage. Record value used for NM automation flowrate 0.072 gpm

Chemistry contact Mcleod

AA 12.11 Ensure > 30 minutes has elapsed since the performance of any activity involving NC System parameters, including charging, letdown (including demineralizers), pressurizer, and/or VCT evolutions. {PIP 07-7077}

N/A AA 12.12 **IF** the OAC is available **AND** Unit 1 is at or near normal operating temperature and pressure (i.e. Tavg > 550°F and W/R pressure > 2200 psig), perform the following:

NOTE:	Maximum run-time for NC System Leakage Calculation is three hours.

12.12.1 Complete the following steps to initiate a NC System Leakage Calculation:

NOTE:	The following step provides an inserted value for NCDT level indication. Use of an inserted value will result in input into the tank to be measured as NCS unidentified leakage.

_____ 12.12.1.1 **IF** the NCDT level indication is **NOT** providing stable input rate, insert the current value of C1A0494 (NCDT Level) into OAC Point C1P0203 (Average NCDT Level).

☐ 12.12.1.2 Activate NC System Leakage Calculations program (RCSLEAK).

_____ 12.12.1.3 **IF** a calculation is currently in progress, then perform one of the following:

_____ A. **IF** it is **NOT** desired to initiate a new calculation, then exit the NC System Leakage Calculations program.

OR

_____ B. **IF** it is desired to initiate a new calculation, abort the current calculation per Step 12.12.3.

NOTE: It is recommended that initiation of the leakage calculation be synchronized with fluctuations of indicated VCT level. Initiating the program in Step 12.12.1.4 approximately half way between the maximum and minimum values observed during the fluctuation will improve the accuracy of the data.

☐ 12.12.1.4 Select "INITIATE".

☐ 12.12.1.5 Enter background leakage obtained from the following:

- Open Item Summary Logbook.
- NM Automation from Primary Chemistry (if **NOT** already in Open Item Summary Logbook).

☐ 12.12.1.6 Enter desired start time.

☐ 12.12.1.7 Select "SAVE".

☐ 12.12.1.8 Enter user name.

☐ 12.12.1.9 Enter reason for calculation.

☐ 12.12.1.10 Select "OK" to continue.

☐ 12.12.1.11 Select "OK" to acknowledge "New NC Leakage Calculation Scheduled" message.

_____ 12.12.2 **IF AT ANY TIME** during the calculation it is desired to obtain a printout of NC System Leakage Calculation Summary, perform the following:

NOTE: If the calculation is still running, it is recommended to wait at least ten seconds after a data update before printing. The program updates every minute.

☐ 12.12.2.1 Ensure NC System Leakage Calculations program (RCSLEAK) is activated.

☐ 12.12.2.2 Select "PRINT".

_____ 12.12.3 **IF AT ANY TIME** during the calculation it becomes necessary to abort a NC System Leakage Calculation due to calculation or plant issues, perform the following:

NOTE:	Upon abort, the application will terminate calculating. Results up to the time of termination are available.

☐ 12.12.3.1 Ensure NC System Leakage Calculations program (RCSLEAK) is activated.

☐ 12.12.3.2 Verify "NC System Leakage Calculation" summary displayed.

☐ 12.12.3.3 Select "ABORT".

☐ 12.12.3.4 Verify message "On Demand NC System Leakage Calculations Will Be Aborted" displayed.

☐ 12.12.3.5 Select "OK" to acknowledge "On Demand NC System Leakage Calculations Will Be Aborted" message and to abort the NC System Leakage Calculation in progress.

☐ 12.12.3.6 Verify the "NC System Leakage Calculations" summary is displayed with the results of the aborted calculation up to time of termination.

_____ 12.12.3.7 **IF** desired to restart the calculation, return to Step 12.12.1.

NOTE:

- Disregard the correlation coefficient "-" (negative) symbol when determining the correlation coefficient. The "-" symbol signifies out leakage from the NC System. The absence of the "-" symbol signifies in leakage into the NC system from an external source.
- In the following step, use of either of the first two conditions is preferred. The third condition is intended to only be used for transient conditions.
- To provide highest quality results, a "CALC ELAPSED TIME" of greater than or equal to 120 minutes is recommended and is to be used in the following step whenever plant conditions allow.

_____ 12.12.4 **WHEN** any of the following sets of conditions are met, then obtain a printout of the "NC System Leakage Calculation" summary as follows:

☐ "CALC ELAPSED TIME" ≥ 60 minutes, and
☐ The absolute value for the "TOTAL LEAKAGE CORRELATION COEFF." ≥ 0.75.

OR

☐ "CALC ELAPSED TIME" ≥ 120 minutes, and
☐ "TOTAL LEAKAGE BEST" < 0.2 gpm.

OR

☐ Plant stability **CANNOT** be maintained, and
☐ "CALC ELAPSED TIME" ≥ 30 minutes, and
☐ The absolute value for the "TOTAL LEAKAGE CORRELATION COEFF." ≥ 0.5.

NOTE: If the calculation is still running, it is recommended to wait at least ten seconds after a data update before printing. The program updates every minute.

☐ 12.12.4.1 Ensure NC System Leakage Calculations program (RCSLEAK) is activated.

☐ 12.12.4.2 Select "PRINT".

_____ 12.12.5 Record the following values on Enclosure 13.1 (Data Sheet):

☐ 12.12.5.1 "TOTAL LEAKAGE BEST" value as Total Leakage.

☐ 12.12.5.2 "IDENTIFIED LEAKAGE BEST" value as Identified Leakage.

☐ 12.12.5.3 "UNIDENTIFIED LEAKAGE BEST" value as Unidentified Leakage.

_____ 12.12.6 **IF** the value for "UNIDENTIFIED LEAKAGE BEST" is negative, perform the following:

NOTE: Negative values of Unidentified Leakage between 0.000 gpm and -0.020 gpm is considered zero leakage. For trending purposes, the actual leakage results shall always be recorded.

_____ 12.12.6.1 **IF** the value for "UNIDENTIFIED LEAKAGE BEST" is between -0.02 and -0.10 gpm, use the displayed value of "UNIDENTIFIED LEAKAGE BEST" while completing this procedure.

NOTE: Unidentified leakage values more negative than -0.10 gpm are indicative of either inleakage or a significant reduction of background leakage. Either situation invalidates the current leakage calculation.

_____ 12.12.6.2 **IF** the value for "UNIDENTIFIED LEAKAGE BEST" is more negative than -0.10 gpm, perform the following:

NOTE: The NC System Leakage Calculation will time out after three hours.

_____ A. **IF** necessary, abort the current calculation per Step 12.12.3.

_____ B. **IF** necessary, return the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the position recorded in Step 12.9.1.

_____ C. **IF** necessary, realign the NCDT per Step 12.15.

_____ D. **IF** a value was inserted for OAC Point C1P0203 (Average NCDT Level) in Step 12.12.1.1, restore that point to processing.

_____ E. **<u>IF</u>** the negative value for "UNIDENTIFIED LEAKAGE BEST" is suspected to be due to plant stability issues, perform the following:

☐ 1. Perform manual leakage calculation per Enclosure 13.3 (Manual Leakage Calculation).

☐ 2. N/A Steps 12.12.6.2F through 12.13.

☐ F. Inform Primary Chemistry that the NC System leakage calculation has been suspended.
Chemistry contact ______________________________

☐ G. Record the individual NC Pump seal leakoff flows:

- NC Pump 1A: ________ gpm
- NC Pump 1B: ________ gpm
- NC Pump 1C: ________ gpm
- NC Pump 1D :________ gpm

Total NC Pump seal leakoff: ________ gpm

☐ H. Record total NC Pump seal leakoff on Enclosure 13.1 (Data Sheet).

☐ I. Calculate Total Accumulative Leakage on Enclosure 13.1 (Data Sheet).

☐ J. Document primary to secondary leakage on Enclosure 13.1 (Data Sheet).

☐ K. Enter the NCS Leakage Calculation Data into the Control Room log using Unit 1 NCS Leakage Data stamp. Include comment that this is an invalid calculation due to high negative leakage result.

☐ L. Re-measure background leakage.

NOTE:	Examples of inleakage could include flush water leakage into low pressure portions of the NV System, KC leakage into the Seal Return Hx and/or NW leakage.

_____ M. **<u>IF</u>** the background leakage has **<u>NOT</u>** changed significantly, identify and isolate the source of inleakage.

☐ N. **<u>WHEN</u>** the current background leakage has been determined and documented **<u>OR</u>** the source of inleakage has been isolated, start a new PT/1/A/4150/001 D (NC System Leakage Calculation).

☐ O. N/A the remaining steps of this procedure.

_____ 12.12.7 Record the individual NC Pump seal leakoff flows:

- NC Pump 1A: _________ gpm
- NC Pump 1B: _________ gpm
- NC Pump 1C: _________ gpm
- NC Pump 1D :_________ gpm

Total NC Pump seal leakoff: _________ gpm

_____ 12.12.8 Record total NC Pump seal leakoff on Enclosure 13.1 (Data Sheet).

_____ 12.12.9 Calculate Total Accumulative Leakage on Enclosure 13.1 (Data Sheet).

_____ 12.12.10 Document primary to secondary leakage on Enclosure 13.1 (Data Sheet).

_____ 12.12.11 Determine PZR steam leak rate to PRT on Enclosure 13.1 (Data Sheet).

_____ 12.12.12 **<u>IF</u>** a value was inserted for OAC Point C1P0203 (Average NCDT Level) in Step 12.12.1.1, restore that point to processing.

NOTE:	The calculation will stop after 180 minutes. It is **<u>NOT</u>** necessary to abort the calculation in the following step.

_____ 12.12.13 Exit the NC System Leakage Calculations program.

_____ 12.13 **<u>IF</u>** the OAC is partially or wholly unavailable **<u>OR</u>** Unit 1 is **<u>NOT</u>** at or near normal operating temperature and pressure (i.e. Tavg ≤ 550°F and W/R pressure ≤ 2200 psig), perform Enclosure 13.3 (Manual Leakage Calculation).

_____ 12.14 Return the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the position recorded in Step 12.9.1.

12.15 Realign the NCDT as follows:

_____ 12.15.1 Ensure 1WL-807B (NCDT Pumps Disch Cont Isol) is open.

_____ 12.15.2 Ensure 1WL-805A (NCDT Pump Disch Cont Isol) is open.

NOTE:	If unable to reduce NCDT level in the following step, the in-service NB evaporator feed filter may need to be swapped / replaced due to high DP. (NCR 01515934)

_____ 12.15.3 **IF** NCDT level is greater than setpoint, perform the following:

_____ 12.15.3.1 Throttle open "NCDT LVL CTRL" to slowly reduce level.

_____ 12.15.3.2 **WHEN** NCDT level is at the desired value, close "NCDT LVL CTRL".

_____ 12.15.4 Place "NCDT LVL CTRL" in "AUTO".

_____ 12.15.5 Ensure "NCDT LVL CTRL" is set for 50%.

_____ 12.15.6 **IF** 1WL-807B (NCDT Pumps Disch Cont Isol) is being maintained closed per OP/1/A/6500/014 (Operations Controlled Liquid Waste Systems), close 1WL-807B (NCDT Pumps Disch Cont Isol).

NOTE:

- NM automation flow, as documented in Step 12.10, is classified as Non-RCPB (Reactor Coolant Pressure Boundary) leakage per WCAP-16423-NP (Reference 2.6). NM sample flow is manually routed and shall **NOT** count as Identified Leakage. The NM sample flow shall still be included in Total Leakage. (PIP M-12-5474).

- The Net Identified Leakage rate will be entered in the Control Room log Leakage Data stamp and the OAC Manual Value Update. It is **NOT** used for determining Total Accumulative Leakage for the purpose of verifying SSF capabilities in Enclosure 13.1 (Data Sheet) or 13.3.2 (Manual Calculation).

_____ 12.16 Calculate Net Identified Leakage rate:

______________ gpm -	______________ gpm =	__________ gpm
Identified Leakage Best (Step 12.12.5.2) or Identified Leakage in Enclosure 13.3.2 (Manual Calculation)	NM automation flow (Step 12.10)	Net Identified Leakage

12.17 Enter the NCS Leakage Calculation Data into the following:

12.17.1 The Control Room log using Unit 1 NCS Leakage Data stamp as follows:

_____ 12.17.1.1 Enter "Net Identified Leakage" calculated in Step 12.16 as the Identified Leakage Rate.

_____ 12.17.1.2 Record the remaining data required in the stamp as presented on printout or as calculated by Enclosure 13.3 (Manual Leakage Calculation).

_____ 12.17.2 **IF** the "Plant stability **CANNOT** be maintained" option was used in Step 12.12.4, ensure this is noted in the Control Room log entry.

_____ 12.17.3 **IF** a manual calculation was performed per Enclosure 13.3 (Manual Leakage Calculation), ensure this is noted in the Control Room log entry.

_____ 12.17.4 OAC Manual Value Update NCLEAK (NC System Leakage Calc) program as follows:

_____ 12.17.4.1 Enter "Net Identified Leakage" calculated in Step 12.16 as the Identified Leakage Rate.

_____ 12.17.4.2 Record the remaining data required as presented on printout or as calculated by Enclosure 13.3 (Manual Leakage Calculation).

12.18 Evaluate the acceptance criteria by performing one of the following:

_____ 12.18.1 Verify the acceptance criteria specified in Section 11 is met.

OR

_____ 12.18.2 **IF** the acceptance criteria is **NOT** met, perform the following:

☐ Notify the Unit/WCC SRO that the acceptance criteria is **NOT** met.

___________________________ ___________ / ___________
Unit/WCC SRO Contacted Date Time

☐ Initiate a CR to document the test failure.

☐ Document all issues on an Equipment Problem Evaluation Form.

_____ SRO 12.19 **IF** in Mode 1, 2, 3 or Pre-Mode 3 **AND** Total Accumulative Leakage > 20 gpm, then declare the Standby Makeup Pump non-functional per SLC16.7-9.

_____ 12.20 Inform Primary Chemistry that the NC System leakage calculation is complete.
Chemistry contact ______________________________

_____ 12.21 **IF** the leakage calculation was performed by the OAC **AND** Unit 1 is in Modes 1 through 4, evaluate Unidentified Leakage results per Enclosure 13.2 (Evaluation of NCS Unidentified Leakage Results).

_____ 12.22 **IF** any discrepancy is noted during the performance of this test that does **NOT** keep the test from meeting the acceptance criteria, it shall be given to the Unit/WCC SRO for evaluation via an Equipment Problem Evaluation Form.

13. Enclosures

13.1 Data Sheet

13.2 Evaluation of NCS Unidentified Leakage Results

13.2.1 Auxiliary Building Potential Leak Sources

13.3 Manual Leakage Calculation

13.3.1 Manual Leakage Data

13.3.2 Manual Calculation

13.3.3 NCDT Level Conversion

13.3.4 PRT Level Conversion

1. Procedure

_____ 1.1 Verify the following valves are closed:

- ☐ 1NC-56B (RMW Pump Disch Cont Isol)
- ☐ 1NV-181A (B/A Blender Otlt To VCT)
- ☐ 1NV-186A (B/A Blender Otlt To VCT Outlet)
- ☐ 1NV-236B (Boric Acid To NV Pumps Suct)
- ☐ 1NV-252A (NV Pumps Suct From FWST)
- ☐ 1NV-253B (NV Pumps Suct From FWST)
- ☐ 1NI-9A (NV Pump C/L Inj Isol)
- ☐ 1NI-10B (NV Pump C/L Inj Isol)

_____ 1.2 Record "Initial Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available).

NOTE: Calculation accuracy improves as the time between initial and final data increases.

_____ 1.3 Wait at least 60 minutes prior to obtaining final data.

_____ 1.4 Record "Final Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available).

_____ 1.5 Using data from Enclosure 13.3.1 (Manual Leakage Data), calculate change in T-Avg:

_______________ - ________________ = __________°F
NC Average temp initial — NC Average temp final

NOTE:
- Procedure may continue while performing the following step.
- If change in T-Avg is greater than 0.25°F (0.1°F if using OAC), calculation is invalid and must be repeated.

_____ 1.6 **IF** change in T-Avg is less than or equal to 0.25°F (0.1°F if using OAC), perform all calculations on Enclosure 13.3.2 (Manual Calculation).

_____ 1.7 Return to Step 12.14.

Enclosure 13.3.1

Manual Leakage Data

NOTE:
- If available, OAC points can be used.
- Where applicable, the same instrument channel (meter) shall be used for obtaining the initial and final data.
- When using OAC Point indication for NCDT and PRT level changes, minor instrument fluctuations that result in a indicated level decrease may be treated as zero level change.

Parameter	Units	Instrument / OAC Point Used	Initial Data (Step 1.2)	Final Data (Step 1.4)
NC Average Temperature	°F			
VCT Level	%			
PZR Level	%			
NCDT Level	%			
PRT Level	%			

Record time Initial Data obtained _____________

Record time Final Data obtained _____________

Elapsed time _________ minutes

VCT

VCT Leakage Rate = $\dfrac{\text{[Initial Level (\%) - Final Level (\%)] x 19.1 gal/\%}}{\text{Elapsed time}}$

= $\dfrac{[(\qquad\qquad) - (\qquad\qquad)] \text{ x 19.1 gal/\%}}{(\qquad\qquad) \text{ min}}$

= ________________ gal/min

PZR

PZR Leakage Rate = $\dfrac{\text{[Initial Level (\%) - Final Level (\%)] x (124.7 Gal/\%) x (0.5983}^{a}\text{)}}{\text{Elapsed time}}$

= $\dfrac{[(\qquad\qquad) - (\qquad\qquad)] \text{ x (124.7 Gal/\%) x (0.5983)}}{(\qquad\qquad) \text{ min}}$

= ________________ gal/min

Total Leakage = (VCT Leakage Rate) + (Pzr Leakage Rate)

= (   ) + (   )

= ________________ gpm

[a] This is the density ratio to normalize leakage at PZR conditions to leakage at 100°F

NCDT

Initial NCDT Volume _______ % = _________ Gal (OAC point C1P5079 (U1 NCDT Volume) or Enclosure 13.3.3 (NCDT Level Conversion))

Final NCDT Volume _______ % = _________ Gal (OAC point C1P5079 (U1 NCDT Volume) or Enclosure 13.3.3 (NCDT Level Conversion))

NCDT Leakage Rate = $\frac{\text{Final Volume (Gal) - Initial Volume (Gal)}}{\text{Elapsed time}}$

= $\frac{(\_\_\_\_\_\_\_\_\_\_) - (\_\_\_\_\_\_\_\_\_\_)}{(\qquad\qquad) \text{ min}}$

= _________ gpm

PRT

Initial PRT Volume _____ % = _________ Gal (OAC point C1P5078 (U1 PRT Volume) or Enclosure 13.3.4 (PRT Level Conversion))

Final PRT Volume _____ % = _________ Gal (OAC point C1P5078 (U1 PRT Volume) or Enclosure 13.3.4 (PRT Level Conversion))

PRT Leakage Rate = $\frac{\text{Final Volume (Gal) - Initial Volume (Gal)}}{\text{Elapsed time}}$

= $\frac{(\_\_\_\_\_\_\_\_\_\_) - (\_\_\_\_\_\_\_\_\_\_)}{(\qquad\qquad) \text{ min}}$

= _________ gpm

Background Leakage = Any quantified/measured leakage

= _________ gpm

Identified Leakage = NCDT Leakage Rate + PRT Leakage Rate + Background Leakage

= _________ gpm + _________ gpm + _________ gpm

= _________ gpm

Unidentified Leakage = Total Leakage - Identified Leakage

= _________ gpm - _________ gpm

= _________ gpm[b]

---

[b] This value is an acceptance criteria of this procedure.

Total NC Pump Seal Leakoff

- 1A NC Pump #1 Seal Leakoff = __________ gpm
- 1B NC Pump #1 Seal Leakoff = __________ gpm
- 1C NC Pump #1 Seal Leakoff = __________ gpm
- 1D NC Pump #1 Seal Leakoff = __________ gpm

Total NC Pump Seal Leakoff: __________ gpm

Total Accumulative Leakage = Sum of Identified Leakage, Unidentified, and NC Pumps #1 Seal Leakoffs

Identified Leakage ___________ gpm

Unidentified Leakage ___________ gpm

Total NC Pump Seal Leakoff ___________ gpm

_____ **IF** any Identified or Unidentified value is negative, enter "0" below in its applicable space.

Identified + Unidentified + Total NC Pump Seal Leakoff = Total Accumulative Leakage

____________ + ____________ + ____________ = _____________

Verify Total Accumulative Leakage:

☐ ≤ 20 gpm {PIP C-99-0606}

OR

☐ > 20 gpm, refer to Step 12.19.

Performed By _________________________ Date: _____________Time:________

Verified By _________________________ Date: _____________Time:________

<u>Primary to Secondary Leakage</u> as determined by one of the following:

_____ **<u>IF</u>** in Mode 1 **<u>AND</u>** 1EMF-33 is functional[c] **<u>AND</u>** the OAC is available, record the reading of OAC Point C1P0189 (Pri To Sec Leakrate 15 Min Running Avg). ____________ gpd

OR

_____ **<u>IF</u>** in Mode 1 **<u>AND</u>** the OAC is **<u>NOT</u>** available **<u>AND</u>** Unit 1 is ≥ 40% RTP, record the readings from the N-16 Leakage Monitors:

- 1EMF-71 __________ gpd
- 1EMF-72 __________ gpd
- 1EMF-73 __________ gpd
- 1EMF-74 __________ gpd

OR

_____ **<u>IF</u>** in Mode 1 **<u>AND</u>** 1EMF-33 is non-functional[c] **<u>AND</u>** Unit 1 is ≥ 40% RTP, record the readings from the N-16 Leakage Monitors:

- 1EMF-71 __________ gpd
- 1EMF-72 __________ gpd
- 1EMF-73 __________ gpd
- 1EMF-74 __________ gpd

OR

_____ **<u>IF</u>** in Mode 1 **<u>AND</u>** 1EMF-33 is non-functional[c] **<u>AND</u>** Unit 1 is < 40% RTP, record the primary to secondary leak rate as determined by Chemistry. _____________ gpd

OR

_____ **<u>IF</u>** in Mode 2, 3, 4 or Pre-Mode 4, record the primary to secondary leak rate value as determined by Chemistry. ___________ gpd

---

[c] For the purposes of this procedure, OAC Point C1P0189 (Pri To Sec Leakrate 15 Minute Running Avg) must be functional for 1EMF-33 to be considered functional.

Enclosure 13.3.3

NCDT Level Conversion

%	Gal	%	Gal	%	Gal	%	Gal	%	Gal
1	19.897	21	74.240	41	143.787	61	218.067	81	286.505
2	22.085	22	77.410	42	147.478	62	221.721	82	289.571
3	24.343	23	80.613	43	151.178	63	225.360	83	292.600
4	26.669	24	83.871	44	154.888	64	228.983	84	295.590
5	29.058	25	87.176	45	158.604	65	232.587	85	298.539
6	31.509	26	90.517	46	162.327	66	236.173	86	301.447
7	34.019	27	93.894	47	166.055	67	239.738	87	304.312
8	36.585	28	97.304	48	169.786	68	243.281	88	307.131
9	39.206	29	100.743	49	173.519	69	246.801	89	309.904
10	41.880	30	104.212	50	177.254	70	250.296	90	312.628
11	44.604	31	107.706	51	180.989	71	253.765	91	315.302
12	47.376	32	111.226	52	184.722	72	257.204	92	317.923
13	50.196	33	114.770	53	188.453	73	260.614	93	320.489
14	53.060	34	118.335	54	192.181	74	263.990	94	322.999
15	55.968	35	121.921	55	195.904	75	267.332	95	325.450
16	58.918	36	125.525	56	199.620	76	270.636	96	327.839
17	61.908	37	129.148	57	203.329	77	273.894	97	330.164
18	64.937	38	132.787	58	207.030	78	277.098	98	332.423
19	68.003	39	136.440	59	210.720	79	280.267	99	334.611
20	71.104	40	140.108	60	214.400	80	283.403	100	336.726

Enclosure 13.3.4

PRT Level Conversion

%	Gal	%	Gal	%	Gal	%	Gal	%	Gal
1	383.572	21	2476.15	41	5302.48	61	8328.88	81	11109.4
2	458.035	22	2605.43	42	5452.77	62	8477.55	82	11233.2
3	536.720	23	2736.38	43	5603.50	63	8625.56	83	11355.0
4	619.374	24	2868.93	44	5754.61	64	8772.86	84	11474.8
5	705.776	25	3003.00	45	5906.04	65	8919.40	85	11592.4
6	795.729	26	3138.52	46	6057.74	66	9065.10	86	11707.7
7	889.054	27	3275.43	47	6209.65	67	9209.92	87	11820.7
8	985.589	28	3413.66	48	6361.73	68	9353.79	88	11931.3
9	1085.19	29	3553.15	49	6513.91	69	9496.66	89	12039.3
10	1187.70	30	3693.82	50	6666.17	70	9638.47	90	12144.6
11	1293.02	31	3835.63	51	6818.38	71	9779.14	91	12247.1
12	1401.00	32	3978.50	52	6970.56	72	9918.63	92	12346.7
13	1511.55	33	4122.37	53	7122.64	73	10056.9	93	12443.2
14	1624.54	34	4267.19	54	7274.55	74	10193.8	94	12536.6
15	1739.89	35	4412.89	55	7426.25	75	10329.3	95	12626.5
16	1857.49	36	4559.43	56	7577.68	76	10463.4	96	12712.9
17	1977.25	37	4706.73	57	7728.79	77	10595.9	97	12795.6
18	2099.08	38	4854.74	58	7879.51	78	10726.9	98	12874.3
19	2222.89	39	5003.40	59	8029.81	79	10856.1	99	12948.7
20	2348.61	40	5152.67	60	8179.92	80	10983.7	100	13018.7

JPM A.1-1S

SRO

NOTE
This JPM is to be administered on the same day as RO JPM A.1-1R

Catawba Nuclear Station
Admin. JPM A.1-1S
September 2019 NRC Exam

EVALUATION SHEET

Task: Perform a Manual NC System Leakage Calculation

Alternate Path: N/A

Facility JPM #: NC-094 Modified

Safety Function: N/A

K/A G 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Importance: 4.4 / 4.7 **CFR:** 41.5 / 43.5 / 45.12 / 45.13

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ________

References: PT/1/A/4150/001 D (NC System Leakage Calculation) rev 86

Task Standard: A manual NC System Leakage Calculation is performed per PT/1/A/4150/001 D (NC System Leakage Calculation) and the following results reported: Unidentified Leakage 8.628 – 8.828 gpm, Identified Leakage 2.272 – 2.372 gpm, Total Accumulated Leakage 21.664 – 21.91 gpm. Determines that T.S. 3.4.13 Condition A and SLC 16.7-9 Condition B are applicable.

Validation Time: 30 minutes **Time Critical:** Yes _____ No __X__

Applicant: Time Start: __________
NAME____________________________ Docket #______________ Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

COMMENTS

____

____

____

____

____

____

Catawba Nuclear Station
Admin. JPM A.1-1S
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is in Mode 1 at 100% power.**
- **The OAC is out of service due to emergent system failures and will not be returned to service for 24 hours.**
- **Other operators are performing PT/1/A/4600/009 (Loss of Operator Aid Computer) and OP/1/A/6700/003 (Operation With the Operator Aid Computer Out of Service).**

INITIATING CUES:

- **The CRS directs you to perform an NC System Leakage Calculation per PT/1/A/4150/001 D (NC System Leakage Calculation).**
- **Steps are complete through 12.12.**
- **You are to perform step 12.13.**
- **The Open Item Summary has been updated. The background leakage is .072 gpm (Orbisphere flow reported by Primary Chemistry).**
- **Using the attached Data Sheet and PT/1/A/4150/001 D, calculate and report the following information back to the CRS:**

Identified Leakage ____________ gpm

Unidentified Leakage ____________ gpm

Total Accumulated Leakage ____________ gpm

List all applicable Tech Specs and/or SLCs (if any), including Required Actions. Also state the reason (if any LCO is not met):

EXAMINER NOTE: Each applicant should receive a copy of attached Data Sheets and a copy of PT/1/A/4150/001 D (Rev 86) body signed off through step 12.12 and Enclosure 13.3.

START TIME: _______

STEP / STANDARD	SAT / UNSAT
STEP 1 12.13 **IF** the OAC is partially or wholly unavailable **OR** Unit 1 is **NOT** at or near normal operating temperature and pressure (i.e. Tavg $\leq$ 550°F and W/R pressure $\leq$ 2200 psig), perform Enclosure 13.3 (Manual Leakage Calculation). STANDARD: Applicant determines that this step is applicable and goes to Enclosure 13.3 for a manual leakage calculation. COMMENTS:	___ SAT ___UNSAT

STEP 2 Enclosure 13.3 step 1.1 Verify the following valves are closed: • 1NC-56B (RMW Pump Disch Cont Isol) • 1NV-181A (B/A Blender Otlt to VCT) • 1NV-186A (B/A Blender Otlt to VCT Outlet) • 1NV-236B (Boric Acid to NV Pumps Suct) • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST) • 1NI-9A (NV Pump C/L Inj Isol) • 1NI-10B (NV Pump C/L Inj Isol) STANDARD: Applicant determines from the data sheet provided that all of the listed valves are closed. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 3 1.2 Record “Initial Data” on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available). STANDARD: Applicant records initial data on Enclosure 13.3.1 using the provided data sheet. COMMENTS:	___ SAT ___ UNSAT
NOTE: Calculation accuracy improves as the time between initial and final data increases.	
STEP 4 1.3 Wait at least 60 minutes prior to obtaining final data. STANDARD: Applicant is given data for 64 minutes after initial data. COMMENTS:	___ SAT ___ UNSAT

STEP5 1.4 Record “Final Data” on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available). STANDARD: Applicant records final data on Enclosure 13.3.1 using the provided data sheet. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 6 1.5 Using data from Enclosure 13.3.1 (Manual Leakage Data), calculate change in T-Avg: ____584.7_____ - ____584.5_____ = ___0.2___ °F NC Average temp initial NC Average temp final STANDARD: Applicant calculates change in T-Avg to be **.2°F**. COMMENTS:	___ SAT ___ UNSAT

NOTE:

- Procedure may continue while performing the following step.
- If change in T-Avg is greater than 0.25°F (0.1°F if using OAC), calculation is invalid and must be repeated.

STEP 7 1.6 **IF** change in T-Avg is less than or equal to 0.25°F (0.1°F if using OAC), perform all calculations on Enclosure 13.3.2 (Manual Calculation). STANDARD: Applicant determines from previous step that T-Avg is 0.2°F and performs calculations from Enclosure 13.3.2. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 8 Enclosure 13.3.2 (Manual Calculation) STANDARD: Applicant performs the required calculations and comes up with the following results: VCT Leakage Rate = 11.042 gpm (Allowable range 11.0 – 11.1 gpm) PZR Leakage Rate = 0 gpm Total Leakage = 11.042 gpm (Allowable range 11.0 – 11.1 gpm) NCDT Leakage Rate = 0 gpm PRT Leakage Rate = 2.216 gpm (Allowable range 2.2 – 2.3 gpm) **Identified Leakage = 2.288 gpm (Allowable range 2.272 – 2.372 gpm)** **Unidentified Leakage = 8.754 gpm (Allowable range 8.628 – 8.828 gpm)** **Total Accumulated Leakage = 21.752 gpm (Allowable range 21.6 – 21.91 gpm)** **These steps are critical to ensure accurate leakage values will be used to determine compliance with Technical Specifications/Selected License Commitments for NC system leakage.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

<table>
<tr><th>STEP / STANDARD</th><th>SAT / UNSAT</th></tr>
<tr><td>STEP 9 Determine applicable Tech Specs/SLCs.

STANDARD:

Tech Spec 3.4.13 Condition A
SLC 16.7-9 Conditions A & B

Applicant determines that T.S. LCO 3.4.13 is not met due to unidentified leakage > 1 gpm and that Condition A needs to be entered.

Due to total accumulated leakage being > 20 gpm, SLC 16.7-9 Condition B should also be entered. This action will direct immediate entry into Condition A.

Although total primary to secondary leakage is > 150 gpd, no single S/G exceeds the requirements of LCO 3.4.13. Therefore T.S. 3.4.13 Condition B and/or T.S. 3.4.18 Condition B should NOT be entered.

This step is critical to meet the task and standard of this JPM.

COMMENTS:

END OF TASK</td><td>CRITICAL STEP

___ SAT

___ UNSAT</td></tr>
</table>

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

<u>READ TO APPLICANT</u>

<u>DIRECTION TO APPLICANT:</u>

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.

<u>INITIAL CONDITIONS:</u>

- **Unit 1 is in Mode 1 at 100% power.**
- **The OAC is out of service due to emergent system failures and will not be returned to service for 24 hours.**
- **Other operators are performing PT/1/A/4600/009 (Loss of Operator Aid Computer) and OP/1/A/6700/003 (Operation With the Operator Aid Computer Out of Service).**

<u>INITIATING CUES:</u>

- **The CRS directs you to perform an NC System Leakage Calculation per PT/1/A/4150/001 D (NC System Leakage Calculation).**
- **Steps are complete through 12.12.**
- **You are to perform step 12.13.**
- **The Open Item Summary has been updated. The background leakage is .072 gpm (Orbisphere flow reported by Primary Chemistry).**
- **Using the attached Data Sheet and PT/1/A/4150/001 D, calculate and report the following information back to the CRS:**

Identified Leakage	**____________**	**gpm**
Unidentified Leakage	**____________**	**gpm**
Total Accumulated Leakage	**____________**	**gpm**

List all applicable Tech Specs and/or SLCs (if any), including Required Actions. Also state the reason (if any LCO is not met):

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DATA SHEET

The following valves are closed:

- **1NC-56B (RMW Pump Disch Cont Isol)**
- **1NV-181A (B/A Blender Otlt to VCT)**
- **1NV-186A (B/A Blender Otlt to VCT Outlet)**
- **1NV-236B (Boric Acid to NV Pumps Suct)**
- **1NV-252A (NV Pumps Suct From FWST)**
- **1NV-253B (NV Pumps Suct From FWST)**
- **1NI-9A (NV Pump C/L Inj Isol)**
- **1NI-10B (NV Pump C/L Inj Isol)**

Parameter	Instrument	2000 hours Data	2104 hours Data
NC Avg. Temp.	1NCCR5421	584.7 °F	584.5 °F
VCT Level	1NVP5761	66%	29%
PZR Level	1NCP5164	55%	55%
NCDT Level	1WLP5630	50%	50%
PRT Level	1NCP5131	69%	70%

1A NC Pump #1 Seal Leakoff Flow	2.46 GPM
1B NC Pump #1 Seal Leakoff Flow	2.77 GPM
1C NC Pump #1 Seal Leakoff Flow	2.60 GPM
1D NC Pump #1 Seal Leakoff Flow	2.88 GPM

1EMF-71 Leakage	1 GPD
1EMF-72 Leakage	84 GPD
1EMF-73 Leakage	77 GPD
1EMF-74 Leakage	1 GPD

Background leakage: .072 gpm (Orbisphere flow)

KEY

<table>
<tr><td rowspan="2">Duke Energy
Catawba Nuclear Station

NC System Leakage Calculation</td><td>Procedure No.
PT/1/A/4150/001 D</td></tr>
<tr><td>Revision No.
086</td></tr>
<tr><td>Continuous Use</td><td>Electronic Reference No.
CN005FZZ</td></tr>
</table>

KEY

☐ N. **WHEN** the current background leakage has been determined and documented **OR** the source of inleakage has been isolated, start a new PT/1/A/4150/001 D (NC System Leakage Calculation).

☐ O. N/A the remaining steps of this procedure.

_____ 12.12.7 Record the individual NC Pump seal leakoff flows:

- NC Pump 1A: ________ gpm
- NC Pump 1B: ________ gpm
- NC Pump 1C: ________ gpm
- NC Pump 1D :________ gpm

Total NC Pump seal leakoff: ________ gpm

_____ 12.12.8 Record total NC Pump seal leakoff on Enclosure 13.1 (Data Sheet).

_____ 12.12.9 Calculate Total Accumulative Leakage on Enclosure 13.1 (Data Sheet).

_____ 12.12.10 Document primary to secondary leakage on Enclosure 13.1 (Data Sheet).

_____ 12.12.11 Determine PZR steam leak rate to PRT on Enclosure 13.1 (Data Sheet).

_____ 12.12.12 **IF** a value was inserted for OAC Point C1P0203 (Average NCDT Level) in Step 12.12.1.1, restore that point to processing.

NOTE:	The calculation will stop after 180 minutes. It is **NOT** necessary to abort the calculation in the following step.

_____ 12.12.13 Exit the NC System Leakage Calculations program.

_____ 12.13 **IF** the OAC is partially or wholly unavailable **OR** Unit 1 is **NOT** at or near normal operating temperature and pressure (i.e. Tavg ≤ 550°F and W/R pressure ≤ 2200 psig), perform Enclosure 13.3 (Manual Leakage Calculation).

_____ 12.14 Return the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the position recorded in Step 12.9.1.

12.15 Realign the NCDT as follows:

_____ 12.15.1 Ensure 1WL-807B (NCDT Pumps Disch Cont Isol) is open.

_____ 12.15.2 Ensure 1WL-805A (NCDT Pump Disch Cont Isol) is open.

NOTE: If unable to reduce NCDT level in the following step, the in-service NB evaporator feed filter may need to be swapped / replaced due to high DP. (NCR 01515934)

_____ 12.15.3 **IF** NCDT level is greater than setpoint, perform the following:

_____ 12.15.3.1 Throttle open "NCDT LVL CTRL" to slowly reduce level.

_____ 12.15.3.2 **WHEN** NCDT level is at the desired value, close "NCDT LVL CTRL".

_____ 12.15.4 Place "NCDT LVL CTRL" in "AUTO".

_____ 12.15.5 Ensure "NCDT LVL CTRL" is set for 50%.

_____ 12.15.6 **IF** 1WL-807B (NCDT Pumps Disch Cont Isol) is being maintained closed per OP/1/A/6500/014 (Operations Controlled Liquid Waste Systems), close 1WL-807B (NCDT Pumps Disch Cont Isol).

NOTE:

- NM automation flow, as documented in Step 12.10, is classified as Non-RCPB (Reactor Coolant Pressure Boundary) leakage per WCAP-16423-NP (Reference 2.6). NM sample flow is manually routed and shall **NOT** count as Identified Leakage. The NM sample flow shall still be included in Total Leakage. (PIP M-12-5474).
- The Net Identified Leakage rate will be entered in the Control Room log Leakage Data stamp and the OAC Manual Value Update. It is **NOT** used for determining Total Accumulative Leakage for the purpose of verifying SSF capabilities in Enclosure 13.1 (Data Sheet) or 13.3.2 (Manual Calculation).

_____ 12.16 Calculate Net Identified Leakage rate:

2.288 gpm - 0.072 gpm = 2.216 gpm

Identified Leakage Best (Step 12.12.5.2) or Identified Leakage in Enclosure 13.3.2 (Manual Calculation) — NM automation flow (Step 12.10) — Net Identified Leakage

KEY

1. Procedure

✓ 1.1 Verify the following valves are closed:

- ☑ 1NC-56B (RMW Pump Disch Cont Isol)
- ☑ 1NV-181A (B/A Blender Otlt To VCT)
- ☑ 1NV-186A (B/A Blender Otlt To VCT Outlet)
- ☑ 1NV-236B (Boric Acid To NV Pumps Suct)
- ☑ 1NV-252A (NV Pumps Suct From FWST)
- ☑ 1NV-253B (NV Pumps Suct From FWST)
- ☑ 1NI-9A (NV Pump C/L Inj Isol)
- ☑ 1NI-10B (NV Pump C/L Inj Isol)

✓ 1.2 Record "Initial Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available).

NOTE:	Calculation accuracy improves as the time between initial and final data increases.

✓ 1.3 Wait at least 60 minutes prior to obtaining final data.

✓ 1.4 Record "Final Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available).

✓ 1.5 Using data from Enclosure 13.3.1 (Manual Leakage Data), calculate change in T-Avg:

584.7 - 584.5 = 0.2 °F

NC Average temp initial — NC Average temp final

NOTE:	• Procedure may continue while performing the following step. • If change in T-Avg is greater than 0.25°F (0.1°F if using OAC), calculation is invalid and must be repeated.

_____ 1.6 **IF** change in T-Avg is less than or equal to 0.25°F (0.1°F if using OAC), perform all calculations on Enclosure 13.3.2 (Manual Calculation).

_____ 1.7 Return to Step 12.13.

KEY

KEY

Enclosure 13.3.1

Manual Leakage Data

NOTE:
- If available, OAC points can be used.
- Where applicable, the same instrument channel (meter) shall be used for obtaining the initial and final data.
- When using OAC Point indication for NCDT and PRT level changes, minor instrument fluctuations that result in a indicated level decrease may be treated as zero level change.

Parameter	Units	Instrument / OAC Point Used	Initial Data (Step 1.2)	Final Data (Step 1.4)
NC Average Temperature	°F	1NCCR5421	584.7	584.5
VCT Level	%	1NVP5761	66	29
PZR Level	%	1NCP5164	55	55
NCDT Level	%	1NCP5630	50	50
PRT Level	%	1NCP5131	69	70

Record time Initial Data obtained 2000

Record time Final Data obtained 2104

Elapsed time 64 minutes

KEY

VCT

VCT Leakage Rate = $\dfrac{\text{[Initial Level (\%) - Final Level (\%)] x 19.1 gal/\%}}{\text{Elapsed time}}$

= $\dfrac{\text{[(66) - (29)] x 19.1 gal/\%}}{\text{(64) min}}$

= 11.042 gal/min

(Acceptable Range 11.0 - 11.1)

PZR

PZR Leakage Rate = $\dfrac{\text{[Initial Level (\%) - Final Level (\%)] x (124.7 Gal/\%) x (0.5983}^{a}\text{)}}{\text{Elapsed time}}$

= $\dfrac{\text{[(55) - (55)] x (124.7 Gal/\%) x (0.5983)}}{\text{(64) min}}$

= 0 gal/min

Total Leakage = (VCT Leakage Rate) + (Pzr Leakage Rate)

= (11.042) + (0)

= 11.042 gpm

(Acceptable Range 11.0 - 11.1)

[a] This is the density ratio to normalize leakage at PZR conditions to leakage at 100°F

KEY

NCDT

Initial NCDT Volume 50 % = 177.254 Gal (OAC point C1P5079 (U1 NCDT Volume) or Enclosure 13.3.3 (NCDT Level Conversion))

Final NCDT Volume 50 % = 177.254 Gal (OAC point C1P5079 (U1 NCDT Volume) or Enclosure 13.3.3 (NCDT Level Conversion))

NCDT Leakage Rate = Final Volume (Gal) - Initial Volume (Gal) / Elapsed time

= (177.254) - (177.254) / (64) min

= 0 gpm

PRT

Initial PRT Volume 69 % = 9496.66 Gal (OAC point C1P5078 (U1 PRT Volume) or Enclosure 13.3.4 (PRT Level Conversion))

Final PRT Volume 70 % = 9638.47 Gal (OAC point C1P5078 (U1 PRT Volume) or Enclosure 13.3.4 (PRT Level Conversion))

PRT Leakage Rate = Final Volume (Gal) - Initial Volume (Gal) / Elapsed time

= (9638.47) - (9496.66) / (64) min

= 2.216 gpm

(Acceptable Range 2.2 - 2.3)

Background Leakage = Any quantified/measured leakage

= 0.072 gpm

Identified Leakage = NCDT Leakage Rate + PRT Leakage Rate + Background Leakage

= 0 gpm + 2.216 gpm + 0.072 gpm

= 2.288 gpm (Acceptable Range 2.272 - 2.372)

Unidentified Leakage = Total Leakage - Identified Leakage

= 11.042 gpm - 2.288 gpm

= 8.754 gpm[b]

(Acceptable Range 8.628 -8.828)

[b] This value is an acceptance criteria of this procedure.

KEY

Total NC Pump Seal Leakoff

- 1A NC Pump #1 Seal Leakoff = 2.46 gpm
- 1B NC Pump #1 Seal Leakoff = 2.77 gpm
- 1C NC Pump #1 Seal Leakoff = 2.60 gpm
- 1D NC Pump #1 Seal Leakoff = 2.88 gpm

Total NC Pump Seal Leakoff: 10.71 gpm

Total Accumulative Leakage = Sum of Identified Leakage, Unidentified, and NC Pumps #1 Seal Leakoffs

Identified Leakage 2.288 gpm

Unidentified Leakage 8.754 gpm

Total NC Pump Seal Leakoff 10.71 gpm

_____ **IF** any Identified or Unidentified value is negative, enter "0" below in its applicable space.

Identified + Unidentified + Total NC Pump Seal Leakoff = Total Accumulative Leakage

2.288 + 8.754 + 10.71 = 21.752

(Acceptable Range 21.664 - 21.91)

Verify Total Accumulative Leakage:

☐ ≤ 20 gpm {PIP C-99-0606}

OR

☑ > 20 gpm, refer to Step 12.19.

Performed By ____________________ Date: ____________ Time: ________

Verified By ____________________ Date: ____________ Time: ________

<u>Primary to Secondary Leakage</u> as determined by one of the following:

N/A **<u>IF</u>** in Mode 1 **<u>AND</u>** 1EMF-33 is functional[c] **<u>AND</u>** the OAC is available, record the reading of OAC Point C1P0189 (Pri To Sec Leakrate 15 Min Running Avg). ____________ gpd

OR

✓ **<u>IF</u>** in Mode 1 **<u>AND</u>** the OAC is **<u>NOT</u>** available **<u>AND</u>** Unit 1 is ≥ 40% RTP, record the readings from the N-16 Leakage Monitors:

- 1EMF-71 ___1___ gpd
- 1EMF-72 ___84___ gpd
- 1EMF-73 ___77___ gpd
- 1EMF-74 ___1___ gpd

OR

N/A **<u>IF</u>** in Mode 1 **<u>AND</u>** 1EMF-33 is non-functional[c] **<u>AND</u>** Unit 1 is ≥ 40% RTP, record the readings from the N-16 Leakage Monitors:

- 1EMF-71 __________ gpd
- 1EMF-72 __________ gpd
- 1EMF-73 __________ gpd
- 1EMF-74 __________ gpd

OR

N/A **<u>IF</u>** in Mode 1 **<u>AND</u>** 1EMF-33 is non-functional[c] **<u>AND</u>** Unit 1 is < 40% RTP, record the primary to secondary leak rate as determined by Chemistry. _____________ gpd

OR

N/A **<u>IF</u>** in Mode 2, 3, 4 or Pre-Mode 4, record the primary to secondary leak rate value as determined by Chemistry. ___________ gpd

[c] For the purposes of this procedure, OAC Point C1P0189 (Pri To Sec Leakrate 15 Minute Running Avg) must be functional for 1EMF-33 to be considered functional.

Enclosure 13.3.3

NCDT Level Conversion

%	Gal	%	Gal	%	Gal	%	Gal	%	Gal
1	19.897	21	74.240	41	143.787	61	218.067	81	286.505
2	22.085	22	77.410	42	147.478	62	221.721	82	289.571
3	24.343	23	80.613	43	151.178	63	225.360	83	292.600
4	26.669	24	83.871	44	154.888	64	228.983	84	295.590
5	29.058	25	87.176	45	158.604	65	232.587	85	298.539
6	31.509	26	90.517	46	162.327	66	236.173	86	301.447
7	34.019	27	93.894	47	166.055	67	239.738	87	304.312
8	36.585	28	97.304	48	169.786	68	243.281	88	307.131
9	39.206	29	100.743	49	173.519	69	246.801	89	309.904
10	41.880	30	104.212	50	177.254	70	250.296	90	312.628
11	44.604	31	107.706	51	180.989	71	253.765	91	315.302
12	47.376	32	111.226	52	184.722	72	257.204	92	317.923
13	50.196	33	114.770	53	188.453	73	260.614	93	320.489
14	53.060	34	118.335	54	192.181	74	263.990	94	322.999
15	55.968	35	121.921	55	195.904	75	267.332	95	325.450
16	58.918	36	125.525	56	199.620	76	270.636	96	327.839
17	61.908	37	129.148	57	203.329	77	273.894	97	330.164
18	64.937	38	132.787	58	207.030	78	277.098	98	332.423
19	68.003	39	136.440	59	210.720	79	280.267	99	334.611
20	71.104	40	140.108	60	214.400	80	283.403	100	336.726

KEY

Enclosure 13.3.4

PRT Level Conversion

%	Gal	%	Gal	%	Gal	%	Gal	%	Gal
1	383.572	21	2476.15	41	5302.48	61	8328.88	81	11109.4
2	458.035	22	2605.43	42	5452.77	62	8477.55	82	11233.2
3	536.720	23	2736.38	43	5603.50	63	8625.56	83	11355.0
4	619.374	24	2868.93	44	5754.61	64	8772.86	84	11474.8
5	705.776	25	3003.00	45	5906.04	65	8919.40	85	11592.4
6	795.729	26	3138.52	46	6057.74	66	9065.10	86	11707.7
7	889.054	27	3275.43	47	6209.65	67	9209.92	87	11820.7
8	985.589	28	3413.66	48	6361.73	68	9353.79	88	11931.3
9	1085.19	29	3553.15	49	6513.91	69	9496.66	89	12039.3
10	1187.70	30	3693.82	50	6666.17	70	9638.47	90	12144.6
11	1293.02	31	3835.63	51	6818.38	71	9779.14	91	12247.1
12	1401.00	32	3978.50	52	6970.56	72	9918.63	92	12346.7
13	1511.55	33	4122.37	53	7122.64	73	10056.9	93	12443.2
14	1624.54	34	4267.19	54	7274.55	74	10193.8	94	12536.6
15	1739.89	35	4412.89	55	7426.25	75	10329.3	95	12626.5
16	1857.49	36	4559.43	56	7577.68	76	10463.4	96	12712.9
17	1977.25	37	4706.73	57	7728.79	77	10595.9	97	12795.6
18	2099.08	38	4854.74	58	7879.51	78	10726.9	98	12874.3
19	2222.89	39	5003.40	59	8029.81	79	10856.1	99	12948.7
20	2348.61	40	5152.67	60	8179.92	80	10983.7	100	13018.7

KEY

Duke Energy Catawba Nuclear Station **NC System Leakage Calculation** **Continuous Use**	Procedure No. PT/**1**/A/4150/001 D Revision No. 086 Electronic Reference No. CN005FZZ

REVISION SUMMARY
Reference AR(s): 02248976; 02229228; 02179037; 02178839 Added new step 12.3 to notify chemistry to determine the primary to secondary leak rate and report the value to the control room. In step 12.6.1 added OP NC LEAK1 and OP NC LEAK2 to the bulleted items to match the radio buttons on the NC LEAKAGE graphic if accessing the point list from the graphics. Added a note prior to step 12.15.3 stating that the NB feed filter may need to be swapped if unable to reduce NCDT level. Deleted old step 12.17 to attach the OAC printout to the PT. Per ENG there is no need to attach this data to the PT.

NC System Leakage Calculation

1. Purpose

To ensure that NC System leakage is calculated at least once per 72 hours. (TS SR 3.4.13.1 and SR 3.4.13.2)

2. References

2.1 Technical Specifications:

- TS SR 3.4.13.1
- TS SR 3.4.13.2
- TS LCO 3.4.15, REQUIRED ACTION A.1, B.1, C.1.1 and E.1
- SLC 16.7-9, Remedial Action Condition B

2.2 Catawba Nuclear Station Operator Aid Computer Documentation

2.3 UFSAR Table 18-1, Reactor Coolant Operational Leakage Monitoring Program

2.4 Catawba Nuclear Station License Renewal Basis Specification CNS-1274.00-00-0016, Section 4.27

2.5 WCAP-16465-NP (Pressurized Water Reactors Owners Group Standard RCS Leakage Action Levels and Response Guidelines for Pressurized Water Reactors)

2.6 WCAP-16423-NP (Pressurized Water Reactors Owners Group Standard Process and Methods for Calculating RCS Leak Rate for Pressurized Water Reactors)

3. Time Required

3.1 Manpower - Two Operators

3.2 Time - 3 hours

3.3 Frequency -

- Once per 72 hours in Modes 1, 2, 3 and 4 per SR 3.4.13.1 during steady state operation.
- Once per 24 hours if required by TS LCO 3.4.15, REQUIRED ACTION A.1, B.1, C.1.1 or E.1.

4. Prerequisite Test

None

5. Test Equipment

None

6. Limits and Precautions

6.1 If more than twelve hours of grace time have elapsed and this PT has **NOT** been completed, then contact the OWPM Group.

6.2 Changing Lower Containment Ventilation Unit alignments can affect indicated NCDT and PRT levels by changing reference leg temperatures on the associated transmitters.

7. Required Unit Status

AA Verify the following parameters are being maintained steady:

- ☑ NC System temperature
- ☑ NC System pressure

8. Prerequisite System Conditions

AA Verify the NCDT capacity is adequate to receive leakage for duration of run.

9. Test Method

9.1 At least once per 72 hours with the OAC available, the OAC NC System Leakage Calculation will be initiated. The calculation will automatically run for 3 hours. During the first 15 minutes of the calculation, no correlation coefficient will be displayed. Calculation results may be used for the leakage calculation when elapsed time of the calculation reaches 60 minutes and the correlation coefficient for total leakage is greater than or equal to 0.75 OR when elapsed time of the calculation reaches 120 minutes and Total Leakage Best is less than or equal to 0.2 gpm. If plant stability **CANNOT** be maintained and elapsed time reaches 30 minutes and the correlation coefficient for total leakage is greater than or equal to 0.5, then the program data may be used.

9.2 At least once per 72 hours with the OAC partially or wholly unavailable, NC System leakage will be calculated manually. Using Control Room indications (or OAC if partially available), initial and final data will be recorded, separated by at least a 60 minute interval. Recorded data will be used in leakage calculations. Tank volume / gallon conversions and water densities are used in equations to determine NC System leakage.

9.3 Primary to secondary leakage will be verified to be less than or equal to 150 gpd through any steam generator by either EMF indications or Chemistry grab samples.

9.4 NC Pump seal leak-off will be recorded and "TOTAL ACCUMULATIVE LEAKAGE" will be calculated.

9.5 The NCS Unidentified Leakage result will be evaluated to verify an acceptably low leakage rate.

10. Data Required

10.1 If the OAC is available, complete Enclosures 13.1 (Data Sheet) and 13.2 (Evaluation of NCS Unidentified Leakage Results).

10.2 If the OAC is partially or wholly unavailable, complete Enclosure 13.3 (Manual Leakage Calculation).

11. Acceptance Criteria

NOTE:
- Negative values of Unidentified Leakage more negative than -0.10 gpm invalidates the current OAC leakage calculation.
- If a negative leakage value of less than (more negative than) -0.10 gpm is due to plant stability issues then a manual leakage calculation per Enclosure 13.3 (Manual Leakage Calculation) may be necessary.
- Negative values of Unidentified Leakage between 0.000 gpm and -0.020 gpm are considered zero leakage.

11.1 NC System leakage is calculated and the values are: (SR 3.4.13.1)

- Unidentified Leakage less than or equal to 1 gpm
- Identified Leakage (net) less than or equal to 10 gpm (Step 12.16)

11.2 Primary to secondary leakage is determined to be less than or equal to 150 gpd through any steam generator. (SR 3.4.13.2)

11.3 If in Mode 1, 2, 3 or Pre-Mode 3, Total Accumulative Leakage is determined to be less than or equal to 20 gpm. {PIP C-99-0606}

12. Procedure

AA___ 12.1 Ensure that the Identified Leakage associated with any system condition changes (NV Pump swap, seal injection filter swap, etc.) has been updated in the open item summary.

N/A AA 12.2 **IF** Unidentified Leakage is more negative than -0.020 gpm on the previous 3 NC System leakage calculations, then re-measure background leakage.

N/A AA 12.3 **IF** in Mode 2, 3, 4, or Pre-Mode 4, notify Chemistry to determine the primary to secondary leak rate **AND** report value to the control room.

Person Notified ________________________

NOTE:	All leakage calculation results, valid and invalid, shall be entered into the Control Room log.

N/A AA 12.4 **IF** more than one leakage calculation performed per shift, enter a brief explanation into the Control Room log indicating the reason for repeating the calculation.

AA 12.5 Ensure > 60 minutes has elapsed since any makeup to NCP standpipes.

NOTE:	OAC points C1P1023, C1P1024, C1P1025, and C1P1026 will indicate NCAL until the leakage program is started.

N/A AA 12.6 **IF** the OAC is available for performing the leakage calculation, perform the following:

_____ 12.6.1 Examine values and quality codes of OAC points in the following Group Displays:

- OPNCLEK1 (OP NC LEAK1 if accessing from NC LEAKAGE graphic)
- OPNCLEK2 (OP NC LEAK2 if accessing from NC LEAKAGE graphic)

_____ 12.6.2 **IF** any obvious erroneous or invalid value or quality code for OAC points in group displays OPNCLEK1 or OPNCLEK2 are found that have **NOT** been previously addressed, they shall be investigated and resolved prior to the start of the calculation.

N/A AA 12.7 **IF** desired to lower NCDT level due to known high inputs, perform the following:

_____ 12.7.1 **IF** 1WL-807B (NCDT Pumps Disch Cont Isol) is being maintained closed per OP/1/A/6500/014 (Operations Controlled Liquid Waste Systems), perform the following:

_____ 12.7.1.1 Place "NCDT LVL CTRL" in "MANUAL".

_____ 12.7.1.2 Close "NCDT LVL CTRL".

_____ 12.7.1.3 Open 1WL-807B (NCDT Pumps Disch Cont Isol).

_____ 12.7.2 Ensure "NCDT LVL CTRL" is in "MANUAL".

_____ 12.7.3 Throttle open "NCDT LVL CTRL".

12.7.4 **WHEN** NCDT level is ≈ 30%, perform the following:

_____ 12.7.4.1 Close "NCDT LVL CTRL".

_____ 12.7.4.2 **IF** Step 12.7.1 was performed, close 1WL-807B (NCDT Pumps Disch Cont Isol).

_____ 12.7.4.3 Return "NCDT LVL CTRL" to "AUTO".

12.8 Align the NCDT as follows:

NOTE:	1WL-802 is the NCDT level control valve.

AA 12.8.1 Ensure 1WL-802 (NCDT Level Control) is closed as follows:

AA 12.8.1.1 Place "NCDT LVL CTRL" in "MANUAL".

AA 12.8.1.2 Close "NCDT LVL CTRL".

N/A AA 12.8.2 **IF** necessary due to known or suspected leakage past 1WL-802 (NCDT Level Control), close 1WL-807B (NCDT Pumps Disch Cont Isol).

N/A AA 12.8.3 **IF** necessary due to known or suspected leakage past 1WL-807B (NCDT Pumps Disch Cont Isol), close 1WL-805A (NCDT Pump Disch Cont Isol).

12.9 Align 1NV-172A (3-Way Divert To VCT-RHT) as follows:

AA 12.9.1 Record the position of the control switch for 1NV-172A (3-Way Divert To VCT-RHT). AUTO / VCT

AA 12.9.2 Place 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.

AA __ 12.10 Contact Primary Chemistry to perform the following:

- Inform them that an NC System leakage calculation is being initiated.
- Ensure that sampling is **NOT** performed while the calculation is in progress.
- Verify current NM automation flowrate for entry into background leakage. Record value used for NM automation flowrate 0.072 gpm

Chemistry contact Mcleod

AA __ 12.11 Ensure > 30 minutes has elapsed since the performance of any activity involving NC System parameters, including charging, letdown (including demineralizers), pressurizer, and/or VCT evolutions. {PIP 07-7077}

N/A AA 12.12 **IF** the OAC is available **AND** Unit 1 is at or near normal operating temperature and pressure (i.e. Tavg > 550°F and W/R pressure > 2200 psig), perform the following:

NOTE:	Maximum run-time for NC System Leakage Calculation is three hours.

12.12.1 Complete the following steps to initiate a NC System Leakage Calculation:

NOTE:	The following step provides an inserted value for NCDT level indication. Use of an inserted value will result in input into the tank to be measured as NCS unidentified leakage.

_____ 12.12.1.1 **IF** the NCDT level indication is **NOT** providing stable input rate, insert the current value of C1A0494 (NCDT Level) into OAC Point C1P0203 (Average NCDT Level).

☐ 12.12.1.2 Activate NC System Leakage Calculations program (RCSLEAK).

_____ 12.12.1.3 **IF** a calculation is currently in progress, then perform one of the following:

_____ A. **IF** it is **NOT** desired to initiate a new calculation, then exit the NC System Leakage Calculations program.

OR

_____ B. **IF** it is desired to initiate a new calculation, abort the current calculation per Step 12.12.3.

NOTE:	It is recommended that initiation of the leakage calculation be synchronized with fluctuations of indicated VCT level. Initiating the program in Step 12.12.1.4 approximately half way between the maximum and minimum values observed during the fluctuation will improve the accuracy of the data.

☐ 12.12.1.4 Select "INITIATE".

☐ 12.12.1.5 Enter background leakage obtained from the following:

- Open Item Summary Logbook.
- NM Automation from Primary Chemistry (if **NOT** already in Open Item Summary Logbook).

☐ 12.12.1.6 Enter desired start time.

☐ 12.12.1.7 Select "SAVE".

☐ 12.12.1.8 Enter user name.

☐ 12.12.1.9 Enter reason for calculation.

☐ 12.12.1.10 Select "OK" to continue.

☐ 12.12.1.11 Select "OK" to acknowledge "New NC Leakage Calculation Scheduled" message.

_____ 12.12.2 **IF AT ANY TIME** during the calculation it is desired to obtain a printout of NC System Leakage Calculation Summary, perform the following:

NOTE:	If the calculation is still running, it is recommended to wait at least ten seconds after a data update before printing. The program updates every minute.

☐ 12.12.2.1 Ensure NC System Leakage Calculations program (RCSLEAK) is activated.

☐ 12.12.2.2 Select "PRINT".

_____ 12.12.3 **IF AT ANY TIME** during the calculation it becomes necessary to abort a NC System Leakage Calculation due to calculation or plant issues, perform the following:

NOTE:	Upon abort, the application will terminate calculating. Results up to the time of termination are available.

☐ 12.12.3.1 Ensure NC System Leakage Calculations program (RCSLEAK) is activated.

☐ 12.12.3.2 Verify "NC System Leakage Calculation" summary displayed.

☐ 12.12.3.3 Select "ABORT".

☐ 12.12.3.4 Verify message "On Demand NC System Leakage Calculations Will Be Aborted" displayed.

☐ 12.12.3.5 Select "OK" to acknowledge "On Demand NC System Leakage Calculations Will Be Aborted" message and to abort the NC System Leakage Calculation in progress.

☐ 12.12.3.6 Verify the "NC System Leakage Calculations" summary is displayed with the results of the aborted calculation up to time of termination.

_____ 12.12.3.7 **IF** desired to restart the calculation, return to Step 12.12.1.

NOTE:
- Disregard the correlation coefficient "-" (negative) symbol when determining the correlation coefficient. The "-" symbol signifies out leakage from the NC System. The absence of the "-" symbol signifies in leakage into the NC system from an external source.
- In the following step, use of either of the first two conditions is preferred. The third condition is intended to only be used for transient conditions.
- To provide highest quality results, a "CALC ELAPSED TIME" of greater than or equal to 120 minutes is recommended and is to be used in the following step whenever plant conditions allow.

_____ 12.12.4 **WHEN** any of the following sets of conditions are met, then obtain a printout of the "NC System Leakage Calculation" summary as follows:

☐ "CALC ELAPSED TIME" ≥ 60 minutes, and
☐ The absolute value for the "TOTAL LEAKAGE CORRELATION COEFF." ≥ 0.75.

OR

☐ "CALC ELAPSED TIME" ≥ 120 minutes, and
☐ "TOTAL LEAKAGE BEST" < 0.2 gpm.

OR

☐ Plant stability **CANNOT** be maintained, and
☐ "CALC ELAPSED TIME" ≥ 30 minutes, and
☐ The absolute value for the "TOTAL LEAKAGE CORRELATION COEFF." ≥ 0.5.

NOTE: If the calculation is still running, it is recommended to wait at least ten seconds after a data update before printing. The program updates every minute.

☐ 12.12.4.1 Ensure NC System Leakage Calculations program (RCSLEAK) is activated.

☐ 12.12.4.2 Select "PRINT".

_____ 12.12.5 Record the following values on Enclosure 13.1 (Data Sheet):

- ☐ 12.12.5.1 "TOTAL LEAKAGE BEST" value as Total Leakage.
- ☐ 12.12.5.2 "IDENTIFIED LEAKAGE BEST" value as Identified Leakage.
- ☐ 12.12.5.3 "UNIDENTIFIED LEAKAGE BEST" value as Unidentified Leakage.

_____ 12.12.6 **IF** the value for "UNIDENTIFIED LEAKAGE BEST" is negative, perform the following:

NOTE:	Negative values of Unidentified Leakage between 0.000 gpm and -0.020 gpm is considered zero leakage. For trending purposes, the actual leakage results shall always be recorded.

_____ 12.12.6.1 **IF** the value for "UNIDENTIFIED LEAKAGE BEST" is between -0.02 and -0.10 gpm, use the displayed value of "UNIDENTIFIED LEAKAGE BEST" while completing this procedure.

NOTE:	Unidentified leakage values more negative than -0.10 gpm are indicative of either inleakage or a significant reduction of background leakage. Either situation invalidates the current leakage calculation.

_____ 12.12.6.2 **IF** the value for "UNIDENTIFIED LEAKAGE BEST" is more negative than -0.10 gpm, perform the following:

NOTE:	The NC System Leakage Calculation will time out after three hours.

_____ A. **IF** necessary, abort the current calculation per Step 12.12.3.

_____ B. **IF** necessary, return the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the position recorded in Step 12.9.1.

_____ C. **IF** necessary, realign the NCDT per Step 12.15.

_____ D. **IF** a value was inserted for OAC Point C1P0203 (Average NCDT Level) in Step 12.12.1.1, restore that point to processing.

_____ E. **IF** the negative value for "UNIDENTIFIED LEAKAGE BEST" is suspected to be due to plant stability issues, perform the following:

☐ 1. Perform manual leakage calculation per Enclosure 13.3 (Manual Leakage Calculation).

☐ 2. N/A Steps 12.12.6.2F through 12.13.

☐ F. Inform Primary Chemistry that the NC System leakage calculation has been suspended.
Chemistry contact ______________________________

☐ G. Record the individual NC Pump seal leakoff flows:

- NC Pump 1A: ________ gpm
- NC Pump 1B: ________ gpm
- NC Pump 1C: ________ gpm
- NC Pump 1D :________ gpm

Total NC Pump seal leakoff: ________ gpm

☐ H. Record total NC Pump seal leakoff on Enclosure 13.1 (Data Sheet).

☐ I. Calculate Total Accumulative Leakage on Enclosure 13.1 (Data Sheet).

☐ J. Document primary to secondary leakage on Enclosure 13.1 (Data Sheet).

☐ K. Enter the NCS Leakage Calculation Data into the Control Room log using Unit 1 NCS Leakage Data stamp. Include comment that this is an invalid calculation due to high negative leakage result.

☐ L. Re-measure background leakage.

NOTE: Examples of inleakage could include flush water leakage into low pressure portions of the NV System, KC leakage into the Seal Return Hx and/or NW leakage.

_____ M. **IF** the background leakage has **NOT** changed significantly, identify and isolate the source of inleakage.

☐ N. **WHEN** the current background leakage has been determined and documented **OR** the source of inleakage has been isolated, start a new PT/1/A/4150/001 D (NC System Leakage Calculation).

☐ O. N/A the remaining steps of this procedure.

_____ 12.12.7 Record the individual NC Pump seal leakoff flows:

- NC Pump 1A: ________ gpm
- NC Pump 1B: ________ gpm
- NC Pump 1C: ________ gpm
- NC Pump 1D :________ gpm

Total NC Pump seal leakoff: ________ gpm

_____ 12.12.8 Record total NC Pump seal leakoff on Enclosure 13.1 (Data Sheet).

_____ 12.12.9 Calculate Total Accumulative Leakage on Enclosure 13.1 (Data Sheet).

_____ 12.12.10 Document primary to secondary leakage on Enclosure 13.1 (Data Sheet).

_____ 12.12.11 Determine PZR steam leak rate to PRT on Enclosure 13.1 (Data Sheet).

_____ 12.12.12 **IF** a value was inserted for OAC Point C1P0203 (Average NCDT Level) in Step 12.12.1.1, restore that point to processing.

NOTE: The calculation will stop after 180 minutes. It is **NOT** necessary to abort the calculation in the following step.

_____ 12.12.13 Exit the NC System Leakage Calculations program.

_____ 12.13 **IF** the OAC is partially or wholly unavailable **OR** Unit 1 is **NOT** at or near normal operating temperature and pressure (i.e. Tavg ≤ 550°F and W/R pressure ≤ 2200 psig), perform Enclosure 13.3 (Manual Leakage Calculation).

_____ 12.14 Return the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the position recorded in Step 12.9.1.

12.15 Realign the NCDT as follows:

_____ 12.15.1 Ensure 1WL-807B (NCDT Pumps Disch Cont Isol) is open.

_____ 12.15.2 Ensure 1WL-805A (NCDT Pump Disch Cont Isol) is open.

NOTE:	If unable to reduce NCDT level in the following step, the in-service NB evaporator feed filter may need to be swapped / replaced due to high DP. (NCR 01515934)

_____ 12.15.3 **IF** NCDT level is greater than setpoint, perform the following:

_____ 12.15.3.1 Throttle open "NCDT LVL CTRL" to slowly reduce level.

_____ 12.15.3.2 **WHEN** NCDT level is at the desired value, close "NCDT LVL CTRL".

_____ 12.15.4 Place "NCDT LVL CTRL" in "AUTO".

_____ 12.15.5 Ensure "NCDT LVL CTRL" is set for 50%.

_____ 12.15.6 **IF** 1WL-807B (NCDT Pumps Disch Cont Isol) is being maintained closed per OP/1/A/6500/014 (Operations Controlled Liquid Waste Systems), close 1WL-807B (NCDT Pumps Disch Cont Isol).

NOTE:

- NM automation flow, as documented in Step 12.10, is classified as Non-RCPB (Reactor Coolant Pressure Boundary) leakage per WCAP-16423-NP (Reference 2.6). NM sample flow is manually routed and shall **NOT** count as Identified Leakage. The NM sample flow shall still be included in Total Leakage. (PIP M-12-5474).
- The Net Identified Leakage rate will be entered in the Control Room log Leakage Data stamp and the OAC Manual Value Update. It is **NOT** used for determining Total Accumulative Leakage for the purpose of verifying SSF capabilities in Enclosure 13.1 (Data Sheet) or 13.3.2 (Manual Calculation).

_____ 12.16 Calculate Net Identified Leakage rate:

______________________ gpm -	__________________ gpm =	___________ gpm
Identified Leakage Best (Step 12.12.5.2) or Identified Leakage in Enclosure 13.3.2 (Manual Calculation)	NM automation flow (Step 12.10)	Net Identified Leakage

12.17 Enter the NCS Leakage Calculation Data into the following:

12.17.1 The Control Room log using Unit 1 NCS Leakage Data stamp as follows:

_____ 12.17.1.1 Enter "Net Identified Leakage" calculated in Step 12.16 as the Identified Leakage Rate.

_____ 12.17.1.2 Record the remaining data required in the stamp as presented on printout or as calculated by Enclosure 13.3 (Manual Leakage Calculation).

_____ 12.17.2 **IF** the "Plant stability **CANNOT** be maintained" option was used in Step 12.12.4, ensure this is noted in the Control Room log entry.

_____ 12.17.3 **IF** a manual calculation was performed per Enclosure 13.3 (Manual Leakage Calculation), ensure this is noted in the Control Room log entry.

_____ 12.17.4 OAC Manual Value Update NCLEAK (NC System Leakage Calc) program as follows:

_____ 12.17.4.1 Enter "Net Identified Leakage" calculated in Step 12.16 as the Identified Leakage Rate.

_____ 12.17.4.2 Record the remaining data required as presented on printout or as calculated by Enclosure 13.3 (Manual Leakage Calculation).

12.18 Evaluate the acceptance criteria by performing one of the following:

_____ 12.18.1 Verify the acceptance criteria specified in Section 11 is met.

OR

_____ 12.18.2 **IF** the acceptance criteria is **NOT** met, perform the following:

☐ Notify the Unit/WCC SRO that the acceptance criteria is **NOT** met.

____________________________	___________ / ___________
Unit/WCC SRO Contacted	Date / Time

☐ Initiate a CR to document the test failure.

☐ Document all issues on an Equipment Problem Evaluation Form.

_____ SRO 12.19 **IF** in Mode 1, 2, 3 or Pre-Mode 3 **AND** Total Accumulative Leakage > 20 gpm, then declare the Standby Makeup Pump non-functional per SLC16.7-9.

_____ 12.20 Inform Primary Chemistry that the NC System leakage calculation is complete.
Chemistry contact ______________________________

_____ 12.21 **IF** the leakage calculation was performed by the OAC **AND** Unit 1 is in Modes 1 through 4, evaluate Unidentified Leakage results per Enclosure 13.2 (Evaluation of NCS Unidentified Leakage Results).

_____ 12.22 **IF** any discrepancy is noted during the performance of this test that does **NOT** keep the test from meeting the acceptance criteria, it shall be given to the Unit/WCC SRO for evaluation via an Equipment Problem Evaluation Form.

13. Enclosures

13.1 Data Sheet

13.2 Evaluation of NCS Unidentified Leakage Results

13.2.1 Auxiliary Building Potential Leak Sources

13.3 Manual Leakage Calculation

13.3.1 Manual Leakage Data

13.3.2 Manual Calculation

13.3.3 NCDT Level Conversion

13.3.4 PRT Level Conversion

1. Procedure

_____ 1.1 Verify the following valves are closed:

- ☐ 1NC-56B (RMW Pump Disch Cont Isol)
- ☐ 1NV-181A (B/A Blender Otlt To VCT)
- ☐ 1NV-186A (B/A Blender Otlt To VCT Outlet)
- ☐ 1NV-236B (Boric Acid To NV Pumps Suct)
- ☐ 1NV-252A (NV Pumps Suct From FWST)
- ☐ 1NV-253B (NV Pumps Suct From FWST)
- ☐ 1NI-9A (NV Pump C/L Inj Isol)
- ☐ 1NI-10B (NV Pump C/L Inj Isol)

_____ 1.2 Record "Initial Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available).

NOTE: Calculation accuracy improves as the time between initial and final data increases.

_____ 1.3 Wait at least 60 minutes prior to obtaining final data.

_____ 1.4 Record "Final Data" on Enclosure 13.3.1 (Manual Leakage Data) using Control Room indications or OAC (if available).

_____ 1.5 Using data from Enclosure 13.3.1 (Manual Leakage Data), calculate change in T-Avg:

________________ - _________________ = __________°F
NC Average temp initial   NC Average temp final

NOTE:
- Procedure may continue while performing the following step.
- If change in T-Avg is greater than 0.25°F (0.1°F if using OAC), calculation is invalid and must be repeated.

_____ 1.6 **IF** change in T-Avg is less than or equal to 0.25°F (0.1°F if using OAC), perform all calculations on Enclosure 13.3.2 (Manual Calculation).

_____ 1.7 Return to Step 12.14.

Enclosure 13.3.1

Manual Leakage Data

NOTE:
- If available, OAC points can be used.
- Where applicable, the same instrument channel (meter) shall be used for obtaining the initial and final data.
- When using OAC Point indication for NCDT and PRT level changes, minor instrument fluctuations that result in a indicated level decrease may be treated as zero level change.

Parameter	Units	Instrument / OAC Point Used	Initial Data (Step 1.2)	Final Data (Step 1.4)
NC Average Temperature	°F			
VCT Level	%			
PZR Level	%			
NCDT Level	%			
PRT Level	%			

Record time Initial Data obtained _____________

Record time Final Data obtained _____________

Elapsed time _________ minutes

VCT

VCT Leakage Rate = $\dfrac{\text{[Initial Level (\%) - Final Level (\%)] x 19.1 gal/\%}}{\text{Elapsed time}}$

= $\dfrac{[(\quad\quad\quad) - (\quad\quad\quad)] \text{ x 19.1 gal/\%}}{(\quad\quad\quad) \text{ min}}$

= ________________ gal/min

PZR

PZR Leakage Rate = $\dfrac{\text{[Initial Level (\%) - Final Level (\%)] x (124.7 Gal/\%) x (0.5983}^{a}\text{)}}{\text{Elapsed time}}$

= $\dfrac{[(\quad\quad\quad) - (\quad\quad\quad)] \text{ x (124.7 Gal/\%) x (0.5983)}}{(\quad\quad\quad) \text{ min}}$

= ________________ gal/min

Total Leakage = (VCT Leakage Rate) + (Pzr Leakage Rate)

= (   ) + (   )

= ________________ gpm

[a] This is the density ratio to normalize leakage at PZR conditions to leakage at 100°F

NCDT

Initial NCDT Volume _______ % = _________ Gal (OAC point C1P5079 (U1 NCDT Volume) or Enclosure 13.3.3 (NCDT Level Conversion))

Final NCDT Volume _______ % = _________ Gal (OAC point C1P5079 (U1 NCDT Volume) or Enclosure 13.3.3 (NCDT Level Conversion))

NCDT Leakage Rate = Final Volume (Gal) - Initial Volume (Gal) / Elapsed time

= (______________) - (______________) / ( ) min

= _________ gpm

PRT

Initial PRT Volume _____ % = _________ Gal (OAC point C1P5078 (U1 PRT Volume) or Enclosure 13.3.4 (PRT Level Conversion))

Final PRT Volume _____ % = _________ Gal (OAC point C1P5078 (U1 PRT Volume) or Enclosure 13.3.4 (PRT Level Conversion))

PRT Leakage Rate = Final Volume (Gal) - Initial Volume (Gal) / Elapsed time

= (______________) - (______________) / ( ) min

= _________ gpm

Background Leakage = Any quantified/measured leakage

= _________ gpm

Identified Leakage = NCDT Leakage Rate + PRT Leakage Rate + Background Leakage

= _________ gpm + _________ gpm + _________ gpm

= _________ gpm

Unidentified Leakage = Total Leakage - Identified Leakage

= _________ gpm - _________ gpm

= _________ gpm[b]

---

[b] This value is an acceptance criteria of this procedure.

Total NC Pump Seal Leakoff

- 1A NC Pump #1 Seal Leakoff = __________ gpm
- 1B NC Pump #1 Seal Leakoff = __________ gpm
- 1C NC Pump #1 Seal Leakoff = __________ gpm
- 1D NC Pump #1 Seal Leakoff = __________ gpm

Total NC Pump Seal Leakoff: __________ gpm

Total Accumulative Leakage = Sum of Identified Leakage, Unidentified, and NC Pumps #1 Seal Leakoffs

Identified Leakage ___________ gpm

Unidentified Leakage ___________ gpm

Total NC Pump Seal Leakoff ___________ gpm

_____ **IF** any Identified or Unidentified value is negative, enter "0" below in its applicable space.

Identified + Unidentified + Total NC Pump Seal Leakoff = Total Accumulative Leakage

____________ + ____________ + ____________ = _____________

Verify Total Accumulative Leakage:

☐ ≤ 20 gpm {PIP C-99-0606}

OR

☐ > 20 gpm, refer to Step 12.19.

Performed By ___________________________ Date: _____________Time:________

Verified By ___________________________ Date: _____________Time:________

Primary to Secondary Leakage as determined by one of the following:

_____ **IF** in Mode 1 **AND** 1EMF-33 is functional[c] **AND** the OAC is available, record the reading of OAC Point C1P0189 (Pri To Sec Leakrate 15 Min Running Avg). ____________ gpd

OR

_____ **IF** in Mode 1 **AND** the OAC is **NOT** available **AND** Unit 1 is ≥ 40% RTP, record the readings from the N-16 Leakage Monitors:

- 1EMF-71 __________ gpd
- 1EMF-72 __________ gpd
- 1EMF-73 __________ gpd
- 1EMF-74 __________ gpd

OR

_____ **IF** in Mode 1 **AND** 1EMF-33 is non-functional[c] **AND** Unit 1 is ≥ 40% RTP, record the readings from the N-16 Leakage Monitors:

- 1EMF-71 __________ gpd
- 1EMF-72 __________ gpd
- 1EMF-73 __________ gpd
- 1EMF-74 __________ gpd

OR

_____ **IF** in Mode 1 **AND** 1EMF-33 is non-functional[c] **AND** Unit 1 is < 40% RTP, record the primary to secondary leak rate as determined by Chemistry. _____________ gpd

OR

_____ **IF** in Mode 2, 3, 4 or Pre-Mode 4, record the primary to secondary leak rate value as determined by Chemistry. ___________ gpd

---

[c] For the purposes of this procedure, OAC Point C1P0189 (Pri To Sec Leakrate 15 Minute Running Avg) must be functional for 1EMF-33 to be considered functional.

Enclosure 13.3.3

NCDT Level Conversion

%	Gal	%	Gal	%	Gal	%	Gal	%	Gal
1	19.897	21	74.240	41	143.787	61	218.067	81	286.505
2	22.085	22	77.410	42	147.478	62	221.721	82	289.571
3	24.343	23	80.613	43	151.178	63	225.360	83	292.600
4	26.669	24	83.871	44	154.888	64	228.983	84	295.590
5	29.058	25	87.176	45	158.604	65	232.587	85	298.539
6	31.509	26	90.517	46	162.327	66	236.173	86	301.447
7	34.019	27	93.894	47	166.055	67	239.738	87	304.312
8	36.585	28	97.304	48	169.786	68	243.281	88	307.131
9	39.206	29	100.743	49	173.519	69	246.801	89	309.904
10	41.880	30	104.212	50	177.254	70	250.296	90	312.628
11	44.604	31	107.706	51	180.989	71	253.765	91	315.302
12	47.376	32	111.226	52	184.722	72	257.204	92	317.923
13	50.196	33	114.770	53	188.453	73	260.614	93	320.489
14	53.060	34	118.335	54	192.181	74	263.990	94	322.999
15	55.968	35	121.921	55	195.904	75	267.332	95	325.450
16	58.918	36	125.525	56	199.620	76	270.636	96	327.839
17	61.908	37	129.148	57	203.329	77	273.894	97	330.164
18	64.937	38	132.787	58	207.030	78	277.098	98	332.423
19	68.003	39	136.440	59	210.720	79	280.267	99	334.611
20	71.104	40	140.108	60	214.400	80	283.403	100	336.726

Enclosure 13.3.4

PRT Level Conversion

%	Gal	%	Gal	%	Gal	%	Gal	%	Gal
1	383.572	21	2476.15	41	5302.48	61	8328.88	81	11109.4
2	458.035	22	2605.43	42	5452.77	62	8477.55	82	11233.2
3	536.720	23	2736.38	43	5603.50	63	8625.56	83	11355.0
4	619.374	24	2868.93	44	5754.61	64	8772.86	84	11474.8
5	705.776	25	3003.00	45	5906.04	65	8919.40	85	11592.4
6	795.729	26	3138.52	46	6057.74	66	9065.10	86	11707.7
7	889.054	27	3275.43	47	6209.65	67	9209.92	87	11820.7
8	985.589	28	3413.66	48	6361.73	68	9353.79	88	11931.3
9	1085.19	29	3553.15	49	6513.91	69	9496.66	89	12039.3
10	1187.70	30	3693.82	50	6666.17	70	9638.47	90	12144.6
11	1293.02	31	3835.63	51	6818.38	71	9779.14	91	12247.1
12	1401.00	32	3978.50	52	6970.56	72	9918.63	92	12346.7
13	1511.55	33	4122.37	53	7122.64	73	10056.9	93	12443.2
14	1624.54	34	4267.19	54	7274.55	74	10193.8	94	12536.6
15	1739.89	35	4412.89	55	7426.25	75	10329.3	95	12626.5
16	1857.49	36	4559.43	56	7577.68	76	10463.4	96	12712.9
17	1977.25	37	4706.73	57	7728.79	77	10595.9	97	12795.6
18	2099.08	38	4854.74	58	7879.51	78	10726.9	98	12874.3
19	2222.89	39	5003.40	59	8029.81	79	10856.1	99	12948.7
20	2348.61	40	5152.67	60	8179.92	80	10983.7	100	13018.7

JPM A.1-2R

RO

Catawba Nuclear Station
Admin. JPM A.1-2R
September 2019 NRC Exam

EVALUATION SHEET

Task: Perform Manual Shutdown Margin Calculation

Alternate Path: N/A

Facility JPM #: RB-127 - Modified

Safety Function: N/A

K/A 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.

Importance: 3.9 / 4.2 **CFR:** 41.10 / 43.5 / 45.12

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ________

References: OP/0/A/6100/006 (Reactivity Balance Calculation)
ROD Book Rev 836

Task Standard: Using OP/0/A/6100/006 Enclosure 4.3, calculates shutdown margin to be 1343 pcm and determines that adequate shutdown margin does exist for current plant conditions. This JPM must be complete within the 1 hour completion time required by T.S. 3.1.4.

Validation Time: 15 minutes **Time Critical:** Yes __X__ No ______

Applicant:
NAME______________________________ Docket #_______________ Time Start: ___________
Time Finish: ___________

Time Critical (<1 hour)
Time Start: ___________
Time Finish: ___________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

===

COMMENTS

____

____

____

____

____

____

Catawba Nuclear Station
Admin. JPM A.1-2R
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **The Reactor Eng Analysis and Calc Toolkit (REACT) – CNS is inoperable.**
- **During performance of PT/0/A/4150/030 (RCCA Bank Repositioning), it was determined that Control Rods B6 and H8 were immovable and untrippable.**
- **IAE is investigating.**
- **Unit 1 conditions:**
  - **Mode 1 at 100% RTP**
  - **Cycle burnup is 25 EFPD**
  - **Control Bank 'D' position is 215 steps withdrawn**
  - **All other rods are at 226 steps withdrawn**
  - **Current Boron Concentration is 1370 ppmB**

INITIATING CUES:

- **The Shift Manager has directed you to perform a shutdown margin calculation using OP/0/A/6100/006 (Reactivity Balance Calculations).**
- **Calculation is to be performed for current date and time.**
- **Initial conditions have been verified.**
- **Independent Verification has been waived.**
- **This JPM is time critical.**

Calculated shutdown margin for current conditions __________ pcm
Adequate shutdown margin exists (YES/NO) ___________

EXAMINER NOTE:

After reading cue, provide applicant with a copy of OP/0/A/6100/006.

STEP / STANDARD	SAT / UNSAT

START TIME: _______

STEP 1: 3.1 Determine the following information:

NOTE: "Quantity of Misaligned Rods" refers to rods that are misaligned but remain trippable. Only the total number of rods is required. (R.M.)

Step	Description	Reference	Value
3.1.1	Unit	N/A	1
3.1.2	Date/Time	N/A	Today's Date / Time
3.1.3	Present Power	P1385	100 %
3.1.4	NC System Boron Concentration	Latest sample	1370 ppm
3.1.5	Current burnup	P1457	25 EFPD
3.1.6	Present control bank position	OAC or Control Board	215 SWD on Control Bank D
3.1.7	Present shutdown bank position	OAC or Control Board	A 226 B 226 C 226 D 226 E 226
3.1.8	Quantity of misaligned rods	N/A	0
3.1.9	Number of untrippable RCCAs	N/A	2
3.1.10	Untrippable RCCA(s) core location(s)	N/A	B6, H8

STANDARD:

From the cue, the applicant records the information per the table above.

COMMENTS:

___ SAT

___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 2: 3.2 **IF** using the REACT program to complete the calculation, perform the following: STANDARD: Applicant determines based of the initiating cue that this step is not applicable. COMMENTS:	___ SAT ___ UNSAT
NOTE: 1. A dropped rod is considered trippable. (R.M.) 2. All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e. ( ) _________ pcm], the sign provided with data must be recorded. The calculations account for these sign conventions. (R.M.)	**CRITICAL STEP**
STEP 3: 3.3 **IF** performing the calculation manually, perform the following: 3.3.1 Determine available reactivity worth of trippable RCCAs for conditions in Step 3.1: **NOTE:** Interpolation is **NOT** required in Step 3.3.1.1. Reactivity worth may be determined by choosing the lowest reactivity worth from Section 5.7 of the R.O.D. Manual associated with cycle burnups that bound the present cycle burnup recorded in Step 3.1. (R.M.) 3.3.1.1 Determine Total Available Rod Worth _______ pcm (Section 5.7 of R.O.D. manual) STANDARD: Applicant determines Total Available Rod Worth is 5008 pcm from R.O.D. Book Section 5.7. **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 4: 3.3.1.2 **IF** only one RCCA is untrippable, determine reactivity worth penalty for untrippable RCCA core location of Step 3.1.10 (Section 5.8 of R.O.D. manual). ___________ pcm STANDARD: Applicant determines that this step is not applicable. COMMENTS:	___ SAT ___ UNSAT
STEP 5: 3.3.1.3 **IF** there are multiple untrippable RCCAs, perform the following: A. Determine untrippable RCCA of Step 3.1.10 with the highest reactivity worth penalty (Section 5.8 of R.O.D. manual). Core Location ______ STANDARD: Applicant determines that RCCA Core Location **H8** has the highest reactivity worth penalty. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 6: 3.3.1.3 B. Record reactivity worth of the untrippable RCCA of Step 3.3.1.3.A (Section 5.8 of R.O.D. Manual). _________ pcm STANDARD: Applicant determines the reactivity worth of rod H8 per R.O.D. Section 5.8 is 580 pcm. **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 7: 3.3.1.3 C. Determine maximum stuck rod worth during cycle (Section 5.7 of the R.O.D. manual). ___________ pcm STANDARD: Applicant determines maximum stuck rod worth from R.O.D. manual section 5.7 is 1010 pcm. **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 8: 3.3.1.3 D. Calculate total untrippable RCCA reactivity worth penalty below:	**CRITICAL STEP**

Description	Reference	Value
A.Number of Untrippable RCCAs	Step 3.1.9	2
B. Highest Worth Penalty	Step 3.3.1.3 B	580 pcm
C. Max Stuck Rod	Step 3.3.1.3 C	1010 pcm
Total untrippable RCCA Worth Penalty for Multiple RCCAs	{ [(A) - 1] X (C) } + (B)	1590 pcm

STANDARD:

Applicant calculates the Total untrippable RCCA worth penalty to be 1590 pcm.

___ SAT

___ UNSAT

Examiner Note: This step is critical to ensure accurate result for final calculation.

COMMENTS:

STEP 9: 3.3.1.4 Record Total Untrippable RCCA Penalty from Step 3.3.1.2 or Step 3.3.1.3D, whichever is applicable.
__________ pcm

STANDARD:

Applicant records 1590 pcm from step 3.3.1.3 D.

___ SAT

___ UNSAT

COMMENTS:

STEP / STANDARD	SAT / UNSAT
NOTE: Interpolation is **NOT** required in Step 3.3.1.5. Reactivity worth may be determined by choosing the highest reactivity worth from Section 5.6.3 of the R.O.D. Manual associated with rod positions that bound the present rod position. (R.M.)	**CRITICAL STEP**

STEP 10: 3.3.1.5 Determine Inserted Rod Worth for present bank positions:

Description	Reference	Value
A. HFP, Eq Xenon IRW for current control bank position and current cycle burnup	Step 3.1.6 Step 3.1.5 (Section 5.6.3 of R.O.D. manual)	9 pcm
B. HFP, Eq Xenon IRW for current shutdown bank positions and current cycle burnup	Step 3.1.7 Step 3.1.5 (Section 5.6.3 of R.O.D. manual)	SD E 0 pcm SD D 0 pcm SD C 0 pcm SD B 0 pcm SD A 0 pcm
Inserted Worth of Present Position	**Sum of above**	9 **pcm**

___ SAT

___ UNSAT

STANDARD:

Applicant calculates Inserted Worth of Present rod positions to be 9 pcm.

Examiner Note: This step is critical to ensure accurate result for final calculation.

COMMENTS:

STEP / STANDARD	SAT / UNSAT
STEP 11: 3.3.1.6 Calculate available reactivity worth of trippable RCCAs:	CRITICAL STEP

Description	Reference	Value
A. Total Available Rod Worth	Step 3.3.1.1	5008 pcm
B. Untrippable RCCAs Penalty	Step 3.3.1.4	1590 pcm
C. Inserted Worth of Present Position	Step 3.3.1.5	9 pcm
Available Reactivity Worth of Trippable RCCAs	(A) - (B) - (C)	3409 **pcm**

STANDARD:

Applicant calculates Available Reactivity Worth of Trippable RCCAs to be 3409 pcm.

___ SAT

___ UNSAT

Examiner Note: This step is critical to ensure accurate result for final calculation.

COMMENTS:

STEP 12: 3.3.1.7 Calculate total misaligned RCCA reactivity worth below:

Description	Reference	Value
A. Quantity of Misaligned Rods	Step 3.1.8	0
B. Maximum Dropped or Misaligned Rod Worth	Section 5.7 of ROD Manual	200 pcm
Total misaligned RCCA Reactivity Worth	**(A) X (B)**	0 **pcm**

STANDARD:

Applicant determines that Total misaligned RCCA Reactivity Worth is 0 pcm.

___ SAT

___ UNSAT

COMMENTS:

STEP / STANDARD	SAT / UNSAT

NOTE: Interpolation of Power Defect is **NOT** required for Step 3.3.2. Bounding burnups and power levels may be used to select the highest Power Defect from Section 5.9 of the R.O.D. manual. (R.M.)

CRITICAL STEP

STEP 13: 3.3.2 Calculate SDM for present conditions:

Description	Reference	Value
A. Available reactivity worth of Trippable RCCAs	Step 3.1.6	3409 pcm
B. Total misaligned RCCA reactivity Worth	Step 3.1.7	0 pcm
C. Total Power Defect at present thermal power (Step 3.1.3) and current cycle burnup (Step 3.1.5)	Section 5.9 of R.O.D. manual	1554 pcm
D. Transient Flux Redistribution Allowance	Section 5.7 of R.O.D. manual	512
Present SDM	**(A) - (B) - (C) - (D)**	**(+)** 1343 **pcm**

STANDARD:

Applicant calculates Present SDM to be +1343 pcm.

___ SAT

___ UNSAT

Examiner Note: **It is not critical for the applicant to record the "+" sign in the above calculation. If the applicant were to incorrectly record a "-" sign in the parentheses above, then this critical step would not be met.**

Examiner Note: **This step is critical to ensure accurate result for final calculation and to determine whether required SDM for present plant conditions is met.**

COMMENTS:

STEP / STANDARD	SAT / UNSAT
STEP 14: Adequate shutdown margin exists (YES/NO). STANDARD: Applicant determines that 1300 pcm of SDM is required for the current plant conditions and that an actual SDM of 1343 pcm is adequate. Applicant records YES for 2nd part of answer. **Examiner Note: This step is critical to determine that adequate SDM does exist for the current plant conditions.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **The Reactor Eng Analysis and Calc Toolkit (REACT) – CNS is inoperable.**
- **During performance of PT/0/A/4150/030 (RCCA Bank Repositioning), it was determined that Control Rods B6 and H8 were immovable and untrippable.**
- **IAE is investigating.**
- **Unit 1 conditions:**
  - **Mode 1 at 100% RTP**
  - **Cycle burnup is 25 EFPD**
  - **Control Bank 'D' position is 215 steps withdrawn**
  - **All other rods are at 226 steps withdrawn**
  - **Current Boron Concentration is 1370 ppmB**

INITIATING CUES:

- **The Shift Manager has directed you to perform a shutdown margin calculation using OP/0/A/6100/006 (Reactivity Balance Calculations).**
- **Calculation is to be performed for current date and time.**
- **Initial conditions have been verified.**
- **Independent Verification has been waived.**
- **This JPM is time critical.**

Calculated shutdown margin for current conditions __________ pcm
Adequate shutdown margin exists (YES/NO) ___________

3. Procedure

_____ 3.1 Determine the following information:

NOTE:	"Quantity of Misaligned Rods" refers to rods that are misaligned but remain trippable. Only the total number of rods is required. (R.M.)

Step	Description	Reference	Value
3.1.1	Unit	N/A	1
3.1.2	Date/Time	N/A	Today's Date / Time
3.1.3	Present Power	P1385	100 %
3.1.4	NC System Boron Concentration	Latest sample	1370 ppm
3.1.5	Current burnup	P1457	25 EFPD
3.1.6	Present control bank position	OAC or Control Board	215 SWD on Control Bank D
3.1.7	Present shutdown bank position	OAC or Control Board	A 226 B 226 C 226 D 226 E 226
3.1.8	Quantity of misaligned rods	N/A	0
3.1.9	Number of untrippable RCCAs	N/A	2
3.1.10	Untrippable RCCA(s) core location(s)	N/A	B6, H8

N/A 3.2 **IF** using the REACT program to complete the calculation, perform the following:

- ☐ 3.2.1 Access "Reactor Eng Analysis and Calc Toolkit (REACT) - CNS" from DAE.
- ☐ 3.2.2 Select "View" then "Reactivity Balance Calculations" on toolbar.
- ☐ 3.2.3 Select "SDM – Mode 1 or 2" tab in Reactivity Balance Calculations window.

CAUTION: All inputs must be checked carefully and corrected as needed before calculating results. The correct Unit must be specified.

NOTE: Untrippable control rods are input by clicking "Select Inoperable Rods" and any inserted shutdown banks are input using "Shutdown Banks Inserted" tab. (R.M.)

_____ 3.2.4 Enter appropriate values from Step 3.1 in "Input Data" section for the following:

- ☐ "Shutdown Margin" tab
- ☐ "Shutdown Banks Inserted" tab

_____ 3.2.5 Obtain results as follows:

- ☐ 3.2.5.1 Click "Calculate" button.
- ☐ 3.2.5.2 Print program results.
- ☐ 3.2.5.3 Label printout appropriately.
- ☐ 3.2.5.4 Attach printout to this enclosure.

3.2.6 Sign below to document performance:

Performed by__________________________Date/Time:______/______

_____ 3.2.7 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE: Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.2.8 Verify that both performances of this enclosure yield equivalent results

_____ 3.2.9 Perform one of the following based on results of the calculations:

_____ 3.2.9.1 **IF** Effective Shutdown Margin for a Present Position is greater than the Required Shutdown Margin, notify the CRS that Effective Shutdown Margin is acceptable.

OR

_____ 3.2.9.2 **IF** Effective Shutdown Margin for a Present Position is less than the Required Shutdown Margin, notify the CRS to apply the applicable Technical Specification Action.

_____ 3.2.10 Submit both performances of this enclosure to the Control Room Supervisor for review.

NOTE:
1. A dropped rod is considered trippable. (R.M.)
2. All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e. ( )______________ pcm], the sign provided with data must be recorded. The calculations account for these sign conventions. (R.M.)

_____ 3.3 **IF** performing the calculation manually, perform the following:

_____ 3.3.1 Determine available reactivity worth of trippable RCCAs for conditions in Step 3.1:

NOTE: Interpolation is **NOT** required in Step 3.3.1.1. Reactivity worth may be determined by choosing the lowest reactivity worth from Section 5.7 of the R.O.D Manual associated with cycle burnups that bound the present cycle burnup recorded in Step 3.1. (R.M.)

_____ 3.3.1.1 Determine Total Available Rod Worth (Section 5.7 of R.O.D. manual) 5008 pcm

N/A 3.3.1.2 **IF** only one RCCA is untrippable, determine reactivity worth penalty for untrippable RCCA core location of Step 3.1.10 (Section 5.8 of R.O.D. manual). ____________ pcm

_____ 3.3.1.3 **IF** there are multiple untrippable RCCAs, perform the following:

☐ A. Determine untrippable RCCA of Step 3.1.10 with the highest reactivity worth penalty (Section 5.8 of ROD Manual). Core Location H-8

☐ B. Record reactivity worth of the untrippable RCCA of Step 3.3.1.3.A (Section 5.8 of ROD Manual). ____580____ pcm

☐ C. Determine maximum stuck rod worth during cycle (Section 5.7 of the R.O.D. manual). ____1010____ pcm

☐ D. Calculate total untrippable RCCA reactivity worth penalty below:

Description	Reference	Value
A.Number of Untrippable RCCAs	Step 3.1.9	2
B. Highest Worth Penalty	Step 3.3.1.3 B	580 pcm
C. Max Stuck Rod	Step 3.3.1.3 C	1010 pcm
Total untrippable RCCA Worth Penalty for Multiple RCCAs	**{ [(A) - 1] X (C) } + (B)**	1590 **pcm**

_____ 3.3.1.4 Record Total Untrippable RCCA Penalty from Step 3.3.1.2 or Step 3.3.1.3D, whichever is applicable. ____1590____ pcm

NOTE: Interpolation is **NOT** required in Step 3.3.1.5. Reactivity worth may be determined by choosing the highest reactivity worth from Section 5.6.3 of the R.O.D Manual associated with rod positions that bound the present rod position. (R.M.)

_____ 3.3.1.5 Determine Inserted Rod Worth for present bank positions:

Description	Reference	Value
A. HFP, Eq Xenon IRW for current control bank position and current cycle burnup	Step 3.1.6 Step 3.1.5 (Section 5.6.3 of R.O.D. manual)	____9____ pcm
B. HFP, Eq Xenon IRW for current shutdown bank positions and current cycle burnup	Step 3.1.7 Step 3.1.5 (Section 5.6.3 of R.O.D. manual)	SD E ___0___ pcm SD D ___0___ pcm SD C ___0___ pcm SD B ___0___ pcm SD A ___0___ pcm
Inserted Worth of Present Position	**Sum of above**	9 **pcm**

_____ 3.3.1.6 Calculate available reactivity worth of trippable RCCAs:

Description	Reference	Value
A. Total Available Rod Worth	Step 3.3.1.1	5008 pcm
B. Untrippable RCCAs Penalty	Step 3.3.1.4	1590 pcm
C. Inserted Worth of Present Position	Step 3.3.1.5	9 pcm
Available Reactivity Worth of Trippable RCCAs	**(A) - (B) - (C)**	3409 **pcm**

_____ 3.3.1.7 Calculate total misaligned RCCA reactivity worth below:

Description	Reference	Value
A. Quantity of Misaligned Rods	Step 3.1.8	0
B. Maximum Dropped or Misaligned Rod Worth	Section 5.7 of ROD Manual	200 pcm
Total misaligned RCCA Reactivity Worth	**(A) X (B)**	0 **pcm**

NOTE: Interpolation of Power Defect is **NOT** required for Step 3.3.2. Bounding burnups and power levels may be used to select the highest Power Defect from Section 5.9 of the R.O.D. manual. (R.M.)

_____ 3.3.2 Calculate SDM for present conditions:

Description	Reference	Value
A. Available reactivity worth of Trippable RCCAs	Step 3.3.1.6	3409 pcm
B. Total misaligned RCCA reactivity Worth	Step 3.3.1.7	0 pcm
C. Total Power Defect at present thermal power (Step 3.1.3) and current cycle burnup (Step 3.1.5)	Section 5.9 of R.O.D. manual	1554 pcm
D. Transient Flux Redistribution Allowance	Section 5.7 of R.O.D. manual	512
Present SDM	**(A) - (B) - (C) - (D)**	**(+)** 1343 **pcm**

3.3.3 Sign below to document performance:

Performed by________________________Date/Time:______/______

_____ 3.3.4 Ensure that an independent calculation per this enclosure has been separately performed

NOTE: Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.3.5 Verify that both performances of this enclosure yield equivalent results

_____ 3.3.6 Perform one of the following based on results of the calculations:

_____ 3.3.6.1 **IF** present SDM is ≥ 1300 pcm per the applicable Technical Specification via COLR, notify the CRS that present SDM is acceptable.

OR

_____ 3.3.6.2 **IF** present SDM is < 1300 pcm notify the CRS to apply the applicable Technical Specification Action.

Duke Energy Catawba Nuclear Station **Faulted Steam Generator Isolation**	Procedure No. **EP/ 1/A/5000/E-2**
	Revision No. **015**
Continuous Use	Electronic Reference No. **CP0094CZ**

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

(ISSUED) - PDF Format

Reactivity Balance Calculation

1. Purpose

NOTE:	Reactivity Management Related

1.1 To estimate critical NC System boron concentration before criticality based on other assumed core reactivity conditions.

1.2 To estimate critical control bank position before criticality based on other assumed core reactivity conditions.

1.3 To calculate shutdown margin in Modes 1 and 2 with untrippable and/or misaligned RCCAs. (TS 3.1.4)

1.4 To calculate the NC System boron concentration at which shutdown margin will **NOT** be met in Modes 2 (with K-eff < 1.0), 3, 4, and 5. (TS 3.1.1)

1.5 To verify K-eff < 0.99 with shutdown banks withdrawn.

1.6 To calculate the NC System boron concentration at which refueling boron concentration will **NOT** be met in Mode 6. (TS 3.9.1)

2. Limits and Precautions

NOTE:	All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

2.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

2.2 Ensure all data used by this procedure are for the correct unit.

2.3 NC System T-AVG shall be maintained within ±1 °F of T-REF in Modes 1 and 2 to reduce uncertainties in calculations.

2.4 Shutdown margin (SDM) shall be ≥ 1000 pcm in Mode 5. (Tech Spec 3.1.1 and Enclosure 4.5 and 4.6)

2.5 SDM shall be ≥ 1300 pcm in Modes 1, 2, 3, and 4. (Tech Spec 3.1.1 and Enclosure 4.3, 4.4, 4.5 or 4.6)

2.6 Required refueling boron concentration is obtained from Tech Spec 3.9.1 and Enclosure 4.6.

2.7 **IF** T-AVG < 500 °F, credit for only 50% of xenon worth can be taken when verifying SDM.

2.8 NC system T-AVG changes in Modes 3, 4 and 5 shall only be performed to a temperature where measured NC System boron concentration is ≥ boron concentration required for SDM.

2.9 Criticality shall **NOT** be obtained outside the maximum window (±750 pcm) of estimated critical position.

2.10 Desired critical control bank position shall **NOT** be below the control bank insertion limits **OR** above any temporary control bank withdrawal limits.

2.11 Verification of K-eff < 0.99 with shutdown banks withdrawn shall only be performed above 200 °F.

2.12 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

2.13 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

2.14 Shutdown Margin is satisfied if NC System Boron Concentration ≥ to the Refueling Boron Concentration per the COLR.

2.15 Maintaining Boron Dilution Mitigation System (BDMS) operability with no reactor coolant pumps in service when in Modes 4 or 5 requires an additional boron penalty be added to Shutdown Margin calculations.

3. Procedure

Refer To Section 4 (Enclosures).

4. Enclosures

NOTE:	For enclosures that require an independent verification, separate enclosures shall be printed out for both parties performing the calculations.

4.1 Estimated Critical Boron Concentration (ECB)

4.2 Estimated Critical Position (ECP)

4.3 Shutdown Margin - Untrippable / Misaligned RCCA(s) - Modes 1 and 2

4.4 Shutdown Margin Within Two Hours Of A Reactor Trip

4.5 Shutdown Margin (With or Without Xenon Credit) Using REACT Program

4.6 Shutdown Margin (With or Without Xenon Credit) Manual Calculation

4.7 Verification of K-eff < 0.99 with Shutdown Banks Withdrawn

4.8 Shutdown Boron Concentration - Mode 6

4.9 Shutdown Fission Product Correction Factor

1. Limits and Precautions

NOTE: All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 NC System T-AVG shall be maintained within ±1 °F of T-REF in Modes 1 and 2 to reduce uncertainties in calculations.

1.4 SDM shall be ≥ 1300 pcm in Modes 1, 2, 3, and 4. (Tech Spec 3.1.1 and Enclosure 4.3, 4.4, 4.5 or 4.6)

1.5 NC system T-AVG changes in Modes 3, 4 and 5 shall only be performed to a temperature where measured NC System boron concentration is ≥ boron concentration required for SDM.

1.6 Criticality shall **NOT** be obtained outside the maximum window (±750 pcm) of estimated critical position.

1.7 Desired critical control bank position shall **NOT** be below the control bank insertion limits **OR** above any temporary control bank withdrawal limits.

1.8 Verification of K-eff < 0.99 with shutdown banks withdrawn shall only be performed above 200 °F.

1.9 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.10 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

2. Initial Conditions

_____ 2.1 Ensure latest NC system boron sample has been entered into the OAC.

_____ 2.2 Verify with Reactor Engineer that OAC MVU group "Boron 10 Depletion" is current.

3. Procedure

NOTE: 1. All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e.( )_________pcm], the sign provided with data must be entered. The calculations account for these sign conventions. (R.M.)

2. All ECB calculations must be performed independently by a Qualified Reactor Engineer (per NSD 304) and a Licensed Operator.

_____ 3.1 Determine the following information:

Step	Description	Reference	Value
3.1.1	Unit	N/A	
3.1.2	Cycle Burnup	P1457	EFPD
3.1.3	Anticipated Date/Time of Criticality	N/A	
3.1.4	NC System Effective Boron Concentration	P5614	ppm
3.1.5	Desired Critical Rod Position At least 1000 pcm above HZP Rod Insertion Limit in Section 2.2 of ROD Manual	Duty Rx Eng	_______________ SWD on Control Bank______
3.1.6	Xenon Worth at Time of Criticality	REACT OAC Predict or Rx Eng	pcm
3.1.7	Diff. Between Eq. and Present Sm Worth	P1475, REACT, OAC Predict or Rx Eng	( ) pcm
3.1.8	Shutdown Fission Product Correction Factor	**IF** Cycle Burnup < 12 EFPD = 0, **ELSE** per Enclosure 4.9	ppm
3.1.9	BAT Boron Concentration	Latest sample	ppm

_____ 3.2 Access "Reactor Eng Analysis and Calc Toolkit (REACT) - CNS" from DAE.

_____ 3.3 Select "View" then "Reactivity Balance Calculations" on toolbar.

_____ 3.4 Select ECB (Estimated Critical Boron Concentration) tab in Reactivity Balance Calculations window.

CAUTION:	All inputs must be checked carefully and corrected as needed before calculating results. The correct Unit must be specified.

NOTE:	Sign must be provided with Difference from Equilibrium Samarium [i.e., ( ) ____ pcm] (R.M.)

_____ 3.5 Enter appropriate values from Step 3.1 in "Input Data" section.

_____ 3.6 Obtain results as follows:

- ☐ 3.6.1 Click "Calculate" button.
- ☐ 3.6.2 Print program results.
- ☐ 3.6.3 Label printout appropriately.
- ☐ 3.6.4 Attach printout to this enclosure.

3.7 Sign below to document performance.

Performed by: ________________________________ Date/Time: _____/______
Circle One: Qualified Reactor Engineer / Licensed Operator

_____ 3.8 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.9 Verify that both performances of this enclosure yield equivalent results.

1. Limits and Precautions

NOTE:	All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 NC System T-AVG shall be maintained within ±1 °F of T-REF in Modes 1 and 2 to reduce uncertainties in calculations.

1.4 SDM shall be ≥ 1300 pcm in Modes 1, 2, 3, and 4. (Tech Spec 3.1.1 and Enclosure 4.3, 4.4, 4.5 or 4.6)

1.5 NC system T-AVG changes in Modes 3, 4 and 5 shall only be performed to a temperature where measured NC System boron concentration is ≥ boron concentration required for SDM.

1.6 Criticality shall **NOT** be obtained outside the maximum window (±750 pcm) of estimated critical position.

1.7 Desired critical control bank position shall **NOT** be below the control bank insertion limits **OR** above any temporary control bank withdrawal limits.

1.8 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.9 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

2. Initial Conditions

_____ 2.1 Ensure latest NC system boron sample has been entered into the OAC.

_____ 2.2 Verify with Reactor Engineer that OAC MVU group "Boron 10 Depletion" is current.

3. Procedure

NOTE:
1. All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e.( )_________pcm], the sign provided with data must be entered. The calculations account for these sign conventions. (R.M.)
2. All ECP calculations must be performed independently by a Qualified Reactor Engineer and a Licensed Operator.

_____ 3.1 Determine the following information:

Step	Description	Reference	Value
3.1.1	Unit	N/A	
3.1.2	Cycle Burnup	P1457	EFPD
3.1.3	Anticipated Date/Time of Criticality	N/A	
3.1.4	NC System Effective Boron Concentration	P5614	ppm
3.1.5	Xenon Worth at Time of Criticality	REACT, OAC Predict or Rx Eng	pcm
3.1.6	Diff. Between Eq. and Present Sm Worth	P1475, REACT, OAC Predict or Rx Eng	( ) pcm
3.1.7	Shutdown Fission Product Correction Factor	**IF** Cycle Burnup < 12 EFPD = 0, **ELSE** per Enclosure 4.9	ppm

_____ 3.2 Access "Reactor Eng Analysis and Calc Toolkit (REACT) - CNS" from DAE.

_____ 3.3 Select "View" then "Reactivity Balance Calculations" on toolbar.

_____ 3.4 Select ECP (Estimated Critical Position) tab in Reactivity Balance Calculations window.

CAUTION: All inputs must be checked carefully and corrected as needed before calculating results. The correct Unit must be specified.

NOTE: Sign must be provided with Difference from Equilibrium Samarium [i.e., ( ) ____ pcm] (R.M.)

_____ 3.5 Enter appropriate values from Step 3.1 in "Input Data" section.

_____ 3.6 Obtain results as follows:

- ☐ 3.6.1 Click "Calculate" button.
- ☐ 3.6.2 Print program results.
- ☐ 3.6.3 Label printout appropriately.
- ☐ 3.6.4 Attach printout to this enclosure.

_____ 3.7 Verify that Rod Insertion Limits (R.O.D. Manual Section 2.2) and (if applicable) Rod Withdrawal Limits (R.O.D. Manual Section 2.3) will **NOT** be violated based on ECP results.

3.8 Sign below to document performance.

Performed by:______________________________________ Date/Time: _____/______

Circle One: Qualified Reactor Engineer / Licensed Operator

_____ 3.9 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.10 Verify that both performances of this enclosure yield equivalent results.

1. Limit and Precautions

NOTE: All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 NC System T-AVG shall be maintained within ±1 °F of T-REF in Modes 1 and 2 to reduce uncertainties in calculations.

1.4 SDM shall be ≥ 1300 pcm in Modes 1, 2, 3, and 4. (Tech Spec 3.1.1 and Enclosure 4.3, 4.4, 4.5 or 4.6)

1.5 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.6 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

2. Initial Conditions

None

3. Procedure

_____ 3.1 Determine the following information:

> **NOTE:** "Quantity of Misaligned Rods" refers to rods that are misaligned but remain trippable. Only the total number of rods is required. (R.M.)

Step	Description	Reference	Value
3.1.1	Unit	N/A	
3.1.2	Date/Time	N/A	
3.1.3	Present Power	P1385	%
3.1.4	NC System Boron Concentration	Latest sample	ppm
3.1.5	Current burnup	P1457	EFPD
3.1.6	Present control bank position	OAC or Control Board	______ SWD on Control Bank______
3.1.7	Present shutdown bank position	OAC or Control Board	A _____ B _____ C _____ D _____ E _____
3.1.8	Quantity of misaligned rods	N/A	
3.1.9	Number of untrippable RCCAs	N/A	
3.1.10	Untrippable RCCA(s) core location(s)	N/A	

_____ 3.2 **IF** using the REACT program to complete the calculation, perform the following:

- ☐ 3.2.1 Access "Reactor Eng Analysis and Calc Toolkit (REACT) - CNS" from DAE.
- ☐ 3.2.2 Select "View" then "Reactivity Balance Calculations" on toolbar.
- ☐ 3.2.3 Select "SDM – Mode 1 or 2" tab in Reactivity Balance Calculations window.

> **CAUTION:** All inputs must be checked carefully and corrected as needed before calculating results. The correct Unit must be specified.

> **NOTE:** Untrippable control rods are input by clicking "Select Inoperable Rods" and any inserted shutdown banks are input using "Shutdown Banks Inserted" tab. (R.M.)

_____ 3.2.4 Enter appropriate values from Step 3.1 in "Input Data" section for the following:

- ☐ "Shutdown Margin" tab
- ☐ "Shutdown Banks Inserted" tab

_____ 3.2.5 Obtain results as follows:

- ☐ 3.2.5.1 Click "Calculate" button.
- ☐ 3.2.5.2 Print program results.
- ☐ 3.2.5.3 Label printout appropriately.
- ☐ 3.2.5.4 Attach printout to this enclosure.

3.2.6 Sign below to document performance:

Performed by__________________________Date/Time:______/______

_____ 3.2.7 Ensure that an independent calculation per this enclosure has been separately performed.

> **NOTE:** Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.2.8 Verify that both performances of this enclosure yield equivalent results

_____ 3.2.9 Perform one of the following based on results of the calculations:

_____ 3.2.9.1 **IF** Effective Shutdown Margin for a Present Position is greater than the Required Shutdown Margin, notify the CRS that Effective Shutdown Margin is acceptable.

OR

_____ 3.2.9.2 **IF** Effective Shutdown Margin for a Present Position is less than the Required Shutdown Margin, notify the CRS to apply the applicable Technical Specification Action.

_____ 3.2.10 Submit both performances of this enclosure to the Control Room Supervisor for review.

NOTE:
1. A dropped rod is considered trippable. (R.M.)
2. All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e. ( )______________ pcm], the sign provided with data must be recorded. The calculations account for these sign conventions. (R.M.)

_____ 3.3 **IF** performing the calculation manually, perform the following:

_____ 3.3.1 Determine available reactivity worth of trippable RCCAs for conditions in Step 3.1:

NOTE: Interpolation is **NOT** required in Step 3.3.1.1. Reactivity worth may be determined by choosing the lowest reactivity worth from Section 5.7 of the R.O.D Manual associated with cycle burnups that bound the present cycle burnup recorded in Step 3.1. (R.M.)

_____ 3.3.1.1 Determine Total Available Rod Worth ____________ pcm (Section 5.7 of R.O.D. manual)

_____ 3.3.1.2 **IF** only one RCCA is untrippable, determine reactivity worth penalty for untrippable RCCA core location of Step 3.1.10 (Section 5.8 of R.O.D. manual). ____________ pcm

_____ 3.3.1.3 **IF** there are multiple untrippable RCCAs, perform the following:

☐ A. Determine untrippable RCCA of Step 3.1.10 with the highest reactivity worth penalty (Section 5.8 of ROD Manual). Core Location _________

☐ B. Record reactivity worth of the untrippable RCCA of Step 3.3.1.3.A (Section 5.8 of ROD Manual). ______________ pcm

☐ C. Determine maximum stuck rod worth during cycle (Section 5.7 of the R.O.D. manual). ______________ pcm

☐ D. Calculate total untrippable RCCA reactivity worth penalty below:

Description	Reference	Value
A.Number of Untrippable RCCAs	Step 3.1.9	
B. Highest Worth Penalty	Step 3.3.1.3 B	pcm
C. Max Stuck Rod	Step 3.3.1.3 C	pcm
Total untrippable RCCA Worth Penalty for Multiple RCCAs	**{ [(A) - 1] X (C) } + (B)**	**pcm**

_____ 3.3.1.4 Record Total Untrippable RCCA Penalty from Step 3.3.1.2 or Step 3.3.1.3D, whichever is applicable. _______________ pcm

NOTE: Interpolation is **NOT** required in Step 3.3.1.5. Reactivity worth may be determined by choosing the highest reactivity worth from Section 5.6.3 of the R.O.D Manual associated with rod positions that bound the present rod position. (R.M.)

_____ 3.3.1.5 Determine Inserted Rod Worth for present bank positions:

Description	Reference	Value
A. HFP, Eq Xenon IRW for current control bank position and current cycle burnup	Step 3.1.6 Step 3.1.5 (Section 5.6.3 of R.O.D. manual)	___________ pcm
B. HFP, Eq Xenon IRW for current shutdown bank positions and current cycle burnup	Step 3.1.7 Step 3.1.5 (Section 5.6.3 of R.O.D. manual)	SD E _________ pcm SD D _________ pcm SD C _________ pcm SD B _________ pcm SD A _________ pcm
Inserted Worth of Present Position	**Sum of above**	**pcm**

_____ 3.3.1.6 Calculate available reactivity worth of trippable RCCAs:

Description	Reference	Value
A. Total Available Rod Worth	Step 3.3.1.1	pcm
B. Untrippable RCCAs Penalty	Step 3.3.1.4	pcm
C. Inserted Worth of Present Position	Step 3.3.1.5	pcm
Available Reactivity Worth of Trippable RCCAs	**(A) - (B) - (C)**	**pcm**

_____ 3.3.1.7 Calculate total misaligned RCCA reactivity worth below:

Description	Reference	Value
A. Quantity of Misaligned Rods	Step 3.1.8	
B. Maximum Dropped or Misaligned Rod Worth	Section 5.7 of ROD Manual	pcm
Total misaligned RCCA Reactivity Worth	**(A) X (B)**	**pcm**

NOTE: Interpolation of Power Defect is **NOT** required for Step 3.3.2. Bounding burnups and power levels may be used to select the highest Power Defect from Section 5.9 of the R.O.D. manual. (R.M.)

_____ 3.3.2 Calculate SDM for present conditions:

Description	Reference	Value
A. Available reactivity worth of Trippable RCCAs	Step 3.3.1.6	pcm
B. Total misaligned RCCA reactivity Worth	Step 3.3.1.7	pcm
C. Total Power Defect at present thermal power (Step 3.1.3) and current cycle burnup (Step 3.1.5)	Section 5.9 of R.O.D. manual	pcm
D. Transient Flux Redistribution Allowance	Section 5.7 of R.O.D. manual	
Present SDM	**(A) - (B) - (C) - (D)**	**( ) pcm**

3.3.3 Sign below to document performance:

Performed by__________________________Date/Time:______/______

_____ 3.3.4 Ensure that an independent calculation per this enclosure has been separately performed

NOTE:	Independently performed calculations may **<u>NOT</u>** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.3.5 Verify that both performances of this enclosure yield equivalent results

_____ 3.3.6 Perform one of the following based on results of the calculations:

_____ 3.3.6.1 **<u>IF</u>** present SDM is ≥ 1300 pcm per the applicable Technical Specification via COLR, notify the CRS that present SDM is acceptable.

OR

_____ 3.3.6.2 **<u>IF</u>** present SDM is < 1300 pcm notify the CRS to apply the applicable Technical Specification Action.

1. Limits and Precautions

NOTE:	All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 NC System T-AVG shall be maintained within ±1 °F of T-REF in Modes 1 and 2 to reduce uncertainties in calculations.

1.4 SDM shall be ≥ 1300 pcm in Modes 1, 2, 3, and 4. (Tech Spec 3.1.1 and Enclosure 4.3, 4.4, 4.5 or 4.6)

1.5 NC system T-AVG changes in Modes 3, 4 and 5 shall only be performed to a temperature where measured NC System boron concentration is ≥ boron concentration required for SDM.

1.6 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.7 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

2. Initial Conditions

None

3. Procedure

NOTE:

- Interpolation is **NOT** required in Step 3.1. The Minimum NC Temperature may be determined by choosing the highest temperature from Section 2.6 of the R.O.D Manual associated with the current cycle burnup that bound the present cycle burnup. (R.M.)
- This enclosure is valid only if all control rods are fully inserted. With one or more rods **NOT** fully inserted, use Enclosure 4.5 (Shutdown Margin (With or Without Xenon Credit) Using REACT Program) or Enclosure 4.6 (Shutdown Margin (With or Without Xenon Credit) Manual Calculation).
- This Enclosure is only valid for two hours from the time of the Reactor trip.

_____ 3.1 Record the following information:

Step	Description	Reference	Value
3.1.1	Unit	N/A	
3.1.2	Cycle Burnup	P1457	EFPD
3.1.3	Present NC System T-AVG	OAC or Control Board	°F
3.1.4	Minimum Moderator Temperature Following Reactor Trip	R.O.D. Manual Section 2.6	°F

_____ 3.2 Verify NC T-AVG is greater than the Minimum Moderator Temperature Following Reactor Trip given in R.O.D. Manual Section 2.6.

3.3 Sign below to document performance.

Performed by: ____________________________________ Date/Time: _____/______

_____ 3.4 Ensure that separate, independent comparison of T-AVG versus Minimum Moderator Temperature has been performed per this enclosure.

NOTE: Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.5 Verify that both performances of this enclosure yield equivalent results.

1. Limits and Precautions

NOTE:	All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 Shutdown margin (SDM) shall be ≥ 1000 pcm in Mode 5. (Tech Spec 3.1.1 and Enclosure 4.5 and 4.6)

1.4 SDM shall be ≥ 1300 pcm in Modes 1, 2, 3, and 4. (Tech Spec 3.1.1 and Enclosure 4.3, 4.4, 4.5 or 4.6)

1.5 Required refueling boron concentration is obtained from Tech Spec 3.9.1 and Enclosure 4.6.

1.6 **IF** T-AVG < 500 °F, credit for only 50% of xenon worth can be taken when verifying SDM.

1.7 NC system T-AVG changes in Modes 3, 4 and 5 shall only be performed to a temperature where measured NC System boron concentration is ≥ boron concentration required for SDM.

1.8 Verification of K-eff < 0.99 with shutdown banks withdrawn shall only be performed above 200 °F.

1.9 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.10 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

1.11 Shutdown Margin is satisfied if NC System Boron Concentration ≥ to the Refueling Boron Concentration per the COLR.

1.12 Maintaining Boron Dilution Mitigation System (BDMS) operability with no reactor coolant pumps in service when in Modes 4 or 5 requires an additional boron penalty be added to Shutdown Margin calculations.

2. Initial Conditions

_____ 2.1 **IF** using effective boron concentration, ensure latest NC system boron sample has been entered into the OAC Manual Data Log (MLOG).

3. Procedure

NOTE:

1. All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e.( )_________pcm], the sign provided with data must be entered. The calculations account for these sign conventions. (R.M.)
2. If latest NC boron sample is used instead of effective boron concentration, a ppm penalty, obtained from applicable Unit R.O.D. manual Section 5.14, is applied to account for B-10 depletion. Interpolation of Section 5.14 is **NOT** required. Using the larger value of the applicable burnup range provides conservatism. (R.M.)
3. "SDM – Mode 5, 4, or 3" option also applies to Mode 2 with K-eff < 1.0. (R.M.)
4. Step 3.1.5 is only applicable when a boration is in progress in support of a NC System cooldown. The PZR is then considered a potential dilution source and a penalty must be included when calculating SDM. Otherwise a Value of 0 is entered in Step 3.1.5.

_____ 3.1 Determine the following information:

Step	Description	Reference	Value
3.1.1	Unit	N/A	
3.1.2	Date/Time	N/A	
3.1.3	Present NC System Boron Conc **OR** Effective Boron Concentration	Latest Sample **OR** P5614	___ ppm
3.1.4	**IF NOT** using Effective Boron Concentration in Step 3.1.3, record B-10 correction	R.O.D. manual Section 5.14	___ ppm
3.1.5	**IF** PZR Boron Conc **NOT** verified to be within 50 ppm of NC System Boron Conc, record PZR mixing penalty of 100 ppm	OP/1(2)/A/6100/002	___ ppm
3.1.6	Adjusted NC System Boron Conc Step 3.1.3 minus Step 3.1.4 minus Step 3.1.5. (**IF** sum negative record 0)	References used in Steps 3.1.3, 3.1.4 and 3.1.5	___ - ___ - ___ = ____ ppm **OR** (0)

_____ 3.2 **IF** NC System Boron Concentration ≥ to the Refueling Operations Boron Concentration per the COLR, Section 2.15, then Shutdown Margin is met and perform the following:

3.2.1 Sign below to document performance.

Performed by:____________________________ Date/Time: _____/______

_____ 3.2.2 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.2.3 Verify that both performances of this enclosure yield equivalent results.

_____ 3.2.4 Submit both performances of this enclosure to the Control Room Supervisor for review.

_____ 3.2.5 N/A the remaining steps of this enclosure.

_____ 3.3 Determine the following information:

Step	Description	Reference	Value
3.3.1	Present NC System Temperature	OAC or Control Board	° F
3.3.2	Desired NC System Temperature	N/A	° F
3.3.3	Present cycle burnup	P1457 or Duty Reactor Engineer	EFPD
3.3.4	Present Difference from Equilibrium Samarium Worth	P1475 or Duty Reactor Engineer	( ) pcm
3.3.5	Number of Known Untrippable Control Rods	OAC or Control Board	
3.3.6	Untrippable RCCA Core Locations	OAC or Control Board	
3.3.7	Date and time of latest valid Iodine and Xenon concentrations; N/A if xenon free.	Duty Reactor Engineer or current time if using OAC	________/________
3.3.8	Iodine concentration at time listed in Step 3.3.7; 0 if xenon free.	P0124 or Duty Reactor Engineer	atm/cc
3.3.9	Xenon concentration at time listed in Step 3.3.7; 0 if xenon free.	P0125 or Duty Reactor Engineer	atm/cc
3.3.10	Shutdown Fission Product Correction Factor	**IF** Cycle Burnup < 12 EFPD = 0, **ELSE** per Enclosure 4.9	ppm

_____ 3.4 Both Trains of DRPI indicate all rods on bottom:

☐ YES (All Rods at Bottom)

OR

☐ NO (Assume Most Reactive Rod Stuck Out)

_____ 3.5 **<u>IF</u>** Unit is in Mode 4 or 5 **<u>AND</u>** no reactor coolant pumps are in service perform the following:

_____ 3.5.1 Record boron penalty from ROD Manual Section 5.15 for desired NC system temperature (Step 3.3.2), cycle burnup (Step 3.3.3) and rod configuration (Step 3.4).
Boron Penalty________________ppm

_____ 3.5.2 Calculate boron concentration for Shutdown Margin (SDM):

_________ - _________ = __________ppm **<u>OR</u>** (0)
(Step 3.1.6) (Step 3.5.1)

_____ 3.6 Access "Reactor Eng Analysis and Calc Toolkit (REACT) - CNS" from DAE.

_____ 3.7 Select "View" then "Reactivity Balance Calculations" on toolbar.

NOTE: "SDM – Mode 5, 4, or 3" option also applies to Mode 2 with K-eff < 1.0. (R.M.)

_____ 3.8 Select "SDM – Mode 5, 4, or 3" tab in Reactivity Balance Calculations window.

CAUTION: All inputs must be checked carefully and corrected as needed before calculating results. The correct Unit must be specified.

NOTE:
1. Sign must be provided with Difference from Equilibrium Samarium [i.e., ( ) ____ pcm] (R.M.)
2. In REACT, "Inoperable RCCAs" refers to untrippable RCCAs. (R.M.)
3. Rod locations are put in REACT in a text only format (e.g. B12 or B-12). REACT uses the maximum stuck rod worth for all known untrippable RCCAs. (R.M.)

_____ 3.9 Enter appropriate values from Steps 3.1, 3.3, 3.4 and 3.5 in "Input Data" section.

_____ 3.10 Obtain results as follows:

☐ 3.10.1 Click "C<u>a</u>lculate" button.

☐ 3.10.2 Print program results.

☐ 3.10.3 Label printout appropriately.

☐ 3.10.4 Attach printout to this enclosure.

_____ 3.11 Compare the "Effective Shutdown Margin for Present Conditions" to adjusted NC system boron concentration recorded in Step 3.1.6 **OR** if applicable, Step 3.5.2.

_____ 3.12 **IF** Xenon Credit was selected **AND** a potential boron deficit is indicated in the calculation results, complete the following steps:

_____ 3.12.1 Record "Adjusted SDM Deficit" from Reactivity Balance Calculation output: ________________pcm

_____ 3.12.2 Select "View" then "Xenon/Samarium Calculations" on toolbar.

_____ 3.12.3 Select "Xenon" for Isotope and "Transient Prediction" for Calculation Type.

_____ 3.12.4 Enter initial concentrations from Steps 3.1 and 3.3.

CAUTION: The time in the initial entry for the power history must be the same time from when initial concentrations are taken. Mismatched times for power history initial time step and initial concentrations will cause REACT to predict incorrect xenon concentrations. (R.M.)

_____ 3.12.5 Enter appropriate power history as follows:

_____ 3.12.5.1 The date/time in step 3.3.

_____ 3.12.5.2 The power level at the time in step 3.3.

_____ 3.12.5.3 **IF** the current power level is different than the power level in step 3.3., then enter the date/time of power change and the current power level.

_____ 3.12.5.4 Enter a date/time approximately two days later after the last recorded date/time.

_____ 3.12.6 After all data has been entered, use the "Calculate" button to obtain program results.

_____ 3.12.7 Print program results.

_____ 3.12.8 Label printout appropriately.

_____ 3.12.9 Attach printout to this enclosure.

CAUTION:	SDM is ensured until the Date/Time recorded below at the present NC System boron or higher. After that time, NC System boration will be required to maintain SDM. {PIP C-03-04173} (R.M.)

_____ 3.12.10 Record the last Date/Time from the xenon predict of Step 3.12.7 that is greater than the xenon worth of Step 3.12.1

Loss of SDM Date/Time _______/_______

3.13 Sign below to document performance.

Performed by:___________________________________ Date/Time: _____/______

_____ 3.14 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.15 Verify that both performances of this enclosure yield equivalent results.

1. Limits and Precautions

NOTE:	All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 Shutdown margin (SDM) shall be ≥ 1000 pcm in Mode 5. (Tech Spec 3.1.1 and Enclosure 4.5 and 4.6)

1.4 SDM shall be ≥ 1300 pcm in Modes 1, 2, 3, and 4. (Tech Spec 3.1.1 and Enclosure 4.3, 4.4, 4.5 or 4.6)

1.5 Required refueling boron concentration is obtained from Tech Spec 3.9.1 and Enclosure 4.6.

1.6 **IF** T-AVG < 500 °F, credit for only 50% of xenon worth can be taken when verifying SDM.

1.7 NC system T-AVG changes in Modes 3, 4 and 5 shall only be performed to a temperature where measured NC System boron concentration is ≥ boron concentration required for SDM.

1.8 Verification of K-eff < 0.99 with shutdown banks withdrawn shall only be performed above 200 °F.

1.9 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.10 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

1.11 Shutdown Margin is satisfied if NC System Boron Concentration ≥ to the Refueling Boron Concentration per the COLR.

1.12 Maintaining Boron Dilution Mitigation System (BDMS) operability with no reactor coolant pumps in service when in Modes 4 or 5 requires an additional boron penalty be added to Shutdown Margin calculations.

2. Initial Conditions

_____ 2.1 **<u>IF</u>** using effective boron concentration, ensure latest NC system boron sample has been entered into the OAC.

3. Procedure

NOTE:
1. All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e.( )_________pcm], the sign provided with data must be entered. The calculations account for these sign conventions. (R.M.)
2. If latest NC boron sample is used instead of effective boron concentration, a ppm penalty, obtained from applicable Unit R.O.D. manual Section 5.14, is applied to account for B-10 depletion. Interpolation of Section 5.14 is **<u>NOT</u>** required. Using the larger value of the applicable burnup range provides conservatism. (R.M.)
3. Step 3.1.5 is only applicable when a boration is in progress in support of a NC System cooldown. The PZR is then considered a potential dilution source and a penalty must be included when calculating SDM. Otherwise a Value of <u>0</u> is entered in Step 3.1.5.

_____ 3.1 Determine the following information:

Step	Description	Reference	Value
3.1.1	Unit	N/A	
3.1.2	Date/Time	N/A	
3.1.3	Present NC System Boron Conc **<u>OR</u>** Effective Boron Concentration	Latest Sample **<u>OR</u>** P5614	___ ppm
3.1.4	**<u>IF</u>** **<u>NOT</u>** using Effective Boron Concentration in Step 3.1.3, record B-10 correction	R.O.D. manual Section 5.14	___ ppm
3.1.5	**<u>IF</u>** PZR Boron Conc **<u>NOT</u>** verified to be within 50 ppm of NC System Boron Conc, record PZR mixing penalty of 100 ppm	OP/1(2)/A/6100/002	___ ppm
3.1.6	Adjusted NC System Boron Conc Step 3.1.3 minus Step 3.1.4 minus Step 3.1.5. (**IF** sum negative record 0)	References used in Steps 3.1.3, 3.1.4 and 3.1.5	___ - ___ - ___ = ____ ppm **<u>OR</u>** <u>(0)</u>

_____ 3.2 **<u>IF</u>** NC System Boron Concentration ≥ the Refueling Operations Boron Concentration per the COLR, Section 2.15, then Shutdown Margin is met and perform the following:

_____ 3.2.1 Sign below to document performance.

Performed by:______________________________Date/Time: _____/______

_____ 3.2.2 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **<u>NOT</u>** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.2.3 Verify that both performances of this enclosure yield equivalent results.

_____ 3.2.4 Submit both performances of this enclosure to the Control Room Supervisor for review.

_____ 3.2.5 N/A the remaining steps of this enclosure.

NOTE: All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e.( )_________pcm], the sign provided with data must be entered. The calculations account for these sign conventions. (R.M.)

_____ 3.3 Determine the following information:

Step	Description	Reference	Value
3.3.1	Present NC System Temperature	OAC or Control Board	° F
3.3.2	Desired NC System Temperature	N/A	° F
3.3.3	Present cycle burnup	P1457 or Duty Reactor Engineer	EFPD
3.3.4	Present Difference from Equilibrium Samarium Worth	P1475 or Duty Reactor Engineer	( ) pcm
3.3.5	Number of Known Untrippable Control Rods	OAC or Control Board	
3.3.6	Untrippable RCCA Core Locations	OAC or Control Board	
3.3.7	Date and time of latest valid Iodine and Xenon concentrations; N/A if xenon free.	Duty Reactor Engineer or current time if using OAC	________/_______
3.3.8	Iodine concentration at time listed in Step 3.3.7; 0 if xenon free.	P0124 or Duty Reactor Engineer	atm/cc
3.3.9	Xenon concentration at time listed in Step 3.3.7; 0 if xenon free.	P0125 or Duty Reactor Engineer	atm/cc
3.3.10	Shutdown Fission Product Correction Factor	**<u>IF</u>** Cycle Burnup < 12 EFPD = 0, **<u>ELSE</u>** per Enclosure 4.9	ppm

NOTE: Interpolation is **<u>NOT</u>** required for Step 3.4. Bounding temperatures and burnups may be used to select the highest boron concentration in Section 5.11 of R.O.D manual. (R.M.)

_____ 3.4 Select the <u>highest</u> boron concentration for the T-AVGs between the range of Step 3.3.1 (Present NC System Temperature) and Step 3.3.2 (Desired NC System Temperature) at current cycle burnup (Step 3.3.3) in Section 5.11 of the R.O.D. manual. {PIP 0-C99-0318} __________ ppm

_____ 3.5 Calculate additional boron concentration penalties:

_____ 3.5.1 Calculate untrippable RCCA penalty:

Description	**Reference**	**Value**
A. Number of Untrippable RCCA(s) **NOT** fully inserted	Step 3.3.5	
B. Boron Penalty per Untrippable rod (Maximum stuck rod worth during cycle (ppmb))	ROD Book Section 5.7	
Untrippable RCCA Penalty	**(A) X (B)**	ppm

_____ 3.5.2 **IF** physics testing is **NOT** complete enter Zero Power Physics Testing penalty of 100 ppm, otherwise, enter 0 ppm. ____________ ppm

_____ 3.5.3 Enter Shutdown Fission Product Correction Factor from Step 3.3.10.
____________ ppm

_____ 3.5.4 **IF** Unit is in Mode 4 or 5 **AND** no reactor coolant pumps are in service, record boron penalty from ROD Manual Section 5.15 for desired NC temperature (Step 3.3.2) and cycle burnup (Step 3.3.3) with the most reactive rod stuck out.
____________ppm

_____ 3.5.5 Calculate total additional boron concentration penalty:

Description	**Reference**	**Value**
A. Untrippable RCCA Penalty	Step 3.5.1	ppm
B. Additional Boron Conc Penalty for ZPPT	Step 3.5.2	ppm
C. Shutdown Fission Product Correction Factor	Step 3.5.3	ppm
D. Penalty for No NCPs in Modes 4 or 5	Step 3.5.4	ppm
Total Boron Penalty	**(A) + (B) + (C) + (D)**	ppm

_____ 3.6 Calculate total required boron concentration for SDM:

Description	**Reference**	**Value**
A. Required SDM Boron	Step 3.4	ppm
B. Total Boron Penalty	Step 3.5.5	ppm
Total Required Boron Concentration for SDM (Xenon Free)	**(A) + (B)**	ppm

_____ 3.7 Determine the Boron Difference between Required Boron Concentration for SDM and current NC System boron concentration.

Description	Reference	Value
A. Total Required Boron Concentration for SDM	Step 3.6	ppm
B. Adjusted NC System Boron Conc recorded in Step 3.1.6	Step 3.1.6	ppm
Boron Difference	**(A) - (B)**	**( ) ppm**

_____ 3.7.1 **<u>IF</u>** the Boron Difference determined in Step 3.7 is negative, SDM is maintained for Xenon free conditions.

_____ 3.7.2 **<u>IF</u>** the Boron Difference determined in Step 3.7 is positive **<u>AND</u>** Xenon credit is **<u>NOT</u>** being used, NCS boration is required to maintain SDM.

_____ 3.8 **<u>IF</u>** the Boron Difference determined in Step 3.7 is positive **<u>AND</u>** Xenon credit is being used, determine the Xenon Credit as follows:

NOTE: Interpolation is **<u>NOT</u>** required for Step 3.8.1. Bounding NC System T-AVG and cycle burnup may be used to select the highest Differential Boron Worth (most negative) from Section 5.3 of R.O.D manual. (R.M.)

_____ 3.8.1 Determine the ARI, Differential Boron Worth at lower T-AVG of Step 3.3.1 or 3.3.2 **<u>AND</u>** cycle burnup of Step 3.3.3 from Section 5.3 of the R.O.D.manual. _____________ pcm/ppm

_____ 3.8.2 Calculate the reactivity worth of the boron difference:

Description	Reference	Value
A. Boron Difference	Step 3.7	ppm
B. ARI Differential Boron Worth	Step 3.8.1	pcm/ppm
Reactivity Worth of Boron Difference	**(A) X (B)**	**pcm**

_____ 3.8.3 Calculate the xenon worth that is required to ensure SDM at the present NC System boron.

_____ 3.8.3.1 **IF** the desired T-AVG from Step 3.3.2 is ≥ 500°F, calculate the Xenon Worth as follows:

Description	Reference	Value
A. Reactivity Worth	Step 3.8.2	pcm
B. Difference from Eq Sm Worth	Step 3.3.4	( ) pcm
Xenon Worth	**{(A) - (B)} ÷ 0.85**	**pcm**

_____ 3.8.3.2 **IF** the desired T-AVG is < 500°F from Step 3.3.2, calculate the Xenon Worth as follows:

Description	Reference	Value
A. Reactivity Worth	Step 3.8.2	pcm
B. Difference from Eq Sm Worth	Step 3.3.4	( ) pcm
Xenon Worth	**{(A) - (B)} X 2**	**pcm**

_____ 3.8.3.3 Predict Xenon for approximately two days into the future using OAC Xenon Predict Program or REACT program and data from steps 3.1 and 3.3.

CAUTION: SDM is ensured until the Date/Time recorded below at the present NC System boron or higher. After that time, NC System boration will be required to maintain SDM. {PIP C-03-04173} (R.M.)

_____ 3.8.3.4 Record the last Date/Time from the xenon predict of Step 3.8.3.3 that is greater than the xenon worth of Step 3.8.3.1 or step 3.8.3.2 in the following step.

_____ 3.8.3.5 Loss of SDM Date/Time _______/_______

3.9 Sign below to document performance.

Performed by: ________________________________ Date/Time: _____/______

_____ 3.10 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.11 Verify that both performances of this enclosure yield equivalent results.

1. Limits and Precautions

NOTE: All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 Shutdown margin (SDM) shall be ≥ 1000 pcm in Mode 5. (Tech Spec 3.1.1 and Enclosure 4.5 and 4.6)

1.4 SDM shall be ≥ 1300 pcm in Modes 1, 2, 3, and 4. (Tech Spec 3.1.1 and Enclosure 4.3, 4.4, 4.5 or 4.6)

1.5 **IF** T-AVG < 500 °F, credit for only 50% of xenon worth can be taken when verifying SDM.

1.6 NC system T-AVG changes in Modes 3, 4 and 5 shall only be performed to a temperature where measured NC System boron concentration is ≥ boron concentration required for SDM.

1.7 Verification of K-eff < 0.99 with shutdown banks withdrawn shall only be performed above 200 °F.

1.8 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.9 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

2. Initial Conditions

_____ 2.1 Ensure latest NC system boron sample has been entered into the OAC Manual Data Log (MLOG).

3. Procedure

NOTE: All values are assumed positive unless otherwise indicated by parentheses. If parentheses precede the value [i.e.( )__________pcm], the sign provided with data must be entered. The calculations account for these sign conventions. (R.M.)

_____ 3.1 Determine the following information:

Step	Description	Reference	Value
3.1.1	Unit	N/A	
3.1.2	Cycle Burnup	P1457	EFPD
3.1.3	Present Effective/Desired NC System Boron Concentration	P5614 or Duty Rx Eng	ppm
3.1.4	Desired NC System Temperature	N/A	˚F
3.1.5	Diff. Between Eq. and Present Sm Worth	P1475, REACT, OAC Predict or Rx Eng	( ) pcm
3.1.6	Shutdown Fission Product Correction Factor	**IF** Cycle Burnup < 12 EFPD = 0, **ELSE** per Enclosure 4.9	ppm

_____ 3.2 Access "Reactor Eng Analysis and Calc Toolkit (REACT) - CNS" from DAE.

_____ 3.3 Select "View" then "Reactivity Balance Calculations" on toolbar.

_____ 3.4 Select "Mode 3 Verification" tab in Reactivity Balance Calculations window.

CAUTION: All inputs must be checked carefully and corrected as needed before calculating results. The correct Unit must be specified.

NOTE: Sign must be provided with Difference from Equilibrium Samarium [i.e.( )_____pcm]. (R.M.)

_____ 3.5 Enter appropriate values from Step 3.1 in "Input Data" section.

_____ 3.6 Obtain results as follows:

- ☐ 3.6.1 Click "Calculate" button.
- ☐ 3.6.2 Print program results.
- ☐ 3.6.3 Label printout appropriately.
- ☐ 3.6.4 Attach printout to this enclosure.

_____ 3.7 **IF** output states "Boron Concentration Acceptable", K-eff will be less than 0.99 (unit will remain in Mode 3) with Shutdown Banks withdrawn.

_____ 3.8 **IF** Xenon Worth is **NOT** zero **AND** the output shows a Potential Mode 2 Boron Deficit:

_____ 3.8.1 Obtain and attach printout of Xenon Predict from OAC program or REACT program for current and future xenon worth.

NOTE:	Mode 3 shall be maintained until the date and time recorded below. Prior to exceeding this date and time, boration will be required to maintain Mode 3 (k-eff < 0.99) with shutdown banks withdrawn. (R.M.)

_____ 3.8.2 Record last date and time xenon worth on printout attached per Step 3.8.1 is greater than Adjusted Mode 2 Deficit on REACT printout.

Date ________________ Time ________________

3.9 Sign below to document performance.

Performed by: _____________________________________ Date/Time: _____/______

_____ 3.10 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.11 Verify that both performances of this enclosure yield equivalent results.

1. Limits and Precautions

NOTE:	All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 Required refueling boron concentration is obtained from Tech Spec 3.9.1 and Enclosure 4.6.

1.4 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.5 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

1.6 Shutdown Margin is satisfied if NC System Boron Concentration ≥ to the Refueling Boron Concentration per the COLR.

2. Initial Conditions

None

3. Procedure

_____ 3.1 Determine present boron concentration of the operating ND train. _____________ ppm

_____ 3.2 Record Tech Spec Refueling Boron Concentration from bottom of page of Section 5.11 of the R.O.D. manual. _____________ ppm

_____ 3.3 Verify present boron concentration of Step 3.1 is greater than refueling boron concentration of Step 3.2.

3.4 Sign below to document performance.

Performed by:_____________________________________ Date/Time: _____/______

_____ 3.5 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.6 Verify that both performances of this enclosure yield equivalent results.

1. Limits and Precautions

NOTE:	All curves/tables used in this procedure are found in Unit One (Two) Reactor Operating Data (R.O.D.) manual. (R.M.)

1.1 This procedure is reactivity management related because it is used to verify proper balance and manipulation of reactivity using various tools (REACT, R.O.D. Manual, etc.).

1.2 Ensure all data used by this procedure are for the correct unit.

1.3 REACT and manual calculations may **NOT** yield equal results due to minor differences in methods (i.e. interpolation). Reactor Engineering may be contacted if questions arise.

1.4 Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

2. Initial Conditions

None

3. Procedure

NOTE:	Interpolation is **NOT** required for the following steps. Bounding times may be used to select the highest shutdown fission product correction per Section 5.13 of R.O.D manual. (R.M.)

_____ 3.1 **IF** the Unit operated for > 3 EFPD from the previous shutdown to the current shutdown, determine the Shutdown Fission Product Correction Factor as follows:

Description	Reference	Value
A. Date/Time of current Unit Trip or Shutdown:	Control Room Log Books	_________/_________
B. Current Date/Time or projected time used in the appropriate calculation:	N/A	_________/_________
C. Duration of Shutdown	(B) - (A)	hours
D. Shutdown Fission Product Correction Factor(using duration from 3.1.C)	**ROD Manual (Sec 5.13)**	**ppm**

_____ 3.2 **IF** the Unit operated for < 1 EFPD from the previous shutdown to the current shutdown, determine the Shutdown Fission Product Correction Factor as follows:

Description	Reference	Value
A. Date/Time of previous Unit Trip or Shutdown:	Control Room Log Books	_________/_________
B. Current Date/Time or projected time used in the appropriate calculation:	N/A	_________/_________
C. Duration of Shutdown	(B) - (A)	hours
D. Shutdown Fission Product Correction Factor (using duration from 3.2.C)	**ROD Manual (Sec 5.13)**	**ppm**

_____ 3.3 **IF** the Unit operated between 1 and 3 EFPD from the previous shutdown to the current shutdown **AND** the current shutdown duration is > 72 hours, determine the Shutdown Fission Product Correction Factor as follows:

Description	Reference	Value
A. Date/Time of current Unit Trip or Shutdown:	Control Room Log Books	_________/_________
B. Current Date/Time or projected time used in the appropriate calculation:	N/A	_________/_________
C. Duration of Shutdown	(B) - (A)	hours
D. Shutdown Fission Product Correction Factor for Present Shutdown (using duration from 3.3.C)	**ROD Manual (Sec 5.13)**	**ppm**

_____ 3.4 **IF** the Unit operated between 1 and 3 EFPD from the previous shutdown to the current shutdown **AND** the current shutdown duration is ≤ 72 hours, determine the Shutdown Fission Product Correction Factor as follows:

Description	Reference	Value
A. Date/Time of previous Unit Trip or Shutdown:	Control Room Log Books	_________/_________
B. Date/Time of previous Unit Startup:	Control Room Log Books	_________/_________
C. Duration of Previous Shutdown	(B) - (A)	hours
D. Shutdown Fission Product Correction Factor for Previous Shutdown (using duration from 3.4.C)	ROD Manual (Sec 5.13)	ppm
E. Date/Time of current Unit Trip or Shutdown:	Control Room Log Books	_________/_________
F. Current Date/Time or projected time used in the appropriate calculation:	N/A	_________/_________
G. Duration of current Shutdown	(F) - (E)	hours
H. Shutdown Fission Product Correction Factor for Current Shutdown (using duration from 3.4.F)	ROD Manual (Sec 5.13)	ppm
I. Shutdown Fission Product Correction Factor	**(Step 3.4.D)/ 2 + (Step 3.4.H)**	**ppm**

3.5 Sign below to document performance.

Performed by:________________________________ Date/Time: _____/______

_____ 3.6 Ensure that an independent calculation per this enclosure has been separately performed.

NOTE:	Independently performed calculations may **NOT** yield exactly the same results due to data taken at different times. The CRS and Reactor Engineering may be contacted if questions arise.

_____ 3.7 Verify that both performances of this enclosure yield equivalent results.

JPM A.1-2S

SRO

Catawba Nuclear Station
Admin. JPM A.1-2S
September 2019 NRC Exam

EVALUATION SHEET

Task: Determine Final BAT level for a Rapid Boration and evaluate Selected License Commitments

Alternate Path: N/A

Facility JPM #: NV-126 Modified

Safety Function: N/A

K/A 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Importance: 4.3 / 4.4 **CFR:** 41.10 / 43.5 / 45.2 / 45.6

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ______

References: OP/1/A/6150/009
Reactor Operating Data (R.O.D.) Book
Unit 1 COLR

Task Standard: Applicant determines that a final BAT #1 level of 43 – 44% and SLC 16.9-12 Condition A applies.

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

Applicant:
NAME______________________________ Docket #________________ Time Start: ___________
Time Finish: ___________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ________________________________ ________________________________/________
NAME SIGNATURE DATE

===

COMMENTS

___

___

___

___

___

Catawba Nuclear Station
Admin. JPM A.1-2S
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is in Mode 3, shutting down to investigate a loose parts issue discovered in the reactor vessel. OP/1/A/6100/002 (Controlling Procedure for Unit Shutdown) Enclosure 1 (Unit Shutdown to Mode 3) is in progress.**
- **The cooldown has NOT been initiated.**
- **Currently Unit 1 is at 50 EFPD.**
- **The REACT program is not available.**
- **Preparations are being made to perform a rapid boration to reach the required refueling boron concentration.**
- **It is NOT desired to use BAT #2 for any of the boric acid addition required.**
- **Current NC system Boron concentration is 1740 ppm per the latest sample taken by primary chemistry.**
- **Current BAT #1 level is 75%.**

INITIATING CUES:

- **The Control Room Supervisor directs you to:**
  - **Determine the final BAT #1 level required to reach the MINIMUM required refueling boron concentration per the COLR by performing OP/1/A/6150/009 (Boron Concentration Control) Enclosure 4.9 (Rapid Boration) steps 3.3 through 3.7.**
  - **Determine applicable Tech Spec / SLC actions, if any, following Boric Acid addition.**

Final BAT #1 level: _______%

Tech Spec / SLC actions (if any):____

EXAMINER NOTE:

After reading the cue, provide the examinee with a copy of Enclosure 4.9 with steps complete thru 3.2, a calculator and access to a copy of the ROD Book.

START TIME: _______

STEP / STANDARD	SAT / UNSAT
NOTE: If Unit shutdown is for a Refueling Outage, the boron concentration in the next step shall be greater than or equal to the refueling boron concentration as stated in the COLR. STEP 1: 3.3 Record the desired NC System boron concentration. Desired concentration _______________ ppm STANDARD: Operator determines that the required MINIMUM boron concentration for refueling operations per 2.15 of the COLR is 2700 ppm. **Examiner Note: This step is critical to determine the minimum required boron concentration needed for refueling operations.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

<table>
<tr><th>STEP / STANDARD</th><th>SAT / UNSAT</th></tr>
<tr><td>NOTE: If Unit shutdown is for a Refueling Outage, approximately 41,000 gallons will be required to achieve 2900 ppmB (Mode 6 boron concentration plus 200 ppmB margin).

<u>STEP 2:</u> 3.4 Determine the volume of boric acid required to achieve the concentration in Step 3.3 using the Unit 1 Rod Manual or REACT program. (R.M.)

___________ gallons

<u>STANDARD</u>:

Operator determines using the Unit 1 Rod Manual that 12,339 gallons of Boric Acid are required to be added to the NC system to increase NC system Boron concentration to 2700 ppm from the present value of 1740 ppm.

Examiner Note: This step is critical to determine the total number of gallons of Boric Acid that need to be added to increase the NC system Boron concentration to the minimum refueling concentration of 2700 ppm.

<u>COMMENTS:</u></td><td>CRITICAL STEP

___ SAT

___ UNSAT</td></tr>
</table>

STEP / STANDARD	SAT / UNSAT
STEP 3: 3.5 Determine equivalent BAT level change corresponding to the volume determined in Step 3.4 as follows: _________ gallons = _________ % 392 gal/% STANDARD: Operator calculates a BAT level change of 31.5 %. Depending on how the operator rounds, 31% - 32% is acceptable. **Examiner Note: This step is critical in order to determine the final BAT #1 level needed to meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 4: 3.6 **IF** aligned per Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1) **AND** it is desired to use BAT #2 to supply a portion of the total boric acid to be added, perform the following: (R.M.) STANDARD: Operator should determine that this step is N/A per the initiating cue. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 5: 3.7 Determine final BAT #1 level as follows: (R.M.) 3.7.1 Record initial BAT #1 level. ________ % 3.7.2 Subtract the volume to be added (Step 3.4 or 3.5.4) from the initial level (Step 3.7.1) to determine final BAT #1 level. __________ % - _______________ % = ___________ % (Step 3.7.1) (Step 3.5 or 3.6.4) STANDARD: Operator should determine a final BAT #1 level of 43.5%. Acceptable range is 43 – 44%. **Examiner Note: This step is critical to determine the final BAT #1 level and meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 6: Determine applicable Tech Spec / SLC actions, if any, following Boric Acid addition. STANDARD: Operator should determine Boric Acid Tank below the minimum volume specified in the COLR and SLC 16.9-12 Condition A is required to be entered. COMMENTS:	___ SAT ___ UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 is in Mode 3, shutting down to investigate a loose parts issue discovered in the reactor vessel. OP/1/A/6100/002 (Controlling Procedure for Unit Shutdown) Enclosure 1 (Unit Shutdown to Mode 3) is in progress.**
- **The cooldown has NOT been initiated.**
- **Currently Unit 1 is at 50 EFPD.**
- **The REACT program is not available.**
- **Preparations are being made to perform a rapid boration to reach the required refueling boron concentration.**
- **It is <u>NOT</u> desired to use BAT #2 for any of the boric acid addition required.**
- **Current NC system Boron concentration is 1740 ppm per the latest sample taken by primary chemistry.**
- **Current BAT #1 level is 75%.**

INITIATING CUES:

- **The Control Room Supervisor directs you to:**
  - **Determine the final BAT #1 level required to reach the <u>MINIMUM</u> required refueling boron concentration per the COLR by performing OP/1/A/6150/009 (Boron Concentration Control) Enclosure 4.9 (Rapid Boration) steps 3.3 through 3.7.**
  - **Determine applicable Tech Spec / SLC actions, if any, following Boric Acid addition.**

Final BAT #1 level: _______%

Tech Spec / SLC actions (if any):____

3. Procedure

NOTE:	This enclosure will affect reactivity of the core and is therefore designated important to Reactivity Management per the guidelines of AD-OP-ALL-0203 (Reactivity Management). (R.M.)

AA 3.1 Ensure valves are aligned per one of the following:

☑ Enclosure 4.8 (Valve Checklist)
OR
☐ Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1)

AA 3.2 Record the position of the Boric Acid Transfer Pumps switches.

☑ B/A Xfer Pmp 1A Auto

☑ B/A Xfer Pmp 1B Auto

NOTE:	If Unit shutdown is for a Refueling Outage, the boron concentration in the next step shall be greater than or equal to the refueling boron concentration as stated in the COLR.

____ 3.3 Record the desired NC System boron concentration.
Desired concentration **2700** ppm

NOTE:	If Unit shutdown is for a Refueling Outage, approximately 41,000 gallons will be required to achieve 2900 ppmB (Mode 6 boron concentration plus 200 ppmB margin).

____ 3.4 Determine the volume of boric acid required to achieve the concentration in Step 3.3 using the Unit 1 Rod Manual or REACT program. (R.M.)

12,339 gallons

____ 3.5 Determine equivalent BAT level change corresponding to the volume determined in Step 3.4 as follows:

$$\frac{\textbf{12,339}\text{ gallons}}{392\text{ gal / \%}} = \textbf{31.5}\ \%$$

(Acceptable Range 31 - 32%)

N/A 3.6 **IF** aligned per Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1) **AND** it is desired to use BAT #2 to supply a portion of the total boric acid to be added, perform the following: (R.M.)

☐ 3.6.1 Record initial BAT #2 level. _______ %

NOTE:	• Minimum BAT #2 level required to maintain the tank functional for Unit 2 when Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1) is completed is contained in the Unit 2 COLR. • Primary AOM may be contacted to determine BAT #2 final level and volume.

☐ 3.6.2 Record desired BAT #2 final level. _______ %

☐ 3.6.3 Determine change in BAT #2 level as follows:

_______________ % - _______________ % = _________ %
Initial level (Step 3.6.1) Final level (Step 3.6.2)

☐ 3.6.4 Determine remaining volume to be added from BAT #1 as follows:

_____________ % - ____________ % = __________ %
Equivalent BAT level change (Step 3.5) Change in BAT #2 level (Step 3.6.3)

3.7 Determine final BAT #1 level as follows: (R.M.)

☐ 3.7.1 Record initial BAT #1 level. 75 %

☐ 3.7.2 Subtract the volume to be added (Step 3.5 or 3.6.4) from the initial level (Step 3.7.1) to determine final BAT #1 level.

75 % - 31.5 % = 43.5 %
(Step 3.7.1) (Step 3.5 or 3.6.4)
(Acceptable Range 43 - 44%)

_____ 3.8 Ensure letdown flow is maximized per OP/1/A/6200/001 (Chemical And Volume Control System).

3.9 Place at least two of the following banks of Pressurizer heaters in "MAN":

_____ • PZR Htr Group 1A
_____ • PZR Htr Group 1B
_____ • PZR Htr Group 1D

2.18 Boration Systems Borated Water Source - Operating (SLC 16.9-12)

2.18.1 Volume and boron concentrations for the Boric Acid Tank (BAT) and the Refueling Water Storage Tank (RWST) during MODES 1, 2, and 3 and MODE 4 with all RCS cold leg temperatures > 210°F*.

*** NOTE: The SLC 16.9-12 applicability is down to MODE 4 temperatures of > 210°F. The minimum volumes calculated support cooldown to 200°F to satisfy UFSAR Chapter 9 requirements.**

Parameter	Limit
NOTE: When cycle burnup is ≥ 481 EFPD, Figure 6 may be used to determine the required BAT Minimum Level.	
BAT minimum boron concentration	7,000 ppm
Volume of 7,000 ppm boric acid solution required to maintain SDM at 210°F	13,500 gallons
BAT Minimum Shutdown Volume (Includes the additional volumes listed in SLC 16.9-12)	25,200 gallons (45.8%)
RWST minimum boron concentration	2,700 ppm
Volume of 2,700 ppm boric acid solution required to maintain SDM at 210 °F	57,107 gallons
RWST Minimum Shutdown Volume (Includes the additional volumes listed in SLC 16.9-12)	98,607 gallons (22.0%)

Unit One Reactor Operating Data
Section 4.1
Boration and Dilution Tables
Hot RCS (Modes 1, 2 and 3)

Desired Boron Conc. (ppmB)	Present Boron Concentration (ppmB)										
	1600	1620	1640	1660	1680	1700	1720	1740	1760	1780	1800
1400	9037	9878	10708	11529	12339	13140	13932	14714	15488	16252	17009
1420	8077	8918	9748	10569	11379	12180	12972	13754	14528	15292	16049
1440	7131	7971	8802	9622	10433	11234	12025	12808	13581	14346	15102
1460	6197	7038	7868	8689	9499	10300	11092	11874	12648	13412	14168
1480	5276	6117	6947	7768	8578	9379	10171	10953	11727	12491	13248
1500	4368	5209	6039	6859	7670	8471	9262	10045	10818	11583	12339
1520	3471	4312	5143	5963	6773	7574	8366	9148	9922	10687	11443
1540	2587	3427	4258	5078	5889	6690	7481	8264	9037	9802	10558
1560	1713	2554	3385	4205	5016	5816	6608	7390	8164	8929	9685
1580	851	1692	2522	3343	4153	4954	5746	6528	7302	8066	8823
1600	0	841	1671	2492	3302	4103	4895	5677	6450	7215	7971
1620	230	0	830	1651	2461	3262	4054	4836	5610	6374	7131
1640	460	231	0	820	1631	2432	3223	4006	4779	5544	6300
1660	692	462	231	0	811	1611	2403	3185	3959	4724	5480
1680	924	694	464	232	0	801	1593	2375	3148	3913	4669
1700	1157	927	697	465	233	0	792	1574	2347	3112	3868
1720	1391	1161	930	699	467	234	0	782	1556	2321	3077
1740	1625	1395	1165	934	701	468	235	0	773	1538	2294
1760	1861	1631	1400	1169	937	704	470	235	0	765	1521
1780	2097	1867	1637	1405	1173	940	706	472	236	0	756
1800	2334	2104	1874	1642	1410	1177	943	709	473	237	0
1820	2572	2342	2111	1880	1648	1415	1181	947	711	475	238
1840	2811	2581	2350	2119	1887	1654	1420	1185	950	714	477
1860	3050	2820	2590	2358	2126	1893	1659	1425	1189	953	716
1880	3291	3061	2830	2599	2367	2134	1900	1665	1430	1194	957
1900	3532	3302	3071	2840	2608	2375	2141	1907	1671	1435	1198
1920	3774	3544	3314	3082	2850	2617	2383	2149	1913	1677	1440
1940	4017	3787	3557	3325	3093	2860	2626	2392	2156	1920	1683
1960	4261	4031	3800	3569	3337	3104	2870	2636	2400	2164	1927
1980	4506	4276	4045	3814	3582	3349	3115	2880	2645	2409	2172

KEY

Unit One Reactor Operating Data
Section 4.1
Boration and Dilution Tables
Hot RCS (Modes 1, 2 and 3)

Desired Boron Conc. (ppmB)	Present Boron Concentration (ppmB)										
	1800	1820	1840	1860	1880	1900	1920	1940	1960	1980	2000
1600	7971	8719	9459	10191	10914	11631	12339	13041	13735	14422	15102
1620	7131	7878	8618	9350	10074	10790	11498	12200	12894	13581	14261
1640	6300	7048	7788	8519	9243	9959	10668	11369	12064	12751	13431
1660	5480	6228	6967	7699	8423	9139	9848	10549	11243	11930	12610
1680	4669	5417	6157	6888	7612	8329	9037	9739	10433	11120	11800
1700	3868	4616	5356	6088	6811	7528	8236	8938	9632	10319	10999
1720	3077	3825	4564	5296	6020	6736	7445	8146	8840	9527	10207
1740	2294	3042	3782	4514	5237	5954	6662	7364	8058	8745	9425
1760	1521	2269	3008	3740	4464	5180	5889	6590	7284	7971	8652
1780	756	1504	2244	2975	3699	4415	5124	5825	6520	7207	7887
1800	0	748	1487	2219	2943	3659	4368	5069	5763	6450	7131
1820	238	0	740	1471	2195	2911	3620	4321	5016	5703	6383
1840	477	239	0	732	1456	2172	2880	3582	4276	4963	5643
1860	716	478	240	0	724	1440	2149	2850	3544	4231	4911
1880	957	719	480	240	0	716	1425	2126	2820	3507	4188
1900	1198	960	721	482	241	0	709	1410	2104	2791	3471
1920	1440	1202	963	724	483	242	0	701	1395	2083	2763
1940	1683	1445	1206	967	726	485	243	0	694	1381	2061
1960	1927	1689	1450	1211	970	729	487	244	0	687	1367
1980	2172	1934	1695	1456	1215	974	732	489	245	0	680
2000	2417	2179	1941	1701	1461	1219	977	734	490	246	0
2020	2664	2426	2187	1948	1707	1466	1224	981	737	492	247
2040	2911	2673	2435	2195	1955	1713	1471	1228	984	740	494
2060	3160	2922	2683	2444	2203	1962	1720	1477	1233	988	742
2080	3409	3171	2932	2693	2452	2211	1969	1726	1482	1237	992
2100	3659	3421	3183	2943	2703	2461	2219	1976	1732	1487	1242
2120	3910	3672	3434	3194	2954	2712	2470	2227	1983	1739	1493
2140	4162	3924	3686	3446	3206	2964	2722	2479	2235	1991	1745
2160	4415	4177	3939	3699	3459	3217	2975	2732	2488	2244	1998
2180	4669	4431	4193	3953	3713	3471	3229	2986	2742	2498	2252

KEY

KEY

Unit One Reactor Operating Data
Section 4.1
Boration and Dilution Tables
Hot RCS (Modes 1, 2 and 3)

Desired Boron Conc. (ppmB)	Present Boron Concentration (ppmB)										
	2000	2020	2040	2060	2080	2100	2120	2140	2160	2180	2200
1800	7131	7804	8471	9131	9785	10433	11074	11710	12339	12963	13581
1820	6383	7056	7723	8383	9037	9685	10326	10962	11591	12215	12833
1840	5643	6317	6983	7644	8298	8945	9587	10222	10852	11476	12094
1860	4911	5585	6252	6912	7566	8214	8855	9490	10120	10744	11362
1880	4188	4861	5528	6188	6842	7490	8131	8767	9396	10020	10638
1900	3471	4145	4812	5472	6126	6773	7415	8050	8680	9304	9922
1920	2763	3436	4103	4763	5417	6065	6706	7342	7971	8595	9213
1940	2061	2735	3402	4062	4716	5363	6005	6640	7270	7894	8512
1960	1367	2041	2707	3368	4022	4669	5311	5946	6576	7200	7818
1980	680	1354	2020	2681	3335	3982	4624	5259	5889	6513	7131
2000	0	673	1340	2000	2654	3302	3944	4579	5209	5832	6450
2020	247	0	667	1327	1981	2629	3270	3906	4535	5159	5777
2040	494	247	0	660	1314	1962	2603	3239	3868	4492	5110
2060	742	496	248	0	654	1302	1943	2579	3208	3832	4450
2080	992	745	498	249	0	648	1289	1925	2554	3178	3796
2100	1242	995	748	499	250	0	642	1277	1907	2530	3148
2120	1493	1246	999	751	501	251	0	635	1265	1889	2507
2140	1745	1498	1251	1003	753	503	252	0	630	1253	1871
2160	1998	1751	1504	1256	1006	756	505	253	0	624	1242
2180	2252	2005	1758	1510	1260	1010	759	507	254	0	618
2200	2507	2260	2013	1765	1515	1265	1014	762	509	255	0
2220	2763	2516	2269	2020	1771	1521	1270	1018	765	511	256
2240	3020	2773	2526	2277	2028	1778	1527	1275	1022	768	513
2260	3277	3031	2783	2535	2286	2036	1784	1532	1279	1025	771
2280	3536	3290	3042	2794	2545	2294	2043	1791	1538	1284	1029
2300	3796	3549	3302	3054	2804	2554	2303	2051	1798	1544	1289
2320	4057	3810	3563	3314	3065	2815	2564	2312	2059	1805	1550
2340	4319	4072	3825	3576	3327	3077	2826	2574	2321	2067	1812
2360	4581	4335	4087	3839	3590	3340	3089	2836	2583	2330	2075
2380	4845	4599	4351	4103	3854	3604	3352	3100	2847	2593	2338

KEY

KEY

Source: Unit 1 ROD 4.1 Hot RCS.XLS
Prepared By: S G Adams
Revision 243, February 18, 1999

Unit One Reactor Operating Data
Section 4.1
Boration and Dilution Tables
Hot RCS (Modes 1, 2 and 3)

Desired Boron Conc. (ppmB)	Present Boron Concentration (ppmB)										
	2200	2220	2240	2260	2280	2300	2320	2340	2360	2380	2400
2000	6450	7063	7670	8271	8868	9459	10045	10626	11202	11773	12339
2020	5777	6389	6996	7598	8194	8785	9371	9952	10528	11099	11666
2040	5110	5723	6330	6931	7528	8119	8705	9286	9862	10433	10999
2060	4450	5062	5669	6271	6867	7458	8044	8625	9201	9772	10339
2080	3796	4409	5016	5617	6213	6804	7390	7971	8547	9118	9685
2100	3148	3761	4368	4969	5566	6157	6743	7324	7900	8471	9037
2120	2507	3119	3726	4328	4924	5515	6101	6682	7258	7829	8396
2140	1871	2484	3091	3692	4289	4880	5466	6047	6623	7194	7760
2160	1242	1854	2461	3063	3659	4250	4836	5417	5993	6564	7131
2180	618	1231	1838	2439	3035	3626	4212	4793	5369	5941	6507
2200	0	612	1219	1821	2417	3008	3594	4175	4751	5322	5889
2220	256	0	607	1209	1805	2396	2982	3563	4139	4710	5276
2240	513	257	0	602	1198	1789	2375	2956	3532	4103	4669
2260	771	515	258	0	596	1187	1773	2354	2930	3501	4068
2280	1029	773	517	259	0	591	1177	1758	2334	2905	3471
2300	1289	1033	776	519	260	0	586	1167	1743	2314	2880
2320	1550	1294	1037	779	521	261	0	581	1157	1728	2294
2340	1812	1556	1299	1041	782	523	262	0	576	1147	1713
2360	2075	1819	1562	1304	1045	785	525	263	0	571	1137
2380	2338	2083	1826	1568	1309	1049	788	527	264	0	566
2400	2603	2347	2091	1833	1574	1314	1053	792	529	265	0
2420	2869	2613	2357	2099	1840	1580	1319	1057	795	531	266
2440	3136	2880	2624	2366	2107	1847	1586	1324	1062	798	533
2460	3404	3148	2892	2634	2375	2115	1854	1593	1330	1066	801
2480	3673	3417	3161	2903	2644	2384	2123	1862	1599	1335	1070
2500	3944	3688	3431	3173	2914	2654	2394	2132	1869	1605	1340
2520	4215	3959	3702	3444	3185	2926	2665	2403	2140	1876	1611
2540	4487	4231	3974	3717	3458	3198	2937	2675	2413	2149	1884
2560	4761	4505	4248	3990	3731	3471	3211	2949	2686	2422	2157
2580	5035	4779	4522	4265	4006	3746	3485	3223	2961	2697	2432

KEY

KEY

Unit One Reactor Operating Data
Section 4.1
Boration and Dilution Tables
Hot RCS (Modes 1, 2 and 3)

Desired Boron Conc. (ppmB)	Present Boron Concentration (ppmB)										
	2400	2420	2440	2460	2480	2500	2520	2540	2560	2580	2600
2200	5889	6450	7007	7560	8108	8652	9191	9726	10257	10783	11306
2220	5276	5838	6395	6947	7495	8039	8578	9113	9644	10171	10693
2240	4669	5231	5788	6340	6888	7432	7971	8506	9037	9564	10086
2260	4068	4629	5186	5739	6287	6831	7370	7905	8436	8962	9485
2280	3471	4033	4590	5143	5691	6234	6773	7308	7839	8366	8889
2300	2880	3442	3999	4552	5100	5643	6182	6717	7248	7775	8298
2320	2294	2856	3413	3966	4514	5057	5596	6131	6662	7189	7712
2340	1713	2275	2832	3385	3933	4476	5016	5551	6081	6608	7131
2360	1137	1699	2256	2809	3357	3900	4440	4975	5505	6032	6555
2380	566	1128	1685	2238	2786	3329	3868	4403	4934	5461	5984
2400	0	562	1119	1671	2219	2763	3302	3837	4368	4895	5417
2420	266	0	557	1110	1658	2201	2740	3275	3806	4333	4856
2440	533	267	0	552	1100	1644	2183	2718	3249	3776	4298
2460	801	535	268	0	548	1092	1631	2166	2697	3223	3746
2480	1070	804	537	269	0	544	1083	1618	2149	2675	3198
2500	1340	1074	807	539	270	0	539	1074	1605	2132	2654
2520	1611	1346	1079	811	541	271	0	535	1066	1593	2115
2540	1884	1618	1351	1083	814	544	272	0	531	1057	1580
2560	2157	1891	1624	1356	1087	817	546	273	0	527	1049
2580	2432	2166	1899	1631	1362	1092	820	548	275	0	523
2600	2707	2442	2175	1907	1637	1367	1096	824	550	276	0
2620	2984	2718	2451	2183	1914	1644	1373	1100	827	552	277
2640	3262	2996	2729	2461	2192	1922	1651	1378	1105	830	555
2660	3541	3275	3008	2740	2471	2201	1930	1658	1384	1110	834
2680	3822	3556	3289	3021	2752	2481	2210	1938	1664	1390	1114
2700	4103	3837	3570	3302	3033	2763	2492	2219	1946	1671	1395
2720	4386	4120	3853	3585	3316	3045	2774	2502	2228	1954	1678
2740	4669	4403	4136	3868	3599	3329	3058	2786	2512	2238	1962
2760	4954	4688	4421	4153	3884	3614	3343	3070	2797	2522	2247
2780	5240	4975	4708	4440	4170	3900	3629	3357	3083	2809	2533

2880 + 2498 + 2593 + 2697 + 1671 = 12,339

KEY

1. Limits and Precautions

1.1 This procedure is Reactivity Management related because it controls activities that can affect core reactivity by changing boron concentration. (R.M.)

1.2 If the boron concentration is being increased in the NC System, at least one NC pump or one ND pump shall be in operation, recirculating the NC System. (R.M.)

1.3 When manually operating any motor operated valve, minimize the torque applied to the handwheel.

1.4 After manual operation, maintenance or packing adjustment of any motor operated safety related valve, it shall be cycled electrically to ensure reliable automatic operation.

1.5 Maintaining VCT pressure as low as practical during large makeups will minimize gas absorption. VCT pressure can be reduced by diverting letdown or by VCT purge.

2. Initial Conditions

AA 2.1 **IF** in Mode 1, 2 or 3, ensure R2 reactivity management controls established per AD-OP-ALL-0203 (Reactivity Management). (R.M.)

AA 2.2 Verify Unit 1 shutdown is in progress per OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown).

AA 2.3 Verify NV Pump 1A or 1B is in operation per OP/1/A/6200/001 (Chemical and Volume Control).

AA 2.4 Verify at least one NC Pump in service.

AA 2.5 Ensure adequate pressurizer spray flow exists by verifying at least one of the following:

- ☑ 1B NC Pump is in service
- ☐ 1A, 1C and 1D NC Pumps are in service
- ☑ Auxiliary PZR spray flow established

AA 2.6 Verify Pressurizer Pressure Master is in auto.

3. Procedure

NOTE:	This enclosure will affect reactivity of the core and is therefore designated important to Reactivity Management per the guidelines of AD-OP-ALL-0203 (Reactivity Management). (R.M.)

AA 3.1 Ensure valves are aligned per one of the following:

☑ Enclosure 4.8 (Valve Checklist)
OR
☐ Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1)

AA 3.2 Record the position of the Boric Acid Transfer Pumps switches.

☑ B/A Xfer Pmp 1A Auto

☑ B/A Xfer Pmp 1B Auto

NOTE:	If Unit shutdown is for a Refueling Outage, the boron concentration in the next step shall be greater than or equal to the refueling boron concentration as stated in the COLR.

_____ 3.3 Record the desired NC System boron concentration.
Desired concentration ______________________________ ppm

NOTE:	If Unit shutdown is for a Refueling Outage, approximately 41,000 gallons will be required to achieve 2900 ppmB (Mode 6 boron concentration plus 200 ppmB margin).

_____ 3.4 Determine the volume of boric acid required to achieve the concentration in Step 3.3 using the Unit 1 Rod Manual or REACT program. (R.M.)

____________ gallons

_____ 3.5 Determine equivalent BAT level change corresponding to the volume determined in Step 3.4 as follows:

$$\frac{\_\_\_\_\_\_\_\_\_\_\ \text{gallons}}{392\ \text{gal / \%}} = \_\_\_\_\_\_\ \%$$

_____ 3.6 **IF** aligned per Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1) **AND** it is desired to use BAT #2 to supply a portion of the total boric acid to be added, perform the following: (R.M.)

☐ 3.6.1 Record initial BAT #2 level. _______ %

NOTE:	• Minimum BAT #2 level required to maintain the tank functional for Unit 2 when Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1) is completed is contained in the Unit 2 COLR. • Primary AOM may be contacted to determine BAT #2 final level and volume.

☐ 3.6.2 Record desired BAT #2 final level. _______ %

☐ 3.6.3 Determine change in BAT #2 level as follows:

_________________ % - __________________ % = __________ %
Initial level (Step 3.6.1) Final level (Step 3.6.2)

☐ 3.6.4 Determine remaining volume to be added from BAT #1 as follows:

_______________ % - _____________ % = ___________ %
Equivalent BAT level change (Step 3.5) Change in BAT #2 level (Step 3.6.3)

3.7 Determine final BAT #1 level as follows: (R.M.)

☐ 3.7.1 Record initial BAT #1 level. _______ %

☐ 3.7.2 Subtract the volume to be added (Step 3.5 or 3.6.4) from the initial level (Step 3.7.1) to determine final BAT #1 level.

______________ % - ______________ % = ______________ %
(Step 3.7.1) (Step 3.5 or 3.6.4)

_____ 3.8 Ensure letdown flow is maximized per OP/1/A/6200/001 (Chemical And Volume Control System).

3.9 Place at least two of the following banks of Pressurizer heaters in "MAN":

_____ • PZR Htr Group 1A
_____ • PZR Htr Group 1B
_____ • PZR Htr Group 1D

3.10 Ensure the Pressurizer heater banks selected in Step 3.9 are in "ON":

_____ • PZR Htr Group 1A

_____ • PZR Htr Group 1B

_____ • PZR Htr Group 1D

_____ 3.11 Verify Pressurizer Spray Valves open to maintain pressure.

☐ 1NC-27 (PZR Spray Ctrl Frm Loop A)
☐ 1NC-29 (PZR Spray Ctrl Frm Loop B)

_____ 3.12 **IF AT ANY TIME** it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows:

_____ 3.12.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position.

_____ 3.12.2 Ensure VCT level is monitored continuously while diverting to the RHT.

NOTE:	Procedure may continue while performing the following step.

3.12.3 **WHEN** desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows:

_____ 3.12.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.

_____ 3.12.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.

_____ 3.13 Open 1NV-236B (Boric Acid To NV Pumps Suct). (R.M.)

NOTE:	If BAT #2 is aligned to Unit 1 per Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1), starting Boric Acid Transfer Pumps in the next step will result in transferring approximately 10 gpm from BAT #2 to BAT #1 via the pump miniflow line.

3.14 Place both Boric Acid Transfer Pumps in "ON". (R.M.)

_____ • B/A Xfer Pmp 1A

_____ • B/A Xfer Pmp 1B

NOTE:	The following step will secure the rapid boration and complete this enclosure prior to adding the volume of boric acid that was initially calculated. **IF** it is desired to resume a rapid boration, a new enclosure will be performed.

_____ 3.15 **IF AT ANY TIME** it is desired to secure the boration, **THEN** perform the following:

3.15.1 Place both Boric Acid Transfer Pumps in "OFF".

_____ • B/A Xfer Pmp 1A

_____ • B/A Xfer Pmp 1B

_____ 3.15.2 **IF** BAT #2 is supplying boric acid per Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1)**AND** it is desired to secure from that alignment, **THEN** complete Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1).

_____ 3.15.3 N/A Step 3.16, **AND** complete the remaining steps in this enclosure.

NOTE:	During the re-alignment of valves in Enclosure 4.7, the Unit 1 BAT is aligned to supply the Unit 1 Boric Acid Transfer Pumps prior to isolating the Unit 2 BAT from Unit 1. It is acceptable to leave the Boric Acid Transfer Pumps "ON" during the re-alignment.

_____ 3.16 **IF** BAT #2 is supplying boric acid per Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1), **WHEN** the desired final BAT #2 level as recorded in Step 3.6.2 is reached, perform the following:

_____ 3.16.1 Complete Enclosure 4.7 (Placing Boric Acid Tank #2 In Service For Unit #1).

NOTE:	• Enclosure 4.7 will have the operator notify the control room when the re-alignment is complete. • IF a cooldown is in progress, the cooldown rate and charging flow may need to be adjusted to maintain VCT level if the following step is required to be performed.

_____ 3.16.2 **IF AT ANY TIME** the Unit 2 BAT approaches 50% level, **THEN** perform the following:

3.16.2.1 Place both Boric Acid Transfer Pumps in "OFF".

_____ • B/A Xfer Pmp 1A

_____ • B/A Xfer Pmp 1B

3.16.2.2 **WHEN** notified by the operator completing Enclosure 4.7, that the Unit 2 BAT is no longer aligned to supply the Unit 1 Boric Acid Transfer Pumps,
THEN place both Boric Acid Transfer Pumps in "ON" (R.M.)

_____ • B/A Xfer Pmp 1A

_____ • B/A Xfer Pmp 1B

_____ 3.17 **WHEN** the final BAT #1 level determined in Step 3.7.2 is reached,
THEN place both Boric Acid Transfer Pumps in "OFF". (R.M.).

_____ • B/A Xfer Pmp 1A

_____ • B/A Xfer Pmp 1B

_____ 3.18 Close 1NV-236B (Boric Acid To NV Pumps Suct).

3.19 Return the switches for the Boric Acid Transfer Pumps to the position recorded in Step 3.2.

_____ • B/A Xfer Pmp 1A

_____ • B/A Xfer Pmp 1B

_____ 3.20 Operate Pressurizer heaters as directed in OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown).

_____ 3.21 **IF** increased letdown flow is **NOT** required for other reasons, reduce letdown flow to normal per OP/1/A/6200/001 (Chemical And Volume Control System).

_____ 3.22 Document volume of boric acid added to the NC system in the Log based on changes in BAT#2 **AND** BAT #1 levels.

3.23 Do **NOT** file this enclosure.

JPM A.2

RO

Catawba Nuclear Station
Admin. JPM A.2
September 2019 NRC Exam

EVALUATION SHEET

Task: Use Flow Diagrams, Electrical Prints and Load Lists To Determine Leak Isolation Boundary

Alternate Path: N/A

Facility JPM #: 2017 NRC Exam

Safety Function: N/A

K/A 2.2.41 Ability to obtain and interpret station electrical and mechanical drawings.

Importance: 3.5 / 3.9 **CFR:** 41.10 / 45.12 / 45.13

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ______

References: Flow diagrams of the CM system (CN 1590-1.5, CN 1590-1.7), Load List for 1MXB, 6.9 KV bus one line electrical drawings

Task Standard: Mechanical and electrical isolation boundary determined for work on 1CM-327 per JPM A.2 key.

Validation Time: 30 minutes **Time Critical:** Yes _____ No __X__

Applicant:
NAME____________________________ Docket #_______________ Time Start: __________
Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

==

COMMENTS

____

____

____

____

____

____

Catawba Nuclear Station
Admin. JPM A.2
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **The 1B Condensate Booster Pump has been shutdown in accordance with OP/1/A/6250/001 (Condensate and Feedwater System) and is to be tagged out for removal and replacement of 1CM-327 (1B Condensate Booster Pump Suction Header Relief Valve).**

INITIATING CUES:

- **The SM has directed you to use the provided materials to determine the required boundary for isolation for this work.**
- **You are to use the valves closest to the work being performed for isolation to minimize drain and fill time.**
- **Identify components, including the required position, for creation of a Clearance for replacement of 1CM-327, including:**
    - **Mechanical isolations**
    - **Electrical isolations**
    - **Applicable Vent and Drain path**
- **Record your answer in the table on the following page.**

EXAMINER NOTE:

After reading cue, provide applicant with a copy of CM flow diagrams (CN 1590-1.5 and CN 1590-1.7), load list for 1MXB, and 6.9 KV Switchgear one line diagrams (CN 1702-1.1, CN 1702-1.2, CN 1702-1.3, and CN 1702-1.4).

STEP / STANDARD	SAT / UNSAT

START TIME: _______

STEP 1: Determine clearance boundary for 1CM-327 boundary.	**CRITICAL STEP**
STANDARD: Applicant identifies clearance boundary per table on the next page. Note that only one vent valve or one drain valve is needed to meet the critical step. **Examiner Note: This step is critical to be able to correctly isolate the 1B Condensate Booster Pump for replacement of 1CM-327.** COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT

Component	Position
1TB-11	Racked Out
1CM-93	Closed
1CM-94	Closed
1CM-96	Closed
1CM-97	Closed
1CM-58	Closed
1CM-306	Closed
1MXB F01D	Off/Open
1MXB-R01B	Off/Open
*1CM-334 (Drain)	Open
*1CM-335 (Drain)	Open
*1CM-424 (Drain)	Open
*1CM-916 (Vent)	Open
*1CM-330 (Vent)	Open
*1CM-917 (Vent)	Open

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **The 1B Condensate Booster Pump has been shutdown in accordance with OP/1/A/6250/001 (Condensate and Feedwater System) and is to be tagged out for removal and replacement of 1CM-327 (1B Condensate Booster Pump Suction Header Relief Valve).**

INITIATING CUES:

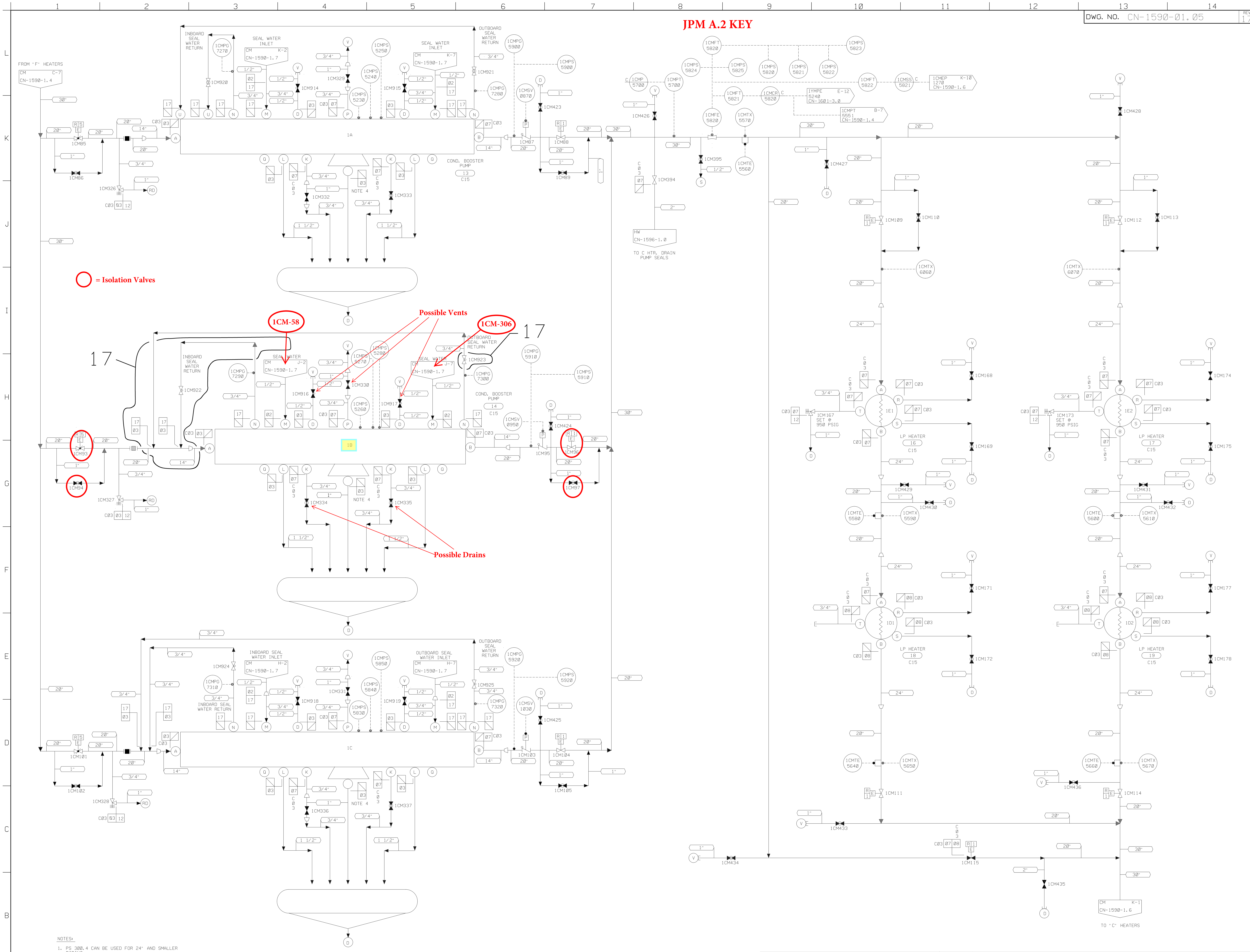
- **The SM has directed you to use the provided materials to determine the required boundary for isolation for this work.**
- **You are to use the valves closest to the work being performed for isolation to minimize drain and fill time.**
- **Identify components, including the required position, for creation of a Clearance for replacement of 1CM-327, including:**
  - **Mechanical isolations**
  - **Electrical isolations**
  - **Applicable Vent and Drain path**
- **Record your answer in the table on the following page.**

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

Answer

Component	Position



NOTES:

1. PS 300.4 CAN BE USED FOR 24" AND SMALLER PIPING.
2. PS 600.4 CAN BE USED FOR 24" AND SMALLER PIPING.
3. DO NOT INSULATE DOWNSTREAM OF VENT AND DRAIN VALVES.
4. BASE PLATE DRAIN.

DESIGN PARAMETERS

LINE LISTING	PIPE SPEC	PRESSURE	TEMPERATURE	CLASS	MATERIAL
02	300.5 (NOTE 1)	395 PSIA	180°F	G	CS
03	300.5 (NOTE 1)	395 PSIA	300°F	G	CS
07	600.5 (NOTE 2)	880 PSIA	310°F	G	CS
08	600.5 (NOTE 2)	880 PSIA	350°F	G	CS
12	150.4	165 PSIA	390°F	G	CS
17	2701.4	395 PSIA	180°F	G	ST

17

ERN: CN000HSR

NO.	REVISIONS	DRN	DATE	CHKD	DATE	APPR	DATE	CIVIL	ELEC.	MECH.
17	REV PER EC 109199	TLC	9-16-14	CGA	9-16-14	WEH	9-17-14	-W-	-W-	-W-
16	REV PER EC 106831	TLC	2-21-13	CGA	2-26-13	WEH	2-26-13	-W-	-W-	-W-
15	REV PER EC 101959	TLC	12-12-12	CGA	12-14-12	WEH	12-14-12	-W-	-W-	-W-
ORIG.	ORIGINAL DRAWING RETIRED	TLC	12-12-12							

INSPECTED

DUKE ENERGY
CATAWBA NUCLEAR STATION UNIT 1

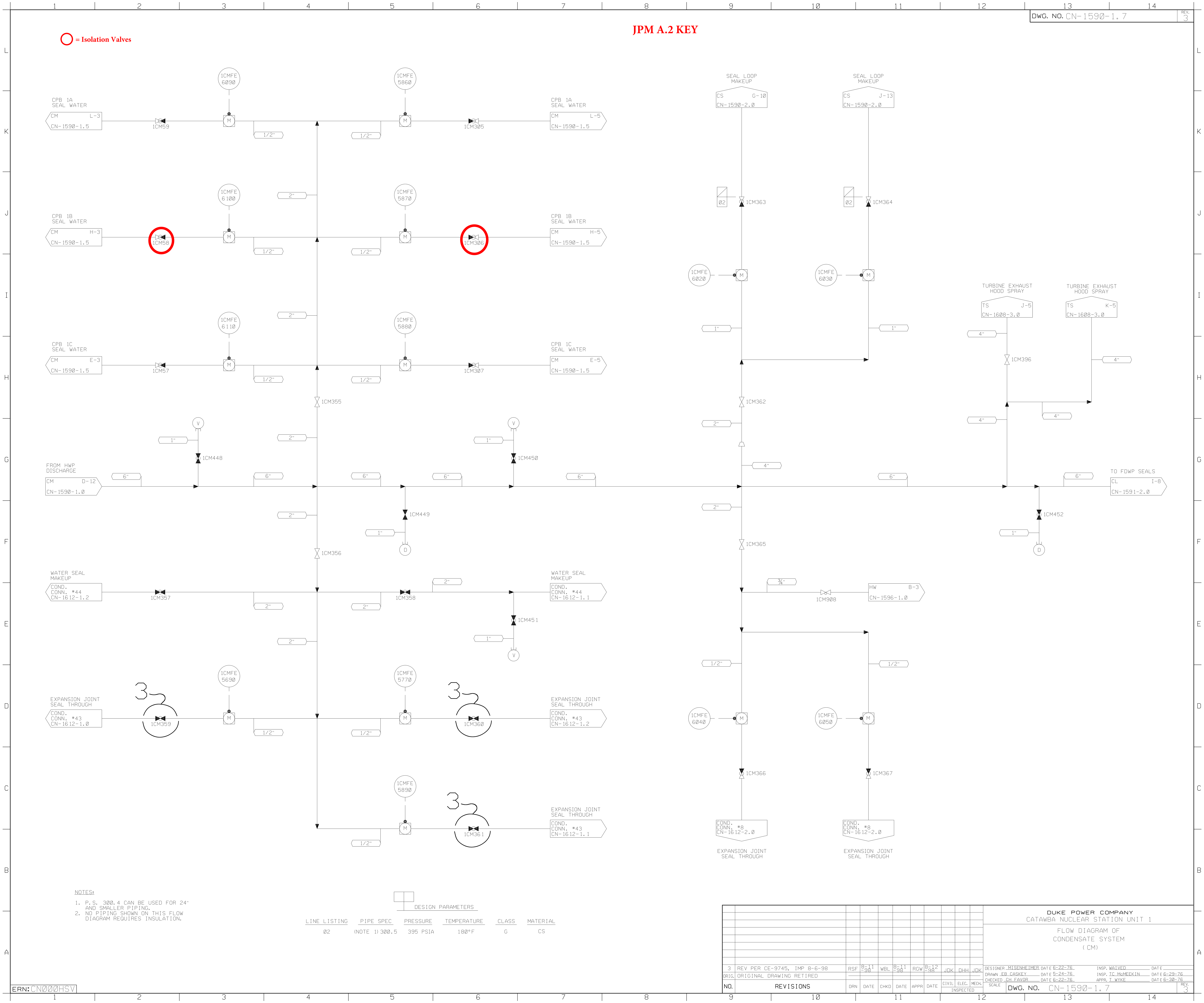
FLOW DIAGRAM OF
CONDENSATE SYSTEM
(CM)

DESIGNER MISENHEIMER DATE 10-30-75 INSP. WAIVED DATE
DRAWN T JONES DATE 10-21-75 INSP. TC MCMEEKIN DATE 10-31-75
CHECKED CH FAVOR DATE 10-30-75 APPR. TF WYKE DATE 11-1-75

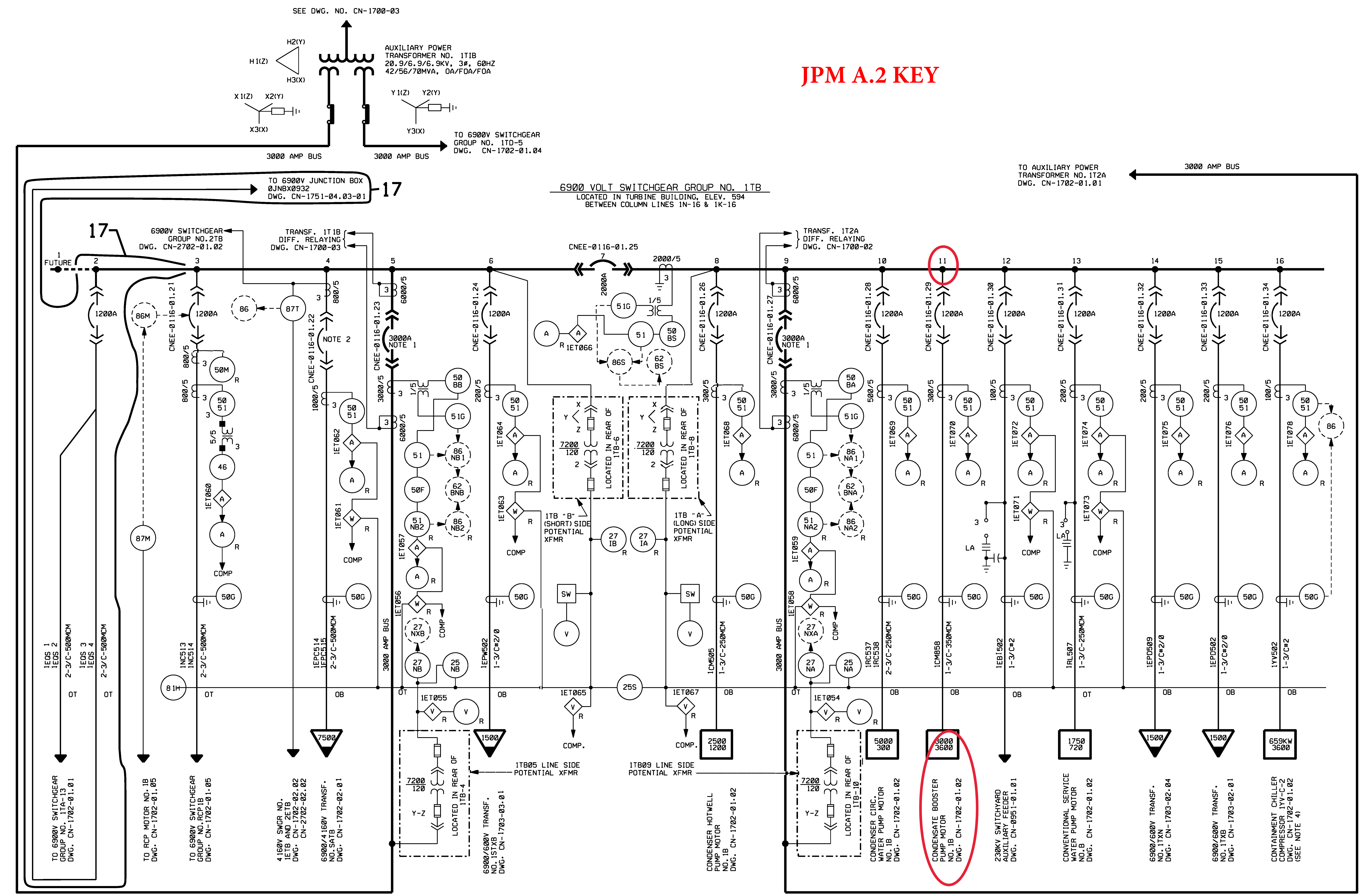
SCALE DWG. NO. CN-1590-01.05 REV. 17

JPM A.2 KEY

○ = Isolation Valves



JPM A.2 KEY



JPM A.2 KEY

DUKE REF. DWGS.
CNWT-1751-01.17 THRU .32 ——— 1TB UNITS 1 THRU 16 WIRE TABS

ABBREVIATIONS
OT - RUN POWER CABLE OUT TOP OF SWITCHGEAR
OB - RUN POWER CABLE OUT BOTTOM OF SWITCHGEAR
R - REMOTE

NOTES:
1. BREAKER IS RATED 2500/3000 AMPERES SELF COOLED/FORCED COOLED.
2. A KIRK KEY INTERLOCK SCHEME IS PROVIDED TO PREVENT BREAKER 1TB4 AND 2TB4 BEING RACKED IN AT THE SAME TIME.
3. FIELD TO ROUTE THE GND. CONN. CABLE ON LTG. ARRS. & SURGE CAPS (1TB12, 1TB13) THROUGH THE ASSOCIATED GND. SENSOR.
4. CABLE TERMINATED IN 1TBOX0485 MOUNTED ON 1YV-C-2. MFR. SUPPLIED.

NO.	REVISIONS
17	REV PER EC 109178
16	REV PER EC 404478

DUKE ENERGY
CATAWBA NUCLEAR STATION UNIT 1

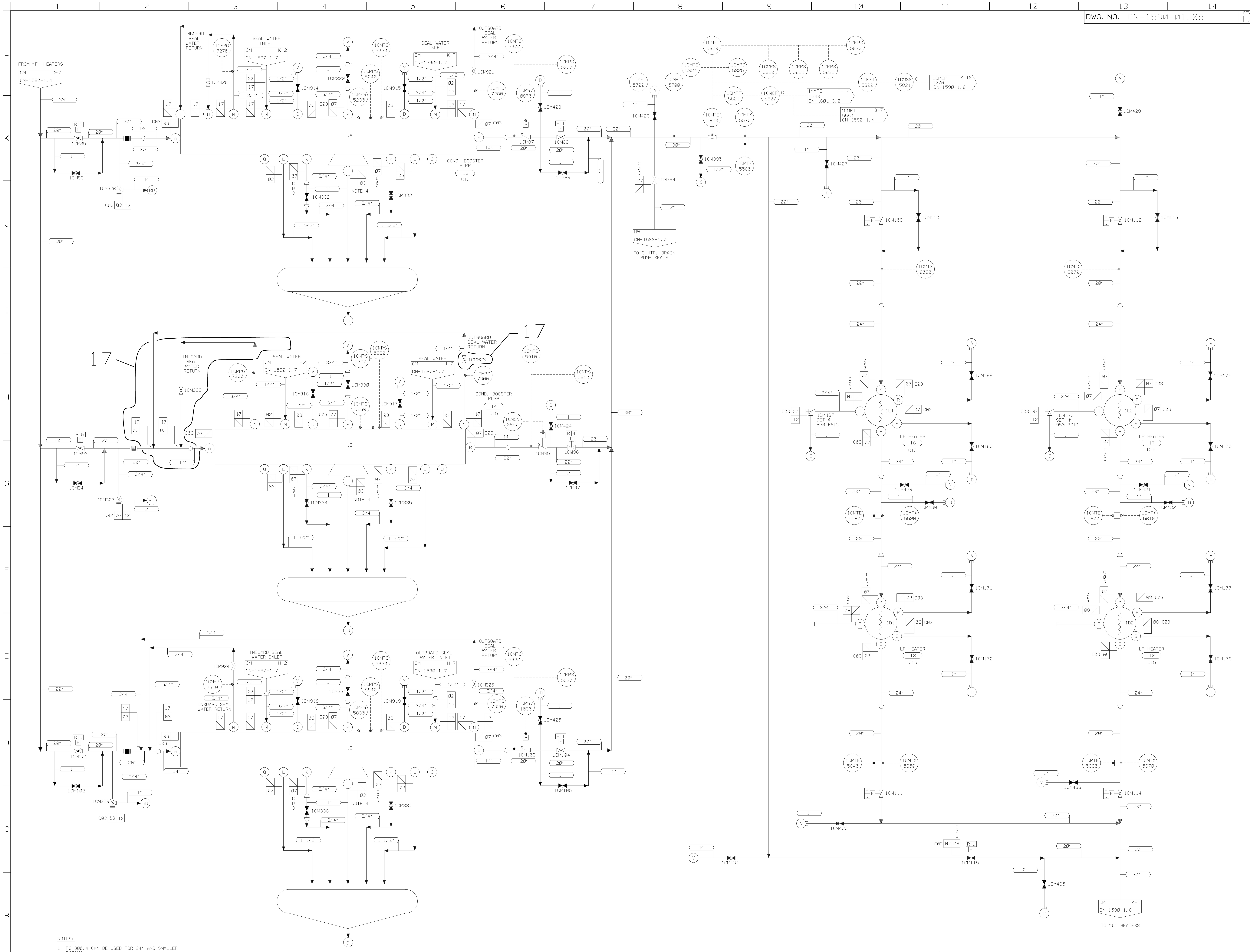
ONE LINE DIAGRAM
6900V NORMAL AUXILIARY POWER SYSTEM (EPB)
6900V SWITCHGEAR NO. 1TB

SCALE N/A | DWG. NO. CN-1702-01.02 | REV. 17

ERN: CN000ITY

Component Type	Component	Equipment Name	Manufacturer	Model	BOM	Serial Number	UTC	Catalog ID	PQL
BK	F01A	1A HOTWELL PUMP DISCHARGE ISOL MOTOR (1CM4)	CUTLER-HAMME	SEE ENG NOTES					
BK	F01B	1B HOTWELL PUMP DISCHARGE ISOL MOTOR (1CM13)	CUTLER-HAMME	SEE ENG NOTES					
BK	F01C	1C HOTWELL PUMP DISCHARGE ISOL MOTOR (1CM22)	CUTLER-HAMME	SEE ENG NOTES					
BK	F01D	1B CONDENSATE BOOSTER PUMP SUCTION ISOL MOTOR (1CM93)	CUTLER-HAMME	SEE ENG NOTES					
BK	F02A	1A CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F02B	1B CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F02C	1C CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F02D	1A CONDENSATE POL DEMIN BACKWASH TANK PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F02E	1A GENERATOR PCB COMPRESSOR NORMAL SUPPLY							
BK	F02F	1MXB BUS POTENTIAL XFMR LOSS OF VOLTAGE RELAY							
BK	F03A	1D CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F03B	1E CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					

Component Type	Component	Equipment Name	Manufacturer	Model	BOM	Serial Number	UTC	Catalog ID	PQL
BK	R01A	1A CONDENSATE BOOSTER PUMP DISCH ISOL MOTOR (1CM88)	CUTLER-HAMME	SEE ENG NOTES					
BK	R01B	1B CONDENSATE BOOSTER PUMP DISCH ISOL MOTOR (1CM96)	CUTLER-HAMME	SEE ENG NOTES					
BK	R01C	1C CONDENSATE BOOSTER PUMP DISCH ISOL MOTOR (1CM104)	CUTLER-HAMME	SEE ENG NOTES					
BK	R01D	1G3 LOW PRESSURE HEATER INLET ISOL MOTOR (1CM68)	CUTLER-HAMME	SEE ENG NOTES					
BK	R02A	1A HOTWELL PUMP SUCTION ISOL MOTOR (1CM2)	CUTLER-HAMME	SEE ENG NOTES					
BK	R02B	HOTWELL PUMP 1B SUCTION ISOLATION VALVE 1CM11	CUTLER-HAMME	SEE ENG NOTES					
BK	R02C	HOTWELL PUMP 1A DISCHARGE VENT VALVE 1CM10	CUTLER-HAMME	SEE ENG NOTES					
BK	R02D	HOTWELL PUMP 1C SUCTION ISOLATION VALVE 1CM20	CUTLER-HAMME	SEE ENG NOTES					
BK	R03A	HOTWELL PUMP 1C DISCHARGE VENT VALVE 1CM28	CUTLER-HAMME	SEE ENG NOTES					
BK	R03B	HOTWELL PUMP 1B DISCHARGE VENT VALVE 1CM19	CUTLER-HAMME	SEE ENG NOTES					
BK	R03C	CONDENSER A VACUUM BREAKER VALVE 1CM368	CUTLER-HAMME	SEE ENG NOTES					



NOTES:

1. PS 300.4 CAN BE USED FOR 24" AND SMALLER PIPING.
2. PS 600.4 CAN BE USED FOR 24" AND SMALLER PIPING.
3. DO NOT INSULATE DOWNSTREAM OF VENT AND DRAIN VALVES.
4. BASE PLATE DRAIN.

DESIGN PARAMETERS

LINE LISTING	PIPE SPEC	PRESSURE	TEMPERATURE	CLASS	MATERIAL
02	300.5 (NOTE 1)	395 PSIA	180°F	G	CS
03	300.5 (NOTE 1)	395 PSIA	300°F	G	CS
07	600.5 (NOTE 2)	880 PSIA	310°F	G	CS
08	600.5 (NOTE 2)	880 PSIA	350°F	G	CS
12	150.4	165 PSIA	390°F	G	CS
17	2701.4	395 PSIA	180°F	G	ST

17

ERN: CN000HSR

NO.	REVISIONS	DRN	DATE	CHKD	DATE	APPR	DATE	CIVIL	ELEC.	MECH.
17	REV PER EC 109199	TLC	9-16-14	CGA	9-16-14	WEH	9-17-14	-W-	-W-	-W-
16	REV PER EC 106831	TLC	2-21-13	CGA	2-26-13	WEH	2-26-13	-W-	-W-	-W-
15	REV PER EC 101959	TLC	12-12-12	CGA	12-14-12	WEH	12-14-12	-W-	-W-	-W-
ORIG.	ORIGINAL DRAWING RETIRED	TLC	12-12-12							

INSPECTED

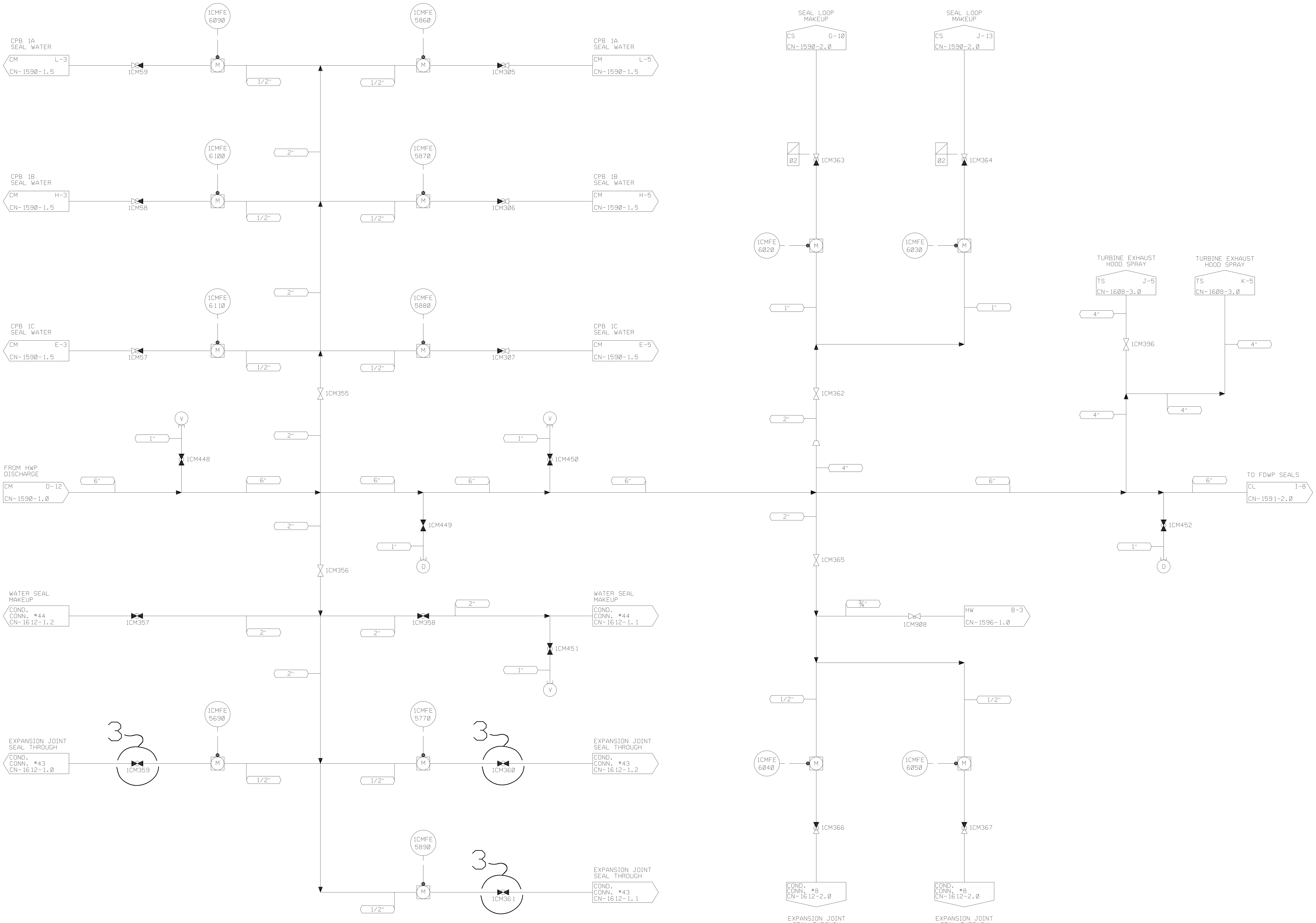
DUKE ENERGY
CATAWBA NUCLEAR STATION UNIT 1

FLOW DIAGRAM OF
CONDENSATE SYSTEM
(CM)

DESIGNER MISENHEIMER DATE 10-30-75 INSP. WAIVED DATE
DRAWN T JONES DATE 10-21-75 INSP. TC MCMEEKIN DATE 10-31-75
CHECKED CH FAVOR DATE 10-30-75 APPR. TF WYKE DATE 11-1-75
SCALE

DWG. NO. CN-1590-01.05 REV. 17

DWG. NO. CN-1590-1.7 REV. 3



NOTES:

1. P.S. 300.4 CAN BE USED FOR 24" AND SMALLER PIPING.
2. NO PIPING SHOWN ON THIS FLOW DIAGRAM REQUIRES INSULATION.

DESIGN PARAMETERS

LINE LISTING	PIPE SPEC	PRESSURE	TEMPERATURE	CLASS	MATERIAL
02	(NOTE 1) 300.5	395 PSIA	180°F	G	CS

NO.	REVISIONS	DRN	DATE	CHKD	DATE	APPR	DATE	CIVIL	ELEC.	MECH.
3	REV PER CE-9745, IMP 8-6-98	RSF	8-11-98	WBL	8-11-98	RGW	8-12-98	JDK	DHH	JDK
ORIG.	ORIGINAL DRAWING RETIRED									

INSPECTED

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION UNIT 1

FLOW DIAGRAM OF
CONDENSATE SYSTEM
(CM)

DESIGNER MISENHEIMER DATE 6-22-76 INSP. WAIVED DATE
DRAWN EB CASKEY DATE 5-24-76 INSP. TC McMEEKIN DATE 6-29-76
CHECKED CH FAVOR DATE 6-22-76 APPR. T WYKE DATE 6-30-76
SCALE DWG. NO. CN-1590-1.7 REV. 3

ERN: CN000HSV

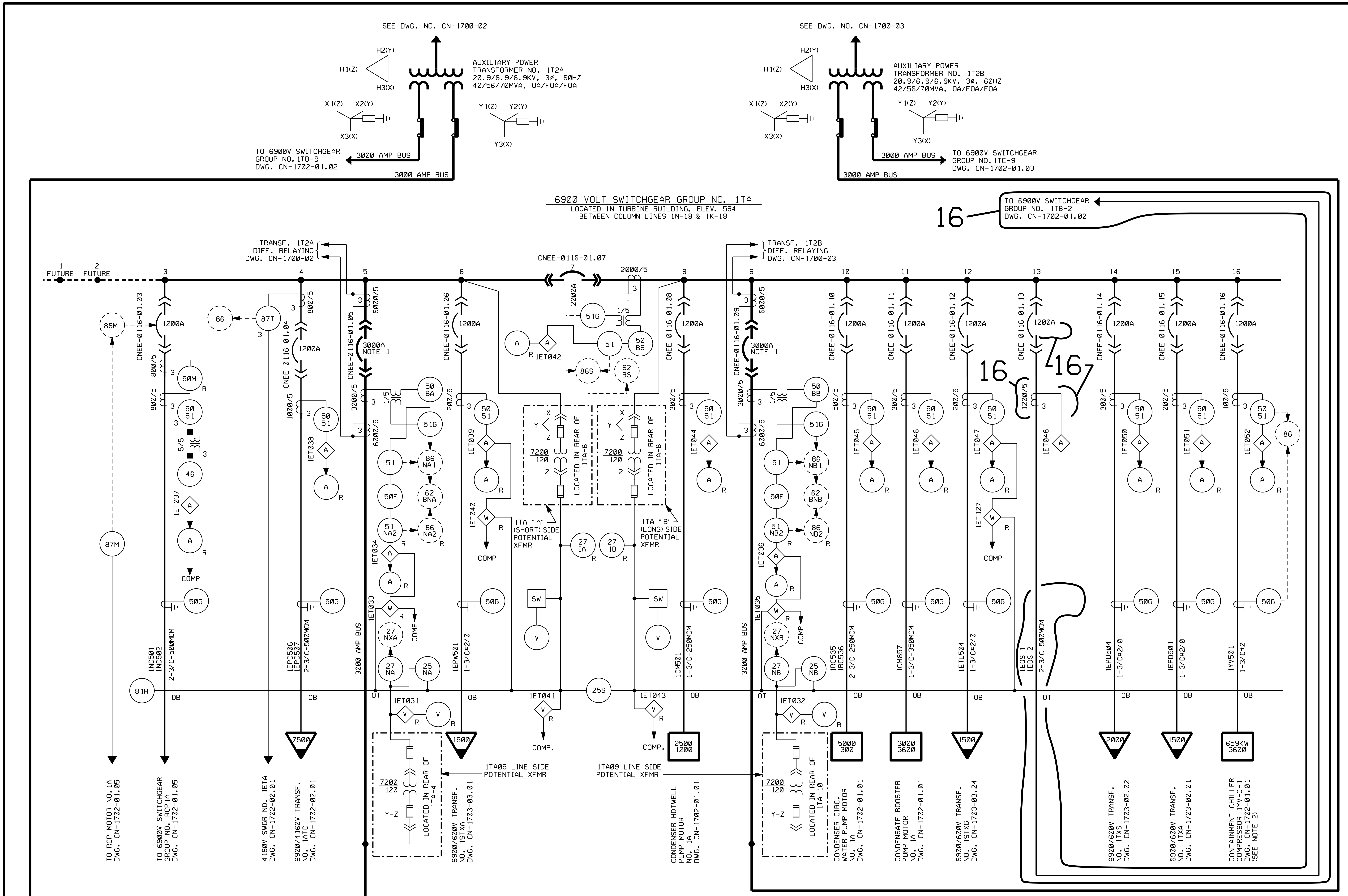
Component Type	Component	Equipment Name	Manufacturer	Model	BOM	Serial Number	UTC	Catalog ID	PQL
BK	F01A	1A HOTWELL PUMP DISCHARGE ISOL MOTOR (1CM4)	CUTLER-HAMME	SEE ENG NOTES					
BK	F01B	1B HOTWELL PUMP DISCHARGE ISOL MOTOR (1CM13)	CUTLER-HAMME	SEE ENG NOTES					
BK	F01C	1C HOTWELL PUMP DISCHARGE ISOL MOTOR (1CM22)	CUTLER-HAMME	SEE ENG NOTES					
BK	F01D	1B CONDENSATE BOOSTER PUMP SUCTION ISOL MOTOR (1CM93)	CUTLER-HAMME	SEE ENG NOTES					
BK	F02A	1A CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F02B	1B CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F02C	1C CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F02D	1A CONDENSATE POL DEMIN BACKWASH TANK PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F02E	1A GENERATOR PCB COMPRESSOR NORMAL SUPPLY							
BK	F02F	1MXB BUS POTENTIAL XFMR LOSS OF VOLTAGE RELAY							
BK	F03A	1D CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F03B	1E CONDENSATE POL DEMIN HOLDING PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					

Component Type	Component	Equipment Name	Manufacturer	Model	BOM	Serial Number	UTC	Catalog ID	PQL
BK	F03C	CONDENSATE POL DEMIN RESIN FEED TANK 1 AGITATOR MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F03D	1B CONDENSATE POL DEMIN BACKWASH TANK PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F03E	WELDING FEEDER							
BK	F03F	HAZARDOUS WASTE STOR BLDG AHU (CN0VKAH-0005) STTR 0CMTS0020							
BK	F04A	NORMAL INCOMING BREAKER FED FROM LOAD CENTER 1LXB							
BK	F04B	FEEDER B TO 1T1A AUX XFMR AUXILIARIES							
BK	F04C	FEEDER B TO 1T1B AUX XFMR AUXILIARIES							
BK	F04D	FEEDER B TO 1T2A AUX XFMR AUXILIARIES							
BK	F04E	1A CONDENSATE BOOSTER PUMP SUCTION ISOL MOTOR (1CM85)	CUTLER-HAMME	SEE ENG NOTES					
BK	F05A	1C CONDENSATE BOOSTER PUMP SUCTION ISOL MOTOR (1CM101)	CUTLER-HAMME	SEE ENG NOTES					
BK	F05B	1A CONDENSATE BOOSTER PUMP AUX LUBE OIL PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F05C	1B CONDENSATE BOOSTER PUMP AUX LUBE OIL PUMP MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F05D	LIGHTING XFMR 1TL2 FEEDER							

Component Type	Component	Equipment Name	Manufacturer	Model	BOM	Serial Number	UTC	Catalog ID	PQL
BK	F05E	LIGHTING XFMR 1TL3 FEEDER							
BK	F05F	CA PUMPS SUCTION FROM HOTWELL MOTOR (1CA2)							
BK	F06A	ALTERNATE INCOMING BREAKER FED FROM LOAD CENTER 1LXE							
BK	F06B	SPARE SIZE 1 CFVR STARTER	CUTLER-HAMME	SEE ENG NOTES					
BK	F06C	SPARE SIZE 1 CFVR STARTER	CUTLER-HAMME	SEE ENG NOTES					
BK	F07A	CONDENSATE POL DEMIN RECIRCULATION TANK AGITATOR MOTOR	CUTLER-HAMME	SEE ENG NOTES					
BK	F07B	TURBINE BUILDING YH SECONDARY PUMP MOTOR (1TB-P-1)							
BK	F07C	PANELBOARD TRANSFORMER 0XFMR0009 (1TL19) FEEDER							
BK	F07D	POWER PANELBOARD XFMR 1KTB FEEDER							
BK	F07E	1TA/1TB 6.9KV SWITCHGEAR ROOM AIR HANDLING UNIT (1TB-AHU-3)							
BK	F07F	HOTWELL STRAINERS 4 TON MONORAIL HOIST (T012)							
BK	F07G	TURBINE BUILDING YH SECONDARY PUMP MOTOR (1TB-P-3)	CUTLER-HAMME	SEE ENG NOTES					
BK	F07H	TURBINE BUILDING YH SECONDARY PUMP MOTOR (1TB-P-4)	CUTLER-HAMME	SEE ENG NOTES					

Component Type	Component	Equipment Name	Manufacturer	Model	BOM	Serial Number	UTC	Catalog ID	PQL
BK	R01A	1A CONDENSATE BOOSTER PUMP DISCH ISOL MOTOR (1CM88)	CUTLER-HAMME	SEE ENG NOTES					
BK	R01B	1B CONDENSATE BOOSTER PUMP DISCH ISOL MOTOR (1CM96)	CUTLER-HAMME	SEE ENG NOTES					
BK	R01C	1C CONDENSATE BOOSTER PUMP DISCH ISOL MOTOR (1CM104)	CUTLER-HAMME	SEE ENG NOTES					
BK	R01D	1G3 LOW PRESSURE HEATER INLET ISOL MOTOR (1CM68)	CUTLER-HAMME	SEE ENG NOTES					
BK	R02A	1A HOTWELL PUMP SUCTION ISOL MOTOR (1CM2)	CUTLER-HAMME	SEE ENG NOTES					
BK	R02B	HOTWELL PUMP 1B SUCTION ISOLATION VALVE 1CM11	CUTLER-HAMME	SEE ENG NOTES					
BK	R02C	HOTWELL PUMP 1A DISCHARGE VENT VALVE 1CM10	CUTLER-HAMME	SEE ENG NOTES					
BK	R02D	HOTWELL PUMP 1C SUCTION ISOLATION VALVE 1CM20	CUTLER-HAMME	SEE ENG NOTES					
BK	R03A	HOTWELL PUMP 1C DISCHARGE VENT VALVE 1CM28	CUTLER-HAMME	SEE ENG NOTES					
BK	R03B	HOTWELL PUMP 1B DISCHARGE VENT VALVE 1CM19	CUTLER-HAMME	SEE ENG NOTES					
BK	R03C	CONDENSER A VACUUM BREAKER VALVE 1CM368	CUTLER-HAMME	SEE ENG NOTES					

Component Type	Component	Equipment Name	Manufacturer	Model	BOM	Serial Number	UTC	Catalog ID	PQL
BK	R03D	CONDENSER B VACUUM BREAKER VALVE 1CM369	CUTLER-HAMME	SEE ENG NOTES					
BK	R04A	CONDENSER C VACUUM BREAKER VALVE 1CM370	CUTLER-HAMME	SEE ENG NOTES					
BK	R04B	FEEDER B TO 1T2B AUX XFMR AUXILIARIES							
BK	R04C	FEEDER A TO 1ATE AUX XFMR AUXILIARIES							
BK	R04D	TURBINE BUILDING SUMP PUMP MOTOR 1B							
BK	R04E	MOTOR OPERATED DISCONNECT SWITCH 1AT MOTOR							
BK	R04F	TURB BLDG HEATING WATER SECONDARY PUMP MOTOR 1TB-P-2							
BK	R05A	STEPUP TRANSFORMER BASE DRAINAGE SUMP PUMP MOTOR 1A							
BK	R05B	CP DEMINERALIZER PRECOAT PUMP MOTOR 1	CUTLER-HAMME	SEE ENG NOTES					
BK	R05C	MOTOR OPERATED DISCONNECT SWITCH 1AG MOTOR							
BK	R05D	SPARE SIZE 2 CFVR STARTER	CUTLER-HAMME	SEE ENG NOTES					
BK	R05E	CT LAB ANNEX FINAL COOLING PUMP #39	CUTLER-HAMME	SEE ENG NOTES					
BK	R05F	SPARE 100 AMP FEEDER BREAKER							



DUKE REF. DWGS.
CNWT-1751-01.01 THRU .16 ——— 1TA UNITS 1 THRU 16 WIRE TABS

ABBREVIATIONS
OT - RUN POWER CABLE OUT TOP OF SWITCHGEAR
OB - RUN POWER CABLE OUT BOTTOM OF SWITCHGEAR
R - REMOTE

NOTES:
1. BREAKER IS RATED 2500/3000 AMPERES SELF COOLED/FORCED COOLED.
2. CABLE TERMINATED IN 1TBOX0483 MOUNTED ON 1YV-C-1 MFR SUPPLIED.

16

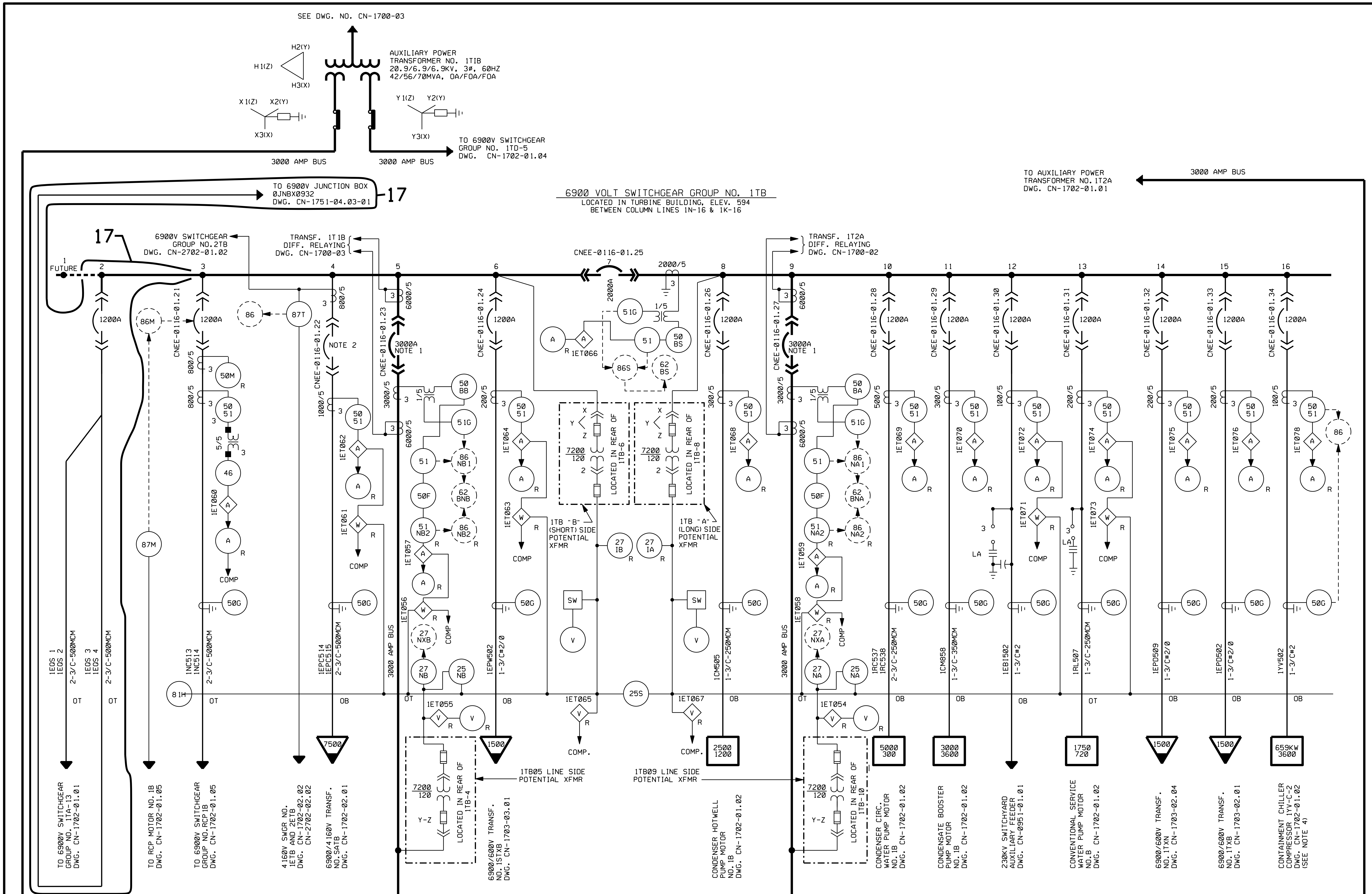
NO.	REVISIONS
16	REV PER EC 109178

DUKE ENERGY
CATAWBA NUCLEAR STATION UNIT 1

ONE LINE DIAGRAM
6900V NORMAL AUXILIARY
POWER SYSTEM (EPB)
6900V SWITCHGEAR NO. 1TA

SCALE N/A | DWG. NO. CN-1702-01.01 | REV. 16

ERN: CN000ITX



NOTES:

1. BREAKER IS RATED 2500/3000 AMPERES SELF COOLED/FORCED COOLED.
2. A KIRK KEY INTERLOCK SCHEME IS PROVIDED TO PREVENT BREAKER 1TB4 AND 2TB4 BEING RACKED IN AT THE SAME TIME.
3. FIELD TO ROUTE THE GND. CONN. CABLE ON LTG. ARRS. & SURGE CAPS (ITB12, ITB13) THROUGH THE ASSOCIATED GND. SENSOR.
4. CABLE TERMINATED IN 1TBOX0485 MOUNTED ON 1YV-C-2. MFR. SUPPLIED.

DUKE REF. DWGS.
CNWT-1751-01.17 THRU .32 ——— 1TB UNITS 1 THRU 16 WIRE TABS

ABBREVIATIONS
OT - RUN POWER CABLE OUT TOP OF SWITCHGEAR
OB - RUN POWER CABLE OUT BOTTOM OF SWITCHGEAR
R - REMOTE

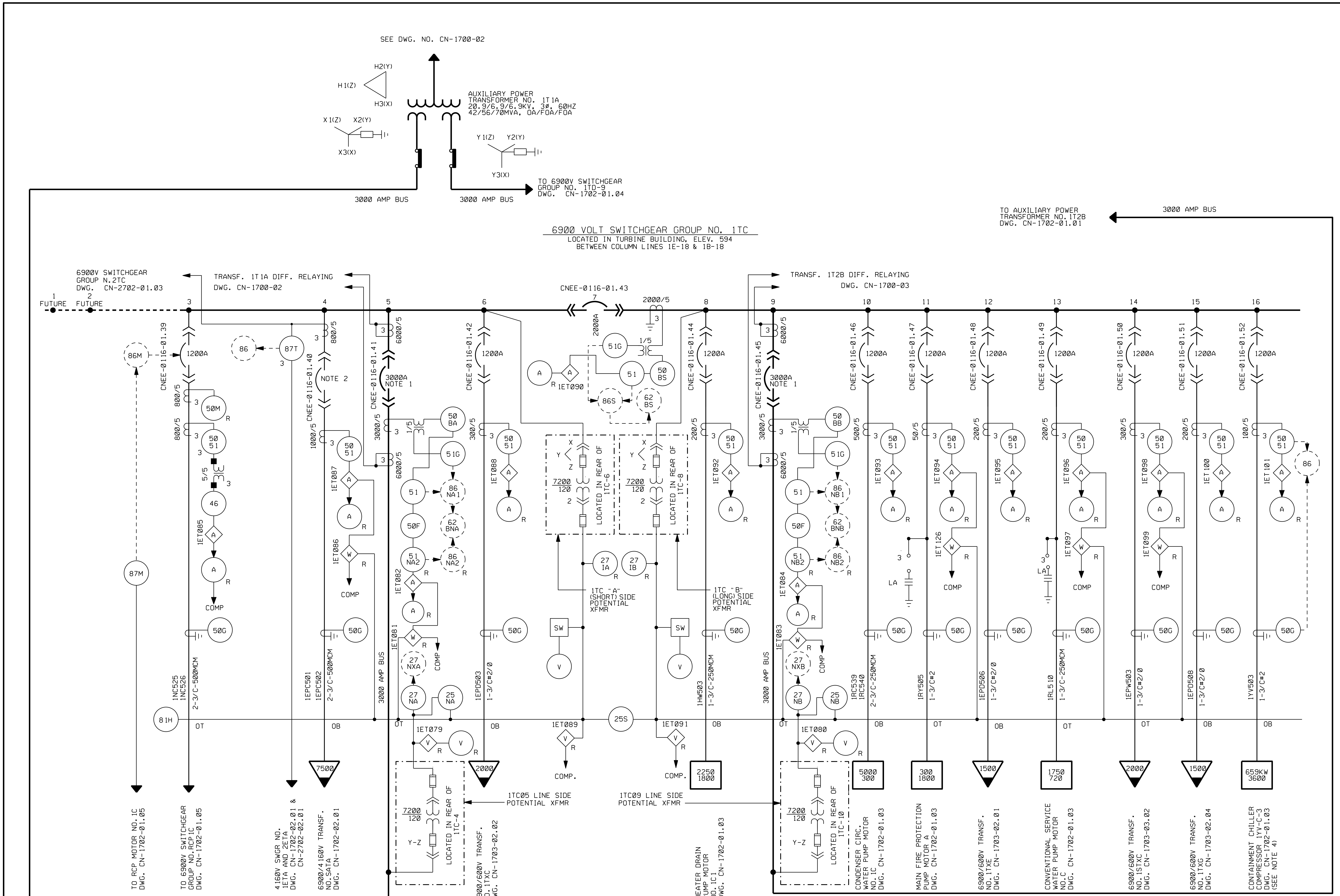
NO.	REVISIONS
17	REV PER EC 109178
16	REV PER EC 404478

DUKE ENERGY
CATAWBA NUCLEAR STATION UNIT 1

ONE LINE DIAGRAM
6900V NORMAL AUXILIARY POWER SYSTEM (EPB)
6900V SWITCHGEAR NO. 1TB

SCALE N/A | DWG. NO. CN-1702-01.02 | REV. 17

ERN: CN000ITY



NOTES:

1. BREAKER IS RATED 2500/3000 AMPERES SELF COOLED/FORCED COOLED.
2. A KIRK KEY INTERLOCK SCHEME IS PROVIDED TO PREVENT BREAKER 1TC4 AND 2TC4 BEING RACKED IN AT THE SAME TIME.
3. FIELD TO ROUTE THE GND. CONN. CABLE ON LTG. ARRESSTORS (ITC11, ITC13) THROUGH THE ASSOCIATED GND. SENSOR.
4. CABLE TERMINATED IN 1TBOX0486 MOUNTED ON 1YV-C-3. MFR. SUPPLIED.

DUKE REF. DWGS.
CNWT-1751-01.33 THRU .48 —— 1TC UNITS 1 THRU 16 WIRE TABS

ABBREVIATIONS
OT - RUN POWER CABLE OUT TOP OF SWITCHGEAR
OB - RUN POWER CABLE OUT BOTTOM OF SWITCHGEAR
R - REMOTE

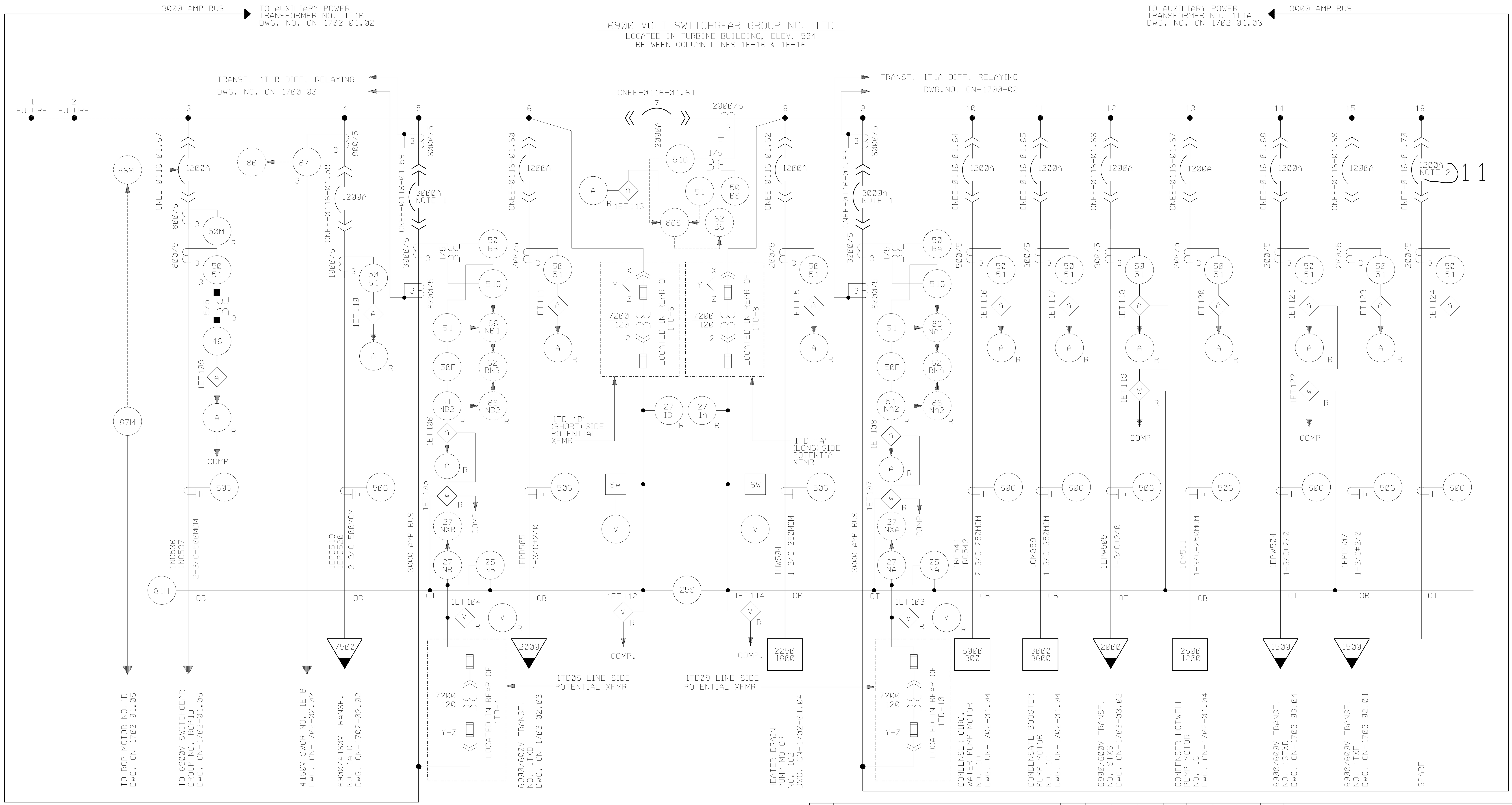
NO.	REVISIONS
14	REVISED PER EC 407952

DUKE ENERGY
CATAWBA NUCLEAR STATION UNIT 1

ONE LINE DIAGRAM
6900V NORMAL AUXILIARY
POWER SYSTEM (EPB)
6900V SWGR. NO. 1TC

SCALE N/A | DWG. NO. CN-1702-01.03 | REV. 14

ERN: CN000ITZ



DUKE REF. DWGS.
CNWT-1751-01.49 THRU .64 —— 1TD UNITS 1 THRU 16 WIRE TABS

NOTES:
1. BREAKER IS RATED 2500/3000 AMPERES SELF COOLED/FORCED COOLED.
2. DEDICATED SPARE PER PIP C-11-05581-50. FOR USE ONLY WHEN DIRECTED BY ENGINEERING. 11

ABBREVIATIONS
OT - RUN POWER CABLE OUT TOP OF SWITCHGEAR
OB - RUN POWER CABLE OUT BOTTOM OF SWITCHGEAR
R - REMOTE

NO.	REVISIONS	DRN	DATE	CHKD	DATE	APPR	DATE	CIVIL	ELEC.	MECH.
11	REV PER C-11-05581. EXEMPT. CODE G.19	KTC	10-29 13	TLC	10-30 13	WEH	10-30 13	-W-	-W-	-W-
ORIG	ORIGINAL DRAWING RETIRED	KTC	10-29 13							

DUKE ENERGY
CATAWBA NUCLEAR STATION UNIT 1

ONE LINE DIAGRAM
6900V NORMAL AUXILIARY
POWER SYSTEM (EPB)
6900V SWGR. NO.1TD

DESIGNER HERRINGTON DATE 7-16-76 INSP. WAIVED DATE 7-16-76
DRAWN RA RAMSEY DATE 7-9-76 INSP. WAIVED DATE 7-16-76
CHECKED JR WYNNE DATE 7-16-76 APPR. RH WALTMAN DATE 7-16-76

DWG. NO. CN-1702-01.04 REV. 11

ERN: CN000IU0

JPM A.2S

SRO

Catawba Nuclear Station
Admin. JPM A.2S
September 2019 NRC Exam

EVALUATION SHEET

Task: Determine Fire Rated Assembly requirements per SLC 16.9-5

Alternate Path: N/A

Facility JPM #: New

Safety Function: 2

K/A G 2.2.40 Ability to apply Technical Specifications for a system.

Importance: 3.4 / 4.7 **CFR:** 41.10 / 43.2 / 43.5 / 45.3

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ______

References: SLC 16.9-5, Aux Bldg Series 1105 Drawings (CN-1105-01, CN-1105-03, CN-1105-06.08, CN-1105-09, CN-1105-10, CN-1105-11), Aux Bldg Series 1209-10 Drawings (CN-1209-10.10, CN-1209-10.11, CN-1209-10.12, CN-1209-10.13, CN-1209-10.14, CN-1209-10.15)

Task Standard: The Required Actions of SLC 16.9-5 Condition A are required to be implemented for failure of a committed boundary located at Auxiliary Building Elevation 560' between columns BB47 and BB48.

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

Applicant: Time Start: __________
NAME____________________________ Docket #______________ Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

COMMENTS

Catawba Nuclear Station
Admin. JPM A.2S
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Both Units are at 100% power.**
- **A Maintenance Technician has reported an opening in a wall. He has stated that the opening passes completely through the wall and the other side is visible. Reported location:**
  - **1ETB Switchgear Room**
  - **Auxiliary Building, Elevation 560'**
  - **Between Columns BB47 and BB48**

INITIATING CUES:

- **The SM directs you to determine remedial actions required due to this report.**

T.S. / SLC LCO ____________________________

Condition(s) ____________________________

EXAMINER NOTE: Provide each applicant with a copy of the applicable CN-1105 and CN-1209-10 drawing for each of the following Auxiliary Building Elevations: 522', 543', 560' 577', 594', and 605' (12 total drawings).

START TIME: _______

STEP / STANDARD	SAT / UNSAT
STEP 1 REMEDIAL ACTIONS IF the required Fire Rated Assembly sealing device is a Fire Door, see Table 16.9-5-1. STANDARD: Applicant locates SLC 16.9-5, refers to the REMEDIAL ACTION section, and determines a Fire Door is not impacted. COMMENTS:	___ SAT ___UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 2 IF the required Fire Rated Assembly sealing device is a Fire Damper see Table 16.5-9-2. STANDARD: Applicant determines a Fire Damper is not impacted. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 3 IF required Fire Rated Assembly is a Fire Barrier or Penetration Seal: 1. Identify the location of the impaired fire protection feature by elevation, column, and building STANDARD: Applicant determines a Fire Barrier could be impacted and notes location information provided in Initial Conditions. COMMENTS:	___ SAT ___ UNSAT

STEP 4 2. Verify the wall, floor/ceiling is a committed boundary on the CN-1105 drawing series (if not a committed boundary, SLC 16.9-5 does not apply) STANDARD: Applicant locates the applicable drawing (CN-1105-06.08) and determines the identified area is a committed boundary. **Examiner Note: This step is critical in order to determine proper application of SLC requirements and determine the correct answer.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 5 3. Refer to CN-1209-10 series drawings to identify the Fire Area on both sides of the impaired feature STANDARD: Applicant locates the applicable drawing (CN-1209-10.12) and determines that Fire Areas 6 and 8 are impaired. **Examiner Note: This step is critical in order to determine proper application of SLC requirements and determine the correct answer.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 6 4. IF either of the Fire Areas is identified as High Safety Significant (HSS) (see Table 16.9-5-3) then implement the REQUIRED ACTION **CONDITION A** STANDARD: Applicant refers to Table 16.9-5-3 and determines that Fire Area 6 is identified as High Safety Significant and implements the Required Action of Condition A. **Examiner Note: This step is critical in order to determine proper application of SLC requirements and determine the correct answer.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 7 5. IF the Fire Areas are not HSS, then identify the associated shutdown trains/methods of the Fire Areas on each side of the barrier using Table 16.9-5-4 and implement the REQUIRED ACTION as identified in the following Chart: STANDARD: Applicant determines that this instruction does not apply since one of the identified Fire Areas is HSS. COMMENTS:	___ SAT ___ UNSAT

The SM directs you to determine remedial actions required due to this report.

T.S. / SLC LCO ______**SLC 16.9-5**____________

Condition(s) ______**CONDITION A**__________

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Both Units are at 100% power.**
- **A Maintenance Technician has reported an opening in a wall. He has stated that the opening passes completely through the wall and the other side is visible. Reported location:**
  - **1ETB Switchgear Room**
  - **Auxiliary Building, Elevation 560'**
  - **Between Columns BB47 and BB48**

INITIATING CUES:

- **The SM directs you to determine remedial actions required due to this report.**

T.S. / SLC LCO ____________________________

Condition(s) ____________________________

16.9 AUXILIARY SYSTEMS

16.9-5 Fire Rated Assemblies

COMMITMENT All required Fire Rated Assemblies (walls, floors/ceilings, cable enclosures and other fire barriers) and all sealing devices in fire rated assembly penetrations (fire doors, fire dampers, and penetration seals) as shown on the CN-1105 drawing series shall be FUNCTIONAL.

APPLICABILITY: At all times.

---NOTE---
Non-functional or breached fire barrier features (walls, floors, ceilings, doors, dampers, and penetration seals) in the diesel generator rooms and the auxiliary feedwater pump rooms may affect CO_2 System FUNCTIONALITY. See SLC 16.9-3, "CO_2 Systems".

REMEDIAL ACTIONS

IF the required Fire Rated Assembly sealing device is a Fire Door, see Table 16.9-5-1

IF the required Fire Rated Assembly sealing device is a Fire Damper see Table 16.9-5-2

IF required Fire Rated Assembly is a Fire Barrier or Penetration Seal:

1. Identify the location of the impaired fire protection feature by elevation, column, and building
2. Verify the wall, floor/ceiling is a committed boundary on the CN-1105 drawing series (if not a committed boundary, SLC 16.9-5 does not apply)
3. Refer to CN-1209-10 series drawings to identify the Fire Area on <u>both</u> sides of the impaired feature
4. IF either of the Fire Areas is identified as High Safety Significant (HSS) (see Table 16.9-5-3) then implement the REQUIRED ACTION **CONDITION A**
5. IF the Fire Areas are not HSS, then identify the associated shutdown trains/methods of the Fire Areas on each side of the barrier using Table 16.9-5-4 and implement the REQUIRED ACTION as identified in the following Chart:

Shutdown Train (Side 1 & Side 2)	*A*	*B*	*SSS*	*A or B*	*A and B*
A	**CONDITION C**	**CONDITION B**	**CONDITION B**	**CONDITION C**	**CONDITION B**
B	**CONDITION B**	**CONDITION C**	**CONDITION B**	**CONDITION C**	**CONDITION B**
SSS	**CONDITION B**	**CONDITION B**	**CONDITION C**	**CONDITION B**	**CONDITION B**
A or B	**CONDITION C**	**CONDITION C**	**CONDITION B**	**CONDITION C**	**CONDITION B**
A and B	**CONDITION B**	**CONDITION B**	**CONDITION B**	**CONDITION B**	**CONDITION C**

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more HSS* required Fire Rated Assemblies is non-functional.	A.1 Establish a continuous fire watch on at least one side of the assembly.	1 hour
	OR	
	A.2.1 Verify at least one side of the assembly has FUNCTIONAL fire detection instrumentation.	1 hour
	AND	
	A.2.2 Establish an hourly fire watch patrol on at least one side of the assembly.	1 hour
	OR	
	A.3 Complete an evaluation as permitted by NRC RIS 2005-07 to institute required action(s).	Prior to terminating Required Action A.1 or A.2

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more LSS** required Fire Rated Assemblies is non-functional.	B.1 Establish an hourly fire watch on at least one side of the assembly.	1 hour
	OR	
	B.2.1 Verify at least one side of the assembly has FUNCTIONAL fire detection instrumentation.	1 hour
	AND	
	B.2.2 Establish a once per shift fire watch patrol on at least one side of the assembly.	1 hour
	OR	
	B.3 Complete an evaluation as permitted by NRC RIS 2005-07 to institute required action(s).	Prior to terminating Required Action B.1 or B.2

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more DID*** required Fire Rated Assemblies is non-functional.	C.1 Establish a once per shift fire watch on at least one side of the assembly.	1 hour
	OR	
	C.2 Verify at least one side of the assembly has FUNCTIONAL fire detection instrumentation.	1 hour
	OR	
	C.3 Complete an evaluation as permitted by NRC RIS 2005-07 to institute required action(s).	Prior to terminating Required Action C.1

*High Safety Significant (HSS) Fire Areas containing required Fire Rated Assemblies are defined in Table 16.9-5-3.

**Low Safety Significant (LSS) Fire Areas containing required Fire Rated Assemblies are defined as those areas with a boundary between redundant shutdown trains.

***Defense-in-Depth (DID) Fire Areas containing required Fire Rated Assemblies are defined as analysis compartment boundaries or PRA compartment boundaries that do not meet the HSS or LSS definitions.

TESTING REQUIREMENTS

TEST		FREQUENCY
TR 16.9-5-1	Verify each HSS and LSS interior unlocked fire door is closed.	24 hours
TR 16.9-5-2	Verify each HSS and LSS locked closed fire door is closed.	7 days
TR 16.9-5-3	Perform an inspection and functional test of the release and closing mechanism and latches for each swinging fire door shown in Table 16.9-5-1.	6 months
TR 16.9-5-4	Perform a visual inspection of the exposed surfaces of each required Fire Rated Assembly.	18 months
TR 16.9-5-5	--------------------------------NOTE-------------------------------- Any abnormal changes or degradation shall be identified and resolved via the corrective action program. Based on the investigation results, additional dampers may be selected for inspection. Samples will be grouped by unit, system, and train and shall be selected such that each damper is inspected every 15 years. -- Perform a visual inspection of fire dampers in each HSS and LSS required Fire Rated Assembly.	18 months, in accordance with the predefined inspection schedule

(continued)

TESTING REQUIREMENTS (continued)

	TEST	FREQUENCY
TR 16.9-5-6	--------------------------------NOTE-------------------------------- Any abnormal changes or degradation shall be identified and resolved via the corrective action program. Based on the investigation results, additional Fire Rated Assemblies may be selected for inspection. Samples shall be selected such that each Fire Rated Assembly is inspected every 15 years. -- Perform a visual inspection of penetration seals in each HSS AND LSS required Fire Rated Assembly.	18 months, in accordance with the predefined inspection schedule
TR 16.9-5-7	Perform an inspection and functional test of the automatic hold open, release and closing mechanism for each rolling fire door shown in Table 16.9-5-1.	18 Months

Table 16.9-5-1

Required Fire Doors

DOOR NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
AX500F	AUX	56, FF	522+0	1/4	DID	C
AX214A	AUX	54-55, FF-GG	543+0	1/4	DID	C
AX214B	AUX	58-59, FF-GG	543+0	1/4	DID	C
AX217D	AUX	52-53, BB	543+0	3/34	LSS	B
AX217F(1)	AUX	51, AA-BB	543+0	3/40	LSS	B
AX217G	AUX	52-53, BB	543+0	3/32	LSS	B
AX227D	AUX	54-55, MM-NN	543+0	4/22	DID	C
AX227E	AUX	59-60, MM-NN	543+0	4/22	DID	C
AX228A	AUX	56-57, EE	543+0	4/9	DID	C
AX228B	AUX	57-58, EE	543+0	4/10	DID	C
AX248	AUX	57-58, QQ	543+0	4/ASB	LSS	B
AX260B	AUX	61-62, BB-CC	543+0	2/36	LSS	B
AX260F(1)	AUX	62, AA-BB	543+0	2/39	LSS	B
AX260G	AUX	61-62, BB-CC	543+0	2/31	LSS	B
AX260H	AUX	61-62, BB-CC	543+0	2/33	LSS	B
T527#1	AUX	52-53, BB-CC	543+0	3/37	LSS	B
AX202	AUX	51, NN	543+0	4/STAIR	DID	C
AX253A	AUX	63, NN	543+0	4/STAIR	DID	C
AX227A	AUX	59, FF-GG	543+0	4/STAIR	DID	C
AX260E	AUX	52, CC	543+0	3/STAIR	DID	C
AX516M	AUX	62, CC	543+0	2/STAIR	DID	C
AX354A	AUX	55, DD-EE	554+0	22/45	LSS	B
AX354B	AUX	59, DD-EE	554+0	22/46	LSS	B
AX418	AUX	57, BB	554+0	9/10	DID	C
AX419	AUX	57, DD-EE	554+0	9/10	DID	C
AX420A	AUX	59, DD-EE	554+0	9/46	LSS	B
AX421A	AUX	55, DD-EE	554+0	10/45	LSS	B
S102A	AUX	53-54, AA	554+0	10/SRV	LSS	B
AX302	AUX	41, CC-DD	556+0	25/41	DID	C
AX304	AUX	41, AA-BB	556+0	26/42	DID	C
AX306	AUX	73, DD-EE	556+0	27/43	DID	C
AX308	AUX	73, BB-CC	556+0	28/44	DID	C
AX348B	AUX	54-55, MM-NN	560+0	11/22	DID	C
AX348C	AUX	53-54, HH	560+0	4/11	DID	C
AX348D	AUX	59-60, MM-NN	560+0	11/22	DID	C
AX348E	AUX	60-61, HH	560+0	4/11	DID	C
AX352B	AUX	53, CC-DD	560+0	6/STAIR	HSS	A
AX352C	AUX	53, CC-DD	560+0	10/STAIR	DID	C
AX352D	AUX	46-47, BB-CC	560+0	6/RB1	HSS	A
AX353	AUX	45, BB	560+0	6/8	HSS	A
AX353B	AUX	45, AA-BB	560+0	8/41	LSS	B
AX353C	AUX	45, AA-BB	560+0	8/42	DID	C

(continued)

Table 16.9-5-1

Required Fire Doors

DOOR NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
AX393B	AUX	61, CC-DD	560+0	9/STAIR	DID	C
AX393C	AUX	61, CC-DD	560+0	5/STAIR	DID	C
AX393D	AUX	67-68, BB-CC	560+0	5/RB2	LSS	B
AX394	AUX	69, BB	560+0	5/7	DID	C
AX394B	AUX	69, AA-BB	560+0	7/43	LSS	B
AX394C	AUX	69, AA-BB	560+0	7/44	DID	C
AX395	AUX	61, AA-BB	560+0	7/9	LSS	B
AX396	AUX	53, AA-BB	560+0	8/10	LSS	B
AX415	AUX	45-46, CC-DD	560+0	6/RB1	HSS	A
AX416	AUX	68-69, CC-DD	560+0	5/RB2	LSS	B
AX417	AUX	57, QQ	560+0	11/ASB	LSS	B
AX313D	AUX	51, NN	560+0	11/STAIR	DID	C
AX388B	AUX	63, NN	560+0	11/STAIR	DID	C
AX348	AUX	59, FF-GG	560+0	11/STAIR	DID	C
AX355A	AUX	53-54, FF	568+0	4/11	DID	C
AX355D	AUX	60, FF	568+0	4/11	DID	C
AX355E	AUX	60, FF	568+0	11/STAIR	DID	C
AX515	AUX	54, BB	574+0	17/45	HSS	A
AX516	AUX	56-57, DD	574+0	14/45	HSS	A
AX516A	AUX	57-58, DD	574+0	16/46	HSS	A
AX516K	AUX	57, AA-BB	574+0	16/17	HSS	A
AX517A	AUX	53-54, DD-EE	574+0	22/45	LSS	B
AX517B	AUX	60-61, DD-EE	574+0	22/46	LSS	B
AX517C	AUX	57, DD-EE	574+0	45/46	DID	C
AX517D	AUX	57, DD-EE	574+0	9/46	LSS	B
AX517E	AUX	56-57, DD-EE	574+0	10/46	LSS	B
AX518	AUX	60, BB	574+0	16/46	HSS	A
S303	SRV	36-37, 1N	574+0	45/SRV	DID	C
S303C	SRV	36-37, V	574+0	45/SRV	DID	C
S304A	AUX	60, AA	574+0	46/SRV	DID	C
AX500H	AUX	54-55, MM-NN	577+0	18/22	DID	C
AX500K	AUX	53-54, HH-GG	577+0	4/18	DID	C
AX500L	AUX	59-60, MM-NN	577+0	18/22	DID	C
AX500N	AUX	60-61, HH-GG	577+0	4/18	DID	C
AX513B	AUX	53, CC-DD	577+0	13/STAIR	HSS	A
AX514	AUX	45, BB	577+0	13/15	HSS	A
AX514B	AUX	45-46, AA-BB	577+0	6/13	HSS	A
AX517	AUX	57, EE	577+0	9/18	DID	C
AX525	AUX	55-56, QQ	577+0	18/ASB	LSS	B
AX525B	AUX	56, QQ	577+0	18/ASB	LSS	B
AX526D	AUX	58, QQ	577+0	18/ASB	LSS	B
A314#3	AUX	61, CC-DD	577+0	12/STAIR	HSS	A
AX533C	AUX	61, CC-DD	577+0	46/STAIR	DID	C
AX534	AUX	69, BB	577+0	12/14	HSS	A

(continued)

Table 16.9-5-1

Required Fire Doors

DOOR NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
AX534B	AUX	68-69, AA-BB	577+0	7/14	HSS	A
AX535A	AUX	61, AA-BB	577+0	14/46	HSS	A
AX536	AUX	53, AA-BB	577+0	15/45	HSS	A
AX656	AUX	53, CC-DD	577+0	45/STAIR	DID	C
AX500P	AUX	51, NN	577+0	18/STAIR	DID	C
AX500S	AUX	63, NN	577+0	18/STAIR	DID	C
AX338A	AUX	60, FF-GG	577+0	18/STAIR	DID	C
AX602	AUX	52, UU-VV	594+0	24/ASB	DID	C
AX627	AUX	62, UU-VV	594+0	23/ASB	DID	C
AX630	AUX	58, QQ	594+0	22/ASB	LSS	B
AX632	AUX	57, QQ	594+0	22/ASB	LSS	B
AX635	AUX	60-61, QQ	594+0	22/ASB	LSS	B
AX635E	AUX	53-54, QQ	594+0	22/ASB	LSS	B
AX635F	AUX	53-54, QQ	594+0	22/ASB	LSS	B
AX655	AUX	62-63, DD	594+0	19/48	LSS	B
AX656C	AUX	61, CC-DD	594+0	19/22	LSS	B
AX657	AUX	60-61, CC	594+0	19/22	LSS	B
AX657A(2)	AUX	54, BB	594+0	21/35	HSS	A
AX657B	AUX	52-53, CC-DD	594+0	20/22	LSS	B
AX657E(2)	AUX	53, BB	594+0	21/35	HSS	A
AX657F	AUX	60, DD-EE	594+0	21/22	HSS	A
AX657G	AUX	57-58, DD-EE	594+0	21/22	HSS	A
AX657H	AUX	54, DD-EE	594+0	21/22	HSS	A
AX657J	AUX	53, BB-CC	594+0	20/21	HSS	A
AX658B	AUX	51-52, DD	594+0	20/49	LSS	B
S400	AUX	55-56, AA	594+0	21/SRV	HSS	A
S406	AUX	58-59, AA	594+0	21/SRV	HSS	A
AX635G	AUX	51, NN	594+0	22/STAIR	DID	C
AX635H	AUX	63, NN	594+0	22/STAIR	DID	C
AX654A	AUX	60, FF	594+0	22/STAIR	DID	C
AX654B	AUX	61, CC-DD	594+0	19/STAIR	DID	C
AX665B	AUX	53, CC-DD	594+0	22/STAIR	DID	C
AX700B	AUX	50-51, JJ-KK	605+10	24/RB1	LSS	B
AX700D	AUX	63-64, KK	605+10	22/23	LSS	B
AX701	AUX	50-51, JJ-KK	605+10	22/RB1	LSS	B
AX714B	AUX	63-64, JJ-KK	605+10	23/RB2	LSS	B
AX720	AUX	50-51, HH-JJ	605+10	22/RB1	LSS	B
AX721	AUX	63-64, HH-JJ	605+10	22/RB2	LSS	B
AX714C	AUX	50-51, KK	605+10	22/24	LSS	B
AX715A	AUX	63-64, JJ-KK	605+10	22/RB2	LSS	B
S211(2)	TB1	17, V	568+0	SRV/TB1	DID	C
S212	TB1	19, V	568+0	SRV/TB1	DID	C
S210	TB1	21,V	568+0	SRV/TB1	DID	C

(continued)

Table 16.9-5-1

Required Fire Doors

DOOR NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
S206	TB1	22, V	568+0	SRV/TB1	DID	C
S201	TB1	33, V	568+0	SRV/TB1	DID	C
SR3(3)	TB1	30-31, V	568+0	SRV/TB1	DID	C
S201A	TB1	27, V	568+0	SRV/TB1	DID	C
T101	TB1	31, 1K	568+0	TB1/U1 OTT	DID	C
S424	TB1	24-25, V	594+0	SRV/TB1	DID	C
S425	TB1	23, V	594+0	SRV/TB1	DID	C
S426	TB1	22, V	594+0	SRV/TB1	DID	C
SR21(3)	TB1	24, V	594+0	SRV/TB1	DID	C
S472	TB1	27, V	594+0	SRV/TB1	DID	C
S423	TB1	29, V	594+0	SRV/TB1	DID	C
S422	TB1	29, V	594+0	SRV/TB1	DID	C
SR7(3)	TB1	29-30, V	594+0	SRV/TB1	DID	C
S416	TB1	32, V	594+0	SRV/TB1	DID	C
S444	TB1	15, V	594+0	SRV/TB1	DID	C
TR4(3)	TB1	15-16, V	594+0	SRV/TB1	DID	C
T200A	TB1	32, 1J-1K	594+0	TB1/U1 MTOT	DID	C
S701	TB1	22, 1L	619+6	SRV/TB1	DID	C
S704	TB1	33, 1L	619+6	SRV/TB1	DID	C
S209	TB2	20, P	568+0	SRV/TB2	DID	C
S208	TB2	22, P	568+0	SRV/TB2	DID	C
SR2(3)	TB2	32-33, P	568+0	SRV/TB2	DID	C
S462	TB2	32, P	568+0	SRV/TB2	DID	C
SR4(3)	TB2	30-31, P	568+0	SRV/TB2	DID	C
S1102	TB2	27, P	568+0	SRV/TB2	DID	C
T151	TB2	31, 2K	568+0	TB2/U2 OTT	DID	C
S423E	TB2	26, P-Q	594+0	SRV/TB2	DID	C
S416A	TB2	32, P	594+0	SRV/TB2	DID	C
SR8(3)	TB2	29-30, P	594+0	SRV/TB2	DID	C
S422A	TB2	29, P	594+0	SRV/TB2	DID	C
S423A	TB2	29, P	594+0	SRV/TB2	DID	C
S435	TB2	24-25, P	594+0	SRV/TB2	DID	C
S436	TB2	23, P	594+0	SRV/TB2	DID	C
S437	TB2	22, P	594+0	SRV/TB2	DID	C
SR22(3)	TB2	24, P	594+0	SRV/TB2	DID	C
S444A	TB2	15, P	594+0	SRV/TB2	DID	C
SR16(3)	TB2	15-16, P	594+0	SRV/TB2	DID	C
S472A	TB2	27, P	594+0	SRV/TB2	DID	C
T250A	TB2	32, 2J-2K	594+0	TB2/U2 MTOT	DID	C
S701A	TB2	22, 2L	619+6	SRV/TB2	DID	C
S704A	TB2	33, 2L	619+6	SRV/TB2	DID	C
AX662A	NSWPS	----	600+0	29/30	LSS	B

(1) These doors are not equipped with closing mechanisms or latches and are therefore exempt from TESTING REQUIREMENT 16.9-5-3.
(2) These doors are held open with a fusible link.
(3) Rolling Door.

Table 16.9-5-2

Required Fire Dampers

DAMPER NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
1VA-FD001	AUX	53/GG-FF	522+0	1/4	DID	C
1VA-FD002	AUX	53/GG-HH	522+0	1/4	DID	C
1VA-FD003	AUX	55-56/GG-HH	522+0	1/4	DID	C
1VA-FD004	AUX	55-56/GG-HH	522+0	1/4	DID	C
1VA-FD005	AUX	54-55/GG-HH	522+0	1/4	DID	C
1VA-FD006	AUX	54-55/GG-HH	522+0	1/4	DID	C
1VA-FD007	AUX	53/GG-FF	522+0	1/4	DID	C
1VA-FD008	AUX	53/GG-FF	522+0	1/4	DID	C
1VA-FD009	AUX	53-54/FF-GG	522+0	1/1 (ND PUMPS)	DID	C
1VA-FD010	AUX	56-57/ GG-HH,	522+0	1/4	DID	C
1VA-FD011	AUX	56-57/FF	522+0	1/4	DID	C
1VA-FD012	AUX	51/NN-PP	543+0	11/STAIR	DID	C
1VA-FD013	AUX	54/MM	543+0	4/22	DID	C
1VA-FD014	AUX	54/MM	543+0	4/22	DID	C
1VA-FD015	AUX	54-55/MM-NN	543+0	4/22	DID	C
1VA-FD016	AUX	54-55/MM-NN	543+0	4/22	DID	C
1VA-FD017	AUX	54-55/MM-NN	543+0	4/22	DID	C
1VA-FD020	AUX	55/JJ-KK	543+0	4/4 (NV PUMPS)	DID	C
1VA-FD033	AUX	51-52/AA-BB	543+0	3/40	LSS	B
1VA-FD034	AUX	51-52/AA-BB	543+0	3/40	LSS	B
1VA-FD035	AUX	52/AA-BB	543+0	3/32	LSS	B
1VA-FD036	AUX	52-53/BB	543+0	3/32	LSS	B
1VA-FD038	AUX	52-53/BB	543+0	3/34	LSS	B
1VA-FD039	AUX	52-53/BB	543+0	3/34	LSS	B
1VA-FD040	AUX	52-53/BB	543+0	3/32	LSS	B
1VA-FD041	AUX	52-53/BB	543+0	3/32	LSS	B
1VA-FD042	AUX	53/CC	543+0	3/STAIR	DID	C
1VA-FD043	AUX	53/CC-DD	543+0	3/STAIR	DID	C
1VA-FD045	AUX	52-53/DD	560+0	3/6	HSS	A
1VA-FD046	AUX	52-53/CC-DD	577+0	6/13	HSS	A
1VA-FD047	AUX	52-53/CC-DD	577+0	6/13	HSS	A
1VA-FD048	AUX	54/MM-NN	560+0	11/22	DID	C
1VA-FD049	AUX	54/MM	560+0	11/22	DID	C
1VA-FD050	AUX	54-55/MM	560+0	4/22	DID	C
1VA-FD051	AUX	54-55/MM	560+0	4/22	DID	C
1VA-FD052	AUX	55/MM-NN	560+0	11/22	DID	C
1VA-FD053	AUX	55/MM	560+0	11/22	DID	C
1VA-FD054	AUX	53/GG-HH	560+0	4/11	DID	C
1VA-FD055	AUX	53/GG-HH	560+0	4/11	DID	C
1VA-FD056	AUX	53/KK	560+0	4/11	DID	C
1VA-FD057	AUX	53/GG-HH	560+0	4/11	DID	C

(continued)

Table 16.9-5-2

REQUIRED FIRE DAMPERS

DAMPER NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
1VA-FD058	AUX	53-54/HH	560+0	4/11	DID	C
1VA-FD059	AUX	54/GG-HH	560+0	4/11	DID	C
1VA-FD060	AUX	54/HH	560+0	4/11	DID	C
1VA-FD061	AUX	56-57/QQ	577+0	18/ASB	LSS	B
1VA-FD062	AUX	55-56/QQ	577+0	18/ASB	LSS	B
1VA-FD063	AUX	55/MM-NN	577+0	18/22	DID	C
1VA-FD064	AUX	55/MM	577+0	18/22	DID	C
1VA-FD065	AUX	54/MM	577+0	18/22	DID	C
1VA-FD066	AUX	54/MM	577+0	18/22	DID	C
1VA-FD067	AUX	54/HH	577+0	4/18	DID	C
1VA-FD068	AUX	53-54/HH	577+0	4/18	DID	C
1VA-FD069	AUX	54/GG-HH	577+0	4/18	DID	C
1VA-FD070	AUX	53-54/HH	577+0	4/18	DID	C
1VA-FD071	AUX	53-54/HH	577+0	4/18	DID	C
1VA-FD072	AUX	53/HH	577+0	4/18	DID	C
1VA-FD073	AUX	53/HH	577+0	4/18	DID	C
1VA-FD074	AUX	53/GG-HH	577+0	4/18	DID	C
1VA-FD075	AUX	53-54/KK-LL	594+0	18/22	DID	C
1VA-FD076	AUX	53-54/KK-LL	594+0	18/22	DID	C
1VA-FD078	AUX	57/NN	594+0	22/STAIR	DID	C
1VA-FD087	AUX	55-56/QQ	594+0	22/ASB	LSS	B
1VA-FD088	AUX	53-54/QQ	594+0	22/ASB	LSS	B
1VA-FD133	AUX	53/CC-DD	594+0	22/STAIR	DID	C
1VA-FD139	AUX	51-52/DD	543+0	3/4	DID	C
1VA-FD140	AUX	53-54/FF-GG	560+0	4/11	DID	C
1VA-FD141	AUX	53-54/FF-GG	560+0	4/11	DID	C
1VA-FD142	AUX	53/GG	560+0	4/11	DID	C
1VA-FD143	AUX	53/JJ-HH	560+0	4/11	DID	C
1VA-FD144	AUX	53/KK	560+0	4/11	DID	C
1VA-FD145	AUX	51/KK	560+0	11/18	DID	C
1VA-FD146	AUX	51/KK	560+0	11/18	DID	C
1VA-FD147	AUX	52/MM	560+0	11/18	DID	C
1VA-FD148	AUX	52/MM-NN	560+0	4/11	DID	C
1VA-FD149	AUX	52-53/DD	560+0	3/6	HSS	A
1VA-FD150	AUX	52-53/DD	560+0	3/6	HSS	A
1VA-FD152	AUX	52-53/BB-CC	543+0	3/37	LSS	B
1VA-FD153	AUX	52-53/CC	543+0	3/37	LSS	B
1VA-FD154	AUX	53-54/GG-HH	594+0	4/22	DID	C
1VA-FD155	AUX	53-54/GG-HH	594+0	4/22	DID	C
1VA-FD159	AUX	49-50/AA-BB	543+0	CO2	HSS	A
1VA-FD160	AUX	50-51/AA-BB	543+0	CO2	HSS	A
1VA-FD163	AUX	56/EE	543+0	10/45	LSS	B
1VA-FD164	AUX	56-57/EE	543+0	4/10	DID	C
2VA-FD001	AUX	61/GG-FF	522+0	1/4	DID	C
2VA-FD002	AUX	61/GG-FF	522+0	1/4	DID	C

(continued)

Table 16.9-5-2

REQUIRED FIRE DAMPERS

DAMPER NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
2VA-FD003	AUX	60-61/FF-GG	522+0	1/1 (ND PUMPS)	DID	C
2VA-FD004	AUX	61/GG-FF	522+0	1/4	DID	C
2VA-FD005	AUX	60-61/GG-HH	522+0	1/4	DID	C
2VA-FD006	AUX	59-60/GG-HH	522+0	1/4	DID	C
2VA-FD007	AUX	59-60/GG-HH	522+0	1/4	DID	C
2VA-FD008	AUX	58-59/GG-HH	522+0	1/4	DID	C
2VA-FD009	AUX	58-59/GG-HH	522+0	1/4	DID	C
2VA-FD010	AUX	57-58/GG-HH	522+0	1/4	DID	C
2VA-FD011	AUX	57-58/FF	522+0	1/4	DID	C
2VA-FD012	AUX	59-60/MM-NN	543+0	4/22	DID	C
2VA-FD013	AUX	59/MM	543+0	4/22	DID	C
2VA-FD014	AUX	59/MM	543+0	4/22	DID	C
2VA-FD015	AUX	59-60/MM-NN	543+0	4/22	DID	C
2VA-FD020	AUX	63/NN	534+0	4/STAIR	DID	C
2VA-FD023	AUX	59/JJ-KK	543+0	4/4 (NV PUMPS)	DID	C
2VA-FD036	AUX	61-62/DD	560+0	2/5	LSS	B
2VA-FD037	AUX	61-62/CC-DD	577+0	5/12	HSS	A
2VA-FD038	AUX	61-62/CC-DD	577+0	5/12	HSS	A
2VA-FD040	AUX	62-63/AA-BB	543+0	2/39	LSS	B
2VA-FD041	AUX	62-63/AA-BB	543+0	2/39	LSS	B
2VA-FD042	AUX	62/AA-BB	543+0	2/31	LSS	B
2VA-FD043	AUX	61-62/BB	543+0	2/31	LSS	B
2VA-FD045	AUX	61/CC	543+0	2/STAIR	DID	C
2VA-FD046	AUX	61/CC-DD	543+0	2/STAIR	DID	C
2VA-FD048	AUX	61-62/BB	543+0	2/33	LSS	B
2VA-FD049	AUX	61-62/BB	543+0	2/33	LSS	B
2VA-FD050	AUX	61-62/BB	543+0	2/31	LSS	B
2VA-FD051	AUX	61-62/BB	543+0	2/31	LSS	B
2VA-FD053	AUX	60/MM	560+0	11/22	DID	C
2VA-FD054	AUX	59/MM-NN	560+0	11/22	DID	C
2VA-FD056	AUX	60/MM-NN	560+0	11/22	DID	C
2VA-FD057	AUX	59-60/MM	560+0	11/22	DID	C
2VA-FD058	AUX	59-60/MM	560+0	4/22	DID	C
2VA-FD059	AUX	60-61/HH	560+0	4/11	DID	C
2VA-FD060	AUX	61/HH-JJ	560+0	4/11	DID	C
2VA-FD061	AUX	60-61/GG-HH	560+0	4/11	DID	C
2VA-FD062	AUX	61/GG-HH	560+0	4/11	DID	C
2VA-FD063	AUX	61/GG-HH	560+0	4/11	DID	C
2VA-FD064	AUX	60-61/GG-HH	560+0	4/11	DID	C
2VA-FD065	AUX	61/HH	560+0	4/11	DID	C
2VA-FD069	AUX	58-59/QQ	577+0	18/ASB	LSS	B
2VA-FD070	AUX	59-60/QQ	577+0	18/ASB	LSS	B
2VA-FD071	AUX	59-60/MM-NN	577+0	18/22	DID	C
2VA-FD072	AUX	59-60/MM	577+0	18/22	DID	C

(continued)

Table 16.9-5-2

REQUIRED FIRE DAMPERS

DAMPER NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
2VA-FD073	AUX	60/MM	577+0	18/22	DID	C
2VA-FD074	AUX	60/MM	577+0	18/22	DID	C
2VA-FD075	AUX	60/HH	577+0	4/22	DID	C
2VA-FD076	AUX	60/HH	577+0	4/22	DID	C
2VA-FD077	AUX	60-61/HH	577+0	4/22	DID	C
2VA-FD078	AUX	60-61/HH	577+0	4/22	DID	C
2VA-FD079	AUX	61/HH	577+0	4/22	DID	C
2VA-FD080	AUX	61/GG-HH	577+0	4/22	DID	C
2VA-FD081	AUX	61/HH	577+0	4/22	DID	C
2VA-FD083	AUX	63/NN	594+0	22/STAIR	DID	C
2VA-FD086	AUX	60/FF	594+0	22/STAIR	DID	C
2VA-FD087	AUX	59-60/QQ	594+0	22/ASB	LSS	B
2VA-FD088	AUX	60-61/QQ	594+0	22/ASB	LSS	B
2VA-FD093	AUX	58-59/QQ	594+0	22/ASB	LSS	B
2VA-FD097	AUX	61/CC-DD	594+0	22/STAIR	DID	C
2VA-FD108A	AUX	57-59/QQ	611+0	22/ASB	LSS	B
2VA-FD108B	AUX	57-59/QQ	611+0	22/ASB	LSS	B
2VA-FD114	AUX	59-60/KK-LL	594+0	18/22	DID	C
2VA-FD115	AUX	59-60/KK-LL	594+0	18/22	DID	C
2VA-FD137	AUX	60-61/FF-GG	560+0	4/18	DID	C
2VA-FD138	AUX	60-61/FF-GG	560+0	4/18	DID	C
2VA-FD139	AUX	61/GG	560+0	4/11	DID	C
2VA-FD141	AUX	62-63/DD	543+0	2/4	DID	C
2VA-FD142	AUX	60-61/KK	560+0	4/11	DID	C
2VA-FD143	AUX	62-63/KK	560+0	4/18	DID	C
2VA-FD144	AUX	63/KK	560+0	4/18	DID	C
2VA-FD145	AUX	61-62/MM-NN	560+0	4/11	DID	C
2VA-FD146	AUX	61-62/DD	560+0	2/5	LSS	B
2VA-FD147	AUX	61-62/DD	560+0	2/5	LSS	B
2VA-FD151	AUX	61-62/BB-CC	543+0	2/36	LSS	B
2VA-FD152	AUX	61-62/CC	543+0	2/36	LSS	B
2VA-FD153	AUX	60-61/GG-HH	594+0	4/22	DID	C
2VA-FD154	AUX	60-61/GG-HH	594+0	4/22	DID	C
2VA-FD157	AUX	63-64/AA-BB	543+0	CO2	HSS	A
2VA-FD158	AUX	64-65/AA-BB	543+0	CO2	HSS	A
2VA-FD160	AUX	57-58/QQ	543+0	4/ASB	LSS	B
2VA-FD161	AUX	57-58/QQ	543+0	4/ASB	LSS	B
2VA-FD163	AUX	58/EE	543+0	9/46	LSS	B
2VA-FD164	AUX	57-58/EE	543+0	4/9	DID	C
0BRS-FD001	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRS-FD010	AUX	57/DD-EE	554+0	9/10	DID	C
0BRS-FD019	AUX	59/DD-EE	554+0	9/22	DID	C
0BRX-FD001A	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRX-FD001B	AUX	54-55/DD-EE	554+0	10/22	DID	C

(continued)

Table 16.9-5-2

REQUIRED FIRE DAMPERS

DAMPER NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
0BRX-FD001C	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRX-FD001D	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRX-FD001E	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRX-FD001F	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRX-FD001G	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRX-FD001H	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRX-FD002	AUX	54-55/DD-EE	554+0	10/22	DID	C
0BRX-FD009	AUX	57/AA-BB	554+0	9/10	DID	C
0BRX-FD010	AUX	57/AA-BB	554+0	9/10	DID	C
0BRX-FD011	AUX	57/BB-CC	554+0	9/10	DID	C
0BRX-FD012	AUX	57/CC-DD	554+0	9/10	DID	C
0BRX-FD013	AUX	57/CC-DD	554+0	9/10	DID	C
0BRX-FD014	AUX	57/DD-EE	554+0	9/10	DID	C
0BRX-FD021	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD022A	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD022B	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD022C	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD022D	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD022E	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD022F	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD022G	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD022H	AUX	60/DD-EE	554+0	9/22	DID	C
0BRX-FD023	AUX	57/BB-CC	554+0	9/10	DID	C
1CRA-FD005A	AUX	54-55/DD-EE	594+0	21/22	HSS	A
1CRA-FD005B	AUX	54-55/DD-EE	594+0	21/22	HSS	A
1CRA-FD008	AUX	54/AA	594+0	21/35	HSS	A
1CRA-FD009	AUX	53-54/CC-DD	594+0	22/STAIR	DID	C
1CRA-FD010	AUX	53-54/CC	594+0	21/STAIR	HSS	A
1CRA-FD011	AUX	53/AA-BB	594+0	20/35	DID	C
1CRA-FD012	AUX	53/BB-CC	594+0	20/21	HSS	A

(continued)

Table 16.9-5-2

REQUIRED FIRE DAMPERS

DAMPER NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
1CRA-FD013	AUX	52/CC-DD	594+0	20/22	LSS	B
1CRA-FD016	AUX	54-55/DD-EE	574+0	22/45	LSS	B
1CRA-FD017	AUX	54-55/DD	574+0	17/45	HSS	A
1CRA-FD018	AUX	54-55/DD	574+0	17/45	HSS	A
1CRA-FD019	AUX	54/AA-BB	574+0	17/45	HSS	A
1CRA-FD020	AUX	57/CC-DD	574+0	16/17	HSS	A
1CRA-FD021	AUX	53-54/DD-EE	574+0	22/45	LSS	B
1CRA-FD022	AUX	55-56/DD	574+0	17/45	HSS	A
1CRA-FD023	AUX	56-57/DD	574+0	17/45	HSS	A
1CRA-FD024A	AUX	57/DD-EE	574+0	45/46	DID	C
1CRA-FD024B	AUX	57/DD-EE	574+0	45/46	DID	C
1CRA-FD025A	AUX	54-55/DD-EE	574+0	22/45	LSS	B
1CRA-FD025B	AUX	54-55/DD-EE	574+0	22/45	LSS	B
1CRA-FD026	AUX	54-55/EE	577+0	18/22	DID	C
1CRA-FD028	AUX	53-54/EE	577+0	18/22	DID	C
1CRA-FD029	AUX	54-55/EE	568+0	11/22	DID	C
1CRA-FD030	AUX	54-55/EE	568+0	11/22	DID	C
1CRA-FD039	AUX	57/EE-FF	577+0	18/18 (KC PUMPS)	DID	C
1CR-FD001	AUX	55-56/DD-EE	594+0	21/22	HSS	A
1CR-FD002	AUX	55-56/DD-EE	594+0	21/22	HSS	A
1CR-FD003	AUX	54/AA-BB	594+0	21/35	HSS	A
1CR-FD004	AUX	53-54/BB	594+0	21/35	HSS	A
1CR-FD005	AUX	53-54/BB	594+0	21/35	HSS	A
1CR-FD007	AUX	51/CC-DD	594+0	13/20	HSS	A
2CRA-FD005A	AUX	59-60/DD-EE	594+0	21/22	HSS	A
2CRA-FD005B	AUX	59-60/DD-EE	594+0	21/22	HSS	A
2CRA-FD008	AUX	60/AA-BB	594+0	19/21	HSS	A
2CRA-FD009	AUX	60-61/CC	594+0	19/22	LSS	B
2CRA-FD012	AUX	61/CC-DD	594+0	19/22	LSS	B
2CRA-FD015	AUX	59-60/DD-EE	574+0	22/46	LSS	B
2CRA-FD016	AUX	59-60/DD	574+0	16/46	HSS	A
2CRA-FD017	AUX	59-60/DD	574+0	16/46	HSS	A
2CRA-FD018	AUX	60/AA-BB	574+0	16/46	HSS	A
2CRA-FD019	AUX	58-59/DD	574+0	16/46	HSS	A
2CRA-FD020	AUX	57-58/DD	574+0	16/46	HSS	A
2CRA-FD021	AUX	60-61/DD-EE	574+0	22/46	LSS	B
2CRA-FD022A	AUX	59-60/DD-EE	574+0	22/46	LSS	B

(continued)

Table 16.9-5-2

REQUIRED FIRE DAMPERS

DAMPER NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
2CRA-FD022B	AUX	59-60/DD-EE	574+0	22/46	LSS	B
2CRA-FD023	AUX	59-60/EE	577+0	18/22	DID	C
2CRA-FD025	AUX	60-61/EE	577+0	18/22	DID	C
2CRA-FD026	AUX	59-60/EE	568+0	11/22	DID	C
2CRA-FD027	AUX	59-60/EE	568+0	11/22	DID	C
2CR-FD001	AUX	58-59/DD-EE	594+0	21/22	HSS	A
2CR-FD002	AUX	58-59/DD	594+0	21/22	HSS	A
2CR-FD003	AUX	63-64/CC	594+0	12/19	HSS	A
1VF-FD001A	AUX	51, NN-PP	605+10	22/24	LSS	B
1VF-FD001B	AUX	51, NN-PP	605+10	22/24	LSS	B
1VF-FD002A	AUX	50-51/NN-PP	631+6	24/38	DID	C
1VF-FD002B	AUX	50-51/NN-PP	631+6	24/38	DID	C
1VF-FD004	AUX	49/PP-QQ	631+6	24/38	DID	C
1VF-FD005	AUX	49-50/PP-QQ	631+6	24/38	DID	C
1VF-FD006	AUX	50-51	631+6	24/38	DID	C
1VF-FD007	AUX	50-51/KK-LL	605+10	22/24	LSS	B
1VF-FD010	AUX	50-51/KK	605+10	22/24	LSS	B
1VF-FD011	AUX	50-51/JJ-KK	631+6	22/38	LSS	B
1VF-FD013	AUX	50-51/JJ-KK	616+10	22/24	LSS	B
1VF-FD014	AUX	50-51/JJ-KK	616+10	22/24	LSS	B
2VF-FD001A	AUX	63, NN-PP	605+10	22/23	LSS	B
2VF-FD001B	AUX	63, NN-PP	605+10	22/23	LSS	B
2VF-FD002A	AUX	63-64/NN-PP	631+6	23/47	DID	C
2VF-FD002B	AUX	63-64/NN-PP	631+6	23/47	DID	C
2VF-FD004	AUX	65/PP-QQ	631+6	23/47	DID	C
2VF-FD005	AUX	64-65/PP-QQ	631+6	23/47	DID	C
2VF-FD006	AUX	63-64/PP-QQ	631+6	23/47	DID	C
2VF-FD007	AUX	63-64/KK-LL	605+10	22/23	LSS	B
2VF-FD010	AUX	63-64/KK	605+10	22/23	LSS	B
2VF-FD011	AUX	64-64/JJ-KK	631+6	22/47	LSS	B
2VF-FD013	AUX	63-64/JJ-KK	616+10	22/23	LSS	B
2VF-FD014	AUX	63-64/JJ-KK	616+10	22/23	LSS	B
1TB-FD001	TB1	18-19/V	594+0	TB1/SRV	DID	C
1TB-FD002	TB1	18-19/V	594+0	TB1/SRV	DID	C
1TB-FD003	TB1	18-19/V	594+0	TB1/SRV	DID	C
1TB-FD004	TB1	18-19/V	594+0	TB1/SRV	DID	C
1TB-FD005	TB1	18-19/V	594+0	TB1/SRV	DID	C
1TB-FD006	TB1	18-19/V	594+0	TB1/SRV	DID	C
1TB-FD007	TB1	21-22/V	594+0	TB1/SRV	DID	C
1TB-FD008	TB1	21-22/V	594+0	TB1/SRV	DID	C
1TB-FD009	TB1	21-22/V	594+0	TB1/SRV	DID	C
1TB-FD010	TB1	21-22/V	594+0	TB1/SRV	DID	C
1TB-FD011	TB1	21-22/V	594+0	TB1/SRV	DID	C
1TB-FD012	TB1	21-22/V	594+0	TB1/SRV	DID	C
1TB-FD032	TB1	18-19/V	594+0	TB1/SRV	DID	C

(continued)

Table 16.9-5-2

REQUIRED FIRE DAMPERS

DAMPER NUMBER	BLDG	LOCATION	ELEVATION	FIRE AREA INTERFACE	RISK CRITERIA	REMEDIAL ACTION CONDITION
1TB-FD038	TB1	16-17/V	594+0	TB1/SRV	DID	C
1TB-FD039	TB1	16-17/V	594+0	TB1/SRV	DID	C
1TB-FD040	TB1	16/V	594+0	TB1/SRV	DID	C
1TB-FD043	TB1	30-31/1J-1K	568+0	TB1/OTT	DID	C
1TB-FD044	TB1	32/1J-1K	594+0	TB1/MTOT	DID	C
1TB-FD045	TB1	30/1J-1K	594+0	TB1/MTOT	DID	C
1TB-FD046	TB1	32/1K-1L	568+0	TB1/OTT	DID	C
2TB-FD013	TB2	21-22/P	594+0	TB2/SRV	DID	C
2TB-FD014	TB2	21-22/P	594+0	TB2/SRV	DID	C
2TB-FD015	TB2	21-22/P	594+0	TB2/SRV	DID	C
2TB-FD016	TB2	21-22/P	594+0	TB2/SRV	DID	C
2TB-FD017	TB2	21-22/P	594+0	TB2/SRV	DID	C
2TB-FD018	TB2	21-22/P	594+0	TB2/SRV	DID	C
2TB-FD019	TB2	18-19/P	594+0	TB2/SRV	DID	C
2TB-FD020	TB2	18-19/P	594+0	TB2/SRV	DID	C
2TB-FD021	TB2	18-19/P	594+0	TB2/SRV	DID	C
2TB-FD022	TB2	18-19/P	594+0	TB2/SRV	DID	C
2TB-FD023	TB2	18-19/P	594+0	TB2/SRV	DID	C
2TB-FD024	TB2	18-19/P	594+0	TB2/SRV	DID	C
2TB-FD031	TB2	32/2K-2L	568+0	TB2/OTT	DID	C
2TB-FD032	TB2	18/P	594+0	TB2/SRV	DID	C
2TB-FD036	TB2	16-17/P	594+0	TB2/SRV	DID	C
2TB-FD038	TB2	17-18/P	594+0	TB2/SRV	DID	C
2TB-FD039	TB2	32/2J-2K	594+0	TB2/MTOT	DID	C
2TB-FD040	TB2	30/2J-2K	594+0	TB2/MTOT	DID	C
2TB-FD041	TB2	30-31/2J/2K	568+0	TB2/OTT	DID	C

Table 16.9-5-3

HIGH SAFETY SIGNIFICANT (HSS) FIRE AREAS*

FIRE AREA	BLDG	ELEVATION	DESCRIPTION
6	AUX	560+0	Unit 1 Electrical Pen Room El 560
12	AUX	577+0	Unit 2 Electrical Pen Room El 577
13	AUX	577+0	Unit 1 Electrical Pen Room El 577
14	AUX	577+0	Unit 2 4160V Essential Swgr Room (2ETA)
15	AUX	577+0	Unit 1 4160V Essential Swgr Room (1ETA)
16	AUX	574+0	Unit 2 Cable Room El 574
17	AUX	574+0	Unit 1 Cable Room El 574
21	AUX	594+0	Main Control Room El 594

*High Safety Significant (HSS) Fire Areas are defined as the areas with HSS fire barrier features in accordance with the Catawba NFPA 805 Monitoring Program.

Table 16.9-5-4

FIRE AREAS AND SHUTDOWN TRAIN / METHOD

FIRE AREA	FIRE AREA DESCRIPTIONS	ASSURED SHUTDOWN TRAIN / METHOD
1	ND & NS Pump Room El 522 (Common)	SSS
2	Unit 2 CA Pump Room El 543	SSS
3	Unit 1 CA Pump Room El 543	SSS
4	Aux Bldg. Gen Area & NV Pump Room El 543 (Common)	SSS
5	Unit 2 Electrical Pen Room El 560	A
6	Unit 1 Electrical Pen Room El 560	A
7	Unit 2 4160V Essential SWGR Room El 560	A
8	Unit 1 4160V Essential SWGR Room El 560	A
9	Unit 2 Battery Room El 554	SSS
10	Unit 1 Battery Room El 554	SSS
11	Aux Bldg. Gen Area & U1 KC Pump Room El 560 (Common)	SSS
12	Unit 2 Electrical Pen Room El 577	B
13	Unit 1 Electrical Pen Room El 577	B
14	Unit 2 4160V Essential SWGR Room El 577	B
15	Unit 1 4160V Essential SWGR Room El 577	B
16	Unit 2 Cable Room El 574	SSS
17	Unit 1 Cable Room El 574	SSS
18	Aux Bldg. Gen Area & U2 KC Pump Room El 577 (Common)	SSS
19	Unit 2 Electrical Pen Room El 594	A
20	Unit 1 Electrical Pen Room El 594	A
21	Control Room El 594 (Common)	SSS
22	Aux Bldg. Gen Area El 594 (Common)	SSS
23	Unit 2 Fuel Storage Area El 605	A
24	Unit 1 Fuel Storage Area El 605	A
25	Diesel Generator Bldg. 1A El 556	B
25A	Diesel Generator Bldg. 1A Stairwell	B
26	Diesel Generator Bldg. 1B El 556	A
26B	Diesel Generator Bldg. 1B Stairwell	A
27	Diesel Generator Bldg. 2A El 556	B
27A	Diesel Generator Bldg. 2A Stairwell	B
28	Diesel Generator Bldg. 2B El 556	A
28B	Diesel Generator Bldg. 2B Stairwell	A
29	Train A RN Pump Structure El 600 (Common)	B
30	Train B RN Pump Structure El 600 (Common)	A
31	Unit 2 Train A Aux Shutdown Panel El 543	B
32	Unit 1 Train A Aux Shutdown Panel El 543	B
33	Unit 2 Train B Aux Shutdown Panel El 543	A
34	Unit 1 Train B Aux Shutdown Panel El 543	A
35	Control Room Tagout Area El 594	A or B
36	Unit 2 Turbine Driven CA Pump Control Panel Room El 543	B
37	Unit 1 Turbine Driven CA Pump Control Panel Room El 543	B
38	Unit 1 Fuel Storage Area HVAC Room El 631	A or B

(continued)

Table 16.9-5-4

FIRE AREAS AND SHUTDOWN TRAIN / METHOD

FIRE AREA	FIRE AREA DESCRIPTIONS	ASSURED SHUTDOWN TRAIN / METHOD
39	Unit 2 Turbine Driven CA Pump Pit El 543	B
40	Unit 1 Turbine Driven CA Pump Pit El 543	B
41	DG1A Sequencer Tunnel El 556	B
42	DG1B Sequencer Tunnel El 556	A
43	DG2A Sequencer Tunnel El 556	B
44	DG2B Sequencer Tunnel El 556	A
45	Unit 1 Cable Room Corridor El 574	B
46	Unit 2 Cable Room Corridor El 574	B
47	Unit 2 Fuel Storage Area HVAC Room El 631	A or B
48	Unit 2 Interior Doghouse	A and B
49	Unit 1 Interior Doghouse	A and B
50	Unit 2 Exterior Doghouse	A and B
51	Unit 1 Exterior Doghouse	A and B
ASB	Auxiliary Service Building	A or B
RB1	Unit 1 Reactor Building	A and B
RB2	Unit 2 Reactor Building	A and B
SRV	Service Building	B
SSF	Standby Shutdown Facility	A or B
STAIR*	Stairway	See Note
TB1	Unit 1 Turbine Building	A or B
TB2	Unit 2 Turbine Building	A or B
YRD**	Yard Area	A or B

* IF the barrier in a stairway is adjacent to a HSS Fire Area (see Table 16.9-5-3), enter CONDITION A; otherwise enter CONDITION C.
** Exterior walls that interface with the YRD do not require entry into a CONDITION statement and therefore do not have a REQUIRED ACTION.

A = A TRAIN
B = B TRAIN
SSS = STANDBY SHUTDOWN SYSTEM

BASES

The functional integrity of the Fire Rated Assemblies and associated sealing devices ensures that fires will be confined or adequately retarded so as not to spread between fire areas/compartments.

The fire barriers and associated penetration seals are passive elements in the facility fire protection program and are subject to periodic inspections.

Risk-informed insights from the Fire PRA process can apply to compensatory actions. The safety significance of the fire area can provide relief for required compensatory actions. In addition, the presence of functional fire detection can reduce the required compensatory actions. Functional fire detection in the area provides early warning of a fire for fire brigade response. Fire detection can provide a compensatory action equivalent to or better than fire watch.

Fire barrier penetration seals, including cable/pipe penetration seals, fire doors, and fire dampers, are considered FUNCTIONAL when the visually observed condition indicates no abnormal change in appearance or abnormal degradation. An evaluation is performed to determine the cause of any identified fire barrier penetration seal abnormal change in appearance or abnormal degradation and the effect of this change on the ability of the fire barrier penetration seal to perform its function. Based on this evaluation additional inspections may be performed.

During periods of time when a barrier is not FUNCTIONAL, either:

(1) Perform the recommended fire watch in accordance with the criteria in the remedial actions, or

(2) a licensee may choose to implement a different required action or a combination of actions (e.g., additional administrative controls, operator briefings, temporary procedures, interim shutdown strategies, operator manual actions, temporary fire barriers, temporary detection or suppression systems). Such a change must be made to the approved Fire Protection Plan (FPP). However, the licensee must complete a documented evaluation of the impact of the proposed required action to the FPP. The evaluation must demonstrate that the required actions would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. Any change to the FPP must maintain compliance with the General Design Criteria and 10 CFR 50.48(a).

The evaluation of the required action should incorporate risk insights regarding the location, quantity, and type of combustible material in the fire area; the presence of ignition sources and their likelihood of occurrence; the automatic fire suppression and the fire detection capability in the fire area; the manual fire suppression capability in the fire area; and the human error probability where applicable.

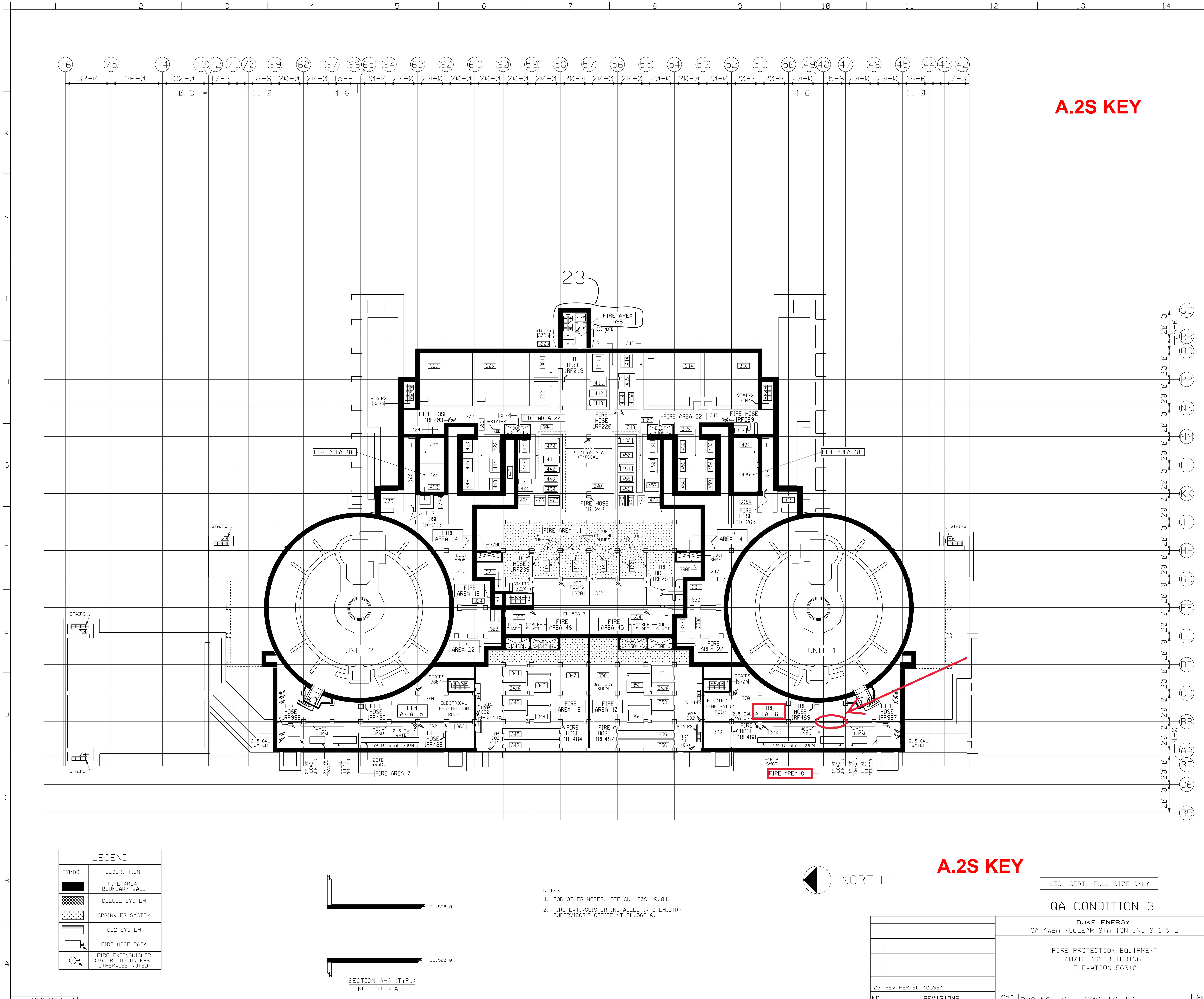
BASES (continued)

The expectation is to promptly complete the corrective action at the first available opportunity and eliminate the reliance on the required action.

This SLC is part of the Catawba Fire Protection Program and therefore subject to the provisions of Section 2.C.(5) of the Catawba Renewed Facility Operating Licenses.

REFERENCES

1. Catawba UFSAR, Section 9.5.1.
2. Catawba Nuclear Station 10 CFR 50.48(c) Fire Protection Safety Evaluation (SE).
3. Catawba Plant Design Basis Specification for Fire Protection, CNS-1465.00-00-0006, as revised.
4. Catawba UFSAR, Section 18.2.8.
5. Catawba License Renewal Commitments, CNS-1274.00-00-0016, Section 4.12.2.
6. NRC Regulatory Issue Summary 2005-07, Compensatory Measures to Satisfy the Fire Protection Program Requirements, April 19, 2005.
7. Catawba Renewed Facility Operating License Conditions 2.C.(5).
8. CNC-1435.00-00-0084, Catawba NFPA 805 Monitoring Program.
9. CNC-1435.00-00-0044, Fire Protection Nuclear Safety Capability Assessment.
10. CN-1209.10 series drawings.
11. CN-1105 series drawings.



LEGEND	
SYMBOL	DESCRIPTION
	FIRE AREA BOUNDARY WALL
	DELUGE SYSTEM
	SPRINKLER SYSTEM
	CO2 SYSTEM
	FIRE HOSE RACK
	FIRE EXTINGUISHER (15 LB CO2 UNLESS OTHERWISE NOTED)

SECTION A-A (TYP.)
NOT TO SCALE

NOTES
1. FOR OTHER NOTES, SEE CN-1209-10.01.
2. FIRE EXTINGUISHER INSTALLED IN CHEMISTRY SUPERVISOR'S OFFICE AT EL.568+0.

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

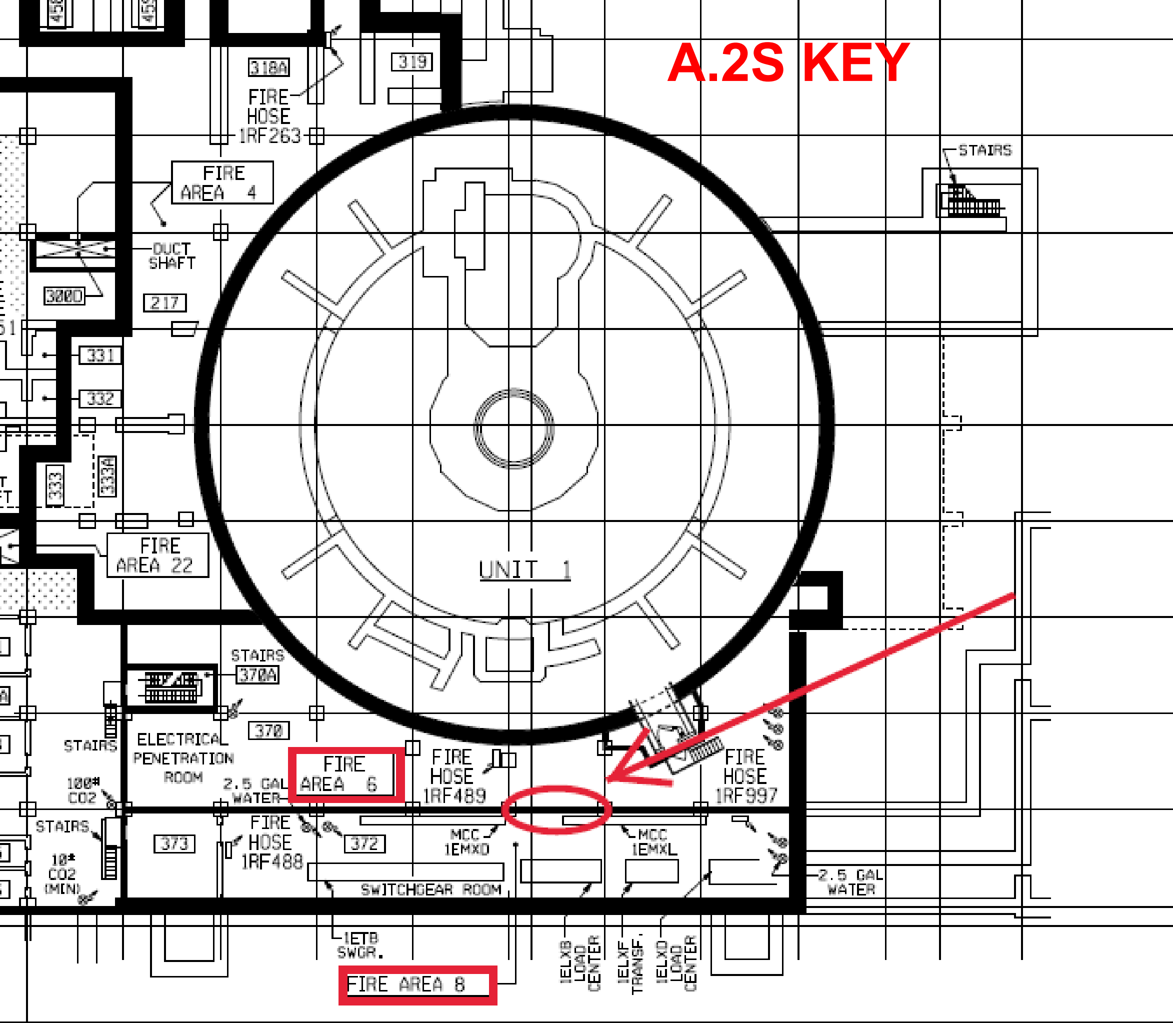
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

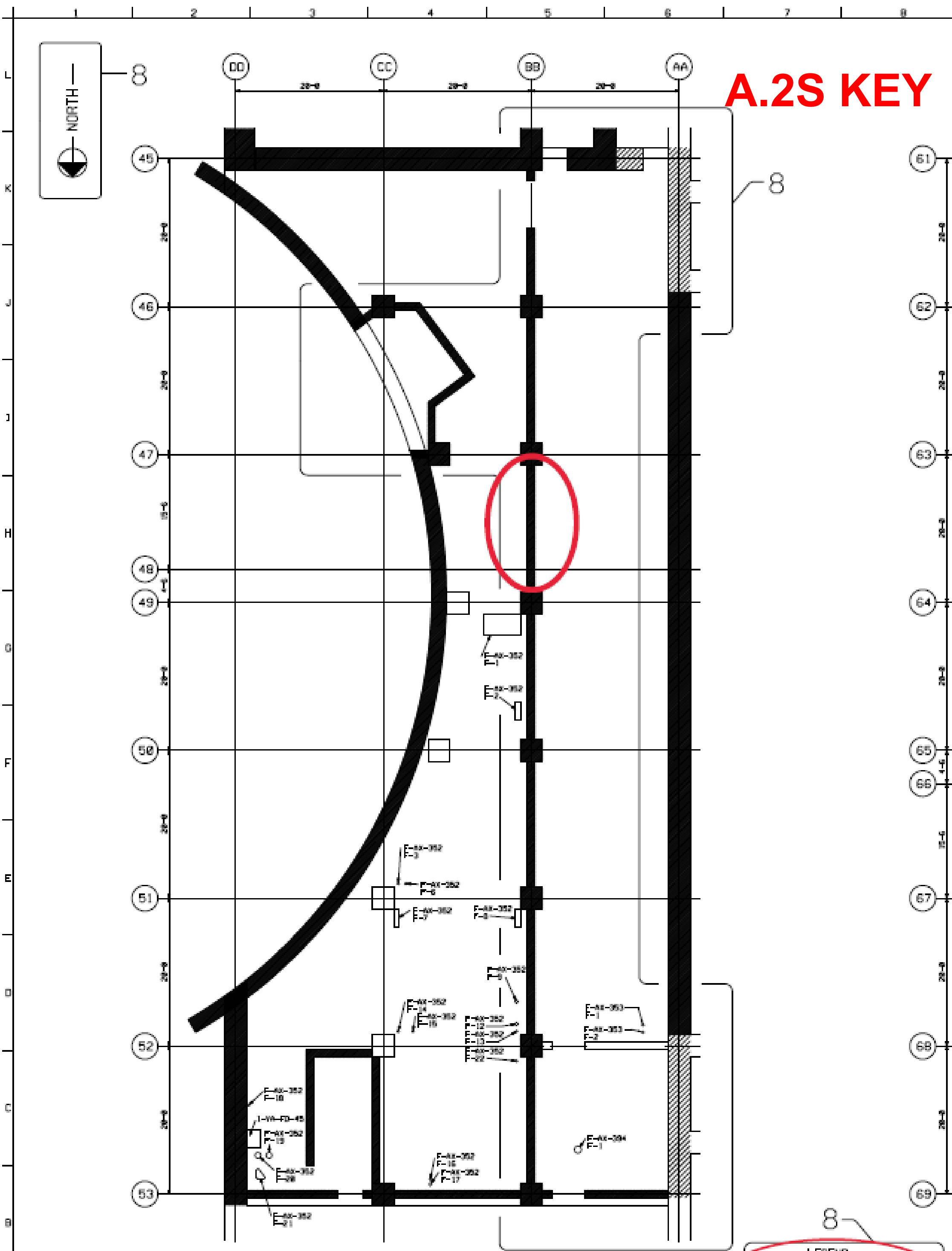
FIRE PROTECTION EQUIPMENT
AUXILIARY BUILDING
ELEVATION 560+0

NO.	REVISIONS
23	REV PER EC 405994

SCALE 20'-1" DWG. NO. CN-1209-10.12 REV. 23

ERN: CN0001LI


A.2S KEY
318A
319
FIRE HOSE 1RF263
FIRE AREA 4
DUCT SHAFT
300D
217
331
332
333
333A
FIRE AREA 22
STAIRS
UNIT 1
STAIRS 370A
370
STAIRS
ELECTRICAL PENETRATION ROOM
100# CO2
2.5 GAL WATER
FIRE AREA 6
FIRE HOSE 1RF489
FIRE HOSE 1RF997
STAIRS
373
10# CO2 (MIN)
FIRE HOSE 1RF488
372
MCC 1EMXD
MCC 1EMXL
SWITCHGEAR ROOM
2.5 GAL WATER
1ETB SWGR.
FIRE AREA 8
1ELXB LOAD CENTER
1ELXF TRANSF.
1ELXD LOAD CENTER



BUILDING FLOOR ELEVATION CODES

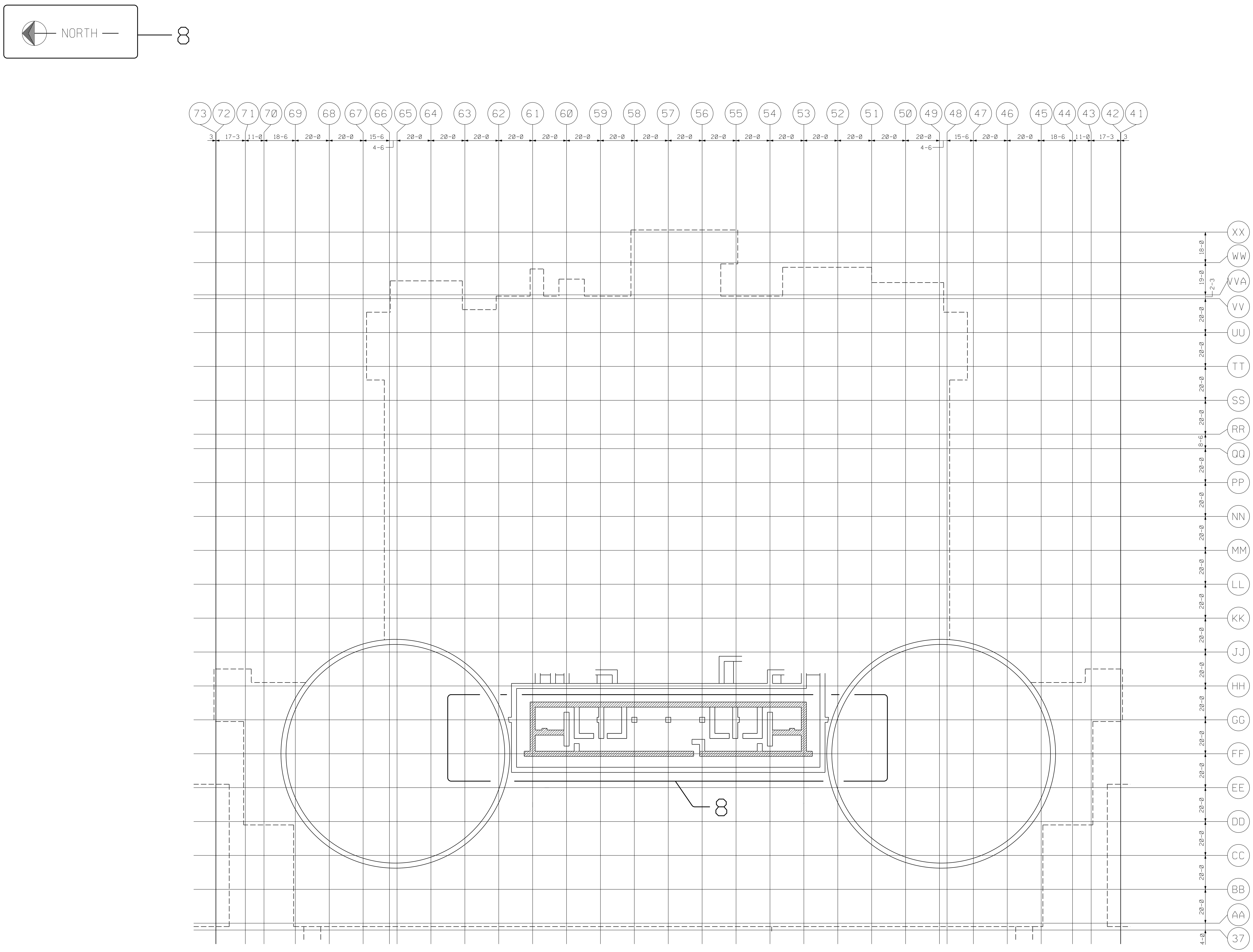
CODE	FL. ELEV	CODE	FL. ELEV
A	522+0	J	577+0
B	533+0	K	594+0
C	543+0	L	605+10
D	554+0	M	605+0
E	556+0	N	610+0
F	560+0	O	619+6
G	568+0	P	631+6
H	574+0		

LEGEND

LOW SAFETY SIGNIFICANT & HIGH SAFETY SIGNIFICANT (LSS/HSS) BARRIERS

DEFENSE-IN-DEPTH (DID) BARRIERS

FLOOR ELEVATION CODE
BUILDING
ROOM NUMBER
OPENING NUMBER
ROOM SURFACE
F=FLOOR
W=WALL



NOTE:
SEE DWG CN-1201-4, NOTES 29 & 30 FOR BLOCK WALL JOINT SEALANT INSTALLATION.

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

8

LEGEND

- LOW SAFETY SIGNIFICANT & HIGH SAFETY SIGNIFICANT (LSS/HSS) BARRIERS
- DEFENSE-IN-DEPTH (DID) BARRIERS

NO.	REVISIONS
8	REVISED PER EC 405594

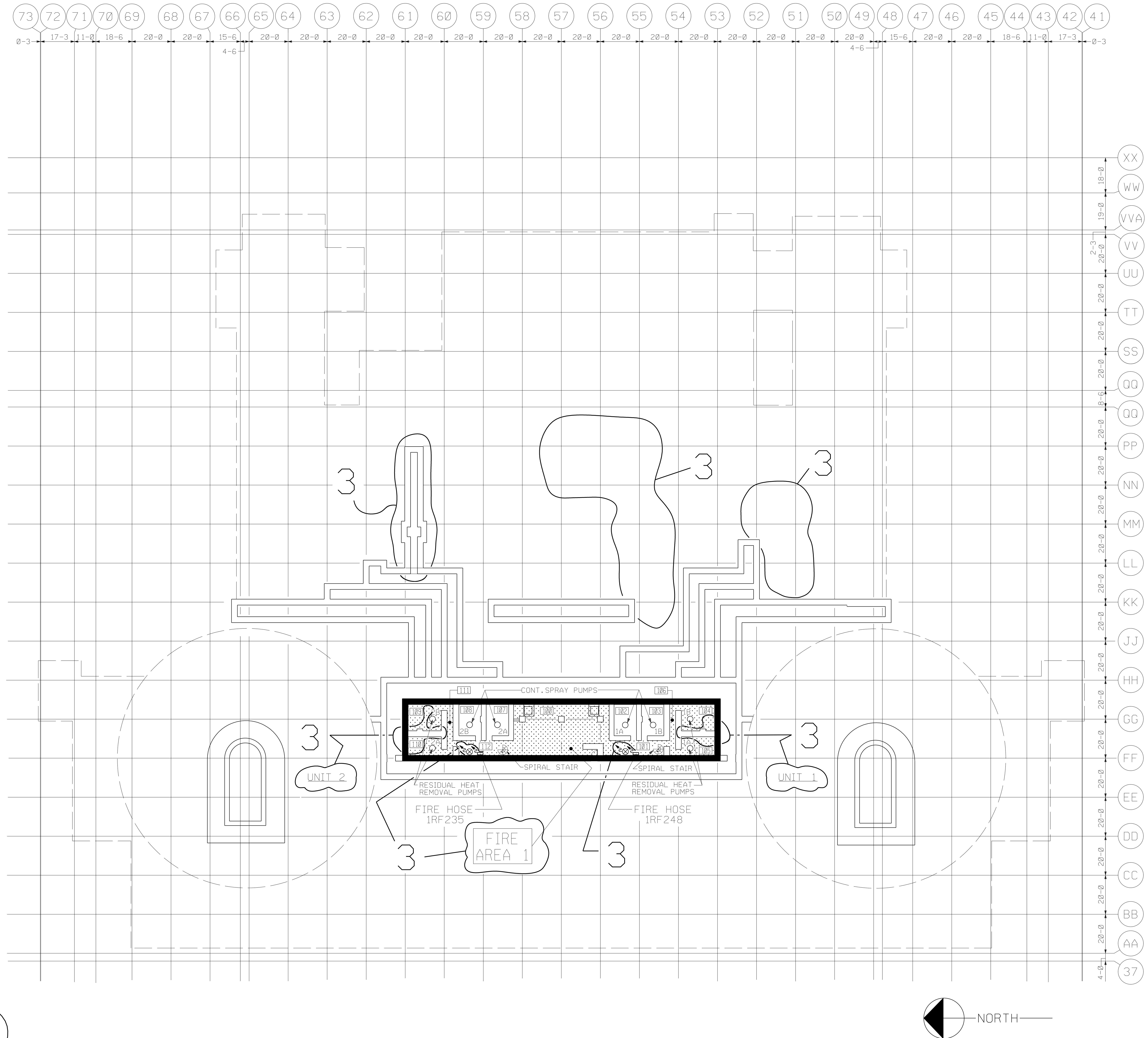
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

ARCHITECTURAL
FIRE BOUNDARY WALLS
FLOOR PLAN
FINISHED FL. EL. 522+0

SCALE 1"=20' DWG. NO. CN-1105-01 REV. 8

ERN: CN00012M

DWG. NO. CN-1209-10.10 REV. 3



LEGEND	
SYMBOL	DESCRIPTION
	FIRE AREA BOUNDARY WALL
	DELUGE SYSTEM
	SPRINKLER SYSTEM
	CO2 SYSTEM
	FIRE HOSE RACK
	FIRE EXTINGUISHER (15 LB CO2 UNLESS OTHERWISE NOTED)

NOTE: FOR NOTES, SEE CN-1209-10.01.

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

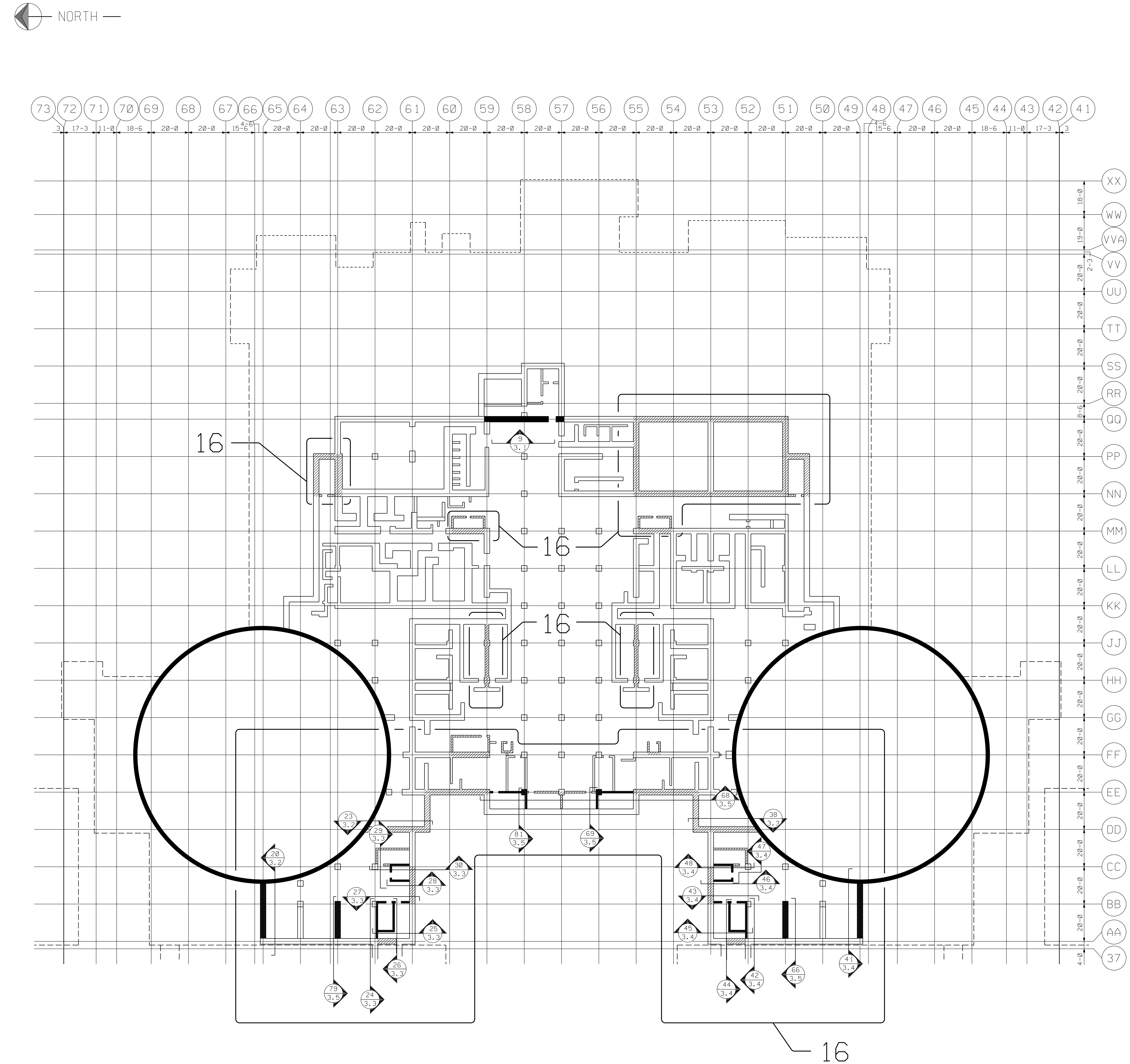
NO.	REVISIONS	DRN	DATE	CHKD	DATE	APPR	DATE
3	REV PER CE-70253, IMP DT: 9-10-01	TLC	3-5-02	CLI	3-12-02	RGW	3-13-02
ORIG	ORIGINAL DRAWING RETIRED	TLC	3-5-02				

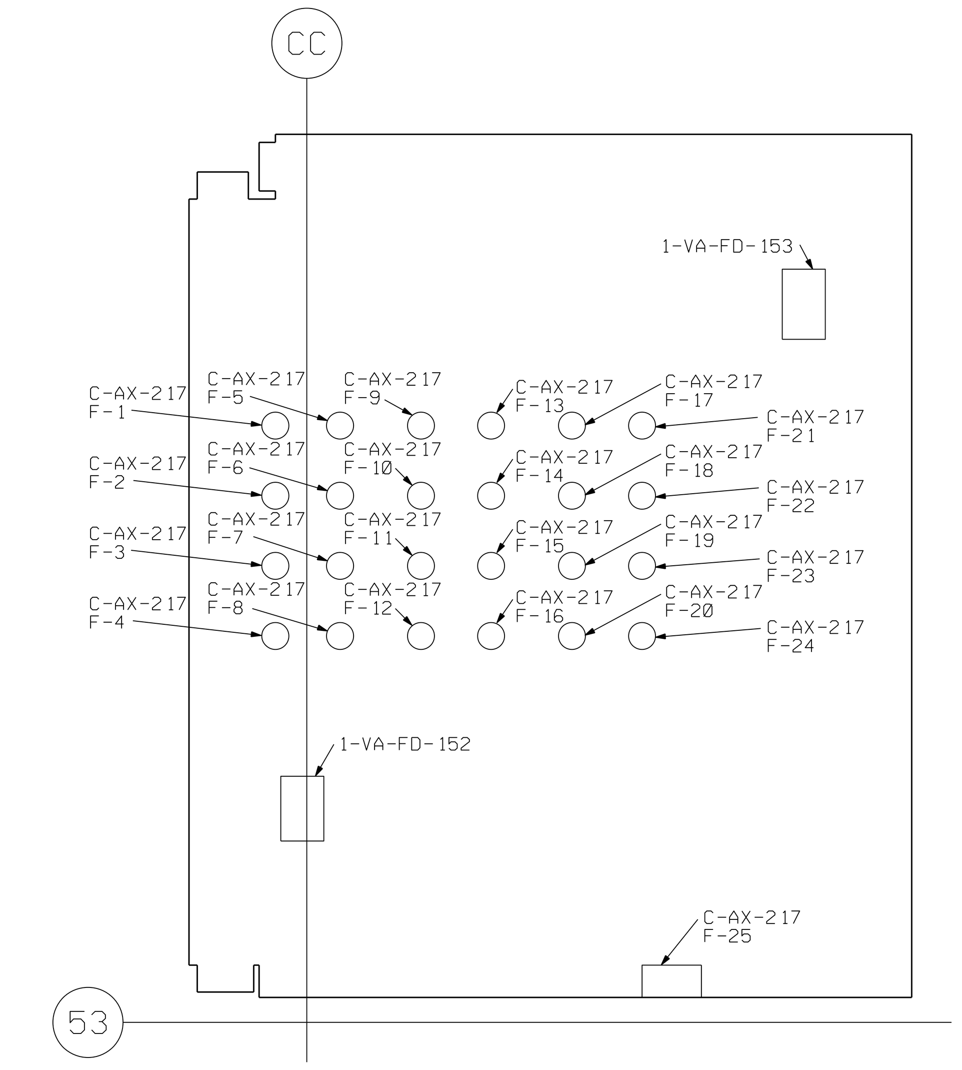
WAIVED — WMH — RFK
CIVIL ELEC. MECH. INSPECTED

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION UNITS 1&2
FIRE PROTECTION EQUIPMENT
AUXILIARY BUILDING
ELEVATION 522+0

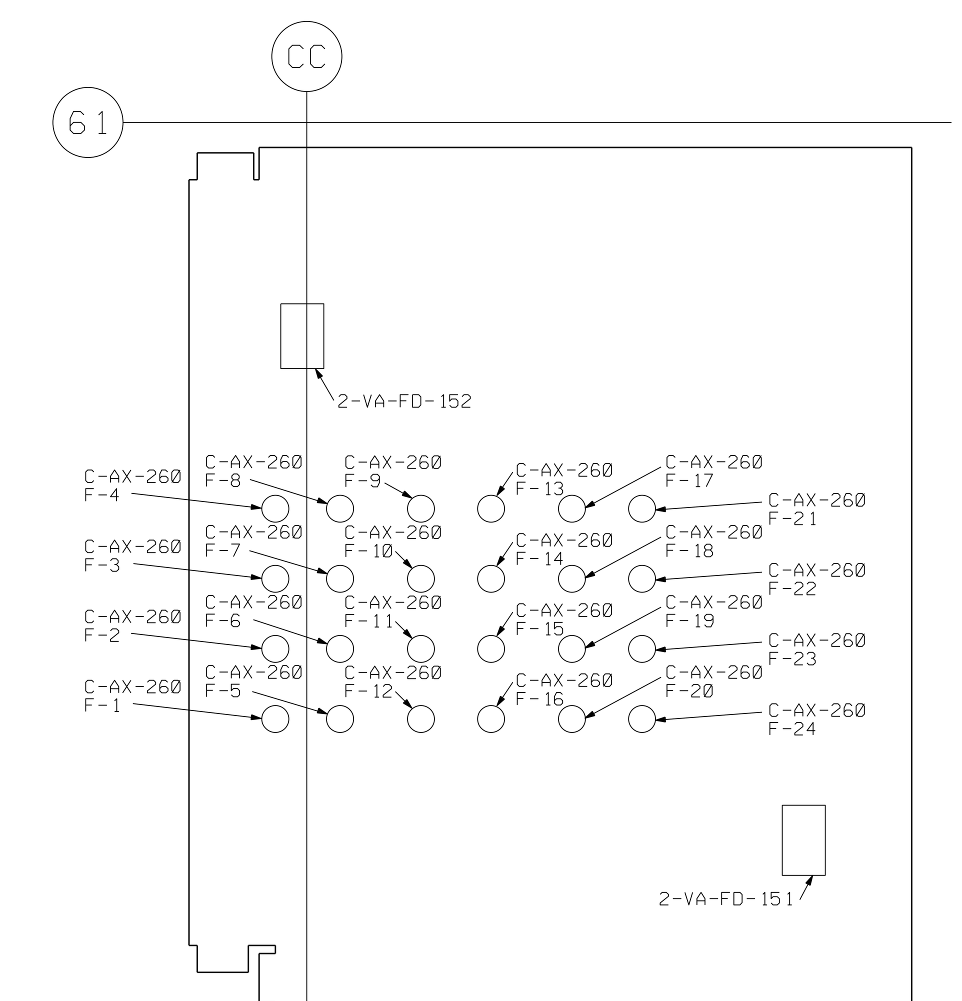
DESIGNER CHRISTOPHER DATE 5-15-81 INSP. HA SMITH DATE 6-10-81
DRAWN CHRISTOPHER DATE 5-15-81 INSP. DE ROBERTS DATE 6-10-81
CHECKED HD BRANDES DATE 5-15-81 APPR. DR HEDRICKS DATE 6-25-81
SCALE 1"=20' DWG. NO. CN-1209-10.10 REV. 3

ERN: CN0001LG





UNIT 1 AUXILIARY FEED WATER PUMP TURBINE PANEL ROOM ROOF @ EL 553+0



UNIT 2 AUXILIARY FEED WATER PUMP TURBINE PANEL ROOM ROOF @ EL 553+0

LEGEND

16

LOW SAFETY SIGNIFICANT & HIGH SAFETY SIGNIFICANT (LSS/HSS) BARRIERS

DEFENSE-IN-DEPTH (DID) BARRIERS

A-AX-100 — FLOOR ELEVATION CODE, BUILDING, ROOM NUMBER

W-6 — OPENING NUMBER, ROOM SURFACE F=FLOOR W=WALL

BUILDING FLOOR ELEVATION CODES

CODE	FL. ELEV	CODE	FL. ELEV
A	522+0	J	577+0
B	533+0	K	594+0
C	543+0	L	605+10
D	554+0	M	609+0
E	556+0	N	610+0
F	560+0	O	619+6
G	568+0	P	631+6
H	574+0		

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

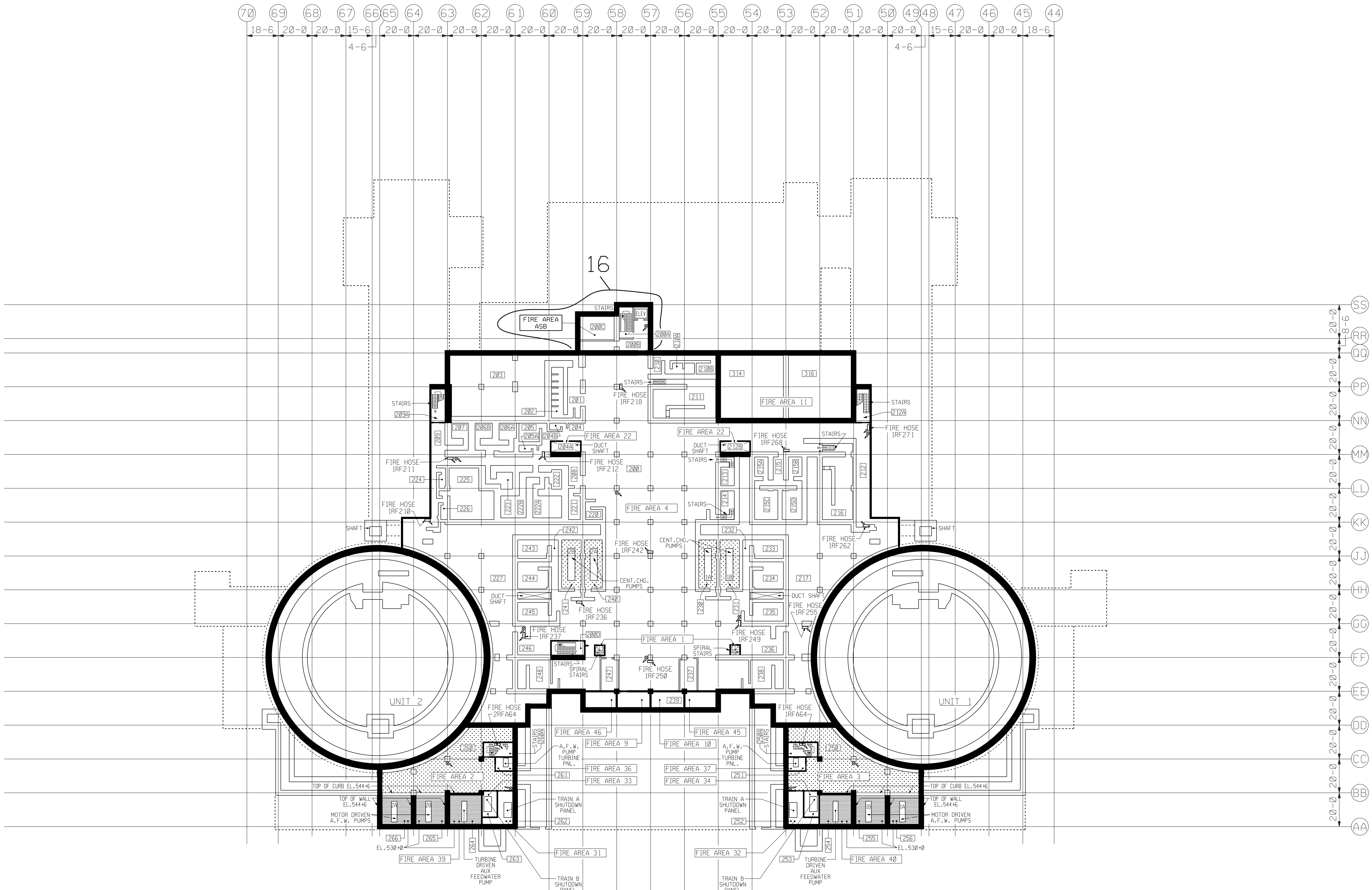
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

ARCHITECTURAL
FIRE BOUNDARY WALLS
PLAN AT EL 543+0

NO.	REVISIONS
16	REVISED PER EC 405994

SCALE 1"=20' DWG. NO. CN-1105-03 REV. 16

ERN: CN00012P



LEGEND

SYMBOL	DESCRIPTION
	FIRE AREA BOUNDARY WALL
	DELUGE SYSTEM
	SPRINKLER SYSTEM
	CO2 SYSTEM
	FIRE HOSE RACK
	FIRE EXTINGUISHER (15 LB CO2 UNLESS OTHERWISE NOTED)

NOTES
1. FOR OTHER NOTES, SEE CN-1209-10.01.

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

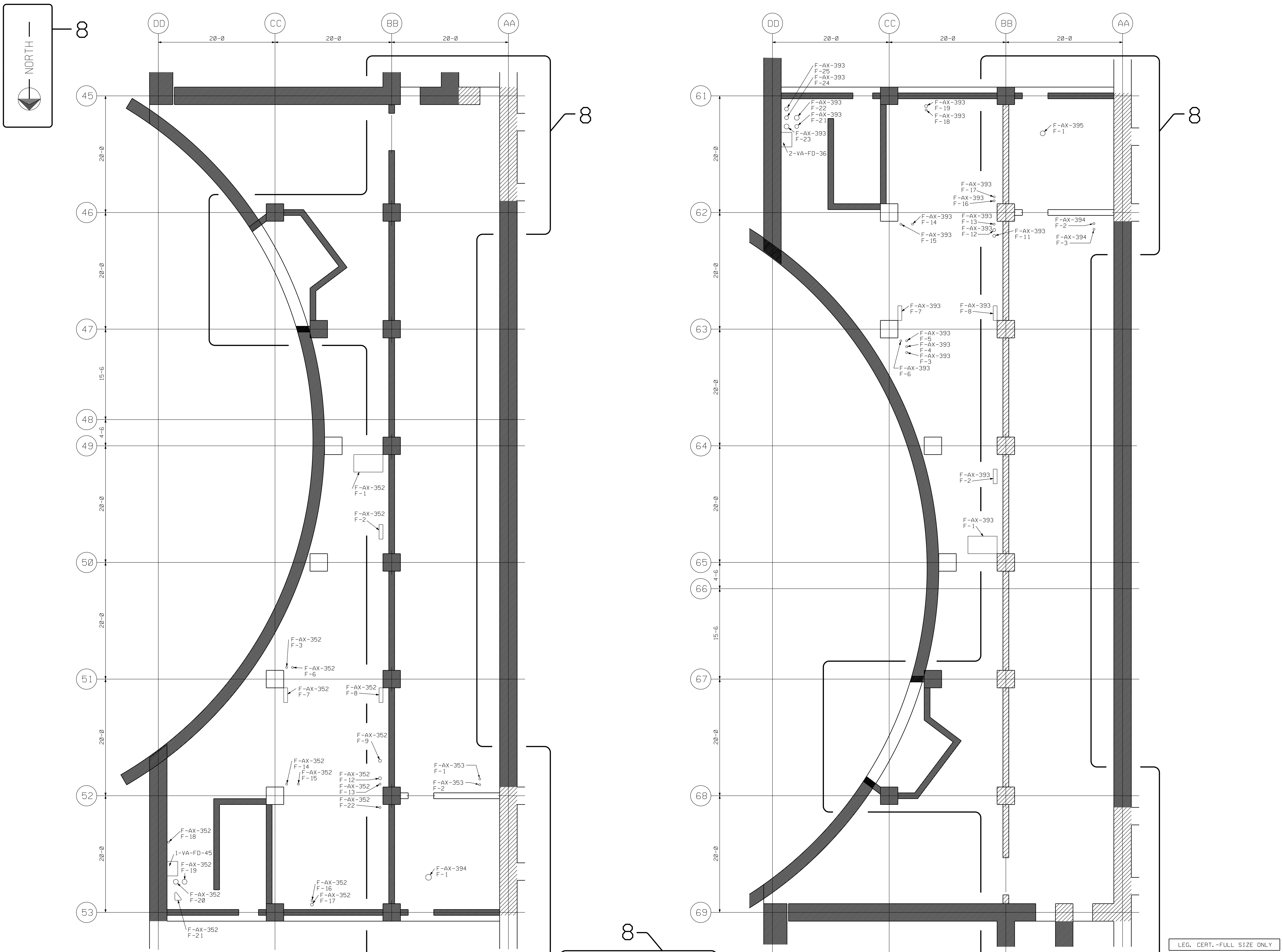
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

FIRE PROTECTION EQUIPMENT
AUXILIARY BUILDING
ELEVATION 543+0

NO.	REVISIONS
16	REV PER EC 405994

SCALE 20'-1" DWG. NO. CN-1209-10.11 REV. 16

ERN: CN0001LH



BUILDING FLOOR ELEVATION CODES			
CODE	FL. ELEV	CODE	FL. ELEV
A	522+0	J	577+0
B	533+0	K	594+0
C	543+0	L	605+10
D	554+0	M	609+0
E	556+0	N	610+0
F	560+0	O	619+6
G	568+0	P	631+6
H	574+0		

LEGEND

LOW SAFETY SIGNIFICANT & HIGH SAFETY SIGNIFICANT (LSS/HSS) BARRIERS

DEFENSE-IN-DEPTH (DID) BARRIERS

A-AX-100 W-6

- FLOOR ELEVATION CODE
- BUILDING
- ROOM NUMBER
- OPENING NUMBER
- ROOM SURFACE F=FLOOR W=WALL

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

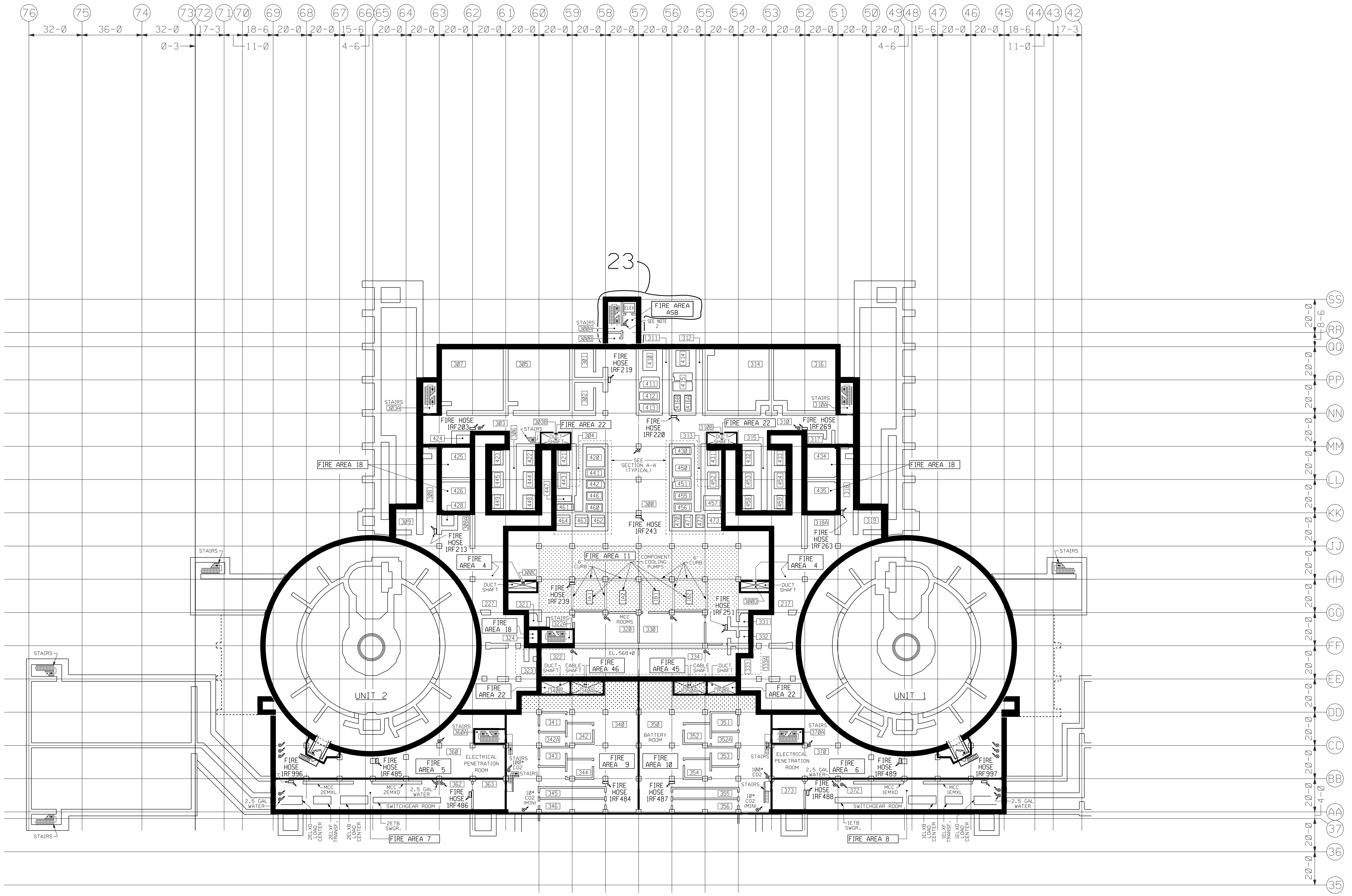
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

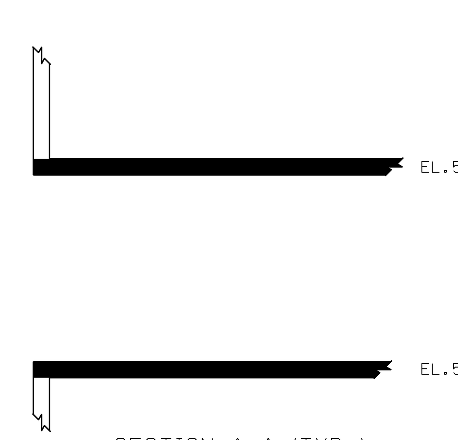
ARCHITECTURAL
FIRE BOUNDARY WALLS
PLAN AT EL. 560+0

NO.	REVISIONS
8	REV PER EC 405994
7	AS BUILT PER EC 114426

SCALE 3/16" = 1' **DWG. NO.** CN-1105-06.08 REV. 8

ERN: CN00013E





SECTION A-A (TYP.)
NOT TO SCALE

NORTH

LEGEND

SYMBOL	DESCRIPTION
	FIRE AREA BOUNDARY WALL
	DELUGE SYSTEM
	SPRINKLER SYSTEM
	CO2 SYSTEM
	FIRE HOSE RACK
	FIRE EXTINGUISHER (15 LB CO2 UNLESS OTHERWISE NOTED)

NOTES

1. FOR OTHER NOTES, SEE CN-1209-10.01.
2. FIRE EXTINGUISHER INSTALLED IN CHEMISTRY SUPERVISOR'S OFFICE AT EL.568+0.

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

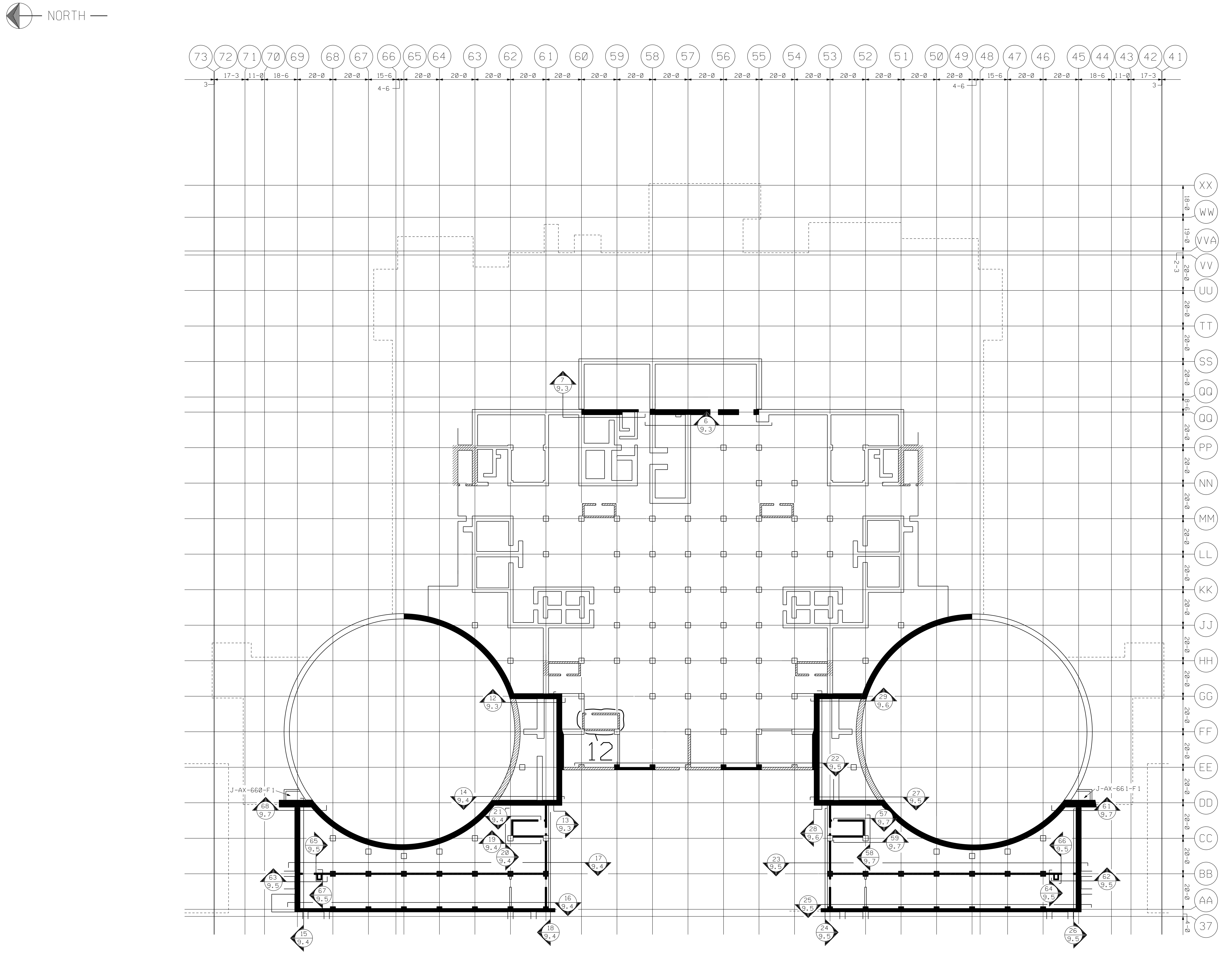
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

FIRE PROTECTION EQUIPMENT
AUXILIARY BUILDING
ELEVATION 560+0

NO.	REVISIONS
23	REV PER EC 405994

SCALE 20'-1" DWG. NO. CN-1209-10.12 REV. 23

ERN: CN0001LI



LEGEND

- LOW SAFETY SIGNIFICANT & HIGH SAFETY SIGNIFICANT (LSS/HSS) BARRIERS
- DEFENSE-IN-DEPTH (DID) BARRIERS
- A-AX-100 W-6: FLOOR ELEVATION CODE; BUILDING; ROOM NUMBER; OPENING NUMBER; ROOM SURFACE F=FLOOR W=WALL

BUILDING FLOOR ELEVATION CODES			
CODE	FL ELEV	CODE	
A	522+Ø	J	577+Ø
B	533+Ø	K	594+Ø
C	543+Ø	L	6Ø5+10
D	554+Ø	M	6Ø9+Ø
E	556+Ø	N	61Ø+Ø
F	56Ø+Ø	O	619+6
G	568+Ø	P	631+6
H	574+Ø		

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

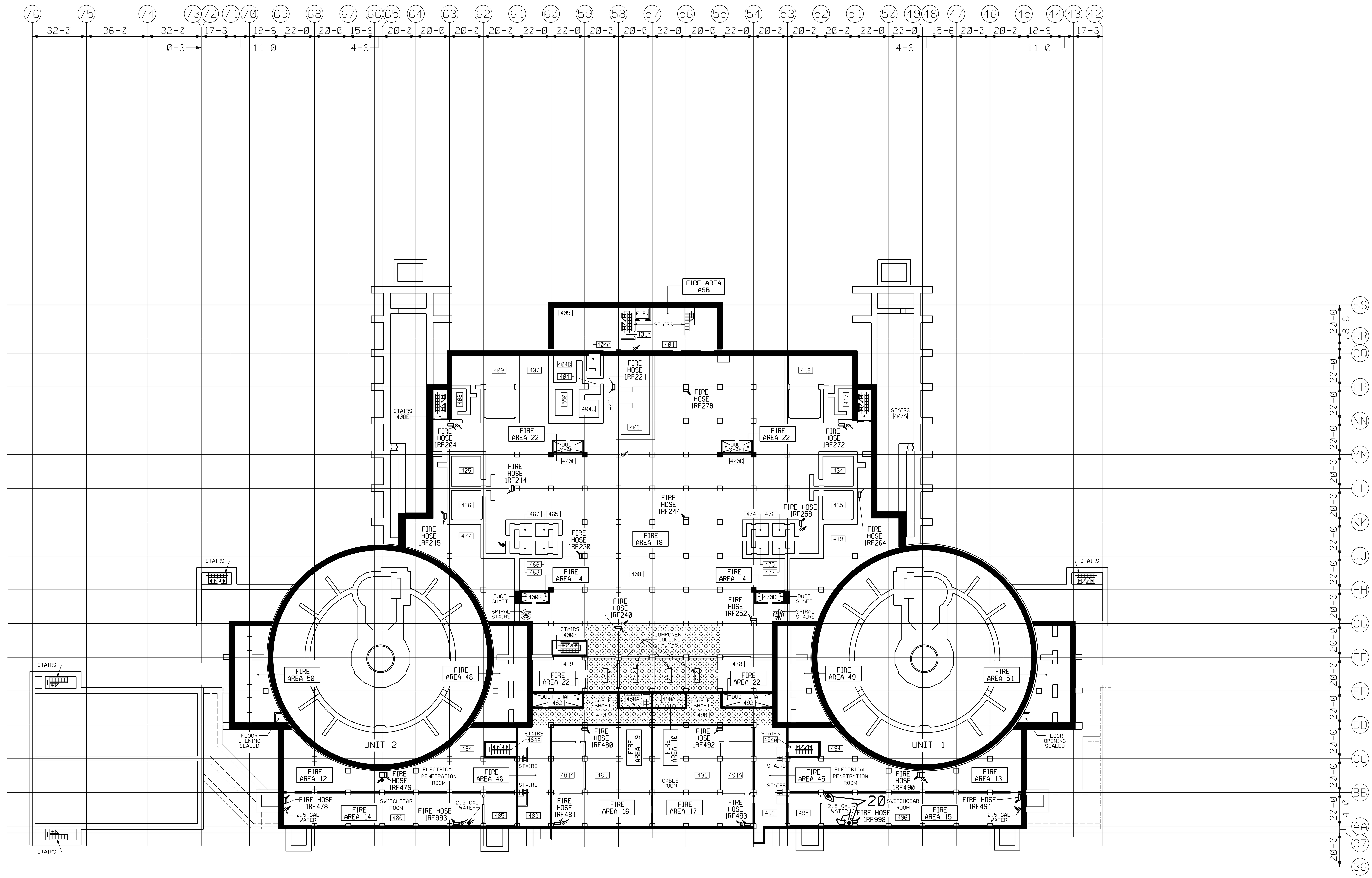
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

ARCHITECTURAL
FIRE BOUNDARY WALLS
PLAN AT EL 577+Ø

NO.	REVISIONS
12	REV PER EC 41Ø919
11	REV PER EC 4Ø5994

SCALE 1" = 2Ø' DWG. NO. CN-11Ø5-Ø9 REV. 12

ERN: CNØØØ13L



LEGEND

SYMBOL	DESCRIPTION
	FIRE AREA BOUNDARY WALL
	DELUGE SYSTEM
	SPRINKLER SYSTEM
	CO2 SYSTEM
	FIRE HOSE RACK
	FIRE EXTINGUISHER (15 LB CO2 UNLESS OTHERWISE NOTED)

NORTH

NOTES

1. FOR OTHER NOTES, SEE CN-1209-10.01.

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

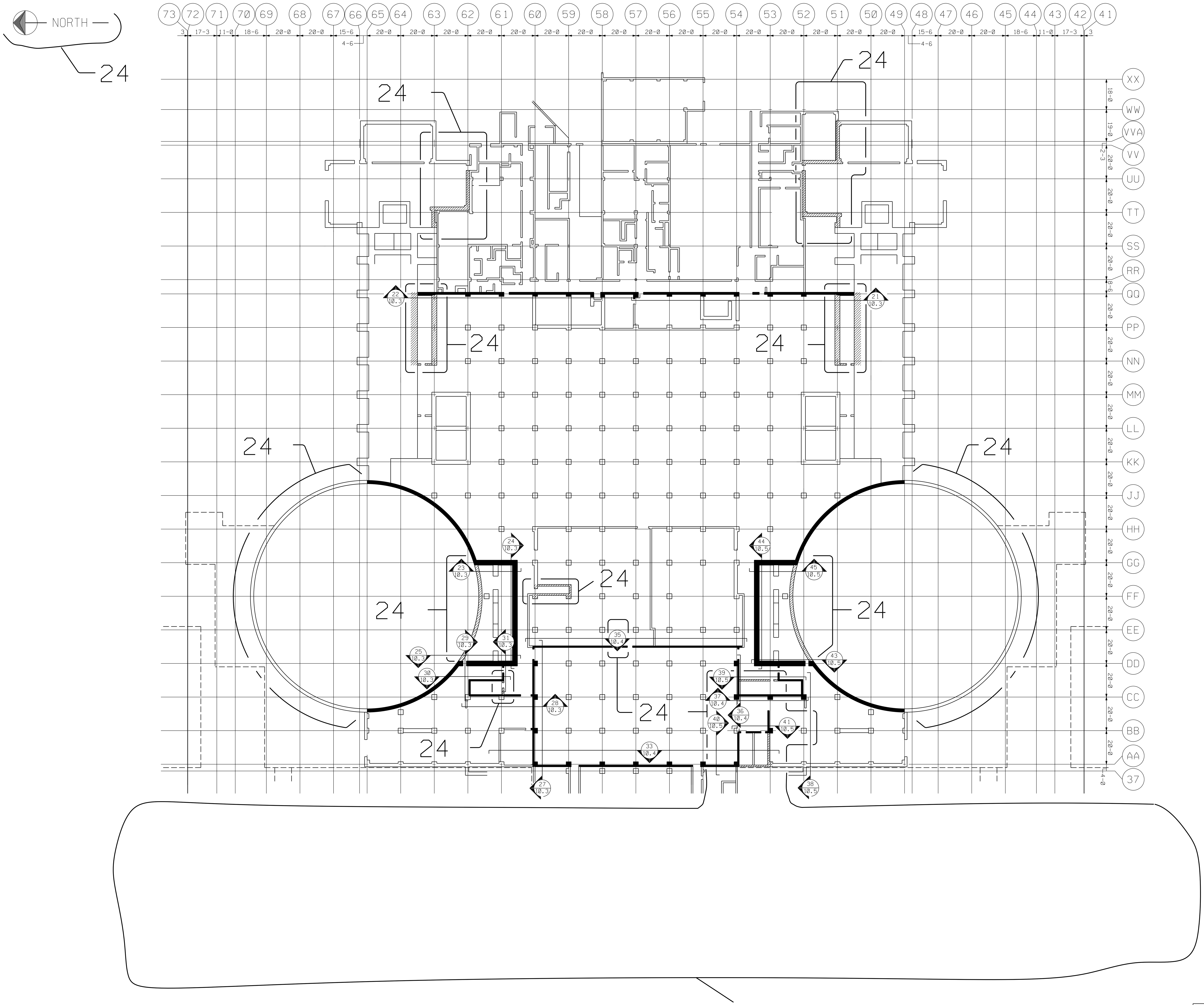
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

FIRE PROTECTION EQUIPMENT
AUXILIARY BUILDING
ELEVATION 577+0

NO.	REVISIONS
20	REV PER EC 405994
19	REV PER EC 405994

SCALE 20'-1" DWG. NO. CN-1209-10.13 REV. 20

ERN: CN0001LJ



LEGEND

LOW SAFETY SIGNIFICANT & HIGH SAFETY SIGNIFICANT (LSS/HSS) BARRIERS

DEFENSE-IN-DEPTH (DID) BARRIERS

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

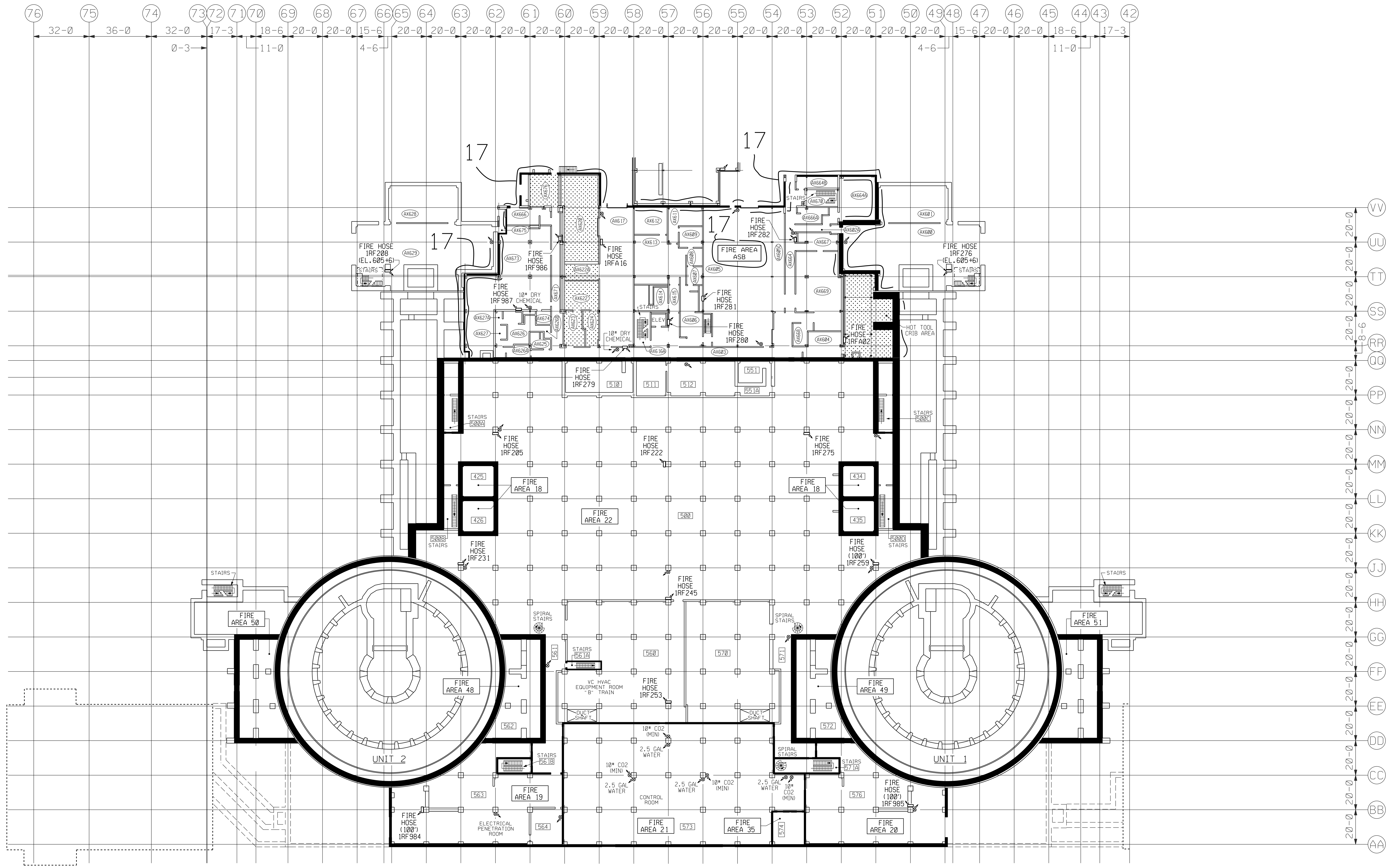
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

ARCHITECTURAL
FIRE BOUNDARY WALLS
PLAN AT EL 594+0

NO.	REVISIONS
24	REVISED PER EC 405994

SCALE 1"=20' DWG. NO. CN-1105-10 REV. 24

ERN: CN00013U



NOTES

1. FOR OTHER NOTES. SEE CN-1209-10.01.

LEGEND	
SYMBOL	DESCRIPTION
	FIRE AREA BOUNDARY WALL
	DELUGE SYSTEM
	SPRINKLER SYSTEM
	CO2 SYSTEM
	FIRE HOSE RACK
	FIRE EXTINGUISHER (15 LB CO2 UNLESS OTHERWISE NOTED)

NORTH

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

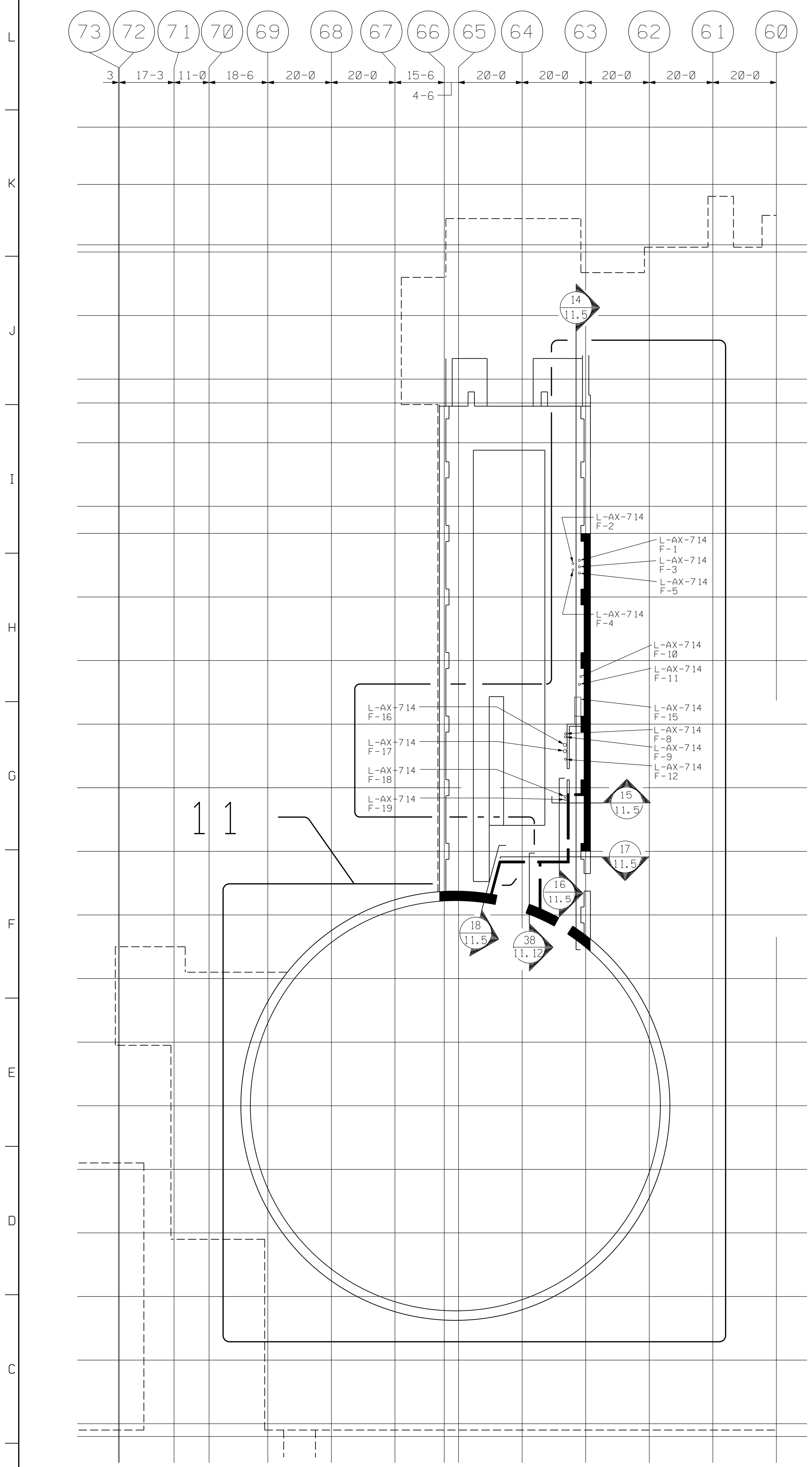
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

FIRE PROTECTION EQUIPMENT
AUXILIARY BUILDING
ELEVATION 594+0

NO.	REVISIONS
17	REV PER EC 405994

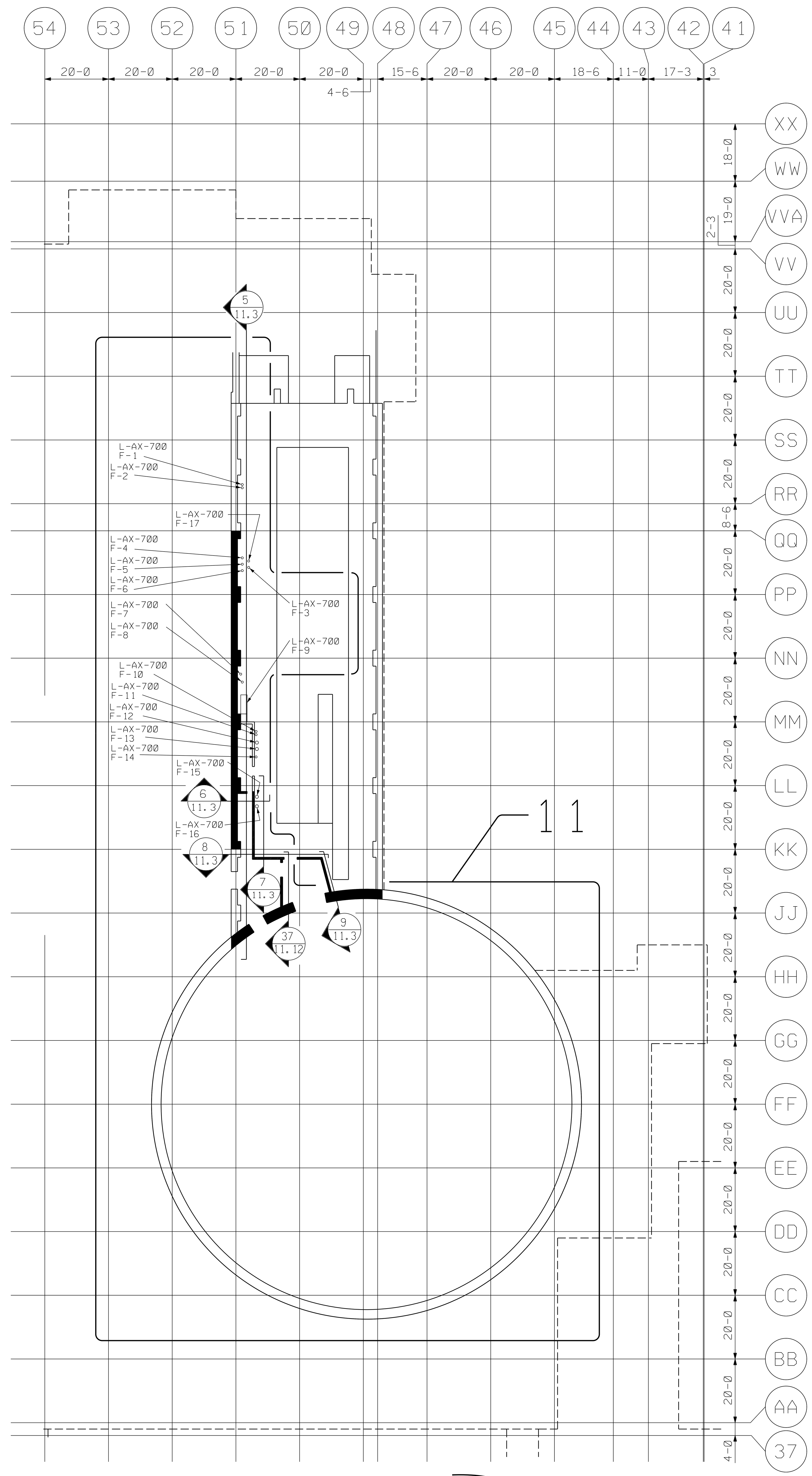
SCALE 20'-1" DWG. NO. CN-1209-10.14 REV. 17

ERN: CN0001LK



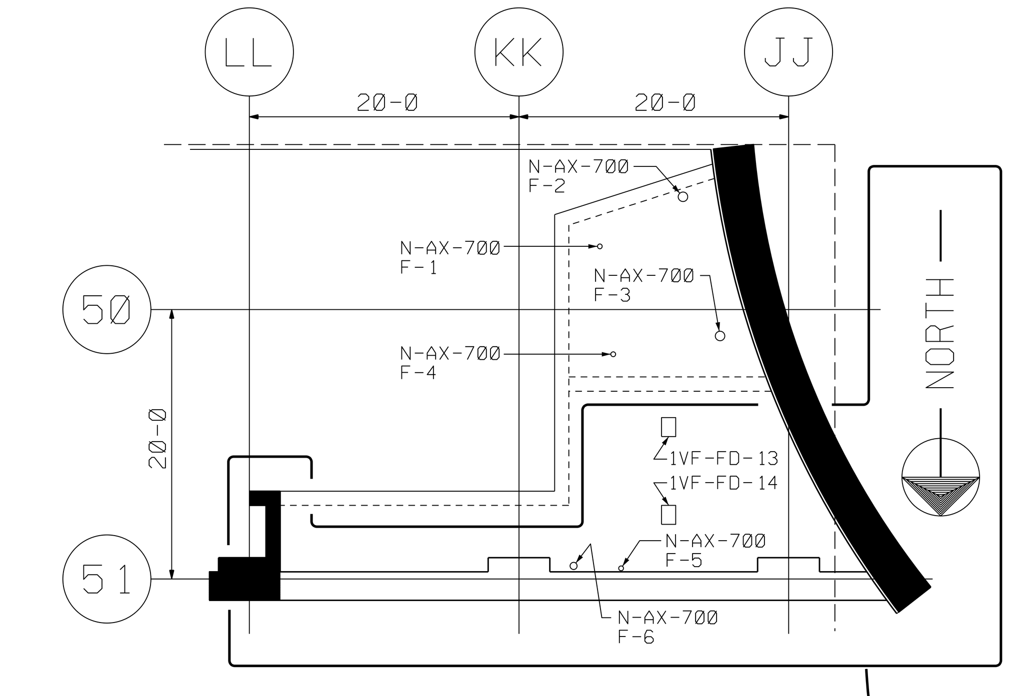
PLAN @ EL. 605+10 UNIT 2

NORTH

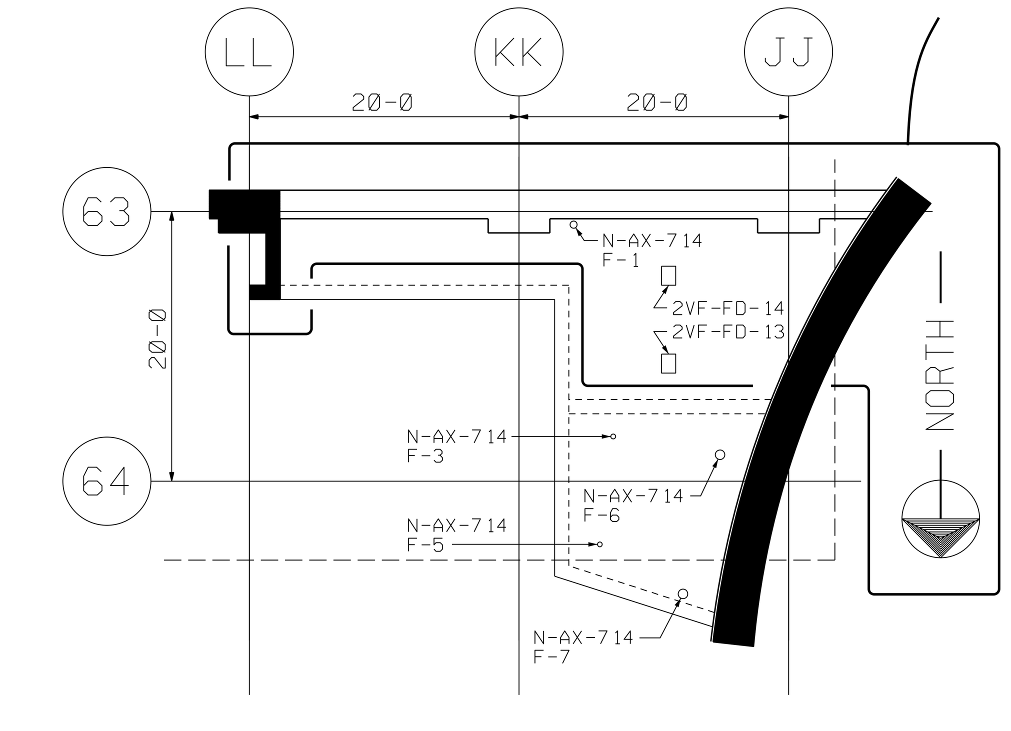


PLAN @ EL. 605+10 UNIT 1

NORTH



PLAN @ EL. 616+10 UNIT 1



PLAN @ EL. 616+10 UNIT 2

LEGEND

LOW SAFETY SIGNIFICANT & HIGH SAFETY SIGNIFICANT (LSS/HSS) BARRIERS

DEFENSE-IN-DEPTH (DID) BARRIERS

A-AX-100 — FLOOR ELEVATION CODE / BUILDING / ROOM NUMBER

W-6 — OPENING NUMBER / ROOM SURFACE F=FLOOR W=WALL

BUILDING FLOOR ELEVATION CODES

CODE	FL. ELEV	CODE	FL. ELEV
A	522+0	J	577+0
B	533+0	K	594+0
C	543+0	L	605+10
D	554+0	M	609+0
E	556+0	N	610+0
F	560+0	O	619+6
G	568+0	P	631+6
H	574+0		

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

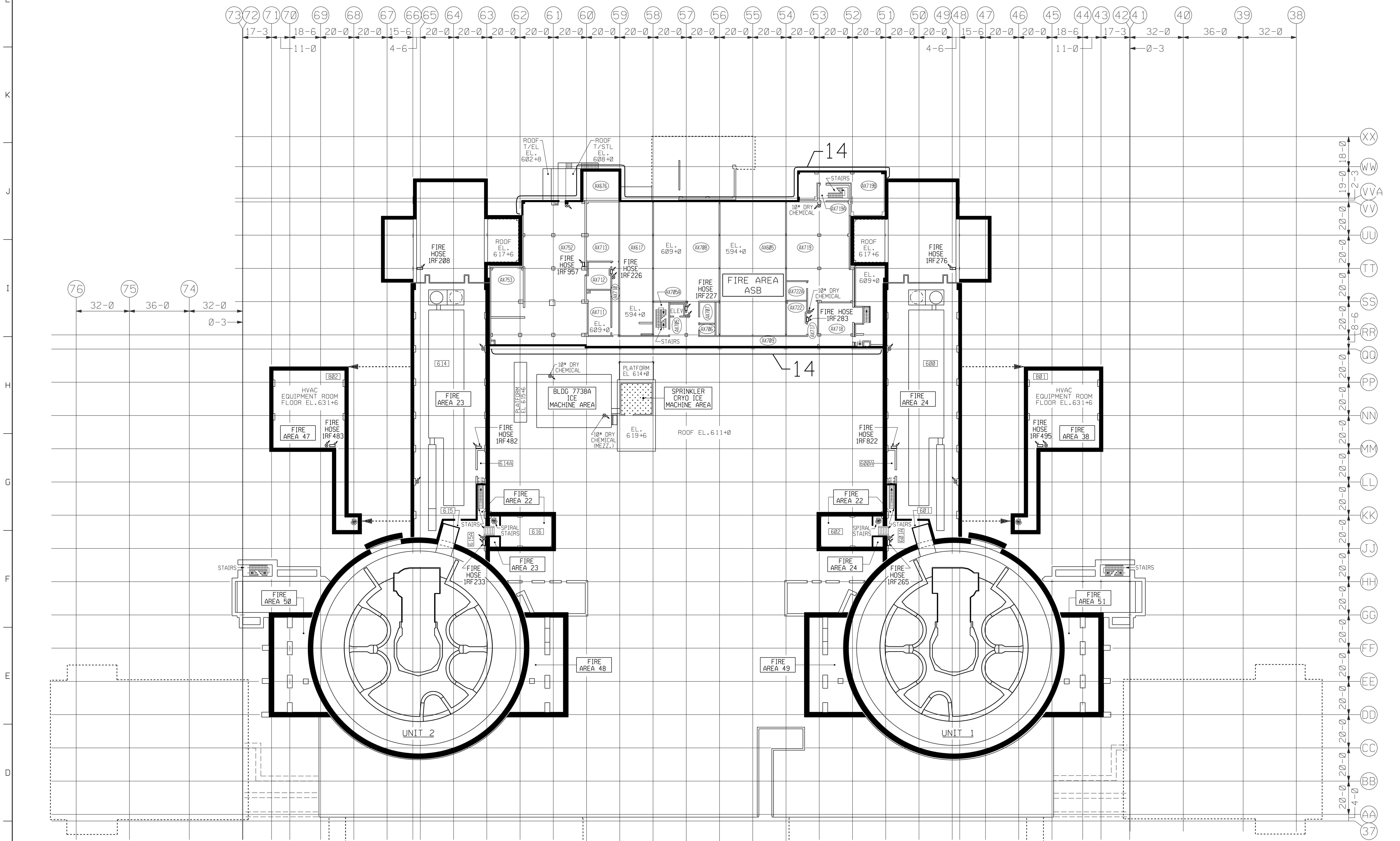
DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

ARCHITECTURAL
FIRE BOUNDARY WALLS
PLAN AT EL. 605+10

NO.	REVISIONS
11	REVISED PER EC 405994

SCALE NONE | DWG. NO. CN-1105-11 | REV. 11

ERN: CN000145



NOTES
1. FOR NOTES, SEE CN-1209-10.01.

LEG. CERT.-FULL SIZE ONLY

QA CONDITION 3

LEGEND

SYMBOL	DESCRIPTION
	FIRE AREA BOUNDARY WALL
	DELUGE SYSTEM
	SPRINKLER SYSTEM
	CO2 SYSTEM
	FIRE HOSE RACK
	FIRE EXTINGUISHER (15 LB CO2 UNLESS OTHERWISE NOTED)

DUKE ENERGY
CATAWBA NUCLEAR STATION UNITS 1 & 2

FIRE PROTECTION EQUIPMENT
AUXILIARY BUILDING
ELEVATIONS 605'+10 & 619+6

NO.	REVISIONS
14	REV PER EC 405994
13	REV PER EC 110500

SCALE 20'-1" DWG. NO. CN-1209-10.15 REV. 14

ERN: CN0001LL

JPM A.3R

RO

Catawba Nuclear Station
Admin. JPM A.3R
September 2019 NRC Exam

EVALUATION SHEET

Task: Determine Radiation Protection Requirements for an activity

Alternate Path: N/A

Facility JPM #: 2005 Admin JPM R03/SRO4 Modified

Safety Function: N/A

K/A G 2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions.

Importance: 3.5 / 3.6 **CFR:** 41.12 / 45.10

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ________

References: Radiation Work Permit # 5021 Task 1, Room 105 (ND Pump 1A) Survey Map

Task Standard: Correctly determine that total dose received for the job is 13 mR and maximum additional time allowed at Low Exposure Waiting Area is 42 minutes prior to exceeding 80% of RWP dose limits.

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

Applicant:
NAME____________________________ Docket #_______________ Time Start: __________
Time Finish: __________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

COMMENTS

Catawba Nuclear Station
Admin. JPM A.3R
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 has entered AP/1/A/5500/019 (Loss of Residual Heat Removal)**
- **The CRS has dispatched an AO to 1A ND pump room to vent the 1A ND pump casing when directed.**
- **The AO has staged himself to minimize dose while waiting.**
- **The following is the timeline for the venting evolution:**

0730 – AO enters 1A ND Pump Room.
0800 – AO is directed to vent using 1ND-88 (1A ND Pump Seal Water Hx Inlet Vent).
0812 – Venting is complete. AO returns to the LEWA to await further instruction.

INITIATING CUES:

Based on the above time line, RWP # 5021, and Survey Maps provided and discounting any dose received during transit:

1. **State the amount of dose that has been received thus far.**

   Amount of dose received - ________________ mR

2. **Following completion of venting activity, calculate how much longer the AO can remain in the room until required to exit (based on exceeding 80% of RWP allowable dose).**

   Allowable time in room following venting activity – ___________ .

EXAMINER NOTE: Each applicant should receive a copy of RWP # 5021 (Task 1) and the Room Survey for rooms 105 and 110.

START TIME: _______

STEP / STANDARD	SAT / UNSAT
STEP 1 Determine dose received for the venting evolution: AO is to stage themselves at the Low Exposure Waiting Area (LEWA) where they wait for 30 minutes (.5 hours) LEWA dose: **10 mR/hr X .5 hr = 5 mR** Venting time is 12 minutes (.2 hours) Area dose: **40 mR/hr X .2 hr = 8 mR** Total amount of dose received = **5 mR + 8 mR = 13 mR** STANDARD: Applicant determines the total amount of dose received for the evolution to be 13 mR. **This step is critical to meet the task requirements and standard for this JPM to determine the total amount of dose received.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP / STANDARD	SAT / UNSAT
STEP 2 Determine allowable time in room following venting activity. The RWP limits total exposure to 25 mR **25 mR x 80% = 20 mR total allowable dose** **20 mR – 13 mR (dose following venting) = 7 mR (remaining)** **7 mR ÷ 10 mR/hr = 0.7 hr (42 minutes)**	**CRITICAL STEP**
STANDARD: Applicant determines they can remain in the room another 42 minutes, or until 0854. **This step is critical to meet the task requirements and standard for this JPM to determine the latest time that venting could complete without exceeding RWP dose requirements.** COMMENTS: **END OF TASK**	___ SAT ___UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Unit 1 has entered AP/1/A/5500/019 (Loss of Residual Heat Removal)**
- **The CRS has dispatched an AO to 1A ND pump room to vent the 1A ND pump casing when directed.**
- **The AO has staged himself to minimize dose while waiting.**
- **The following is the timeline for the venting evolution:**

0730 – AO enters 1A ND Pump Room.
0800 – AO is directed to vent using 1ND-88 (1A ND Pump Seal Water Hx Inlet Vent).
0812 – Venting is complete. AO returns to the LEWA to await further instruction.

INITIATING CUES:

Based on the above time line, RWP # 5021, and Survey Maps provided and discounting any dose received during transit:

1. State the amount of dose that has been received thus far.

Amount of dose received - ________________ mR

2. Following completion of venting activity, calculate how much longer the AO can remain in the room until required to exit (based on exceeding 80% of RWP allowable dose).

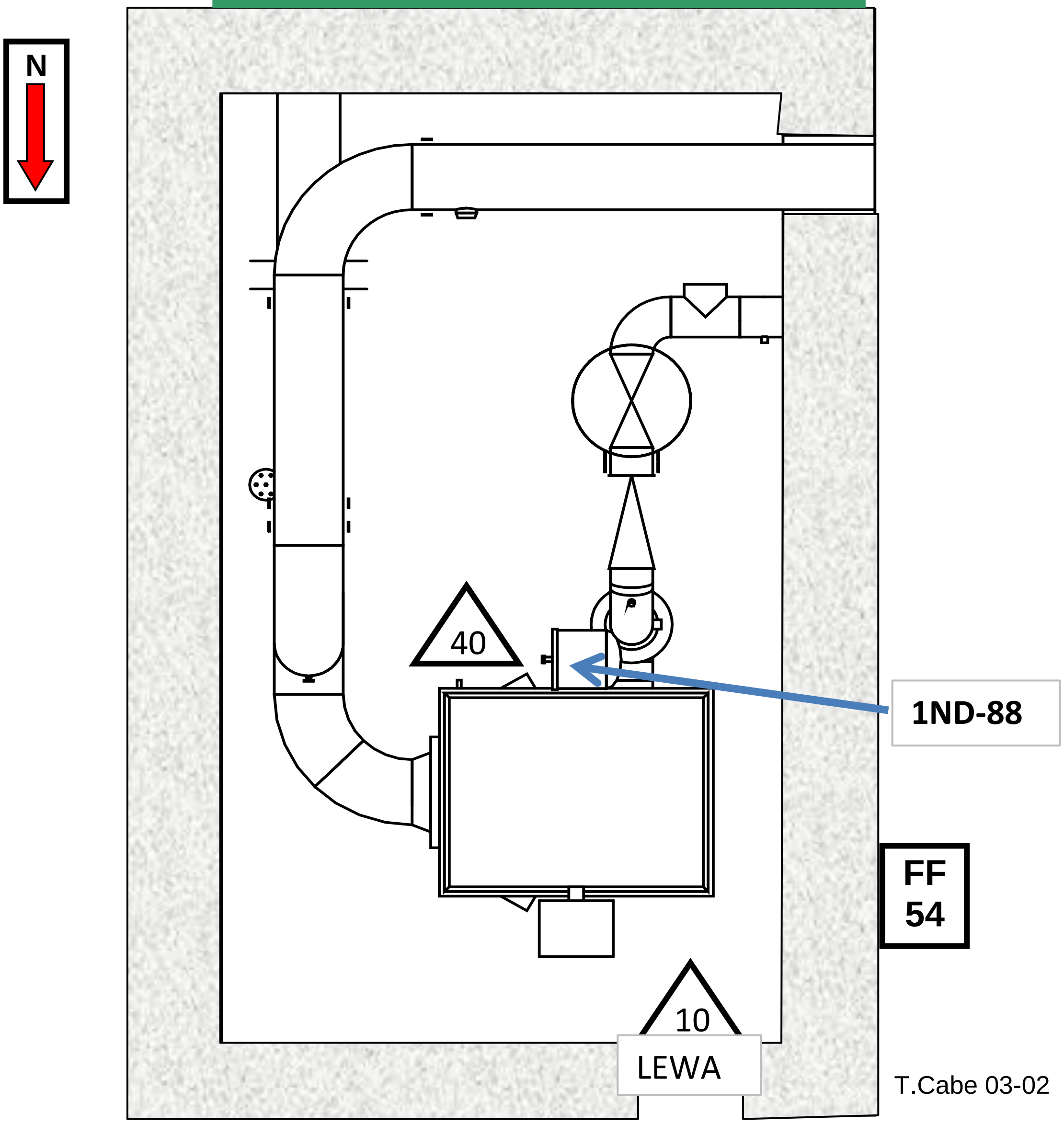
Allowable time in room following venting activity – ___________ .

CATAWBA NUCLEAR STATION
MONTHLY ROUTINE SURVEY SHEET

PERFORMED BY: ______________________ / ____________ DATE/TIME: ______________ / ________
(print name) (initials)

Instrument/#(s) ______________________ βγ Counter/#: ____________ Reviewed By: ________
(initials)

Room 105 ND Pump 1A



HIGHEST GA*: ____________ **HIGHEST CONTACT*:** ____________ **HIGHEST dpm/100cm^2:** ____________ K βγ
HIGHEST MASSLINN CCPM: ____________

*** Radiation readings in mRem/hr unless otherwise noted.**

LEGEND: **LEWA** = LOW EXPOSURE WAITING AREA **HS** = HOT SPOT --x----x----x-- = RCZ BOUNDARY

= DIRECT FRISK = GENERAL AREA > = CONTACT = SMEAR (dpm/100cm^2) = MASSLINN

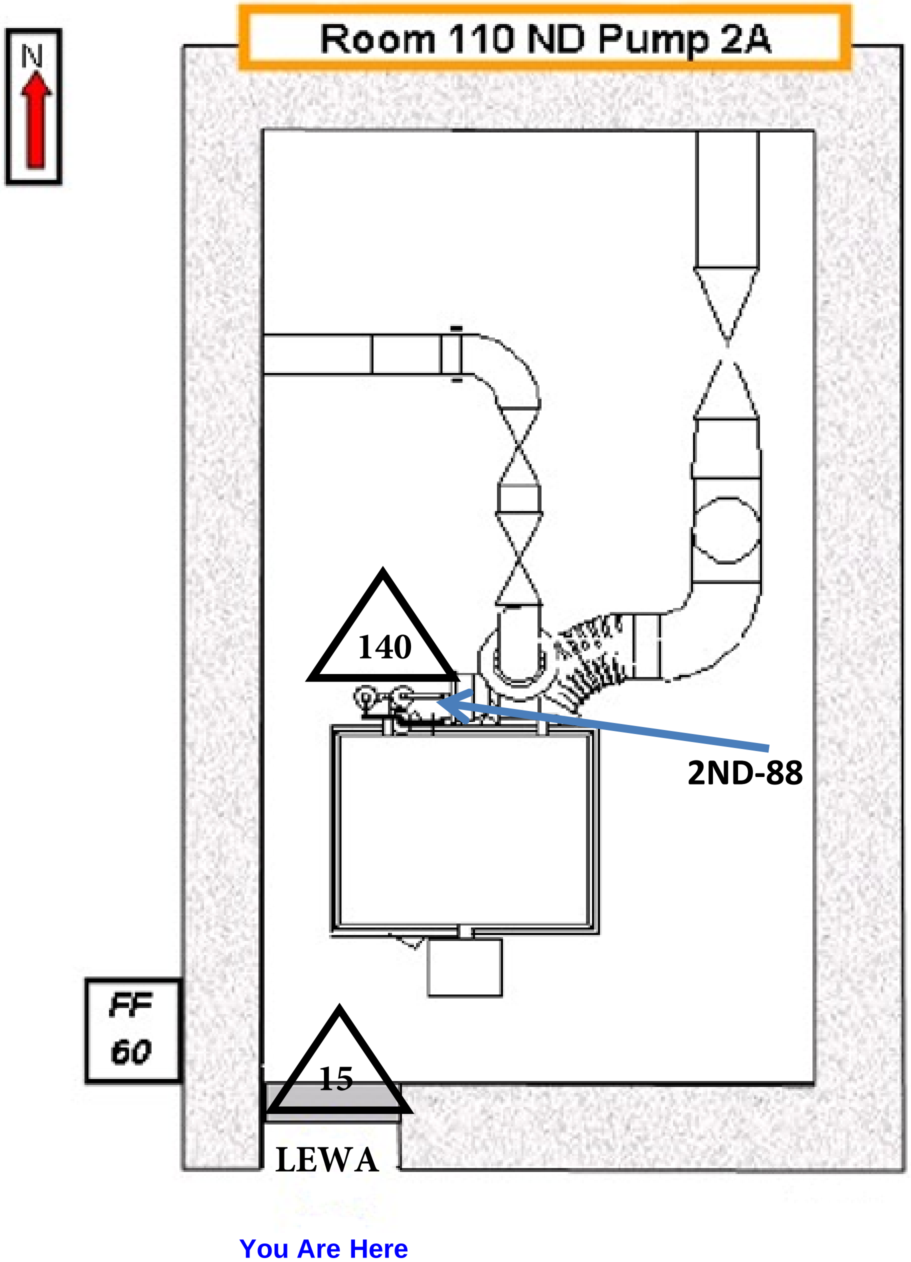
Comments: ____

RWP#15

CATAWBA NUCLEAR STATION
MONTHLY ROUTINE SURVEY SHEET

PERFORMED BY: ______________________ / ____________ DATE/TIME: ____________ / ______
(print name) (initials)

Instrument/#(s) ______________________ βγ Counter/#: ____________ Reviewed By: ________
(initials)



HIGHEST GA*: ____________ **HIGHEST CONTACT*:** ____________ **HIGHEST dpm/100cm^2:** ____________ K βγ

HIGHEST MASSLINN CCPM: ____________

*** Radiation readings in mRem/hr unless otherwise noted.**

LEGEND: **LEWA** = LOW EXPOSURE WAITING AREA **HS** = HOT SPOT --x----x----x-- = RCZ BOUNDARY

= DIRECT FRISK = GENERAL = CONTACT = SMEAR **(dpm/100cm^2)** = MASSLINN

Comments: ____

RWP#15

INFORMATION USE ONLY

Catawba Nuclear Station
Radiation Work Permit

INFORMATION USE ONLY

AUX BUILDING ENTRY INTO PENTRATION ROOMS HEAT EXCHANGER ROOMS AND PUMP ROOMS TO PERFORM VENTING ON ECCS SYSTEMS **RWP # 5021** **Rev: 11**

Task # 1

AUX BUILDING ENTRY INTO PENTRATION ROOMS, HEAT EXCHANGER ROOMS AND PUMP ROOMS TO PERFORM VENTING ON ECCS SYSTEMS

ED Alarm Set Points:

Dose Alarm: 25 mrem **Dose Rate Alarm: 50 mrem/hr**

RWP Requirements

Dress Category/Work Description

- Dress Category "F" 1. Complete protection of skin and clothing is NOT required. 2. Radioactive material is handled and/or transported AND the potential for loose surface contamination >1000 dpm/100cm2 exists AND durability of surgical gloves is sufficient.
- E Dress Category "G" Entry into dry contaminated areas <25,000 dpm/100cm2 with NO climbing or physical / strenuous work. NO brushing, grinding, lapping, etc. is allowed.
- Dress Category "H" Entry into dry contaminated areas <25,000 dpm/100cm2 with NO climbing or physical / strenuous work. NO brushing, grinding, lapping, etc. is allowed.
- Dress Category "I" Work in dry contaminated areas <50,000 dpm/100cm2 with a risk of puncturing or tearing gloves or beta dose concerns to the hands. Work may involve brushing, grinding, lapping, etc. (1) (3) (4)
- Dress Category "N" Wet work, hot particle controls are required or work in highly contaminated areas. Work may involve brushing, grinding, lapping, etc. (1)
- Dress Category "Z" Special dress. See Additional Instructions.
- Modesty garments, top & bottom, are required under protective clothing where personal outer clothing is not worn
- (1) Cloth coverall are acceptable for use when allowed by RP. Gloves and booties must be secured (e.g. taped, elastic cuff) when wearing cloth coveralls
- (2) IF double SOP is not used when wearing double PCs, remove the outer layers at the source
- (3) Skull caps may be substituted for a hood when approved by RP and NO hands on work is to be performed.
- (4) For activities requiring crawling, kneeling, etc., review need for additional barrier to prevent contamination events, e.g., additional protective clothing, knee pads, use of floor covering, etc.

Protective Clothing

- F - Lab coat, glove liners, rubber gloves OR surgical gloves, booties and shoe covers
- G - Hood, coveralls, glove liners and rubber gloves, booties, and shoe covers over personal clothing (NO modesty clothing required).
- H - Hood, coveralls, glove liners and rubber gloves, booties and shoe covers, NO personal outer clothing.
- I - Hood, coveralls, glove liners, 2 pair rubber gloves, booties and shoe covers, no personal outer clothing.
- N - Hood, coveralls, water resistant/water proof suit, glove liners, 2 pair rubber gloves, booties, 2 pair shoe covers, no personal outer clothing.
- Z - Special dress

Contamination Control

- Wipe down AND bag all tools and equipment prior to removal from a contaminated area as directed by RP
- Utilize facial protection (e.g. face shield, hood sock, power visor) as directed by RP
- Install catch containments OR drain rigs to prevent spills if draining components
- If installing a drain rig, use hose clamps to secure hose OR tubing connections
- If installing a drain rig, secure hose OR tubing to floor drain
- Wear disposable (plastic) booties inside of orex booties for work in wet conditions
- Change outer rubber gloves often when handling highly contaminated material as directed by RP

INFORMATION USE ONLY

Catawba Nuclear Station
Radiation Work Permit

INFORMATION USE ONLY

AUX BUILDING ENTRY INTO PENTRATION ROOMS HEAT EXCHANGER ROOMS AND PUMP ROOMS TO PERFORM VENTING ON ECCS SYSTEMS **RWP # 5021** **Rev: 11**

Task # 1

AUX BUILDING ENTRY INTO PENTRATION ROOMS, HEAT EXCHANGER ROOMS AND PUMP ROOMS TO PERFORM VENTING ON ECCS SYSTEMS

ED Alarm Set Points:

Dose Alarm: 25 mrem

Dose Rate Alarm: 50 mrem/hr

RWP Requirements

- Use surgical gloves in lieu of rubber gloves for the manipulation of small or specialty items as directed by RP

RP Job Coverage

- Start of Job, Intermittent or No Coverage In Radiation Areas or Less
- RP Coverage Required To Transport Material > 5 mrem/hr at 30 cm
- Pre-job briefing required
- Continuous RP Coverage for aggressive work in Alpha Level III areas or Alpha Level II areas with beta-gamma to alpha ratios less than 3000:1 or where conditions could change

Dosimetry Requirements

- Monitor ED periodically while inside the RCA/RCZ (once or twice per hour in low dose rate areas). Monitor more frequently in higher dose rate areas, for example every 10 to 15 minutes.
- If dress requirements prevent the monitoring of ED, and RP is not remotely monitoring (via teledose & communications), place ED external to the outmost layer of protective clothing for monitoring

Respiratory Protection

- If weighted DAC-Hours are expected to result in greater than or equal to 4 DAC-Hours per person, perform a TEDE/ALARA evaluation
- Full Face Particulate (Additional Hood Required) IF warranted by TEDE ALARA Evaluation OR directed by RP
- Personal (lapel) air samplers required for Alpha Level III areas or Alpha Level II areas with beta-gamma to alpha ratios of less than 3000:1

RP Hold Points

- Breaching Contaminated System
- RP Survey Required Prior to Handling Debris or Foreign Material
- RP survey required after removal of items from contaminated systems. Decon may be necessary (as directed by RP)
- Notify RP prior to reaching OR entry into the overhead (8 feet and above)
- Accumulated Dose Higher than Expected
- Notify RP Prior to Start of Work
- A change in Alpha Level (AL I to AL II or AL III; AL II to AL III) requires additional planning for alpha considerations

Stop Work Criteria

- Dose Alarm
- Unexpected dose rate alarm
- Airborne conditions higher than expected
- Actual dose rates are higher than the expected levels written on this RWP task
- Actual contamination levels are higher than the expected levels written on this RWP task

INFORMATION USE ONLY

Catawba Nuclear Station
Radiation Work Permit

INFORMATION USE ONLY

AUX BUILDING ENTRY INTO PENTRATION ROOMS HEAT EXCHANGER ROOMS AND PUMP ROOMS TO PERFORM VENTING ON ECCS SYSTEMS **RWP # 5021** **Rev: 11**

Task # 1

AUX BUILDING ENTRY INTO PENTRATION ROOMS, HEAT EXCHANGER ROOMS AND PUMP ROOMS TO PERFORM VENTING ON ECCS SYSTEMS

ED Alarm Set Points:

Dose Alarm: 25 mrem

Dose Rate Alarm: 50 mrem/hr

RWP Requirements

- Unexpected wet conditions
- Work scope changes
- If monitoring of the ED indicates that the dose alarm set point will be exceeded prior to completing the job, leave the area and contact RP. Do not wait to receive an alarm before exiting the area
- Failure of OR sweat soaked protective clothing

Expected Radiological Conditions

Expected radiological conditions:
General Area Dose Rates: <0.1 mrem/hr - 50 mrem/hr
High Contact Dose Rates: <0.1 mrem/hr - 1000 mrem/hr

Contamination Levels: < 1000 dpm/100cm2- 100,000 dpm/100cm2

Additional Instructions

Electronic Dosimeter rate alarms are established based on general area dose rates. If personnel are positioned in close proximity to primary piping and equipment they may anticipate receiving a dose rate alarm.

Z Dress - Orex Coveralls only. This is for use in clean areas only due to potential for contamination from wearing a fall harness.

Approved on 09/01/2019 by CAMPBELL, KENNETH C Printed on 09/01/2019 Activated on 09/01/2019

JPM A.3S

SRO

Catawba Nuclear Station
Admin. JPM A.3S
September 2019 NRC Exam

EVALUATION SHEET

Task: Calculate Total RL Discharge Flow

Alternate Path: N/A

Facility JPM #: WL-001 Modified

Safety Function: N/A

K/A 2.3.11 Ability to control radiation releases.

Importance: 3.8 / 4.3 **CFR:** 41.11 / 43.4 / 45.10

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ______

References: PT/0/A/4250/011 (RL Temperature and Discharge Flow Determination)

Task Standard: Total RL Discharge Flow calculated to be 44,112 gpm (43,933 to 44,383 gpm acceptable range) and determination that sufficient dilution flow does NOT exist for LWR #2019025 approval.

Validation Time: 25 minutes **Time Critical:** Yes ______ No __X__

Applicant: Time Start: ___________
NAME_____________________________ Docket #_______________ Time Finish: ___________

Performance Rating: Performance Time _____

SAT ____ UNSAT ____

Examiner: _______________________________ _______________________________/_________
NAME SIGNATURE DATE

===

COMMENTS

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Catawba Nuclear Station
Admin. JPM A.3S
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **The RL discharge header flow instrumentation is inoperable.**
- **An LWR package has been delivered to the control room for approval.**

INITIATING CUES:

- **You are directed to calculate and record the total RL discharge flow per Enclosure 13.2 (Total Discharge Flow Calculation Sheet) of PT/0/A/4250/011 and determine whether sufficient dilution flow exists to approve the LWR.**
- **The following plant indications are noted:**

Unit 1 Power	**NO Mode**
Unit 2 Power	**100%**
0RLP5030 (RL Discharge Pressure)	**68 psig**
0RNP7380 (Lake Elevation)	**567 feet**
C1P5856 (RN Calculate Total Flow)	**Out of service**
C1P5854 (RN Train A Calculated Total Flow)	**13560 gpm**
C1P5855 (RN Train B Calculated Total Flow)	**5450 gpm**
C2P5853 (Unit 2 Cooling Tower Evaporation)	**11500 gpm**
RL Pumps A and B are in service	
RN discharge is aligned to RL discharge header	
OAC Databook is not available	

Total RL Discharge Flow (Step 1.5): _____________ gpm

Sufficient dilution flow for LWR #2019025 approval? (YES/NO) _____________

EXAMINER NOTE:

After reading cue, provide applicant with a copy of PT/0/A/4250/011 Enclosures 13.2 and 13.7 and copy of LWR #2019025.

START TIME: _______

STEP / STANDARD	SAT / UNSAT
STEP 1 1.1 Obtain Total RL Supply (A) as follows: 1.1.1 **IF** 0RLP5030 (Conventional LP Service Wtr Press) is **NOT** available contact engineering for optional indications and elevation corrections. STANDARD: Applicant determines per initiating cue that this step is not applicable. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	**SAT / UNSAT**
STEP 2 1.1.2 Perform the following calculations to obtain Total Discharge Head:	**CRITICAL STEP**
Perform the following calculations to obtain Total Discharge Head: RL Disch Pressure = 0RLP5030 + 3.9 psi RL Disch Pressure = __68__ + 3.9 psi = __71.9__ psig Lake Elevation = __567__ 0RNP7380 (Lake Wylie Level) or obtained from hydro central per Step 1.1.4.2 of Enclosure 13.1 or Step 1.1.2.2 of Enclosure 13.8. (__71.9__ psig x 2.311 ft/psig) + (571.75 - __567__ ft) = __170.9__ ft RL Disch Pressure; Lake Elev; Total Disch Head (Acceptable Range 170.75 - 171) STANDARD: Applicant Calculates Total Discharge Head of 170.9 feet. (170.75 -171 Acceptable) **Examiner Note: This step is critical to be able to correctly calculate Total RL Discharge Flow to meet the JPM standard.** COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 3 1.1.3 Using Total Discharge Head from Step 1.1.2 obtain the RL Pump Flow value using one of the following: • Enclosure 13.7 OR • OAC Databook in "Secondary Systems Databook Calcs" using "RL Total Discharge Head vs. RL Pump Flow Rate". STANDARD: Applicant determines that Enclosure 13.7 should be used to determine RL pump flow value since the OAC Databook is not available per the initiating cue. Applicant determines RL pump flow to be 30,178 gpm. (30,040 – 30,386 gpm Acceptable) **Examiner Note: This step is critical to be able to correctly calculate Total RL Discharge Flow to meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 4 1.1.4 Once RL Pump Flow value is obtained, calculate Total RL Supply based on number of RL pumps in operation: 30178 X 2 = 60356 gpm (A) RL Pump Flow Value / # of pumps in operation / Total RL Supply (Acceptable Range 60080 - 60772) STANDARD: Applicant calculates Total RL Supply to be 60,356 gpm. (60,080 – 60,772 gpm Acceptable) **Examiner Note: This step is critical to be able to correctly calculate Total RL Discharge Flow to meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 5 1.1.5 Enter Total RL Supply (A) value in Step 1.4. STANDARD: Applicant records value for (A) in Step 1.4. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 6 1.2 **IF** RN discharge is aligned to the RL discharge header, obtain Total RN Flow (B) as follows: 1.2.1 **IF** OAC point C1P5856 (RN Calculated Total Flow) is available, perform the following: STANDARD: Applicant determines per initiating cue that OAC point C1P5856 is not available and that this step is not applicable. COMMENTS:	___ SAT ___ UNSAT

STEP 7 1.2.2 **IF** OAC points C1P5854 (RN Train A Calculated Total Flow) **AND** C1P5855 (RN Train B Calculated Total Flow) are available, perform the following to obtain total RN flow: _____ 1.2.2.1 Record the value of C1P5854 (RN Train A Calculated Total Flow) below: C1P5854 __13,560__ gpm (RN Pump Train A Flow) _____ 1.2.2.2 Record the value of C1P5855 (RN Train B Calculated Total Flow) below: C1P5855 __5,450__ gpm (RN Pump Train B Flow) STANDARD: Applicant records values for RN trains A and B calculated flow from values given in the initiating cue. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 8 1.2.3 **IF** either C1P5854 (RN Train A Calculated Total Flow) **OR** C1P5855 (RN Train B Calculated Total Flow) is **NOT** available, perform the following to obtain total RN flow: STANDARD: Applicant determines that this step is not applicable. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 9 1.2.4 Perform the following calculations to obtain Total RN Flow: Perform the following calculations to obtain Total RN Flow: 13,560 + 5,450 = 19,010 gpm (B) RN Pump Train A Flow + RN Pump Train B Flow = Total RN Flow STANDARD: Applicant calculates Total RN Flow (B) to be 19,010 gpm. **Examiner Note: This step is critical to be able to correctly calculate Total RL Discharge Flow to meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 10 1.2.5 Enter Total RN Flow (B) in Step 1.4. STANDARD: Applicant records value in Step 1.4. COMMENTS:	___ SAT ___ UNSAT

NOTE: Normal Cooling Tower evaporation loss @ 100% power is 9,000 to 14,000 gpm/unit. STEP 11 1.3 Obtain Total Cooling Tower Evaporation (C) as follows: 1.3.1 **IF** a Unit 1 NC Pump is **NOT** inservice **AND** Unit 1 is in Mode 5, 6, or No Mode, enter 0 for Unit 1 Cooling Tower Evaporation in Step 1.3.3. STANDARD: Applicant determines per initiating cue that Unit 1 is in No Mode and enters 0 for Unit 1 evaporation in Step 1.3.3. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
<u>STEP 12</u> 1.3.2 **<u>IF</u>** a Unit 2 NC Pump is **<u>NOT</u>** inservice **<u>AND</u>** Unit 2 is in Mode 5, 6, or No Mode, enter 0 for Unit 2 Cooling Tower Evaporation in Step 1.3.3. <u>STANDARD</u>: Applicant determines that this step is not applicable. <u>COMMENTS:</u>	___ SAT ___ UNSAT

<u>STEP 13</u> 1.3.3 Calculate Cooling Tower Total Evaporation as follows: Calculate Cooling Tower Total Evaporation as follows: ___0___ + ___11,500___ = ___11,500___ gpm (C) Unit 1 Cooling Tower Evaporation + Unit 2 Cooling Tower Evaporation = Total Evaporation (C1P5853 or Step 1.3.1) (C2P5853 or Step 1.3.2) <u>STANDARD</u>: Applicant calculates Total Evaporation (C) to be 11,500 gpm. **Examiner Note: This step is critical to be able to correctly calculate Total RL Discharge Flow to meet the JPM standard.** <u>COMMENTS:</u>	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 14 1.3.4 Enter Total Evaporation (C) in Step 1.4. STANDARD: Applicant enters value for Total Evaporation (C) in Step 1.4. COMMENTS:	___ SAT ___ UNSAT

STEP 15 1.4 Perform the following to obtain Calculated Total RL Disch Flow: __60,356__ + __19,010__ - __11,500__ = __67,866__ gpm Total RL Supply (A) + Total RN Flow (B) - Total Evaporation (C) = Calculated Total RL Disch Flow (Acceptable Range 67,590 - 68,282) STANDARD: Applicant calculates the Calculated Total RL Disch Flow to be 67,866 gpm. (67,590 – 68,282 gpm Acceptable) **Examiner Note: This step is critical to be able to correctly calculate Total RL Discharge Flow to meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
NOTE: Due to problems with current RL instrumentation (PIP C-10-4540) and discrepancies between calculated and OAC RL flow (PIP C-12-1399), a safety factor is applied to the Calculated Total RL Disch Flow of Step 1.4 to ensure conservative Total RL Disch Flow rates are used for dilution purposes. This is a temporary conservative action for use till RL discharge flow instrumentation problems are resolved.	**CRITICAL STEP**
STEP 16 1.5 Apply dilution safety factor to obtain Total RL Discharge Flow from the Calculated Total RL Discharge Flow from Step 1.4 as follows: 67,866 X 0.65 = 44,112 gpm Calculated Total RL Disch Flow Step 1.4 / Total RL Disch Flow (Acceptable Range 43,933 - 44,383) STANDARD: Applicant calculates Total RL Disch Flow to be 44,112 gpm. (43,933 – 44,383 gpm Acceptable) **Examiner Note: This step is critical to correctly determine Total RL Discharge Flow to meet the JPM standard.** COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 17 Determine whether LWR #2019025 should be approved. STANDARD: Applicant determines that the RL Low Flow Interlock would be set for 45,000 gpm and that sufficient dilution flow does NOT exist to approve the LWR. **Examiner Note: This step is critical to correctly determine that Total RL Flow is less than the RL Low Flow Interlock Setpoint and that sufficient dilution flow does NOT exist to approve the LWR.** COMMENTS: **END OF TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **The RL discharge header flow instrumentation is inoperable.**
- **An LWR package has been delivered to the control room for approval.**

INITIATING CUES:

- **You are directed to calculate and record the total RL discharge flow per Enclosure 13.2 (Total Discharge Flow Calculation Sheet) of PT/0/A/4250/011 and determine whether sufficient dilution flow exists to approve the LWR.**
- **The following plant indications are noted:**

Unit 1 Power	**NO Mode**
Unit 2 Power	**100%**
0RLP5030 (RL Discharge Pressure)	**68 psig**
0RNP7380 (Lake Elevation)	**567 feet**
C1P5856 (RN Calculate Total Flow)	**Out of service**
C1P5854 (RN Train A Calculated Total Flow)	**13560 gpm**
C1P5855 (RN Train B Calculated Total Flow)	**5450 gpm**
C2P5853 (Unit 2 Cooling Tower Evaporation)	**11500 gpm**
RL Pumps A and B are in service	
RN discharge is aligned to RL discharge header	
OAC Databook is not available	

Total RL Discharge Flow (Step 1.5): _____________ gpm

Sufficient dilution flow for LWR #2019025 approval? (YES/NO) _____________

Duke Energy Catawba Nuclear Station **Faulted Steam Generator Isolation**	Procedure No. **EP/ 1/A/5000/E-2**
	Revision No. **015**
Continuous Use	Electronic Reference No. **CP0094CZ**

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

(ISSUED) - PDF Format

1. Procedure

1.1 Obtain Total RL Supply (A) as follows:

N/A 1.1.1 **IF** 0RLP5030 (Conventional LP Service Wtr Press) is **NOT** available contact engineering for optional indications and elevation corrections.

Engineer contacted: ______________________________

NOTE:	Engineering specified optional indications and elevation corrections may be substituted for 0RLP5030 (Conventional LP Service Wtr Press) and the 3.9 psi elevation correction of following step to obtain Total Discharge Head.

_____ 1.1.2 Perform the following calculations to obtain Total Discharge Head:

RL Disch Pressure = 0RLP5030 + 3.9 psi

RL Disch Pressure = ___68___ + 3.9 psi = ___71.9___psig

Lake Elevation = ___567___ 0RNP7380 (Lake Wylie Level) or obtained from hydro central per Step 1.1.4.2 of Enclosure 13.1 or Step 1.1.2.2 of Enclosure 13.8.

(___71.9___psig x 2.311 ft/psig) + (571.75 - ___567___ft) = ___170.9___ft

RL Disch Pressure — Lake Elev — Total Disch Head

(Acceptable Range 170.75 - 171)

_____ 1.1.3 Using Total Discharge Head from Step 1.1.2 obtain the RL Pump Flow value using <u>one</u> of the following:

- ☐ Enclosure 13.7 (RL Pumps Head / Capacity Table)

  OR

- ☐ OAC Databook in "Secondary Systems Databook Calcs" using "RL Total Discharge Head vs. RL Pump Flow Rate".

_____ 1.1.4 Once RL Pump Flow value is obtained, calculate Total RL Supply based on number of RL pumps in operation:

___30178___ X ___2___ = ___60356___gpm (A)

RL Pump Flow Value — # of pumps in operation — Total RL Supply

(Acceptable Range 60080 - 60772)

_____ 1.1.5 Enter Total RL Supply (A) value in Step 1.4.

_____ 1.2 **IF** RN discharge is aligned to the RL discharge header, obtain Total RN Flow (B) as follows:

N/A 1.2.1 **IF** OAC point C1P5856 (RN Calculated Total Flow) is available, perform the following:

☐ 1.2.1.1 Record the current value of C1P5856 (RN Calculated Total Flow)

C1P5856 __________ gpm

☐ 1.2.1.2 Enter above value as Total RN Flow (B) in Step 1.4.

☐ 1.2.1.3 N/A Step 1.2.2 thru Step 1.2.5.

_____ 1.2.2 **IF** OAC points C1P5854 (RN Train A Calculated Total Flow) **AND** C1P5855 (RN Train B Calculated Total Flow) are available, perform the following to obtain total RN flow:

_____ 1.2.2.1 Record the value of C1P5854 (RN Train A Calculated Total Flow) below:

C1P5854 13,560 gpm (RN Pump Train A Flow)

_____ 1.2.2.2 Record the value of C1P5855 (RN Train B Calculated Total Flow) below:

C1P5855 5,450 gpm (RN Pump Train B Flow)

N/A 1.2.3 **IF** either C1P5854 (RN Train A Calculated Total Flow) **OR** C1P5855 (RN Train B Calculated Total Flow) is **NOT** available, perform the following to obtain total RN flow:

_____ 1.2.3.1 Calculate RN Pump Train A flow:

__________ + __________ = __________gpm

1RNP7520 + 2RNP7520 = RN Pump Train A flow

_____ 1.2.3.2 Calculate RN Pump Train B flow:

__________ + __________ = __________gpm

1RNP7510 + 2RNP7510 = RN Pump Train B flow

_____ 1.2.4 Perform the following calculations to obtain Total RN Flow:

13,560 + 5,450 = 19,010 gpm (B)

RN Pump Train A Flow + RN Pump Train B Flow = Total RN Flow

_____ 1.2.5 Enter Total RN Flow (B) in Step 1.4.

NOTE:	Normal Cooling Tower evaporation loss @ 100% power is 9,000 to 14,000 gpm/unit.

1.3 Obtain Total Cooling Tower Evaporation (C) as follows:

_____ 1.3.1 **IF** a Unit 1 NC Pump is **NOT** inservice **AND** Unit 1 is in Mode 5, 6, or No Mode, enter 0 for Unit 1 Cooling Tower Evaporation in Step 1.3.3.

N/A 1.3.2 **IF** a Unit 2 NC Pump is **NOT** inservice **AND** Unit 2 is in Mode 5, 6, or No Mode, enter 0 for Unit 2 Cooling Tower Evaporation in Step 1.3.3.

_____ 1.3.3 Calculate Cooling Tower Total Evaporation as follows:

0 + 11,500 = 11,500 gpm (C)

Unit 1 Cooling Tower Evaporation (C1P5853 or Step 1.3.1) + Unit 2 Cooling Tower Evaporation (C2P5853 or Step 1.3.2) = Total Evaporation

_____ 1.3.4 Enter Total Evaporation (C) in Step 1.4.

_____ 1.4 Perform the following to obtain Calculated Total RL Disch Flow:

60,356 + 19,010 - 11,500 = 67,866 gpm

Total RL Supply (A) + Total RN Flow (B) - Total Evaporation (C) = Calculated Total RL Disch Flow

(Acceptable Range 67,590 - 68,282)

NOTE:	Due to problems with current RL instrumentation (PIP C-10-4540) and discrepancies between calculated and OAC RL flow (PIP C-12-1399), a safety factor is applied to the Calculated Total RL Disch Flow of Step 1.4 to ensure conservative Total RL Disch Flow rates are used for dilution purposes. This is a temporary conservative action for use till RL discharge flow instrumentation problems are resolved.

_____ 1.5 Apply dilution safety factor to obtain Total RL Discharge Flow from the Calculated Total RL Discharge Flow from Step 1.4 as follows:

67,866 X 0.65 = 44,112 gpm

Calculated Total RL Disch Flow Step 1.4 — Total RL Disch Flow (Acceptable Range 43,933 - 44,383)

Calculated By ______________________ ______________
Operator/Initials Date/Time

Verified By ______________________ ______________
Operator/Initials Date/Time

Enclosure 13.7

RL Pumps Head / Capacity Table

Head	Flow	Head	Flow	Head	Flow	Head	Flow
100	57192	146	46803	175.50	24110	200	15185
101	56997	147	46524	175.75	23824	201	14965
102	56800	148	46238	176.00	23544	202	14737
103	56602	149	45942	176.25	23271	203	14499
104	56403	150	45636	176.50	23005	204	14252
105	56202	151	45318	176.75	22747	205	13997
106	55999	152	44984	177.00	22496	206	13733
107	55795	153	44633	177.25	22252	207	13460
108	55590	154	44262	177.50	22016	208	13180
109	55383	155	43867	177.75	21787	209	12891
110	55175	156	43444	178.00	21566	210	12595
111	54966	157	42987	178.25	21352	211	12292
112	54755	158	42493	178.50	21146	212	11982
113	54543	159	41954	178.75	20947	213	11665
114	54330	160	41365	179.00	20756	214	11342
115	54116	161	40717	179.25	20571	215	11012
116	53900	162	40004	179.50	20394	216	10677
117	53683	163	39219	179.75	20224	217	10335
118	53465	164	38354	180.00	20061	218	9988
119	53246	165	37405	180.25	19904	219	9635
120	53025	166	36368	180.50	19754	220	9277
121	52804	167	35244	180.75	19611	221	8914
122	52581	168	34036	181.00	19473	222	8546
123	52357	169	32755	181.25	19341	223	8174
124	52132	170.00	31416	181.50	19215	224	7796
125	51906	170.25	31074	181.75	19095	225	7414
126	51679	170.50	30731	182.00	18980	226	7028
127	51451	170.75	30386	182.25	18870	227	6638
128	51222	171.00	30040	182.50	18764	228	6243
129	50991	171.25	29693	183	18568	229	5845
130	50760	171.50	29345	184	18224	230	5443
131	50527	171.75	28998	185	17935	231	5036
132	50293	172.00	28652	186	17689	232	4627
133	50058	172.25	28306	187	17475	233	4213
134	49821	172.50	27962	188	17286	234	3796
135	49583	172.75	27620	189	17112	235	3376
136	49343	173.00	27281	190	16949	236	2952
137	49102	173.25	26944	191	16791	237	2525
138	48859	173.50	26611	192	16635	238	2095
139	48613	173.75	26281	193	16476	239	1662
140	48365	174.00	25955	194	16314	240	1226
141	48114	174.25	25634	195	16146	241	786
142	47860	174.50	25318	196	15971	242	344
143	47603	174.75	25008	197	15788		
144	47341	175.00	24703	198	15596		
145	47075	175.25	24403	199	15395		

1. Procedure

1.1 Obtain Total RL Supply (A) as follows:

_____ 1.1.1 **IF** 0RLP5030 (Conventional LP Service Wtr Press) is **NOT** available contact engineering for optional indications and elevation corrections.

Engineer contacted: ______________________________

NOTE:	Engineering specified optional indications and elevation corrections may be substituted for 0RLP5030 (Conventional LP Service Wtr Press) and the 3.9 psi elevation correction of following step to obtain Total Discharge Head.

_____ 1.1.2 Perform the following calculations to obtain Total Discharge Head:

RL Disch Pressure = 0RLP5030 + 3.9 psi

RL Disch Pressure = __________ + 3.9 psi = _________psig

Lake Elevation = _______________ 0RNP7380 (Lake Wylie Level) or obtained from hydro central per Step 1.1.4.2 of Enclosure 13.1 or Step 1.1.2.2 of Enclosure 13.8.

(_______________psig x 2.311 ft/psig) + (571.75 - _________ft) = __________ft

RL Disch Pressure — Lake Elev — Total Disch Head

_____ 1.1.3 Using Total Discharge Head from Step 1.1.2 obtain the RL Pump Flow value using one of the following:

☐ Enclosure 13.7 (RL Pumps Head / Capacity Table)

OR

☐ OAC Databook in "Secondary Systems Databook Calcs" using "RL Total Discharge Head vs. RL Pump Flow Rate".

_____ 1.1.4 Once RL Pump Flow value is obtained, calculate Total RL Supply based on number of RL pumps in operation:

____________________ X _________________ = ____________gpm (A)

RL Pump Flow Value — # of pumps in operation — Total RL Supply

_____ 1.1.5 Enter Total RL Supply (A) value in Step 1.4.

_____ 1.2 **IF** RN discharge is aligned to the RL discharge header, obtain Total RN Flow (B) as follows:

_____ 1.2.1 **IF** OAC point C1P5856 (RN Calculated Total Flow) is available, perform the following:

☐ 1.2.1.1 Record the current value of C1P5856 (RN Calculated Total Flow)

C1P5856 ___________ gpm

☐ 1.2.1.2 Enter above value as Total RN Flow (B) in Step 1.4.

☐ 1.2.1.3 N/A Step 1.2.2 thru Step 1.2.5.

_____ 1.2.2 **IF** OAC points C1P5854 (RN Train A Calculated Total Flow) **AND** C1P5855 (RN Train B Calculated Total Flow) are available, perform the following to obtain total RN flow:

_____ 1.2.2.1 Record the value of C1P5854 (RN Train A Calculated Total Flow) below:

C1P5854 ___________ gpm (RN Pump Train A Flow)

_____ 1.2.2.2 Record the value of C1P5855 (RN Train B Calculated Total Flow) below:

C1P5855 ___________ gpm (RN Pump Train B Flow)

_____ 1.2.3 **IF** either C1P5854 (RN Train A Calculated Total Flow) **OR** C1P5855 (RN Train B Calculated Total Flow) is **NOT** available, perform the following to obtain total RN flow:

_____ 1.2.3.1 Calculate RN Pump Train A flow:

__________ + __________ = __________gpm
1RNP7520 + 2RNP7520 = RN Pump Train A flow

_____ 1.2.3.2 Calculate RN Pump Train B flow:

__________ + __________ = __________gpm
1RNP7510 + 2RNP7510 = RN Pump Train B flow

_____ 1.2.4 Perform the following calculations to obtain Total RN Flow:

________________ + ________________ = _____________gpm (B)
RN Pump Train A Flow + RN Pump Train B Flow = Total RN Flow

_____ 1.2.5 Enter Total RN Flow (B) in Step 1.4.

NOTE: Normal Cooling Tower evaporation loss @ 100% power is 9,000 to 14,000 gpm/unit.

1.3 Obtain Total Cooling Tower Evaporation (C) as follows:

_____ 1.3.1 **IF** a Unit 1 NC Pump is **NOT** inservice **AND** Unit 1 is in Mode 5, 6, or No Mode, enter 0 for Unit 1 Cooling Tower Evaporation in Step 1.3.3.

_____ 1.3.2 **IF** a Unit 2 NC Pump is **NOT** inservice **AND** Unit 2 is in Mode 5, 6, or No Mode, enter 0 for Unit 2 Cooling Tower Evaporation in Step 1.3.3.

_____ 1.3.3 Calculate Cooling Tower Total Evaporation as follows:

______________________ + ______________________ = ___________gpm (C)
Unit 1 Cooling Tower Evaporation + Unit 2 Cooling Tower Evaporation = Total Evaporation
(C1P5853 or Step 1.3.1) (C2P5853 or Step 1.3.2)

_____ 1.3.4 Enter Total Evaporation (C) in Step 1.4.

_____ 1.4 Perform the following to obtain Calculated Total RL Disch Flow:

__________ ___ + __________ ___ - __________ ___ = __________ ___gpm
Total RL Supply (A) + Total RN Flow (B) - Total Evaporation (C) = Calculated Total RL Disch Flow

NOTE: Due to problems with current RL instrumentation (PIP C-10-4540) and discrepancies between calculated and OAC RL flow (PIP C-12-1399), a safety factor is applied to the Calculated Total RL Disch Flow of Step 1.4 to ensure conservative Total RL Disch Flow rates are used for dilution purposes. This is a temporary conservative action for use till RL discharge flow instrumentation problems are resolved.

_____ 1.5 Apply dilution safety factor to obtain Total RL Discharge Flow from the Calculated Total RL Discharge Flow from Step 1.4 as follows:

________________________ X 0.65 = ________________________ gpm
Calculated Total RL Disch Flow Step 1.4 — Total RL Disch Flow

Calculated By ________________________________ ________________
Operator/Initials Date/Time

Verified By ________________________________ ________________
Operator/Initials Date/Time

Enclosure 13.7

RL Pumps Head / Capacity Table

Head	Flow	Head	Flow	Head	Flow	Head	Flow
100	57192	146	46803	175.50	24110	200	15185
101	56997	147	46524	175.75	23824	201	14965
102	56800	148	46238	176.00	23544	202	14737
103	56602	149	45942	176.25	23271	203	14499
104	56403	150	45636	176.50	23005	204	14252
105	56202	151	45318	176.75	22747	205	13997
106	55999	152	44984	177.00	22496	206	13733
107	55795	153	44633	177.25	22252	207	13460
108	55590	154	44262	177.50	22016	208	13180
109	55383	155	43867	177.75	21787	209	12891
110	55175	156	43444	178.00	21566	210	12595
111	54966	157	42987	178.25	21352	211	12292
112	54755	158	42493	178.50	21146	212	11982
113	54543	159	41954	178.75	20947	213	11665
114	54330	160	41365	179.00	20756	214	11342
115	54116	161	40717	179.25	20571	215	11012
116	53900	162	40004	179.50	20394	216	10677
117	53683	163	39219	179.75	20224	217	10335
118	53465	164	38354	180.00	20061	218	9988
119	53246	165	37405	180.25	19904	219	9635
120	53025	166	36368	180.50	19754	220	9277
121	52804	167	35244	180.75	19611	221	8914
122	52581	168	34036	181.00	19473	222	8546
123	52357	169	32755	181.25	19341	223	8174
124	52132	170.00	31416	181.50	19215	224	7796
125	51906	170.25	31074	181.75	19095	225	7414
126	51679	170.50	30731	182.00	18980	226	7028
127	51451	170.75	30386	182.25	18870	227	6638
128	51222	171.00	30040	182.50	18764	228	6243
129	50991	171.25	29693	183	18568	229	5845
130	50760	171.50	29345	184	18224	230	5443
131	50527	171.75	28998	185	17935	231	5036
132	50293	172.00	28652	186	17689	232	4627
133	50058	172.25	28306	187	17475	233	4213
134	49821	172.50	27962	188	17286	234	3796
135	49583	172.75	27620	189	17112	235	3376
136	49343	173.00	27281	190	16949	236	2952
137	49102	173.25	26944	191	16791	237	2525
138	48859	173.50	26611	192	16635	238	2095
139	48613	173.75	26281	193	16476	239	1662
140	48365	174.00	25955	194	16314	240	1226
141	48114	174.25	25634	195	16146	241	786
142	47860	174.50	25318	196	15971	242	344
143	47603	174.75	25008	197	15788		
144	47341	175.00	24703	198	15596		
145	47075	175.25	24403	199	15395		

LIQUID WASTE RELEASE PERMIT REPORT

LWR Number: 2019025
Release ID: 1 Waste Monitor Tank "A"
Release Mode: 2 Batch
Status: P Pre-Release
Comments:

=== NUCLIDE DATA - INITIAL SAMPLE ===

Nuclide	Undiluted uCi/ml	EC	EC Ratio
CS-137	5.00E-06	1.00E-06	5.00E+00
Gamma	5.00E-06		
H-3	7.50E-01	1.00E-03	7.50E+02
Beta	7.50E-01		
Total	7.50E-01		7.55E+02

LIQUID WASTE RELEASE PERMIT REPORT

LWR Number: 2019025

```
=== RL/RN PUMP DATA ====================================================
RL pumps assigned to release.................................. 1.00
RN pumps assigned to release.................................. 1.00
Minimum RL flow interlock setpoint for radionuclides (gpm)..... 4.50E+04

=== RECOMMENDED RELEASE RATE ===========================================
Allowable release rate (gpm).................................. 3.70E+02
Recommended release rate (gpm)................................ 1.00E+02
Release rate margin (%)....................................... 270.47

=== SETPOINT DATA ======================================================
EMF49L  in Service ...........................................      Yes
EMF49L  Background (cpm)...................................... 1.00E+03

Cs-137 Equivalence (uCi/ml)................................... 5.00E-06
Expected CPM.................................................. 2.75E+03
50 % of Expected CPM.......................................... 1.37E+03
Trip 1 setpoint (cpm)......................................... 2.47E+04
Trip 2 setpoint (cpm)......................................... 3.30E+04

=== SPECIAL INSTRUCTIONS FOR RELEASE ===================================
* RL flow interlock must be greater than or equal to 4.50E+04 gpm *
0 EMF 49 FUNCTIONAL
```

____

____

____

Performed by: _______________________________________ Date: ___________

Verified by: _______________________________________ Date: ___________

LWR Number: 2019025
Release ID: 1 Waste Monitor Tank "A"
Release Mode: 2 Batch

CRS AUTHORIZING RELEASE __________________ DATE/TIME__________________

COMPLETE PRIOR TO RELEASE:

(O)_____EMF49L Source Checked & Operable

(O)_____EMF49L Setpoints Set (Low Range)

TRIP 1_______ cpm TRIP 2______ cpm

(O)_____(I.V.)Independent Verification

(O)_____EMF Recorder Stamped

(O)_____Ensure number of RL Pumps
Operating is at least 1.00

(O)_____Ensure number of RN Pumps
Operating is at least 1.00

(O)_____RL Flowrate _________________gpm

(O)_____RL Flowrate Interlock set @
_____gpm For Appropriate Headers
(A, B, or A&B)

(O)_____Reset LWR Integrator

(O)_____1WL124 Flowrate set @ ______gpm

(O)_____Date/Time Release Started
_____________/____________

(O)_____0WLP6160 channel check

________________________/_____________
(OPS Contact)

(O)_____Date/Time Release Secured
____________/_____________

(O)_____Date/Time First Restart
____________/_____________

(O)_____Date/Time Second Restart
____________/_____________

COMPLETE FOLLOWING RELEASE:

(O)____ EMF Recorder Stamped

(O)_____Date/Time First Trip
____________/_____________

(O)_____Date/Time Second Trip
____________/_____________

(O)_____Date/Time Release Secured
____________/_____________

(O)_____Tank Level ____________%

(O)_____Flush per Procedure

(O)_____Flush secured

(O)_____EMF Reading after Flush:

_____________cpm

(O)_____Volume Released ______gal

(O)_____Reset LWR Integrator

(O) (O/_____Reset EMF49L Setpoints
IAE)
EMF Reading (cpm)After Flush:

______cpm X 3 =______cpm (Trip2)

Trip 2 X 0.7 =______cpm (Trip1)

(O)_____Highest EMF Reading
During Release:______cpm

(O)_____RL Flowrate Interlock Set
@ Zero (0)

COMPLETION OF RELEASE ACKNOWLEDGED:

CRS ________________________________ DATE/TIME_________/_________

RP SHIFT REVIEW________________________ DATE/TIME_________/_________

Ensure all signoffs are legible. Print name where indicated on next page.

LWR Number: 2019025
Release ID: 1 Waste Monitor Tank "A"
Release Mode: 2 Batch

Print Name	Initials	Print Name	Initials

JPM A.4

SRO

Catawba Nuclear Station
Admin. JPM A.4
September 2019 NRC Exam

EVALUATION SHEET

Task: Classify an Event and fill out the Emergency Notification Form

Alternate Path: N/A

Facility JPM #: NEW

Safety Function: N/A

K/A 2.4.40 Knowledge of SRO responsibilities in emergency plan implementation.

Importance: 2.7 / 4.5 **CFR:** 41.10 / 43.5 / 45.11

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

Simulator ______ Classroom __X__ Perform __X__ Simulate ________

References: RP/0/A/5000/001 (Classification of Emergency)
NEI Rev 6 EAL Wallchart
RP/0/A/5000/006 A (Notifications to States and Counties from the Control Room)

Task Standard: Using NEI Rev 6 EAL Wallchart and RP/0/A/5000/001, applicant classifies the event as a Site Area Emergency (HS6.1) in ≤ 15 minutes, and then completes the Emergency Notification Form, in accordance with supplied KEY, in ≤ 15 minutes.

Validation Time: 30 minutes **Time Critical:** Yes __X__ No ______

Applicant:
NAME____________________________ Docket #_______________

Time Start: __________
Time Finish: __________

Time Critical 1 (<15 min):
Time Start: __________
Time Finish: __________

Time Critical 2 (<15 min):
Time Start: __________
Time Finish: __________

Performance Rating:

SAT ____ UNSAT ____

Performance Time _____

Examiner: ______________________________ ______________________________/________
NAME SIGNATURE DATE

==

COMMENTS

Catawba Nuclear Station
Admin. JPM A.4
September 2019 NRC Exam

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Both Units are at 100% RTP.**
- **Radiography is in progress in the Unit 1 CA Pump Room.**
- **Subsequently**
  - **0800: A fork lift performing material handling in the Unit 1 yard between the Containment and Turbine Building overturns rupturing its fuel tank.**
  - **0801: Propane gas enters the Unit 1 VC/YC intake.**
  - **0802: Control Room evacuation is initiated in accordance with AP/1(2)/A/5500/017 (Loss of Control Room).**
  - **0808 Radiography in the Unit 1 CA Pump Room is hindering access to the Unit 1 ASP. The SM directs operators to transition to the SSF in order to establish safe shutdown conditions.**
  - **0813: Unit 2 control is established at the Unit 2 Aux Shutdown Panels.**
  - **0824: Unit 1 control is established at the SSF.**

INITIATING CUES:

- **You are the Emergency Coordinator.**
- **Classify this event per RP/0/A/5000/001 (Emergency Classification).**
- **Emergency Coordinator Judgment is NOT to be used when making this classification.**
- **Fill out the Emergency Notification Form per RP/0/A/5000/006 A (Notifications to the States And Counties From the Control Room).**
- **This JPM is time critical.**

EXAMINER NOTE:

After reading cue, provide applicant with a copy of RP/0/A/5000/001, RP/0/A/5000/006 A, and NEI Rev 6 EAL wallcharts.

START TIME: _______

STEP / STANDARD	SAT / UNSAT
Time Critical 1 Start: ____________ STEP 1: Classify the Event: Unit 2 is in an Alert (HA6.1) due to the event which resulted in plant control being transferred from the Control Room to the ASP. Unit 1 is in an Site Area Emergency (HS6.1) due to transfer of control from the Control Room AND the inability to reestablish control within 15 minutes. Since Unit 1 is in a higher classification than Unit 2, the emergency classification for the site will be an Site Area Emergency (HS6.1). STANDARD: Applicant determines from NEI Rev 6 EAL Wallchart, that Catawba is in a Site Area Emergency HS6.1. **Time Critical 1 Finish:** ____________ **Examiner Note: This step is critical to determine the proper Emergency Action Level prior to notification of the States and Counties. This time critical must be complete in ≤ 15 minutes.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
Time Critical 2 Start: ____________ STEP 2: Fill out Emergency Notification Form: STANDARD: Applicant properly fills out the emergency notification form (in accordance with provided KEY) within 15 minutes. **Time Critical 2 Finish:** ____________ **Examiner Note: This step is critical to ensure timely and accurate notification of the States and Counties. This time critical must be complete in ≤ 15 minutes.** COMMENTS: **END OF TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

STOP TIME ________

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

- **Both Units are at 100% RTP.**
- **Radiography is in progress in the Unit 1 CA Pump Room.**
- **Subsequently**
  - **0800: A fork lift performing material handling in the Unit 1 yard between the Containment and Turbine Building overturns rupturing its fuel tank.**
  - **0801: Propane gas enters the Unit 1 VC/YC intake.**
  - **0802: Control Room evacuation is initiated in accordance with AP/1(2)/A/5500/017 (Loss of Control Room).**
  - **0808 Radiography in the Unit 1 CA Pump Room is hindering access to the Unit 1 ASP. The SM directs operators to transition to the SSF in order to establish safe shutdown conditions.**
  - **0813: Unit 2 control is established at the Unit 2 Aux Shutdown Panels.**
  - **0824: Unit 1 control is established at the SSF.**

INITIATING CUES:

- **You are the Emergency Coordinator.**
- **Classify this event per RP/0/A/5000/001 (Emergency Classification).**
- **Emergency Coordinator Judgment is NOT to be used when making this classification.**
- **Fill out the Emergency Notification Form per RP/0/A/5000/006 A (Notifications to the States And Counties From the Control Room).**
- **This JPM is time critical.**

Declared EAL: ________________

Declaration Time: _______________

Items marked with a * indicate critical tasks

JPM A.4 KEY

NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM

MESSAGE # 1 **Confirmation Phone #:** SIM:(803) 831-3807 **AUTHENTICATION CODE #:** ____________

Lines 1 – 6 are required for INITIAL Notifications

1. EVENT: ■ DRILL ☐ ACTUAL DECLARATION ☐ TERMINATION (ONLY Lines 1, 2, & 4 required)

2. AFFECTED SITE:

Catawba

3.* EMERGENCY CLASSIFICATION

☐ UNUSUAL EVENT ☐ ALERT ■ SITE AREA EMERGENCY ☐ GENERAL EMERGENCY

4.* EAL # HS6.1 * **Declaration Date**: ____/____/____ **Time:** _________

Termination Date: ____/____/____ **Time:** _________(mark "N/A" for EAL # & Description)

EAL DESCRIPTION: An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panels or Standby Shutdown Facility AND Control of any of the following key safety functions is not eestablished within 15 minutes (Note 1): Reactivity (Modes 1, 2 and 3 only) OR Core Cooling OR NCS heat removal

5.* RELEASE TO THE ENVIRONMENT (caused by the emergency): ■ NONE ☐ IS OCCURRING ☐ HAS OCCURRED

6.* PROTECTIVE ACTION RECOMMENDATIONS:

■ NONE

☐ EVACUATE: ____________________

☐ SHELTER: ____________________

☐ CONSIDER THE USE OF KI (POTASSIUM IODIDE) IN ACCORDANCE WITH ORO PLANS AND POLICIES

☐ OTHER: ____________________

*Lines 7-11 are **NOT** required for INITIAL notifications. Lines 7-11 may be provided separately for follow-up notifications.*

7. PROGNOSIS: Upgrade in classification or PAR change is likely before the next follow-up notification ☐ **Yes** ☐ **No**

8. SITE UNIT(S) STATUS:

AFFECTED UNIT

☐ YES Unit 1 - __________% Power Shutdown: Date ___/_____/____Time __________

☐ YES Unit 2 - __________% Power Shutdown: Date ___/_____/____Time __________

9. METEOROLOGICAL DATA:

Wind direction from: _________ degrees Wind Speed: ________ mph Precipitation: ________ inches

Stability Class: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

*Lines 10 - 11 are completed for follow-up notifications, **IF** Line 5 IS OCCURRING or HAS OCCURRED is selected*

10. AIRBORNE RELEASE CHARACTERIZATION: ☐ GROUND ☐ MIXED ☐ ELEVATED

MAGNITUDE UNITS: ☐ Ci ☐ Ci/sec ☐ µCi/sec

Noble Gases: ____________ Iodines: ____________ Particulates: ____________

11. DOSE PROJECTION: Projection period: __________ Hours Estimated Release Duration ________Hours

Performed: Date ___/_____/____ Time: __________	**DISTANCE**	**TEDE (mrem)**	**Thyroid CDE (mrem)**
	Site Boundary		
	2 Miles		
	5 Miles		
	10 Miles		

12. REMARKS (As Applicable): ____________________

13.* APPROVED BY: Operator Name TITLE: Emergency Coordinator Date XX/ XX / XX Time __________

14. NOTIFIED BY: ____________________ Date ___/_____/____Time __________

15. RECEIVED BY (ORO use only): ____________________ Date ___/_____/____Time __________

JPM A.1-2 KEY

GOVERNMENT AGENCIES NOTIFIED

Record the name, date, time, and agencies notified as applicable.

1. ______________________________ York County WP/EOC
(name)
______________________________ 9-1-803/329-1110
(date) (time)

2. ______________________________ Mecklenburg County WP/EOC
(name) 9-704/336-2441 (WP)
______________________________ 9-704/432-4120 (EOC)
(date) (time)

3. ______________________________ Gaston County WP/EOC
(name)
______________________________ 9-704/866-3300
(date) (time)

4. ______________________________ North Carolina EOC/WP
(name) 9-1-919/733-3300 (Primary)
______________________________ 9-1-800/858-0368 (Alt.)
(date) (time)

5. ______________________________ North Carolina Alt. WP
(name) 9-1-828/466-5500
______________________________ 9-1-828/466-5501
(date) (time)

6. ______________________________ North Carolina Alt. EOC
(name) 9-1-919/733-3300 (Primary)
______________________________ 9-1-800-858-0368 (Alt.)
(date) (time)

7. ______________________________ South Carolina WP
(name) 9-1-803/737-8500 (Primary)
______________________________ 9-1-800/811-8045 (Alt.)
(date) (time)

8. ______________________________ South Carolina Alt. WP
(name)
______________________________ 9-1-803/896-9621
(date) (time)

9. ______________________________ South Carolina EOC
(name) 9-1-803/737-8500 (Primary)
______________________________ 9-1-803-737-8724 (Alt.)
(date) (time)