Facility: CATAWBA Date of Exam: JUNE 2017

Tier	Group	RO K/A Category Points											SRO-Only Points		
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	3	3	6
	2	1	1	2				2	2			1	9	2	2	4
	Tier Totals	4	4	5				5	5			4	27	5	5	10
2. Plant Systems	1	3	2	3	2	2	3	3	2	3	3	2	28	3	2	5
	2	1	1	1	1	1	1	1	1	1	1	0	10	~~2~~ 2	1	3
	Tier Totals	4	3	4	3	3	4	4	3	4	4	2	38	5	3	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1	2	3	4	7
		3			2			2			3			1	2	2	2	

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7. *The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to section D.1.b of ES-401 for the applicable KAs.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics= importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note # 1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43..

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
007EK1.05	Reactor Trip - Stabilization - Recovery / 1	3.3	3.8	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Decay power as a function of time
008AK2.03	Pressurizer Vapor Space Accident / 3	2.5	2.4	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Controllers and positioners
009EK1.02	Small Break LOCA / 3	3.5	4.2	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Use of steam tables
011EG2.1.25	Large Break LOCA / 3	3.9	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to interpret reference materials such as graphs, monographs and tables which contain performance data.
015AG2.1.20	RCP Malfunctions / 4	4.6	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to execute procedure steps.
022AK3.01	Loss of Rx Coolant Makeup / 2	2.7	3.1	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Adjustment of RCP seal backpressure regulator valve to obtain normal flow
025AK2.02	Loss of RHR System / 4	3.2	3.2	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	LPI or Decay Heat Removal/RHR pumps
026AA1.06	Loss of Component Cooling Water / 8	2.9	2.9	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Control of flow rates to components cooled by the CCWS
029EA1.09	ATWS / 1	4	3.6	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Manual rod control
040AA2.01	Steam Line Rupture - Excessive Heat Transfer / 4	4.2	4.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Occurrence and location of a steam line rupture from pressure and flow indications
054AK1.02	Loss of Main Feedwater / 4	3.6	4.2	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Effects of feedwater introduction on dry S/G

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
056AG2.2.44	Loss of Off-site Power / 6	4.2	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions
062AA2.01	Loss of Nuclear Svc Water / 4	2.9	3.5	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Location of a leak in the SWS
065AK3.04	Loss of Instrument Air / 8	3	3.2	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Cross-over to backup air supplies
077AA1.05	Generator Voltage and Electric Grid Disturbances / 6	3.9	4.0	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Engineered Safety Features
WE04EA2.2	LOCA Outside Containment / 3	3.6	4.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.
WE05EK2.1	Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4	3.7	3.9	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes and automatic and manual features.
WE11EK3.4	Loss of Emergency Coolant Recirc. / 4	3.6	3.8	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
036AA1.02	Fuel Handling Accident / 8	3.1	3.5							☑					ARM system
037AA2.06	Steam Generator Tube Leak / 3	4.3	4.5								☑				S/G tube failure
059AK1.02	Accidental Liquid RadWaste Rel. / 9	2.6	3.2	☑											Biological effects on humans of various types of radiation, exposure levels that are acceptable for nuclear power plant personnel and the units used for radiation-intensity measurements and for radiation exposure levels
069AK2.03	Loss of CTMT Integrity / 5	2.8	2.9		☑										Personnel access hatch and emergency access hatch
WE01EA2.1	Rediagnosis / 3	3.2	4								☑				Facility conditions and selection of appropriate procedures during abnormal and emergency operations.
WE03EK3.4	LOCA Cooldown - Depress. / 4	3.5	3.9			☑									RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.
we06EG2.1.30	Degraded Core Cooling / 4	4.4	4.0											☑	Ability to locate and operate components, including local controls.
WE13EA1.2	Steam Generator Over-pressure / 4	3.0	3.2							☑					Operating behavior characteristics of the facility.
WE16EK3.4	High Containment Radiation / 9	3.0	3.2			☑									RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
003A3.01	Reactor Coolant Pump	3.3	3.2	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Seal injection flow
004K2.04	Chemical and Volume Control	2.6	2.7	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	BWST tank heaters
005A2.02	Residual Heat Removal	3.5	3.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Pressure transient protection during cold shutdown
006K6.05	Emergency Core Cooling	3.0	3.5	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	HPI/LPI cooling water
007A3.01	Pressurizer Relief/Quench Tank	2.7	2.9	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Components which discharge to the PRT
008A4.05	Component Cooling Water	2.7	2.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Normal CCW-header total flow rate and the flow rates to the components cooled by the CCWS
010A2.03	Pressurizer Pressure Control	4.1	4.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	PORV failures
010A4.03	Pressurizer Pressure Control	4.0	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	PORV and block valves
012K3.01	Reactor Protection	3.9	4.0	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	CRDS
012K5.01	Reactor Protection	3.3	3.8	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	DNB
013G2.4.1	Engineered Safety Features Actuation	4.6	4.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of EOP entry conditions and immediate action steps.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
013K6.01	Engineered Safety Features Actuation	2.7	3.1	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Sensors and detectors
022K1.04	Containment Cooling	2.9	2.9	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Chilled water
025A3.02	Ice Condenser	3.4	3.4	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Isolation valves
025K6.01	Ice Condenser	3.4	3.6	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Upper and lower doors of the ice condenser
026K4.04	Containment Spray	3.7	4.1	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Reduction of temperature and pressure in containment after a LOCA by condensing steam, to reduce radiological hazard and protect equipment from corrosion damage (spray)
039A1.09	Main and Reheat Steam	2.5	2.7	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Main steam line radiation monitors
039K3.06	Main and Reheat Steam	2.8	3.1	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	SDS
059G2.4.35	Main Feedwater	3.8	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects
061K5.01	Auxiliary/Emergency Feedwater	3.6	3.9	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Relationship between AFW flow and RCS heat transfer
062K1.04	AC Electrical Distribution	3.7	4.2	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Off-site power sources
063A4.01	DC Electrical Distribution	2.8	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Major breakers and control power fuses

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
064K4.02	Emergency Diesel Generator	3.9	4.2	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Trips for ED/G while operating (normal or emergency)
073K3.01	Process Radiation Monitoring	3.6	4.2	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Radioactive effluent releases
076A1.02	Service Water	2.6	2.6	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Reactor and turbine building closed cooling water temperatures.
078K2.01	Instrument Air	2.7	2.9	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Instrument air compressor
103A1.01	Containment	3.7	4.1	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Containment pressure, temperature and humidity
103K1.01	Containment	3.6	3.9	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	CCS

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
002K3.03	Reactor Coolant	4.2	4.6	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Containment
014K5.01	Rod Position Indication	2.7	3.0	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Reasons for differences between RPIS and step counter
016K1.08	Non-nuclear Instrumentation	3.4	3.4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	PZR PCS
027K2.01	Containment Iodine Removal	3.1	3.4	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Fans
033A3.01	Spent Fuel Pool Cooling	2.5	2.7	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Temperature control valves
034K6.02	Fuel Handling Equipment	2.6	3.3	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Radiation monitoring systems
035A2.05	Steam Generator	3.2	3.4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Unbalanced flows to the 5/Gs
071A1.06	Waste Gas Disposal	2.5	2.8	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Ventilation system
079K4.01	Station Air	2.9	3.2	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Cross-connect with IAS
086A4.01	Fire Protection	3.3	3.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Fire water pumps

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.15	Conduct of operations	2.7	3.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of administrative requirements for temporary management directives such as standing orders, night orders, Operations memos, etc.
G2.1.17	Conduct of operations	3.9	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to make accurate, clear and concise verbal reports.
G2.1.28	Conduct of operations	4.1	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the purpose and function of major system components and controls.
G2.2.22	Equipment Control	4.0	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of limiting conditions for operations and safety limits.
G2.2.44	Equipment Control	4.2	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions
G2.3.11	Radiation Control	3.8	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to control radiation releases.
G2.3.12	Radiation Control	3.2	3.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiological safety principles pertaining to licensed operator duties
G2.4.32	Emergency Procedures/Plans	3.6	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of operator response to loss of all annunciators.
G2.4.37	Emergency Procedures/Plans	3.0	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the lines of authority during implamentation of an emergency plan.
G2.4.9	Emergency Procedures/Plans	3.8	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
009EG2.4.47	Small Break LOCA / 3	4.2	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.
022AG2.4.4	Loss of Rx Coolant Makeup / 2	4.5	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.
027AG2.1.7	Pressurizer Pressure Control System Malfunction / 3	4.4	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior and instrument interpretation.
057AA2.03	Loss of Vital AC Inst. Bus / 6	3.7	3.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	RPS panel alarm annunciators and trip indicators
062AA2.05	Loss of Nuclear Svc Water / 4	2.4	2.5	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	The normal values for SWS-header flow rate and the flow rates to the components cooled by the SWS
WE12EA2.2	Steam Line Rupture - Excessive Heat Transfer / 4	3.4	3.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
033AG2.2.38	Loss of Intermediate Range NI / 7	3.6	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of conditions and limitations in the facility license.
WE02EA2.2	SI Termination / 3	3.5	4.0	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.
we07EG2.2.3	Saturated Core Cooling Core Cooling / 4	3.8	3.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	(multi-unit license) Knowledge of the design, procedural and operational differences between units.
WE15EA2.2	Containment Flooding / 5	2.9	3.3	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
004G2.1.7	Chemical and Volume Control	4.4	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior and instrument interpretation.
013A2.04	Engineered Safety Features Actuation	3.6	4.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Loss of instrument bus
059A2.05	Main Feedwater	3.1	3.4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Rupture in MFW suction or discharge line
061G2.1.23	Auxiliary/Emergency Feedwater	4.3	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to perform specific system and integrated plant procedures during all modes of plant operation.
078A2.01	Instrument Air	2.4	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Air dryer and filter malfunctions

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028A2.03	Hydrogen Recombiner and Purge Control	3.4	4.0	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	The hydrogen air concentration in excess of limit flame propagation or detonation with resulting equipment damage in containment
055G2.2.37	Condenser Air Removal	3.6	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to determine operability and/or availability of safety related equipment
079A2.01	Station Air	2.9	3.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Cross-connection with IAS

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.7	Conduct of operations	4.4	4.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior and instrument interpretation.
G2.2.11	Equipment Control	2.3	3.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for controlling temporary design changes.
G2.2.5	Equipment Control	2.2	3.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for making design or operating changes to the facility
G2.3.14	Radiation Control	3.4	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities
G2.3.6	Radiation Control	2.0	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to aprove release permits
G2.4.26	Emergency Procedures/Plans	3.1	3.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.
G2.4.5	Emergency Procedures/Plans	3.7	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the organization of the operating procedures network for normal, abnormal and emergency evolutions.

ES-301 **Administrative Topics Outline** **Form ES-301-1**

NRC EXAM

Facility: **Catawba Nuclear Station**	Date of Examination: **June 2017**
Examination Level: RO ☒ SRO ☐	Operating Test Number: **2017301**

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,D	**Perform Manual Shutdown Margin Calculation** G 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. 3.9/4.2
Conduct of Operations	R,D,P	**Calculate FWST Makeup** G 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. 4.3/4.4
Equipment Control	R,N	**Unit Vent Flow Calculation** G 2.2.12 Knowledge of surveillance procedures. 3.7/4.1
Radiation Control	R,M	**Calculate Total RL Discharge Flow** G 2.3.11 Ability to control radiation releases. 3.8/4.3
Emergency Procedures/Plan		

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Admin JPMs

JPM A.1-1 – Perform Manual Shutdown Margin Calculation (Common RO & SRO) – Bank JPM RB-125
This JPM is time critical with a completion time requirement of 1 hour (to comply with requirement of T.S. 3.1.4).

K/A Generic 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR 41.10 / 43.5 / 45.12) RO 3.9 SRO 4.2

Initial conditions are that the computer program used to calculate shutdown margin is inoperable and that during performance of the RCCA Bank Repositioning Periodic Test, that Shutdown Bank E would not move. Control Rods H4 and K14 have been determined to be immovable and untrippable. Tech Specs require that a shutdown margin calculation be performed within 1 hour. Applicants are given values for current power level, core life, control rod positions, and current boron concentration and are instructed to perform a manual shutdown margin calculation per OP/0/A/6100/006 (Reactivity Balance Calculations) Enclosure 4.3 (Shutdown Margin – Untrippable / Misaligned RCCA(s) – Modes 1 & 2). Applicant will determine that current calculated shutdown margin is 1263 pcm. Applicant determines that required shutdown margin of 1300 pcm for the current mode does not exist.

JPM A.1-2S – Calculate boric acid and water addition to FWST. (RO ONLY) – Bank JPM 2016 NRC Exam JPM A.1-2R

K/A Generic 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR 41.10 / 43.5 / 45.2 / 45.6) RO 4.3 SRO 4.4

Initial conditions are that an improper valve lineup has decreased Unit 1 FWST level. The valve lineup issue has been corrected to stop the level decrease. The applicant is directed to calculate a makeup to the FWST to restore level to a value above the Tech Spec minimum.

JPM A.2 – Determine and perform required actions for Unit Vent Stack Flow Meter Inoperable (Common RO & SRO) – New JPM

K/A Generic 2.2.12 Knowledge of surveillance procedures. (CFR 41.10 / 45.13) RO 3.7 SRO 4.1

Initial conditions are that Unit 1 is in Mode 6 with the Unit Vent Stack Flow Meter Inoperable. Applicants are given various ventilation and plant system lineups and are told to perform PT/1/A/4450/017 (Unit Vent Flow Manual Calculation) Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet). Applicants will determine that Total Unit Vent Flow is 143,092 CFM.

JPM A.3 – Calculate Total RL Discharge Flow (RO ONLY) – Bank JPM WL-001 Modified (Changed some values which changed the final answer)

K/A Generic 2.3.11 Ability to control radiation releases. (CFR 41.11 / 43.4 / 45.10) RO 3.8 SRO 4.3

Initial conditions are that the RL discharge header flow instrumentation is inoperable. Applicants are given plant conditions and directed to calculate and record the total RL discharge flow per PT/0/A/4250/011 (RL Temperature and Discharge Flow Determination). Applicant will calculate Total RL Discharge Flow to be 48,608 gpm (46,943 to 51,640 gpm acceptable).

NRC EXAM

Facility: **Catawba Nuclear Station** Date of Examination: **June 2017**

Examination Level: RO ☐ SRO ☒ Operating Test Number: **2017301**

Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,D	**Perform Manual Shutdown Margin Calculation** G 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. 3.9/4.2
Conduct of Operations	R,D,P	**Calculate FWST Makeup and Tech Spec Actions** G 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. 4.3/4.4
Equipment Control	R,N	**Unit Vent Flow Calculation** G 2.2.12 Knowledge of surveillance procedures. 3.7/4.1
Radiation Control	R,M	**Calculate Total RL Discharge Flow** G 2.3.11 Ability to control radiation releases. 3.8/4.3
Emergency Procedures/Plan	R,N	**Classify an Event and Fill Out the Emergency Notification Form** G 2.4.40 Knowledge of SRO responsibilities in emergency plan implementation. 2.7/4.5

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Admin JPMs

JPM A.1-1 – Perform Manual Shutdown Margin Calculation (Common RO & SRO) – Bank JPM RB-125
This JPM is time critical with a completion time requirement of 1 hour (to comply with requirement of T.S. 3.1.4).

K/A Generic 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR 41.10 / 43.5 / 45.12) RO 3.9 SRO 4.2

Initial conditions are that the computer program used to calculate shutdown margin is inoperable and that during performance of the RCCA Bank Repositioning Periodic Test, that Shutdown Bank E would not move. Control Rods H4 and K14 have been determined to be immovable and untrippable. Tech Specs require that a shutdown margin calculation be performed within 1 hour. Applicants are given values for current power level, core life, control rod positions, and current boron concentration and are instructed to perform a manual shutdown margin calculation per OP/0/A/6100/006 (Reactivity Balance Calculations) Enclosure 4.3 (Shutdown Margin – Untrippable / Misaligned RCCA(s) – Modes 1 & 2). Applicant will determine that current calculated shutdown margin is 1263 pcm. Applicant determines that required shutdown margin of 1300 pcm for the current mode does not exist.

JPM A.1-2S – Calculate boric acid and water addition to FWST and determine applicable Tech Spec actions. (SRO ONLY) – Bank JPM 2016 NRC Exam JPM A.1-2S

K/A Generic 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR 41.10 / 43.5 / 45.2 / 45.6) RO 4.3 SRO 4.4

Initial conditions are that an improper valve lineup has decreased Unit 1 FWST level. The valve lineup issue has been corrected to stop the level decrease. The applicant is directed to calculate a makeup to the FWST to restore level to a value above the Tech Spec minimum. Following makeup calculation, the applicant is required to address Tech Specs action at the time of discovery and one hour later. The applicant will conclude an action statement existed at time of discovery due to level below minimum required. One hour later, with a given makeup flowrate, the applicant will determine that level remains below minimum. This will require entry into another action due to inability to restore operability within one hour, as well as remaining in original action statement.

JPM A.2 – Determine and perform required actions for Unit Vent Stack Flow Meter Inoperable (Common RO & SRO) – New JPM

K/A Generic 2.2.12 Knowledge of surveillance procedures. (CFR 41.10 / 45.13) RO 3.7 SRO 4.1

Initial conditions are that Unit 1 is in Mode 6 with the Unit Vent Stack Flow Meter Inoperable. Applicants are given various ventilation and plant system lineups and are told to perform PT/1/A/4450/017 (Unit Vent Flow Manual Calculation) Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet). Applicants will determine that Total Unit Vent Flow is 143,092 CFM.

Admin JPMs

JPM A.3 – Calculate Total RL Discharge Flow (SRO ONLY) – Bank JPM WL-001 Modified (Changed some values which changed the final answer and added LWR to be approved for SRO ONLY)

K/A Generic 2.3.11 Ability to control radiation releases. (CFR 41.11 / 43.4 / 45.10) RO 3.8 SRO 4.3

Initial conditions are that the RL discharge header flow instrumentation is inoperable and an LWR package has been delivered to the control room for approval. Applicants are given plant conditions and directed to calculate and record the total RL discharge flow per PT/0/A/4250/011 (RL Temperature and Discharge Flow Determination) and determine whether sufficient dilution flow exists to approve the LWR. Applicant will calculate Total RL Discharge Flow to be 48,608 gpm (46,943 to 51,640 gpm acceptable). Applicant will determine that sufficient dilution flow does exist for the LWR approval.

JPM A.4 – Classify an Event and Fill Out the Emergency Notification Form (SRO ONLY) – NEW JPM
This JPM is time critical (≤ 15 minutes) from the point that the emergency classification is made.

K/A Generic 2.4.40 Knowledge of SRO responsibilities in emergency plan implementation. (CFR 41.10 / 43.5 / 45.11) RO 2.7 SRO 4.5

Initial conditions are that both Units are at 100% power. A tornado strikes the switchyard causing a Loss of Offsite power to Unit 2. A lighting pole from the switchyard has punctured the FWST on Unit 1 and water is spilling out of it into the missile shield around it. Applicants are given a copy of RP/0/A/5000/001 (Emergency Classification) and the NEI Rev 6 EAL Wallcharts and are directed to classify the event and to fill out the Emergency Notification Form per RP/0/A/5000/006 A (Notifications to the States and Counties From the Control Room). This event is classified as an Alert (SA9.1).

NRC EXAM

Facility: **Catawba Nuclear Station** Date of Examination: **June 2017**

Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test Number: **2017301**

Control Room Systems (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. Emergency Borate the Reactor Coolant System 004 A2.14 (3.8/3.9)	A,D,S	1
b. Perform E-0 Actions To Ensure Complete Containment Isolation 013 A4.01 (4.5/4.8)	A,EN,N,S	2
c. Establish NC System Bleed and Feed WE05EA1.1 (4.1/4.0)	A,D,L,S	4P
d. Realign CA Suction Source 054AA1.01 (4.5/4.4)	A,D,L,S	4S
e. Operate Containment Cooling Fans 022 A4.01 (3.6/3.6)	D,P,S	5
f. Reset Radiation Monitor Trip Setpoints 073 A4.02 (3.7/3.7)	D,P,S	7
g. Isolate Cold Leg Accumulators During Shutdown LOCA 006 A1.13 (3.5/3.7)	A,D,L,P,S	3
h. Restore Normal Power To 1ETA From The Control Room 064 A4.07 (3.4/3.4)	D,S	6
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. Place 2A Hydrogen Analyzer In Service 028 A1.01 (3.4/3.8)	D,E,L,R	5
j. Align Seal Injection to the Unit 1 NC Pumps 076 A2.01 (3.5/3.7)	E,N	4S
k. Align Swing Inverter 1EIE to 1ERPA 062 A2.01 (3.4/3.9)	D,E	6

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3 **(5/5/3)**
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4 **(9/8/3)**
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1 **(3/3/2)**
(EN)gineered safety feature	- / - / ≥ 1 **(1/1/1)**
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1 **(4/4/2)**
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1 **(2/2/2)**
(P)revious 2 exams	≤ 3 ≤ 3 / ≤ 2 **(3/3/0)**
(R)CA	≥ 1 / ≥ 1 / ≥ 1 **(1/1/1)**
(S)imulator	

Simulator JPMs

JPM a – Emergency Borate the Reactor Coolant System – Bank JPM - Alternate Path

K/A 004 A2.14 – Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Emergency Boration
(CFR: 41.5 / 43/5 / 45/3 / 45/5) RO 3.8 / SRO 3.9

Initial conditions are that a valid reactor trip signal has been received and the reactor will not trip from the control room. A Red Path on the Subcriticality CSF is in effect. The OATC is inserting control rods manually. The CRS directs the applicant to initiate emergency boration, per EP/1/A/5000/FR-S.1 (Nuclear Power Generation/ATWS) step 4. The applicant ensures that an NV pump is in service and then depresses the OPEN pushbutton on 1NV-236B (Boric Acid To NV Pumps Suct). 1NV-236B fails to open beginning the **ALTERNATE PATH**. After ensuring that both boric acid transfer pumps are in service and still no emergency boration flow exists, the applicant will open the NV pump suction isolations from the FWST and isolate the NV pump suction from the VCT, ensure proper system lineup to the NC system, and verify NC system pressure is < 2335 psig.

JPM b – Perform E-0 Actions To Ensure A Complete Containment Isolation – NEW JPM - Alternate Path

K/A 013 A4.01 – Ability to manually operate and/or monitor in the control room: ESFAS-initiated equipment which fails to actuate. (CFR: 41.7 / 45.5 to 45.8) RO 4.5 / SRO 4.8 (Justification for the Safety Function 2 (Inventory Control) designation is that the WL penetration that is left un-isolated during this JPM is from the Containment Sump. As long as this penetration remains un-isolated, a constant discharge of water from the containment sump will be in progress. On a Large Break LOCA this water in the containment sump will eventually be the water used for core cooling following transfer to Cold Leg Recirculation. Removing inventory from the containment sump may lead to the eventual inability to properly cool the core and ultimately lead to core damage).

Initial conditions are that the applicant assumes the OATC role with the BOP out of the control room and the CRS performing an IPTE brief on Unit 2. Once the applicant has the watch, a Large Break LOCA will occur on Unit 1. The OATC will verify that all immediate actions are met. The examiner will provide a cue to applicant that the CRS directs them to continue performance of E-0 beginning at step 6. The applicant will announce that a safety injection has occurred and will verify that all Feedwater Isolation status lights are lit. The applicant will then determine that a Phase A Containment Isolation has not occurred and will manually initiate both trains. This begins the **ALTERNATE PATH**. The applicant will determine from the monitor light panel that Phase A Containment Isolation valves 1WL-825A and 1WL-827B (both on the containment floor and equipment sump discharge penetration) have not closed as expected. The applicant will then manually close these valves to end the JPM.

JPM c – Initiate RCS Bleed and Feed following loss of Secondary Heat Sink – Bank JPM – Alternate Path

K/A WE05 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. (CFR: 41.7 / 45.5 / 45.6) RO 4.1 SRO 4.0

Initial conditions are that a Reactor Trip has occurred due to a loss of both main feed pumps. The Auxiliary Feedwater Pumps will not function. EP/1/A/5000/FR-H.1 has been entered and Bleed and Feed initiation criteria has been met. The applicant is directed to initiate Bleed and Feed in accordance with FR-H.1. Applicant will stop all NC pumps and manually initiate both trains of safety injection (Only 'A' train will initiate & NV pump cold leg injection valves fail to open). This begins the **ALTERNATE PATH**. When NV S/I flow cannot be verified, the applicant will start 1B NV pump and 1B NI pump and manually aligns the cold leg injection flowpath from the NV pumps. The applicant will then establish a bleed path from the NC system by opening 2 Pressurizer PORVs to finish the JPM.

Simulator JPMs

JPM d - Realign CA Suction Source – Bank JPM - Alternate Path

K/A 054 AA1.01 – Ability to operate and/or monitor the following as they apply to the Loss of Main Feedwater(MFW): AFW controls, including the use of alternate AFW sources. (CFR: 41.7 / 45.5 / 45.6) RO 4.5 SRO 4.4

Initial conditions are that the crew is performing actions in EP/1/A/5000/ES-0.1 (Reactor Trip Response) following a reactor trip when alarm 1AD-8, B/1 (UST LO LEVEL) is received. The crew has transitioned to AP/1/A/5500/006 (Loss of S/G Feedwater) Case II (Loss of Normal CA Supply). The CRS directs the applicant to perform the actions of AP-06 Case II beginning at step 7. The applicant will attempt to manually close 1CA-4 (CA Pmps Suct From UST) but is unsuccessful and will dispatch an operator to locally close 1CS-19 (CA Pumps Supply From Upper Surge Tank). Applicant will throttle CA flow to < 600 gpm to conserve UST inventory. Applicant will then attempt to break condenser vacuum from the control room, but is unsuccessful and dispatches operators to locally open the vacuum breaker valves. Operators are unable to locally open the vacuum breaker valves to begin the **ALTERNATE PATH**. Applicant will then align RN (Nuclear Service Water) to supply the running CA pumps to complete the JPM.

JPM e – Operate Containment Cooling System Fans – Bank JPM (2016 NRC Exam)

K/A 022 A4.01 Ability to manually operate and/or monitor in the control room: CCS fans. (CFR 41.7 / 45.5 to 45.8) RO 3.6 SRO 3.6

Initial conditions are that a secondary steam leak is occurring. The CRS directs the applicant to perform step 9 of AP/1/A/5500/028 (Secondary Steam Leak). The applicant will determine, based on conditions specified in the procedure, that the leak is occurring inside containment. The applicant will then start one additional Lower Containment Ventilation Unit, three additional Upper Containment Ventilation Units, and place all eight operating ventilation units in “MAX” cooling mode.

JPM f – Reset Radiation Monitor Trip Setpoints – Bank JPM (2015 NRC Exam)

K/A 073 A4.02 Ability to manually operate and/or monitor in the control room: Radiation monitoring system control panel (CFR 41.7 / 45.5 to 45.8) RO 3.7 SRO 3.7

Initial conditions are that Unit 1 is at 100% power. Following a discussion with RP concerning a premature gaseous release termination, the CRS directs the applicant to reset EMF 50L setpoints per OP/0/A/6500/080 (EMF RP86A Output Modules) Enclosure 4.2 (EMF RP86A Trip Setpoint Adjustment). The new setpoints will have a Trip 1 value of 6300 cpm and a Trip 2 value of 9000 cpm. The OAC program EMFLIB is not available. The applicants will input the new values one at a time per procedure and perform a verification of proper setpoints per the procedure. The applicants will then fill out the appropriate setpoint log entries to finish the JPM.

Simulator JPMs

JPM g – Isolate Cold Leg Accumulators Following a Shutdown LOCA – Bank JPM - Alternate Path (2016 NRC Exam)

K/A 006 A1.13 – Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: Accumulator pressure (level, boron concentration) (CFR: 41.5 / 45.5) RO 3.5 SRO 3.7

Initial conditions are Unit 1 is in Mode 4 when pressurizer level and pressure begin to decrease uncontrollably. The CRS enters AP/1/A/5500/027 (Shutdown LOCA) to address the LOCA. The CRS directs the applicant to isolate the Unit 1 Cold Leg Accumulators by performing Enclosure 14 (Isolating Cold Leg Accumulators) of AP/27. The applicant will attempt to close all Cold Leg Accumulator discharge isolation valves, but only 1A and 1D will isolate. The applicant will transition to the RNO to begin the **ALTERNATE PATH**. Applicant will isolate the Nitrogen supply to the 1B and 1C Cold Leg Accumulators and then make the valve alignment to vent these accumulators to containment. This JPM is written to terminate at this time since all critical steps have been completed. Complete depressurization of these accumulators would take ~ 30 minutes.

JPM h – Restore Normal Power to 1ETA From the Control Room - Bank JPM

K/A 064 A4.07 Ability to manually operate and/or monitor in the control room: Transfer ED/G (with load) to grid. (CFR 41.7 / 45.5 to 45.8) RO 3.4 SRO 3.4

Initial conditions are that Unit 1 is recovering from a blackout per AP/1/A/5500/007 (Loss of Normal Power) Case I. Power has been aligned to 1ATC (normal offsite power source for 1ETA). CRS directs the applicant to parallel 1A D/G to 1ETA's normal power source (1ATC) and to shutdown 1A D/G per OP/1/A/6350/002 (Diesel Generator Operation) Enclosure 4.17 (Shutdown of D/G 1A After an Automatic Start). Applicant adjusts 1A D/G voltage to be 50-200 volts higher than line volts, increases D/G 1A speed, closes the ETA normal feeder breaker from 1ATC, and stabilizes 1A D/G with a positive load and a lagging power factor. Applicant will then decrease 1A D/G load to 200 KW prior to opening the 1A D/G breaker to 1ETA. Applicant will then depress the 1A D/G 'OFF' pushbutton to complete the JPM.

Plant JPMs

JPM i – Place the 2A Hydrogen Analyzer in Service – Bank JPM (RCA entry required)

K/A 028 A1.01 Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: Hydrogen concentration. (CFR 41.5 / 45.5) RO 3.4 SRO 3.8

Initial conditions are that a Large Break LOCA has occurred on Unit 2 and 2B Hydrogen Analyzer is tagged out for maintenance. The CRS directs the applicant to place the 2A Containment Hydrogen Analyzer in service to position "1" for sampling Upper Containment per OP/2/A/6450/010 (Containment Hydrogen Control Systems) Enclosure 4.9 (Operation of the Containment Hydrogen Analyzers Following a LOCA). Applicant will select the desired sample location, insert key and turn key-switch to open containment isolation valves, verify the analyzer is in standby, and energize the hydrogen analyzer.

JPM j – Align Seal Injection to the Unit 1 NC Pumps – NEW JPM

K/A 076 A2.01 Ability to (a) predict the impacts of the following malfunction or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of SWS (CFR 41.5 / 43.5 /45.3 / 45.13) RO 3.5 SRO 3.7

Initial conditions are that a loss of RN has occurred on Unit 1 and AP/0/A/5500/020 (Loss of Nuclear Service Water) has been entered. Alternate power has been aligned to 1EMXS per AP-20 Enclosure 4 (Align Alternate Power Supply To 1EMXS or 2EMXS). The CRS directs the applicant to place standby makeup pump #1 in service to provide seal injection to the Unit 1 NC pumps per the local copy of AP-20 Enclosure 6 (Align Seal Injection to the Unit 1 NC Pumps). Applicant will verify power to 1EMXS, open 1NV-865A (Stdby M/U Pump Suct Frm Xfer Tube) and 1NV-872A (Stdby M/U Pmp Filt Otlt), close 1NV-89A (NC Pmps Seal Ret Cont Isol), verify 1NV-877 (Stdby M/U To NC Pump Seal Inj) is open, and start Standby Makeup Pump #1 by depressing the "ON" pushbutton.

JPM k – Align Swing Inverter 1EIE to 1ERPA – Bank JPM

K/A 062 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Types of loads that, if de-energized, would degrade or hinder plant operation. (CFR 41.5 / 43.5 / 45.3 / 45.13) RO 3.4 SRO 3.9

Initial conditions are that vital AC Panelboard 1ERPA is being powered from regulated power (1VRD). The CRS directs the applicant to align Swing Inverter 1EIE to supply 1ERPA per OP/1/A/6350/008 (125 VDC/120 VAC Vital Instrument and Control Power System) Enclosure 4.37 (Placing in Service and Removing From Service 1EIE). Applicant will close breakers from 125 VDC distribution center, pre-charge 1EIE, and close 1EIE input breaker. Applicant will then align sync switch on 1EIE and close the 1EIE output breaker. Once applicant verifies 1EIE is in sync with the alternate source, they will align the manual bypass switch to provide power to 1ERPA from 1EIE.

NRC EXAM

Facility: **Catawba Nuclear Station** Date of Examination: **June 2017**

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test Number: **2017301**

Control Room Systems (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. Emergency Borate the Reactor Coolant System 004 A2.14 (3.8/3.9)	A,D,S	1
b. Perform E-0 Actions To Ensure Complete Containment Isolation 013 A4.01 (4.5/4.8)	A,EN,N,S	2
c. Establish NC System Bleed and Feed WE05EA1.1 (4.1/4.0)	A,D,L,S	4P
d. Realign CA Suction Source 054AA1.01 (4.5/4.4)	A,D,L,S	4S
e. Operate Containment Cooling Fans 022 A4.01 (3.6/3.6)	D,P,S	5
f. Reset Radiation Monitor Trip Setpoints 073 A4.02 (3.7/3.7)	D,P,S	7
g. Isolate Cold Leg Accumulators During Shutdown LOCA 006 A1.13 (3.5/3.7)	A,D,L,P,S	3

In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. Place 2A Hydrogen Analyzer In Service 028 A1.01 (3.4/3.8)	D,E,L,R	5
j. Align Seal Injection to the Unit 1 NC Pumps 076 A2.01 (3.5/3.7)	E,N	4S
k. Align Swing Inverter 1EIE to 1ERPA 062 A2.01 (3.4/3.9)	D,E	6

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3 **(5/5/3)**
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4 **(9/8/3)**
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1 **(3/3/2)**
(EN)gineered safety feature	- / - / ≥ 1 **(1/1/1)**
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1 **(4/4/2)**
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1 **(2/2/2)**
(P)revious 2 exams	≤ 3 ≤ 3 / ≤ 2 **(3/3/0)**
(R)CA	≥ 1 / ≥ 1 / ≥ 1 **(1/1/1)**
(S)imulator	

Simulator JPMs

JPM a – Emergency Borate the Reactor Coolant System – Bank JPM - Alternate Path

K/A 004 A2.14 – Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Emergency Boration
(CFR: 41.5 / 43/5 / 45/3 / 45/5) RO 3.8 / SRO 3.9

Initial conditions are that a valid reactor trip signal has been received and the reactor will not trip from the control room. A Red Path on the Subcriticality CSF is in effect. The OATC is inserting control rods manually. The CRS directs the applicant to initiate emergency boration, per EP/1/A/5000/FR-S.1 (Nuclear Power Generation/ATWS) step 4. The applicant ensures that an NV pump is in service and then depresses the OPEN pushbutton on 1NV-236B (Boric Acid To NV Pumps Suct). 1NV-236B fails to open beginning the **ALTERNATE PATH**. After ensuring that both boric acid transfer pumps are in service and still no emergency boration flow exists, the applicant will open the NV pump suction isolations from the FWST and isolate the NV pump suction from the VCT, ensure proper system lineup to the NC system, and verify NC system pressure is < 2335 psig.

JPM b – Perform E-0 Actions To Ensure A Complete Containment Isolation – NEW JPM - Alternate Path

K/A 013 A4.01 – Ability to manually operate and/or monitor in the control room: ESFAS-initiated equipment which fails to actuate. (CFR: 41.7 / 45.5 to 45.8) RO 4.5 / SRO 4.8 (Justification for the Safety Function 2 (Inventory Control) designation is that the WL penetration that is left un-isolated during this JPM is from the Containment Sump. As long as this penetration remains un-isolated, a constant discharge of water from the containment sump will be in progress. On a Large Break LOCA this water in the containment sump will eventually be the water used for core cooling following transfer to Cold Leg Recirculation. Removing inventory from the containment sump may lead to the eventual inability to properly cool the core and ultimately lead to core damage).

Initial conditions are that the applicant assumes the OATC role with the BOP out of the control room and the CRS performing an IPTE brief on Unit 2. Once the applicant has the watch, a Large Break LOCA will occur on Unit 1. The OATC will verify that all immediate actions are met. The examiner will provide a cue to applicant that the CRS directs them to continue performance of E-0 beginning at step 6. The applicant will announce that a safety injection has occurred and will verify that all Feedwater Isolation status lights are lit. The applicant will then determine that a Phase A Containment Isolation has not occurred and will manually initiate both trains. This begins the **ALTERNATE PATH**. The applicant will determine from the monitor light panel that Phase A Containment Isolation valves 1WL-825A and 1WL-827B (both on the containment floor and equipment sump discharge penetration) have not closed as expected. The applicant will then manually close these valves to end the JPM.

JPM c – Establish RCS Bleed and Feed following loss of Secondary Heat Sink – Bank JPM – Alternate Path

K/A WE05 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. (CFR: 41.7 / 45.5 / 45.6) RO 4.1 SRO 4.0

Initial conditions are that a Reactor Trip has occurred due to a loss of both main feed pumps. The Auxiliary Feedwater Pumps will not function. EP/1/A/5000/FR-H.1 has been entered and Bleed and Feed initiation criteria has been met. The applicant is directed to initiate Bleed and Feed in accordance with FR-H.1. Applicant will stop all NC pumps and manually initiate both trains of safety injection (Only 'A' train will initiate & NV pump cold leg injection valves fail to open). This begins the **ALTERNATE PATH**. When NV S/I flow cannot be verified, the applicant will start 1B NV pump and 1B NI pump and manually aligns the cold leg injection flowpath from the NV pumps. The applicant will then establish a bleed path from the NC system by opening 2 Pressurizer PORVs to finish the JPM.

Simulator JPMs

JPM d - Realign CA Suction Source – Bank JPM - Alternate Path

K/A 054 AA1.01 – Ability to operate and/or monitor the following as they apply to the Loss of Main Feedwater(MFW): AFW controls, including the use of alternate AFW sources. (CFR: 41.7 / 45.5 / 45.6) RO 4.5 SRO 4.4

Initial conditions are that the crew is performing actions in EP/1/A/5000/ES-0.1 (Reactor Trip Response) following a reactor trip when alarm 1AD-8, B/1 (UST LO LEVEL) is received. The crew has transitioned to AP/1/A/5500/006 (Loss of S/G Feedwater) Case II (Loss of Normal CA Supply). The CRS directs the applicant to perform the actions of AP-06 Case II beginning at step 7. The applicant will attempt to manually close 1CA-4 (CA Pmps Suct From UST) but is unsuccessful and will dispatch an operator to locally close 1CS-19 (CA Pumps Supply From Upper Surge Tank). Applicant will throttle CA flow to < 600 gpm to conserve UST inventory. Applicant will then attempt to break condenser vacuum from the control room, but is unsuccessful and dispatches operators to locally open the vacuum breaker valves. Operators are unable to locally open the vacuum breaker valves to begin the **ALTERNATE PATH**. Applicant will then align RN (Nuclear Service Water) to supply the running CA pumps to complete the JPM.

JPM e – Operate Containment Cooling System Fans – Bank JPM (2016 NRC Exam)

K/A 022 A4.01 Ability to manually operate and/or monitor in the control room: CCS fans. (CFR 41.7 / 45.5 to 45.8) RO 3.6 SRO 3.6

Initial conditions are that a secondary steam leak is occurring. The CRS directs the applicant to perform step 9 of AP/1/A/5500/028 (Secondary Steam Leak). The applicant will determine, based on conditions specified in the procedure, that the leak is occurring inside containment. The applicant will then start one additional Lower Containment Ventilation Unit, three additional Upper Containment Ventilation Units, and place all eight operating ventilation units in “MAX” cooling mode.

JPM f – Reset Radiation Monitor Trip Setpoints – Bank JPM (2015 NRC Exam)

K/A 073 A4.02 Ability to manually operate and/or monitor in the control room: Radiation monitoring system control panel (CFR 41.7 / 45.5 to 45.8) RO 3.7 SRO 3.7

Initial conditions are that Unit 1 is at 100% power. Following a discussion with RP concerning a premature gaseous release termination, the CRS directs the applicant to reset EMF 50L setpoints per OP/0/A/6500/080 (EMF RP86A Output Modules) Enclosure 4.2 (EMF RP86A Trip Setpoint Adjustment). The new setpoints will have a Trip 1 value of 6300 cpm and a Trip 2 value of 9000 cpm. The OAC program EMFLIB is not available. The applicants will input the new values one at a time per procedure and perform a verification of proper setpoints per the procedure. The applicants will then fill out the appropriate setpoint log entries to finish the JPM.

JPM g – Isolate Cold Leg Accumulators Following a Shutdown LOCA – Bank JPM - Alternate Path (2016 NRC Exam)

K/A 006 A1.13 – Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: Accumulator pressure (level, boron concentration) (CFR: 41.5 / 45.5) RO 3.5 SRO 3.7

Initial conditions are Unit 1 is in Mode 4 when pressurizer level and pressure begin to decrease uncontrollably. The CRS enters AP/1/A/5500/027 (Shutdown LOCA) to address the LOCA. The CRS directs the applicant to isolate the Unit 1 Cold Leg Accumulators by performing Enclosure 14 (Isolating Cold Leg Accumulators) of AP/27. The applicant will attempt to close all Cold Leg Accumulator discharge isolation valves, but only 1A and 1D will isolate. The applicant will transition to the RNO to begin the **ALTERNATE PATH**. Applicant will isolate the Nitrogen supply to the 1B and 1C Cold Leg Accumulators and then make the valve alignment to vent these accumulators to containment. This JPM is written to terminate at this time since all critical steps have been completed. Complete depressurization of these accumulators would take ~ 30 minutes.

Plant JPMs

JPM i – Place the 2A Hydrogen Analyzer in Service – Bank JPM (RCA entry required)

K/A 028 A1.01 Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: Hydrogen concentration. (CFR 41.5 / 45.5) RO 3.4 SRO 3.8

Initial conditions are that a Large Break LOCA has occurred on Unit 2 and 2B Hydrogen Analyzer is tagged out for maintenance. The CRS directs the applicant to place the 2A Containment Hydrogen Analyzer in service to position "1" for sampling Upper Containment per OP/2/A/6450/010 (Containment Hydrogen Control Systems) Enclosure 4.9 (Operation of the Containment Hydrogen Analyzers Following a LOCA). Applicant will select the desired sample location, insert key and turn key-switch to open containment isolation valves, verify the analyzer is in standby, and energize the hydrogen analyzer.

JPM j – Align Seal Injection to the Unit 1 NC Pumps – NEW JPM

K/A 076 A2.01 Ability to (a) predict the impacts of the following malfunction or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of SWS (CFR 41.5 / 43.5 /45.3 / 45.13) RO 3.5 SRO 3.7

Initial conditions are that a loss of RN has occurred on Unit 1 and AP/0/A/5500/020 (Loss of Nuclear Service Water) has been entered. Alternate power has been aligned to 1EMXS per AP-20 Enclosure 4 (Align Alternate Power Supply To 1EMXS or 2EMXS). The CRS directs the applicant to place standby makeup pump #1 in service to provide seal injection to the Unit 1 NC pumps per the local copy of AP-20 Enclosure 6 (Align Seal Injection to the Unit 1 NC Pumps). Applicant will verify power to 1EMXS, open 1NV-865A (Stdby M/U Pump Suct Frm Xfer Tube) and 1NV-872A (Stdby M/U Pmp Filt Otlt), close 1NV-89A (NC Pmps Seal Ret Cont Isol), verify 1NV-877 (Stdby M/U To NC Pump Seal Inj) is open, and start Standby Makeup Pump #1 by depressing the "ON" pushbutton.

JPM k – Align Swing Inverter 1EIE to 1ERPA – Bank JPM

K/A 062 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Types of loads that, if de-energized, would degrade or hinder plant operation. (CFR 41.5 / 43.5 / 45.3 / 45.13) RO 3.4 SRO 3.9

Initial conditions are that vital AC Panelboard 1ERPA is being powered from regulated power (1VRD). The CRS directs the applicant to align Swing Inverter 1EIE to supply 1ERPA per OP/1/A/6350/008 (125 VDC/120 VAC Vital Instrument and Control Power System) Enclosure 4.37 (Placing in Service and Removing From Service 1EIE). Applicant will close breakers from 125 VDC distribution center, pre-charge 1EIE, and close 1EIE input breaker. Applicant will then align sync switch on 1EIE and close the 1EIE output breaker. Once applicant verifies 1EIE is in sync with the alternate source, they will align the manual bypass switch to provide power to 1ERPA from 1EIE.

NRC EXAM

Facility: **Catawba Nuclear Station** Date of Examination: **June 2017**

Exam Level: RO ☐ SRO-I ☐ SRO-U ☒ Operating Test Number: **2017301**

Control Room Systems (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. Emergency Borate the Reactor Coolant System 004 A2.14 (3.8/3.9)	A,D,S	1
b. Perform E-0 Actions To Ensure Complete Containment Isolation 013 A4.01 (4.5/4.8)	A,EN,N,S	2
c. Establish NC System Bleed and Feed WE05EA1.1 (4.1/4.0)	A,D,L,S	4P

In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. Place 2A Hydrogen Analyzer In Service 028 A1.01 (3.4/3.8)	D,E,L,R	5
j. Align Seal Injection to the Unit 1 NC Pumps 076 A2.01 (3.5/3.7)	E,N	4S

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

*Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3 **(5/5/3)**
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4 **(9/8/3)**
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1 **(3/3/2)**
(EN)gineered safety feature	- / - / ≥ 1 **(1/1/1)**
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1 **(4/4/2)**
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1 **(2/2/2)**
(P)revious 2 exams	≤ 3 ≤ 3 / ≤ 2 **(3/3/0)**
(R)CA	≥ 1 / ≥ 1 / ≥ 1 **(1/1/1)**
(S)imulator	

Simulator JPMs

JPM a – Emergency Borate the Reactor Coolant System – Bank JPM - Alternate Path

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(CFR: 41.5 / 43/5 / 45/3 / 45/5) RO 3.8 / SRO 3.9

Initial conditions are that a valid reactor trip signal has been received and the reactor will not trip from the control room. A Red Path on the Subcriticality CSF is in effect. The OATC is inserting control rods manually. The CRS directs the applicant to initiate emergency boration, per EP/1/A/5000/FR-S.1 (Nuclear Power Generation/ATWS) step 4. The applicant ensures that an NV pump is in service and then depresses the OPEN pushbutton on 1NV-236B (Boric Acid To NV Pumps Suct). 1NV-236B fails to open beginning the **ALTERNATE PATH**. After ensuring that both boric acid transfer pumps are in service and still no emergency boration flow exists, the applicant will open the NV pump suction isolations from the FWST and isolate the NV pump suction from the VCT, ensure proper system lineup to the NC system, and verify NC system pressure is < 2335 psig.

JPM b – Perform E-0 Actions To Ensure A Complete Containment Isolation – NEW JPM - Alternate Path

K/A 013 A4.01 – Ability to manually operate and/or monitor in the control room: ESFAS-initiated equipment which fails to actuate. (CFR: 41.7 / 45.5 to 45.8) RO 4.5 / SRO 4.8 (Justification for the Safety Function 2 (Inventory Control) designation is that the WL penetration that is left un-isolated during this JPM is from the Containment Sump. As long as this penetration remains un-isolated, a constant discharge of water from the containment sump will be in progress. On a Large Break LOCA this water in the containment sump will eventually be the water used for core cooling following transfer to Cold Leg Recirculation. Removing inventory from the containment sump may lead to the eventual inability to properly cool the core and ultimately lead to core damage).

Initial conditions are that the applicant assumes the OATC role with the BOP out of the control room and the CRS performing an IPTE brief on Unit 2. Once the applicant has the watch, a Large Break LOCA will occur on Unit 1. The OATC will verify that all immediate actions are met. The examiner will provide a cue to applicant that the CRS directs them to continue performance of E-0 beginning at step 6. The applicant will announce that a safety injection has occurred and will verify that all Feedwater Isolation status lights are lit. The applicant will then determine that a Phase A Containment Isolation has not occurred and will manually initiate both trains. This begins the **ALTERNATE PATH**. The applicant will determine from the monitor light panel that Phase A Containment Isolation valves 1WL-825A and 1WL-827B (both on the containment floor and equipment sump discharge penetration) have not closed as expected. The applicant will then manually close these valves to end the JPM.

JPM c – Establish RCS Bleed and Feed following loss of Secondary Heat Sink – Bank JPM – Alternate Path

K/A WE05 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. (CFR: 41.7 / 45.5 / 45.6) RO 4.1 SRO 4.0

Initial conditions are that a Reactor Trip has occurred due to a loss of both main feed pumps. The Auxiliary Feedwater Pumps will not function. EP/1/A/5000/FR-H.1 has been entered and Bleed and Feed initiation criteria has been met. The applicant is directed to initiate Bleed and Feed in accordance with FR-H.1. Applicant will stop all NC pumps and manually initiate both trains of safety injection (Only 'A' train will initiate & NV pump cold leg injection valves fail to open). This begins the **ALTERNATE PATH**. When NV S/I flow cannot be verified, the applicant will start 1B NV pump and 1B NI pump and manually aligns the cold leg injection flowpath from the NV pumps. The applicant will then establish a bleed path from the NC system by opening 2 Pressurizer PORVs to finish the JPM.

Plant JPMs

JPM i – Place the 2A Hydrogen Analyzer in Service – Bank JPM (RCA entry required)

K/A 028 A1.01 Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: Hydrogen concentration.
(CFR 41.5 / 45.5) RO 3.4 SRO 3.8

Initial conditions are that a Large Break LOCA has occurred on Unit 2 and 2B Hydrogen Analyzer is tagged out for maintenance. The CRS directs the applicant to place the 2A Containment Hydrogen Analyzer in service to position "1" for sampling Upper Containment per OP/2/A/6450/010 (Containment Hydrogen Control Systems) Enclosure 4.9 (Operation of the Containment Hydrogen Analyzers Following a LOCA). Applicant will select the desired sample location, insert key and turn key-switch to open containment isolation valves, verify the analyzer is in standby, and energize the hydrogen analyzer.

JPM j – Align Seal Injection to the Unit 1 NC Pumps – NEW JPM

K/A 076 A2.01 Ability to (a) predict the impacts of the following malfunction or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of SWS (CFR 41.5 / 43.5 /45.3 / 45.13) RO 3.5 SRO 3.7

Initial conditions are that a loss of RN has occurred on Unit 1 and AP/0/A/5500/020 (Loss of Nuclear Service Water) has been entered. Alternate power has been aligned to 1EMXS per AP-20 Enclosure 4 (Align Alternate Power Supply To 1EMXS or 2EMXS). The CRS directs the applicant to place standby makeup pump #1 in service to provide seal injection to the Unit 1 NC pumps per the local copy of AP-20 Enclosure 6 (Align Seal Injection to the Unit 1 NC Pumps). Applicant will verify power to 1EMXS, open 1NV-865A (Stdby M/U Pump Suct Frm Xfer Tube) and 1NV-872A (Stdby M/U Pmp Filt Otlt), close 1NV-89A (NC Pmps Seal Ret Cont Isol), verify 1NV-877 (Stdby M/U To NC Pump Seal Inj) is open, and start Standby Makeup Pump #1 by depressing the "ON" pushbutton.

B

ILT-17 NRC Written Exam CNS RO NRC QUESTION 1 1

EPE007 EK1.05 - Reactor Trip

Knowledge of the operational implications of the following concepts as they apply to the reactor trip: (CFR 41.8 / 41.10 / 45.3)

Decay power as a function of time .....

Given the following Unit 1 conditions:

- The Unit entered EP/1/A/5000/ECA-1.1, (Loss of Emergency Coolant Recirculation) following a LOCA outside containment
- Safety Injection Termination criteria is NOT met
  - The crew has been directed to determine minimum SI flow per Enclosure 4 (Minimum S/I Flowrate Versus Time After Trip)

Current conditions:

- Unit 1 Reactor was tripped 60 minutes ago
- NCS pressure is 1000 psig.
- 1B NI pump is running with flow indicated at 380 gpm
- 1A NV pump is running with flow indicated at 400 gpm

The MINIMUM S/I Flowrate required to remove current reactor decay heat is _____(1)_____.

The _____(2)_____ pump is required to be secured.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. 340 gpm
   2. 1A NV

B. 1. 360 gpm
   2. 1A NV

C. 1. 340 gpm
   2. 1B NI

D. 1. 360 gpm
   2. 1B NI

General Discussion

Required SI flow at 50 minutes is 360 gpm (graph starts at 10 minutes) if the graph is interpreted correctly. Securing the 1A NV pump would reduce flow to the 380 gpm being supplied by the 1B NI pump. Securing 1B NI pump would reduce flow to the 400 gpm being supplied by the 1A NV pump. Since the intent of this portion of the procedure is to minimize use of makeup sources, the crew would secure 1A NV pump.

Answer A Discussion

Part 1 is plausible because this would be the determined flow if the applicant overlooks the fact that the graph starts at 10 minutes (i.e. uses the 70 minute vs. 60 minute line due to incorrect interpretation).

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because this would be the determined flow if the applicant overlooks the fact that the graph starts at 10 minutes (i.e. uses the 70 minute vs. 60 minute line due to incorrect interpretation).

Part 2 is plausible because securing 1B NI pump would reduce flow to a value close to the minimum required. Additionally, the applicant may reason that an NV pump must always remain in operation for RCP seal injection flow.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because securing 1B NI pump would reduce flow to a value close to the minimum required. Additionally, the applicant may reason that an NV pump must always remain in operation for RCP seal injection flow.

Basis for meeting the KA

The KA is matched because the applicant must determine injection flow (operational implication) as it relates to decay power as a function of time following a reactor trip. Additionally, the applicant must demonstrate knowledge of the concept of minimizing flow to only that required (in the condition given).

Basis for Hi Cog

Applicant is presented with numerous operating parameters, and must analyze these to determine a required injection flow rate which relates to removal of decay power as a function of time.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	'15 CNS NRC Exam

Development References	Student References Provided
EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirculation), Rev 41, Step 18 and Enclosure 4	EP/1/A/5000/ECA-1.1, Encl. 4

EPE007 EK1.05 - Reactor Trip

Knowledge of the operational implications of the following concepts as they apply to the reactor trip: (CFR 41.8 / 41.10 / 45.3)

Decay power as a function of time .....

Remarks/Status

APE008 AK2.03 - Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)
Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: (CFR 41.7 / 45.7)
Controllers and positioners .....

Given the following Unit 1 timeline of events while at 100% RTP:

- 1000: 1NC-36B (PZR PORV) begins to experience seat leakage
- 1003: PZR Pressure is 2220 psig and decreasing
- 1005: PZR Pressure is 2210 psig and decreasing
- 1006: PZR Pressure is 2206 psig and decreasing
- 1007: 1NC-35B (PZR PORV Isol) is closed
- 1009: PZR Pressure is 2215 psig and increasing

The EARLIEST time that 1C PZR Heaters were receiving 100% output was _____(1)_____ .

At time 1009, PZR Back-up Heaters _____(2)_____ energized.

Which ONE of the following completes the statements above?

A. 1. 1003
   2. were

B. 1. 1003
   2. were NOT

C. 1. 1005
   2. were

D. 1. 1005
   2. were NOT

General Discussion

The C Heaters are controlled by a Silicon Controlled Rectifier (SCR) circuit that allows the heat output of the heaters to vary with the amount of pressure error they receive. They are full off at 15 psi greater than setpoint (2250 psig) and full on at 15 psi less than setpoint (2220 psig). At setpoint the heaters are 50% on or half on.

Backup Heaters are OFF at 17 psig below setpoint (2218 psig) and ON at 25 psig below setpoint (2210 psig).

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because this would be the correct answer if PZR Pressure had not previously decreased below the heater on setpoint (2210 psig).

Answer C Discussion

Part 1 is plausible because there are multiple setpoints for the PZR Pressure Control system. At 2210 psig back-up heaters energize and a low pressure deviation alarm actuates.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because there are multiple setpoints for the PZR Pressure Control system. At 2210 psig back-up heaters energize and a low pressure deviation alarm actuates.

Part 2 is plausible because this would be the correct answer if PZR Pressure had not previously decreased below the heater on setpoint (2210 psig).

Basis for meeting the KA

The applicant is required to demonstrate knowledge of controller output as it relates to fluctuating pressures following a PZR Vapor Space event.

Basis for Hi Cog

The applicant is required to analyze given conditions, recall associated setpoints from memory and apply analysis for both decreasing and increasing pressure situations.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-PS-IPE (Pressurizer Pressure Control LP), Rev. 101, Section 2.2 & 2.5	

APE008 AK2.03 - Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)
Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: (CFR 41.7 / 45.7)
Controllers and positioners .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 3 3

A

EPE009 EK1.02 - Small Break LOCA

Knowledge of the operational implications of the following concepts as they apply to the small break LOCA: (CFR 41.8 / 41.10 / 45.3)

Use of steam tables .....

Given the following Unit 1 conditions:

- The crew has transitioned to EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization) following a small break LOCA
- NV SI flow indicates 350 gpm
- Total CA flow is 300 gpm
- Current NC pressure is 1100 psig
- All NC T-Colds are 488°F

Based on listed conditions:

Steam header pressure is _____(1)_____ .

Steam Generators _____(2)_____ required for heat removal.

Which ONE of the following completes the statements above?

A. 1. 595 psig
   2. are

B. 1. 610 psig
   2. are

C. 1. 595 psig
   2. are NOT

D. 1. 610 psig
   2. are NOT

General Discussion

Steam header pressure is determined by use of steam tables and obtaining the saturation pressure associated with Tcold and then converting psia to psig (488 degrees = 610 psia - ~15 psi = 595 psig).

Although injection flow exceeds auxiliary feedwater flow, RCS pressure exceeds S/G pressure. Therefore, S/Gs are required for heat removal.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is plausible because the saturation pressure for 488°F is ~610 psia. The applicant must convert psia to psig.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because injection flow exceeds aux feedwater flow. The applicant may reason that core cooling is being provided by break flow.

Answer D Discussion

Part 1 is plausible because the saturation pressure for 488°F is ~610 psia. The applicant must convert psia to psig.

Part 2 is plausible because injection flow exceeds aux feedwater flow. The applicant may reason that core cooling is being provided by break flow.

Basis for meeting the KA

The applicant is required to demonstrate proper use of steam tables and demonstrate knowledge of the operational implications of a small break LOCA (S/G heat removal).

Basis for Hi Cog

The applicant is required to analyze supplied information and apply to a chart in order to arrive at the correct answer.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 6899

Development References	Student References Provided
Steam Tables OP-CN-EP-E1 (E1 LP), Rev. 105 Pg. 10	Steam Tables

EPE009 EK1.02 - Small Break LOCA

Knowledge of the operational implications of the following concepts as they apply to the small break LOCA: (CFR 41.8 / 41.10 / 45.3)

Use of steam tables .....

Remarks/Status

EPE011 2.1.25 - Large Break LOCA
EPE011 GENERIC
Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)

Given the following Unit 1 conditions:

- A Large Break LOCA occurred 30 minutes ago
- NC System Tcolds are 249 degrees F and decreasing slowly

The NC Integrity CSF Status Tree color is currently _____(1)_____ .

With the given conditions, OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines) MINIMUM monitoring requirements states that CSF Status Trees shall be monitored _____(2)_____ .

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. RED
   2. continuously

B. 1. RED
   2. every 10 to 15 minutes

C. 1. ORANGE
   2. continuously

D. 1. ORANGE
   2. every 10 to 15 minutes

General Discussion

Per F-0, the requirements for an Orange CSF status tree are:
Cooldown >100 deg in 1 hr
RCS Pressure/Tcold points to the right of Limit A
All RCS Tcolds less than 250 deg

Per OMP 1-7: Status tree monitoring shall be continuous if an orange or red condition exists. Otherwise, monitoring frequency shall be every 10 to 15 minutes.

Answer A Discussion

Part 1 is plausible because this condition would lead the crew to enter FR-P.1 which is the same procedure required for a Red condition. Also plausible if the applicant concludes that Tcolds < 250 degrees results in a Red status tree indication.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because this condition would lead the crew to enter FR-P.1 which is the same procedure required for a Red condition. Also plausible if the applicant concludes that Tcolds < 250 degrees results in a Red status tree indication.

Part 2 is plausible because this would be the correct answer if an orange path condition did not exist.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because this would be the correct answer if an orange path condition did not exist.

Basis for meeting the KA

The applicant must compare provided information with reference material in order to determine plant status following a Large Break LOCA.

Basis for Hi Cog

The question requires a calculation and application of tables.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

EP/1/A/5000/F-0 (Critical Safety Function Status Trees), Rev. 9, Pg. 7 & 8
OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), Rev. 41, Sect. 7.3.F

Student References Provided

Steam Tables
EP/1/A/5000/F-0, Pg. 9

EPE011 2.1.25 - Large Break LOCA
EPE011 GENERIC
Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)

Remarks/Status

APE015/017 2.1.20 - Reactor Coolant Pump (RCP) Malfunctions
APE015/017 GENERIC
Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)

Given the following Unit 2 conditions:

- The Unit is at 100% RTP
- The BOP observes that vibration readings on the 2C NCP are increasing as follows:

Time	2100	2105	2110	2115
Shaft Vibration (mils)	5	15	19	22
Frame Vibration (mils)	2	4	6	8

Per 2AD-6 B/5 (NCP HI-HI VIBRATION), which ONE of the following indicates the EARLIEST time that the 2C NCP must be secured?

A. 2100

B. 2105

C. 2110

D. 2115

General Discussion

NCP must be tripped if vibration exceeds: shaft 20 mils, frame 5 mils.

Answer A Discussion

Plausible if the applicant reverses the required trip setpoints of the SHAFT and FRAME.

Answer B Discussion

Plausible because this indication would result in actuation of the Hi NCP Vibration alarm (Shaft - 15 mils, Frame - 3 mils). However, NCP trip is not required at this setpoint.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

Plausible because this is the earliest time at which Shaft Vibration exceeds NCP trip criteria.

Basis for meeting the KA

The applicant is required to demonstrate the ability to interpret and execute procedure steps (Annunciator Response) related to a malfunctioning Reactor Coolant Pump.

Basis for Hi Cog

Applicant is required to analyze given information and compare to procedure steps recalled from memory.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 5187

Development References	Student References Provided
OP/2/B/6100/010 G, Annunciator Response for Panel 2AD-6, Rev. 44, A/5 & B/5	

APE015/017 2.1.20 - Reactor Coolant Pump (RCP) Malfunctions
APE015/017 GENERIC
Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)

Remarks/Status

APE022 AK3.01 - Loss of Reactor Coolant Makeup

Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: (CFR 41.5, 41.10 / 45.6 / 45.13)

Adjustment of RCP seal backpressure regulator valve to obtain normal flow . . . . . .

Given the following Unit 1 initial conditions:

- The Unit is at 100% RTP
- The crew has entered AP/1/A/5500/012 (Loss of Charging or Letdown), Case I (Loss of Charging) following a trip of 1A NV Pump

Subsequently:

- The crew is in the process of re-establishing charging
  - 1B NV Pump has been started
  - 1NV-294 (NV Pmps A&B Disch Flow Ctrl) has been throttled to proper flow

In accordance with AP/12, the BOP will next throttle 1NV-309 (Seal Water Injection Flow) in the _____(1)_____ direction to establish a MINIMUM of _____(2)_____ "Total Seal Water Flow".

Which ONE of the following completes the statement above?

A. 1. OPEN
   2. 32 gpm

B. 1. CLOSED
   2. 32 gpm

C. 1. OPEN
   2. 40 gpm

D. 1. CLOSED
   2. 40 gpm

General Discussion

Following a loss of a charging pump, AP/12 will direct the crew to fully open NV-309 (Seal Inj Flow) and close NV-294 (Charging Flow Ctrl) prior to starting the alternate Charging Pump. Following charging pump start, NV-294 will be throttled for >32 gpm charging flow and then NV-309 will be throttled closed to establish 32 gpm seal injection flow.

Answer A Discussion

Part 1 is plausible because NV-309 would be closed if left in auto following the trip of the charging pump in a attempt to obtain required seal injection flow. However, the applicant must realize that the procedure directs this valve to be placed in manual and open in order to first establish charging flow prior to seal injection flow.

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because NV-309 would be closed if left in auto following the trip of the charging pump in a attempt to obtain required seal injection flow. However, the applicant must realize that the procedure directs this valve to be placed in manual and open in order to first establish charging flow prior to seal injection flow.

Part 2 is plausible because 40 gpm is the TS value for maximum seal water injection flow with the charging flow control valve fully open.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because 40 gpm is the TS value for maximum seal water injection flow with the charging flow control valve fully open.

Basis for meeting the KA

Given a loss of Reactor Coolant Makeup, the applicant is required to demonstrate knowledge of the reasons (establishment of required minimum flow) as applied to adjustment of the RCP seal backpressure regulator valve to obtain normal flow (required adjustment to obtain required flow).

Basis for Hi Cog

The applicant must recall information related to the operation of the RCP Seal Injection Control valve (backpressure regulator) and compare this knowledge with given information to determine the direction of travel required to establish seal flow.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-CN-PS-NV (Chemical and Volume Control System LP), Rev. 204, Sect. 1.3.2
AP/1/A/5500/012, Rev. 34, Case I, Step 8RNOb.
T.S. 3.5.5

Student References Provided

APE022 AK3.01 - Loss of Reactor Coolant Makeup
Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: (CFR 41.5, 41.10 / 45.6 / 45.13)
Adjustment of RCP seal backpressure regulator valve to obtain normal flow . . . . . .

Remarks/Status

C

ILT-17 NRC Written Exam CNS RO NRC QUESTION 7 7

APE025 AK2.02 - Loss of Residual Heat Removal System (RHRS)
Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: (CFR 41.7 / 45.7)
LPI or Decay Heat Removal/RHR pumps .....

Given the following Unit 2 initial conditions:

- The Unit is in MODE 5 and drained to MidLoop
- ND Train 2A is in service
- ND system flow rate is 3200 gpm
- NC system level is 6.5% and stable

Subsequently:

- 2A ND pump amps and discharge pressure begin to oscillate
- The crew has entered AP/2/A/5500/019 (Loss of Residual Heat Removal System), Case IV (Loss of ND in Midloop)

The 2A ND pump is _____(1)_____ .

Per AP/19, the BOP will _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. cavitating
   2. secure 2A ND pump

B. 1. operating at runout condition
   2. secure 2A ND pump

C. 1. cavitating
   2. reduce ND flow to less than 1000 gpm

D. 1. operating at runout condition
   2. reduce ND flow to less than 1000 gpm

General Discussion

If the ND pumps were experiencing runout, the pump amperage indication would be high but would not be oscillating and the pump discharge pressure would be low and would not be oscillating.

If an ND pump is on and level is greater than 5.5%, Case IV of AP-19 will direct a flow reduction to less than 1000 gpm in order to stop pump cavitation.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because this is the first step in the other three cases of AP/19. However, not correct for the listed conditions.

Answer B Discussion

Part 1 is plausible if the applicant reasons that the flow rate is high for current plant conditions. If so, it is reasonable to believe that the pumps are in a runout condition.

Part 2 is plausible because this is the first step in the other three cases of AP/19. However, not correct for the listed conditions.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is plausible if the applicant reasons that the flow rate is high for current plant conditions. If so, it is reasonable to believe that the pumps are in a runout condition.

Part 2 is correct.

Basis for meeting the KA

When given a loss of RHR condition (cavitation of 2A ND pump), applicant must apply knowledge of the interrelation of the cavitating RHR pump and the loss of RHR procedure to determine the correct course of action.

Basis for Hi Cog

The applicant must compare provided information with that recalled from memory in order to determine the status of RHR pumps and correct procedure requirement.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 6547

Development References	Student References Provided
AP/2/A/5500/019, (Loss of Residual Heat Removal), Rev. 60, Case IV, Step 3	

APE025 AK2.02 - Loss of Residual Heat Removal System (RHRS)

Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: (CFR 41.7 / 45.7)

LPI or Decay Heat Removal/RHR pumps .....

Remarks/Status

APE026 AA1.06 - Loss of Component Cooling Water (CCW)

Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: (CFR 41.7 / 45.5 / 45.6)

Control of flow rates to components cooled by the CCWS .....

Given the following Unit 1 timeline:

1000

- The Unit is at 100% RTP
- 1A2 KC Pump is in service
- 1A KC flow is 5000 gpm and stable

1005

- 1KC-9 (1A2 KC Pump Disch) is inadvertently closed

1007

- 1KC-9 is reopened
- No additional KC pumps have been started

Following closure of 1KC-9, 1KC-C37A (Train A Miniflow Isol) opened as flow decreased to a MINIMUM value of _____(1)_____ .

Assuming no operator action, once 1KC-9 is reopened 1AD-9 F/5 "KC Train A Single Pump Runout" _____(2)_____ alarm.

Which ONE of the following completes the statement above?

A. 1. 1100 gpm
   2. will

B. 1. 3150 gpm
   2. will

C. 1. 1100 gpm
   2. will NOT

D. 1. 3150 gpm
   2. will NOT

General Discussion

Per the KC Lesson Plan:

The Minimum Flow Valves open at 3150 gpm decreasing and close at 5800 gpm increasing. It is possible for a minimum flow valve to be open when flow is less than 5800 gpm while the single pump runout annunciator is lit (greater than 5700 gpm).

Answer A Discussion

Part 1 is plausible because this is the required minimum flow for the KC pump.

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because this is the required minimum flow for the KC pump.

Part 2 is plausible because it is reasonable to believe that operation of the mini-flow valve would not cause a pump runout condition.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because it is reasonable to believe that operation of the mini-flow valve would not cause a pump runout condition.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/16/17

Loss of Component Cooling Water - Only operating CCW pump discharge valve is closed.

Ability to monitor control of flow rates to components cooled by CCWS as applied to the listed loss of CCW - Upon loss of CCW, the applicant must demonstrate knowledge of how the miniflow valve will operate in an attempt to control system flowrate. Upon restoration of flow, the applicant must demonstrate the ability to monitor/control system flow rate in order to prevent a pump runout condition.

Basis for Hi Cog

This question requires a calculation (existing flowrate plus miniflow) along with comparison of information recalled from memory (single pump runout alarm setpoint).

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP/1/A/6100/010J (Annunciator Response for Panel 1AD-9), Rev. 68, F/5 OP-CN-PSS-KC (Component Cooling System LP), Rev. 101, Section 2.2	

APE026 AA1.06 - Loss of Component Cooling Water (CCW)

Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: (CFR 41.7 / 45.5 / 45.6)

Control of flow rates to components cooled by the CCWS .....

Remarks/Status

PRE-REVIEW QUESTION - SAT 03/16/17

ILT-17 NRC Written Exam CNS RO NRC QUESTION 9 9

A

EPE029 EA1.09 - Anticipated Transient Without Scram (ATWS)
Ability to operate and monitor the following as they apply to a ATWS: (CFR 41.7 / 45.5 / 45.6)
Manual rod control .....

Given the following Unit 1 initial conditions:

- The Unit was at 72% RTP and increasing following a refueling outage

Subsequently:

- The main turbine has tripped due to a low condenser vacuum
- DRPI indicates Control Bank "D" at 178 steps and inserting

One of the required Immediate Action Steps is to _____(1)_____ .

Following completion of this step, control rod speed will indicate _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. Insert Control Rods in MANUAL
   2. 48 steps per minute

B. 1. Insert Control Rods in MANUAL
   2. 72 steps per minute

C. 1. Verify Control Rods IN "AUTO" AND STEPPING IN
   2. 48 steps per minute

D. 1. Verify Control Rods IN "AUTO" AND STEPPING IN
   2. 72 steps per minute

General Discussion

Since reactor power is greater than 69%, a turbine trip should have resulted in a reactor trip. EP/1/A/5000/FR-S.1 directs the operator to insert rods (manually), in Step 1, (Immediate Action). Manual rod speed is 48 steps per minute.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because this is the maximum rod insertion speed.

Answer C Discussion

Part 1 is plausible if the applicant does not recognize an ATWS has occurred. This is an immediate action of AP/1/A/5500/02 (Turbine Trip) and would be correct if power was below 69% when the turbine tripped.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible if the applicant does not recognize an ATWS has occurred. This is an immediate action of AP/1/A/5500/02 (Turbine Trip) and would be correct if power was below 69% when the turbine tripped.

Part 2 is plausible because this is the maximum rod insertion speed.

Basis for meeting the KA

The applicant is required to recognize that the listed conditions represent an ATWS and then apply the proper procedural response. Additionally, the applicant must recall the correct rod speed for manual insertion (48 steps/min vs. 72 steps/min).

Basis for Hi Cog

The applicant is required to analyze given information, recall a setpoint, and apply procedural knowledge as well as recall proper control rod insertion speed, based on application of system response (rod speed in auto vs. in manual).

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 6904

Development References

AP/1/A/5500/002, Rev. 032, step 3
EP/1/A/5000/FR-S.1 (Response to Nuclear Power Generation/ATWS), Rev. 022, Step 1
OP-CN-IC-IRE (Rod Control System Lesson Plan), Rev. 103, Section 15

Student References Provided

EPE029 EA1.09 - Anticipated Transient Without Scram (ATWS)
Ability to operate and monitor the following as they apply to a ATWS: (CFR 41.7 / 45.5 / 45.6)
Manual rod control .....

Remarks/Status

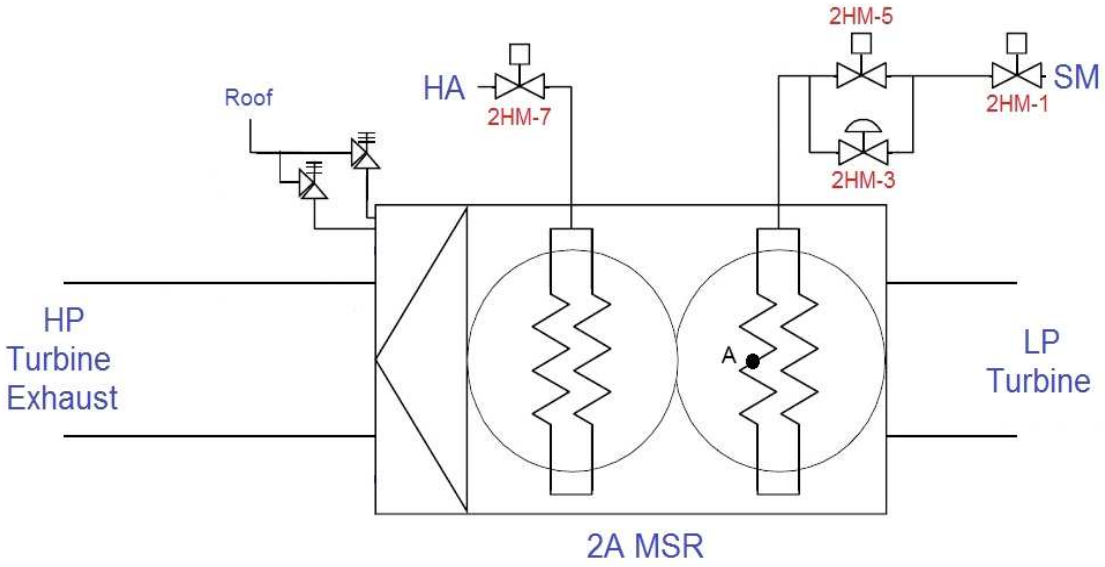
APE040 AA2.01 - Steam Line Rupture

Ability to determine and interpret the following as they apply to the Steam Line Rupture: (CFR: 43.5 / 45.13)

Occurrence and location of a steam line rupture from pressure and flow indications .....

Given the following Unit 2 conditions:

- The Unit is at 45% RTP
- The crew has entered AP/2/A/5500/028 (Secondary Steam Leak)



A steam leak at location A, will cause Main Turbine Megawatts to _____(1)_____ .

In order to isolate the leak, AP/28 will direct the crew to _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. increase
   2. trip the Main Turbine

B. 1. increase
   2. trip the Reactor and close MSIVs

C. 1. decrease
   2. trip the Main Turbine

D. 1. decrease
   2. trip the Reactor and close MSIVs

General Discussion

A steam leak inside the moisture separator reheater (MSR) shell from 2nd stage reheat steam will cause a pressure and temperature increase to the low pressure (LP) turbine. This will cause turbine megawatts to increase.
AP-28 Step 15 e. attempts to isolate the steam leak based on location relative to the main turbine. If it is isolable by tripping the main turbine and power is less than 69% the crew will trip the turbine and transition to AP-2. Even though the leak is in the MSR, which is located in the turbine train between the HP and LP turbines, the source of the leak is from Main Steam and is not isolable by tripping the main turbine.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because the physical location of the leak is downstream of the main turbine stop valves, and RX power is less than 69%.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because a steam leak external to the MSR shell, or from the MSR shell itself would result in this response.

Part 2 is plausible because the physical location of the leak is downstream of the main turbine stop valves, and RX power is less than 69%.

Answer D Discussion

Part 1 is plausible because a steam leak external to the MSR shell, or from the MSR shell itself would result in this response.

Part 2 is correct.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/16/17

Steam Line Rupture - Steam leak inside MSR shell.
Ability to determine and interpret occurrence and location of steam line rupture from pressure and flow indications as applied to Steam Line Rupture - With given information, the applicant must demonstrate the ability to determine how this occurrence affects turbine megawatt indication due to increase of pressure and temperature to the LP turbine. The applicant must also demonstrate the ability to locate the source of the leak and how to mitigate the leak with approved procedures.

Basis for Hi Cog

The applicant must compare provided information with knowledge recalled from memory (main turbine train layout) in order to determine the location of the steam leak and its effects of turbine operation. This requires more than one mental step.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-MT-MSR (Main Steam LP), Rev. 102, Figure 10.1,10.3 AP/2/A/5500/028, Rev. 09, Step 15 e	

APE040 AA2.01 - Steam Line Rupture
Ability to determine and interpret the following as they apply to the Steam Line Rupture: (CFR: 43.5 / 45.13)
Occurrence and location of a steam line rupture from pressure and flow indications .....

Remarks/Status

PRE-REVIEW QUESTION - SAT 03/16/17

APE054 AK1.02 - Loss of Main Feedwater (MFW)

Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): (CFR 41.8 / 41.10 / 45.3)

Effects of feedwater introduction on dry S/G .....

Given the following Unit 1 initial conditions:

- A feedwater line break on the 1A S/G inside containment and a total loss of feedwater occurred
- EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) was entered and bleed and feed of the NC system was initiated
- All CA Flow Control Valves have been closed

Subsequently:

- The Turbine Driven CA pump is returned to service and a source of feedwater is available
- CETs are stable
- All S/G WR levels are indicating 8%

In accordance with FR-H.1, Enclosure 6 (S/G CA Flow Restoration), CA flow is required to be restored to _____(1)_____ at a rate not to exceed 100 gpm.

The restoration of flow criteria is designed to minimize _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. ALL intact S/Gs
   2. thermal stress to S/G components

B. 1. only ONE intact S/G
   2. thermal stress to S/G components

C. 1. ALL intact S/Gs
   2. additional NC cooldown

D. 1. only ONE intact S/G
   2. additional NC cooldown

General Discussion

A "dry" S/G is defined as a S/G with less than 12% W/R level. FR-H.1 directs that flow be established to one intact S/G at less than or equal to 100 gpm. There is a note prior to this step concerning the risk of thermal shock to the S/G. Following flow initiation, and once S/G level has exceeded 12%, this procedure provides guidance to increase feed flow to desired rate. A "Caution" prior to this step states that the rate should be controlled to prevent excessive NC system cooldown.

Answer A Discussion

Part 1 is plausible because this would be required action if CETs continued to increase, or if all S/G W/R levels were >12%.

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because this would be required action if CETs continued to increase, or if all S/G W/R levels were >12%.

Part 2 is plausible because this is a concern when initiating "desired" feed flow to a S/G >12% W/R level per Caution preceding step 5.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because this is a concern when initiating "desired" feed flow to a S/G >12% W/R level per Caution preceding step 5.

Basis for meeting the KA

When provided with events related to a loss of feedwater, the applicant must demonstrate knowledge related to how many S/G□s will initially be fed (operational implication) and what concern is being addressed by this strategy (effects of feedwater introduction on dry S/G).

Basis for Hi Cog

The applicant must compare provided information with that recalled from memory in order to determine proper procedure flowpath. This requires more than one mental step.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 6906

Development References	Student References Provided
EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink), Rev. 42, Encl. 6, (S/G CA Flow Restoration), Steps 1 and 3, and Notes prior to Step 1 & 5	

APE054 AK1.02 - Loss of Main Feedwater (MFW)

Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): (CFR 41.8 / 41.10 / 45.3)

Effects of feedwater introduction on dry S/G .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 12 12 **A**

APE056 2.2.44 - Loss of Offsite Power
APE056 GENERIC
Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)

Given the following Unit 2 conditions:

- A Loss of All Offsite Power has occurred
- Both Unit 2 D/Gs started and loaded their associated bus
- While monitoring D/G operating parameters, the Unit 2 BOP notes that D/G 2B "VOLTS" indicates 3925 V
- Voltage is adjusted to within the normal operating range

As a result of the 2B D/G voltage adjustment:

2B D/G "AMPS" _____(1)_____ .

2B D/G "P/F" _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. decreased
   2. remained the same

B. 1. decreased
   2. became more lagging

C. 1. increased
   2. remained the same

D. 1. increased
   2. became more lagging

General Discussion

The applicants must understand that the D/G is not paralleled with the grid and that voltage must be increased by depressing the Raise pushbutton. When voltage is increased, D/G / ETA amps will decrease. This has no effect on Power Factor.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because if the D/G was operating parallel to the grid this would be correct.

Answer C Discussion

Part 1 is plausible since voltage needs to be increased and applicant may conclude that amps will increase if voltage and current relationship is misunderstood.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible since voltage needs to be increased and applicant may conclude that amps will increase if voltage and current relationship is misunderstood.

Part 2 is plausible because if the D/G was operating parallel to the grid this would be correct.

Basis for meeting the KA

The applicant is required to interpret control room indications in order to verify the status of the system (interpret D/G voltage to determine if it must be increased or decreased) and then determine how the action required to correct this interpretation will affect a major plant component (D/G) following a loss of offsite power.

Basis for Hi Cog

The applicant must recall a setpoint from memory (normal Essential bus voltage), compare to the value provided, determine required voltage adjustment, and then determine the effects of that adjustment.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 1747

Development References	Student References Provided
OP-CN-DG-DG3 (D/G LP), Rev. 103, Section 6.3	

APE056 2.2.44 - Loss of Offsite Power

APE056 GENERIC

Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 13 13

A

APE062 AA2.01 - Loss of Nuclear Service Water

Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13)

Location of a leak in the SWS .....

Given the following initial conditions:

- 1B RN Pump in service
- 1B1 KC Pump in service
- 2A1 KC Pump in service

Subsequently:

- Both units enter AP/0/A/5500/030 (Plant Flooding), Enclosure 8 (Flooding From RN) following discovery of a large RN leak on the 1A Essential Header
- Per AP/30 guidance, the crew has isolated the 1A RN Essential Header (ONLY)

Based on current conditions:

Cooling water supply _____(1)_____ available to 1A D/G.

Mini-Flow protection _____(2)_____ available for the 1B RN Pump.

Which ONE of the following completes the statements above?

A. 1. is
   2. is

B. 1. is
   2. is NOT

C. 1. is NOT
   2. is

D. 1. is NOT
   2. is NOT

General Discussion

Following discovery of flooding, the crew will enter AP/30, Case II (Auxiliary/Diesel Building Flooding) which will direct performance of Enclosure 8 (RN Flooding). Step 4 of Enclosure 8 will direct the crew to perform step 13, based on leak location. This step will isolate the 1A Essential Header. Following this isolation, the 1A D/G cooling water supply will be available due to the system layout (see RN diagram).

RN Mini-flow protection is determined by operation of the CCW system (KC). KC trains in service require the associated HX to be aligned in temperature control mode. The alternate HX will be aligned for mini-flow protection. With the provided conditions, 1A and 2B KC HX are aligned for miniflow protections, since the alternate train KC pumps are in service. Following the isolation of 1A KC HX (within the essential header boundary), and with trains remaining cross connected, the 2B KC HX remains available as mini-flow protection for both units.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because the 1A KC Heat Exchanger was aligned for mini-flow protection. This flowpath is now isolated. The applicant may not realize that miniflow protection remains available through the 2B KC Heat Exchanger.

Answer C Discussion

Part 1 is plausible because the 1A D/G is an essential SWS load. However, this cooling water flow path is not part of the associated essential header.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because the 1A D/G is an essential SWS load. However, this cooling water flow path is not part of the associated essential header.

Part 2 is plausible because the 1A KC Heat Exchanger was aligned for mini-flow protection. This flow path is now isolated. The applicant may not realize that miniflow protection remains available through the 2B KC Heat Exchanger.

Basis for meeting the KA

CE NOTE: This question was discussed on 02/16/17. CE agreed to K/A match in principle.

With a given leak location, the applicant is required to interpret the significance of the leak location (interpret availability of D/G cooling) and the significance of actions taken to address the leak (interpret availability of miniflow protection following mitigating actions)

NOTE: Although the Loss of NSW AOP is not referenced in this question, the listed conditions would meet entry criteria. If entered, the Loss of NSW AOP would direct the crew to the Plant Flooding AOP for mitigation of the given event.

Basis for Hi Cog

The applicant is required to analyze initial conditions to determine mini-flow protection, and then determine the affect of mitigative actions in order to determine the correct availability and flow path.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-PSS-RN (Nuclear Service Water LP), Rev. 105, Section 19.2 AP/0/5500/030, Rev. 21, Case II, Step 6, and Encl. 8, Steps 4 & 13	

APE062 AA2.01 - Loss of Nuclear Service Water

Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13)

Location of a leak in the SWS .....

Remarks/Status
02/16/17 - Discussed K/A match with CE. Agreed to accept match based on interpretation of leak significance and significance of required actions.

C

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APE065 AK3.04 - Loss of Instrument Air

Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: (CFR 41.5,41.10 / 45.6 / 45.13)

Cross-over to backup air supplies .....

For a Loss of Instrument Air event, which ONE of the following completes the statements below?

The reason for the CA accumulators is to provide a backup supply of operating air to the CA flow control valve actuators for a MINIMUM of _____(1)_____ .

The purpose for this feature is to protect from _____(2)_____ with a Loss of VI.

A. 1. 30 minutes
   2. S/G overfill during a S/G Tube Rupture

B. 1. 30 minutes
   2. runout of the CA pumps during a Main Feedwater Line Rupture

C. 1. 60 minutes
   2. S/G overfill during a S/G Tube Rupture

D. 1. 60 minutes
   2. runout of the CA pumps during a Main Feedwater Line Rupture

---

General Discussion

Per the Aux Feedwater LP Section 7.3 (Loss of VI):

The discharge flow control valves are pneumatically operated valves provided with air accumulators for each valve to allow the valves to be remotely operated on a loss of VI. The accumulators are sized so the flow control valves can be operated for one hour to allow Operators enough time to manually secure flow to a S/G following a S/G Tube Rupture (SGTR) Design Basis Event in order to prevent overfill of the S/G.

Answer A Discussion

Part 1 is plausible because 30 minutes is a time period given in the Design Basis for Aux. Feedwater System, as follows: "No operator action is required to assure the nuclear safety related function of providing system minimum required flow for up to 30 minutes following initiation of the system."

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because 30 minutes is a time period given in the Design Basis for Aux. Feedwater System, as follows: "No operator action is required to assure the nuclear safety related function of providing system minimum required flow for up to 30 minutes following initiation of the system."

Part 2 is plausible because runout protection is a concern that is addressed in design of the Aux. Feedwater System, and is discussed in the training material, as detailed in the DBD for Aux. Feed.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because runout protection is a concern that is addressed in design of the Aux. Feedwater System, and is discussed in the training material, as detailed in the DBD for Aux. Feed.

Basis for meeting the KA

The primary emphasis of this KA is NOT to test what ARE the backup air supplies, but WHY there is a backup air supply. An accumulator is a form of backup air supply; the "crossover" aspect is met in the fact that the accumulator automatically begins to provide its backup function when normal air supply pressure drops below a certain value.

The KA is matched because the applicant is presented with a loss of VI (Instrument Air), and then tested on why it is needed (to provide a minimum amount of time of backup air), and then why THAT function is needed (to prevent S/G overfill).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 6997

Development References	Student References Provided
OP-CN-CF-CA (Auxiliary Feedwater System), Rev. 110, Section 7.3	

APE065 AK3.04 - Loss of Instrument Air

Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: (CFR 41.5,41.10 / 45.6 / 45.13)

Cross-over to backup air supplies .....

Remarks/Status

APE077 AA1.05 - Generator Voltage and Electric Grid Disturbances

Ability to operate and/or monitor the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 41.10 / 45.5, 45.7, and 45.8)

Engineered safety features ....

Given the following conditions:

- AP/1/A/5500/037 (Generator Voltage and Electric Grid Disturbances), Case I (Abnormal Generator or Grid Voltage) has been entered following a Grid Disturbance
- The TCC has reported that "Real Time Contingency Analysis" (RTCA) indicates CNS switchyard voltage would NOT be adequate if the unit should trip
- SPOC is making preparation for installation of Jumpers per AM/1/A/5100/008 (4KV Essential Power System Degraded Voltage Logic)

Unit 1 ECCS is currently _____(1)_____ .

Once jumpers are installed, LOCA sequencer actuation will cause a Blackout _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. operable
   2. immediately

B. 1. operable
   2. after 5 seconds

C. 1. inoperable
   2. immediately

D. 1. inoperable
   2 after 5 seconds

General Discussion

Per a Note contained in AP/37:
When TCC "RTCA" indicates switchyard voltage would NOT be adequate if the unit trips, the following conditions exist:
Both trains of offsite (normal) power are inoperable.
Both ECCS trains are in an unanalyzed condition and inoperable.
Shared systems (RN, VC, YC, VA) that require an operable normal power source, are inoperable.

Per the AP/37 LP:
The jumpers will bypass the degraded voltage relay logic such that a Blackout will be immediately initiated if a LOCA occurs (bypassing the 5 second delay). Installing the jumpers is intended to prevent an unanalyzed condition called Double Sequencing.

Answer A Discussion

Part 1 is plausible because:
Offsite and onsite emergency power remains for ECCS components (TS requirement)
This situation is not addressed in the ECCS TS
ECCS will be operable once jumper is placed.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because:
Offsite and onsite emergency power remains for ECCS components (TS requirement)
This situation is not addressed in the ECCS TS
ECCS will be operable once jumper is placed.

Part 2 is plausible because this is normal delay associated with degraded voltage sequencer logic.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because this is normal delay associated with degraded voltage sequencer logic.

Basis for meeting the KA

The applicant is required to monitor Engineered Safety features, through application of TS and knowledge of specific sequencer functions, following a Generator Voltage Disturbance.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

AP/1/A/5500/037, Rev. 03, Case I, Note prior to Step 8 and Step 15 RNO a & Case III, Step 7
OP-CN-AP-37 (AP/37 LP), Rev. 2, Sect. 1.4.4

Student References Provided

APE077 AA1.05 - Generator Voltage and Electric Grid Disturbances
Ability to operate and/or monitor the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 41.10 / 45.5, 45.7, and 45.8)
Engineered safety features .....

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Remarks/Status

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B

WE04 EA2.2 - LOCA Outside Containment

Ability to determine and interpret the following as they apply to the (LOCA Outside Containment)
(CFR: 43.5 / 45.13)

Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

A loss of coolant accident outside containment has occurred on the residual heat removal system injection header.

The crew is performing Step 3 of EP/1/A/5000/ECA-1.2, LOCA Outside Containment, which states:

"*Verify leak path is isolated as follows*:"

Which one of the following indications is used by this procedure to identify that the leak has been successfully isolated?

A. ND Pump discharge pressure increasing

B. Reactor coolant pressure increasing

C. ND/NS room sump levels decreasing

D. Pressurizer level increasing

General Discussion

Per step 3 of ECA-1.2 the leak is isolated when RCS pressure is increasing. This is the only indication used to verify leak isolation. There is a discussion in the basis document concerning an increase in RCS pressure prior to leak isolation.

Answer A Discussion

Plausible: ND discharge pressure would increase but that is not the indication used by ECA-1.2 .

Answer B Discussion

CORRECT: See above explanation.

Answer C Discussion

Plausible: This might be true if the leak is contained and the sumps are pumped down but is not the indication used by ECA-1.2

Answer D Discussion

Plausible: Pressurizer level increasing is a later issue for SI termination. It is reasonable to assume that level would be increasing but is not the indication used by ECA-1.2.

Basis for meeting the KA

The applicant is required to demonstrate the ability to adhere to the applicable procedure by interpretation of given conditions in order to determine the status of a LOCA Outside Containment.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 1616

Development References	Student References Provided
OP-CN-EP-E1 (E1 LP), Rev. 105, Sect. 9.1 EP/1/A/5000/ECA-1.2, Rev. 3, Step 3	

WE04 EA2.2 - LOCA Outside Containment

Ability to determine and interpret the following as they apply to the (LOCA Outside Containment)
(CFR: 43.5 / 45.13)

Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Remarks/Status

WE05 EK2.1 - Loss of Secondary Heat Sink

Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following:
(CFR: 41.7 / 45.7)

Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Given the following Unit 1 conditions:

- The Unit has entered EP/1/A/5000/FR-H.1 (Response To Loss of Secondary Heat Sink)
- The Instrument Air (VI) system is unavailable
- Bleed and Feed criteria has been met

In order to establish Bleed and Feed, FR-H.1 will FIRST direct the crew to open PZR PORVS 1NC-34A (PZR PORV) and _____(1)_____ .

Motive force for PZR PORV operation will be provided by _____(2)_____ alignment of Cold Leg Accumulator Nitrogen Supply Valves.

Which ONE of the following completes the statements above?

A. 1. 1NC-32B (PZR PORV)
   2. manual

B. 1. 1NC-32B (PZR PORV)
   2. automatic

C. 1. 1NC-36B (PZR PORV)
   2. manual

D. 1. 1NC-36B (PZR PORV)
   2. automatic

General Discussion

Although three PZR PORVs are available, FR-H.1 will direct that only 2 are opened for Bleed and Feed. The third PORV (NC-36B) can be used as a backup bleed path if one of the preferred PORVs fail to operate. However, since this PORV does not receive a backup Nitrogen supply, it would not operate in this instance and is considered unavailable.

Nitrogen backup supplies for PZR PORV operation does have an automatic open function for LTOP operations. However, with the given conditions, manual operation will be required.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because these valves do provide an automatic alignment function in LTOP mode.

Answer C Discussion

Part 1 is plausible because this PZR PORV does provide an available bleed path. However, this valve is not the first priority specified in the procedure and, since it does not receive nitrogen backup, is not available per the given conditions.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because this PZR PORV does provide an available bleed path. However, this valve is not the first priority specified in the procedure and, since it does not receive nitrogen backup, is not available per the given conditions.

Part 2 is plausible because these valves do provide an automatic alignment function in LTOP mode.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the interrelation between a Loss of Heat Sink condition and the function / control of components (PZR PORV) used for mitigation. Knowledge of Automatic / Manual features of these components is also required.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
EP/1/A/5000/FR-H.1, Rev. 42, Step 23 & 24 OP-CN-PS-IPE (Pressurizer Pressure Control LP), Rev. 101, Section 4.2	

WE05 EK2.1 - Loss of Secondary Heat Sink

Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following:
(CFR: 41.7 / 45.7)

Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Remarks/Status

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D

WE11 EK3.4 - Loss of Emergency Coolant Recirculation

Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation)
(CFR: 41.5 / 41.10, 45.6, 45.13)

RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.

Which ONE of the following is a complete list of the reasons for performing a cooldown/depressurization in accordance with EP/1/A/5000/ECA-1.1, (Loss of Emergency Coolant Recirculation)?

List of Reasons

1. To inject Cold Leg Accumulators
2. Minimize reactor coolant break flow
3. To establish conditions for ND system operation
4. Minimize NC dilution potential in case of a subsequent tube rupture

A. 1 and 4 ONLY

B. 2 and 3 ONLY

C. 1, 2, and 4 ONLY

D. 1, 2, and 3 ONLY

General Discussion

Per ECA-1.1 Major Action Summary, the reasons for the cooldown/depressurization during the performance of ECA-1.1, (Loss of Emergency Coolant Recirculation) are to enable cold leg accumulators injection, minimize break flow, and to establish RHR conditions.

Answer A Discussion

Plausible, since one of the choices is correct (#1). Reason #4 (NC dilution) is plausible, because reducing SG pressure would reduce the potential for dilution, but it is misapplied here, and is not part of the basis, or reason, for the required RO actions.

Answer B Discussion

Plausible, since Reasons 2 and 3 are correct. However, the applicant has failed to also recognize that Reason #1 is also correct. By excluding this selection, the applicant has failed to recognize an important aspect of mitigation of this event (and the reason for their actions).

Answer C Discussion

Plausible, since Reasons 1 and 2 are correct. However, Reason 4 is NOT part of the basis for SG depressurization during the performance of ECA-1.1.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The K/A asks for the reasons for RO function (action) during a Loss of Emergency Coolant Recirculation, NOT necessarily what actions are performed. This question establishes a context of ECA-1.1 performance, including an important function performed by the RO during the Loss of Emergency Coolant Recirculation, and tests knowledge of the reasons (basis) for performing these actions, with an inherent knowledge component of why they are important (minimizing break flow, assuring injection, etc.). This also addresses the K/A component of (limitations are not violated).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	'15 CNS NRC Q18

Development References	Student References Provided
OP-CN-EP-E1 (E-1 Series Lesson Plan), Rev. 105, Section 8.1	

WE11 EK3.4 - Loss of Emergency Coolant Recirculation

Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation)
(CFR: 41.5 / 41.10, 45.6, 45.13)

RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.

Remarks/Status

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B

APE036 AA1.02 - Fuel Handling Incidents

Ability to operate and / or monitor the following as they apply to the Fuel Handling Incidents: (CFR 41.7 / 45.5 / 45.6)

ARM system .....

Given the following Unit 1 conditions:

- The refueling crew is lowering an irradiated fuel assembly next to a new fuel assembly in the core
- The assembly inadvertently drops completely into the core
- 1RAD-3 D/2 (1EMF-17 REACTOR BLDG REFUEL BRIDGE) alarms
- No other annunciators have been received
- The crew has entered AP/1/A/5500/025 (Damaged Spent Fuel)

As a result of this event:

The Containment Evacuation Alarm _____(1)_____ automatically initiate.

VP (Containment Purge) will be _____(2)_____ secured.

Which ONE of the following completes the statements above?

A. 1. will
   2. automatically

B. 1. will
   2. manually

C. 1. will NOT
   2. automatically

D. 1. will NOT
   2. manually

General Discussion

In accordance with Annunciator Response Procedure OP/1/B/6100/010Z, 1RAD-3, D/2, 1EMF17 REACTOR BLDG REFUEL BRIDGE, when radiation monitor 1EMF- 17 alarms, it sends a signal to automatically actuate the Containment Evacuation alarm, as long as power level is below permissive P-6 (10E-5%). Since EMF-39 has not entered Trip 2, the VP system will not be automatically shutdown. AP/25 will direct the crew to manually secure the system.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because the VP system will automatically secure upon EMF-39 (Containment Hi Rad) actuation. This EMF has not reached the Trip 2 condition.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because AP/25 directs operators to ensure the containment evacuation alarm is initiated. However, this should occur automatically in response to the EMF-17 actuation.

Part 2 is plausible because the VP system will automatically secure upon EMF-39 (Containment Hi Rad) actuation. This EMF has not reached the Trip 2 condition.

Answer D Discussion

Part 1 is plausible because AP/25 directs operators to ensure the containment evacuation alarm is initiated. However, this should occur automatically in response to the EMF-17 actuation.

Part 2 is correct.

Basis for meeting the KA

Given a fuel handling incident, the applicant is required to demonstrate knowledge related to monitoring operation of an associated Area Radiation Monitor.

Basis for Hi Cog

The applicant is required to evaluate plant conditions, recall a setpoint, then determine if a set of automatic actions should have occurred.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 6998

Development References

AP/1/A/5500/025, Case I, Rev. 017, Steps 1 & 7
OP/1/B/6100/010Z (Annunciator Response Procedure for 1RAD-3), Rev. 024, A/2 & D/2

Student References Provided

APE036 AA1.02 - Fuel Handling Incidents
Ability to operate and / or monitor the following as they apply to the Fuel Handling Incidents: (CFR 41.7 / 45.5 / 45.6)
ARM system .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 20 20

B

APE037 AA2.06 - Steam Generator (S/G) Tube Leak
Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: (CFR: 43.5 / 45.13)
S/G tube failure .....

Given the following Unit 2 conditions:

- AP/2/A/5500/010 (Reactor Coolant Leak), Case I (S/G Tube Leak) has been entered due to indications of a 2B S/G tube leak.

- Current conditions are as follows:
  - Pressurizer level has been stabilized
  - Letdown flow is 75 GPM
  - Charging flow is 150 GPM

Based on the above conditions, the estimated leak rate is _____(1)_____ GPM.

If leak rate increases, a S/G Tube Rupture will be indicated by the inability to maintain Pressurizer level above a MINIMUM of _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. 63
   2. 2%

B. 1. 63
   2. 4%

C. 1. 75
   2. 2%

D. 1. 75
   2. 4%

General Discussion

The estimated leak rate is 150 gpm (Charging flow) - [75 gpm (Letdown flow) + 12 gpm (Seal return)],which equals 63 gpm.

Enclosure 1 of AP-10 directs operators to trip the Reactor and Safety Inject if PZR cannot be maintained above 4%. A required Safety Injection classifies the event as a tube rupture (vs. tube leak).

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because this value represents a thumb rule specified in the AP/10 background document stating that a PZR level decrease > 2%/Min will exceed the capacity of an NV Pump and Rx Trip/ SI would be prudent.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible if the applicant only subtracts letdown flow from charging flow and fails to include seal return in their calculation.

Part 2 is plausible because this value represents a thumb rule specified in the AP/10 background document stating that a PZR level decrease > 2%/Min will exceed the capacity of an NV Pump and Rx Trip/ SI would be prudent.

Answer D Discussion

Part 1 is plausible if the applicant only subtracts letdown flow from charging flow and fails to include seal return in their calculation.

Part 2 is correct.

Basis for meeting the KA

The applicant is required to demonstrate the ability to determine that a S/G tube leak has evolved into a tube failure.

Basis for Hi Cog

The applicant is required to perform a calculation in order to determine leak rate.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 6562

Development References

AP/2/A/5500/010, Rev. 54, Encl 1
OP-CN-PS-NV (Chemical and Volume Control System LP), Rev. 204, Sect. 6.1
PBG/1/5500/010 (AP/10 Background Doc), Rev. 8, Step 2 K/A

Student References Provided

APE037 AA2.06 - Steam Generator (S/G) Tube Leak
Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: (CFR: 43.5 / 45.13)
S/G tube failure .....

Remarks/Status

APE059 AK1.02 - Accidental Liquid Radioactive-Waste Release

Knowledge of the operational implications of the following concepts as they apply to Accidental Liquid Radwaste Release: (CFR 41.8 / 41.10 / 45.3)

Biological effects on humans of various types of radiation, exposure levels that are acceptable for nuclear power plant personnel, and the units used for radiation-intensity measurements and for radiation exposure levels .....

Given the following Unit 2 conditions:

- A leak has developed in the Spent Fuel Pool area
- Water leaking from an overhead pipe is collecting on the floor
- RP reports that the water is a Beta dose concern

The primary biological concern for this spill is dose to _____(1)_____ .

The normal occupational dose limit for this body location is _____(2)_____ per year.

Which ONE of the following completes the statements above?

A. 1. skin
   2. 15 rem

B. 1. skin
   2. 50 rem

C. 1. internal organs
   2. 15 rem

D. 1. internal organs
   2. 50 rem

General Discussion

Beta radiation presents an absorption and skin dose concern. The NRC, and Duke, occupational limit for skin and extremities is 50 rem/yr.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because this represents the occupational limit for the lens of the eye.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because of the potential for airborne radioactive material due to the leak. However, the conditions provided state that the primary concern is Beta dose.

Part 2 is plausible because this represents the occupational limit for the lens of the eye.

Answer D Discussion

Part 1 is plausible because of the potential for airborne radioactive material due to the leak. However, the conditions provided state that the primary concern is Beta dose.

Part 2 is correct.

Basis for meeting the KA

When given an accidental liquid waste release, the applicant is required to demonstrate knowledge of biological effects and acceptable exposure levels for plant personnel.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	Bank Q 6564

Development References	Student References Provided
OP-CN-RAD-HP (Radiation Protection LP), Rev. 104, Pg. 73 &75	

APE059 AK1.02 - Accidental Liquid Radioactive-Waste Release

Knowledge of the operational implications of the following concepts as they apply to Accidental Liquid Radwaste Release: (CFR 41.8 / 41.10 / 45.3)

Biological effects on humans of various types of radiation, exposure levels that are acceptable for nuclear power plant personnel, and the units used for radiation-intensity measurements and for radiation exposure levels .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 22 22

A

APE069 AK2.03 - Loss of Containment Integrity
Knowledge of the interrelations between the Loss of Containment Integrity and the following: (CFR 41.7 / 45.7)
Personnel access hatch and emergency access hatch .....

Which ONE of the following statements represents a loss of Containment Integrity?

A. Both lower personnel airlock doors closed with all seals deflated

B. Annulus doors blocked open for maintenance work

C. Submarine hatch is found open

D. Engineering discovery of major divider barrier seal degradation

---

General Discussion

One of the four Personal Airlock Door seals (two per door) is required to maintain containment integrity.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Plausible because this would affect Reactor Building operability.

Answer C Discussion

Plausible because this would affect divider barrier operability.

Answer D Discussion

Plausible because this would affect divider barrier operability.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the interrelation of the Personnel Airlock Doors (personnel access hatch) and the Submarine Hatch (emergency access hatch) as related to a Loss of Containment Integrity.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 428

Development References	Student References Provided
LessonOP-CN-CNT-CNT(Containment System LP), Rev. 106, Sect. 2.4, 2.11, and 3.1	

APE069 AK2.03 - Loss of Containment Integrity

Knowledge of the interrelations between the Loss of Containment Integrity and the following: (CFR 41.7 / 45.7)

Personnel access hatch and emergency access hatch .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 23 23 **A**

WE01 EA2.1 - Rediagnosis

Ability to determine and interpret the following as they apply to the (Reactor Trip or Safety Injection Rediagnosis) (CFR: 43.5 / 45.13)

Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

In accordance with the following step of EP/1/A/5000/ES-0.0 (Rediagnosis):

2. **Verify entry conditions:**

A previous Safety Injection signal actuation _____(1)_____ required to proceed in this procedure.

Completion of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) _____(2)_____ required to proceed in this procedure.

Which ONE of the following completes the statements above?

A. 1. is
   2. is

B. 1. is
   2. is NOT

C. 1. is NOT
   2. is

D. 1. is NOT
   2. is NOT

General Discussion

Step 2 of ES-0.0 requires Safety Injection signal actuation and completion of E-0 in order to continue. Otherwise, the crew will be directed to return to procedure and step in effect.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant assumes this procedure could be used to rediagnose an event while performing steps in E-0. For example, a determination is made that a previous step was incorrectly performed resulting in a lost opportunity to transition.

Answer C Discussion

Part 1 is plausible if the applicant reasons that this procedure will direct proper transition directly to an event procedure provided that a safety injection has not previously occurred and is now required.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible if the applicant reasons that this procedure will direct proper transition directly to an event procedure provided that a safety injection has not previously occurred and is now required.

Part 2 is plausible if the applicant assumes this procedure could be used to rediagnose an event while performing steps in E-0. For example, a determination is made that a previous step was incorrectly performed resulting in a lost opportunity to transition.

Basis for meeting the KA

The applicant is required to demonstrate the ability to interpret conditions and select appropriate procedures through demonstration of the Rediagnosis procedure entry requirements.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-CN-EP-E0 (E-0 Series LP), Rev. 102, Sect. 8.3 EP/1/A/5000/ES-0.0, Rev. 5, Step 2	

WE01 EA2.1 - Rediagnosis

Ability to determine and interpret the following as they apply to the (Reactor Trip or Safety Injection Rediagnosis) (CFR: 43.5 / 45.13)

Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 24

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B

WE03 EK3.4 - LOCA Cooldown and Depressurization

Knowledge of the reasons for the following responses as they apply to the (LOCA Cooldown and Depressurization)
(CFR: 41.5 / 41.10, 45.6 / 45.13)

RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the
facilities license and amendments are not violated.

Given the following Unit 1 conditions:

- A Small-Break LOCA has occurred
- EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization) has been implemented
- Containment pressure is 2.8 PSIG and STABLE
- 1AD-9, C/8 "FWST Pre-Lo Level" is illuminated
- 1AD-20, B2 "Cont Sump Level >2.5 ft" is DARK
- 1AD-21, B2 "Cont Sump Level >2.5 ft" is DARK

In accordance with the requirements of ES-1.2, Enclosure 1 (Foldout Page), the BOP _____(1)_____ secure Unit 1 ND Pumps because _____(2)_____ .

Which ONE of the following completes the statement above?

A. 1. will
   2. ND Heat Exchanger cooling is NOT aligned

B. 1. will
   2. 1AD-20, B/2 and 1AD-21, B/2 are NOT LIT

C. 1. will NOT
   2. 1AD-9, D/8 "FWST 2/4 Lo Level" is NOT LIT

D. 1. will NOT
   2. EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) entry requirements are met

ILT-17 NRC Written Exam CNS RO NRC QUESTION 24

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B

General Discussion

Per ES-1.2 Foldout Page, ND pumps must be secured if FWST pre-lo level annunciator is lit and both containment sump level annunciators are dark due to inadequate sump level for Cold Leg Recirc alignment.

Answer A Discussion

Plausible because this is a correct alignment. ND Heat Exchanger cooling water flow is aligned following Phase B (3 psig in Containment) or SI with FWST at 20%. Since neither condition is met, cooling water flow has not been aligned. It is reasonable to conclude this lack of cooling may impact operation of the ND Pumps operating in recirc.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Plausible because FWST has not reached the required value to implement the Cold Leg Recirculation procedure. It is reasonable that securing ND Pumps would not be required until FWST decreased to CLR level criteria (without adequate sump level).

Answer D Discussion

Plausible because the "FWST 2/4 Lo Level" (vs. FWST Pre-Lo level) annunciator does meet ES-1.3 entry requirements.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of an RO function, required by the LOCA Cooldown and Depressurization procedure, and the reason for the required action in order to ensure limitations of the facility license and amendments is not violated (loss of CLR capability).

Basis for Hi Cog

The applicant is required to recall specific procedure requirements from memory (Foldout page) and apply to provided conditions in order to determine proper response and reason.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
EP/1/A/5000/ES-1.2, Rev. 36, Encl. 1, Step 4 & 5	

WE03 EK3.4 - LOCA Cooldown and Depressurization

Knowledge of the reasons for the following responses as they apply to the (LOCA Cooldown and Depressurization)
(CFR: 41.5 / 41.10, 45.6 / 45.13)

RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the
facilities license and amendments are not violated.

Remarks/Status

WE06 2.1.30 - Degraded Core Cooling
WE06 GENERIC
Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)

Given the following Unit 2 conditions:

- The crew has reached the following step in EP/2/A/5000/FR-C.2 (Response to Degraded Core Cooling):

  18. **Isolate CLAs as follows**

In accordance with FR-C.2, closing Cold Leg Accumulator Discharge valves will require a MINIMUM of _____(1)_____ NC $T_{hot(s)}$ < 370 degrees F and _____(2)_____ require AO support for local power alignment.

Which ONE of the following completes the statements above?

A. 1. one
   2. will

B. 1. one
   2. will NOT

C. 1. two
   2. will

D. 1. two
   2. will NOT

General Discussion

Following a cooldown, FR-C.2 will direct Cold Leg Accumulator isolation in order to prevent nitrogen injection into the RCS. This isolation is directed when a minimum of two Thots are <370 degrees. Per the C-2 basis document, two RTDs are used to ensure that one RTD is not giving an erroneous reading.

The Cold Leg Accumulator Isolation valves are normally opened with power removed. Valve operation requires local power alignment.

Answer A Discussion

Part 1 is plausible because one Thot less than required temperature is required to ensure nitrogen does not inject into the RCS. However, a conservatism factor is added by requiring two RTDs <370 degrees to ensure that one RTD is not providing erroneous indication.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because one Thot less than required temperature is required to ensure nitrogen does not inject into the RCS. However, a conservatism factor is added by requiring two RTDs <370 degrees to ensure that one RTD is not providing erroneous indication.

Part 2 is plausible if the applicant reasons a valve operation directed by an EOP would require no outside support. This instance is one of very few exceptions of control room operated valves which require field assistance.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible if the applicant reasons a valve operation directed by an EOP would require no outside support. This instance is one of very few exceptions of control room operated valves which require field assistance.

Basis for meeting the KA

In accordance with the Degraded Core Cooling procedure, the applicant is required to demonstrate the ability to determine the required local operations necessary to facilitate control of plant equipment.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

EP/2/A/5000/FR-C.2, Rev. 24, Step 18.a & 18.b
OP-CN-ECCS-CLA (Cold Leg Accumulators LP), Rev. 102, Sect. 7.1
EBG/1/5000/FR-C.2 (C-2 Background Doc), Rev. 14, Step 18 Basis

Student References Provided

WE06 2.1.30 - Degraded Core Cooling
WE06 GENERIC
Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)

Remarks/Status

D

ILT-17 NRC Written Exam CNS RO NRC QUESTION 26 26

WE13 EA1.2 - Steam Generator Overpressure

Ability to operate and / or monitor the following as they apply to the (Steam Generator Overpressure)
(CFR: 41.7 / 45.5 / 45.6)

Operating behavior characteristics of the facility.

Given the following Unit 1 conditions:

- The Reactor tripped following an inadvertent Main Steam Isolation
- The crew has entered EP/1/A/5000/FR-H.2 (Response to Steam Generator Overpressure)
- The OATC has been directed to manually operate 1SV-19 (S/G 1A PORV) in order to decrease 1A S/G pressure

In order to operate 1SV-19, in MANUAL, the Main Steam Isolation signal _____(1)_____ required to be RESET.

Once 1SV-19 is opened, 1A S/G NR Level indication will initially change due to _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. is
   2. SHRINK

B. 1. is
   2. SWELL

C. 1. is NOT
   2. SHRINK

D. 1. is NOT
   2. SWELL

General Discussion

From the Main Steam LP:
If the S/G PORV is in AUTO when the Main Steam Isolation Signal is received, the S/G PORV will close and remain closed until the SM Isolation is "RESET" and PORV "RESET" is depressed for Train A & B. If the S/G PORV is in AUTO, then both the SM and PORV RESETS Train A and B must be depressed.
If the S/G PORV is in MANUAL when an automatic Main Steam Isolation Signal is received, the control for the S/G PORV'S will revert back to "AUTO", and the S/G PORV will close. If "MANUAL" is selected again, the S/G PORV can be repositioned by using
the "0" to "10" pot. The SM isolation signal does not have to be RESET to select "MANUAL". MANUAL" will allow reopening the PORV with an SM Isol Signal present.
If a "MANUAL" SM Isolation Signal is initiated and the S/G PORV's are selected to "MANUAL", the PORV's will stay in manual and will not close on the SM Isolation signal.

From the S/G Level Control LP:
SHRINK occurs when a transient results in a DECREASE in steam voiding. This appears as a rapid DECREASE in N/R S/G level. This can be caused by:
An INCREASE in Steam Pressure. This occurs on rapid decreases in steam demand, e.g. turbine runback or SM isolation valve closure.
An INCREASE in Feedwater Flow. This is especially pronounced at low power levels, where feed temperature is low.
A DECREASE in Reactor Power

SWELL occurs when a transient results in an INCREASE in steam voiding. This appears as a rapid INCREASE in N/R S/G level. This can be caused by:
A DECREASE in Steam Pressure. This occurs on rapid increases in steam demand such as turbine loading, steam dump actuation, or S/G PORV or Safety Valve operation.
An INCREASE in Reactor Power

Answer A Discussion

Part 1 is plausible because MSI reset would be required for automatic S/G PORV operation.

Part 2 is plausible because it is reasonable to assume a level decrease while removing mass from the S/G with all feed alignments isolated.

Answer B Discussion

Part 1 is plausible because MSI reset would be required for automatic S/G PORV operation.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because it is reasonable to assume a level decrease while removing mass from the S/G with all feed alignments isolated.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to demonstrate the ability to monitor operating behavior of the S/G (level indication) and operate the facility (S/G PORV) during a Steam Generator Overpressure condition.

Basis for Hi Cog

This question requires more than one mental step:
1. Comparison of provided information, with that recalled from memory, to determine requirements for S/G PORV operation.
2. Comparison of provided information, with that recalled from memory, to determine operation characteristics of the S/G level indication.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 1625

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D

Development References	Student References Provided
OP-CN-CF-IFE (Steam Generator Water Level Feedwater Pump Speed Control LP), Rev. 104, Sect. 2 OP-CN-STM-SM (Main Steam System LP), Rev. 102, Pg. 22 & 23	

WE13 EA1.2 - Steam Generator Overpressure

Ability to operate and / or monitor the following as they apply to the (Steam Generator Overpressure)
(CFR: 41.7 / 45.5 / 45.6)

Operating behavior characteristics of the facility.

Remarks/Status
01/19/17 - Discussed original question with CE. As written does not meet intent of K/A. Will accept question related to H.4 major actions and how this action affects plant behavior.

ILT-17 NRC Written Exam CNS RO NRC QUESTION 27 27 **A**

WE16 EK3.4 - High Containment Radiation

Knowledge of the reasons for the following responses as they apply to the (High Containment Radiation)
(CFR: 41.5 / 41.10, 45.6, 45.13)

RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.

Given the following Unit 1 conditions:

- The CRS has elected to enter EP/1/A/5000/FR-Z.3 (Response to High Containment Radiation) following an event
- Containment Sump level instruments indicate bottom of scale

In accordance with FR-Z.3, the BOP _____(1)_____ start the Containment Auxiliary Charcoal Filters (CACFU).

If required for inventory control, _____(2)_____ letdown must be placed in service.

Which ONE of the following completes the statements above?

A. 1. will
   2. excess

B. 1. will
   2. normal

C. 1. will NOT
   2. excess

D. 1. will NOT
   2. normal

General Discussion

The major actions of FR-Z.3 are as follows:
1. Verify Containment Ventilation Isolation
2. Place Containment Auxiliary Charcoal Filters in service (if Containment Sump level is <0.5ft)
3. Notify plant engineering staff of Containment Radiation levels

Several EOPs (including ES-1.1) require excess letdown to be placed in service if Containment Radiation level exceeds 25 R/Hr .

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because excess letdown is not used if normal letdown is available (except in this particular instance). No information has been given to determine normal letdown would not be available.

Answer C Discussion

Part 1 is plausible if the applicant is unfamiliar with the major actions of FR-Z.3. May assume that charcoal filters will have limited effect due to possible fuel damage.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible if the applicant is unfamiliar with the major actions of FR-Z.3. May assume that charcoal filters will have limited effect due to possible fuel damage.

Part 2 is plausible because excess letdown is not used if normal letdown is available (except in this particular instance). No information has been given to determine normal letdown would not be available.

Basis for meeting the KA

CE NOTE: This K/A was discussed on 01/19/17 due to CSF yellow path entry requirement being restricted to SRO questions. CE agreed (in principle) to use of testing a major action of the procedure for K/A match.

The applicant is required to demonstrate knowledge a major action of the High Containment Radiation procedure (knowledge of the reason is inherent to the action). Additionally, the applicant is required to demonstrate knowledge of proper procedure adherence related to minimizing exposure to plant personnel when faced with a high radiation condition inside containment.

Basis for Hi Cog

The applicant must compare provided information with that recalled from memory in order to determine if current radiation levels exceed that which precludes the use of normal letdown establishment.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-CN-EP-FRZ (FR-Z Series LP), Rev. 102, Sect. 5.2
OP-CN-EP-E1 (E1 LP), Rev. 105, Pg 26
EP/1/A/5000/FR-Z.3, Rev. 1, Step 3

Student References Provided

WE16 EK3.4 - High Containment Radiation

Knowledge of the reasons for the following responses as they apply to the (High Containment Radiation)
(CFR: 41.5 / 41.10, 45.6, 45.13)

RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.

ILT-17 NRC Written Exam CNS RO NRC **QUESTION 27** 27 **A**

Remarks/Status
01/19/17 - Discussed developed question with CE. Agreed upon K/A match in principle.

SYS003 A3.01 - Reactor Coolant Pump System (RCPS)
Ability to monitor automatic operation of the RCPS, including: (CFR: 41.7 / 45.5)
Seal injection flow .....

Given the following Unit 1 conditions:

- The Unit is at 100% RTP
- Total charging flow is currently 90 gpm
- 1NV-294 (NV Pmps A&B Disch Flow Ctrl) is in MANUAL
- 1NV-309 (Seal Water Injection Flow) is in AUTO

Consider Each Statement Separately

Assuming stable plant conditions, as 1NV-294 is throttled OPEN, 1NV-309 will throttle in the _____(1)_____ direction.

Assuming 1NV-294 position does not change, if NC pressure is increased from 2235 psig to 2300 psig seal injection flow will initially decrease and then _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. OPEN
   2. return to original value

B. 1. CLOSED
   2. return to original value

C. 1. OPEN
   2. remain at a new lower value

D. 1. CLOSED
   2. remain at a new lower value

General Discussion

RCP Seal Injection Control is accomplished via a backpressure control valve. More Charging water will flow to the RCP seals as the control valve throttles closed and vice versa. Therefore, assuming stable plant conditions, as charging flow is increased, 1NV-309 will throttle open to allow more flow to the RCS while maintaining the same seal injection flow.

With the 1NV-294 in manual, increasing RCS pressure will actually decrease charging flow due to backpressure. However, 1NV-309 (in Auto) will adjust as necessary to maintain constant seal injection flow at setpoint.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is plausible if the applicant reverses the logic of the backpressure control valve.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because charging flow will decrease and remain at a new lower rate due to increased backpressure.

Answer D Discussion

Part 1 is plausible if the applicant reverses the logic of the backpressure control valve.

Part 2 is plausible because charging flow will decrease and remain at a new lower rate due to increased backpressure.

Basis for meeting the KA

The applicant is required to demonstrate the ability to monitor automatic operation of the seal injection flow control valve.

Basis for Hi Cog

This question requires more than one mental step:
1. The applicant must compare provided information with that recalled from memory to determine the effect, upon seal injection flow, of increasing charging.
2. The applicant must determine the effect of increased RCS pressure upon charging flow and then apply that determination to seal injection flow.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-CN-PS-NV (Chemical and Volume Control System LP), Rev. 204, Sect. 2.3.9

Student References Provided

SYS003 A3.01 - Reactor Coolant Pump System (RCPS)
Ability to monitor automatic operation of the RCPS, including: (CFR: 41.7 / 45.5)
Seal injection flow .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 29 29

C

SYS004 K2.01 - Chemical and Volume Control System
Knowledge of bus power supplies to the following: (CFR: 41.7)
Boric acid makeup pumps .....

The 1A Boric Acid Transfer Pump receives power from _____ .

Which ONE of the following completes the statement above?

A. 1MXW

B. SMXG

C. 1EMXA

D. 1EMXG

General Discussion

1A Boric Acid Transfer Pump receives power from 1EMXA.

Answer A Discussion

Plausible because this is the power supply to the 1A Reactor Makeup Water Pump..

Answer B Discussion

Plausible because the Standby Makeup Pump is powered from SMXG.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Plausible because this is also a Unit 1 "A" train essential power supply.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the power supply for a makeup pump which is part of the CVCS.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	'15 CNS Q30

Development References	Student References Provided
OP-CN-PS-NV (Chemical and Volume Control System Lesson Plan), Rev. 204, Section 4.1	

SYS004 K2.01 - Chemical and Volume Control System
Knowledge of bus power supplies to the following: (CFR: 41.7)
Boric acid makeup pumps .....

Remarks/Status

SYS005 A2.02 - Residual Heat Removal System (RHRS)

Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Pressure transient protection during cold shutdown .....

Given the following Unit 1 initial conditions:

- The Unit is in MODE 5
- NC temperature is 112°F
- LTOP is in service
- 1B NV pump is running
- 1A NV pump is tagged out for maintenance
- Both NI pumps are tagged out

Subsequently:

- 1A NV pump breaker is racked in following maintenance

Entry into the Action statement of Technical Specification 3.4.12 (LTOP SYSTEM) _____(1)_____ required at this time.

ND Suction Relief Valves will open if NC Pressure exceeds the MINIMUM listed value of _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. is
   2. 400 psig

B. 1. is
   2. 450 psig

C. 1. is NOT
   2. 400 psig

D. 1. is NOT
   2. 450 psig

General Discussion

Per TS LCO 3.4.12 (LTOP), an LTOP system shall be OPERABLE with a maximum of two pumps (charging pumps, safety injection pumps, or charging and safety injection pumps) capable of injecting into the RCS and the accumulators isolated and one of the below:

RHR Suction Relief Valves are designed to lift at 450 psig (TS 3.4.12 requires a lift setting of 417 - 509 psig).

Answer A Discussion

Part 1 is plausible because of change to this TS. In the past a maximum of one NV and one NI pump were allowed (not two NV pumps).

Part 2 is plausible because this is the setpoint for PZR PORVs in LTOP mode.

Answer B Discussion

Part 1 is plausible because of change to this TS. In the past a maximum of one NV and one NI pump were allowed (not two NV pumps).

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because this is the setpoint for PZR PORVs in LTOP mode.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

Pressure transient protection during cold shutdown is provided by the LTOP system. By demonstrating a knowledge of this Tech Spec, the applicant demonstrates the ability to predict the impact and use procedures (Tech Spec 3.4.12) to control the consequences of a pressure transient while in cold shutdown.

Basis for Hi Cog

This question requires the applicant to compare given conditions to that recalled from memory and determine TS applicability based on analysis.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 5915

Development References	Student References Provided
Tech Spec 3.4.12 (LTOP System), OP-CN-PS-ND (Residual Heat Removal System LP), Rev. 101, Sect. 1.3	

SYS005 A2.02 - Residual Heat Removal System (RHRS)

Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Pressure transient protection during cold shutdown .....

Remarks/Status

SYS006 K6.05 - Emergency Core Cooling System (ECCS)
Knowledge of the effect of a loss or malfunction on the following will have on the ECCS: (CFR: 41.7 / 45.7)
HPI/LPI cooling water .....

Given the following Unit 1 initial conditions:

- The Unit is at 100% RTP
- 1B NV Pump is running
- 1A NV Pump is OFF

Subsequently:

- KC cooling flow to the Unit 1 NV pumps is lost
- The crew enters AP/1/A/5500/021 (Loss of Component Cooling), and has dispatched an operator to align backup cooling to an NV Pump
- The crew is performing Enclosure 5 (Maximize NV Pump Run Time)

NV Pump alternate cooling water will be supplied by the _____(1)_____ system.

While the alternate cooling alignment is being performed, the operating pump will be _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. YD
   2. secured immediately

B. 1. YD
   2. operated for a maximum of 10 minutes

C. 1. YM
   2. secured immediately

D. 1. YM
   2. operated for a maximum of 10 minutes

General Discussion

Step 2 of AP/21 verifies at least one KC pump is ON AND that flow to KC loads exists. The stem gives conditions that KC flow to the NV pumps has been lost. Therefore, the RNO requires that alternate cooling be aligned to the NV pump. This cooling water is aligned from the YD (Drinking Water) system.

With the operator dispatched to perform the alternate cooling alignment for 1A NV pump, the stem says that the crew is now performing Enclosure 5, "Maximize NV Pump Run Time." This enclosure provides a means of maintaining the NV pump function while alternate cooling is pursued. To do that, the first step is to record the time at which KC was lost to the NV pumps. The next step is to ensure 1B NV pump is ON. In the initial conditions of the stem 1A NV pump is running, and 1B is OFF. This enclosure requires the operator to start 1B and then secure 1A. Once the alternate cooling alignment is complete, the operator will then operate 1A and secure 1B, but until then the crew is in a "do loop" of alternating between 1B and 1A pumps, running each no more than 10 minutes at a time. This time restriction is a characteristic of these pumps, and is required in order to prevent damage to the pump.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because 1A NV Pump (if in service) would be secured immediately.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because this system supplies alternate cooling water to D/G Starting Air Compressors.

Part 2 is plausible because 1A NV Pump (if in service) would be secured immediately.

Answer D Discussion

Part 1 is plausible because this system supplies alternate cooling water to D/G Starting Air Compressors.

Part 2 is correct.

Basis for meeting the KA

The KA is matched because conditions involve a loss of cooling water to high pressure injection pumps (NV - high head injection). The applicant must demonstrate knowledge of the effect of this loss on operation of components of the ECCS by selecting both how the alternate cooling alignment is to be performed, and the effects of that on the operating pump.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	Bank Q 6999

Development References

AP/1/A/5500/021, Rev 42, Encl. 5, Step 2 RNO note, and Encl. 5, Step 2, 3, & 5
OP-CN-PS-NV (Chemical and Volume Control System LP), Rev. 204, Sect. 2.3.3
OP-CN-DG-VG (D/G Engine Starting Air LP), Rev. 100, Sect. 2.2

Student References Provided

SYS006 K6.05 - Emergency Core Cooling System (ECCS)
Knowledge of the effect of a loss or malfunction on the following will have on the ECCS: (CFR: 41.7 / 45.7)
HPI/LPI cooling water .....

Remarks/Status

D

ILT-17 NRC Written Exam CNS RO NRC QUESTION 32 32

SYS007 A3.01 - Pressurizer Relief Tank/Quench Tank System (PRTS)
Ability to monitor automatic operation of the PRTS, including: (CFR: 41.7 / 45.5)
Components which discharge to the PRT .....

Given the following Unit 1 conditions:

- ND is aligned in RHR mode

A failure of _____(1)_____ will cause a PRT pressure increase.

If the input continues, PRT pressure will increase until rupture disc actuation at a MINIMUM value of _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. 1ND-31 (1A ND Train Cold Leg Inj Return Safety Relief)
   2. 50 psig

B. 1. 1ND-31 (1A ND Train Cold Leg Inj Return Safety Relief)
   2. 100 psig

C. 1. 1ND-3 (1A ND Pump Suction From NC Loop B Header Relief)
   2. 50 psig

D. 1. 1ND-3 (1A ND Pump Suction From NC Loop B Header Relief)
   2. 100 psig

General Discussion

The RHR Pump Suction Relief valves discharge the PRT. RHR Discharge Relief Valves discharge to the Recycle Holdup Tank.

The PRT is protected from overpressure by two rupture discs set to relieve if PRT
pressure exceeds 100 psig. If PRT pressure exceeds 50 psig, then a PIP shall be initiated to evaluate the rupture disc integrity

Answer A Discussion

Part 1 is plausible because the suction relief valve does discharge to the PRT. Therefore making it plausible that the discharge relief would also relieve to the PRT.

Part 2 is plausible because a limit and precaution states that a PIP shall be generated for rupture disc integrity evaluation if PRT pressure exceeds 50 psig.

Answer B Discussion

Part 1 is plausible because the suction relief valve does discharge to the PRT. Therefore making it plausible that the discharge relief would also relieve to the PRT.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because a limit and precaution states that a PIP shall be generated for rupture disc integrity evaluation if PRT pressure exceeds 50 psig.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to demonstrate the ability to monitor automatic operation of the PRTS through knowledge of components which discharge to the PRT and automatic operation of the PRT relief device.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	Bank Q 7000

Development References

OP-CN-PS-PRT (Pressuirzer Relief Tank LP), Rev. 101, Sect. 2.1 & 2.2
OP-CN-PS-ND (Residual Heat Removal System LP), Rev. 101, Sect. 2.4

Student References Provided

SYS007 A3.01 - Pressurizer Relief Tank/Quench Tank System (PRTS)
Ability to monitor automatic operation of the PRTS, including: (CFR: 41.7 / 45.5)
Components which discharge to the PRT .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 33 33

A

SYS008 A4.05 - Component Cooling Water System (CCWS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5)
Normal CCW-header total flow rate and the flow rates to the components cooled by the CCWS .....

Given the following Unit 1 conditions:

- The Unit is cooling down in Mode 4
- 1A1 and 1A2 KC Pumps are in service
- 1A ND is being aligned for RHR
- 1AD-9 F/7 "KC Train A Two Pump Runout" has alarmed

Aligning cooling water flow to 1A ND Heat Exchanger increased KC system flow by a MINIMUM of _____(1)_____ .

Total KC system flow has exceeded a MINIMUM value of _____(2)_____ .

Which ONE of the following correctly completes the statements above?

A. 1. 5,000 gpm
   2. 10,800 gpm

B. 1. 5,000 gpm
   2. 11,400 gpm

C. 1. 5,600 gpm
   2. 10,800 gpm

D. 1. 5,600 gpm
   2. 11,400 gpm

General Discussion

The RHR HX Outlet throttle valve is set to maintain 5000 gpm when aligned for RHR. This valve fails open upon a safety injection signal and will provide more flow.

The KC Runout flow Annunciator setpoints are 5,700 gpm for one pump and 10,800 gpm for two pumps.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant is unaware of the two pump runout alarm setpoint and doubles the single pump runout setpoint (5700 x 2 = 11,400 gpm).

Answer C Discussion

Part 1 is plausible because this is the setpoint for the high flow alarm through this Heat Exchanger.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because this is the setpoint for the high flow alarm through this Heat Exchanger.

Part 2 is plausible if the applicant is unaware of the two pump runout alarm setpoint and doubles the single pump runout setpoint (5700 x 2 = 11,400 gpm).

Basis for meeting the KA

The applicant is required to demonstrate the ability to monitor normal CCW header flow rates during alignment of a supported system and demonstrate knowledge of CCW total header flow rate monitoring through knowledge of the maximum flow setpoint.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-CN-PSS-KC (Component Cooling Water LP), Rev. 101, Sect. 2.2 & 2.5	

SYS008 A4.05 - Component Cooling Water System (CCWS)

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

Normal CCW-header total flow rate and the flow rates to the components cooled by the CCWS .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 34 34

B

SYS010 A2.03 - Pressurizer Pressure Control System (PZR PCS)

Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

PORV failures .....

Given the following Unit 1 conditions:

- The Unit is at 100% RTP
- 1NC-36B (PZR PORV) failed to the intermediate position
- The BOP closed 1NC-35B (PZR PORV Isol)
- NC Pressure is currently 2150 psig and increasing slowly

Current PZR Pressure Error (psi) indicates a _____(1)_____ value.

In accordance with TS 3.4.11 (Pressurizer Power Operated Relief Valves), 1NC-35B _____(2)_____ required to be de-energized.

Which ONE of the following completes the statements above?

A. 1. positive
   2. is

B. 1. negative
   2. is

C. 1. positive
   2. is NOT

D. 1. negative
   2. is NOT

ILT-17 NRC Written Exam CNS RO NRC QUESTION 34

34

B

General Discussion

The PZR PCS output signal, from the master controller, is indicated in psig on the controller as the Output (O) and is also the Pressure Error signal in psig developed between Process Variable (PV) and Setpoint (SP) pressure. Due to the integral function within the Pzr Pressure Master controller the Output value will change to cause PV to return to SP (normally 2235 psig). The Pressurizer Pressure Master Controller lowers the controller output to raise pressurizer pressure and raises the controller output to lower pressurizer pressure. With the given conditions, the error output signal would be a negative value.

Per TS 3.4.11 Condition B (One or two PORVs inoperable and not capable of being manually cycled), the associated PORV block valve must be closed with power removed within 1 hour.

Answer A Discussion

Part 1 is plausible if the applicant concludes that a positive signal would be required to increase pressure.

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible if the applicant concludes that a positive signal would be required to increase pressure.

Part 2 is plausible if the applicant misapplies TS 3.4.11. De-energization is not required if the PORV is capable of being manually cycled.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible if the applicant misapplies TS 3.4.11. De-energization is not required if the PORV is capable of being manually cycled.

Basis for meeting the KA

The applicant is required to demonstrate the ability to predict the impact of a PORV failure upon the operation of the PZR PCS through knowledge of the control system response. Additionally, the applicant must demonstrate the ability to use procedures (TS) to mitigate this event.

Basis for Hi Cog

The applicant must compare provided information with that recalled from memory, and perform a mental calculation, in order to determine the value of the PZR control system output.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-PS-IPE (Pressurizer Pressure Control LP), Rev. 101, Sect. 5.1 T.S. 3.4.11, Condition B	

SYS010 A2.03 - Pressurizer Pressure Control System (PZR PCS)

Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

PORV failures .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 35 35

B

SYS010 A4.03 - Pressurizer Pressure Control System (PZR PCS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
PORV and block valves .....

Given the following Unit 1 initial conditions:

- The Unit was at 100% power
- 1NC-35B (PZR PORV Isol) is in the "CLOSE" position due to a leak from 1NC-36B (PZR PORV)

Subsequently:

- A pressure transient resulted in an NC system pressure increase
- 1NC-34A (PZR PORV) opened but did not re-close
- NC pressure is 2200 psig and decreasing
- 1NC-34A is manually isolated using 1NC-33A (PZR PORV Isol)

1NC-33A Select Switch is currently in the _____(1)_____ position.

_____(2)_____ provides a BLOCK signal to 1NC-34A on decreasing pressure.

Which ONE of the following completes the statements above?

A. 1. OVERRIDE
   2. Selected Pressurizer Pressure 1 (SPP-1)

B. 1. OVERRIDE
   2. Selected Pressurizer Pressure 2 (SPP-2)

C. 1. CLOSE
   2. Selected Pressurizer Pressure 1 (SPP-1)

D. 1. CLOSE
   2. Selected Pressurizer Pressure 2 (SPP-2)

ILT-17 NRC Written Exam CNS RO NRC QUESTION 35

35

B

General Discussion

The Pressurizer PORV isolation valves are interlocked to ensure that no more than one isolation valve is closed at a time. This interlock can be bypassed by placing the switch in "Override". SPP-2 supplies a block signal to 1NC-34A on lowering pressurizer pressure.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because SPP-1 provides a block for PORVs NC-32B and NC-36B.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible if the applicant is does not recognize the significance of one PORV isolation valve being previously closed, or has not mastered knowledge of the interlock associated with the PORV isolation valves.

Part 2 is plausible because SPP-1 provides a block for PORVs NC-32B and NC-36B.

Answer D Discussion

Part 1 is plausible if the applicant is does not recognize the significance of one PORV isolation valve being previously closed, or has not mastered knowledge of the interlock associated with the PORV isolation valves.

Part 2 is correct.

Basis for meeting the KA

When given conditions of a stuck open PZR relief valve, the applicant is required to demonstrate the ability to operate PORV Block Valves and monitor PORV operation by knowledge of the applicable control circuit.

Basis for Hi Cog

The applicant is required to analyze given conditions, recall interlocks and system inputs, and apply this knowledge to demonstate the ability to operate controls associated with PORV block valves and monitor operation of a PZR PORV via controls which would provide a close signal.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 7001

Development References	Student References Provided
OP-CN-PS-IPE (Pressurizer Pressure Control LP), Rev. 101, Section 2.8 & 11.1	

SYS010 A4.03 - Pressurizer Pressure Control System (PZR PCS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
PORV and block valves .....

Remarks/Status

C

ILT-17 NRC Written Exam CNS RO NRC QUESTION 36 36

SYS012 K3.01 - Reactor Protection System (RPS)
Knowledge of the effect that a loss or malfunction of the RPS will have on the following : (CFR: 41.7 / 45.6)
CRDS .....

Given the following Unit 2 initial conditions:

- The Unit is at 45% RTP for 2A CFPT repairs
- Control Rod select switch is in "AUTO"

Subsequently:

- Power Range Channel N-41 Control Power fuse has blown

Following this failure:

control rods _____(1)_____ be inserting in automatic.

manual control rod withdrawal _____(2)_____ blocked.

Which ONE of the following completes the statements above?

A. 1. will
   2. is

B. 1. will
   2. is NOT

C. 1. will NOT
   2. is

D. 1. will NOT
   2. is NOT

General Discussion

A failure of one Power Range control power fuse will result in a single RPS actuation signal or Hi neutron flux. However, DCS will negate the input of a single failed channel. Therefore, this failure will not cause automatic rod motion. Prior to the installation of the Distributed Control System, this same failure would cause inward rod motion.

Although DCS will negate this channel's input to the rod control system, it will not affect protection/control related signals. A single PR channel > 103% will actuate Control Permissive C-2 (PR Hi Flux Rod Stop) which will block all auto and manual rod withdrawal.

Answer A Discussion

Part 1 is plausible because an immediate operator action exists for this event in AP/16 (verify all rod motion stopped). Also, prior to DCS installation one failed PR channel would result in rod insertion.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because an immediate operator action exists for this event in AP/16 (verify all rod motion stopped). Also, prior to DCS installation one failed PR channel would result in rod insertion.

Part 2 is plausible because C-5 (low power rod block) stops auto rod withdrawal only.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because C-5 (low power rod block) stops auto rod withdrawal only.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/16/17

Loss or malfunction of RPS - Loss of one Power Range NI represents a malfunction of the RPS by instituting a 1/4 Rx Trip logic which places the unit within single failure from an unnecessary transient (Rx. Trip). This malfunction also inputs Control permissives. Applicant must demonstrate knowledge of the effect of a blown fuse (fails high).

Effect of malfunction on CRDS - The applicant must demonstrate knowledge of the effect of this malfunction on automatic and manual control rod function (i.e. will rods automatically insert? - prior to DCS installation - yes, after - no).

Basis for Hi Cog

This question requires more than one mental step:
1. The applicant must analyze provided information to determine the effect of a single power range malfunction and its effect upon control rod operation.
2. The applicant must also analyze the above listed information to determine the affect upon control rod block circuitry.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-IC-ENB (Excore Nuclear Instrumentation LP), Rev. 102, Sect. 7.4 OP-CN-AP-16 (AP/16 LP), Rev. 01, Sect. 3.4	

SYS012 K3.01 - Reactor Protection System (RPS)
Knowledge of the effect that a loss or malfunction of the RPS will have on the following : (CFR: 41.7 / 45.6)
CRDS .....

Remarks/Status

PRE-REVIEW QUESTION - SAT 03/16/17

ILT-17 NRC Written Exam CNS RO NRC QUESTION 37 37

A

SYS012 K5.01 - Reactor Protection System (RPS)
Knowledge of the operational implications of the following concepts as the apply to the RPS: (CFR: 41.5 / 45.7)
DNB .....

Given the following Unit 2 conditions:

- The Unit is at 3% RTP following a refueling outage

Per Technical Specifications, which ONE of the following reactor trips is required to be operable to provide protection against DNB from the current power level to 100% RTP?

A. OTDT

B. OPDT

C. Low NC loop flow

D. Pressurizer low pressure

General Discussion

The OTDT reactor trip is required to be operable in Modes 1 & 2 and the stated purpose is for DNB protection.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Plausible because this trip is required to be operable in Modes 1 & 2, but the stated purpose is for excessive fuel centerline temperature protection.

Answer C Discussion

Plausible because there are two low RCS loop flow trips based on DNB protection. However, these trips are not applicable in the current operating Mode (Mode 2).

Answer D Discussion

Plausible because this trip is based on DNB protection, but not applicable in the current operating Mode (Mode 2).

Basis for meeting the KA

The applicant is required to demonstrate knowledge of operation implications through the application of TS bases for DNB protection as related to the RPS. This basis information is required information for RO candidates.

Basis for Hi Cog

The applicant is required to compare provided information with that recalled from memory in order to determine current operating mode in order to correctly answer the question. This requires more than one mental step.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 1338

Development References	Student References Provided
OP-CN-IC-IPX (Reactor Protection System LP), Rev. 101, pg 111 TS basis 3.3.1, Applicability	

SYS012 K5.01 - Reactor Protection System (RPS)

Knowledge of the operational implications of the following concepts as the apply to the RPS: (CFR: 41.5 / 45.7)

DNB .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 38 38

B

SYS013 2.4.1 - Engineered Safety Features Actuation System (ESFAS)
SYS013 GENERIC
Knowledge of EOP entry conditions and immediate action steps. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 1 initial conditions:

- A Reactor Coolant System leak has developed inside Containment
- The CRS has provided direction to the OATC for manually tripping the Reactor and the BOP for initiating Safety Injection

Subsequently:

- Attempts to trip the Reactor have failed
- Containment pressure is 0.55 psig and increasing slowly
- PZR Pressure is 1950 psig and decreasing slowly

Given the above conditions, EP/1/A/5000/F-0 (Critical Safety Function Status Trees) _____(1)_____ required to be entered.

The BOP _____(2)_____ initiate Safety Injection at this time.

Which ONE of the following completes the statements above?

A. 1. is
   2. will

B. 1. is
   2. will NOT

C. 1. is NOT
   2. will

D. 1. is NOT
   2. will NOT

General Discussion

With given conditions, the crew will first enter E-0 but exit at step 2 (Verify Rx Trip). Prior to transition to FR-S.1 direction is given to implement F-0.

Although conditions requiring Safety Injection will soon exist, the operator should never manually initiate SI in "anticipation" of conditions during an ATWS.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because the operator would normally initiate SI in anticipation of an automatic action and the fact that direction has been provided by the CRS.

Answer B Discussion

CORRECT. See explanation above

Answer C Discussion

Part 1 is plausible because the guidance to implement F-0 would not be given if the crew remains in E-0.

Part 2 is plausible because the operator would normally initiate SI in anticipation of an automatic action and the fact that direction has been provided by the CRS.

Answer D Discussion

Part 1 is plausible because the guidance to implement F-0 would not be given if the crew remains in E-0.

Part 2 is correct.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/16/17

Knowledge of EOP entry conditions: Given a condition in which E-0 does not mitigate and for which FR-S.1 entry conditions are met, the applicant must demonstrate knowledge of the method of entry (F-0 implementation).

Knowledge of immediate action steps: Given an EOP immediate action, the applicant must demonstrate knowledge of correct performance during a specific condition (ATWS).

ESFAS is tested through knowledge of Safety Injection initiation.

Basis for Hi Cog

The applicant is required to compare given information to that recalled from memory in order to determine that an Automatic SI actuation signal has not been reached and then correctly apply this determination in order to correctly answer the question.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), Rev. 041, Section 7.2.B and Attachment 11.1 Sect. 13
EP/1/A/5000/E-0 (Reactor Trip or Safety Injection), Rev. 42, Step 2 RNO

Student References Provided

SYS013 2.4.1 - Engineered Safety Features Actuation System (ESFAS)
SYS013 GENERIC
Knowledge of EOP entry conditions and immediate action steps. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

PRE-REVIEW QUESTION - SAT 03/16/17

ILT-17 NRC Written Exam CNS RO NRC QUESTION 39 39

A

SYS013 K6.01 - Engineered Safety Features Actuation System (ESFAS)
Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: (CFR: 41.7 / 45.5 to 45.8)
Sensors and detectors .....

Given the following Unit 2 conditions:

- Containment Pressure Channel III has failed high

Following this malfunction, the logic required to actuate the High Containment Pressure Safety Injection signal is now _____ .

Which ONE of the following completes the statement above?

A. 1/2

B. 2/2

C. 1/3

D. 2/3

ILT-17 NRC Written Exam CNS RO NRC QUESTION 39

39

A

General Discussion

The normal logic for High Containment Pressure SI is 2/3 (referencing Channels 2-4). With one channel failed high, the logic for actuation becomes 1 of 2. These same channels feed the Hi-Hi Containment Pressure logic along with Channel 1. The Hi-Hi Containment Pressure signal would be placed in bypass (per TS) following this malfunction, but High Containment Pressure SI is not.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Plausible because the Hi-Hi Containment Pressure (Phase B Cnt Isolation) signal would be placed in bypass for this malfunction. If the applicant applies the same logic to the Hi Containment Pressure signal this would be the correct answer.

Answer C Discussion

Plausible because the Hi-Hi Containment Pressure (Phase B Cnt Isolation) signal references 4 channels. This would be the correct answer if 4 channels were referenced for the High Containment Pressure signal.

Answer D Discussion

Plausible because this would meet the logic for the Hi-Hi Containment Pressure (Phase B Cnt Isolation) signal following this malfunction. Failed channel would be place in bypass with three operable channels remaining.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the effect of a detector malfunction upon an ESFAS actuation signal.

Basis for Hi Cog

The applicant is required to compare provided information with that recalled from memory (number of Cnt pressure channels which input SI and which channels input SI) in order to determine the coincidence required for actuation.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-ECCS-ISE (Engineered Safety Features Actuation System LP), Rev. 102, Pgs 37, 42, & 95	

SYS013 K6.01 - Engineered Safety Features Actuation System (ESFAS)

Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: (CFR: 41.7 / 45.5 to 45.8)

Sensors and detectors .....

Remarks/Status

SYS022 K1.04 - Containment Cooling System (CCS)

Knowledge of the physical connections and/or cause-effect relationships between the CCS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Chilled water .....

Concerning the Containment Chilled Water System (YV):

Chilled water cooling _____(1)_____ supplied to the Containment Pipe Tunnel Booster Fans.

YV cooling water supply to NC Pump Motor Air Cooler will isolate upon a _____(2)_____ signal.

Which ONE of the following completes the statements above?

A. 1. is
   2. Phase A

B. 1. is
   2. Phase B

C. 1. is NOT
   2. Phase A

D. 1. is NOT
   2. Phase B

General Discussion

YV Chilled Water provides cooling to the following components: Lower Cont Vent Units, Upper Cont Vent Units, Incore Inst Vent Units, RCP Motor Coolers, Aux Bldg Supply Units, SFP Vent Supply Units. However, Pipe Tunnel Booster Fans have no cooling provided.

NCP Motor Cooling Water from YV (Normal) or RN (backup):
The YV or RN systems will cool the Reactor Coolant Pump Motor Cooling air discharge to minimize containment heating due to the Reactor Coolant Pumps.

Answer A Discussion

Part 1 is plausible because most other components comprising the Containment Cooling System receive cooling from the YV system.

Part 2 is plausible because most containment penetrations are isolated upon a Phase A signal.

Answer B Discussion

Part 1 is plausible because most other components comprising the Containment Cooling System receive cooling from the YV system

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because most containment penetrations are isolated upon a Phase A signal.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the physical connections of the Containment Cooling System and determine cause-effect relationship related to Containment Isolation.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-CN-PSS-RN (Nuclear Service Water LP), Rev. 105, Sect. 8.1 & 8.4 OP-CN-CNT-VV (Containment Ventilation LP), Rev. 101, Sect. 2.1.2	

SYS022 K1.04 - Containment Cooling System (CCS)
Knowledge of the physical connections and/or cause-effect relationships between the CCS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)
Chilled water .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 41 41

B

SYS025 A3.02 - Ice Condenser System
Ability to monitor automatic operation of the ice condenser system, including: (CFR: 41.7 / 45.5)
Isolation valves .....

Given the following Unit 1 conditions:

- 1AD-13, D/8 "GLYCOL EXPANSION TNK LO-LO LVL" has alarmed

1NF-228A (Glycol Sup Cont Isol Otsd) _____(1)_____ closed.

The Glycol Expansion Tank Lo-Lo Level Interlock bypass switch is located on the _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. is
   2. main control board

B. 1. is
   2. local NF control panel

C. 1. is NOT
   2. main control board

D. 1. is NOT
   2. local NF control panel

General Discussion

The Ice Condenser Glycol supply and return outside containment isolation valves will automatically close on lo-lo expansion tank level. The inside return containment isolation valve will not close. Interlock Bypass is a key switch on the local panel.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because Ice Condenser Isolation valve controls are located on the main control board.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

Part 1 is plausible because 1NF-233B does not automatically close on this signal. It is also reasonable to believe that the supply isolation valve would remain open in order to refill the Glycol Expansion tank.

Part 2 is plausible because Ice Condenser Isolation valve controls are located on the main control board.

Answer D Discussion

Part 1 is plausible because 1NF-233B does not automatically close on this signal. It is also reasonable to believe that the supply isolation valve would remain open in order to refill the Glycol Expansion tank.

Part 2 is correct.

Basis for meeting the KA

The applicant is required to demonstrate the ability to monitor the effects of automatic isolation valve closure upon the Ice Condenser System.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	Bank Q 547

Development References	Student References Provided
OP-NF-CNT-NF (Ice Condenser LP), Rev. 100, Section 3.3, & 5.1	

SYS025 A3.02 - Ice Condenser System

Ability to monitor automatic operation of the ice condenser system, including: (CFR: 41.7 / 45.5)

Isolation valves .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 42 42

A

SYS025 K6.01 - Ice Condenser System

Knowledge of the effect of a loss or malfunction of the following will have on the ice condenser system: (CFR: 41.7 / 45.7)

Upper and lower doors of the ice condenser .....

Given the following Unit 1 conditions:

- The Unit is at 10% RTP
- ICE COND LOWER INLET DOORS OPEN alarm is lit
- The lower inlet door position display panel indicates that a door is open
- The door is confirmed to be cracked opened. The door will not move further open and cannot be closed
- No other alarms related to the ice condenser, NF system or AHUs are lit

Which ONE of the following contains a complete list of Tech Spec and/or SLC Action Statements that must be entered for the current plant conditions?

A. Tech Spec 3.6.13 Ice Condenser Doors ONLY

B. SLC 16.6-3 Ice Condenser Door Position Monitoring System ONLY

C. Tech Spec 3.6.13 Ice Condenser Doors, AND
SLC 16.6-3 Ice Condenser Door Position Monitoring System

D. Tech Spec 3.6.12 Ice Bed, AND
Tech Spec 3.6.13 Ice Condenser Doors

General Discussion

Per TS 3.6.13 (Ice Condenser Doors), the ice condenser inlet doors, intermediate deck doors, and top deck doors shall be OPERABLE and closed while in MODES 1, 2, 3, and 4.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Plausible because the ability to monitor Ice Condenser Doors will be impeded by the actuation of Control Room alarm (this alarm would be actuated constantly). However, this system is providing indication as required.

Answer C Discussion

Plausible because the ability to monitor Ice Condenser Doors will be impeded by the actuation of Control Room alarm (this alarm would be actuated constantly). However, this system is providing indication as required.

Answer D Discussion

Plausible if the applicant reasons that an open Ice Condenser door would raise Ice Bed Temperature. However, since no temperature alarms are present, this action statement is not required to be entered.

Basis for meeting the KA

The applicant is required to demonstrate knowledge related to a malfunction of an Ice Condenser lower inlet door by application of Tech Specs.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 648

Development References

TS 3.6.13
TS 3.6.12
SLC 16.6-3

Student References Provided

SYS025 K6.01 - Ice Condenser System
Knowledge of the effect of a loss or malfunction of the following will have on the ice condenser system: (CFR: 41.7 / 45.7)
Upper and lower doors of the ice condenser .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 43 43

C

SYS026 K4.04 - Containment Spray System (CSS)

Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)

Reduction of temperature and pressure in containment after a LOCA by condensing steam, to reduce radiological hazard, and protect equipment from corrosion damage (spray) .....

Concerning operation of the Containment Spray System (NS):

Aligning suction from the _____(1)_____ with a specific _____(2)_____ limits post-accident Iodine concentration and minimizes stress corrosion.

Which ONE of the following completes the statement above?

A. 1. FWST
   2. pH

B. 1. FWST
   2. boron concentration

C. 1. containment sump
   2. pH

D. 1. containment sump
   2. boron concentration

General Discussion

Although the Containment Spray system was automatically actuated and aligned to the FWST in the past, it is now only operated manually with suction from the containment sump. This alignment is only performed following CLR.

One function of the ice bed and Containment Spray system is to remove fission product iodine following a Design Basis Accident. This is accomplished by ensuring an alkaline pH is present in the sump water.

Answer A Discussion

Part 1 is plausible because the Containment Spray System suction is normally aligned to the FWST at power.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because the Containment Spray System suction is normally aligned to the FWST at power.

Part 2 is plausible because specific requirements do exist for boron concentration (related to ensuring post accident subcriticality) and this concentration does contribute to alkaline pH requirements.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because specific requirements do exist for boron concentration (related to ensuring post accident subcriticality) and this concentration does contribute to alkaline pH requirements.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of a design feature (operation of the CSS from the Cnt sump only) and the method for reduction of a radiological hazard/corrosion control inside Cnt following a DBA.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

OP-CN-CNT-NF (Ice condenser LP), Rev. 100, Sect. 1.1
OP-CN-FH-FW (Refueling Water System LP), Rev. 102, Sect. 2.1
OP-CN-EP-E1 (E1 Series LP), Rev. 105, Sect. 6.1

Student References Provided

SYS026 K4.04 - Containment Spray System (CSS)
Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Reduction of temperature and pressure in containment after a LOCA by condensing steam, to reduce radiological hazard, and protect equipment from corrosion damage (spray) .....

Remarks/Status

SYS039 A1.09 - Main and Reheat Steam System (MRSS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MRSS controls including: (CFR: 41.5 / 45.5)

Main steam line radiation monitors .....

Given the following Unit 1 conditions:

- The Unit is at 35% RTP
- The crew has entered AP/1/A/5500/010 (Reactor Coolant Leak) due to a 1C S/G Tube leak

1EMF-73 (S/G C Leakage) _____(1)_____ provide accurate indication of S/G tube leakage at the current power level.

If the leak size increases, EP/1/A/5000/E-3 (Steam Generator Tube Rupture) will FIRST direct closure of _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. will
   2. 1C MSIV

B. 1. will
   2. All MSIVs

C. 1. will NOT
   2. 1C MSIV

D. 1. will NOT
   2. All MSIVs

General Discussion

When power is less than 40%, N-16 monitors (EMF-71 - 74) do not provide accurate indication of leakage because of inadequate N-16 activity .

Following a tube rupture, E-3 will first direct the affected S/G MSIV closed. If unsuccessful, all other MSIVs will be closed.

Answer A Discussion

Part 1 is plausible because AP/10 lists this as an indication of S/G leakage.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because AP/10 lists this as an indication of S/G leakage.

Part 2 is plausible if the applicant reasons that all S/Gs should be isolated to minimize leakage. Also, E-3 will direct closure of remaining MSIVs (effectively all MSIVs) if the affected MSIV did not close.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible if the applicant reasons that all S/Gs should be isolated to minimize leakage. Also, E-3 will direct closure of remaining MSIVs (effectively all MSIVs) if the affected MSIV did not close.

Basis for meeting the KA

The applicant is required to demonstrate the ability to monitor changes in parameters (power level related to accuracy of main steam line radiation monitors) and predict operation of MRSS controls (predict isolation of all vs. one S/G).

Basis for Hi Cog

The applicant is required to compare information recalled from memory and compare with that given in order to determine accuracy of EMF-71.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-WE-EMF (Radiation Monitoring System LP), Rev. 103, Sect. 6.29 EP/1/A/5000/E-3 (Steam Generator Tube Rupture), Rev. 43, Step 5	

SYS039 A1.09 - Main and Reheat Steam System (MRSS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MRSS controls including: (CFR: 41.5 / 45.5)

Main steam line radiation monitors .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 45 45

B

SYS039 K3.06 - Main and Reheat Steam System (MRSS)
Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: (CFR: 41.7 / 45.6)
SDS .....

Given the following Unit 1 initial conditions:

- The Unit is at 25% RTP following a refueling outage.
- AP/1/A/5500/028 (Secondary Steam Leak) has been entered following a discovery of a leak on the Unit 1 Main Turbine Crossover line

Subsequently:

- The Unit 1 Main Turbine is tripped to isolate the leak
- Reactor power is currently 11%

At this time, _____(1)_____ steam dumps are operating to control NC temperature at _____(2)_____ degrees F.

Which ONE of the following completes the statement above?

A. 1. ONLY condenser
   2. 557

B. 1. ONLY condenser
   2. 560

C. 1. condenser AND atmospheric
   2. 557

D. 1. condenser AND atmospheric
   2. 560

ILT-17 NRC Written Exam CNS RO NRC QUESTION 45

45

B

General Discussion

Based on given conditions, the Load Rejection Controller will be controlling operation of the Steam Dumps. This controller operates dumps to achieve a 3 degree F deadband in order to allow for control rod insertion.

Atmospheric Steam dumps are only available to be operated by the Load Rejection Controller, which is currently in service. However, Atmospheric dumps also require a C-7B (Loss of Load Interlock) signal which is not present . This signal requires a 30% step change in order to actuate.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because this is the reference temperature value for the turbine being tripped. The applicant fails to apply the 3 degree deadband.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because Atmospheric Dumps are operated only by the Load Rejection controller. This would be true if the power change exceeded 30%.

Part 2 is plausible because this is the reference temperature value for the turbine being tripped. The applicant fails to apply the 3 degree deadband.

Answer D Discussion

Part 1 is plausible because Atmospheric Dumps are operated only by the Load Rejection controller. This would be true if the power change exceeded 30%.

Part 2 is correct.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the effect to Steam Dump operation following a MRSS malfunction under specific conditions.

Basis for Hi Cog

The applicant must calculate reference temperature and also calculate a power change percentage in order to correctly answer this question.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-STM-IDE (Steam Dump Control LP), Rev. 100, Sect. 2.2 & Pg 40	

SYS039 K3.06 - Main and Reheat Steam System (MRSS)
Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: (CFR: 41.7 / 45.6)
SDS .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 46 46

C

SYS059 2.4.35 - Main Feedwater (MFW) System
SYS059 GENERIC
Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 1 initial conditions:

- EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) was entered following a Small Break LOCA
- Both trains of Safety Injection automatically actuated
- 1B Reactor Trip Breaker (RTB) failed to open from the Control Room
- All CA pumps failed to start

Subsequently:

- The crew has entered EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) and is attempting to align feed flow from 1A CFPT

In order to reset 1B ECCS, 1B RTB _____(1)_____ required to be locally opened.

1A CFPT will be reset _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. is
   2. locally

B. 1. is NOT
   2. locally

C. 1. is
   2. at 1MC-10

D. 1. is NOT
   2. at 1MC-10

General Discussion

A Safety Injection signal (either train) will trip both Main Feedwater Pumps (MFP). In order to reset either MFP both SI signals must be reset. In order to reset an automatic SI signal, the associated P-4 (Rx Trip & Bypass Breakers open) must be present.

Therefore, the 1B RTB must first be opened locally, both trains of ECCS are then reset, and the 1A CFPT is reset on the Main Control Board (1MC-10).

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because local reset of the CAPT (Auxiliary Feedpump Turbine) is required for an overspeed condition.

Answer B Discussion

Part 1 is plausible because this would be the correct answer if Safety Injection was initiated manually.

Part 2 is plausible because local reset of the CAPT (Auxiliary Feedpump Turbine) is required for an overspeed condition.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is plausible because this would be the correct answer if Safety Injection was initiated manually.

Part 2 is correct.

Basis for meeting the KA

Local Auxiliary Operator Task during emergency related to Main Feedwater: Local trip of Rx Trip Breaker.

Resultant operational effects: Reset of ECCS which allows reset of Main Feedwater Pump (inherent to the question).

Basis for Hi Cog

The applicant must reason through multiple mental processes in order to determine the prerequisite conditions required to reset a Main Feed Pump with conditions provided.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-CN-ECCS-ISE (Engineered Safety Features Actuation System LP), Rev. 102, Pg. 22 & 82
OP-CN-CF-CA (Auxiliary Feedwater System LP), Rev. 110, Pg. 28

Student References Provided

SYS059 2.4.35 - Main Feedwater (MFW) System
SYS059 GENERIC
Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

03/16/17 - Discussed with CE due to difficulty meeting K/A with discriminating question. CE suggested question scenario related to loss of Main Feedwater which questioned local AO task related to Aux Feed as a mitigative action.

ILT-17 NRC Written Exam CNS RO NRC QUESTION 47 47 **A**

SYS061 K5.01 - Auxiliary / Emergency Feedwater (AFW) System
Knowledge of the operational implications of the following concepts as the apply to the AFW: (CFR: 41.5 / 45.7)
Relationship between AFW flow and RCS heat transfer .....

Given the following Unit 1 conditions:

- EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) has been implemented
- Following Bleed and Feed initiation, CA flow has been restored from CAPT #1
- Containment pressure peaked at 2.1 psig

In accordance with FR-H.1, which ONE of the following indicates the MINIMUM heat sink requirements that must be met to allow termination of NC system bleed and feed?

A. NR level in at least ONE S/G > 11%

B. NR level in at least ONE S/G > 29%

C. WR level in at least THREE S/Gs > 24%

D. WR level in at least THREE S/Gs > 36%

General Discussion

Per FR-H.1, NC system feed and bleed must continue until NR level in at least one S/G is greater than 11%.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

Plausible because 29% in one S/G is the minimum heat sink requirement if Containment pressure was greater than 3 PSIG.

Answer C Discussion

Plausible because three S/Gs < 24% is the requirement for initiating feed and bleed. It is therefore plausible for the applicant to conclude that if three S/Gs were > 24% that the entry conditions for initiating feed and bleed were no longer met and that it could be secured.

Answer D Discussion

Plausible because three S/Gs < 36% is the requirement for initiating feed and bleed under adverse Containment conditions. It is therefore plausible for the applicant to conclude that if three S/Gs were > 36% that the entry conditions for initiating feed and bleed were no longer met and that it could be secured.

Basis for meeting the KA

During feed and bleed, RCS heat transfer is via SI flow and the open PZR PORVs. Once CA flow is re-established and an adequate heat sink is restored (by establishing minimum S/G level), feed and bleed may be secured. By demonstrating a knowledge of the amount of AFW flow required to re-establish an adequate heat sink for securing feed and bleed, the applicant demonstrates a knowledge of the operational implications of the relationship between AFW flow and RCS heat transfer.

This is also reinforced by FR-H.1 in that after the procedure verifies minimum S/G level, the next step performs an addition check for adequate heat sink by verifying that NC system temperature is "GOING DOWN". If NC system temperature is not going down, the operator is returned to a previous step to perform additional actions to establish a secondary heat sink (via CA flow, CF flow, CM flow, or RY flow).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 5169

Development References	Student References Provided
OP-CN-EP-FRH (FR-H Series LP), Rev. 102, Sect. 9.2	

SYS061 K5.01 - Auxiliary / Emergency Feedwater (AFW) System

Knowledge of the operational implications of the following concepts as the apply to the AFW: (CFR: 41.5 / 45.7)

Relationship between AFW flow and RCS heat transfer .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 48 48 **A**

SYS062 K1.04 - AC Electrical Distribution System

Knowledge of the physical connections and/or cause-effect relationships between the ac distribution sys- tem and the following systems : (CFR: 41.2 to 41.9)

Off-site power sources .....

Given the following conditions:

Unit 1 and Unit 2 are at 100% RTP when the following switchyard PCBs open:

- PCB 17
- PCB 18

_____(1)_____ will experience a Turbine Runback due to loss of the associated _____(2)_____ offsite power.

Which ONE of the following completes the statement above?

A. 1. Unit 1
   2. "A" train

B. 1. Unit 1
   2. "B" train

C. 1. Unit 2
   2. "A" train

D. 1. Unit 2
   2. "B" train

General Discussion

PCBs 17 and 18 provide connection between the Unit 1 A train bus line and the grid.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant is unaware of the order of alignment between the A and B trains exiting the facility.

Answer C Discussion

Part 1 is plausible if the applicant is unaware of the switchyard PCB breaker alignment.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible if the applicant is unaware of the switchyard PCB breaker alignment.

Part 2 is plausible if the applicant is unaware of the order of alignment between the A and B trains exiting the facility.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the physical connection between off-site power sources and the on-site AC distribution system and describe the effect of a loss of a portion of the off-site system.

Basis for Hi Cog

The applicant must first recall a diagram from memory and then compare the provided information to this diagram. More than one mental step is required.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 1611

Development References	Student References Provided
OP-CN-EL-EPA (Main Power Distribution LP), Rev. 104, Fig 14	

SYS062 K1.04 - AC Electrical Distribution System

Knowledge of the physical connections and/or cause-effect relationships between the ac distribution sys- tem and the following systems : (CFR: 41.2 to 41.9)

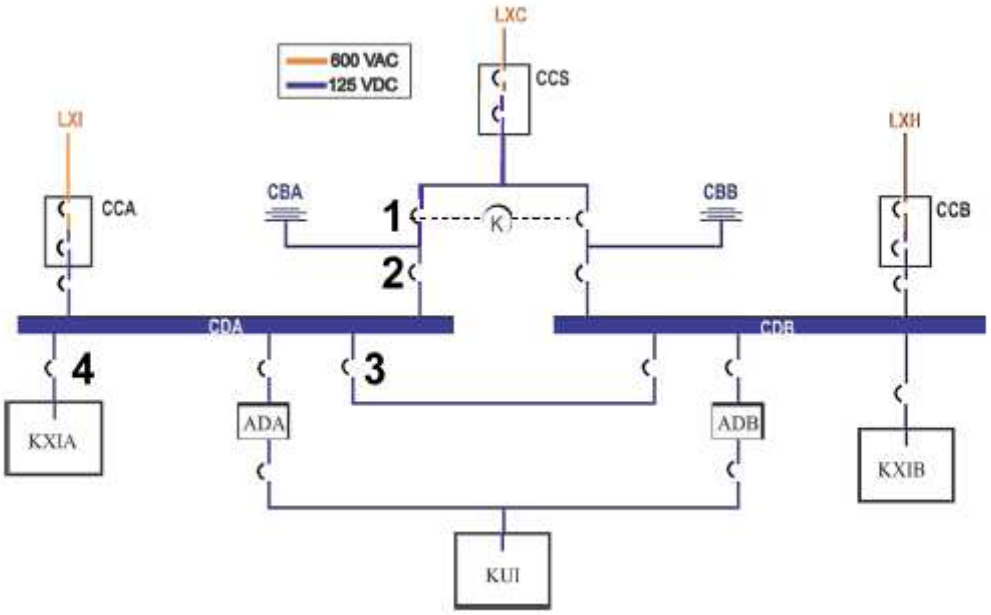
Off-site power sources .....

Remarks/Status

D

ILT-17 NRC Written Exam CNS RO NRC QUESTION 49 49

SYS063 A4.01 - DC Electrical Distribution System
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Major breakers and control power fuses .....



Which ONE of the following describes which of the DC breakers (labeled 1, 2, 3, 4 in the drawing above) that will cause an alarm to be received in the Control Room when the breakers OPEN?

A. Any one of the four breakers

B. Breakers 1 and 3 ONLY

C. Breakers 2 and 3 ONLY

D. Breakers 2 and 4 ONLY

ILT-17 NRC Written Exam CNS RO NRC QUESTION 49

49

D

General Discussion

Breakers 2 and 4 are the ONLY two of the four breakers that, if opened, cause an alarm, per reference section.

Answer A Discussion

"Any of the four breakers" is plausible because there are numerous DC breakers on this drawing (and in the Auxiliary Control Power System) that input to alarms in the Control Room when they open or close, depending on the breaker. At least one of these is correct, and adds plausibility to the overall distractor. Even if the applicant knows the exact function of each of the labeled breakers, they are plausible because:

Breaker 1 is plausible because it uses a Kirk Key interlock design. This is a special operation, requiring a key from the Shift Manager. It is plausible that such an operation would provide an alarm indicating the status of the breaker.

Breaker 3 is plausible since it is an alternate power supply to the DC bus. It is reasonable to think that "losing" this power supply; i.e., opening of the breaker would be a condition warranting special consideration by the Control Room, and an alarm to alert the operators. Applicant could reason that the other breaker (of the two crossties) is normally open, but that 3 is maintained closed.

Answer B Discussion

Plausibility described in "A" above.

Answer C Discussion

Plausibility described in "A" above.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The KA is matched because the applicant must demonstrate the ability to monitor and select from various DC breakers (as illustrated on a drawing of the system) which one would cause an alarm to be received in the Control Room (alarms are a method of monitoring) if the breaker opens.

Basis for Hi Cog

Involves more than one mental step. Applicant must determine from the provided drawing what the function of each of the labeled DC breakers is, and then apply system knowledge for the correct answer.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 7002

Development References

OP-CN-EL-EPF (125 VDC and 240/120 VAC Auxiliary Control Power System LP), Rev, 102, Pg. 25

Student References Provided

SYS063 A4.01 - DC Electrical Distribution System

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

Major breakers and control power fuses .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 50 50

B

SYS064 K4.02 - Emergency Diesel Generator (ED/G) System
Knowledge of ED/G system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Trips for ED/G while operating (normal or emergency) .....

Given the following Unit 2 conditions:

- 2ETB has experienced a Blackout while at 100% RTP
- No operator action has been taken

Which ONE of the following lists parameters which will cause a trip of the 2B D/G if a setpoint is exceeded?

A. Engine Speed
Jacket Water Temperature

B. Engine Speed
Lube Oil Pressure

C. Lube Oil Temperature
Jacket Water Temperature

D. Lube Oil Temperature
Lube Oil Pressure

General Discussion

The only D/G Trips active following a Sequencer start are:

Engine Overspeed
D/G Lockout
Lo-Lo Lube Oil Pressure

Answer A Discussion

Plausible because both parameters are associated with D/G trips. However, the High Jacket Water Temperature is not active following a sequencer start.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Plausible because both parameters are associated with D/G trips. However, these are not active following a sequencer start.

Answer D Discussion

Plausible because both parameters are associated with D/G trips. However, the High Lube Oil Temperature is not active following a sequencer start.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of a ED/G system design feature (D/G trips) and interlocks (bypassed on sequencer start) while operating.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 3124

Development References	Student References Provided
OP/2/A/6100/009B, Rev. 53, Sect. 3	

SYS064 K4.02 - Emergency Diesel Generator (ED/G) System
Knowledge of ED/G system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Trips for ED/G while operating (normal or emergency) .....

Remarks/Status

C

ILT-17 NRC Written Exam CNS RO NRC QUESTION 51 51

SYS073 K3.01 - Process Radiation Monitoring (PRM) System

Knowledge of the effect that a loss or malfunction of the PRM system will have on the following: (CFR: 41.7 / 45.6)

Radioactive effluent releases .....

Given the following Unit 2 conditions:

- The Unit is in Mode 5
- 2EMF-39 has been declared Non-Functional
- 2EMF-36 is in service

In accordance with SLC 16.11-7 (Radioactive Gaseous Effluent Monitoring Instrumentation):

Completion of an in-progress Containment Purge (VP) release _____(1)_____ continue.

A new Containment Purge (VP) release _____(2)_____ be initiated.

Which ONE of the following completes the statements above?

A. 1. may
   2. may

B. 1. may NOT
   2. may

C. 1. may
   2. may NOT

D. 1. may NOT
   2. may NOT

General Discussion

Per the VP Lesson Plan:

Note the statement in both SLCs, regarding VP operation, stating initiation of the Containment Purge Exhaust System with EMF-39 non-functional is not permissible. The only way EMF-36 can replace EMF-39 is when the VP is already operating.

Answer A Discussion

Plausible because EMF-36 is suitable to monitor an existing release. Applicant may reason that it is suitable to initiate a release also.

Answer B Discussion

Plausible if the applicant reverses the restriction on EMF monitoring of a VP release and believes that either EMF can be assigned to initiate a release but only EMF-39 can monitor once it has begun.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Plausible if the applicant believes that only EMF-39 can monitor a VP release, since the release is from containment.

Basis for meeting the KA

The applicant is required to demonstrate knowledge concerning the loss of a process radiation monitor and the associated effect upon initiation and continuation of a containment purge release.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	Bank Q 7003

Development References	Student References Provided
OP-CN-CNT-VP (Containment Purge System Lesson Plan), Rev. 100, Section 5.4	

SYS073 K3.01 - Process Radiation Monitoring (PRM) System

Knowledge of the effect that a loss or malfunction of the PRM system will have on the following: (CFR: 41.7 / 45.6)

Radioactive effluent releases .....

Remarks/Status

SYS076 A1.02 - Service Water System (SWS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: (CFR: 41.5 / 45.5)

Reactor and turbine building closed cooling water temperatures. .....

Given the following conditions:

- Unit 1 and 2 are at 100% RTP
- "A" and "B" RL pumps are in service
- "C" RL pump is tagged out while the pump is being rebuilt
- RL Pressure Controller malfunctions and causes all turnaround valves to fail full open

Which ONE of the following statements describes the system response / consequences related to this event?

A. RL flow to the KR heat exchangers increases resulting in the temperature control valves closing to maintain KR temperature constant.

B. RL flow to the KR heat exchangers decreases resulting in the temperature control valves opening to maintain KR temperature constant.

C. RL flow to the IPB air coolers will increase which may result in condensation in the IPBs during low load conditions.

D. RL flow to the IPB air coolers will decrease which may require a load reduction to prevent the IPBs from overheating.

ILT-17 NRC Written Exam CNS RO NRC QUESTION 52

52

B

General Discussion

The RL Turnaround valves control RL (Low Pressure Service Water) system pressure by bypassing flow to the Discharge Header. A failure of these valves (open) would result in more flow to the discharge header and a reduction in flow to system loads.

The KR (Recirculated Cooling Water) system is cooled by RL with temperature controlled via RL Flow Controller. In response to the above listed event, the decreased RL flow would result in a signal to further open control valves in order to increase KR system cooling.

Answer A Discussion

Plausible if the candidate believes RL Turnaround valves are upstream of system loads.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Plausible if the candidate is not aware that IPB is cooled by KR (vs. RL) and believes that the RL Turnaround valves are installed upstream of the system loads.

Answer D Discussion

Plausible if the candidate is not aware that IPB is cooled by KR (vs. RL).

Basis for meeting the KA

For a given conditions, the applicant is required to demonstrate the ability to predict the changes in parameters (SWS flow to turbine bldg closed cooling water system and resulting system response based on temperature changes) associated with SWS controls.

Basis for Hi Cog

This question requires several mental steps.
1. Compare provided information to system details recalled from memory
2. Determine associated effect upon the SWS flow
3. Apply SWS flow effects to a separate system

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Q 1259

Development References

OP-CN-SS-RL (Low Pressure Service Water LP), Rev. 36, Sect. 2.2.C.3
OP-CN-SS-KR (Recirculated Cooling Water LP), Rev. 20, Sect. 2.2.B.4
OP-CN-EL-EPA (Main Power Distribution LP), Rev. 104, Pg. 101

Student References Provided

SYS076 A1.02 - Service Water System (SWS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: (CFR: 41.5 / 45.5)

Reactor and turbine building closed cooling water temperatures. .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC **QUESTION 53** 53

C

SYS078 K2.01 - Instrument Air System (IAS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Instrument air compressor .....

The power supply for Instrument Air (VI) Compressor E is _____(1)_____.

Which ONE of the following completes the statement above?

A. 1SLXC

B. 2SLXC

C. 1LXI

D. 2LXH

ILT-17 NRC Written Exam CNS RO NRC QUESTION 53

53

C

General Discussion

CNS has 3 installed Instrument Air Compressors (D, E, & F VI Compressors) .

Instr. Air Compressor E 1LXI (Blackout Load Center)
Instr. Air Compressor F 2LXH (Blackout Load Center)
Instr. Air Compressor D 2SLXC (Shared Load Center)

Answer A Discussion

Plausible because "D" VI Compressor is powered from a similar shared load center (2SLXC).

Answer B Discussion

Plausible because this is the power supply for "D" VI Compressor.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Plausible because this is the power supply for "F" VI Compressor.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of Instrument Air Compressor power supply.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-CN-SS-VI, VS&VB (Air Systems - VI,VS and VB LP), Rev. 101, Sect. 3.7	

SYS078 K2.01 - Instrument Air System (IAS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Instrument air compressor .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 54 54 **B**

SYS103 A1.01 - Containment System

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: (CFR: 41.5 / 45.5)

Containment pressure, temperature, and humidity .....

Given the following Unit 2 initial conditions:

- The Unit is in Mode 4 with NC system heat-up is in progress
- Lower Containment pressure is 0.05 psig and stable
- Lower Containment temperature is 101°F and stable
- The BOP places 3 Lower Containment Ventilation Units in service in Low Speed in the MAX cooling mode

Subsequently:

- Lower Containment pressure is DECREASING at 0.02 psig/minute
- Lower Containment temperature is DECREASING at 4°F/minute

A Tech Spec limit will FIRST be EXCEEDED in _____ .

Which ONE of the following completes the statement above?

A. 30 seconds

B. 8 minutes

C. 10.5 minutes

D. 18 minutes

General Discussion

The requirement for Containment Air Temperature, per TS 3.6.5 is as follows:

Containment average air temperature shall be:
a. > 75°F and < 100°F for the containment upper compartment, and
b. > 100°F and < 120°F for the containment lower compartment.
----------NOTE----------
The minimum containment average air temperature in MODES 2, 3, and 4 may be reduced to 60°F.

The requirement for Containment Pressure, per TS 3.6.4 is as follows:

Containment pressure shall be > -0.1 psig and < +0.3 psig.

Both of these TS are applicable in Modes 1-4. Initial conditions provided are Mode 4.

Answer A Discussion

Plausible because Containment Pressure would be 0 psig. Automatic actions (Containment Air Release isolation) share this setpoint, but this is not the TS limit. Also in 30 seconds, containment temperature would be < 100°F which is the TS limit in Mode 1.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Plausible if the applicant does not address the Containment Pressure TS. Containment Temperature would decrease less than TS limit at this time.

Answer D Discussion

Plausible if the applicant does not address the Containment Temperature TS and reverses the limits of Containment Pressure (i.e. negative 0.3 psig)

Basis for meeting the KA

The applicant is required to monitor changes in Containment Temperature and Pressure and demonstrate the ability to predict/prevent exceeding design limits through the application of TS requirements.

Basis for Hi Cog

This question requires multiple calculations.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
TS 3.6.4 TS 3.6.5	

SYS103 A1.01 - Containment System

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: (CFR: 41.5 / 45.5)

Containment pressure, temperature, and humidity .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 55 55 **B**

SYS103 K1.01 - Containment System

Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

CCS .....

Given the following Unit 1 conditions:

- A rapid downpower is in progress due to a secondary steam leak inside Containment
- 1A, 1B, and 1D Lower Containment Vent Units (LCVU) are in operation
- Current Unit 1 Containment pressure is 0.58 psig and increasing slowly

Assuming no operator action,

1RN-473 (LCVU A Full Flow Valve) _____(1)_____ currently open.

1A LCVU _____(2)_____ operating in "Hi Speed".

Which ONE of the following completes the statements above?

A. 1. is
   2. is

B. 1. is
   2. is NOT

C. 1. is NOT
   2. is

D. 1. is NOT
   2. is NOT

ILT-17 NRC Written Exam CNS RO NRC QUESTION 55

55

B

General Discussion

Per the Containment Ventilation LP:

A BYPASS valve or FULL FLOW valve is installed in parallel with the normal cooling water flow control valve. This valve will automatically open for each of the following conditions:
1. An LCVU is selected to HIGH speed.
2. Containment pressure rises to greater than or equal to 0.5 psig.

Per Annunciator Response Procedure for 1AD-19, B/12 will direct LCVUs be placed in High Speed as required. This is not an automatic response.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because of the title of the associated annunciator "Lower Cont Press 0.5 psig Initiate Hi Speed". Also, plausible because High Speed fan operation automatically opens the associated Full Flow valve.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible if the applicant confuses the operation of this valve with LCVU fan speed selection.

Part 2 is plausible because of the title of the associated annunciator "Lower Cont Press 0.5 psig Initiate Hi Speed". Also, plausible because High Speed fan operation automatically opens the associated Full Flow valve.

Answer D Discussion

Part 1 is plausible if the applicant confuses the operation of this valve with LCVU fan speed selection.

Part 2 is correct.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the relationship between Containment and Containment Cooling by determining automatic and manual functions, of the CCS, required when high pressure conditions are experienced in Containment.

Basis for Hi Cog

The applicant must compare provided conditions with a setpoint, recalled from memory, and apply that determination to a specific set of conditions.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 6950

Development References	Student References Provided
OP-CN-CNT-VV (Containment Ventilatin System LP), Rev. 101, Pg. 12, 30,	

SYS103 K1.01 - Containment System

Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

CCS .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 56 56

B

SYS002 K3.03 - Reactor Coolant System (RCS)
Knowledge of the effect that a loss or malfunction of the RCS will have on the following: (CFR: 41.7)
Containment .....

Given the following Unit 1 initial conditions:

- A unit shutdown to Mode 5 is in progress for a refueling outage
- Containment Purge (VP) system startup is in progress

Subsequently:

- The crew enters AP/1/A/5500/019 (Loss of Residual Heat Removal System) following indications of a NC system leak inside Containment
- 1EMF-39 (Containment Gas Hi Rad) has exceeded Trip 2 actuation
- Containment pressure is 0.28 psig and increasing slowly

Based on current conditions:

The VP system _____(1)_____ isolated.

Phase "A" containment isolation _____(2)_____ occurred.

Which ONE of the following completes the statements above?

A. 1. is
   2. has

B. 1. is
   2. has NOT

C. 1. is NOT
   2. has

D. 1. is NOT
   2. has NOT

General Discussion

Actuation of EMF-38 or EMF-39, Trip 2, will initiate a Containment Ventilation Isolation (Sh) signal. The Sh signal can also be initiated by a Phase A Containment Isolation signal. Sh isolates Containment Purge and Containment Air Release systems.

Phase A Containment Isolation is actuated by Safety Injection, but in turn actuations Sh.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible if the applicant reverses automatic actuation signals (i.e. Sh actuates Phase A).

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible if the applicant does not correctly apply the actions of an Sh signal and assumes Containment Purge is not isolated since a VP release can continue following a loss of EMF-39 functionality.

Part 2 is plausible if the applicant reverses automatic actuation signals (i.e. Sh actuates Phase A).

Answer D Discussion

Part 1 is plausible does not correctly apply the actions of an Sh signal and assumes Containment Purge is not isolated since a VP release can continue following a loss of EMF-39 functionality.

Part 2 is correct.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the effect of a malfunction of the RCS (leak) will have on Containment by demonstrating knowledge of applicable Containment Isolations and ventilation system alignments.

Basis for Hi Cog

The applicant must compare provided information with that recalled from memory (EMF actuations) and then determine the status of a system based on those actions. Applicant must also compare provide Containment pressure with a setpoint recalled from memory (Phase A actuation) in order to determine correct answer.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-ECCS-ISE (Engineered Safety Features Actuation System LP), Rev. 102, Sect. 5.4	

SYS002 K3.03 - Reactor Coolant System (RCS)

Knowledge of the effect that a loss or malfunction of the RCS will have on the following: (CFR: 41.7)

Containment .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 57 57

A

SYS014 K5.01 - Rod Position Indication System (RPIS)
Knowledge of the operational implications of the following concepts as they apply to the RPIS: (CFR: 41.5 / 45.7)
Reasons for differences between RPIS and step counter .....

Given the following Unit 1 conditions:

- The Unit is at 100% RTP
- Control Banks A, B, & C are 228 steps withdrawn
- Control Bank D is 215 steps withdrawn
- 1AD-2 E/10 "RPI Non-Urgent Failure" is illuminated
- DRPI displays "Data A Failure"

Subsequently:

- The OATC performs the following evolution in accordance with the RCCA Movement Test
  - Withdraws Control Bank "B" to 238 steps as indicated by the applicable step demand counter
  - Inserts Control Bank "B" to 228 steps as indicated by the applicable step demand counter

Following completion of this step (and plant stabilization):

DRPI accuracy is _____(1)_____ .

NC system temperature will be _____(2)_____ (as compared to temperature prior to testing).

Which ONE of the following completes the statements above?

A. 1. -10/+4 steps
   2. lower

B. 1. -10/+4 steps
   2. the same

C. 1. +10/-4 steps
   2. Lower

D. 1. +10/-4 steps
   2. the same

General Discussion

Per the Rod Control LP:
The rods (control and shutdown banks) have a hard stop at 231 steps. They will not move any further out than 231 steps. If motion is called for past 231 steps the demand counters will continue to count steps even though the rods are not moving. If the demand counters are not repositioned manually, when inward rod motion is called for the rods will begin moving in and the step counters will indicate an incorrect rod position.

Per the Digital Rod Position Indication LP:
With either a Data A or Data B failure the system is reduced to half accuracy, -10, +4 steps.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant is unaware of the hard stop which occurs at 231 SWD. Control Bank B will actually be 221 SWD following this evolution resulting in a lower RCS system temperature.

Answer C Discussion

Part 1 is plausible because this is the accuracy of DRPI with a Data A failure with the numbers reversed.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because this is the accuracy of DRPI with a Data A failure with the numbers reversed.

Part 2 is plausible if the applicant is unaware of the hard stop which occurs at 231 SWD. Control Bank B will actually be 221 SWD following this evolution resulting in a lower RCS system temperature.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/16/17

Knowledge of operational implications of the reasons for differences between RPIS and step counter - "Reason for differences" is demonstrated through knowledge of which system provides actual rod position and the accuracy limits of this system. "Operational implications" is demonstrated through knowledge of the effect upon RCS temperature if rods are incorrectly aligned using step counter indication only.

Basis for Hi Cog

This question requires more than one mental step:
1. The applicant must perform a calculation to determine actual rod height following the listed evolution.
2. The applicant must apply the effects of the calculated rod height to the RCS (temperature).

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-CN-IC-IRE (Rod Control System LP), Rev. 103, Pg. 24 OP-CN-IC-EDA (Digital Rod Position LP), Rev. 100, Sect. 2.5	

SYS014 K5.01 - Rod Position Indication System (RPIS)
Knowledge of the operational implications of the following concepts as they apply to the RPIS: (CFR: 41.5 / 45.7)
Reasons for differences between RPIS and step counter .....

Remarks/Status

PRE-REVIEW QUESTION - SAT 03/16/17

SYS016 K1.08 - Non-Nuclear Instrumentation System (NNIS)

Knowledge of the physical connections and/or cause-effect relationships between the NNIS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

PZR PCS .....

Given the following Unit 1 initial conditions:

- PZR Pressure Channel 1 has failed HIGH
- A Unit plant transient results in a cooldown of the NC system causing the PZR Backup Heaters to energize and "C" Heaters to be full ON

Subsequently:

- No Tech Spec actions have been taken related to PZR Pressure Channel 1
- Unit 1 PZR Pressure Channel 3 fails LOW
- Annunciator 1AD-2, F/9 (DCS ALTERNATE ACTION) alarms

Following this event:

The "C" Heaters _____(1)_____ remain full ON.

The PZR Backup Heaters _____(2)_____ remain energized.

Which ONE of the following completes the statements above?

A. 1. will
   2. will

B. 1. will
   2. will NOT

C. 1. will NOT
   2. will

D. 1. will NOT
   2. will NOT

General Discussion

With the given conditions, two PZR pressure channels are indicating beyond the control deadband and will be discarded by DCS logic resulting in an Alternate Action.

PZR PCS Alternate Action results in the following:
PZR Pressure Master reverts to MANUAL
"C" Heater will remain in operation (as required) based on last known good value
PZR Spray will remain in operation (as required) based on last known good value
All automatic PORV actuation is blocked
Hi/Lo Deviation alarms are blocked
Backup PZR Heaters operation is blocked

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because for most alternate actions, the last good value is held and any previous system actuations in the system would continue to operate in the same state as was required by that last good value.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because an alternate action on Pzr pressure does block actuation of the Pzr PORVs in automatic and applicants could deduce that the same principle could apply to the C Heater operation.

Part 2 is plausible because for most alternate actions, the last good value is held and any previous system actuations in the system would continue to operate in the same state as was required by that last good value.

Answer D Discussion

Part 1 is plausible because an alternate action on Pzr pressure does block actuation of the Pzr PORVs in automatic and applicants could deduce that the same principle could apply to the C Heater operation.

Part 2 is correct.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the effect to the Pzr PCS of a DCS Alternate Action (cause) due to 2 Pzr pressure channels (NNIS) being failed.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

OP-CN-PS-IPE (Pressurizer Pressure Control LP), Rev. 101, Sect. 5.4
OP-CN-DCS-DCS (Distributed Control System LP), Rev. 100, Sect. 1.2

Student References Provided

SYS016 K1.08 - Non-Nuclear Instrumentation System (NNIS)
Knowledge of the physical connections and/or cause-effect relationships between the NNIS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)
PZR PCS .....

Remarks/Status

D

ILT-17 NRC Written Exam CNS RO NRC QUESTION 59 59

SYS027 K2.01 - Containment Iodine Removal System (CIRS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Fans .....

Which ONE of the following is the power supply for the 1A VE Fan?

A. 1MXK

B. 1MXJ

C. 1EMXB

D. 1EMXI

General Discussion

From Lesson Plan OP-CN-CNT-VE:

Each train has its own 100% capacity fan. Power supplies to the Annulus Ventilation Fans are:
1(2)A VE Fan: 1(2)EMXI
1(2)B VE Fan: 1(2)EMXB

600 V motor control centers MXJ & MXK power several ventilation components including Fuel Pool Ventilation Supply Fans and Containment Purge Supply and Exhaust Fans. These components are located on the same control board location as the VE fans.

Answer A Discussion

Plausible because this is a power supply to fans located on the same section of the main control board (VF supply fans & VP supply and exhaust fans), and applicant could confuse this power supply with the VE fan power supply.

Answer B Discussion

Plausible because this is a power supply to fans located on the same section of the main control board (VF supply fans & VP supply and exhaust fans), and applicant could confuse this power supply with the VE fan power supply.

Answer C Discussion

Plausible because this is a power supply to a VE fan (1B), but is not the power supply to the 1A VE fan.

Answer D Discussion

CORRECT: See discussion above.

Basis for meeting the KA

CNS does not have a Containment Iodine Removal system per se. However, the Annulus Ventilation system does have an Iodine removal function. Since the applicant must have knowledge of the power supplies to the Annulus Ventilation fans which are part of a system which has an Iodine removal function, the KA is matched.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	'16 CNS Q59

Development References

OP-CN-CNT-VE (Annulus Ventilation System LP), Rev. 100, Sect. 4
OP-CN-CNT-VP (Containment Purge System LP), Rev. 100, Sect. 11.7 & 11.8
OP-CN-FH-VF (Fuel Pool Ventilation System LP), Rev. 103, Sect. 4

Student References Provided

SYS027 K2.01 - Containment Iodine Removal System (CIRS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Fans .....

Remarks/Status

SYS033 A3.01 - Spent Fuel Pool Cooling System (SFPCS)
Ability to monitor automatic operation of the Spent Fuel Pool Cooling System including: (CFR: 41.7 / 45.5)
Temperature control valves .....

Given the following Unit 1 initial conditions:

- 1A1 KC Pump is in service
- 1A KF Pump is in service

Subsequently:

- 1KC-50A (Aux Bldg Non-Ess Hdr Isol) has spuriously closed

1KC-149 (KF Hx 1A Cool Wtr Otlt) _____(1)_____ AUTOMATICALLY reposition in order to maintain Spent Fuel Pool temperature.

If the Spent Fuel Pool High Temperature annunciator setpoint is exceeded, entry into the actions of SLC 16.7-9 (Standby Shutdown System) _____(2)_____ be required.

Which ONE of the following completes the statements above?

A. 1. will
2. will

B. 1. will
2. will NOT

C. 1. will NOT
2. will

D. 1. will NOT
2. will NOT

General Discussion

The temperature of the Spent Fuel Pool is maintained by control of CCW flow through the KF heat exchangers. This flow is adjusted via a manual loader located on the Main Control Boards. There is no automatic function of this valve.

Per the KF OP:
With fuel pool temperature greater than/equal to 125 deg F (setpoint for 1AD-13, E/1 "SPENT FUEL POOL TEMP HI"), the SSF is non-functional per the associated Annunciator Response.

Although the suction source is required to be less than 135 deg, measured locally, a conservative requirement has been instituted (125 deg on CR gauge) to ensure the initial temperature is within the assumptions for an SSF event.

Answer A Discussion

Part 1 is plausible because this valve does maintain KF system temperature, is manipulated from the control room, and is rarely adjusted. It is reasonable to assume it functions automatically.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because this valve does maintain KF system temperature, is manipulated from the control room, and is rarely adjusted. It is reasonable to assume it functions automatically.

Part 2 is plausible because the SFP has multiple other TSs & SLCs (i.e. SFP water level, boron concentration, assembly storage, level instrumentation) which require analysis following an undesired condition. The relationship between the SSF and SFP are not inherently obvious. Also, the DBD states that temperature must be less than 135 deg, by local measurement, which is above the conservative requirement of the CR gauge.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because the SFP has multiple other TSs & SLCs (i.e. SFP water level, boron concentration, assembly storage, level instrumentation) which require analysis following an undesired condition. The relationship between the SSF and SFP are not inherently obvious. Also, the DBD states that temperature must be less than 135 deg, by local measurement, which is above the conservative requirement of the CR gauge.

Basis for meeting the KA

CE NOTE: This K/A was discussed on 01/19/17 due to the lack of automatic SFP temperature control at CNS. CE agreed to accept question related to manual control of cooling water in order to maintain SFP within temperature limits.

This question requires the applicant to demonstrate the ability to monitor operation of SFP cooling through knowledge of the method of operation of the associated controls and knowledge of SFP temperature limits through SLC required actions.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References
OP-CN-FH-KF (Spent Fuel Pool Cooling System LP), Rev. 103, Sect. 2.3 OP/1/A/6200/005 (Spent Fuel Cooling System), Rev. 95, L&P 2.16 OP-CN-CP-AD (Standby Shutdown Facility LP), Rev. 107, Sect. 3.1.1

Student References Provided

SYS033 A3.01 - Spent Fuel Pool Cooling System (SFPCS)
Ability to monitor automatic operation of the Spent Fuel Pool Cooling System including: (CFR: 41.7 / 45.5)
Temperature control valves .....

Remarks/Status
01/19/17 - Discussed with CE. Will accept question related to manual control of cooling water in order to maintain SFP within temperature limits. Ensure K/A match statement contains info related to discussion and CE approval.

ILT-17 NRC Written Exam CNS RO NRC QUESTION 61 61

B

SYS034 K6.02 - Fuel Handling Equipment System (FHES)

Knowledge of the effect of a loss or malfunction on the following will have on the Fuel Handling System : (CFR: 41.7 / 45.7)

Radiation monitoring systems .....

Which ONE of the following describes the effect of 1EMF-15, Spent Fuel Building Refueling Bridge Monitor losing power?

A. The Auxiliary Hoist cannot be raised

B. New fuel elevator cannot be operated in the UP direction

C. SFP Ventilation System automatically swaps to filter mode

D. Fuel movement in the Spent Fuel Pool must be stopped immediately

---

ILT-17 NRC Written Exam CNS RO NRC QUESTION 61

61

B

General Discussion

If 1EMF-15 loses power, it processes a Trip 2 signal which, for this monitor, prevents the New Fuel Elevator from being operated in the UP direction.

Answer A Discussion

Plausible, since 1EMF-15 DOES prevent a lifting device from operating to raise its load; but it is for the New Fuel Elevator. The Auxiliary Hoist is used in refueling operations, including movement of fuel assemblies, and the radiation monitor signal could be misapplied.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

Supplementary Action #2 of the alarm response for 1EMF-15 actuation (1RAD-3, tile C/5) provides guidance to:
"ensure Spent Fuel Pool Ventilation System filters in filter mode per OP/1/A/6450/004 (Fuel Pool Ventilation System), if required."
There is nothing in the stem to indicate conditions requiring the Spent Fuel Pool ventilation to be in filter mode. This adds plausibility to this distractor, since there is guidance regarding Filter Mode. Also, there are other radiation monitors which DO automatically place the VF (Spent Fuel Pool Ventilation System) in Filter Mode; e.g., 1EMF-35, Unit Vent Particulate Monitor, 1EMF-36L, Unit Vent Gas Monitor, etc., as explained in the Lesson Plan for EMF.

Answer D Discussion

SLC 16.7-10, Condition E Required Action does contain some direction to suspend all operations involving fuel movement in the fuel building, but the Completion Time is NOT Immediately.

Basis for meeting the KA

KA is matched because the question tests knowledge of the effect of a loss of power to a radiation monitor associated with fuel handling.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	Bank Q 206

Development References	Student References Provided
OP-CN-WE-EMF (EMF LP), Rev. 103, Section 5.4, 1EMF15 SLC 16.7-10, Condition F	

SYS034 K6.02 - Fuel Handling Equipment System (FHES)
Knowledge of the effect of a loss or malfunction on the following will have on the Fuel Handling System : (CFR: 41.7 / 45.7)
Radiation monitoring systems .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 62 62 **C**

SYS035 A2.05 - Steam Generator System (S/GS)

Ability to (a) predict the impacts of the following mal- functions or operations on the GS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.5)

Unbalanced flows to the 5/Gs .....

Given the following Unit 1 conditions:

- The Unit is at 100% RTP
- A DCS failure has caused the 1A S/G CF Main Feed Reg Valve to transfer to MANUAL and begin opening
- The crew enters AP/1/A/5500/006 (Loss of S/G Feedwater), Case III (CF Control Not in Auto) to address the failure

If 1A S/G level control is not established, AP/06 will direct the crew to trip the reactor prior to reaching the S/G Hi-Hi Level setpoint of _____(1)_____ .

AP/06 _____(2)_____ direct the crew to place 1A S/G CF Feed Reg Bypass Valve in Manual.

Which ONE of the following completes the statements above?

A. 1. 77%
   2. will

B. 1. 77%
   2. will NOT

C. 1. 83%
   2. will

D. 1. 83%
   2. will NOT

General Discussion

Per the AP/06 lesson plan - mitigating strategy:

Manually trip the reactor when required - The reactor should be manually tripped anytime S/G levels approach the S/G Hi-Hi Level Turbine Trip at 83% [U2: 77%] or the S/G Lo-Lo Level Reactor Trip 11% [U2: 37%].

Ensure CF Control Valves working in Auto - Control valves are controlled in manual if required. Any time a FRV is in Manual, its associated Bypass Feed Reg Valve (BFRV) should also be placed in Manual.

Answer A Discussion

Part 1 is plausible because this is the Unit 2 value for Hi S/G Level Rx Trip.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because this is the Unit 2 value for Hi S/G Level Rx Trip.

Part 2 is plausible if the applicant reasons that automatic control of the bypass valve (functioning properly) will assist in recovering S/G level and result in less operator burden.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible if the applicant reasons that automatic control of the bypass valve (functioning properly) will assist in recovering S/G level and result in less operator burden.

Basis for meeting the KA

The applicant is required to demonstrate the ability to use the applicable procedure to correct and control the consequences of an unbalanced S/G flow malfunction via knowledge of the mitigating actions of this procedure. The applicant is also required to predict impacts of the malfunction through knowledge of the Hi S/G Level Rx trip.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-CN-AP-06 (AP/06: Loss of S/G Feedwater LP), Rev. 02, Sect. 3.3	

SYS035 A2.05 - Steam Generator System (S/GS)

Ability to (a) predict the impacts of the following mal- functions or operations on the GS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.5)

Unbalanced flows to the 5/Gs .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 63 63 **B**

SYS071 A1.06 - Waste Gas Disposal System (WGDS)

Ability to predict and/or monitor changes in parameters(to prevent exceeding design limits) associated with Waste Gas Disposal System operating the controls including: (CFR: 41.5 / 45.5)

Ventilation system .....

Given the following conditions:

- A release has been initiated from "C" Waste Gas Decay Tank
- A calculation error resulted in improper determination of EMF setpoints for the release
  - The release has been secured following EMF Trip 2 actuation of the Unit Vent Gas Monitor

Following this event (assuming no operation action):

ABUXF-1A (1A Auxiliary Building Ventilation Unfiltered Exhaust Fan) _____(1)_____ be in operation.

ABUXF-2A (2A Auxiliary Building Ventilation Unfiltered Exhaust Fan) _____(2)_____ be in operation.

Which ONE of the following completes the statements above?

A. 1. will
   2. will

B. 1. will NOT
   2. will

C. 1. will
   2. will NOT

D. 1. will NOT
   2. will NOT

General Discussion

Waste Gas release discharge path is to the Unit 1 vent ONLY. The given conditions would result in an actuation of 1EMF-36. The associated automatic actions will be:
1. Trip unit related Aux Bldg Unfiltered Exhaust Fans
2. Align unit related Aux Bldg Filtered Exhaust Units to Filter Mode
3. Align SFP Ventilation to Filter Mode
4. Close 1WG-160 (WGDT Outlet to Unit Vent Isol)
5. Isolate unit related Containment Air Release

Answer A Discussion

Plausible if the applicant is unaware of the effects of the unit vent EMF's actuation upon Aux Bldg Ventilation, or believes it only places this system in Filter Mode.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Plausible if the applicant reverses the discharge path of a Waste Gas release (Unit 1 vs. Unit 2)

Answer D Discussion

Plausible if the applicant believes that a Waste Gas release will be aligned to both units or believes that an actuation of 1EMF-36 affects all Aux Bldg Vent Units (shared system).

Basis for meeting the KA

The applicant is predict changes in ventilation system operations as related to functions associated with the Waste Gas Disposal system.

Basis for Hi Cog

This question requires more than one mental step:
1. The applicant must compare provided information with that recalled from memory in order to determine the EMF actuation was associated with Unit 1 and determine which EMF was actuated.
2. The applicant must apply knowledge of EMF actuations to Unit 1 and Unit 2 Ventilation systems.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 6565

Development References

OP-CN-WE-WG (Waste Gas System LP), Rev. 204, Sect. 5.4
OP-CN-WE-EMF (Radiation Monitoring System LP), Rev. 103, Sect. 6.5 & 6.10

Student References Provided

SYS071 A1.06 - Waste Gas Disposal System (WGDS)
Ability to predict and/or monitor changes in parameters(to prevent exceeding design limits) associated with Waste Gas Disposal System operating the controls including: (CFR: 41.5 / 45.5)
Ventilation system .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 64 64

C

SYS079 K4.01 - Station Air System (SAS)
Knowledge of SAS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Cross-connect with IAS .....

Given the following conditions:

- 1AD-8 A/7 (VI Lo Press) is received
- 0VIP5260 (VI Pressure) indicates 74 psig and slowly decreasing

Which ONE of the following describes the position of VI system valves (and correct setpoint) in response to the lowering VI header pressure?

A. VS-78 (VS Supply to VI) opens at 80 psig

B. VI-500 (VI Supply to VS) closes at 76 psig

C. VS-78 (VS Supply to VI) opens at 76 psig

D. VI-500 (VI Supply to VS) closes at 78 psig

General Discussion

From the Instrument/Station Air lesson plan:
80 psig - VI supply to VS CLOSES (VI-500)
76 psig - VS supply to VI OPENS (VS-78)

Answer A Discussion

Plausible because the valve position is correct; setpoint is incorrect.

Answer B Discussion

Plausible because the valve position is correct; setpoint is incorrect.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Plausible because the valve position is correct; setpoint is incorrect.

Basis for meeting the KA

The applicant is presented with plant conditions involving an air leak and how the cross-connect design feature between instrument air and station/service air functions for the given conditions.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 7004

Development References

OP-CN-SS-VI (Air Systems - VI, VS, and VB LP), Rev. 101, Sect. 3.5

Student References Provided

SYS079 K4.01 - Station Air System (SAS)
Knowledge of SAS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Cross-connect with IAS .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 65 65

C

SYS086 A4.01 - Fire Protection System (FPS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Fire water pumps .....

Given the following Unit 2 conditions:

- 2ETA has experienced a blackout

Following sequencer loading, the _____(1)_____ Main Fire Pump will be operating.

The "Main Fire Pumps Running" annunciator will alarm on the _____(2)_____ annunciator panel.

Which ONE of the following completes the statements above?

A. 1. "A"
   2. Unit 1

B. 1. "A"
   2. Unit 2

C. 1. "C"
   2. Unit 1

D. 1. "C"
   2. Unit 2

General Discussion

Following an Essential bus blackout, the blackout sequencer will start the associated D/G and sequence on load groups 1, 2, 3, 6, 7, 8, 9, 10, 11, and 12, and provide a permissive for load group 13. The applicable Main Fire Pump will be loaded as part of load group 9. The C Main Fire Pump associated with 2ETA (Powered by the associated blackout bus - 2FTA).

The Main Fire Pump autostart will initiate Annunciator 1AD-13 D/5 (Main Fire Pumps Running).

Answer A Discussion

Part 1 is plausible if the applicant is unaware of Main Fire Pump power supplies and associated A Main Fire Pump with A essential bus.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible if the applicant is unaware of Main Fire Pump power supplies and associated A Main Fire Pump with A essential bus.

Part 2 is plausible because of other Fire Protection System alarms which actuate only on a Unit 2 Annunciator Panel (2AD-13 B/5 "EFA System Trouble" & A/5 "EFA System Alarm").

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because of other Fire Protection System alarms which actuate only on a Unit 2 Annunciator Panel (2AD-13 B/5 "EFA System Trouble" & A/5 "EFA System Alarm").

Basis for meeting the KA

The applicant is required to demonstrate the ability to monitor Main Fire Pump operation in the Control Room by demonstrating knowledge of which pump would be expected to start and where start indication would be found for a given condition.

Basis for Hi Cog

This question requires more than one mental step:
1. The applicant must compare given conditions (blackout) with that recalled from memory in order to determine associated operational effects.
2. The applicant must apply operational effects to the RF system and recall the power supply for the applicable pump.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-CN-SS-RFY (Fire Protection Systems LP), Rev. 28, Sect. 2.2.A.5
OP/1/B/6100/010N (Annunciator Response for Panel 1AD-13), Rev. 49, D/5
OP/2/B/6100/010N (Annunciator Response for Panel 2AD-13), Rev. 39, A/5

Student References Provided

SYS086 A4.01 - Fire Protection System (FPS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Fire water pumps .....

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC **QUESTION 66** 66 **A**

GEN2.1 2.1.15 - GENERIC - Conduct of Operations

Conduct of Operations

Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, Operations memos, etc.

Which ONE of the following describes an appropriate example of information to be communicated to the shifts by use of an OPS Guide, in accordance with the requirements of SOMP 01-13 (Operations Work List, Routine Task List, and OPS Guides)?

A. Notification that engineering has determined a Tech Spec inoperability may exist under certain conditions due to new analyzed failure scenarios

B. SM direction to verify 1A D/G Lube Oil Temp two times per shift due to an annunciator failure

C. Temporary procedure instructions for a system which is currently being modified, while a procedure change is being completed

D. Direction, from the unit lead, concerning work (or evolutions) that need(s) to be completed on a particular shift

---

General Discussion

From SOMP 01-13, step 9.1.2

"IF engineering guidance documents, Operational Decision Making Issues (ODMIs) and PIP immediate/interim corrective actions are issued to provide additional monitoring, they shall be communicated to the shifts through OPS Guides. ODMIs, engineering guidance documents, OPS Focus Items, OPS Guides, etc. shall NOT be used to operate the plant."

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Plausible because this answer meets the criteria for creation of an Increased Surveillance (not OPS Guide) per OMP 2-31.

Answer C Discussion

Plausible because the applicant may assume from the title OPS Guide that the purpose may include procedural guidance. However, SOMP 01-13 specifically states that OPS guides are not to be used as replacement for Operating Procedures.

Answer D Discussion

Plausible because this answer meets the criteria for creation of a Work List Item per SOMP 01-13.

Basis for meeting the KA

Applicant is required to demonstrate knowledge of a temporary management directive, specifically OPS Guides which are used to communicate important information to shift personnel.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 7005

Development References

OMP 2-31 (Control Room Instrumentation Status), Rev. 30, page 3,
SOMP 01-13 (Operations Work List, Routine Task List, and OPS Guides), Rev. 0, Steps 7.1.1 & 9.1.12,

Student References Provided

GEN2.1 2.1.15 - GENERIC - Conduct of Operations

Conduct of Operations

Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, Operations memos, etc.

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 67 67

D

GEN2.1 2.1.17 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to make accurate, clear, and concise verbal reports. (CFR: 41.10 / 45.12 / 45.13)

Given the following Unit 1 conditions:

- The crew has entered EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) following a steam leak inside containment
- The BOP notes that containment pressure has exceeded 3.0 psig

The BOP will communicate containment conditions to the crew using a _____(1)_____ .

This communication _____(2)_____ required to be 3-way.

In accordance with SOMP 01-07 (Control Room Oversight) and AD-OP-ALL-1000 (Conduct of Operations), which ONE of the following completes the statements above?

A. 1. Crew Brief
   2. is

B. 1. Crew Brief
   2. is NOT

C. 1. Crew Update
   2. is

D. 1. Crew Update
   2. is NOT

General Discussion

Per AD-OP-ALL-1000 and SOMP 01-07:
A Crew Update is a method of transferring information to all crew members when additional information is obtained by one crew member. A Crew Update may be provided by any member of the crew.
A Crew Brief is used to ensure consistent understanding of plant conditions and direction. This brief shall be led by the SM or CRS.

Since a Crew Update is an announcement to all crew members, repeat back is not feasible and not required. See example listed in Section 5.5.6.b of AD-OP-ALL-1000.

Answer A Discussion

Part 1 is plausible because this is a communication listed in AD-OP-ALL-1000 which include all crew members.

Part 2 is plausible because 3-way communication is the normally required method of information transfer.

Answer B Discussion

Part 1 is plausible because this is a communication listed in AD-OP-ALL-1000 which include all crew members.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because 3-way communication is the normally required method of information transfer.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to demonstrate the ability to provide an accurate and concise verbal report to the Control Room team and knowledge of the communication standard.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
SOMP 01-07 (Control Room Oversight), Rev. 02, Sect. 8	

GEN2.1 2.1.17 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to make accurate, clear, and concise verbal reports. (CFR: 41.10 / 45.12 / 45.13)

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC **QUESTION 68** 68

C

GEN2.1 2.1.28 - GENERIC - Conduct of Operations
Conduct of Operations
Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)

The SSF Diesel Generator ____(1)____ receive an automatic start signal and has the capability to supply power to a sub-bank of ___(2)___ pressurizer heaters.

Which ONE of the following completes the statement above?

A. 1. does
   2. D

B. 1. does
   2. B

C. 1. does NOT
   2. D

D. 1. does NOT
   2. B

General Discussion

The D/G is started by selecting ON at the SSF D/G switch on the SSF Panel (ONLY). SSF 600VAC loads Motor control center (MCC) SMXG receives power from 1SLXG and distributes power to SSF required loads including pressurizer heaters (a subgroup of bank D).

Answer A Discussion

Part 1 is plausible because the emergency DG receives automatic starts based on undervoltage and safety injection.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because the emergency DG receives automatic starts based on undervoltage and safety injection.

Part 2 is plausible because A & B PZR Heaters are required to be powered from an emergency power source.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because A & B PZR Heaters are required to be powered from an emergency power source.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the purpose and function of a major system component (SSF DG) and associated required controls.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

OP-CN-CP-AD (Standby Shutdown Facility LP), Rev. 107, Sect. 2.1.1 & 2.3
OP-CN-DG-DG3 (Emergency Diesel Generator LP), Rev. 103, Sect. 7.1 - 7.3
T.S.B. 3.4.9

Student References Provided

GEN2.1 2.1.28 - GENERIC - Conduct of Operations

Conduct of Operations

Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 69 69

C

GEN2.2 2.2.22 - GENERIC - Equipment Control
Equipment Control
Knowledge of limiting conditions for operations and safety limits. (CFR: 41.5 / 43.2 / 45.2)

In accordance with Tech Spec 2.1.1 (Reactor Core SLs), the peak centerline fuel temperature shall be maintained less than _____(1)_____. This limit _____(2)_____ change over core life.

Which ONE of the following completes the statements above?

A. 1. 2200°F
   2. does

B. 1. 2200°F
   2. does NOT

C. 1. 5080°F
   2. does

D. 1. 5080°F
   2. does NOT

General Discussion

Per T.S. 2.1.1, the peak centerline temperature shall be maintained < 5080°F, decreasing 58°F for every 10,000MWd/mtU of fuel burnup.

Answer A Discussion

Part 1 is plausible because this is the value specified in the Fuel Design criteria.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because this is the value specified in the Fuel Design criteria.

Part 2 is plausible because it is reasonable to believe that this value does not change since it is "safety limit", and the other two safety limits do not have a similar change over core life.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because it is reasonable to believe that this value does not change since it is "safety limit", and the other two safety limits do not have a similar change over core life.

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of the NC system Tech Spec Safety Limits.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 6966

Development References	Student References Provided
T.S. 2.1.2 (RCS Pressure SL) & 2.2 (SL Violations) OP-CN-PS-IPE (Pressurizer Pressure Control LP), Rev. 101, Sect. 10.3	

GEN2.2 2.2.22 - GENERIC - Equipment Control

Equipment Control

Knowledge of limiting conditions for operations and safety limits. (CFR: 41.5 / 43.2 / 45.2)

Remarks/Status

GEN2.2 2.2.44 - GENERIC - Equipment Control

Equipment Control

Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)

Given the following Unit 1 timeline:

1000

- The Unit has experienced a runback, from 100% power, following a trip of 1A CFPT

1005

- Main Turbine target load has been reached
- 1AD-2 B/9 (Control Rod Bank Lo-Lo Limit) is illuminated
- Steam Dumps have closed
- Temperature Error meter indicates (+) 1.8° F

In accordance with OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), at **1005** the crew will _____ .

Which ONE of the following completes the statement above?

A. initiate boration

B. place control rods in manual

C. begin control rod withdrawal to restore insertion limits

D. insert control rods to maintain T_{avg} within 1 degree of T_{ref}

General Discussion

OMP 1-7 Attachment 11.1 (General Statements of Philosophy) states the following:

"Following a load rejection/turbine runback, the control room crew should place control rods in manual once the steam dumps have closed. This will stop auto rod insertion with Tavg ~ 3°F higher than Tref. With the negative reactivity from the Xenon transient still causing Tavg to decrease, this should allow the crew the time to have a focus brief on borating the NC system and restoring rods above insertion limits (if necessary) without Tavg decreasing excessively below Tref."

Answer A Discussion

Plausible because AP/03 (Load Rejection) contains guidance (step 12 and Encl 3) to initiate boration, as required, to restore control rod insertion limits. Additionally, TS 3.1.6 requires boration initiation within one hour when insertion limits are not met.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Plausible because the applicable procedure (AP/03) contains guidance to maintain control rods above insertion limits. See steps 8, 13, & 17. Additionally, TS 3.1.6 requires control banks to be restored above insertion limits within 2 hours.

Answer D Discussion

Plausible because this is part of the global guidance provided by the procedure in effect , AP/03 (step 17) after the runback target is reached. However, OMP 1-7 employs an alternate strategy at this point due to the affects of xenon

Basis for meeting the KA

The applicant is required to interpret control room indications in order to verify unit status and apply a specific management directive related to overall plant operation (effects of xenon following a runback).

Basis for Hi Cog

This question requires more than one mental step:
1. The applicant must compare provided information with that recalled from memory in order to determine the listed temperature error is less than that specified in OMP 1-7.
2. The applicant must separately analyze all listed distractors, as they are valid procedural action for given conditions, and then select the correct answer.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), Rev. 41, Attachment 11.1 Sect. 14
AP/1/A/5500/03, Rev. 41, Step 2 and Enclosure 3

Student References Provided

GEN2.2 2.2.44 - GENERIC - Equipment Control

Equipment Control

Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 71 71

C

GEN2.3 2.3.11 - GENERIC - Radiation Control
Radiation Control
Ability to control radiation releases. (CFR: 41.11 / 43.4 / 45.10)

Consider the following Unit 1 conditions:

- EMF-50 (WG Disch Monitor - Waste Gas) Trip 2 actuated
- EMF-31 (Turbine Building Sump) Trip 2 actuated

Consider Each Statement Separately

Re-initiation of the Waste Gas release at least once WITHOUT resampling _____(1)_____ allowed.

Re-initiation of the Turbine Building Sump release at least once WITHOUT sampling _____(2)_____ allowed.

Which ONE of the following completes the statements above?

A. 1. is
   2. is

B. 1. is NOT
   2. is

C. 1. is
   2. is NOT

D. 1. is NOT
   2. is NOT

General Discussion

Re-initiation is allowed following two High Rad discharge trips for EMF-50 per the Limits and Precautions of OP/0/A/6500/018. EMF-31 release is required to be secured if pre-set levels are exceeded per OP/0/B/6500/113.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible if the applicant is not aware that EMF-31 re-initiation is not allowed

Answer B Discussion

Part 1 is plausible if the applicant not aware that re-initiation is allowed following two High Rad trips of EMF-50.

Part 2 is plausible if the applicant is not aware that EMF-31 re-initiation is not allowed.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is plausible if the applicant not aware that re-initiation is allowed following two High Rad trips of EMF-50.

Part 2 is correct.

Basis for meeting the KA

This is a generic KA, and the scope of the question meets that aspect by testing on two radiation paths and associated unacceptable conditions. The "control" aspect is met by testing on whether a release has to be re-sampled before re-initiating.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 7006

Development References	Student References Provided
OP/0/A/6500/143 (Waste Gas Decay Tank C Release), Rev. 0, L&P 2.5 OP/0/B/6500/113 (Operations Liquid Waste Release), Rev. 010, L&P 2.5	

GEN2.3 2.3.11 - GENERIC - Radiation Control

Radiation Control

Ability to control radiation releases. (CFR: 41.11 / 43.4 / 45.10)

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 72 72 **D**

GEN2.3 2.3.12 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 45.9 / 45.10)

Given the following Unit 1 conditions:

- A valve is required to be operated at the "A" Containment Floor and Equipment Sump (CFES)
- General Area Dose rates at the valve are 1250 mrem/hr

In accordance with PD-RP-ALL-0001 (Radiation Protection), the "A" CFES will be designated as a _____(1)_____ Area.

The radiological boundary at the "A" CFES will be identified by a flashing _____(2)_____ light.

Which ONE of the following completes the statements above?

A. 1. Very High Radiation
   2. blue

B. 1. Very High Radiation
   2. yellow

C. 1. Locked High Radiation
   2. blue

D. 1. Locked High Radiation
   2. yellow

General Discussion

Per PD-RP-ALL-0001:
Locked High Radiation Area: An area accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 1.0 rem in 1 hr at 30 centimeters from the radiation source or from any surface that the radiation penetrates. These areas are locked or guarded and require continuous RP coverage for entry.

Areas that meet the following criteria shall be conspicuously posted, and a flashing light shall be activated as a warning device:
Areas located within large areas, such as reactor containment where no enclosure exists for purposes of locking or that cannot be continuously guarded.

Answer A Discussion

Part 1 is plausible because this would be the correct answer if the general area dose rates were 1250 r/hr (vs. mrem/hr).

Part 2 is plausible because blue flashing lights are used at CNS for designation of radiography boundaries.

Answer B Discussion

Part 1 is plausible because this would be the correct answer if the general area dose rates were 1250 r/hr (vs. mrem/hr).

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because blue flashing lights are used at CNS for designation of radiography boundaries.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of radiological safety principals by applying the requirements of accessing a locked high radiation area.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

PD-RP-ALL-0001 (Radiation Worker Responsibilites), Rev. 7, Sect. 3.0.9 & 3.0.22
AD-RP-ALL-2022 (Radiation Protection Radiography Responsibilities), Rev. 1, Sect. 3.0.2
OP-CN-RAD-HP (Radiation Protection LP), Rev. 104, Sect. 3.7

OP-CN-CNT-VP (Containment Purge System LP), Rev. 100, Pg. 17
OP/1/A/6450/015 (Containment Purge System), Rev. 58, L&P 2.1
OP/1/A/6450/010 (Containment Hydrogen Control Systems), Rev. 43, L&P 2.3

Student References Provided

GEN2.3 2.3.12 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 45.9 / 45.10)

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 73 73

D

GEN2.4 2.4.6 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 2 conditions

- The crew has entered EP/2/A/5000/E-1 (Loss of Reactor or Secondary Coolant) following a LOCA
- Containment pressure peaked at 3.2 psig
- Current Containment pressure is 2.4 psig

In accordance with E-1, the OATC will throttle CA flow in order to maintain S/G NR levels between _____ .

Which ONE of the following completes the statement above?

A. 11 and 50%

B. 29 and 50%

C. 15 and 62%

D. 26 and 62%

ILT-17 NRC Written Exam CNS RO NRC QUESTION 73

73

D

General Discussion

E-1 will direct throttling to maintain Unit 2 S/G between 15 - 62% (non-ACC conditions) and 26-62% (ACC conditions).

Adverse Containment Conditions are present as pressure has previously exceeded the setpoint of 3 psig.

Answer A Discussion

Plausible because this is the E-1 specified values for Unit 1 S/G level control (non-ACC conditions).

Answer B Discussion

Plausible because this is the E-1 specified values for Unit 1 S/G level control (ACC conditions).

Answer C Discussion

Plausible because this is the E-1 specified values for Unit 2 S/G level control (non-ACC conditions).

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of an EOP strategy related to heat sink requirements in a particular procedure.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	BANK Q 7007

Development References

EP/2/A/5000/E-1 (Loss of Reactor or Secondary Coolant), Rev. 27, Step 4.b
EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant), Rev. 30, Step 4.b

Student References Provided

GEN2.4 2.4.6 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of EOP mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

01/19/17 - CE agreed to replace K/A due to lack of loss of annunciator response procedural actions.

ILT-17 NRC Written Exam CNS RO NRC QUESTION 74 74

A

GEN2.4 2.4.37 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of the lines of authority during implementation of the emergency plan. (CFR: 41.10 / 45.13)

During conditions involving the implementation of Emergency Procedures, and in accordance with OMP 1-7, (Emergency/Abnormal Procedure Implementation Guidelines), control board manipulations may be performed by an SRO **other than** the _____(1)_____ , ONLY if authorized by the _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. Control Room Supervisor
   2. Shift Manager

B. 1. Unit Supervisor
   2. Control Room Supervisor

C. 1. Shift Manager
   2. Control Room Supervisor

D. 1. Unit Supervisor
   2. Shift Manager

General Discussion

Nuclear Control Operator (ROs) should perform all control board manipulations. An SRO, other than the CRS, may perform control board manipulations at the discretion of the Shift Manager.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Incorrect. All Unit Supervisors at Catawba are licensed SROs, and therefore a Unit Supervisor could perform board manipulations. The CRS is plausible since that is a position of authority and oversight, but not for this particular item, which specifically requires approval by the Operations Shift Manager.

Answer C Discussion

Incorrect. Plausible that a unit specific position (CRS) may need assistance on the boards and be able to authorize the OSM to assist in an emergency.

Answer D Discussion

Incorrect. The second part is correct. Plausibility of Unit Supervisor as NOT being able to perform board manipulations is described above.

Basis for meeting the KA

The KA is matched is because knowledge of the lines of authority are tested by asking which control board manipulations can be performed by whom during emergency procedure implementation.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Q 7008

Development References	Student References Provided
OMP 1-7, (Emergency/Abnormal Procedure Implementation Guidelines), Section 9.1, Step H., Rev. 041	

GEN2.4 2.4.37 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of the lines of authority during implementation of the emergency plan. (CFR: 41.10 / 45.13)

Remarks/Status

ILT-17 NRC Written Exam CNS RO NRC QUESTION 75 75 **D**

GEN2.4 2.4.9 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 1 conditions:

- The Unit is in Mode 6. The following indications are noted:
  - 1AD-10 C/1 "ND & NS Rooms Sump Level Emerg Hi" - LIT
  - 1AD-10 C/2 "ND & NS Rooms Sump Level Hi-Hi" - LIT
  - NC Vessel level - Decreasing
  - Refueling Canal level - Decreasing
  - EMF-41 (Aux Bldg Ventilation) reading 5 x 10^5 cpm

Based on listed symptoms, _____(1)_____ contains the proper guidance for mitigation of this event.

Based on current EMF-41 indication (ONLY), Site Assembly initiation _____(2)_____ required.

Which ONE of the following completes the statements above?

A. 1. AP/1/A/5500/027 (Shutdown LOCA)
   2. is

B. 1. AP/1/A/5500/027 (Shutdown LOCA)
   2. is NOT

C. 1. AP/1/A/5500/019 (Loss of Residual Heat Removal System)
   2. is

D. 1. AP/1/A/5500/019 (Loss of Residual Heat Removal System)
   2. is NOT

General Discussion

AP/19, Case III (Large Vent Path) contains the guidance for mitigation of the listed event. AP/27 contains guidance for a leak outside containment, but this procedure is not applicable in Mode 6.

Per the EMF-41 Annunciator Response Procedure, a site assembly is required if count rate exceeds 1,000,000 cpm.

Answer A Discussion

Part 1 is plausible because some of the listed conditions would meet the required symptoms for entry into this procedure. However, this procedure is only applicable in Mode 3 with CLAs isolated, or Mode 4.

Part 2 is plausible if the applicant confuses, or is unaware of, the setpoint for site assembly initiation.

Answer B Discussion

Part 1 is plausible because some of the listed conditions would meet the required symptoms for entry into this procedure. However, this procedure is only applicable in Mode 3 with CLAs isolated, or Mode 4.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible if the applicant confuses, or is unaware of, the setpoint for site assembly initiation.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of mitigation strategies related to a loss of residual heat removal through application of correct procedure.

Basis for Hi Cog

This question requires more than one mental step:
1. The applicant must compare provided information with that recalled from memory in order to determine the applicability of listed procedures.
2. The applicant must compare provided information with that recalled form memory in order to determine required EMF actions per listed value.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Q 7009

Development References

OP/1/B/6100/010X (Annunciator Response for Radiation Monitoring Panel 1RAD-1), Rev. 64, B/3
OP-CN-AP-27 (AP/27: Shutdown LOCA LP), Rev. 102, Sect. 1.1 & 1.2
OP-CN-AP-19 (AP/19 Loss of Residual Heat Removal System LP), Rev. 06, Sect. 1.3.1

Student References Provided

GEN2.4 2.4.9 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR QUESTION 76 76 **B**

EPE009 2.4.47 - Small Break LOCA

EPE009 GENERIC

Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)

Given the following Unit 1 timeline:

0900

- The crew has completed steps of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and transitioned to EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant) following a LOCA
  - All S/G NR Levels are 39% and stable
  - NC subcooling is (+) 15° F and stable
  - Containment Pressure is 1.8 psig and increasing at 0.1 psig per minute
  - NC Pressure is 1450 psig and increasing at 10 psig per minute
  - PZR level is 4% and increasing at 2% per minute
  - FWST level is 77% and decreasing at 2% per minute

0910

The CRS reaches step 9 of E-1:

9. **Verify S/I termination criteria:**

Which ONE of the following represents the correct procedure flow path direction at **0910**?

A. Transition to EP/1A/5000/ES-1.1 (Safety Injection Termination) at 0913

B. Transition to EP/1A/5000/ES-1.1 (Safety Injection Termination) IMMEDIATELY

C. Remain in E-1 until transition to EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation)

D. Remain in E-1 until transition to EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization)

General Discussion

E-1 contains several possible procedure transitions. However, for a LOCA inside containment there are three main transitions based on leak size (ES-1.1, ES-1.2, & ES-1.3. For the given conditions, the candidate should diagnose a small break LOCA requiring transition to ES-1.1 once SI termination criteria is met.

Although Containment pressure is not a parameter verified for SI termination, it is important for proper completion of this step since ACC conditions (>3 psig) change the SI termination criteria. At 0910, the following conditions should be calculated:
S/G Lvl - 39%
NC Subcooling - 15 degF
NC Pressure - 1550 psig (increasing)
PZR Lvl - 24%

These indications will meet SI termination for ACC conditions. If termination criteria was not met, the crew would monitor conditions while continuing in E-1. A transition to ES-1.2 may occur while monitoring termination criteria. If this criteria was not met, and a transition to ES-1.2 did not occur, the crew would eventually transition to ES-1.3.

Answer A Discussion

Plausible if the candidate utilizes the ACC value for PZR level believing 30% level is required to terminate SI.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Plausible because this is a E-1 procedure transition for a LOCA inside containment and the fact that FWST level is decreasing. If all other criteria were met, this transition would occur at an FWST level of 20%.

Answer D Discussion

Plausible if the candidate incorrectly determines this event to be a medium size LOCA inside containment.

Basis for meeting the KA

The applicant must recognize trends to properly diagnose a Small Break LOCA and determine appropriate reference material (procedure transition) for mitigation.

Basis for Hi Cog

The applicant must calculate current conditions based on provided trends and compare results with information recalled from memory.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires knowledge a specific procedure requirement, assessment of plant conditions, and selection of the proper procedure for recovery.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References	Student References Provided
EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant), Rev. 30, Steps 9, 15, 17	

EPE009 2.4.47 - Small Break LOCA
EPE009 GENERIC
Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (CFR: 41.10 / 43.5 / 45.12)

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 76** 76 **B**

Remarks/Status

APE022 2.4.4 - Loss of Reactor Coolant Makeup

APE022 GENERIC

Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)

Given the following Unit 1 initial conditions:

- The Unit is at 100% RTP
- The crew entered AP/1/A/5500/010 (Reactor Coolant Leak), Case II (NC System Leak) due to an NCS leak inside containment

15 minutes later:

- Letdown has been isolated
- Charging flow is stable at 110 gpm
- PZR level is 55% and stable
- 1AD-7 I/1 "VCT Lo Lvl" annunciator is lit
- An Automatic VCT makeup is in progress
- Containment pressure is 0.4 psig and slowly increasing

In accordance with AP/10 guidance, the CRS _____(1)_____ direct a reactor trip.

In accordance with EAL Wall Chart specific criteria (i.e. not EC Judgment), the SM will determine that an EAL threshold _____(2)_____ been exceeded.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. will
   2. has

B. 1. will
   2. has NOT

C. 1. will NOT
   2. has

D. 1. will NOT
   2. has NOT

General Discussion

With the given conditions, AP/10 will direct Charging Pump suction realignment to the FWST and Reactor trip (see step 9 of Case II), but no Safety Injection actuation. This transition is due to the inability to maintain VCT level (maximum makeup of 90 gpm, leak size of approximately 98 gpm).

This will be classified as an Unusual Event per SU5.1 (NCS Unidentified or Pressure Boundary leakage greater than 10 gpm for greater than or equal to 15 minutes).

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant correctly determines that a Safety Injection is NOT required but applies only the Fission Product Barrier Matrix of the EAL Wallchart. The correct classification is contained within the System Malfunction chart.

Answer C Discussion

Part 1 is plausible because PZR level is being maintained (common trip/SI guidance of this procedure).

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because PZR level is being maintained (common trip/SI guidance of this procedure).

Part 2 is plausible if the applicant correctly determines that a Safety Injection is NOT required but applies only the Fission Product Barrier Matrix of the EAL Wallchart. The correct classification is contained within the System Malfunction chart.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/14/17

CHIEF EXAMINER NOTE

01/19/17 - Discussed with CE due to difficulty in meeting K/A at SRO level - suggested question related to: leak rate, charging pump capacity, inability to maintain PZR level, reportability, classification.

The applicant is required to interpret given conditions (insufficient makeup capability), and apply to specific procedure requirements in order to determine transition to an EP (from an AP). The procedure transition is inherent in the knowledge of a required reactor trip. The applicant is also required to recognize conditions requiring EAL classification.

Basis for Hi Cog

The applicant must apply given information in order to calculate required makeup flow in order to maintain VCT level and then compare this value to a known maximum rate, recalled from memory, along with specific procedure requirements.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires an assessment of plant conditions, knowledge of a diagnostic step in an AOP, and selection of a procedure for mitigation.

Additionally, this question can be classified as an SRO Plant Specific Example. This question requires additional knowledge required for the higher license level and is unique to the SRO/SM position. At CNS it is the responsibility of the SRO to classify the event in the event that an emergency is declared. Per Lesson Plan OP-CN-EP-SEP, Emergency Plan, Objective #2, the SRO is trained to: "When given a set of plant conditions and access to reference materials, correctly classify an event using RP/0/A/5000/001." This is identified as an SRO only learning objective.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

ILT-17 NRC Written Exam CNS SRO NR QUESTION 77

77

A

Development References
AP/1/A/5500/010, Rev. 57, Case II, Step 9 EAL Wallchart

Student References Provided
EAL Wallchart

APE022 2.4.4 - Loss of Reactor Coolant Makeup

APE022 GENERIC

Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (CFR: 41.10 / 43.2 / 45.6)

Remarks/Status
PRE-REVIEW QUESTION - SAT 03/14/17 01/19/17 - Discussed with CE due to difficulty in meeting K/A at SRO level - suggested question related to: leak rate, charging pump capacity, inability to maintain PZR level, reportability, classification.

ILT-17 NRC Written Exam CNS SRO NR QUESTION 78 78 **B**

APE027 2.1.7 - Pressurizer Pressure Control System (PZR PCS) Malfunction
APE027 GENERIC
Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)

Given the following Unit 1 conditions:

- The Unit is at 100% RTP
- Annunciator 1AD-2 F/9 (DCS Alternate Action) is received
- The OATC determines Selected PZR Pressure-2 (SPP-2) is in Alternate Action

In accordance with Tech Spec 3.4.11 (Pressurizer PORVs) and the associated Basis,

1NC-32B (PZR PORV) _____(1)_____ operable.

PZR PORV operability is required to mitigate the effects of a _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. is
   2. Locked NCP Rotor

B. 1. is
   2. Steam Generator Tube Rupture

C. 1. is NOT
   2. Locked NCP Rotor

D. 1. is NOT
   2. Steam Generator Tube Rupture

General Discussion

DCS Alternate Action will prevent Automatic operation of the PZR PORVs. However, per T.S.B. 3.4.11, automatic operation of the PZR PORV is not required for operability when in Modes 1-3.

The basis also states that the Applicable Safety Analysis assumes manual capability of PZR PORVs for RCS depressurization to terminate break flow during a S/G Tube Rupture..

Answer A Discussion

Part 1 is correct.

Part 2 is plausible this is the basis for PZR Safety Valves.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because automatic PORV operation is required in LTOP mode of operation.

Part 2 is plausible this is the basis for PZR Safety Valves.

Answer D Discussion

Part 1 is plausible because automatic PORV operation is required in LTOP mode of operation.

Part 2 is correct.

Basis for meeting the KA

An Alternate Action occurs as a result of instrument input. The applicant is required to evaluate this occurrence, determine implications upon the PZR PCS based on operating characteristics (loss of Automatic operation), and then make an operational judgment (TS evaluation).

Basis for Hi Cog

The applicant must recall (from memory) the effects of this particular alternate action, apply those effects to PZR PORVs, and then compare the outcome to TS requirements also recalled from memory.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.
4) This question requires the applicant to have knowledge of the Tech Spec Basis.

This question requires knowledge of TS bases.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	Bank Q 6588

Development References	Student References Provided
OP-CN-PS-IPE (Pressurizer Pressure Control LP), Rev. 101, Sect. 5.4 T.S.B. 3.4.11 Applicable Safety Analysis & LCO T.S.B. 3.4.10, Applicable Safety Analysis & Background	

APE027 2.1.7 - Pressurizer Pressure Control System (PZR PCS) Malfunction

APE027 GENERIC

Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)

Remarks/Status

D

ILT-17 NRC Written Exam CNS SRO NR QUESTION 79 79

APE057 AA2.03 - Loss of Vital AC Electrical Instrument Bus

Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: (CFR: 43.5 / 45.13)

RPS panel alarm annunciators and trip indicators .....

Given the following Unit 1 initial conditions:

- The Unit is at 100% RTP
- Containment Pressure Channel 1 failed High
- Pressurizer Pressure Channel 1 failed High
- All required Tech Spec actions have been completed

Subsequently:

- A loss of 1ERPB occurs

1FO-1, D/5 "Hi Cont Press S/I Rx Trip" _____(1)_____ be lit.

If the Unit 1 Reactor does NOT trip, an ATWS _____(2)_____ in progress.

Which ONE of the following completes the statements above?

A. 1. will
   2. is

B. 1. will
   2. is NOT

C. 1. will NOT
   2. is

D. 1. will NOT
   2. is NOT

General Discussion

The loss of Containment Pressure Channel I will have no effect upon Reactor Trip signal generation since this logic utilizes channels 2, 3, & 4 of Containment Pressure and requires a 2/3 coincidence. Therefore, a loss of 1ERPB (channel 2) would result in a 1/3 coincidence for this actuation. However, a Reactor Trip/Safety Injection signal would be present due to Lo PZR pressure.

Per OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines) General Statements of Philosophy, an instrument failure alone does not constitute an ATWS. This event would be classified as a failure of the Reactor Protection System.

Answer A Discussion

Part 1 is plausible because the Hi-Hi Containment Pressure logic would be met as this signal utilizes channels 1-4. Additionally, if the applicant confuses channels used by P-11 (PZR Hi Press SI Permissive) which utilizes channels 1-3.

Part 2 is plausible because a Reactor Trip signal has been initiated with no resulting actuation.

Answer B Discussion

Part 1 is plausible because the Hi-Hi Containment Pressure logic would be met as this signal utilizes channels 1-4. Additionally, if the applicant confuses channels used by P-11 (PZR Hi Press SI Permissive) which utilizes channels 1-3.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because a Reactor Trip signal has been initiated with no resulting actuation.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/14/17

Loss of Vital AC Electrical Instrument Bus - Loss of 1ERPB

Ability to determine and interpret RPS panel alarm annunciators and trip indicators - The applicant must demonstrate the ability to determine if given conditions will result in a particular trip indication and also determine that a separate trip signal has been generated. The applicant must also interpret overall plant conditions to determine if this malfunction will be classified as an ATWS.

Basis for Hi Cog

The applicant is required to recall from memory the channels required for actuation of a particular actuation signal, compare this information to that provided, and calculate a logic for comparison.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires knowledge of the CNS administrative procedure which specifies AOP and EOP hierarchy, implementation, and coordination. This procedure contains a special discussion related to an ATWS (Anticipated Transient Without Scram) which details specific requirements for initiating the appropriate procedure. The applicant must correctly apply this guidance for proper action and procedure selection.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
OP-CN-ECCS-ISE (Engineered Safety Features Actuation System LP), Rev. 102 Sect. 5.1 & 5.3 OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), Rev. 041, Attach 11.1, #11

Student References Provided

ILT-17 NRC Written Exam CNS SRO NR QUESTION 79

79

D

APE057 AA2.03 - Loss of Vital AC Electrical Instrument Bus

Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: (CFR: 43.5 / 45.13)

RPS panel alarm annunciators and trip indicators .....

Remarks/Status
PRE-REVIEW QUESTION - SAT 03/14/17

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 80** 80

C

APE062 AA2.05 - Loss of Nuclear Service Water

Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13)

The normal values for SWS-header flow rate and the flow rates to the components cooled by the SWS .....

Given the following conditions:

- AP/0/A/5500/020 (Loss of Nuclear Service Water), Case I (Loss of RN Train) has been entered due to a leak in the 2B RN Essential Header

AP/20 will direct closure of RN Supply crossover isolation valves if operating RN pump discharge flow exceeds a MINIMUM value of _____(1)_____ .

Once the 2B RN Essential Header is isolated, the **RN system** _____(2)_____ have sufficient flow to support post LOCA loads on one unit and shutdown and cooldown on the other unit.

Which ONE of the following completes the statements above?

A. 1. 19,000 gpm
   2. does

B. 1. 19,000 gpm
   2. does NOT

C. 1. 23,000 gpm
   2. does

D. 1. 23,000 gpm
   2. does NOT

ILT-17 NRC Written Exam CNS SRO NR QUESTION 80

80

C

General Discussion

AP/20, Case I, Step 5 will direct closure of RN supply crossover valves and non-essential header isolation valves in order to prevent operating pump runout.

Per the bases of TS 3.7.8, one NSWS loop containing two OPERABLE NSWS pumps has sufficient capacity to supply post loss of coolant accident (LOCA) loads on one unit
and shutdown and cooldown loads on the other unit.

Answer A Discussion

Part 1 is plausible because this is the normal RN operating flow rate.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because this is the normal RN operating flow rate.

Part 2 is plausible because two loops are required to be operable per T.S. 3.7.8.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because two loops are required to be operable per T.S. 3.7.8.

Basis for meeting the KA

CE NOTE: Discussed with CE on 02/14/17, agreed to question specific in principle.

The applicant is required to apply flow rate values associated with a loss of Nuclear Service Water requiring a procedure action. Additionally, the applicant is required to interpret an effect upon the Nuclear Service Water system via application of Tech Specs Basis.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.
4) This question requires the applicant to have knowledge of the Tech Spec Basis.

This question requires knowledge of TS bases.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References

AP/0/A/5500/020 (Loss of Nuclear Service Water), Rev. 043, Case I, step 5
OP-CN-PSS-RN (Nuclear Service Water LP), Rev. 105, Pg. 19
TSB 3.7.8 Background

Student References Provided

APE062 AA2.05 - Loss of Nuclear Service Water
Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13)
The normal values for SWS-header flow rate and the flow rates to the components cooled by the SWS .....

Remarks/Status

02/14/17 - Discussed K/A match with CE. Agreed to question specifics in principle.

WE12 EA2.2 - Uncontrolled Depressurization of all Steam Generators

Ability to determine and interpret the following as they apply to the (Uncontrolled Depressurization of all Steam Generators) (CFR: 43.5 / 45.13)

Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Given the following Unit 2 conditions:

- Safety Injection termination is in progress per EP/2/A/5000/ECA-2.1 (Uncontrolled Depressurization Of All Steam Generators)
- OATC reports that 2B S/G MSIV has closed and that 2B S/G pressure is increasing

Based on the conditions above, which ONE of the following indicates the response directed by the CRS?

Procedure Legend:

EP/2/A/5000/E-2 (Faulted S/G Isolation)
EP/2/A/5000/ES-1.1 (SI Termination)

A. Immediately transition to E-2 to verify that 2B S/G is intact

B. Immediately transition to step 10 of ES-1.1 to complete Safety Injection termination

C. Complete Safety Injection termination per ECA-2.1 and then transition to E-2

D. Complete Safety Injection termination and initiate a cooldown to cold shutdown per ECA-2.1

General Discussion

From the ECA-2.1 Background Document:

Guideline ECA-2.1 is exited whenever any steam generator pressure boundary is re-established as indicated by an increase in the associated steam generator pressure indication. In this case, the operator transfers to guideline E-2 for further recovery actions. It is noted that this transition only applies when the S/I termination criteria are not yet met or after S/I termination has already been completed in guideline ECA-2.1. Delaying S/I termination in ECA-2.1 could lead to overfill of the PZR which is not beneficial to plant control

Answer A Discussion

Plausible because this would be the correct answer if SI termination steps were not in progress.

Answer B Discussion

Plausible because this is the normal transition following verification of SI termination in E-0.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Plausible because this would be the normal flowpath if a S/G pressure boundary had not been established.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/14/17

Ability to determine and interpret adherence to appropriate procedures and operation with the limitations in the facility's license and amendments (Uncontrolled Depressurization of all Steam Generators) - The applicant must demonstrate the ability to interpret given conditions and determine proper adherence to the applicable procedure. This procedure will direct a transition, but not while SI termination is in progress.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires knowledge a specific procedure requirement, assessment of plant conditions, and selection of the proper procedure for recovery.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	5835

Development References

EBG/1/A/5000/ECA-2.1 (ECA-2.1 Background Document), Rev. 8, Page 66
OP-CN-EP-EP2, (E-2 Series LP), Rev. 104, Sect. 4.1
EP/1/A/5000/E-0 (Reactor Trip or Safety Injection), Rev. 42, Step 38

Student References Provided

WE12 EA2.2 - Uncontrolled Depressurization of all Steam Generators
Ability to determine and interpret the following as they apply to the (Uncontrolled Depressurization of all Steam Generators)
(CFR: 43.5 / 45.13)
Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Remarks/Status

PRE-REVIEW QUESTION - SAT 03/14/17

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 82** 82 **A**

APE033 2.2.38 - Loss of Intermediate Range Nuclear Instrumentation
APE033 GENERIC
Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)

Given the following Unit 1 conditions:

- A Unit startup in progress
- All Power Range Instruments indicate 6%
- Intermediate Range Detector N35 fails low
- The CRS enters AP/1/A/5500/016 (Malfunction of Nuclear Instrumentation System)

In accordance with Tech Spec 3.3.1 (Reactor Trip System (RTS) Instrumentation), the power increase _____(1)_____ continue.

Loss of N35 Control Power _____(2)_____ result in a Reactor trip.

Which ONE of the following completes the statements above?

A. 1. may
   2. will

B. 1. may
   2. will NOT

C. 1. may NOT
   2. will

D. 1. may NOT
   2. will NOT

General Discussion

In accordance with Tech Spec 3.3.1(Condition G) with Thermal Power between P-6 and P-10 and one IR neutron flux channel inoperable, the required action is to decrease Thermal Power < P-6 or increase power > P-10 within 24 hours.

In accordance with the CAUTION in AP-16 Case III, loss of control power (to one detector) with power less than P-10 will result in a reactor trip.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant confuses the control power and instrument power fuses. The instrument power fuses could be removed below P-10 without causing a Reactor trip provided the channel is placed in LEVEL TRIP bypass.

Answer C Discussion

Part 1 is plausible since this would be the correct required action if two IR Instruments failed .

Part 2 is correct.

Answer D Discussion

Part 1 is plausible since this would be the correct required action if two IR Instruments failed .

Part 2 is plausible if the applicant confuses the control power and instrument power fuses. The instrument power fuses could be removed below P-10 without causing a Reactor trip provided the channel is placed in LEVEL TRIP bypass.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the conditions and limitations of the facility license through the application of Tech. Spec basis information.

Basis for Hi Cog

This is a higher cognitive level question because the applicant must analyze the plant conditions and determine the power is between P-6 and P-10 and that Power Range indications are available to determine the appropriate action.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.
4) This question requires the applicant to have knowledge of the Tech Spec Basis.

This question requires knowledge of TS required actions as detailed in the applicable Basis.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	Bank Q 5229

Development References
CNS-TSB-B-3.3.1 (RTS Instrumentation), Rev. 8, Actions, Conditions F & G AP/1/A/5500/016 (Malfunction of Nuclear Instrumentation System), Rev. 27, Caution prior to step 8

Student References Provided

APE033 2.2.38 - Loss of Intermediate Range Nuclear Instrumentation
APE033 GENERIC
Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR QUESTION 83 83

A

WE02 EA2.2 - SI Termination

Ability to determine and interpret the following as they apply to the (SI Termination)
(CFR: 43.5 / 45.13)

Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Given the following Unit 2 conditions:

- A spurious Safety Injection has occurred due to an instrument malfunction

The CRS will direct SI termination sequence per _____(1)_____ .

SI Termination must be completed within a MAXIMUM of _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. EP/2/A/5000/E-0 (Reactor Trip or Safety Injection)
   2. 15 minutes

B. 1. EP/2/A/5000/E-0 (Reactor Trip or Safety Injection)
   2. 50 minutes

C. 1. EP/2/A/5000/ES-1.1 (Safety Injection Termination)
   2. 15 minutes

D. 1. EP/2/A/5000/ES-1.1 (Safety Injection Termination)
   2. 50 minutes

General Discussion

Per the E-0 Background Document:

Safety Injection will be terminated in E-0 if conditions are met. Following the termination a transition to ES-1.1 will be made to complete the recovery. The termination sequence was added to E-0, by DW-96-038, to reduce the time it takes to terminate SI to prevent going water solid in the PZR.

AND

Time Critical Operator Action - Operators will terminate Safety Injection (NI-9A and NI-10B closed) within 15 minutes of spurious initiation (10 minutes strongly preferred). Note that simple prevention of PZR overfill is NOT equivalent to meeting this time requirement. Under nominal, expected conditions, the PZR may not overfill within the specified time frame. This could lead to some confusion over the emphasis given this sequence. However, under the worst case (licensed) assumptions used in the analysis, the PZR WILL overfill. The time requirement is not based on overfill prevention, it is based on maintaining relief valve outflow temperature above the minimum acceptable value for continued relief valve performance.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because this is the time requirement associated with an FWST puncture and SI due to MSLB.

Answer C Discussion

Part 1 is plausible because a transition to ES-1.1 is directed for SI termination in most cases (other than spurious initiation).

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because a transition to ES-1.1 is directed for SI termination in most cases (other than spurious initiation).

Part 2 is plausible because this is the time requirement associated with an FWST puncture and SI due to MSLB.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/14/17

The applicant is required to demonstrate knowledge of the SI Termination sequence following a spurious actuation in accordance with the appropriate procedure and demonstrate knowledge of facility limitations (commitment) via a Time Critical Operator Action.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires the applicant to assess plant conditions, and then select a procedure to mitigate along with demonstrating knowledge of a time requirement to accomplish recovery actions per station commitment.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References
EBG/1/5000/E-0, (E-0 Background Document), Rev. 027, Step 28 EP/1/A/5000/ES-1.1 (Safety Injection Termination), Rev. 33, Sect. B PT/0/A/4700/061 (Time Critical Operator Action Review), Rev. 07, Encl. 13.11

Student References Provided

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83

A

WE02 EA2.2 - SI Termination

Ability to determine and interpret the following as they apply to the (SI Termination)
(CFR: 43.5 / 45.13)

Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Remarks/Status
PRE-REVIEW QUESTION - SAT 03/14/17

ILT-17 NRC Written Exam CNS SRO NR QUESTION 84 84 **A**

WE07 2.2.44 - Saturated Core Cooling

WE07 GENERIC

Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)

Given the following Unit 2 conditions:

- The crew has entered EP/2/A/5000/ECA-3.2 (SGTR With Loss of Reactor Coolant Saturated Recovery Desired)
- All NCPs are secured
- Subcooling indicates (-) 8°F
- Core Exit Thermocouples indicate 670°F
- RVLIS lower range level is 48%

Based on listed conditions,

EP/2/A/5000/FR-C.3 (Response to Saturated Core Cooling) entry conditions _____(1)_____ met.

Increasing Safety Injection flow _____(2)_____ desired.

Which ONE of the following completes the statements above?

A. 1. are
   2. is

B. 1. are
   2. is NOT

C. 1. are NOT
   2. is

D. 1. are NOT
   2. is NOT

General Discussion

FR-C.3 entry requirements:
CETs <1200 deg, Subcooling <0 deg, plus No RCPs in service, CETs <700 deg, RVLIS LR Lvl >41%
FR-C.3 is a yellow path CSF procedure so entry is not required. However, entry requirements are met per given conditions.

Step 2 of FR-C.3 directs a return to procedure in effect if ECA-3.2. The purpose of this step is to prevent direction to increase Safety Injection flow which is inconsistent with the actions of ECA-3.2.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant reasons increasing SI with a tube rupture would increase break flow.

Answer C Discussion

Part 1 is plausible is the applicant misapplies FR-C.3 entry requirements and determines one of the following conditions must be met (CET >700 deg or RVLIS lvl <41%).

Part 2 is correct.

Answer D Discussion

Part 1 is plausible is the applicant misapplies FR-C.3 entry requirements and determines one of the following conditions must be met (CET >700 deg or RVLIS lvl <41%).

Part 2 is plausible if the applicant reasons increasing SI with a tube rupture would increase break flow.

Basis for meeting the KA

The applicant must interpret control room indications in order to verify the status of the primary coolant system as related to entry into the Saturated Core Cooling procedure. The operator must also demonstrate an understanding of effects of how procedure actions, if used, will affect plant conditions.

Basis for Hi Cog

The applicant must interpret given indications and compare with information recalled from memory.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires knowledge of yellow path CSF entry criteria (SRO only) and knowledge of a diagnostic step which involves the possible transition to specific sub-procedure.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
EP/2/A/5000/F-0 Rev 11 page 4 EP/2/A/5000/FR-C.3 Rev 6 step 2 EP/2/A/5000/ECA-3.2 Rev 31 pages 17, 41, and 42

Student References Provided

WE07 2.2.44 - Saturated Core Cooling
WE07 GENERIC
Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)

Remarks/Status
01/19/17 - CE agreed to replace K/A due to lack of unit difference.

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C

WE15 EA2.2 - Containment Flooding

Ability to determine and interpret the following as they apply to the (Containment Flooding)
(CFR: 43.5 / 45.13)

Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Given the following Unit 1 initial conditions:

- A LOCA occurred

Current conditions:

- Containment pressure is 2.5 PSIG
- ECCS suctions have been swapped to the Cold Leg Recirculation alignment
- FWST level is 4% and slowly decreasing
- NC pressure is 2 PSIG and stable
- CETs are 600°F and slowly increasing
- Reactor Vessel Lower Range level is 49% and slowly decreasing
- Containment Sump level is 16.1 feet and increasing

Based on the current conditions, which ONE of the following states the required procedure transition AND the reason for implementation of this procedure?

A. Implement FR-C.2 (Response to Degraded Core Cooling).
The level of water in the core region has been reduced such that a challenge exists to core cooling.

B. Implement FR-C.2 (Response to Degraded Core Cooling).
Core exit temperatures and NC pump status indicate that a challenge exists to core cooling.

C. Implement FR-Z.2 (Response to Containment Flooding).
Containment sump levels are higher than expected, indicating a potential for a ruptured RN or KC pipe inside containment.

D. Implement FR-Z.2 (Response to Containment Flooding).
Containment sump levels are higher than expected, indicating a potential secondary line (feedwater or main steam) break inside containment along with the input from the NC system and the FWST.

General Discussion

From the conditions given, an ORANGE condition exists on the Containment CSFST that requires FR-Z.2 be implemented (i.e. Containment pressure less than 15 PSIG - YES => Containment pressure less than 3 PSIG - YES => Containment Sump Level less than 15.5 FT - NO => GO TO FR-Z.2).

There is a YELLOW condition on Core Cooling due to which would require FR-C.3 to be implemented (i.e. CETs < 1200°F - YES => NC Subcooling based on CETs > 0°F - NO => At least one NC Pump ON - NO => CETs Less than 700°F - YES => Reactor Vessel Lower Range Level Greater Than 41% - YES => GO TO FR-C.3)

From the FRZ Lesson Plan (Basis Document):

The maximum level of water in the containment following a major accident generally is based upon the stored water volumes from the FWST, CLAs, ice condenser, and NC system. This water volume approximates the maximum water volume introduced into the containment following a LOCA plus a steamline or feed line break inside containment.
An indicated water level in the containment greater than the maximum expected volume (design basis flood level) is an indication that water volumes other than those represented by the above noted volumes have been introduced into the containment. Also, the high water level provides an indication that potential flooding of critical systems and components needed for plant recovery may occur. Identification and isolation for any broken or leaking water line inside containment is essential to maintaining the water level below the design basis flood level.

Answer A Discussion

Plausible because the indications show some loss of core cooling has occurred due to the loss of inventory in the core.

Answer B Discussion

Plausible because there are no NC pumps running and CETs are elevated. Therefore, this answer is plausible if the applicant does not recall the temperatures that represent a challenge to Core Cooling.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

Plausible because the total volume of the NC system and the total volume of the FWST emptying into Containment would cause a substantial rise in Containment sump levels. These are also plausible because they are expected inputs into the Containment sump during an accident. If the applicant fails to recall, from the basis document all of the inputs that contribute to the normal increase in sump level during an accident they could incorrectly conclude that this is the correct response.

Basis for meeting the KA

The applicant must demonstrate knowledge of the CSFSTs to prioritize which procedure must be implemented and must have knowledge of the FRZ Basis Document to determine the basis for why the procedure is being implemented.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. The applicant must first recall from memory the Containment and Core Cooling CSFSTs. The applicant must then analyze the conditions given to determine what conditions have been met and what Functional Restoration Procedure must be implemented. The applicant must also recall from the Basis Document the reason why the CSF has been jeopardized making it a priority for implementation.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires additional knowledge of procedure content (information contained in the associated basis document).

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	Bank Q 5046

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85

C

Development References	Student References Provided
EP/1/A/5000/F-0 (Critical Safety Function Status Trees), Rev. 09, Pg. 4 & 9 EBG/1/A/5000/FR-Z.2 (Response to Containment Flooding Background Doc), Rev. 2, Step 2	

WE15 EA2.2 - Containment Flooding

Ability to determine and interpret the following as they apply to the (Containment Flooding)
(CFR: 43.5 / 45.13)

Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Remarks/Status

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D

SYS004 2.1.7 - Chemical and Volume Control System
SYS004 GENERIC
Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)

Given the following Unit 1 initial conditions:

- The Unit has been in Mode 1 for 326 days
- It has been discovered that PT/1/A/4200/007A (Centrifugal Charging Pump 1A Test) was last performed 117 days ago.
- This test is required to be performed once every 92 days

Subsequently:

- Pump testing in accordance with PT/1/A/4200/007A was completed on the day of discovery.
- Test Data Sheets are attached (see reference package)

Prior to performance of the IWP, the "Action Statement" of TS 3.5.2 (ECCS - Operating) _____(1)_____ required to be entered.

Following completion of the IWP, the "Action Statement" of TS 3.5.2 _____(2)_____ required to be entered (continued).

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. was
   2. is

B. 1. was NOT
   2. is

C. 1. was
   2. is NOT

D. 1. was NOT
   2. is NOT

General Discussion

Per SR 3.0.2, the specified frequency for each SR is met if the surveillance is performed within 1.25 times the interval specified. However, SR 3.0.3 states that entry into the actions of the associated LCO may be delayed, from the time of discovery, up to 24 hours or the limit of the specified frequency (whichever is greater).

A risk evaluation shall be performed if the surveillance is delayed beyond 24 hours. With a listed frequency of 92 days, this surveillance is required to be completed within 115 days of last performance. Per the provided information, this was not accomplished. However, LCO entry is not required due to the requirements of SR 3.0.3 and since the surveillance is performed within 24 hours of discovery a risk evaluation is not required.

The associated procedure requires LCO entry for values found to be in the "Required Action" range during testing. Values within the "Alert" range require an increase in testing frequency and evaluation by engineering.

Answer A Discussion

Part 1 is plausible because surveillance testing was not performed within the requirements of SR 3.0.2.

Part 2 is plausible because two of the provided values are within the "Alert" range which require further action/monitoring, but not LCO entry.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because two of the provided values are within the "Alert" range which require further action/monitoring, but not LCO entry.

Answer C Discussion

Part 1 is plausible because surveillance testing was not performed within the requirements of SR 3.0.2.

Part 2 is correct.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to evaluate performance testing of a Chemical and Volume Control System pump and make an operational judgment (TS evaluation) based on results.

Basis for Hi Cog

The applicant must calculate SR frequency requirements and compare that calculated value to one recalled from memory.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.

This question demonstrates knowledge of the rules for application of Surveillance Requirements.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
T.S. S.R. 3.0.2 & 3.0.3 PT/1/A/4200/007A (Centrifugal Charging Pump 1A Test), Rev. 61 Encl. 13.1, Step 1.7 and 1.8

Student References Provided
Test Data Sheets

SYS004 2.1.7 - Chemical and Volume Control System

SYS004 GENERIC

Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)

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Remarks/Status

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B

SYS013 A2.04 - Engineered Safety Features Actuation System (ESFAS)

Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Loss of instrument bus .....

Given the following Unit 2 conditions:

- The Unit is at 100% RTP
- A loss of 2ERPD has occurred
- The crew has entered AP/2/A/5500/029 (Loss of Vital or Aux Control Power)
- NO Tech Spec actions have been addressed

The current Containment Pressure channel logic for the remaining Containment Pressure channels which will cause a **Phase B** actuation is _____(1)_____ .

In accordance with Tech Spec 3.3.2 (ESFAS Instrumentation) LCO Actions, when the failed channel is removed from service, I&E will place the Containment Pressure **Hi-Hi** Bistable in _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. 1/3
   2. Trip

B. 1. 1/3
   2. Bypass

C. 1. 1/2
   2. Trip

D. 1. 1/2
   2. Bypass

General Discussion

The normal logic for Phase B actuation based on Hi-Hi Containment Pressure is 2/4 channels. With a loss of ERPD, the associated channel 4 bistable would be in a tripped condition resulting in an actuation logic of one of the remaining 3 channels.

In accordance with Tech Spec 3.3.2 (ESFAS Instrumentation), the Containment Pressure Hi-Hi Bistable will be placed in BYPASS when the channel is removed from service. The basis for this is that an inadvertent signal on any one of the remaining Containment Pressure Hi-Hi Bistables would result in an inadvertent Phase B isolation.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible because when most channels are removed from service the bistables associated with the failed channel are placed in the tripped position. Even with Containment Pressure the Hi Pressure Bistable is placed in TRIP while the Hi-Hi Pressure Bistable is placed in BYPASS.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible because this would be the correct answer for Safety Injection initiation based on Containment Hi Pressure actuation logic.

Part 2 is plausible because when most channels are removed from service the bistables associated with the failed channel are placed in the tripped position. Even with Containment Pressure the Hi Pressure Bistable is placed in TRIP while the Hi-Hi Pressure Bistable is placed in BYPASS.

Answer D Discussion

Part 1 is plausible because this would be the correct answer for Safety Injection initiation based on Containment Hi Pressure actuation logic.

Part 2 is correct.

Basis for meeting the KA

Given a loss of a vital instrument bus, the applicant is required to predict the impact of this malfunction on an ESFAS system and use procedures (TS) to mitigate the consequences.

Basis for Hi Cog

The applicant must recall from memory the logic for Phase B actuation and then analyze given conditions to determine the effect upon this logic. The applicant must then recall from memory the requirement for removing a Containment Pressure channel (Hi vs. Hi-Hi) from service.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.

This question requires the applicant to have knowledge of TS 3.3.2 actions related to removing an instrument channel from service which are "below-the-line".

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	Bank Q 7010

Development References
T.S.B. 3.3.2 (ESFAS), Rev. 12, Actions - Condition E T.S. 3.3.2 (ESFAS), Table 3.3.2-1 OP-CN-ECCS-ISE (ESFAS LP), Rev. 102, Sect. 5.3

Student References Provided

SYS013 A2.04 - Engineered Safety Features Actuation System (ESFAS)

Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Loss of instrument bus .....

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 87** 87 **B**

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 88** 88 **A**

SYS059 A2.05 - Main Feedwater (MFW) System

Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Rupture in MFW suction or discharge line .....

Given the following Unit 1 conditions:

- The Unit was manually tripped from 100% RTP following a loss of both Main Feedwater Pumps
- An Auxiliary Operator has reported a rupture of the Main Feed Common Discharge Header
- All CA Pumps failed to automatically start and cannot be manually started
- The crew has implemented EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink)
- S/G WR level is 40% in all S/Gs and decreasing

Consider Each Statement Separately

In accordance with FR-H.1:

The CRS will mitigate this event by directing the crew to _____(1)_____ .

If required, Bleed and Feed must be initiated within a MAXIMUM of _____(2)_____ after reaching initiation criteria.

Which ONE of the following completes the statements above?

A. 1. initiate NC System Bleed and Feed
   2. 4 minutes

B. 1. initiate NC System Bleed and Feed
   2. 8 minutes

C. 1. depressurize the NC System and two S/Gs for injection of CBPs
   2. 4 minutes

D. 1. depressurize the NC System and two S/Gs for injection of CBPs
   2. 8 minutes

General Discussion

From the FR-H.1 Background Document:
Initiating Feed and Bleed is time critical. CNC-1552.08-00-0285 (McGuire and Catawba Nuclear Stations- All Units, Loss of Feedwater Feed and Bleed Analysis) assumes that feed and bleed will be initiated within 4 minutes of meeting initiation criteria, or within 8 minutes of Rx trip on Lo-Lo Steam Generator Level.

While awaiting Feed and Bleed criteria, FR-H.1 will direct attempts to place the Main Feed Pumps in service followed by a depressurization to allow Condensate Booster Pump flow to the S/Gs. With the conditions given, main feed or condensate will not be available options for feeding the S/Gs due to the common discharge line rupture.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible because this is the requirement for initiation of Feed and Bleed following a Rx trip on Lo-Lo S/G level.

Answer C Discussion

Part 1 is plausible because this is the normal flowpath through this procedure (if the Condensate system is an available feed option).

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because this is the normal flowpath through this procedure (if the Condensate system is an available feed option).

Part 2 is plausible because this is the requirement for initiation of Feed and Bleed following a Rx trip on Lo-Lo S/G level.

Basis for meeting the KA

The applicant must demonstrate the ability to predict the impact of a rupture of the MFW discharge line (loss of condensate and main feed paths) by use of the Loss of Heat Sink Procedure to mitigate the consequence of this malfunction.

Basis for Hi Cog

This question requires more than one mental step:
1. Compare information provided with that recalled from memory in order to determine that the malfunction results in a loss of all feed paths from the condensate/main feed system.
2. Recall the purpose of the depressurization step of FR-H.1 and apply that to circumstances listed in order to determine the effectiveness of this step.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires additional knowledge of procedure content (information contained in the associated basis document).

Additionally, this question requires the applicant to assess plant conditions, and then select (a section of a) procedure to mitigate listed conditions.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	Bank Q 6583

Development References
EBG/1/A/5000/FR-H.1 (Response to Loss of Heat Sink Background Doc), Rev. 4, Steps 10 & 22 K/A EP/1/A/5000/FR-H.1 (Response to Loss of Heat Sink), Rev. 42, Step 10

Student References Provided

SYS059 A2.05 - Main Feedwater (MFW) System

ILT-17 NRC Written Exam CNS SRO NR QUESTION 88

88

A

Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Rupture in MFW suction or discharge line .....

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR QUESTION 89 89 **A**

SYS061 2.1.23 - Auxiliary / Emergency Feedwater (AFW) System
SYS061 GENERIC
Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)

Given the following Unit 1 conditions:

- The Unit is at 12% power and preparing to roll the main turbine
- An OAC alarm associated with 1CA-37 (CA Pmp #1 Disch to S/G 1D Check) has been received
- The CRS has directed completion of OP/1/A/6250/002 (Auxiliary Feedwater System), Enclosure 4.11 (Cool Down of Turbine Driven CA Pump Piping)
- As required by this enclosure, the BOP must position the following controller to 0%:
  - 1CA-36 (CA Pump #1 Flow to S/G 1D)

In accordance with OP/1/A/6250/002, Enclosure 4.11:

the purpose of this enclosure is to prevent void formation _____(1)_____ of the CA Pump discharge check valve.

prior to repositioning 1CA-36 controller, the CRS _____(2)_____ required to declare CAPT #1 inoperable.

Which ONE of the following completes the statements above?

A. 1. upstream
   2. is

B. 1. upstream
   2. is NOT

C. 1. downstream
   2. is

D. 1. downstream
   2. is NOT

ILT-17 NRC Written Exam CNS SRO NR QUESTION 89

89

A

General Discussion

Closing the discharge valve makes the CA pump inoperable per the NOTE just prior to Step 3.7 of Enclosure 4.11, Cooldown of the Turbine Driven CA Pumps Piping in OP/1/A/6250/002, (Auxiliary Feedwater System). Since there are numerous references to temperature concerns, including in the OAC alarm response, but the concern is for high temperature UPSTREAM of the check valve, indicating check valve leakage and concern for the CA pump piping. Further, the thermocouples associated with the OAC alarm are installed UPSTREAM of the check valve, not downstream. The concern is for steam binding.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant reasons operation of this valve would not affect operability since this valve has an Auto Open feature when required and the fact that this action is being taken to restore a problem with the piping and pump.

Answer C Discussion

Part 1 is plausible if the applicant misapplies system layout knowledge and reasons gas formation would occur downstream of the check valve.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible if the applicant misapplies system layout knowledge and reasons gas formation would occur downstream of the check valve.

Part 2 is plausible if the applicant reasons operation of this valve would not affect operability since this valve has an Auto Open feature when required and the fact that this action is being taken to restore a problem with the piping and pump.

Basis for meeting the KA

The applicant is required to perform a specific plant procedure (Aux Feedwater OP) during all modes of operation (per the TS surveillance requirement basis, operability declaration would not be required <10% RTP; at 12% RTP the OP requires a declaration of CAPT inoperability)

Basis for Hi Cog

This question requires more than one mental step.
1. The applicant must analyze the given information, compare to knowledge recalled from memory (system drawing), and then determine the correct area of susceptibility.
2. The applicant must compare provided information in order to determine operability of a safety related component.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.
4) This question requires the applicant to have knowledge of the Tech Spec Basis.

This question requires knowledge of TS required actions as detailed in the applicable Basis.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	Bank Q 7011

Development References
OP/1/A/6250/002 (Auxiliary Feedwater System), Rev. 152, Encl. 4.11 Note prior to Step 3.1 & Note prior to Step 3.7 TSB 3.7.5 SR 3.7.5.1 OP-CN-CF-CA (Auxiliary Feedwater System LP), Rev. 110, Sect. 3.3

Student References Provided

SYS061 2.1.23 - Auxiliary / Emergency Feedwater (AFW) System
SYS061 GENERIC
Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 89** 89 **A**

Remarks/Status

SYS008 A2.01 - Component Cooling Water System (CCWS)

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 malfunc- tions or operations : (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Loss of CCW pump .....

Following an earthquake impacting Catawba Nuclear Station, plant conditions are as follows:

- Unit 1 Conditions:
  - Safety Injection has been initiated following a NC System leak
  - The crew is performing EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)

- Unit 2 Conditions:
  - Unit 2 remains at power
  - 2ETB has experienced a blackout with failure of 2B D/G to start
  - 2A1 and 2A2 KC Pumps have been secured due to piping rupture
  - The crew is performing AP/2/A/5500/021 (Loss of Component Cooling)
  - 2A NV Pump remains in service
  - VCT level is 20% and decreasing slowly

In accordance with AP/21:

The Unit 2 CRS _____(1)_____ direct performance of AP/21, Enclosure 2 (Alternate Cooling to NV Pump 2A).

The Unit 2 CRS _____(2)_____ direct performance of AP/21, Enclosure 6 (Rx Trip Sequence).

Which ONE of the following completes the statements above?

A. 1. will
   2. will

B. 1. will
   2. will NOT

C. 1. will NOT
   2. will

D. 1. will NOT
   2. will NOT

General Discussion

Per AP/21 step 2 RNO b.1, the step to align backup cooling to the NV Pump is bypassed if a Safety Injection has been actuated on either unit. Per the associated Background Document, this alignment will not be made under these conditions due to the additional flow to the ND and NS sumps which would exceed the assumed flow for design basis accident analysis. Since an SI has occurred on Unit 1, Unit 2 would not align backup cooling to 2A NV Pump.

Although direction to perform Enclosure 6 is contained within the Foldout Page other direction is contained within the body of AP/21. Specifically, VCT level <23% or PZR level >85%. With conditions given, performance of Enclosure 6 would be directed.

Answer A Discussion

Part 1 is plausible because performance of this enclosure would be directed if an SI had not occurred on Unit 1.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because performance of this enclosure would be directed if an SI had not occurred on Unit 1.

Part 2 is plausible because none of the conditions specified on the foldout page direct performance of this enclosure. The requirement to perform is contained within the body of AP/21.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because none of the conditions specified on the foldout page direct performance of this enclosure. The requirement to perform is contained within the body of AP/21.

Basis for meeting the KA

As associated with a loss of CCW pump (loss of all CCW pumps), the applicant must predict the impacts (Rx trip sequence requirement), and use procedures to mitigate the consequences (alignment of alternate cooling).

Basis for Hi Cog

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires knowledge a specific procedure requirement, assessment of plant conditions, and selection of the proper procedure (section of appropriate procedure) for recovery.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References	Student References Provided
ABG/1/5500/021 (AP/21 Background Doc), Rev. 01, Step 2 AP/2/A/5500/021 (Loss of Component Cooling), Rev. 38, Steps 2 RNO b.1 & 4 RNO g and Enclosure 1 (Foldout Page)	

SYS008 A2.01 - Component Cooling Water System (CCWS)
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 malfunc- tions or operations : (CFR: 41.5 / 43.5 / 45.3 / 45.13)
Loss of CCW pump .....

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 90** 90 **C**

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR QUESTION 91 91 **B**

SYS028 A2.03 - Hydrogen Recombiner and Purge Control System (HRPS)

Malfunctions or operations on the HRPS; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

The hydrogen air concentration in excess of limit flame propagation or detonation with resulting equipment damage in containment

.....

Given the following Unit 1 conditions:

- The crew is performing steps in EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant) following LOCA
- Containment Pressure is 2.2 psig
- Containment Sump Level is 10.6 ft
- Containment Radiation is 28 R/Hr
- Containment Hydrogen Concentration is 6.8%

Per the Containment CSF status tree, MINIMUM requirements for entry into EP/1/A/5000/FR-Z.4 (Response to High Containment Hydrogen Concentration) _____(1)_____ met.

Based on above listed conditions, the crew _____(2)_____ energize Hydrogen Ignitors.

Which ONE of the following completes the statements above?

A. 1. are
   2. will

B. 1. are
   2. will NOT

C. 1. are NOT
   2. will

D. 1. are NOT
   2. will NOT

General Discussion

Per F-0, the following parameters are required for entry into FR-Z.4:
Containment Pressure < 3 psig
Containment Sump Level < 15.5 ft
Containment Radiation Level < 35 R/hr
Containment Hydrogen > 0.5%

E-1 and FR-Z.4 will only direct energizing hydrogen ignitors if Containment Hydrogen concentration is < 6%. Otherwise, station management will be consulted for recommendation of other methods.

Answer A Discussion

Part 1 is correct.

Part 2 is plausible if the applicant is unaware of the high Containment Hydrogen limit and the applicant reasons that a higher concentration would require use of the Hydrogen Ignitors.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Part 1 is plausible if the applicant is unaware of the additional parameters (beyond H2 concentration) required in order to meet FR-Z.4 entry. For example, Containment Radiation >35 would result in FR-Z.2 entry and bypass this CSF function. Additionally, multiple EPs provide H2 control guidance following a LOCA which could lead one to reason this procedure would not necessarily be required for mitigation.

Part 2 is plausible if the applicant is unaware of the high Containment Hydrogen limit and the applicant reasons that a higher concentration would require use of the Hydrogen Ignitors.

Answer D Discussion

Part 1 is plausible if the applicant is unaware of the additional parameters (beyond H2 concentration) required in order to meet FR-Z.4 entry. For example, Containment Radiation >35 would result in FR-Z.2 entry and bypass this CSF function. Additionally, multiple EPs provide H2 control guidance following a LOCA which could lead one to reason this procedure would not necessarily be required for mitigation.

Part 2 is correct.

Basis for meeting the KA

The applicant is required to demonstrate the ability to use procedures to mitigate the actions of a high containment hydrogen concentration through knowledge of the operation of the HRPS system.

Basis for Hi Cog

This question requires more than one mental step:
1. The applicant must compare provided information with that recalled from memory in order to determine entry requirements for a CSF recovery procedure.
2. The applicant must compare provided information with that recalled from memory in order to determine proper operation of the Hydrogen Ignitor system.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires knowledge of yellow path CSF entry criteria (SRO only) and detailed knowledge of the associated procedure.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

ILT-17 NRC Written Exam CNS SRO NR QUESTION 91

91

B

Development References	Student References Provided
EP/1A/5000/F-0 (Critical Safety Function Status Trees), Rev. 9, Pg. 9 EP/1/A/5000/FR-Z.4 (Response to High Containment Hydrogen Concentration), Rev. 2, Step 2 EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant), Rev. 30, Step 13	

SYS028 A2.03 - Hydrogen Recombiner and Purge Control System (HRPS)

Malfunctions or operations on the HRPS; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

The hydrogen air concentration in excess of limit flame propagation or detonation with resulting equipment damage in containment

.....

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 92** 92

D

SYS055 2.2.37 - Condenser Air Removal System (CARS)
SYS055 GENERIC
Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)

Given the following Unit 1 conditions:

- Condenser Hotwell temperature is increasing following a malfunction of the Condenser Air Ejectors

Assuming this trend continues, the CRS will declare the CA system inoperable, per TS 3.7.5 (Auxiliary Feedwater System), when Hotwell temperature reaches a MINIMUM value of _____(1)_____ .

Once TS 3.7.5 actions are entered, the CRS _____(2)_____ apply the Required Actions of LCO 3.0.3.

Which ONE of the following completes the statements above?

A. 1. 134 degrees F
   2. will

B. 1. 134 degrees F
   2. will NOT

C. 1. 136 degrees F
   2. will

D. 1. 136 degrees F
   2. will NOT

General Discussion

Per the Annunciator Response Procedure for Hi-Hi CA Suction Source Temperature, the Auxiliary Feedwater system must be declared inoperable once the Hotwell or Upper Surge Tank temperature reaches 136 degrees.

Since this source affects the entire system, the CRS would enter TS 3.7.5 Condition D (Three AFW trains inoperable in Mode 1, 2 or 3). This condition contains a note stating that LCO 3.0.3 and all other LCO required actions requiring Mode changes are suspended until one AFW train is restored to operable status.

Answer A Discussion

Part 1 is plausible because actions are required at this temperature if performing actions of the loss of OAC procedure.

Part 2 is plausible because in most cases inoperability of all available trains results in LCO 3.0.3 entry. This is an exception.

Answer B Discussion

Part 1 is plausible because actions are required at this temperature if performing actions of the loss of OAC procedure.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because in most cases inoperability of all available trains results in LCO 3.0.3 entry. This is an exception.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

PRE-REVIEW QUESTION - SAT 03/14/17

The applicant is required to determine safety related system availability (aux feed) based on a condition resulting from a malfunction of the Condenser Air Removal System. The applicant is also required to apply the related T.S. actions in order to determine LCO 3.0.3 applicability.

Basis for Hi Cog

The applicant must compare provided information to that recalled from memory in order to determine the correct entry condition of a TS and then recall and apply specific requirements of the applicable TS condition.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.

This question requires the applicant to demonstrate detailed knowledge of a procedure containing a specific TS entry requirement and application of generic LCO 3.0.3.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
OP/1/A/6100/010 I (Annunciator Response for Panel 1AD-8), Rev. 80, D/1 TS 3.7.5, Conditon D TSB 3.7.5, Action D.1 PT/1/A/4600/009 (Loss of Operator Aid Computer), Rev. 90, Encl. 13.14, Step 1.8

Student References Provided

SYS055 2.2.37 - Condenser Air Removal System (CARS)
SYS055 GENERIC
Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 92** 92 **D**

Remarks/Status
PRE-REVIEW QUESTION - SAT 03/14/17

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 93** 93

C

SYS016 A2.01 - Non-Nuclear Instrumentation System (NNIS)

Ability to (a) predict the impacts of the following malfunctions or operations on the NNIS; and (b) based on those predictions, use or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.5)

Detector failure .....

Given the following Unit 1 conditions:

- The Unit is at 100% RTP
- Channel 4 PZR Pressure has failed low
- All required T.S. actions have been completed

Subsequently:

- 1B NC Loop T_{cold} detector fails low

Channel 2 $OT_{delta}T$ setpoint will _____(1)_____ .

Assuming no other actions are taken, the latest time that Unit 1 will be required to reach Mode 3 is in _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. decrease
   2. 7 hours

B. 1. decrease
   2. 78 hours

C. 1. increase
   2. 7 hours

D. 1. increase
   2. 78 hours

General Discussion

Concerning the OTdeltaT set point:
1. Pressure below 2235 psig will cause the set point to decrease. Therefore, Channel 4 OTdeltaT will decrease.
2. Tave below full load will cause the set point to increase. Therefore, Channel 2 OTdeltaT will increase.

T.S. 3.3.1 requires four channels of OTdeltaT operable and only contains a condition for one channel inoperable. Therefore, the Unit would enter T.S. 3.0.3. If neither instrument is repaired, the unit will be required to enter Mode 3 within 7 hours.

Answer A Discussion

Part 1 is plausible if the applicant reverses the affect of low Tave upon OTdeltaT.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible if the applicant reverses the affect of low Tave upon OTdeltaT.

Part 2 is plausible because the applicant must recall that both instruments provide input into the OT delta T calculation. (Separate entry is allowed into 3.3.1. for each failure)

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because the applicant must recall that both instruments provide input into the OT delta T calculation. (Separate entry is allowed into 3.3.1. for each failure)

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the operational impacts of a detector failure related to Non-Nuclear Instrumentation and the ability to use procedures (Tech Spec.) to mitigate the consequences of the malfunction.

Basis for Hi Cog

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.

This question requires the applicant to apply generic LCO 3.0.3

This question also requires the applicant to have knowledge of the OTdeltaT equation in order to determine the effects of instrument failures. This equation is located in the basis of TS 3.3.1.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	15 CNS NRC Q92

Development References	Student References Provided
OP-CN-IC-IPX (Reactor Protection System Lesson Plan), Rev. 101, Section 4.11 T.S. 3.3.1 (Reactor Trip System Instrumentation), Rev. 173/165, Table 3.3.1-1, Item 6 and Condition E	

SYS016 A2.01 - Non-Nuclear Instrumentation System (NNIS)
Ability to (a) predict the impacts of the following malfunctions or operations on the NNIS; and (b) based on those predictions, use or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.5)
Detector failure .....

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 93** 93 **C**

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR QUESTION 94 94

D

GEN2.1 2.1.7 - GENERIC - Conduct of Operations

Conduct of Operations

Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)

Given the following Unit 1 initial conditions:

- The Unit experienced a complete loss of the switchyard
- The crew was performing steps in EP/1/A/5000/ES-0.2, (Natural Circulation Cooldown)
- Station management recommended a rapid cooldown due to secondary inventory concerns
- The crew transitioned to EP/1/A/5000/ES-0.3, (Natural Circulation Cooldown) with Steam Void in the Vessel

Subsequently:

- Pressurizer level is 92% and increasing
- Reactor vessel Upper Range (UR) level is 70% and decreasing
- The STA notes a YELLOW path on NC INVENTORY and confers with the SM regarding whether to transition to EP/1/A/5000/FR-I.3, (Response to Voids in Reactor Vessel)

In order to control void growth, the CRS will direct the BOP to _____(1)_____ per the direction provided in _____(2)_____ .

Which ONE of the following completes the statement above?

A. 1. open reactor vessel head vents
   2. FR-I.3

B. 1. open reactor vessel head vents
   2. ES-0.3

C. 1. energize pressurizer heaters
   2. FR-I.3

D. 1. energize pressurizer heaters
   2. ES-0.3

General Discussion

ES-0.3 is implemented if the 50°F/hr cooldown of ES-0.2 limit is not fast enough. ES-0.3 is designed to perform a plant cooldown on natural circulation, assuming that a void will develop in the reactor vessel head region. The operator monitors the void growth and the procedure requires that level in the vessel head be maintained greater than 73% upper range level. The void level is controlled by the use of pressurizer heaters (to control subcooling), and charging and letdown. FR-I.3 is entered from a yellow path on CSF status trees when reactor vessel upper range level is not greater than 95%. This sends the crew to FR-I.3. This procedure is primarily for venting a hard bubble in the PZR, not collapsing a steam void. Therefore, for the current conditions, if a transition to FR-I.3 is made, it will send you back to ES-0.3 for mitigation.

Answer A Discussion

Plausible, since this is an action in FR-I.3 to vent a non-condensable bubble, but these conditions are NOT for a non-condensable bubble.

Answer B Discussion

Plausible, since this is the correct procedure to be in. However, this procedure does not vent the head, since this is the action taken in FR-I.3 if the bubble is non-condensable gas.

Answer C Discussion

FR-I.3 does contain this step for this condition, but the direction in Step 1 is, if ES-0.3 was in progress, to return to the procedure in effect (i.e., ES-0.3).

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The applicant is required to demonstrate the ability to evaluate plant performance and make an operational judgement based on instrument interpretation.

Basis for Hi Cog

This is a high cognitive level question because it involves a level of analysis of a given set of plant conditions to determine that vessel head voiding is occurring, then apply system knowledge, and knowledge of plant operating characteristics (response of natural circulation when mitigating vessel head voiding) to decide upon a course of action, including procedure selection, for mitigation.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires knowledge of yellow path CSF entry criteria (SRO only).
This question also requires analysis of accident conditions, determination of what action will control vessel head void growth, without interrupting natural circulation, and then evaluating which procedure to use to accomplish the action. The procedure selected is NOT a major EOP, but is a specific sub-procedure (ES- 0.3).

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	Bank Q 7012

Development References
EP/1/A/5000/ES-0.3, (Natural Circulation Cooldown With Steam Void in Vessel), Rev. 14, Step 5.b RNO EP/1/A/5000/FR-I.3, (Response to Voids in Reactor Vessel), Rev. 18, Step 1 & 22

Student References Provided

GEN2.1 2.1.7 - GENERIC - Conduct of Operations

Conduct of Operations

Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)

ILT-17 NRC Written Exam CNS SRO NR QUESTION 94 94 D

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR QUESTION 95 95 **A**

GEN2.2 2.2.11 - GENERIC - Equipment Control
Equipment Control
Knowledge of the process for controlling temporary design changes. (CFR: 41.10 / 43.3 / 45.13)

Given the following Unit 1 conditions:

- The Unit is in Mode 6
- 1AD-4 B/1 (S/G A Level Deviation) will not illuminate. IAE has Blocked the inputs for outage related activities
- 1AD-9 B/7 (FWST Emerg Lo Temp) will not illuminate. IAE has disconnected the associated transmitter in order to temporarily change the alarm setpoint for an upcoming test

In accordance with OMP 2-31 (TMs Affecting Control Room Annunciators):

Attachment 8.1 will be used to track the inoperability of _____(1)_____ .

Attachment 8.1 will be filed in the _____(2)_____ .

Which ONE of the following completes the statements above?

A. 1. 1AD-9 B/7
   2. Ops Shift Routine Logbook

B. 1. 1AD-4 B/1
   2. Ops Shift Routine Logbook

C. 1. 1AD-9 B/7
   2. Shift Work Manager Logbook

D. 1. 1AD-4 B/1
   2. Shift Work Manager Logbook

General Discussion

Per OMP 2-31 (Control Room Instrumentation Status), Attachment 8.1 is used for temporary modifications. Annunciators disabled for a temporary setpoint change would qualify. This log shall be filed in the OPS Shift Routines Logbook.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is plausible since the inputs to this annunciator have been modified on a temporary basis. However, this is not a temporary modification and is separately addressed in OMP 2-31.

Part 2 is correct.

Answer C Discussion

Part 1 is correct.

Part 2 is plausible because most file copies (i.e. hazard barriers, and fire impairments) are maintained by the Shift Work Manager in the Work Control Center.

Answer D Discussion

Part 1 is plausible since the inputs to this annunciator have been modified on a temporary basis. However, this is not a temporary modification and is separately addressed in OMP 2-31.

Part 2 is plausible because most file copies (i.e. hazard barriers, and fire impairments) are maintained by the Shift Work Manager in the Work Control Center.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of the method of tracking annunciators made inoperable for testing.

Basis for Hi Cog

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Facility licensee procedures required to obtain authority for design and operating changes in the facility):

Administrative processes for temporary modifications

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	'15 NRC Q97

Development References	Student References Provided
OMP 2-31 (Control Room Instrumentation Status), Rev. 030, Section 5.3	

GEN2.2 2.2.11 - GENERIC - Equipment Control

Equipment Control

Knowledge of the process for controlling temporary design changes. (CFR: 41.10 / 43.3 / 45.13)

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 96** 96

B

GEN2.2 2.2.5 - GENERIC - Equipment Control
Equipment Control
Knowledge of the process for making design or operating changes to the facility. (CFR: 41.10 / 43.3 / 45.13)

Which ONE of the following changes requires a 10CFR50.59 screen?

A. A change to the Site Physical Security Plan that reduces the shift staffing requirements for security guards.

B. A system modification that adds a backup Nitrogen accumulator to an air operated containment isolation valve.

C. A revision to the Site Emergency Plan that changes the designated assembly areas for accountability.

D. A change to the Nuclear Quality Assurance Plan.

General Discussion

Containment isolation valves are Tech Spec SSCs, and therefore require the 10CFR50.59 review.

Answer A Discussion

Security Guard staffing is not covered under Tech Specs but under 10CFR50.72. Plausible: If the applicant is not familiar with the requirements for USQs. Some station staffing requirements are covered under Tech Specs.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

The emergency plan is changed under the 10CFR50.54q process which is similar in concept to 10CFR50.59 but not the same. Plausible: If the applicant is not familiar with the requirements for USQs.

Answer D Discussion

Does not require a 10CFR50.59 evaluation. The QA Plan is not a Tech Spec SSC. Plausible: If the applicant is not familiar with the requirements for USQs. NQA is covered under 10CFR50 Appendix B.

Basis for meeting the KA

The KA is matched because it tests knowledge of 10CFR50.59 reviews and for which situations this type of review would be required.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Facility licensee procedures required to obtain authority for design and operating changes in the facility):

Process for changing the plant or plant procedures.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	Bank Q 1292

Development References	Student References Provided
AD-LS-ALL-007 (Applicability Determination Process), Rev. 2, Sect. 5.3.3	

GEN2.2 2.2.5 - GENERIC - Equipment Control

Equipment Control

Knowledge of the process for making design or operating changes to the facility. (CFR: 41.10 / 43.3 / 45.13)

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR **QUESTION 97** 97 **A**

GEN2.3 2.3.14 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (CFR: 41.12 / 43.4 / 45.10)

In accordance with SLC 16.11-19 (Gas Storage Tanks):

Waste Gas Decay Tanks (WGDT) are monitored to ensure radioactivity is limited to a MAXIMUM of _____(1)_____.

This limit is based on exposure received by a _____(2)_____ during an accidental release.

Which ONE of the following completes the statements above?

A. 1. 97,000 Curies
   2. member of the public

B. 1. 97,000 Curies
   2. plant worker

C. 1. 10 Curies
   2. member of the public

D. 1. 10 Curies
   2. plant worker

General Discussion

Per SLC 16.11-19, the quantity of radioactivity contained in each gas storage tank shall be limited to 97,000 Curies of noble gas. Per the basis, this provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting whole body exposure to a member of the public at the nearest site boundary will not exceed 0.5 rem.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

Part 1 is correct.

Part 2 is plausible if the applicant believes that curie content is to protect plant workers who will likely receive higher dose rates from an uncontrolled release of the tank contents.

Answer C Discussion

Part 1 is plausible because SLC 16.11-17 limits Liquid Holdup Tanks radioactive material content to 10 Curies.

Part 2 is correct.

Answer D Discussion

Part 1 is plausible because SLC 16.11-17 limits Liquid Holdup Tanks radioactive material content to 10 Curies.

Part 2 is plausible if the applicant believes that curie content is to protect plant workers who will likely receive higher dose rates from an uncontrolled release of the tank contents.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of radiological hazards associated with a waste gas disposal malfunction through a SLC required activity limit and the associated basis for this limit.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Tech Specs):

1) This question can NOT be answered by knowing less than 1 hour Tech Specs
2) This question can NOT be answered by knowing information listed "above-the-line".
3) This question can NOT be answered by knowing the TS Safety Limits.
4) This question requires the applicant to have knowledge of the Tech Spec Basis.

This question requires knowledge of SLC required activity limits as detailed in the applicable Basis.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	Bank Q 6501

Development References	Student References Provided
SLC 16.11-19 (Rev 0) SLC 16.11-17 (Rev 0)	

GEN2.3 2.3.14 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (CFR: 41.12 / 43.4 / 45.10)

Remarks/Status

ILT-17 NRC Written Exam CNS SRO NR QUESTION 98 98

B

GEN2.3 2.3.6 - GENERIC - Radiation Control
Radiation Control
Ability to approve release permits. (CFR: 41.13 / 43.4 / 45.10)

Given the following conditions:

- An Auxiliary Building waste monitor tank liquid waste release (LWR) package has been delivered to the Control Room
- All RN Pumps are ON
- 1AD-12 B/1 RN Pump Intake Pit A Lo Level is LIT
- 1AD-12 E/2 RN Pit-A Swap to SNSWP is LIT
- A and B RL pumps are on and RL flow is greater than required for WL release
- EMF-57 (Monitor Tank Building Liquid Discharge Monitor) is NOT Functional
- EMF-49 (Liquid Waste Discharge Lo Range) is Functional

The CRS _____(1)_____ approve this release because _____(2)_____ .

Which ONE of the following completes the statement above?

A. 1. will NOT
   2. EMF-57 is NOT Functional

B. 1. will NOT
   2. RN is aligned to the SNSWP

C. 1. will
   2. RL flow is greater than required for WL release ONLY

D. 1. will
   2. EMF-49 is Functional AND RL flow is greater than required for WL release

---

General Discussion

With RN aligned to the Standby Nuclear Service Water Pond, release cannot be approved.

Answer A Discussion

Plausible, since EMF-57 is a radiation monitor associated with releases, but its operability does not affect this release.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

Plausible because RL flow would be required . However, RN alignment to the lake is an additional requirement for release approval.

Answer D Discussion

Plausible because RL flow would be required and EMF-49 functionality would be desired. However, RN alignment to the lake is an additional requirement for release approval.

Basis for meeting the KA

The applicant is required to demonstrate the ability to make determinations related to approval of a liquid waste release.

Basis for Hi Cog

This step requires more than one mental step:
1. The applicant must compare provided information with that recalled from memory in order to determine the applicable requirements for a release from a specific location.
2. The applicant must compare provided information with that recalled from memory in order determine the required Nuclear Service Water alignment for the specified release.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Radiation Hazards that may arise during normal or abnormal situations, including maintenance and various contamination conditions):

Process for gaseous/liquid release approvals, i.e. release permits

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	Bank Q 7013

Development References

OP-CN-WE-WL (Liquid Waste System LP), Rev. 204, Figure 1
OP/0/B/6500/113 (Operations Liquid Waste Release), Rev. 10, Encl. 4.1, Step 1.2

Student References Provided

GEN2.3 2.3.6 - GENERIC - Radiation Control
Radiation Control
Ability to approve release permits. (CFR: 41.13 / 43.4 / 45.10)

Remarks/Status

GEN2.4 2.4.26 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of facility protection requirements, including fire brigade andportable fire fighting equipment usage. (CFR: 41.10 / 43.5 / 45.12)

Given the following conditions:

- A fire event has occurred inside the Protected Area

In accordance with RP/0/B/5000/029 (Fire Brigade Response), the "Fire Emergency Report" is completed by the _____(1)_____ .

If required, _____(2)_____ will direct a partial transfer to the SSF.

Which ONE of the following completes the statements above?

A. 1. Shift Manager
   2. AP/0/A/5500/045 (Plant Fire)

B. 1. Shift Manager
   2. RP/0/B/5000/029 (Fire Brigade Response)

C. 1. Fire Brigade Leader
   2. AP/0/A/5500/045 (Plant Fire)

D. 1. Fire Brigade Leader
   2. RP/0/B/5000/029 (Fire Brigade Response)

General Discussion

RP/29 directs the on duty Fire Brigade Leader to complete the Fire Emergency Report. AP/45 (Plant Fire) directs partial transfer to the SSF if a fire is located in the dedicated areas. (See Note just prior to Step 5, of AP/45.)

Answer A Discussion

Part 1 is plausible because the Operations Shift Manager is required to approve the Fire Emergency Report.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because the Operations Shift Manager is required to approve the Fire Emergency Report.

Part 2 is plausible because RP/29 contains guidance to shift personnel for response to plant fires.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because RP/29 contains guidance to shift personnel for response to plant fires.

Basis for meeting the KA

The KA is matched because conditions involve a fire with activation of the TSC. The applicant demonstrates knowledge of the fire protection procedures by being tested on a requirement from the procedure for Fire Brigade. At the SRO level, the applicant is tested on knowledge of these procedures by selecting the procedure containing the details of how a transfer to the SSF (Standby Shutdown Facility) is performed.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires knowledge of an Emergency Response Procedure (SRO) and required knowledge of when to implement attachments, including how to coordinate these items with procedure steps.

This question also requires the applicant to assess plant conditions and select a procedure for mitigative actions with which to proceed.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	Bank Q 7014

Development References

RP/0/B/5000/029, (Fire Brigade Response), Rev. 31, Enclosure 3.1, NOTE prior to Step 2.8
AD-OP-ALL-0207 (Fire Brigade and Hazmat Team Administrative Controls), Rev. 0, Attachment 1
AP/0/A/5500/045, (Plant Fire), Rev. 11, Step 5.a

Student References Provided

GEN2.4 2.4.26 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of facility protection requirements, including fire brigade andportable fire fighting equipment usage. (CFR: 41.10 / 43.5 / 45.12)

ILT-17 NRC Written Exam CNS SRO NR QUESTION 99 99 C

Remarks/Status

GEN2.4 2.4.5 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 1 initial conditions:

- The Primary SPDS Display indicates:
  - CORE COOLING ORANGE
  - RADIATION RED
  - The remaining Critical Safety Functions indicate GREEN
  - The CRS selects the appropriate CSF procedure and begins implementation

Subsequently:

- The Primary SPDS Display NOW indicates:
  - CORE COOLING ORANGE
  - HEAT SINK RED
  - RADIATION RED
  - The remaining Critical Safety Functions indicate GREEN

Based on current conditions, the CRS _____(1)_____ continue implementation of the originally selected CSF procedure. The basis for the decision is contained in _____(2)_____ .

Which ONE of the following completes the statement above?

A. 1. will
   2. Westinghouse Owners Group Background Documents

B. 1. will
   2. NEI 99-01 Wallchart, Fission Product Barrier Threshold Matrix

C. 1. will NOT
   2. Westinghouse Owners Group Background Documents

D. 1. will NOT
   2. NEI 99-01 Wallchart, Fission Product Barrier Threshold Matrix

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General Discussion

Although Core Cooling is considered a higher overall priority, a RED indication for Heat Sink represents an Extreme Challenge and will require transition to the appropriate procedure. Radiation indication is for information only and does not require entry into the CSF procedures.

Per the CSF Lesson Plan: The table of CSF priority is based on Westinghouse Owners Group Background Documents, not the Fission Product Barrier Matrix.

Answer A Discussion

Part 1 is plausible because Core Cooling represents a higher priority in the CSF matrix.

Part 2 is correct.

Answer B Discussion

Part 1 is plausible because Core Cooling represents a higher priority in the CSF matrix.

Part 2 is plausible because the wallchart does contain event prioritization related items, but it is for the purpose of emergency classification.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

Part 1 is correct.

Part 2 is plausible because the wallchart does contain event prioritization related items, but it is for the purpose of emergency classification.

Basis for meeting the KA

The KA is matched because the applicant must analyze conditions involving critical safety function status changes, and the how the emergency procedures are implemented based on that prioritization.

Basis for Hi Cog

This is a higher cognitive level question because the applicant analyzes conditions to determine the priority of emergency procedure implementation.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 10, ES-401, Attachment 2 (Assessment and selection of procedures):
1) This question can NOT be answered solely by knowing systems knowledge.
2) This question can NOT be answered by knowing immediate operator actions.
3) This question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
4) This question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

This question requires an assessment of plant conditions (involving F-0 content and rules of usage), and then selecting a procedure with specific content for a specific purpose: to mitigate the Critical Safety Function that has the highest priority per the rules of usage.
Therefore, this is an SRO only question.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	Bank Q 7015

Development References	Student References Provided
OP-CN-EP-CSF (Introduction to Critical Safety Functions LP), Rev. 100, Sect. 1.2 OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines), Rev. 41, Sect. 7.3 A &.E	

GEN2.4 2.4.5 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions. (CFR: 41.10 / 43.5 / 45.13)

ILT-17 NRC Written Exam CNS SRO NR QUESTION 100 100 C

Remarks/Status

2017 INITIAL LICENSE NRC EXAM
SCENARIO # 1

Facility: Catawba NRC Exam 2017 Scenario No.: 1 Op Test No.: 2017301

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. 1A CA Pump is removed from service for PMs. 1A CA Pump has been inoperable for 3 hours and is expected to be returned to service in 6 hours. 1A Condensate Booster Pump is tagged out for emergent motor replacement. Direction for the crew is to decrease reactor power to 50% to secure a main feedwater pump in preparation for entering a Unit 1 Refueling Outage. 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	CM004F	C – BOP C – SRO	1B CFPT suction valve fails closed / 1B CFPT fails to auto trip
3	NC005F	C – RO C – SRO TS - SRO	NC PORV 1NC-32B fails open
4	NV020D	C – BOP TS – SRO	1A NV pump trips
5	IPX001A IPX001B	C – RO C – SRO	1A CFPT trips / Reactor fails to automatically trip
6	CA005 EP008B	M – ALL	Loss of Secondary Heat Sink
7	EP008B CA005	C – RO	1ETB Blackout / CAPT #1 fails to autostart
8	NI001A	C – BOP C - SRO	1A NI pump fails to auto start on initiation of Feed and Bleed

* (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. 1A CA Pump is removed from service for PMs. 1A CA Pump has been inoperable for 3 hours and is expected to be returned to service in 6 hours. 1A Condensate Booster Pump is tagged out for emergent motor replacement. Direction for the crew is to decrease reactor power to 50% to secure a main feedwater pump in preparation for entering a Unit 1 Refueling Outage. 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 2
The 1B CFPT suction valve (1CM-140) will fail closed. 1B CFPT will not trip on low suction pressure or low suction flow. Following manual trip of the 1B CFPT, the crew will enter AP/1/A/5500/003 (Load Rejection) Case 1 (Switchyard Available) to address the turbine runback.

Verifiable Action – BOP will manually trip 1B CFPT.

Event 3
NC PORV 1NC-32B will fail open. Crew will enter AP/1/A/5500/011 (Pressurizer Pressure Anomalies) to address this failure.

Verifiable Action – The RO will attempt to manually close 1NC-32B. This valve will not close and the RO will be required to close the PORV isolation valve, 1NC-31B, to isolate the failed open PORV.

Event 4
1A NV pump will trip. The crew will enter AP/1/A/5500/012 (Loss of Charging or Letdown) to address this failure.

Verifiable Action – BOP will start the 1B NV pump and restore normal letdown to service per AP/1/A/5500/012.

Event 5
A trip of the running Condensate Booster Pumps will cause 1A CFPT to trip on low suction pressure after 20 seconds. The RO will take the immediate actions of AP/1/A/5500/006 (Loss of S/G Feedwater) to manually trip Unit 1 reactor.

Verifiable Action – RO trips Unit 1 reactor.

Event 6
A loss of secondary heat sink will occur following loss of all power to 1ETB (1A CA pump tagged out & 1B CA pump loss of power) and subsequent overspeed trip of CAPT #1.

Verifiable Action – RO will start CAPT #1 following failure of it to autostart. Crew will eventually enter EP/1/A/5000/FR-H.1 (Loss of Secondary Heat Sink), and establish NC system feed and bleed.

Event 7
1ETB will lose all power and CAPT #1 will fail to autostart on the blackout.

Verifiable Action – RO will manually start CAPT #1.

Event 8
NI pumps will fail to autostart upon initiation of S/I for establishing NC system feed and bleed.

Verifiable Action – BOP initiates S/I, will reset ECCS and D/G load sequencer for 'A' train and manually start 1A NI pump, and then open 2 Pressurizer PORVs.

***Critical Task 1* – Manually isolate failed open Pressurizer PORV (1NC-32B) 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* – Initiate Reactor Coolant System Bleed and Feed before Pressurizer PORVs open automatically (NC system pressure of 2335 PSIG) due to heat up of the NC system.**

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	6
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 # 170 and load schedule file for NRC Scenario 1

START TIME:_____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		2	VLV-CM004F (CM140 COND CF PMP 1B SUCTION ISOL FAIL TO POSITION)	0		:20		2
		2	BST-JFB5940B (2/3 LO SUCT FLOW CFPT B TRIP)	AS_IS				2
		2	BST-JFB5943B (2/3 LO SUCT FLOW CFPT B TRIP)	AS_IS				2
		2	BST-JPB5972 (2/3 LO SUCT PRESS CFPT B TRIP) - PS	AS_IS				2
		2	BST-JPB5973 (2/3 LO SUCT PRESS CFPT B TRIP) - PS	AS_IS				2
		3	ANN-AD19-F04 (YN CRITICAL TROUBLE)	ON				3
		10	VLV-NC005F (NC32B PZR PORV FAIL TO POSITION)	1				3
		4	OVR-NV020D (NV PMP 1A OFF PB)	ON				4
		5	LOA-CM040 (RACKOUT CBP 1B)	RACK-OUT				5
		5	LOA-CM041 (RACKOUT CBP 1C)	RACK-OUT				5
			LOA-CM039 (RACKOUT CBP 1A)	RACK-OUT				5
			MAL-IPX001A (AUTO REACTOR TRIP FAILURE TRN A)	ACTIVE				5
			MAL-IPX001B (AUTO REACTOR TRIP FAILURE TRN B)	ACTIVE				5
			MAL-CA005 (CA PUMP OVERSPEED TRIP)	MECH-ANICAL				6
		7	MAL-EP008B (LOSS OF 4160V BUS ETB)	ACTIVE	:10			7
			MAL-NI001A (NI PUMP A FAILURE)	AUTO				8
			LOA-CA017 (RACKOUT CA PUMP 1A)	RACK-OUT				

		11	**OVR-NV020D (NV PMP 1A OFF PB)**	**OFF**			**:01**	
		13	**LOA-CNT002 (H2 ANALYZERS)**	**BOTH**	**10:00**			
		15	**VLV-NC004C (NC31B PZR PORV ISOL VLV FAIL PWR)**	**ACTIVE**	**10:00**			
		17	**LOA-NV078 (SEAL WATER LOW FLOW LCL REFLASH ACK (AD7,C4))**	**ACKN**	**5:00**			
		Ensure EVENT 7 = jpplp4(1) | jpplp4(2) (Reactor Trip Either Train)						
		Ensure EVENT 10 = x5ri017a (1AD-19 Acknowledge)						
		Ensure EVENT 11 = x11i197i						
		Ensure control rods are placed in MANUAL						
		Ensure Red Collar is placed on 1A Condensate Booster Pump						
		Ensure Red Collar is placed on 1A CA Pump						
		Ensure all Pressurizer heaters are on for mixing						

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**, Power decrease to 50%

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as SOC by the crew to inform of commencing power decrease, **REPEAT** the information.

3.3 **Scenario EVENT 2**, 1B CFPT suction valve 1CM-140 fails closed with failure of 1B CFPT to trip automatically

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 2** to cause 1B CFPT suction valve 1CM-140 to fail closed.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1CM-140, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an AO is contacted to complete shutdown of the CHDPs, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as the SOC reporting on runback of Unit 1, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection to sample and analyze gaseous effluents referring to SLC 16.11-6, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Primary Chemistry to sample for isotopic analysis of iodine between 2-6 hours following a power change of > 15% in a 1 hour period referring to Tech Spec 3.4.16, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Reactor Engineering to report on Unit 1 runback, **REPEAT** the information.

3.4 **Scenario EVENT 3**, NC PORV 1NC-32B Fails Open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause an HVAC Panel Trouble Alarm. Once this alarm is acknowledged on 1AD-19, NC PORV 1NC-32B will fail open.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1NC-32B, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an AO or the Unit Supervisor is contacted to create a clearance to remove power from 1NC-31B, **REPEAT** the information and **INSERT Trigger 15**.
	After 10 minutes, contact the control room and **REPORT** "Power has been removed from 1NC-31B."

3.5 **Scenario EVENT 4**, 1A NV Pump Trip

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 4** to cause 1A NV Pump Trip.

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

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO to perform a post start check of 1B NV pump, **REPEAT** the information.
	After 5 minutes, contact the crew and **REPORT** "1B NV pump looks good for continued operation".

✓	BOOTH INSTRUCTOR ACTION
	When AP-12 Case 2 Step 16.k (WHEN 5 minutes has elapsed…)is read, call the control room and **REPORT** "Using time compression, 5 minutes has elapsed."

✓	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 17**.
	After 5 minutes, contact the crew and **REPORT** "Seal Water Low Flow alarm has been acknowledged".

3.6 **Scenario EVENT 5**, Trip of Running Condensate Booster Pumps

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 5** to cause a trip of the running condensate booster pumps.

3.7 **Scenario EVENTS 6, 7, 8**, Loss of Heat Sink, 1ETB Blackout, and NI Pumps Fail to Autostart On Initiation of Bleed and Feed

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

✓	BOOTH INSTRUCTOR ACTION
	IF an AO is contacted to locally reset the Trip and Throttle valve, **REPEAT** the information.
	After 10 minutes, **REPORT** "The trip and throttle valve is mechanically bound and cannot be reset."

✓	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 an AO is contacted to restore power to 1NC-31B (1EMXD-F02C), **REPEAT** the information.

Op Test No.:	301	Scenario #	1	Event #	1	Page	10	of	139

Event Description: Power Reduction To 50%

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
Boration

OP/1/A/6150/009
Page 1 of 6

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.

2. Initial Conditions

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

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

BB 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.)

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

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".

Enclosure 4.2
Boration

OP/1/A/6150/009
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☐ 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.

_____ 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.

_____ 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.

Enclosure 4.2
Boration

OP/1/A/6150/009
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_____ 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).

_____ (Step 3.5) - _____ (Step 3.13.3) = _____ gallons

_____ 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

Enclosure 4.2
Boration

OP/1/A/6150/009
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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)

Enclosure 4.2
Boration

OP/1/A/6150/009
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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".

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.

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

Enclosure 4.2
Boration

OP/1/A/6150/009
Page 6 of 6

_____ 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.)

_____ 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 in the Control Copy folder of this procedure.

Enclosure 4.16
Control Bank Manual Operation At Power

OP/1/A/6150/008
Page 1 of 2

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

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

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

BB 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

OP/1/A/6150/008
Page 2 of 2

3. Procedure

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

BB 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)

BB 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.

BB 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

OP/1/B/6300/001
Page 4 of 5

_____ 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:

_____ 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:

_____ 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
Page 5 of 5

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 to 50% has begun. At the discretion of the Lead Evaluator, the scenario may continue to the next event by having the booth operator INSERT Trigger 2 for Event 2 (1B CFPT suction valve fails closed with failure of 1B CFPT to automatically trip).

Op Test No.: 301	Scenario # 1	Event # 2	Page 21	of 139
Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically				

Control Room Indications
1AD-5, D/4 "CFP B LOW SUCT FLOW" - LIT
1AD-5, F/5 "CFP B LOW SUCT PRESS" - LIT
CF PUMP 1B Suction pressure on 1CMP5970 decreasing
CF PUMP 1B Suction flow on 1CMP5940 decreasing
GREEN CLSD light LIT and RED OPEN light DARK on 1CM-140

Note To Evaluator:

Normally 20 seconds after receiving a low suction pressure or flow on a CFPT, that CFPT will trip. Both of these trips are blocked for 1B CFPT for this scenario, so the crew will be required to manually trip 1B CFPT. Once this occurs the crew will transition to AP/1/A/5500/003 (Load Rejection) Case 1 (Switchyard Available). This procedure begins on the following page.

Op Test No.:	301	Scenario #	1	Event #	2	Page	22	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 3 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

1. Verify turbine load - DECREASING IN AUTOMATIC.

   Perform the following:

   a. Select "MANUAL" on turbine control panel.

   b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load as required.

Note To Evaluator:

Crew may make the decision to return control rods to AUTO for the runback.

2. Verify proper reactor response:

   - Control rods - IN "AUTO" AND STEPPING IN
   - P/R neutron flux - DECREASING.

   IF T-Avg is 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.

3. Verify proper steam dump operation as follows:

   a. Verify T-Ref instrumentation - AVAILABLE.

   a. IF T-Avg Coastdown is 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.

Op Test No.:	301	Scenario #	1	Event #	2	Page	23	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 4 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
c. Verify the following:	c. IF steam dump valves are closed AND T-Avg is 3°F greater than T-Ref, THEN:
__ • "C-7A LOSS OF LOAD INTLK COND DUMP" status light (1SI-18) - LIT.	__ 1) Place "STM DUMP CTRL" in manual.
__ • Steam dump valves - MODULATING.	__ 2) Adjust "STM DUMP CTRL" to 0% demand.
	__ 3) Place the steam dumps in pressure mode.
	__ 4) Operate condenser steam dump valves to maintain T-Avg at T-Ref.
	__ 5) IF steam dump valves fail to operate, THEN dump steam as necessary from available S/G PORVs to maintain T-Avg at T-Ref.
__ d. T-Avg - DECREASING TO T-REF.	d. Perform the following:
	__ 1) Place "STM DUMP CTRL" in manual.
	__ 2) Adjust "STM DUMP CTRL" to 0% demand.
	__ 3) Place the steam dumps in pressure mode.
	__ 4) Operate condenser steam dump valves to maintain T-Avg at T-Ref.
	__ 5) IF steam dump valves fail to operate, THEN dump steam as necessary from available S/G PORVs to maintain T-Avg at T-Ref.

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Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 5 of 40 Revision 41

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 is less than 2315 PSIG, THEN: __ 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: __ a) Trip reactor. __ b) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
__ b. Normal Pzr spray valves - CLOSED.	b. IF Pzr pressure is less than 2150 PSIG, THEN: __ 1) CLOSE the affected spray valve(s). __ 2) REFER TO AP/1/A/5500/011 (Pressurizer Pressure Anomalies).

Op Test No.:	301	Scenario #	1	Event #	2	Page	25	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 6 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify proper CM System operation as follows:**	
__ a. **WHEN** reactor power is 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:**	__ **Ensure turbine generator load - REDUCED TO APPROXIMATELY 48% AND THE ALARM CLEARS.**
__ • 1AD-11, C/1 "GEN BKR A OVER CURRENT"	
__ • 1AD-11, F/1 "GEN BKR B OVER CURRENT".	

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Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 7 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Verify S/G levels are 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 is decreasing in an uncontrolled manner, THEN: __ 1) Trip reactor. __ 2) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
__ 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 reactor power between 6%-10%. d. IF AT ANY TIME reactor power is less than or equal to 5%, THEN perform the following: __ 1) Ensure turbine - TRIPPED. __ 2) Concurrently insert control rods to shutdown the reactor. REFER TO OP/1/A/6150/008 (Rod Control). __ 3) GO TO AP/1/A/5500/002 (Turbine Generator Trip). __ e. GO TO Step 10.
__ 9. **IF AT ANY TIME reactor power is less than or equal to 20%, THEN perform Step 8 RNO.**	

Op Test No.:	301	Scenario #	1	Event #	2	Page	27	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 8 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 10. Verify AS header pressure - GREATER THAN OR EQUAL TO 140 PSIG.	__ Adjust 1AS-2 (Main Stm To Aux Steam) as required to maintain AS header pressure between 140 PSIG and 150 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).	Enclosure 3 is included as Attachment 3.

Op Test No.:	301	Scenario #	1	Event #	2	Page	28	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 9 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Verify reactor power - LESS THAN 30%.**	**Perform the following:**
	N/A a. IF the runback target load is less than 30%, THEN:
	__ 1) WHEN time and personnel 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 is less than 30%.
	__ 3) WHEN reactor power is less than 30%, THEN GO TO Step 14.
	b. WHEN the appropriate runback target load is reached, THEN:
	__ 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.

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Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 10 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 14. **Verify the "RESET" light on "AMSAC FOR CF VALVES" switch - DARK.**	**Perform the following:** __ a. **IF** turbine impulse pressure is less than 190 PSIG, **THEN** notify IAE to correct the cause of the AMSAC failure to deactivate. __ b. Depress the "BYPASS" pushbutton on "AMSAC FOR CF VALVES" switch. __ c. **WHEN** 2 minutes has elapsed, **THEN** verify "RESET" light on "AMSAC FOR CF VALVES" switch has remained dark.

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 11 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. **Verify the following PCBs - CLOSED:**

__ • Generator breaker 1A
__ • Generator breaker 1B
__ • PCB 14
__ • PCB 15
__ • PCB 17
__ • PCB 18.

NOTE When separated from the grid the turbine reverts to speed control.

Perform the following:

__ a. IF both generator PCBs are open, THEN ensure main turbine speed - MAINTAINED BETWEEN 1792 AND 1807 RPM.

b. IF the turbine generator is separated from the grid, THEN:

__ 1) Ensure main turbine speed - MAINTAINED BETWEEN 1792 AND 1807 RPM.

__ 2) Ensure main generator voltage - MAINTAINED BETWEEN 21 KV AND 23 KV.

c. IF load rejection caused by loss of main busline 1A or 1B, THEN:

1) Notify Transmission Control Center (TCC), using one of the following methods, to investigate and repair cause of the loss of busline:

__ • 704-382-9403
__ • 704-382-9404
__ • 704-399-9744
__ • 704-382-4413 (System Operating Center).

__ 2) WHEN notified by TCC that the affected busline is ready to be re energized, THEN restore power to the affected busline. REFER TO Enclosure 1 (Offsite Power Restoration).

Op Test No.:	301	Scenario #	1	Event #	2	Page	31	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 12 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 16. **Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.**

17. **WHEN the appropriate runback target load is reached, THEN:**

__ • 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.

__ 18. **Notify System Operating Center (SOC) using the red dispatcher telephone of current unit status.**

__ 19. **Determine and correct cause of load rejection.**

Op Test No.:	301	Scenario #	1	Event #	2	Page	32	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 13 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

20. **Shut down unnecessary plant equipment as follows:**

a. Restore CM and CF as follows:

__ 1) Verify C-htr drain pumps - ON. → __ 1) **WHEN** time and manpower permit, **THEN** complete the shutdown of the C-htr drain pumps. **REFER TO** OP/1/B/6250/004 (Feedwater Heater Vents, Drains and Bleed System).

__ 2) Verify both CF Pumps - IN SERVICE. → __ 2) GO TO Step 20.b.

__ 3) Shutdown one CF pump as necessary. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System).

__ 4) Shutdown excess Condensate Booster Pumps. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System).

__ 5) Shutdown excess Hotwell Pumps. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System).

__ b. RC pump(s) and cooling tower fans. REFER TO OP/1/B/6400/001A (Condenser Circulating Water System).

21. **Reset steam dump valves as follows:**

__ a. Verify reactor power - STABLE.

a. Perform the following:

__ 1) **WHEN** reactor power is stable, **THEN** perform Steps 21.b through 21.g.

(RNO continued on next page)

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Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 14 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. (Continued)	
	__ 2) GO TO Step 22.
__ b. Verify steam dump valves - IN "T-AVG" MODE.	b. Perform the following: 1) IF using S/G PORVs, THEN: __ a) WHEN T-Avg is within 1°F of T-Ref AND stable, THEN close S/G PORVs. __ b) GO TO Step 21.d. 2) WHEN T-Avg is within 1°F of T-Ref AND stable, THEN: __ a) Ensure steam dumps - CLOSED. __ b) Perform Steps 21.d through 21.g. __ 3) GO TO Step 22.
__ c. Verify steam dump valves - CLOSED.	c. Perform the following: __ 1) WHEN steam dump valves are closed, THEN perform Steps 21.d through 21.g. __ 2) GO TO Step 22.
__ d. Reset steam dump valves.	
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".	

Op Test No.:	301	Scenario #	1	Event #	2	Page	34	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 15 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. (Continued)	
__ f. IF "T-AVG" mode of operation is available, THEN ensure steam dump valves in "T-AVG" mode.	
__ g. Verify "STM DUMP CTRL" - IN AUTO.	__ g. IF steam dumps are in "T-AVG" mode, THEN place "STM DUMP CTRL" in auto.
__ 22. **Verify reactor power - GREATER THAN 15%.**	__ **Transfer feed flow to CA nozzles. REFER TO Enclosure 2 (Transferring Feed Flow From CF To CA Nozzles).**
__ 23. **Verify CA pumps - OFF.**	**Perform the following:** __ a. WHEN CA is no longer needed to feed S/G(s), THEN shutdown the CA System following the 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. REFER TO OP/1/A/6250/008 (Steam Generator Blowdown).
__ 24. **Verify reactor power change - GREATER THAN OR EQUAL TO 15% IN A 1 HOUR PERIOD.**	__ GO TO **Step 26.**

Op Test No.:	301	Scenario #	1	Event #	2	Page	35	of	139

Event Description: 1B CFPT Suction Valve Fails Closed With Failure of 1B CFPT To Trip Automatically

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 16 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

25. **Notify the following sections to take appropriate samples:**

__ • Radiation Protection to sample and analyze gaseous effluents. REFER TO Selected Licensee Commitments Manual, Section 16.11-6.

__ • Primary Chemistry to sample for isotopic analysis of iodine. REFER TO 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).

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

N/A • 3.1.1 (Shutdown Margin (SDM))

N/A • 3.1.6 (Control Bank Insertion Limits)

N/A • 3.8.1 (AC Sources - Operating)

N/A • SLC 16.8-2 (230 KV Switchyard Systems).

__ 27. **Notify Reactor Group Engineer of occurrence.**

__ 28. **Determine long term plant status. RETURN TO OP/1/A/6100/003 (Controlling Procedure For Unit Operation).**

END

Note To Evaluator:

This concludes Event 2. At the Lead Evaluators discretion, scenario can continue to the next event by having the booth operator INSERT Trigger 3 for Event 3 (This trigger will initially cause an HVAC Panel Trouble Alarm. When acknowledged, NC PORV 1NC-32B fails open).

Op Test No.:	301	Scenario #	1	Event #	3	Page	36	of	139

Event Description: NC PORV 1NC-32B Fails Open

Control Room Indications
1AD-13, F/5 "HVAC PANEL TROUBLE" – LIT (This is the only initial alarm until the alarm panel is acknowledged on 1AD-19 – Then the following alarms and indications are noted)
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
Pressurizer Pressure Channels on 1MC-10 decreasing

Op Test No.:	301	Scenario #	1	Event #	3	Page	37	of	139

Event Description: NC PORV 1NC-32B 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:

__ 1) CLOSE affected PORV(s) isolation valve. Critical Task #1

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	Page	38	of	139

Event Description: NC PORV 1NC-32B 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)

Op Test No.:	301	Scenario #	1	Event #	3	Page	39	of	139

Event Description: NC PORV 1NC-32B Fails Open

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.

Op Test No.:	301	Scenario #	1	Event #	3	Page	40	of	139

Event Description: NC PORV 1NC-32B Fails Open

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.

__ 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	Page 41	of 139

Event Description: NC PORV 1NC-32B 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:**

N/A • 3.3.1 (Reactor Trip System (RTS) Instrumentation)

N/A • 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation)

N/A • 3.3.3 (Post Accident Monitoring (PAM) Instrumentation)

N/A • 3.3.4 (Remote Shutdown System)

__ • 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits)

N/A • 3.4.4 (RCS Loops - MODES 1 and 2)

N/A • 3.4.5 (RCS Loops - MODE 3)

N/A • 3.4.6 (RCS Loops - MODE 4)

N/A • 3.4.9 (Pressurizer)

N/A • 3.4.10 (Pressurizer Safety Valves)

__ • 3.4.11 (Pressurizer Power Operated Relief Valves (PORVs))

N/A • 3.4.13 (RCS Operational Leakage).

Tech Spec 3.4.1 (If Pressurizer Low Pressure DNB limit alarm received):
- **Condition A applies. Crew will need to restore DNB parameter to within limit in 2 hours.**

Tech Spec 3.4.11:
- **Condition B applies. Crew will need to close associated block valve in 1 hour AND remove power from the associated block valve in 1 hour AND restore the PORV to OPERABLE status in 72 hours.**

__ 9. **Determine long term plant status. RETURN TO procedure in effect.**

END

Note To Evaluator:

This concludes Event 3. At the Lead Evaluators discretion, scenario can continue to the next event by having the booth operator INSERT Trigger 4 for Event 4 (1A NV Pump Trip).

Op Test No.:	301	Scenario #	1	Event #	4	Page	42	of	139

Event Description: 1A NV Pump Trip

Control Room Indications
1AD-7, C/4 "NCP SEAL WATER LO FLOW" - LIT
1AD-7, E/1 "CHARGING LINE HI/LO FLOW" - LIT
GREEN OFF light for 1A NV Pump - LIT

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Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. 2 of 35 Revision 34

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. **Ensure any malfunctioning NV pump - SECURED.**

Op Test No.:	301	Scenario #	1	Event #	4	Page	44	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. 3 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Monitor conditions for continued NC pump operation as follows:** __ • NC pump #1 seal outlet temperature - LESS THAN 235°F __ • NC pump lower bearing temperature - LESS THAN 225°F.	**Perform the following:** a. **IF** in Mode 1 or 2, **THEN** perform the following: __ 1) **IF** all NC pumps affected, **THEN** place steam dumps in pressure mode. __ 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. **REFER TO** AP/1/A/5500/004 (Loss of Reactor Coolant Pump).
N/A 5. **IF excess letdown in service, THEN ensure manual loader for 1NV-124B (Excess Letdn Press Ctrl) - ADJUSTED TO 0%.**	

Op Test No.:	301	Scenario #	1	Event #	4	Page	45	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. **4 of 35** **Revision 34**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Gas entrainment in the NV pump suction can produce pump failure or degradation. Gas entrainment can result in a complete loss of charging, or in a reduction of charging capacity, without indication of cavitation.

6. **Verify NV pump status as follows:**

__ • At least one NV pump - ON.

__ • Charging flow - ADEQUATE FOR PLANT CONDITIONS.

Perform the following:

__ a. Ensure any malfunctioning NV pump - SECURED.

b. Ensure the following valves - OPEN:

__ • 1NV-203A (NV Pumps A&B Recirc Isol)

__ • 1NV-202B (NV Pmps A&B Recirc Isol).

c. Ensure only one suction source as follows:

• VCT:

__ • 1NV-188A (VCT Otlt Isol) - OPEN

__ • 1NV-189B (VCT Otlt Isol) - OPEN

__ • VCT level - GREATER THAN 23%

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

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

(RNO continued on next page)

Op Test No.:	301	Scenario #	1	Event #	4	Page	46	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. **5 of 35** **Revision 34**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

OR

- FWST:
  - Either of the following valves - OPEN:
    - __ 1NV-252A (NV Pumps Suct From FWST)
    - __ 1NV-253B (NV Pumps Suct From FWST).
  - Either of the following valves - CLOSED:
    - __ 1NV-188A (VCT Otlt Isol)
    - __ 1NV-189B (VCT Otlt Isol).

N/A d. **IF** operating NV pump tripped due to loss of suction, **THEN** perform the following:

__ 1) Dispatch operator(s) to vent available NV pump. **REFER TO** Enclosure 2 (NV Pump Venting).

__ 2) **WHEN** pump venting complete, **THEN GO TO** Step 6 RNO e.

(RNO continued on next page)

Op Test No.:	301	Scenario #	1	Event #	4	Page	47	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. **6 of 35** **Revision 34**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

3) **IF AT ANY TIME** Standby Makeup pump required to maintain Pzr level **OR** seal injection, **THEN** perform the following:

__ a) **IF** 1EMXS de-energized, **THEN** dispatch operator to align alternate power supply. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 20 (Align Alternate Power Supply To 1EMXS).

__ b) Dispatch operator to SSF to establish NC makeup. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 19 (Establishing NC Makeup/Seal Injection From The SSF).

__ c) **WHEN** Standby Makeup Pump started, **THEN** adjust Control Rods and Turbine load, as required, to maintain T-Avg within 1°F of T-Ref.

__ 4) **GO TO** Step 14.

(RNO continued on next page)

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Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. 7 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

e. Start available NV pump as follows:

__ 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 aux oil pump.

__ 4) Start available NV pump.

__ 5) Stop NV pump aux oil pump.

N/A 6) **IF** suction from FWST, **THEN** adjust Control Rods and Turbine load, as required, to maintain T-Avg within 1°F of T-Ref.
REFER TO the following:

__ • AP/1/A/5500/009 (Rapid Downpower)

OR

__ • OP/1/A/6100/003 (Controlling Procedure For Unit Operation).

(RNO continued on next page)

Op Test No.: 301	Scenario # 1	Event # 4	Page 49	of 139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. **8 of 35** **Revision 34**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

N/A f. **IF** no NV pump(s) available, **THEN** perform the following:

__ 1) Initiate actions to restore one NV pump to operable.

__ 2) **WHEN** an NV pump available, **THEN RETURN TO** Step 6 RNO e.

3) **IF** Standby Makeup pump required to maintain Pzr level **OR** seal injection, **THEN** perform the following:

__ a) **IF** 1EMXS de-energized, **THEN** dispatch operator to align alternate power supply. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 20 (Align Alternate Power Supply To 1EMXS).

__ b) Dispatch operator to SSF to establish NC makeup. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 19 (Establishing NC Makeup/Seal Injection From The SSF).

__ c) **WHEN** Standby Makeup Pump started, **THEN** adjust Control Rods and Turbine load, as required, to maintain T-Avg within 1°F of T-Ref.

__ 4) **GO TO** Step 14.

Op Test No.: 301 Scenario # 1 Event # 4 Page 50 of 139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. **9 of 35** **Revision 34**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **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:	__ c. OPEN either valve.
__ • 1NV-32B (NV Supply To Loop A Isol) OR	
__ • 1NV-39A (NV Supply To Loop D Isol).	

Op Test No.:	301	Scenario #	1	Event #	4	Page	51	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. **10 of 35** **Revision 34**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

d. Verify the following NC pump conditions:

__ • #1 seal outlet temperatures less than or equal to 180°F

__ • Lower bearing temperatures less than or equal to 180°F.

d. Slowly restore seal injection flow to limit NC pump cooldown rate as follows:

__ 1) Maintain lower bearing temperature cooldown rate less than or equal to 1°F per minute.

__ 2) Maintain #1 seal outlet temperature cooldown rate less than or equal to 1°F per minute.

__ 3) OPEN 1NV-309 (Seal Water Injection Flow).

__ 4) THROTTLE open 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to establish 32 GPM "N/R CHRG LN FLOW".

NOTE "TOTAL SEAL WTR FLOW" rate greater than 6 gpm may exceed cooldown limit.

__ 5) Slowly increase "TOTAL SEAL WTR FLOW" by throttling 1NV-309 to cooldown #1 seal and lower bearing.

__ 6) **WHEN** all NC pump #1 seal outlet **AND** lower bearing temperatures less than 180°F, **THEN GO TO** Step 8.

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Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. 11 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. (Continued)

__ e. Verify 1NV-294 (NV Pmps A&B Disch Flow Ctrl) - OPEN.

e. Perform the following:

__ 1) OPEN 1NV-309 (Seal Water Injection Flow).

__ 2) THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to establish greater than 32 GPM "N/R CHRG LN FLOW".

8. **Verify the following:**

__ • "TOTAL SEAL WTR FLOW" - GREATER THAN 32 GPM

__ • 1NV-309 (Seal Water Injection Flow) - IN AUTO.

Perform the following:

N/A a. **IF** any NC pump #1 seal outlet temperature **OR** lower bearing temperature greater than 180°F, **THEN** maintain cooldown rate less than or equal to 1°F per minute.

__ b. Slowly THROTTLE 1NV-309 (Seal Water Injection Flow) to establish 32 GPM "TOTAL SEAL WTR FLOW".

__ c. 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. Increase charging flow to restore Pzr level greater than 17%.

__ d. Do not continue in this procedure until Pzr level greater than 17%.

Op Test No.:	301	Scenario #	1	Event #	4	Page	53	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. 12 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 10. **Control charging to stabilize Pzr level greater than 17%.**

__ 11. **Ensure "PZR HTR GROUP 1C" - ON.**

12. **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).

__ 13. **Verify normal letdown - IN SERVICE.** → **Perform the following:**

N/A a. **IF** excess letdown was previously in service, **THEN** perform the following:

__ 1) Establish excess letdown. **REFER TO** OP/1/A/6200/001 (Chemical and Volume Control System).

__ 2) **GO TO** Step 14.

__ b. Restore normal letdown. **REFER TO** Case II (Loss of Letdown).

Note To Evaluator:

Crew will transition to Case II at this time to restore Normal Letdown. Once Letdown is restored, the crew will transition back to Case I Step 14.

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 15 of 35 Revision 34

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. Increase 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 #	1	Event #	4	Page	55	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 16 of 35 Revision 34

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.**

N/A 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 Enclosure 3 (Control Room Ventilation System Verification).**

Enclosure 3 is included as Attachment 4.

Op Test No.:	301	Scenario #	1	Event #	4	Page	56	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 17 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

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

N/A • 3.3.1 (Reactor Trip System (RTS) Instrumentation)

N/A • 3.3.3 (Post Accident Monitoring (PAM) Instrumentation)

N/A • 3.3.4 (Remote Shutdown System)

N/A • 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits)

N/A • 3.4.12 (Low Temperature Overpressure Protection (LTOP) System)

N/A • 3.4.13 RCS (Operational Leakage)

N/A • 3.6.3 (Containment Isolation Valves).

11. **Verify at least one of the following valves - CLOSED:** __ **GO TO Step 16.**

__ • 1NV-1A (NC Letdn To Regen Hx Isol)

OR

__ • 1NV-2A (NC Letdn To Regen Hx Isol).

Op Test No.:	301	Scenario #	1	Event #	4	Page	57	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 18 of 35 Revision 34

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.

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Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 19 of 35 Revision 34

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).

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.**

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Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 20 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. **Do not continue in this procedure until one of the following met:**

__ • Notified by dispatched operator that the letdown line is 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 the ability to establish normal letdown has been 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 # 1	Event # 4	Page 60 of 139
Event Description: 1A NV Pump Trip			

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 21 of 35 Revision 34

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 increases

OR

__ • Valve demand position is 60% open.

__ h. Do not continue until one of the above conditions met.

Op Test No.: 301 Scenario # 1 Event # 4 Page 61 of 139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 22 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. (Continued)	
__ i. Verify letdown flow and letdown pressure - HAS INCREASED.	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.	

Op Test No.:	301	Scenario #	1	Event #	4	Page	62	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 23 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. (Continued)

k. **WHEN** 5 minutes have 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.

N/A 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).

Note To Evaluator:

To use time compression for this step, have the booth operator contact the control room and REPORT "5 minutes has elapsed."

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Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case II Loss of Letdown	PAGE NO. 24 of 35 Revision 34

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:

Crew will transition back to Case I Step 14 at this point.

Op Test No.: 301 Scenario # 1 Event # 4 Page 64 of 139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. 13 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

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

N/A • 3.4.12 (Low Temperature Overpressure Protection (LTOP) System)

N/A • 3.4.13 (RCS Operational Leakage)

N/A • 3.4.14 (RCS Pressure Isolation Valve (PIV) Leakage)

__ • 3.5.2 (ECCS - Operating)

N/A • 3.5.3 (ECCS - Shutdown)

N/A • 3.5.5 (Seal Injection Flow)

N/A • 3.6.3 (Containment Isolation Valves)

N/A • SLC 16.9-9 (Boration Systems Charging Pump - Shutdown)

__ • SLC 16.9-10 (Boration Systems Charging Pump - Operating).

Tech Spec 3.5.2:
- **Condition A applies to restore ECCS train to OPERABLE status in 72 hours.**

SLC 16.9-10:
- **Condition A applies to restore the non-functional Boration System Charging Pump to FUNCTIONAL status in 72 hours.**

15. **Determine required notifications:**

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

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

__ 16. **Verify at least one NV pump - ON.**

__ **RETURN TO Step 6.**

N/A 17. **IF Standby Makeup Pump in service and no longer required, THEN secure the pump. REFER TO OP/0/B/6100/013 (Standby Shutdown Facility Operations).**

Op Test No.:	301	Scenario #	1	Event #	4	Page	65	of	139

Event Description: 1A NV Pump Trip

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN Case I Loss of Charging	PAGE NO. 14 of 35 Revision 34

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 18. **Determine long term plant status.**
RETURN TO procedure in effect.

END

Note To Evaluator:

This concludes Event 4. At the Lead Evaluators discretion, scenario can continue to the next event by having the booth operator INSERT Trigger 5 for Event 5 (Trip of Running Condensate Booster Pumps leads to loss of 1A CFPT on low suction pressure).

Op Test No.: 301	Scenario # 1	Event # 5	Page 66	of 139
Event Description: Trip of Condensate Booster Pumps / 1A CFPT Trip On Low Suction Pressure				

Control Room Indications
1AD-5, B/4 "CFPT A LO SUCT FLOW" - LIT
1AD-5, E/5 "CFP A LOW SUCT PRESS" - LIT
1AD-5, A/1 "CFPT A TRIPPED" – LIT (After 20 second delay)
1AD-4, C/1-4 "S/G A/B/C/D FLOW MISMATCH LO CF FLOW" - LIT

Op Test No.:	301	Scenario #	1	Event #	5	Page	67	of	139

Event Description: Trip of Condensate Booster Pumps / 1A CFPT Trip On Low Suction Pressure

CNS AP/1/A/5500/006	LOSS OF S/G FEEDWATER Case I Loss of CF Supply To S/Gs	PAGE NO. **2 of 20** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

1. **Verify reactor power - LESS THAN 5%.**

Note To Evaluator:

Crew will transition to E-0 at this point which begins the Major Event (Loss of Heat Sink). CAPT#1 will overspeed and 1ETB will blackout. Crew will transition to FR-H.1 and immediately initiate Feed & Bleed due to no NV pumps available.

IF AT ANY TIME all CF supply to S/G(s) lost, THEN perform the following:

a. Manually trip reactor. Critical Task #2

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 are greater than 83%, THEN:

a. Verify all Feedwater Isolation status lights (1SI-5) - LIT.

b. **IF** any Feedwater Isolation status light is not lit, **THEN**:

1) Manually initiate Feedwater Isolation.

2) **IF** proper status light indication is not obtained, **THEN** manually 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	68	of	139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

Note To Evaluator:

Once the reactor is tripped, a blackout of 1ETB will occur. CAPT#1 will fail to start automatically, requiring the crew to manually start it to feed the S/Gs. Once started, it will experience a mechanical overspeed trip. Once S/G levels all decrease to below 11% N/R, a transition to FR-H.1 will occur. Crew will immediately transition to steps to initiate NC system Feed and Bleed due to no NV pumps being available. Once S/I is initiated, the 1A NI pump will fail to start requiring the crew to reset S/I and the D/G load sequencer and manually starting the 1A NI pump. The 1A NV pump will also start when S/I is initiated.

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 69	of 139
Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B				

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 4 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Monitor Enclosure 1 (Foldout Page).

Enclosure 1 is included as Attachment 5.

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:

__ • 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:

__ 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 # 1	Event # 6, 7, 8	Page 70 of 139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 5 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. Verify 1ETA and 1ETB - ENERGIZED.	Perform the following:
	N/A 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).
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: __ • 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.

Note To Evaluator:

Crew will transition to ES-0.1 which begins on the next page.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	71	of	139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 2 of 42 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. **Operator Actions**

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

Enclosure 1 is included as Attachment 6.

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.

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%.

(RNO continued on next page)

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 72	of 139
Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B				

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 3 of 42 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. (Continued)

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).**

Enclosure 2 is included as Attachment 7.

5. **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 #	1	Event #	6, 7, 8	Page	73	of	139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. **4 of 42** **Revision 42**

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.

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 74	of 139
Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B				

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 5 of 42 Revision 42

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).

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 75 of 139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. **6 of 42** **Revision 42**

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.

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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 224 PPM for each rod not fully inserted 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 boron addition. **REFER TO** 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.

__ c. Stop any boron dilutions in progress.

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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** ROD Book, Section 2.6.

__ 4) **IF** lowest T-Cold less than allowable limit, **THEN** immediately add 30 gallons of 7000 PPM boron solution at greater than or equal to 30 GPM for each degree lowest T-Cold below limit of ROD Book, Section 2.6.

__ 5) **GO TO** Step 9.

__ e. **IF AT ANY TIME** NC T-Colds decrease to less than or equal to 545°F, **THEN** perform Step 8.d.

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CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. **9 of 42** **Revision 42**

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)

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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 have throttled 1NV-295 and 1NV-311, **THEN** depress manual pushbutton and increase 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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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.
__ 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).

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CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 12 of 42 Revision 42

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** decreasing, **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)

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CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 13 of 42 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. (Continued)

b. **IF** Pzr pressure greater than 2235 PSIG **AND** increasing, **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 increase, **THEN** stop feed flow to that S/G.

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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:**

- A Train:
  - __ • "FTA B/O NORM FDR FRM ATC" - CLOSED
  - __ • "D/G 1A BKR TO ETA" - OPEN
  - __ • 1ETA - ENERGIZED.
- B Train:
  - __ • "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. **REFER TO** 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. **IF AT ANY TIME** Spent Fuel Pool cooling not restored within 2 hrs, **THEN** ensure available operator monitors Spent Fuel Pool level and temperature. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).

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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 (1SMP5211).

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) **GO TO** Step 17.

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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. Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.	
__ d. Verify steam dumps in T-AVE mode.	d. Perform the following: __ 1) **IF** C-7A and C-7B reset, **THEN GO TO** Step 17. 2) 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 17.

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CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 17 of 42 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. (Continued)

e. Place steam dumps in pressure mode as follows:

__ 1) Place "STM DUMP CTRL" in manual.

__ 2) Ensure "STM DUMP CTRL" M/A station output equal to "% STM DUMP DEMAND" (1SMP5211).

3) Using "STEAM DUMP SELECT" switch, perform the following:

__ • Reset C-7A and C-7B

__ • Place steam dumps in pressure mode.

__ 4) Place "STM DUMP CTRL" in auto.

__ 5) Ensure steam dumps control to maintain steam header pressure - 1090 PSIG.

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CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. **18 of 42** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 17. **Verify 1B NC pump - ON**	**Perform the following:**

NOTE Preference should be given to starting 1B NC pump to provide Pzr spray capability. If 1B NC pump not available, running 1A NC pump along with 1 or 2 additional NC pumps may be required for adequate spray.

__ a. Start 1B NC pump. **REFER TO** OP/1/A/6150/002A (Reactor Coolant Pump Operation).

__ b. **IF AT ANY TIME** 1B NC pump cannot be started, **THEN** start NC pumps as needed to provide adequate Pzr spray. **REFER TO** OP/1/A/6150/002A (Reactor Coolant Pump Operation).

__ c. **IF** any NC pump on, **THEN GO TO** Step 18.

__ d. Ensure Natural Circulation until an NC pump can be started. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 15 (Natural Circulation Monitoring Parameters).

e. Ensure compliance with appropriate Tech Specs:

__ • 3.4.5 (RCS Loops - MODE 3)
__ • 3.4.6 (RCS Loops - MODE 4).

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CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 19 of 42 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18. **Determine status of N/Is as follows:**	
__ a. Verify I/R channels - LESS THAN 10^{-5}% POWER.	a. Perform the following: __ 1) **WHEN** I/R channels less than 10^{-5}% Power, **THEN** perform Steps 18.b and 18.c. __ 2) **GO TO** Step 19.
__ b. Verify S/R channels - ON SCALE.	b. Perform the following: __ 1) Verify "CPS NEUTRON LEVEL" on S/R drawers indicating as expected. __ 2) Notify IAE to investigate. __ 3) Monitor all available S/R and I/R indications.
__ c. Ensure any S/R displayed on NIS RECORDER.	

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE	PAGE NO. 20 of 42 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

19. **Maintain stable plant conditions as follows:**

__ a. Pzr pressure - AT 2235 PSIG.

__ b. Pzr level - AT "PZR REF LEVEL".

__ c. S/G N/R levels - BETWEEN 11% **AND** 50%.

d. Verify condenser available as follows:

__ • Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.

__ • MSIVs on all intact S/Gs - OPEN.

d. **IF AT ANY TIME** S/G PORVs cycling in automatic, **THEN** perform the following to stabilize S/G pressure and NC temperature:

1) Perform the following substeps in rapid succession to limit risk of opening SM safeties:

__ a) CLOSE PORV manual loaders.

__ b) Place PORV control mode Switches - IN MANUAL.

__ c) THROTTLE intact S/G PORVs as necessary to stabilize S/G pressure at approximately 1090 PSIG.

__ e. Verify at least one NC pump - ON.

e. Perform the following:

__ 1) Maintain NC T-Cold at 557°F.

__ 2) **GO TO** Step 20.

__ f. NC T-Avg at 557°F.

__ 20. **Verify proper ventilation system operation. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 16 (Control Room Ventilation Verification).**

G-1 Enclosure 16 is included as Attachment 8.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

21. **Shutdown unnecessary plant equipment as follows:**

__ a. 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).

__ b. Stop excess condensate booster pumps.

__ c. Stop excess hotwell pumps.

__ d. Stop C heater drain pumps.

e. **IF** B/O actuated, **THEN** stop unnecessary loads placed on affected bus by sequencer as follows:

__ 1) Reset affected D/G load sequencer(s).

__ 2) Stop unnecessary loads.

__ f. **IF** desired to feed S/Gs with CF, **THEN** align feedwater to S/Gs. **REFER TO** OP/1/A/6250/001 (Condensate and Feedwater System).

__ g. **WHEN** CA no longer needed to feed S/Gs, **THEN** shutdown the CA System following the automatic start and return CA System to standby readiness. **REFER TO** OP/1/A/6250/002 (Auxiliary Feedwater System).

__ h. **WHEN** both trains of CA reset, **THEN** align S/Gs for Chemistry sampling.

__ i. Perform required steps in OP/1/A/6100/003 (Controlling Procedure For Unit Operation).

Note To Evaluator:

Once all S/G N/R levels are < 11%, a RED path on the Heat Sink Critical Safety Function will occur, and the crew will transition to FR-H.1.

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CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 2 of 90 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

N/A 1. **IF total feed flow is 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 is 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 with 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 is established, THEN RETURN TO procedure and step in effect.

__ 3. **Monitor Enclosure 1 (Foldout Page).**

Enclosure 1 is included as Attachment 9.

__ 4. **Verify at least one NV pump - AVAILABLE.**

__ **GO TO Step 19.**

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CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **28 of 90** Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. **Verify bleed and feed should be initiated as follows:**

__ a. Steps 20 through 24 - HAVE BEEN PREVIOUSLY PERFORMED.

__ a. **GO TO** Step 18.c.

__ b. **GO TO** Step 33.

__ c. W/R level in at least three S/Gs - LESS THAN 24% (36% ACC).

__ c. **RETURN TO** Step 1.

__ 19. **Perform Steps 20 through 24 quickly to establish NC heat removal by NC bleed and feed.**

__ 20. **Ensure all NC pumps - OFF.**

__ 21. **Initiate S/I.** Critical Task #3

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CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **29 of 90** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. **Verify NC System feed path as follows:**

a. Verify the following pumps - ON:

__ • At least one NV pump

__ • At least one NI pump.

Note To Evaluator:

In the following RNO, ECCS can only be reset once a 60 second time delay has elapsed. If the crew attempts to reset ECCS prior to this time delay, it will not reset.

a. Perform the following for affected train(s):

__ 1) Reset ECCS.

__ 2) Reset D/G load sequencer.

__ 3) Start pumps.

__ 4) **IF AT ANY TIME** a B/O occurs, **THEN** restart S/I equipment previously on.

__ 5) **IF** at least one NV pump in service, **THEN GO TO** Step 22.b.

6) **IF** all the following conditions are met, **THEN GO TO** Step 22.b:

__ • At least one NI Pump - ON

__ • Time between reactor trip and implementation of this procedure - GREATER THAN 90 MINUTES.

__ 7) Continue attempts to restore NV and NI to service.

8) **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.

__ 9) **RETURN TO** Step 6.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22. (Continued)	
__ b. Verify "NV S/I FLOW" - INDICATING FLOW.	b. Perform the following: 1) Ensure the following pumps - ON: __ • NV Pumps __ • NI Pumps. 2) **IF** at least one NV pump in service, **THEN** perform the following: a) Ensure the following valves - OPEN: __ • 1NV-252A (NV Pumps Suct From FWST) __ • 1NV-253B (NV Pumps Suct From FWST). b) Ensure the following valves - CLOSED: __ • 1NV-188A (VCT Otlt Isol) __ • 1NV-189B (VCT Otlt Isol). c) Ensure the following valves - OPEN: __ • 1NI-9A (NV Pmp C/L Inj Isol) __ • 1NI-10B (NV Pmp C/L Inj Isol). (RNO continued on next page)

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. (Continued)

3) **IF** NI Pump 1A is 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).

4) **IF** NI Pump 1B is 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).

5) **IF** no feed path can be aligned, **THEN** perform the following:

__ a) Continue attempts to establish feed path.

__ b) **RETURN TO** Step 6.

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 96	of 139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **32 of 90** Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. **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) Critical Task #3
__ • 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).

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.

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 97	of 139
Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B				

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **33 of 90** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. (Continued)

__ d. Verify power to all Pzr PORV isolation valves - AVAILABLE.

d. Perform the following:

1) Dispatch operator to restore power to affected Pzr PORV isolation valve(s):

__ • 1EMXD-F02C (PORV Isol Motor (1NC31B)) (AB-560, BB-50, Rm 372)

__ • 1EMXC-F03C (Pressurizer Power Operated Relief Isol. Valve 1NC33A) (AB-577, BB-50, Rm 496)

__ • 1EMXD-F05A (PORV Isol Motor (1NC35B)) (AB-560, BB-50, Rm 372).

2) **WHEN** power is restored, **THEN** perform the following:

__ a) OPEN Pzr PORV isolation valves.

Critical Task #3

__ b) Ensure two Pzr PORVs and associated Pzr PORV isolation valves - OPEN.

The critical part of this task is to ensure that two Pressurizer PORVs and their associated block valves need to be opened. This can be done per step 23.d.RNO 2.b or step 24 RNO e.

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 98	of 139
Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B				

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **34 of 90** Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24. **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. N/A c. **IF** VI pressure less than 85 PSIG, **THEN** dispatch operator to ensure proper VI compressor operation. 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. Critical Task #3 __ f. **IF** two Pzr PORV flow paths are open, **THEN GO TO** Step 25. g. Align A Train vent path by opening the following valves: __ • 1NC-250A (Rx Head Vent Block) __ • 1NC-251B (Rx Head Vent). (RNO continued on next page)

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **35 of 90** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

24. (Continued)

h. **IF** A Train vent path cannot be aligned, **THEN** align B train 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).

i. Align any low pressure water source to intact S/G(s) using the following sources:

__ • Hotwell pump

__ • RN

__ • CA (gravity feed)

__ • RF. **REFER TO** Enclosure 3 (Aligning Alternate Water Source to S/G(s)).

__ j. **IF** no low pressure water source can be aligned, **THEN GO TO** Step 25.

(RNO continued on next page)

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	100	of	139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **36 of 90** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

24. (Continued)

__ k. Depressurize at least one intact S/G to atmospheric pressure using S/G PORV to inject the low pressure water source.

25. **WHEN manpower AND time permits, THEN verify proper system alignments as follows:**

__ • **REFER TO** Enclosure 4 (System Verification Following S/I Actuation).

__ • Notify Unit 2 operator to perform Enclosure 5 (Opposite Unit Ventilation Verification).

Enclosure 4 is included as Attachment 10.

26. **Maintain NC System heat removal as follows:**

__ • Maintain S/I flow
__ • Maintain two Pzr PORVs - OPEN.

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 101 of 139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 37 of 90 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

27. **Ensure S/I - RESET:**

__ a. ECCS.

__ a. 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** a B/O occurs, **THEN** restart S/I equipment previously on.

28. **Verify proper Phase B actuation as follows:**

__ a. Containment pressure - HAS REMAINED LESS THAN 3 PSIG.

a. Perform the following:

1) Verify following monitor light panel lights - LIT:

__ • Group 1 Sp lights

__ • Group 5 Sp lights

__ • Group 5 St light L/11.

__ 2) **IF** monitor light panel is not in correct alignment, **THEN** ensure correct alignment.

__ 3) Ensure Phase B containment isolation signals - RESET.

__ 4) Ensure 1VI-77B (VI Cont Isol) - OPEN.

(RNO continued on next page)

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	102	of	139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **38 of 90** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

28. (Continued)

5) **IF** VI pressure is less than 85 PSIG **OR** 1VI-77B is closed, **THEN** align N2 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).

__ 6) **IF** VI pressure is less than 85 PSIG, **THEN** dispatch operator to ensure proper VI compressor operation.

7) **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.

__ 8) **GO TO** Step 31.

__ b. **IF AT ANY TIME** containment pressure exceeds 3 PSIG while in this procedure, **THEN** perform Step 28.a.

Op Test No.: 301	Scenario # 1	Event # 6, 7, 8	Page 103	of 139
Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B				

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 39 of 90 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

28. (Continued)

c. **IF** both the following conditions exist,

__ • Containment pressure - BETWEEN 1 PSIG **AND** 3 PSIG

__ • Containment pressure - HAS REMAINED LESS THAN 3 PSIG

__ **THEN** start one VX fan and secure normal containment ventilation. **REFER TO** Enclosure 9 (VX and Containment Ventilation Control).

__ 29. **Ensure Phase B containment isolation signals - RESET.**

Note To Evaluator:

When Feed and Bleed is aligned, the PRT will eventually rupture and cause containment pressure to increase. If containment pressure exceeds 1 PSIG but remains < 3 PSIG, then a VX fan will be started per Enclosure 9.

Enclosure 9 can be found as Attachment 11.

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	104	of	139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **40 of 90** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

30. **Establish VI to containment as follows:**

__ a. Ensure 1VI-77B (VI Cont Isol) - OPEN

a. Perform the following:

__ 1) Dispatch operator to open 1VI-77B (VI Cont Isol) (AB-553, CC-51, Rm 250) (Ladder needed).

2) 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. Verify VI pressure - GREATER THAN 85 PSIG.

b. Perform the following:

1) 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).

__ 2) Dispatch operator to ensure proper VI compressor operation.

__ 3) Restore VI while continuing with this procedure. **REFER TO** AP/0/A/5500/022 (Loss of Instrument Air).

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	105	of	139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. 41 of 90 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

31. **Obtain containment H_2 concentration as follows:**

__ a. Ensure operator has been 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 are in service, **THEN** perform Steps 31.c through 31.e.

__ 3) **GO TO** Step 32.

__ 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 32.

__ d. Verify H2 Igniters - ON

__ d. **WHEN** all ice condenser air handling units are secured **AND** H2 concentration is less than 6%, **THEN** place H2 igniters in service.

__ e. Verify containment H2 concentration - LESS THAN 0.5%.

__ e. Dispatch operator to place H2 recombiners in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems).

Op Test No.:	301	Scenario #	1	Event #	6, 7, 8	Page	106	of	139

Event Description: CAPT #1 Overspeed / 1ETB Blackout / NI Pumps Fail To Autostart on Initiation of F&B

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK	PAGE NO. **42 of 90** Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 32. **Verify KC flow to ND heat exchangers - INDICATING FLOW.**	__ **IF AT ANY TIME an ND pump is operating with flow less than 1000 GPM to NC loops AND KC to associated ND HX is isolated, THEN stop affected ND pump within 3 hours.**
33. **Align CA to establish control of S/G feed as follows:** __ a. Ensure CA System valve control - RESET. __ b. CLOSE CA flow control valves on S/Gs not presently being fed.	
34. **Continue attempts to establish secondary heat sink in at least one S/G as follows:** __ • CA. **REFER TO** Steps 6 through 7 __ • CF or CM. **REFER TO** Steps 10 through 17.	Note To Evaluator: At this point NC System Bleed and Feed have been established and verified. All critical tasks have been performed. At the Lead Evaluators discretion, the scenario may be terminated by having the booth operator place the simulator in FREEZE.
__ 35. **Verify N/R level in at least one S/G - GREATER THAN 11% (29% ACC).**	__ **RETURN TO Step 34.**
36. **Verify NC System temperatures as follows:** __ • Core exit T/Cs - DECREASING __ • All NC T-Hots - DECREASING.	__ **RETURN TO Step 34.**

Attachment List

Scenario 1

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 -	AP/1/A/5500/003 Enclosure 3 (Rod Insertion Limit Boration)
ATTACHMENT 4 -	AP/1/A/5500/012 Enclosure 3 (Control Room Ventilation System Verification)
ATTACHMENT 5 -	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page)
ATTACHMENT 6 -	EP/1/A/5000/ES-0.1 Enclosure 1 (Foldout Page)
ATTACHMENT 7 -	EP/1/A/5000/ES-0.1 Enclosure 2 (NC Temperature Control)
ATTACHMENT 8 -	EP/1/A/5000/G-1 Enclosure 16 (Control Room Ventilation Verification)
ATTACHMENT 9 -	EP/1/A/5000/FR-H.1 Enclosure 1 (Foldout Page)
ATTACHMENT 10 -	EP/1/A/5000/FR-H.1 Enclosure 4 (System Verification Following S/I Actuation)
ATTACHMENT 11 -	EP/1/A/5000/FR-H.1 Enclosure 9 (System Verification Following S/I Actuation)

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 (W/R S/G level < 12%) occurs on any S/G.
		3	Initiate Reactor Coolant System Bleed and Feed before Pressurizer PORVs open automatically (NC system pressure of 2235 PSIG) due to heat up of the NC system.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION

Unit 1 Status

Power Level	Power History	NCS Boron	Xenon
75 %	EOL	177 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 3.15 are complete.

Other Information Needed to Assume the Shift

- Unit 1 is at 75% power at the EOL. Unit 2 is at 100% power. 1A CA Pump is removed from service for PMs. 1A CA Pump has been inoperable for 3 hours and is expected to be returned to service in 6 hours. 1A Condensate Booster Pump is tagged out for emergent motor replacement. Direction for the crew is to decrease reactor power to 50% to secure a main feedwater pump in preparation for entering a Unit 1 Refueling Outage. 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/5500/003	LOAD REJECTION Enclosure 3 - Page 1 of 1 **Rod Insertion Limit Boration**	PAGE NO. 39 of 40 Revision 41

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 4

CNS AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN **Enclosure 3 - Page 1 of 3** **Control Room Ventilation System Verification**	PAGE NO. **33 of 35** Revision 34

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** EP/1/A/5000/G-1 (Generic Enclosures), 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 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

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 AP/1/A/5500/012	LOSS OF CHARGING OR LETDOWN **Enclosure 3 - Page 3 of 3** **Control Room Ventilation System Verification**	PAGE NO. **35 of 35** **Revision 34**

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 EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 32 of 47 Revision 42

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 - ON
     - 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:
     - Level increasing in an uncontrolled manner or radiation level in that S/G abnormal
     - 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. 33 of 47 Revision 42

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 an 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).

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/ES-0.1	REACTOR TRIP RESPONSE **Enclosure 1 - Page 1 of 1** **Foldout Page**	PAGE NO. **28 of 42** **Revision 42**

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 7

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE **Enclosure 2 - Page 1 of 6** **NC Temperature Control**	PAGE NO. **29 of 42** **Revision 42**

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. Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE. d. Place steam dumps in pressure mode as follows: __ 1) Place "STM DUMP CTRL" in manual. __ 2) Ensure "STM DUMP CTRL" M/A station output equal to "% STM DUMP DEMAND" (1SMP5211). 3) Using "STEAM DUMP SELECT" switch, perform the following: __ • Reset C-7A and C-7B __ • Place steam dumps in pressure mode. __ 4) Place "STM DUMP CTRL" in auto. __ 5) Ensure steam dumps control to maintain steam header pressure - 1090 PSIG. __ e. **GO TO** Step 4.
__ 2. **Use NC T-Avg to determine NC temperature as required in subsequent steps.**	

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 3. **IF AT ANY TIME NC pumps tripped, THEN use NC T-Colds to determine NC temperature as required in subsequent steps.**

4. **Verify one of the following:** __ **GO TO Step 7.**

__ • NC temperature - STABLE AT LESS THAN OR EQUAL TO 557°F

OR

__ • NC temperature - TRENDING TO 557°F.

__ 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 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.

ATTACHMENT 7

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE **Enclosure 2 - Page 3 of 6** **NC Temperature Control**	PAGE NO. **31 of 42** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **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 9.

ATTACHMENT 7

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

   2) Place steam dumps in pressure mode as follows:

   __ a) Place "STM DUMP CTRL" in manual.

   __ b) Ensure "STM DUMP CTRL" M/A station output equal to "% STM DUMP DEMAND" (1SMP5211).

   c) Using "STEAM DUMP SELECT" switch, perform the following:

   __ • Reset C-7A and C-7B

   __ • Place steam dumps in pressure mode.

   __ d) Place "STM DUMP CTRL" in auto.

   __ e) 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.

ATTACHMENT 7

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE **Enclosure 2 - Page 5 of 6** **NC Temperature Control**	PAGE NO. **33 of 42** **Revision 42**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

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.

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 7

CNS EP/1/A/5000/ES-0.1	REACTOR TRIP RESPONSE **Enclosure 2 - Page 6 of 6** **NC Temperature Control**	PAGE NO. **34 of 42** **Revision 42**

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 the 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 8

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 16 - Page 1 of 3 **Control Room Ventilation Verification**	PAGE NO. 45 of 103 Revision 10

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 8

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 8

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 16 - Page 3 of 3 **Control Room Ventilation Verification**	PAGE NO. 47 of 103 Revision 10

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 9

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. **55 of 90** Revision 42

1. **Bleed and Feed Initiation Criteria:**

   __ • **IF** W/R level in at least 3 S/Gs are less than 24% (36% ACC), **THEN GO TO** Section C. (Operator Actions), Step 19.

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

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

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

4. **Cold Leg Recirc Switchover Criterion:**

   __ • **IF** FWST level decreases 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 Pmps 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 10

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK **Enclosure 4 - Page 1 of 9** **System Verification Following S/I Actuation**	PAGE NO. **66 of 90** Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 1. **Announce "Unit 1 Safety Injection".**	
2. **Determine required notifications:**	
__ • **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)	
__ • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).	
3. **Verify Phase A Containment Isolation status as follows:**	
__ a. Phase A "RESET" lights - DARK.	__ a. Initiate Phase A Isolation.
__ b. Cont Vent "RESET" lights - DARK.	__ b. Initiate Phase A Isolation.
__ c. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.	__ c. Align valves as necessary to ensure each penetration isolated by at least one isolation valve.
__ d. Ensure Phase A containment isolation signals - RESET.	
__ 4. **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** a B/O occurs, **THEN** restart S/I equipment previously on.

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Verify all Unit 1 and Unit 2 RN pumps - ON.**	**Perform the following:** __ a. **IF** any Unit 2 RN pump is off, **THEN** start affected pump(s). b. **IF** any Unit 1 RN pump is off, **THEN** perform the following for affected train(s): __ 1) Reset ECCS. __ 2) Reset D/G load sequencer. __ 3) Start affected pump. __ 4) **IF AT ANY TIME** a B/O occurs, **THEN** restart S/I equipment previously on.
__ 6. **Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.**	**Perform the following:** __ a. Do not isolate feedwater isolation valves in the following step. __ b. Align equipment.

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Ensure proper VA System operation as follows:**

   • Ensure the following fans - OFF:

   __ • ABUXF 1A
   __ • ABUXF 1B.

   • Ensure VA System filter is 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.

8. **Verify proper VC/YC operation as follows:**

   a. Verify one train of the following equipment is 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 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

b. 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".

b. **IF** chlorine odor is detected in Control Room, **THEN** perform the following based on status of given alarms:

1) **IF** detectors on both unit intakes are 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 8.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 8.d.

(RNO continued on next page)

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

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 8 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.

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 8.d.

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Verify proper VE System operation as follows:**	
__ a. VE fans - ON.	__ a. Start fan(s).
__ b. Annulus pressure - BETWEEN -1.4 IN. WC AND -1.8 IN. WC.	b. Perform the following: 1) **IF** annulus pressure is 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 is 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. (RNO continued on next page)

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (Continued)	
	__ 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 9.c.
	2) **IF** annulus pressure is 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 is 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 9.b every 30 minutes until notified by station management.	

ATTACHMENT 10

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK **Enclosure 4 - Page 8 of 9** **System Verification Following S/I Actuation**	PAGE NO. **73 of 90** Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 10. **Verify all S/G pressures - GREATER THAN 775 PSIG.**	**IF S/G pressure has decreased in an uncontrolled manner to less than 775 PSIG, THEN 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 is open, **THEN** perform the following: __ 1) Initiate Main Steam Isolation. __ 2) **IF** any valve is still open, **THEN** CLOSE valve.

ATTACHMENT 10

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK **Enclosure 4 - Page 9 of 9** **System Verification Following S/I Actuation**	PAGE NO. **74 of 90** Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 11. **Record time ventilation systems are verified on following table:**

TIME	SYSTEM (VC, VE)	INITIALS

ATTACHMENT 11

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK **Enclosure 9 - Page 1 of 4** **VX and Containment Ventilation Control**	PAGE NO. **87 of 90** Revision 42

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.

__ 1. **IF containment pressure goes above 3 PSIG prior to performing this enclosure, THEN return this enclosure to Control Room Supervisor.**

2. **Start one VX Containment Air Return Fan as follows:**

__ a. Verify Train "A" containment air return fan and damper - AVAILABLE.

__ a. **GO TO** Step 2.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 is open, **THEN GO TO** Step 3.

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 4.

__ d. **GO TO** Step 3.

__ e. Place "ARF-1B CONT AIR RETURN FAN" to "ON".

ATTACHMENT 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (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 is open, **THEN GO TO** Step 3. 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-1B (HSF-1B INLT ISOL) - CLOSED. __ d) **GO TO** Step 4.

ATTACHMENT 11

CNS EP/1/A/5000/FR-H.1	RESPONSE TO LOSS OF SECONDARY HEAT SINK **Enclosure 9 - Page 3 of 4** **VX and Containment Ventilation Control**	PAGE NO. **89 of 90** Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. **WHEN containment pressure less than 0.4 PSIG, THEN 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 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **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 (1A Lower Containment Ventilation Unit Fan Motor) (AB-577, BB-50, Rm 496) __ • 1MXP-F03A (1B Lower Containment Ventilation Unit Fan Motor) (AB-560, BB-52, Rm 370) __ • 1MXO-F03A (1C Lower Containment Ventilation Unit Fan Motor) (AB-577, BB-52, Rm 494) __ • 1MXR-F03A (1D Lower Containment Ventilation Unit Fan Motor) (AB-560, BB-50, Rm 372)
__ 5. **Return this enclosure to Control Room Supervisor.**	

Elapsed Time (Hours)	Power (%FP)	Rod Bank Position (SWD)	Chemical & Volume Control System Changes		Comments
0.0	75.0	CD @ 162	100	Gallons of ACID	includes 20 extra gals ACID
0.5	70.0	CD @ 147	70	Gallons of ACID	
1.0	65.0	CD @ 132	65	Gallons of ACID	flush with 20 gals WATER
1.5	60.0	CD @ 117	--		
2.0	55.0	CD @ 97	--		
2.5	50.0	CD @ 88	--		
3.0	45.0	CD @ 81	--		
3.5	40.0	CD @ 74	--		
4.0	35.0	CD @ 68	--		
4.5	30.0	CD @ 62	--		
5.0	25.0	CD @ 57	--		
5.5	20.0	CD @ 52	--		
6.0	15.0	CD @ 47	--		
6.5	10.0	CD @ 42	--		
7.0	5.0	CD @ 39	--		
7.5	0.0	-- ARI --	--		

1. Limits and Precautions

1.1 This procedure is Reactivity Management related because it controls activities that can affect core reactivity by changing inputs to the RTBE program and changing reactor coolant system pressure. (R.M.)

1.2 Securing more than one bank of PZR Backup heaters can alter hydrogen solubility in the PZR and has resulted in an increase in NC System hydrogen concentration. (PIP C-10-1322)

2. Initial Conditions

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

3. Procedure

NOTE: Steps 3.1 and 3.2 may be performed in any order or concurrently.

_____ 3.1 **IF** Pressurizer Backup Heater(s) will be operated in manual on Unit 1, perform the following:

NOTE:
- PZR pressure increase/decrease will directly affect RTBE. A nominal 25 psig pressure increase will result in a 0.10% increase in reactor power. (R.M.)
- Energizing backup PZR heaters may cause PZR pressure to increase. Depending on the magnitude of the pressure change and the magnitude of the moderator pressure coefficient, reactor thermal power may be affected. (R.M.)

BB 3.1.1 **IF** Pressurizer Backup Heater(s) being energized will increase pressurizer pressure, ensure reactor power is at a level that will accommodate the increase in pressure. (R.M.)

BB 3.1.2 Record "PRESSURE MASTER" controller initial output. **10.5**

3.1.3 Place the desired Pressurizer Heater Control switch in manual:

BB • PZR HTR CTRL 1A
BB • PZR HTR CTRL 1B
BB • PZR HTR CTRL 1D

3.1.4 Ensure the desired Pressurizer Heater Group selected to "ON": (R.M.)

BB • PZR HTR GROUP 1A
BB • PZR HTR GROUP 1B
BB • PZR HTR GROUP 1D

BB 3.1.5 Verify the desired Pressurizer Heater Group energized:

☑ PZR HTR GROUP 1A
☑ PZR HTR GROUP 1B
☑ PZR HTR GROUP 1D

BB 3.1.6 **IF** pressurizer pressure increases to cause spray actuation, ensure spray valves respond to increasing PZR pressure.

BB 3.1.7 **IF** an additional Pressurizer Heater Group is desired to be operated in manual, repeat Steps 3.1.3 through 3.1.7 as necessary.

N/A 3.1.8 **IF AT ANY TIME** it is desired to shift a Pressurizer Backup Heater Group operating in manual, perform the following:

3.1.8.1 Place the desired Pressurizer Heater Control switch in manual:

_____ • PZR HTR CTRL 1A
_____ • PZR HTR CTRL 1B
_____ • PZR HTR CTRL 1D

3.1.8.2 Ensure the desired Pressurizer Heater Group selected to "ON":

_____ • PZR HTR GROUP 1A
_____ • PZR HTR GROUP 1B
_____ • PZR HTR GROUP 1D

_____ 3.1.8.3 Verify the desired Pressurizer Heater Group energized:

☐ PZR HTR GROUP 1A
☐ PZR HTR GROUP 1B
☐ PZR HTR GROUP 1D

3.1.8.4 Place the desired Pressurizer Heater Control Switch in automatic:

_____ • PZR HTR CTRL 1A
_____ • PZR HTR CTRL 1B
_____ • PZR HTR CTRL 1D

_____ 3.1.8.5 Verify the desired Pressurizer Heater Group de-energized:

- ☐ PZR HTR GROUP 1A
- ☐ PZR HTR GROUP 1B
- ☐ PZR HTR GROUP 1D

RP Jones

3.1.9 **WHEN** desired to secure backup heaters, perform the following:

_____ 3.1.9.1 **IF** a single Pressurizer Backup Heater Group is in manual, perform the following:

NOTE: Pressurizer pressure can be expected to decrease to below 2235 psig before C Heaters stabilize pressure due to controller windup and PZR spray bypass valve setup. This pressure decrease could reach the setpoint of C1L4364 (PZR Press Lo Tech Spec DNB Limit). (R.M.) (PIP C-14-01581)

A. Place the desired Pressurizer Heater Control Switch in automatic: (R.M.)

_____ • PZR HTR CTRL 1A
_____ • PZR HTR CTRL 1B
_____ • PZR HTR CTRL 1D

_____ B. Verify the desired Pressurizer Heater Group de-energized:

- ☐ PZR HTR GROUP 1A
- ☐ PZR HTR GROUP 1B
- ☐ PZR HTR GROUP 1D

C. **IF** desired to take manual action to restore NC System pressure to normal, perform the following:

_____ 1. Place "PRESSURE MASTER" controller in manual.

_____ 2. Slowly decrease "PRESSURE MASTER" controller output to the value recorded in Step 3.1.2.

_____ 3. Place "PRESSURE MASTER" controller in auto.

_____ D. Monitor NC System pressure to ensure return to normal steady state conditions.

_____ 3.1.9.2 **IF** multiple Pressurizer Backup Heater Groups are in manual, perform the following:

_____ A. Notify Chemistry that the first of multiple Pressurizer Backup Heater Groups will be de-energized and to evaluate the affect on NC System hydrogen concentration. (PIP C-10-1322).

Person notified _____

B. Place one Pressurizer Heater Control Switch in automatic: (R.M.)

_____ • PZR HTR CTRL 1A
_____ • PZR HTR CTRL 1B
_____ • PZR HTR CTRL 1D

_____ C. Verify the affected Pressurizer Heater Group de-energized:

☐ PZR HTR GROUP 1A
☐ PZR HTR GROUP 1B
☐ PZR HTR GROUP 1D

_____ D. Record date and time _____ / _____.

_____ E. Monitor NC System pressure to ensure return to normal steady state conditions.

F. **WHEN** at least 24 hours has elapsed since the first Pressurizer Backup Heater Group was de-energized as recorded in Step 3.1.9.2D, perform the following:

_____ 1. Notify Chemistry that a second Pressurizer Backup Heater Group will be de-energized and to evaluate the affect on NC System hydrogen concentration. (PIP C-10-1322).

Person notified _____

NOTE: If this is the last backup heater group to be de-energized, pressurizer pressure can be expected to decrease to below 2235 psig before C Heaters stabilize pressure due to controller windup and PZR spray bypass valve setup. This pressure decrease could reach the setpoint of C1L4364 (PZR Press Lo Tech Spec DNB Limit). (R.M.) (PIP C-14-01581)

2. Place the second Pressurizer Heater Control Switch in automatic: (R.M.)

_____ • PZR HTR CTRL 1A
_____ • PZR HTR CTRL 1B
_____ • PZR HTR CTRL 1D

_____ 3. Verify the affected Pressurizer Heater Group de-energized:

☐ PZR HTR GROUP 1A
☐ PZR HTR GROUP 1B
☐ PZR HTR GROUP 1D

_____ 4. Record date and time _____ / _____.

_____ 5. **IF** this is the last backup heater group to be de-energized **AND** it is desired to take manual action to restore NC System pressure to normal, perform the following:

_____ a. Place "PRESSURE MASTER" controller in manual.

_____ b. Slowly decrease "PRESSURE MASTER" controller output to the value recorded in Step 3.1.2.

_____ c. Place "PRESSURE MASTER" controller in auto.

_____ 6. Monitor NC System pressure to ensure return to normal steady state conditions.

G. **IF** the third Pressurizer Backup Heater Group was operated in manual, **WHEN** at least 24 hours has elapsed since the second Pressurizer Backup Heater Group was de-energized as recorded in Step 3.1.9.2F.4, perform the following:

_____ 1. Notify Chemistry that a third Pressurizer Backup Heater Group will be de-energized and to evaluate the affect on NC System hydrogen concentration. (PIP C-10-1322).
Person notified _____

NOTE: Pressurizer pressure can be expected to decrease to below 2235 psig before C Heaters stabilize pressure due to controller windup and PZR spray bypass valve setup. This pressure decrease could reach the setpoint of C1L4364 (PZR Press Lo Tech Spec DNB Limit). (R.M.) (PIP C-14-01581)

2. Place the final Pressurizer Heater Control Switch in automatic: (R.M.)

_____ • PZR HTR CTRL 1A
_____ • PZR HTR CTRL 1B
_____ • PZR HTR CTRL 1D

_____ 3. Verify the affected Pressurizer Heater Group de-energized:

☐ PZR HTR GROUP 1A
☐ PZR HTR GROUP 1B
☐ PZR HTR GROUP 1D

_____ 4. **IF** desired to take manual action to restore NC System pressure to normal, perform the following:

_____ a. Place "PRESSURE MASTER" controller in manual.

_____ b. Slowly decrease "PRESSURE MASTER" controller output to the value recorded in Step 3.1.2.

_____ c. Place "PRESSURE MASTER" controller in auto.

_____ 5. Monitor NC System pressure to ensure return to normal steady state conditions.

N/A 3.1.10 **IF** reactor power was lowered per Step 3.1.1, restore reactor power to desired level. (R.M.)

N/A 3.2 **IF** Pressurizer Backup Heater(s) will be operated in manual on Unit 2, perform the following:

NOTE:
- PZR pressure increase/decrease will directly affect RTBE. A nominal 25 psig pressure increase will result in a 0.10% increase in reactor power. (R.M.)
- Energizing backup PZR heaters may cause PZR pressure to increase. Depending on the magnitude of the pressure change and the magnitude of the moderator pressure coefficient, reactor thermal power may be affected. (R.M.)

_____ 3.2.1 **IF** Pressurizer Backup Heater(s) being energized will increase pressurizer pressure, ensure reactor power is at a level that will accommodate the increase in pressure. (R.M.)

_____ 3.2.2 Record "PRESSURE MASTER" controller initial output. _____

3.2.3 Place the desired Pressurizer Heater Control switch in manual:

_____ • PZR HTR CTRL 2A
_____ • PZR HTR CTRL 2B
_____ • PZR HTR CTRL 2D

3.2.4 Ensure the desired Pressurizer Heater Group selected to "ON": (R.M.)

_____ • PZR HTR GROUP 2A
_____ • PZR HTR GROUP 2B
_____ • PZR HTR GROUP 2D

_____ 3.2.5 Verify the desired Pressurizer Heater Group energized:

☐ PZR HTR GROUP 2A
☐ PZR HTR GROUP 2B
☐ PZR HTR GROUP 2D

_____ 3.2.6 **IF** pressurizer pressure increases to cause spray actuation, ensure spray valves respond to increasing PZR pressure.

_____ 3.2.7 **IF** an additional Pressurizer Heater Group is desired to be operated in manual, repeat Steps 3.2.3 through 3.2.7 as necessary.

_____ 3.2.8 **IF AT ANY TIME** it is desired to shift a Pressurizer Backup Heater Group operating in manual, perform the following:

3.2.8.1 Place the desired Pressurizer Heater Control switch in manual:

_____ • PZR HTR CTRL 2A
_____ • PZR HTR CTRL 2B
_____ • PZR HTR CTRL 2D

3.2.8.2 Ensure the desired Pressurizer Heater Group selected to "ON":

_____ • PZR HTR GROUP 2A
_____ • PZR HTR GROUP 2B
_____ • PZR HTR GROUP 2D

_____ 3.2.8.3 Verify the desired Pressurizer Heater Group energized:

☐ PZR HTR GROUP 2A
☐ PZR HTR GROUP 2B
☐ PZR HTR GROUP 2D

3.2.8.4 Place the desired Pressurizer Heater Control Switch in automatic:

_____ • PZR HTR CTRL 2A
_____ • PZR HTR CTRL 2B
_____ • PZR HTR CTRL 2D

_____ 3.2.8.5 Verify the desired Pressurizer Heater Group de-energized:

☐ PZR HTR GROUP 2A
☐ PZR HTR GROUP 2B
☐ PZR HTR GROUP 2D

3.2.9 **WHEN** desired to secure backup heaters, perform the following:

_____ 3.2.9.1 **IF** a single Pressurizer Backup Heater Group is in manual, perform the following:

NOTE: Pressurizer pressure can be expected to decrease to below 2235 psig before C Heaters stabilize pressure due to controller windup and PZR spray bypass valve setup. This pressure decrease could reach the setpoint of C2L4364 (U2 PZR Press Lo Tech Spec DNB Limit). (R.M.) (PIP C-14-01581)

A. Place the desired Pressurizer Heater Control Switch in automatic: (R.M.)

_____ • PZR HTR CTRL 2A
_____ • PZR HTR CTRL 2B
_____ • PZR HTR CTRL 2D

_____ B. Verify the desired Pressurizer Heater Group de-energized:

☐ PZR HTR GROUP 2A
☐ PZR HTR GROUP 2B
☐ PZR HTR GROUP 2D

_____ C. **IF** desired to take manual action to restore NC System pressure to normal, perform the following:

_____ 1. Place "PRESSURE MASTER" controller in manual.

_____ 2. Slowly decrease "PRESSURE MASTER" controller output to the value recorded in Step 3.2.2.

_____ 3. Place "PRESSURE MASTER" controller in auto.

_____ D. Monitor NC System pressure to ensure return to normal steady state conditions.

_____ 3.2.9.2 **IF** multiple Pressurizer Backup Heater Groups are in manual, perform the following:

_____ A. Notify Chemistry that the first of multiple Pressurizer Backup Heater Groups will be de-energized and to evaluate the affect on NC System hydrogen concentration. (PIP C-10-1322).

Person notified _____

B. Place one Pressurizer Heater Control Switch in automatic: (R.M.)

_____ • PZR HTR CTRL 2A
_____ • PZR HTR CTRL 2B
_____ • PZR HTR CTRL 2D

_____ C. Verify the affected Pressurizer Heater Group de-energized:

☐ PZR HTR GROUP 2A
☐ PZR HTR GROUP 2B
☐ PZR HTR GROUP 2D

_____ D. Record date and time _____ / _____.

_____ E. Monitor NC System pressure to ensure return to normal steady state conditions.

F. **WHEN** at least 24 hours has elapsed since the first Pressurizer Backup Heater Group was de-energized as recorded in Step 3.2.9.2D, perform the following:

_____ 1. Notify Chemistry that a second Pressurizer Backup Heater Group will be de-energized and to evaluate the affect on NC System hydrogen concentration. (PIP C-10-1322).

Person notified _____

NOTE: If this is the last backup heater group to be de-energized, pressurizer pressure can be expected to decrease to below 2235 psig before C Heaters stabilize pressure due to controller windup and PZR spray bypass valve setup. This pressure decrease could reach the setpoint of C2L4364 (U2 PZR Press Lo Tech Spec DNB Limit). (R.M.) (PIP C-14-01581)

2. Place the second Pressurizer Heater Control Switch in automatic: (R.M.)

_____ • PZR HTR CTRL 2A
_____ • PZR HTR CTRL 2B
_____ • PZR HTR CTRL 2D

_____ 3. Verify the affected Pressurizer Heater Group de-energized:

☐ PZR HTR GROUP 2A
☐ PZR HTR GROUP 2B
☐ PZR HTR GROUP 2D

_____ 4. Record date and time _____ / _____.

_____ 5. **IF** this is the last backup heater group to be de-energized **AND** it is desired to take manual action to restore NC System pressure to normal, perform the following:

_____ a. Place "PRESSURE MASTER" controller in manual.

_____ b. Slowly decrease "PRESSURE MASTER" controller output to the value recorded in Step 3.2.2.

_____ c. Place "PRESSURE MASTER" controller in auto.

_____ 6. Monitor NC System pressure to ensure return to normal steady state conditions.

_____ G. **IF** the third Pressurizer Backup Heater Group was operated in manual, **WHEN** at least 24 hours has elapsed since the second Pressurizer Backup Heater Group was de-energized as recorded in Step 3.2.9.2F.4, perform the following:

_____ 1. Notify Chemistry that a third Pressurizer Backup Heater Group will be de-energized and to evaluate the affect on NC System hydrogen concentration. (PIP C-10-1322).

Person notified _____

NOTE: Pressurizer pressure can be expected to decrease to below 2235 psig before C Heaters stabilize pressure due to controller windup and PZR spray bypass valve setup. This pressure decrease could reach the setpoint of C2L4364 (U2 PZR Press Lo Tech Spec DNB Limit). (R.M.) (PIP C-14-01581)

2. Place the final Pressurizer Heater Control Switch in automatic: (R.M.)

_____ • PZR HTR CTRL 2A
_____ • PZR HTR CTRL 2B
_____ • PZR HTR CTRL 2D

_____ 3. Verify the affected Pressurizer Heater Group de-energized:

☐ PZR HTR GROUP 2A
☐ PZR HTR GROUP 2B
☐ PZR HTR GROUP 2D

_____ 4. **IF** desired to take manual action to restore NC System pressure to normal, perform the following:

_____ a. Place "PRESSURE MASTER" controller in manual.

_____ b. Slowly decrease "PRESSURE MASTER" controller output to the value recorded in Step 3.2.2.

_____ c. Place "PRESSURE MASTER" controller in auto.

_____ 5. Monitor NC System pressure to ensure return to normal steady state conditions.

_____ 3.2.10 **IF** reactor power was lowered per Step 3.2.1, restore reactor power to desired level. (R.M.)

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

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

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

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

BB 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

3. Procedure

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

BB 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)

BB 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.

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

____ 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.

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.

2. Initial Conditions

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

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

BB 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.)

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

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.

_____ 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.

_____ 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

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)

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

_____ 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".

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.

_____ 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.)

_____ 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 in the Control Copy folder of this procedure.

1. Limits and Precautions

1.1 This procedure is Reactivity Management related because it controls activities that can effect core reactivity by the following: (R.M.)

- Control rod movement
- Turbine load changes
- Feedwater manipulations
- Reactor power changes

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

1.2.1 Before returning reactor control to automatic, T-AVG shall be within ± 1°F of T-REF.

1.2.2 Do **NOT** exceed rod insertion limits or temporary rod withdrawal limits.

1.2.3 Automatic control rod withdrawal is blocked when Control Bank D ≥ 200 steps withdrawn.

1.2.4 The difference in boron concentration between the PZR and NC System is desired to be maintained within ± 50 ppm.

1.2.5 Axial Flux Difference (AFD) shall be maintained within the allowable limits as defined in the ROD manual at all power levels above 50% reactor power. (Tech Spec 3.2.3)

1.2.6 During a power change, other indications of reactor power shall be observed along with power range and secondary thermal power indications to aid in determining the reactor power level. Using indications like turbine impulse pressure, CF flow rate, NC loop ΔTs, and others may help in detecting the miscalibration of a nuclear instrument.

1.2.7 During power changes the following alternate indications for Reactor Power are available: (R.M.)

- Thermal Power Best Estimate
- Tavg, Tcold, NC Loop Delta-T
- Intermediate range Channels
- Turbine Impulse Pressure, Megawatt Output
- CF Flowrate

1.3 In the event of an inadvertent power reduction, it is recommended that the power level **NOT** be increased until an investigation has been conducted and corrective action taken.

1.4 If reactor control is in manual, maintain T-AVG within ± 2°F of T-REF to prevent receiving "T-REF/T-AVG HI/LO" alarm.

1.5 Whenever there is a thermal power change greater than or equal to 15% rated thermal power within a one hour period: (OAC point C1L4790 in alarm)

- Notify Chemistry to take an isotopic analysis for iodine within 2 to 6 hours following the last power change that is greater than or equal to 15% rated thermal power within a one hour period. (T.S. SR 3.4.16.2)

- When thermal power has stabilized, notify Radiation Protection to sample and analyze gaseous effluents. (S.L.C. 16.11-6)

1.6 S/G blowdown flowrate shall **NOT** exceed a maximum of 200 GPM per S/G.

1.7 After a thermal power change when plant conditions stabilize, 1EMF-39 setpoints shall be adjusted so the Trip 2 setpoint is set at three times the containment activity and Trip 1 setpoint is set at 70% of Trip 2 setpoint.

1.8 If the RC System condenser inlet temperature drops to less than or equal to 60°F when the Rx is shutdown or less than or equal to 55°F when the Rx is critical, the system shall be configured as follows:

- One RC pump running (throttled).
- One tower inlet isolated.
- All three riser bypasses open.

1.9 OAC point C1K0628 (CF Flow Venturi Correction Factor) shall be reset to 1.0 when either of the following conditions are met:

- A step load change such as a load rejection greater than 10% rated thermal power,
- A ramp load change of greater than 15% rated thermal power in a one hour period.

1.10 When the Unit is engaged in a power maneuver resulting in a mismatch between OAC point C1P1385 (Reactor Thermal Power, Best) and any excore power channel in excess of 2% refer to Tech Spec Basis for SR 3.3.1.2.

1.11 The insertion of Control Bank D will affect mismatch between OAC point C1P1385 (Reactor Thermal Power, Best) and the excore power range channels. This is due to shielding of the power range detectors by Control Bank D. Therefore, refer to Tech Spec Basis for SR 3.3.1.2 when mismatch between Reactor Thermal Power (Best Estimate) and the excore power range channels shall be observed to be exceeding 2%.

1.12 Engineering normally provides information for planned power maneuvers. The OAC xenon predict program can be used to help anticipate dilution and boration requirements. {PIP C99-0587}

1.13 The Steamline N-16 Radiation Monitors (EMF-71, 72, 73, 74) become inaccurate at power levels below 40% due to inaccuracies in the algorithm used to calculate the output of these monitors. {PIP 99-3980}

1.14 It is recommended that Primary Chemistry be notified prior to all significant boric acid additions or dilutions to the NC System such that proper pH control may be maintained. Normal boric acid additions and dilutions should be communicated at the Control Room shift briefing. {PIP C-01-665}

2. Initial Conditions

BB 2.1 Ensure R1 reactivity management controls established per AD-OP-ALL-0203 (Reactivity Management). (R.M.)

BB 2.2 Verify the Unit is operating between 15% and 85% power.

BB 2.3 Verify desired power reduction rate and final power level have been determined (enter values in the following blanks):
10 %/hour **50** % power

3. Procedure

NOTE:
1. 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, and Turbine Load when making at power reactivity changes. (R.M.)
2. This enclosure will affect reactivity of core and is therefore designated important to Reactivity Management per guidelines of AD-OP-ALL-0203 (Reactivity Management). (R.M.)
3. If the desired power reduction rate is ≥ 15%/hr (3 MW/Min), consider using AP/1/A/5500/009 (Rapid Downpower).
4. During normal plant power reductions, maintaining power reduction rates between 8-12% per hour when power is between 100 – 50% helps prevent steam generator sodium exceeding 0.8 ppb (Chemistry Effectiveness Indicator (CEI) limit). 0.8 ppb CEI limit does **NOT** apply below 50% power.

N/A SRO 3.1 **IF** shutdown is due to Tech Spec, ensure NRC has been notified per RP/0/B/5000/013 (NRC Notification Requirements).

N/A 3.2 **IF** this is a T-AVG Coastdown, maintain T-AVG ≥ Limiting Curve for Phases 2 and 3 (Enclosure 4.4.1).

BB 3.3 Ensure SOC has been notified prior to reducing load per OP/1/B/6300/001 (Turbine-Generator).

BB 3.4 Begin load reduction to desired power level.

NOTE: A PC may be installed at MSR Panel to be used in removing the MSR's from service from local MSR Panel. PC will be linked to OAC

N/A 3.5 **IF** required setup the temporary MSR PC which will be used for aligning MSR's. {PIP 00-97}

N/A 3.6 **IF** power reduction is due to coastdown at the end of a fuel cycle, perform following until provided with more specific guidance for shutdown by Engineering:

- Maintain NC System T-Avg as follows:
  - ☐ Monitor T-Avg - T-Ref deviation.
  - ☐ Allow NC System T-Avg to decrease until T-Avg – T-Ref deviation indicates approximately –0.5°F.
  - ☐ Reduce turbine load per OP/1/B/6300/001 (Turbine Generator) until T-Avg – T-Ref deviation indicates approximately +0.5°F.
- Maintain AFD as follows:
  - ☐ Maintain AFD on target ± 2 %, if possible.

NOTE: Waiting for peaks (positive or negative) prior to initiating control rod motion will make an AFD oscillation worsen.

_____ **IF AT ANY TIME** AFD oscillation challenges limits of target band, insert control rods as AFD is trending positive **OR** pull control rods as AFD is trending negative to dampen oscillation.

- Maintain Control Rod positioning as follows:
  - ☐ Maintain Control Rods within insertion and withdrawal limits per ROD Book for current fuel cycle.

_____ **IF AT ANY TIME** Control Bank D is inserted to less than or equal to 210 steps, contact Engineering to evaluate new AFD targets to allow withdrawal of Control Bank D to minimize the reactivity penalty of inserted control rods.
Engineer Contacted_____

CAUTION: 1. When Unit is engaged in a power maneuver resulting in a mismatch between OAC point C1P1385 (Reactor Thermal Power, Best) and any excore power channel in excess of 2%, refer to Tech Spec Basis SR 3.3.1.2.

2. Alternate indications of reactor power shall be monitored to verify reactor power level and help prevent NI miscalibration.

NOTE: Step 3.7 may have already been performed by Enclosure 4.3 (Unit Operation Between 85% and 100% Power).

BB 3.7 **IF** a power decrease of more than approximately 20% reactor power is planned, issue Model W/O #00874628 to IAE to prevent the mismatch between OAC heat balance point C1P1385 (Reactor Thermal Power, Best) and any excore power channel exceeding 2%.

BB 3.8 **WHILE** decreasing power maximize S/G blowdown to help maintain S/G water chemistry.

NOTE: During a Unit coastdown at EOL or extended operation at reduced power levels, AFD shall be maintained as directed by Engineering.

BB 3.9 **WHILE** decreasing power maintain control rods above insertion limit and AFD within limits by boration or dilution per OP/1/A/6150/009 (Boron Concentration Control).

NOTE: Steps 3.10 and 3.11 may be performed concurrently.

BB 3.10 **WHILE** decreasing power at approximately 85% turbine load (1041 MWe), monitor AS pressure (1AS-2 black needle) as "C" Bleed (C1A1094 (C Bleed Steam Pressure)) drops below 125 psig to ensure 1AS-2 (Main Stm To Aux Stm) is operating to maintain AS pressure greater than or equal to 125 psig.

NOTE: Due to lower quality steam being admitted to CFPT a momentary opening of CFPT High Pressure Control Valves could occur.

3.11 At approximately 85% turbine load (1041 MWe), perform following while ensuring CF pump speed is maintained:

BB 3.11.1 Adjust 1AS-2 (Main Stm To Aux Stm) setpoint to maintain 165 psig. (R.M.)
BB 3.11.2 Slowly open 1AS-12 (AS To CFPT Isol).
BB 3.11.3 Slowly close 1SP-3 (SC To CFPT 1A & 1B) (TB-640, 1G-24).

NOTE: DCS alarms associated with OTΔT will alarm below approximately 85% power due to inputs over ranging. Performing below will prevent the associated alarms.

3.12 Perform following to prevent DCS alarms associated with OTΔT on DCS graphic 6068:

BB • Set alarm checking to "OFF" for NCAA5422.

BB • Set alarm checking to "OFF" for NCAA5462.

BB • Set alarm checking to "OFF" for NCAA5502.

BB • Set alarm checking to "OFF" for NCAA5542.

BB • Set alarm checking to "OFF" for OTDELTAT-FAIL.

NOTE: "C" Heater Drain pumps shall be removed from service by 70% turbine load (857 Mwe). {PIP 98-1726}

BB 3.13 **WHEN** turbine load is reduced below 80% (~980 MWe), begin running OP/1/B/6250/004 (Feedwater Heaters, Vents, Drains and Bleed Systems) to remove "C" Heater Drain pumps from service.

NOTE: 1. A ladder may be required to perform Step 3.14 satisfactorily.

2. Procedure may continue while performing Step 3.14.

3.14 At 75% turbine load (~919 MWe) **AND** prior to reaching 70% turbine load (~ 857 MWe) perform following:

BB 3.14.1 Document local positions (Open, Closed, Intermediate) of following valves:

☒ 1TL-3 (Steam Seal Reg) (1TB-605, 1G-31) **Closed**

☒ 1TL-10 (E Bleed Stm Seal Reg) (1TB-604, 1G-31) **Intermediate**

BB 3.14.2 Document local Steam Seal Header pressure on 1TLPG5000 (Seal Hdr) (1TB-599, 1G-31).
5 psig

BB 3.14.3 Establish communications with Control Room in preparation for possible adjustment of Steam Seal Header Pressure.

N/A 3.14.4 **IF** the following conditions are observed, **THEN** notify Control Room to throttle open 1TL-4 (Stm Seal Reg Byp) until 1TL-9 (Stm Seal Packing Unloader Reg) (1TB-604, 1G-31) is observed to open:

- 1TL-3 (Steam Seal Reg) **AND** 1TL-10 (E Bleed Stm Seal Reg) closed
OR
- Steam Seal Header Pressure on 1TLPG5000 (Seal Hdr) < 4.0 psig

CAUTION: 1. Steam seal header pressure ≥ 4.0 psig is needed prior to reducing power < 70% (857 MWe) to prevent possible loss of Main Vacuum through Main Turbine Steam Seals.

2. Steam Seal Header Pressure unloader to condenser will lift at 6.0 psig.

N/A 3.14.5 **IF** required maintain steam seal header pressure between 4.0 and 6.0 psig on 1TLP5000 (Seal Hdr) by throttling 1TL-4 (Stm Seal Reg Byp) as required.

BB 3.14.6 Initiate an increased surveillance to monitor Steam Seal Header Pressure as turbine load is decreased with following criteria:

- OATC will be responsible for increased surveillance of Steam Seal Header Pressure.
- Terminate increased surveillance when Turbine offline **OR** power decrease secured as required.

_____ 3.15 At approximately 69% reactor power, verify "P9-REACTOR TRIP ON TURBINE TRIP BLOCKED" light on 1SI-18 illuminates.

_____ 3.16 **WHEN** turbine load is < 70% (857 MWe) place "SSRH Hi Load Mode" switch on 1MC-13 to "MAN' per OP/1/B/6250/013 (Moisture Separator Reheater Operation).

_____ 3.17 **IF** power decrease was due to a Main Turbine Generator issue that only required a power decrease to less than 69% (P-9) perform following:

_____ 3.17.1 Ensure "P9-REACTOR TRIP ON TURBINE TRIP BLOCKED" light on 1SI-18 is illuminated.

_____ 3.17.2 **HOLD** power decrease at approximately 66% turbine load (808 MWe) until issue is resolved.

_____ 3.17.3 **IF** required by plant conditions continue with power decrease to desired power.

_____ 3.17.4 **IF** issue with Main Turbine Generator is resolved then N/A rest of this enclosure and return to Power Increase Enclosure.

NOTE: Procedure may continue while performing Step 3.18.

_____ 3.18 **WHEN** turbine load < 65% (796 MWe), remove Second Stage Reheater high load valves from service **AND** ensure low load valve operation per power decrease enclosure of OP/1/B/6250/013 (Moisture Separator Reheater Operation).

NOTE:
1. Power is restricted to ≤ 50% when only one CF Pump is available to limit the stresses induced on a single CF Pump Turbine steam path components. {PIP 06-3461}
2. Procedure may continue while performing Step 3.19.

_____ 3.19 **IF** required based on shutdown requirements when ≤ 50% turbine load (612 MWe), stop one CF pump per OP/1/A/6250/001 (Condensate and Feedwater System).

CAUTION: At least four banks shall remain in service and adjacent banks shall **NOT** be secured (i.e., either coolers #1, 3, 5, 8, and 10 or coolers #2, 4, 7, and 9 shall remain in service on each transformer).

NOTE: If the power decrease is being performed in order to open a Generator PCB and turbine is to remain online, oil pumps and cooling fans shall **NOT** be secured in following step for transformer associated with the Generator PCB that will remain closed.

_____ 3.20 **IF** required at approximately 50% turbine load (612 MWe), perform one of following based on Shutdown requirements:

_____ 3.20.1 **IF** both Generator PCB's will remain closed, place one group of switches (located inside the local alarm panel) for each main transformer in "OFF" position to secure every other bank of oil pumps and cooling fans on each PCB's.

_____ 3.20.1.1 For Main Transformer 1A secure one of following groups:

- Main Transformer 1A, Group1

  - ☐ 1A Cooler Bkr 8-1
  - ☐ 1A Cooler Bkr 8-3
  - ☐ 1A Cooler Bkr 8-5
  - ☐ 1A Cooler Bkr 8-8
  - ☐ 1A Cooler Bkr 8-10

OR

- Main Transformer 1A, Group 2

  - ☐ 1A Cooler Bkr 8-2
  - ☐ 1A Cooler Bkr 8-4
  - ☐ 1A Cooler Bkr 8-7
  - ☐ 1A Cooler Bkr 8-9

_____ 3.20.1.2 For Main Transformer 1B secure <u>one</u> of following groups:

- <u>Main Transformer 1B, Group 1</u>

  - ☐ 1B Cooler Bkr 8-1
  - ☐ 1B Cooler Bkr 8-3
  - ☐ 1B Cooler Bkr 8-5
  - ☐ 1B Cooler Bkr 8-8
  - ☐ 1B Cooler Bkr 8-10

OR

- <u>Main Transformer 1B, Group 2</u>

  - ☐ 1B Cooler Bkr 8-2
  - ☐ 1B Cooler Bkr 8-4
  - ☐ 1B Cooler Bkr 8-7
  - ☐ 1B Cooler Bkr 8-9

_____ 3.20.2 **<u>IF</u>** one Generator PCB will be opened and one will remain closed, maintain all oil pumps and cooling fans in service for associated Generator PCB that will remain closed. Secure every other bank on main transformer associated with Generator PCB to be opened by placing one group of switches (located inside local alarm panel) in "OFF" position.

_____ 3.20.2.1 **<u>IF</u>** GCPB 1A is to be opened, secure <u>one</u> of following groups of breakers:

- <u>Main Transformer 1A, Group1</u>

  - ☐ 1A Cooler Bkr 8-1
  - ☐ 1A Cooler Bkr 8-3
  - ☐ 1A Cooler Bkr 8-5
  - ☐ 1A Cooler Bkr 8-8
  - ☐ 1A Cooler Bkr 8-10

OR

- <u>Main Transformer 1A, Group 2</u>

  - ☐ 1A Cooler Bkr 8-2
  - ☐ 1A Cooler Bkr 8-4
  - ☐ 1A Cooler Bkr 8-7
  - ☐ 1A Cooler Bkr 8-9

_____ 3.20.2.2 **IF** GCPB 1B is to be opened, secure one of following groups of breakers:

- Main Transformer 1B, Group 1

  - ☐ 1B Cooler Bkr 8-1
  - ☐ 1B Cooler Bkr 8-3
  - ☐ 1B Cooler Bkr 8-5
  - ☐ 1B Cooler Bkr 8-8
  - ☐ 1B Cooler Bkr 8-10

OR

- Main Transformer 1B, Group 2

  - ☐ 1B Cooler Bkr 8-2
  - ☐ 1B Cooler Bkr 8-4
  - ☐ 1B Cooler Bkr 8-7
  - ☐ 1B Cooler Bkr 8-9

_____ 3.21 **IF** power reduction will be stopped at or above 48%, then N/A rest of this enclosure and return to Power Increase Enclosure when the reason for reduction has been resolved.

_____ 3.22 At approximately 48% reactor power, verify P-8, "HI PWR LO FLOW RX TRIP BLOCK" light on 1SI-18 illuminates.

NOTE: 1. Maintenance Rule requires 2 out of 3 Steam Generator Tube Leakage EMFs functional once a Unit enters Mode 3 or higher. N-16 monitors are **NOT** functional below 40% power.

2. Power decrease and procedure may continue while performing Step 3.23.

3.23 Prior to decreasing power below 40% perform following:

_____ 3.23.1 Check status of EMFs associated with monitoring for Steam Generator Tube Leakage:

- 1EMF-33 (Condenser Air Ejector Exhaust) Functional YES____ NO_____
- 1EMF-26 (Steamline 1A)Functional YES____ NO_____
- 1EMF-27 (Steamline 1B) Functional YES____ NO_____
- 1EMF-28 (Steamline 1C) Functional YES____ NO_____
- 1EMF-29 (Steamline 1D) Functional YES____ NO_____

_____ 3.23.2 **IF** any of above EMFs are Non-Functional perform following:

_____ • Notify Engineering to acknowledge operating below 40% power without one of the two remaining Steam Generator Tube Leakage EMFs.

Engineer Notified_____

_____ • Initiate a CR to document status of Steam generator Tube Leakage EMFs to allow Engineering to document entry into Maintenance Rule space.

CR#_____

NOTE:
1. Due to sensitivity of DCS to CM/CF flow changes at lower power, changes to CM/CF alignments can create swings in total CM/CF flow. This is more likely to occur when only one CFPT is in service on a downpower.
2. DCS has been programmed to maintain a minimum D/P of 60 psid between CF Header Pressure and SM Header pressure.
3. At 40% Reactor power OAC alarms for Power Range and Intermediate Range Low Power Trips enabled will occur.

_____ 3.24 **WHILE** decreasing power, perform following concerning CM/CF flow:

- Monitor CM/CF total flow for transients when operating equipment that affects CM/CF total flow.
- Monitor C1P1538 (CF HDR PRESS/SM HDR PRESS D/P) **AND/OR** D/P on DCS Graphic 6011 (CF-FEEDWATER OVERVIEW)
- Verify D/P between CF Header Pressure and SM Header Pressure is maintained by DCS at greater than or equal 60 psid.

_____ 3.25 **IF** shutdown is for refueling outage begin performance of PT/1/B/4250/002 N (Extraction Check Valve Position Verification) to document present position of Extraction Check Valves.

_____ 3.26 **IF** containment entry is anticipated **AND** EH&S request it, start containment auxiliary charcoal units per OP/1/A/6450/001 (Containment Ventilation System).

Person making request_____

3.27 At approximately 30% turbine power (~367 MWe), perform <u>one</u> of following concerning AMSAC:

_____ 3.27.1 Verify the "RESET" light on "AMSAC For CF Valves" is dark.

OR

_____ 3.27.2 **<u>IF</u>** the turbine impulse pressure is less than 193 psig **<u>AND</u>** the "RESET" light on "AMSAC For CF Valves" is lit, perform following:

_____ 3.27.2.1 Issue a work request to IAE on the AMSAC circuit and pressure switches to determine and repair reason circuit failed to deactivate automatically.

_____ 3.27.2.2 Depress the "BYPASS" pushbutton on "AMSAC For CF Valves".

_____ 3.27.2.3 Verify "RESET" light on "AMSAC For CF Valves" is dark.

_____ 3.27.2.4 **<u>AFTER</u>** 2 minutes (time delay for AMSAC bypass) has elapsed, verify "RESET" light on "AMSAC For CF Valves" remains dark.

CAUTION: If AMSAC **<u>CANNOT</u>** be bypassed a turbine trip and CA auto start will occur between 15 to 20% reactor power due to 3/4 CF Reg Valves being less than 25% open and CF Byp Reg Valves **<u>NOT</u>** being 50% open during power decrease.

NOTE: Tech Spec or equipment issue shutdowns may require power decrease to continue while AMSAC repairs in progress.

_____ 3.27.2.5 **<u>IF</u>** possible, stop the power decrease until AMSAC circuitry is repaired.

NOTE: Maintaining RC temperature from the cooling towers to the main condenser > 80°F will ensure main condenser vacuum remains < 28.5". (PIP 09-1324)

_____ 3.28 **<u>WHILE</u>** load on Main Turbine is being reduced, operate RC pumps and/or cooling tower fans as required per OP/1/B/6400/001 A (Condenser Circulating Water) to maintain RC temperature from the cooling towers to main condenser > 80°F.

3.29 As turbine load decreases between approximately 30% (367 MWe) and 20% (245 MWe), perform following: {PIP 95-2376}

_____ 3.29.1 Place 1HW-126 (LP Htr 1F1 Nor Dn Ctl Vlv) in manual ("M").

_____ 3.29.2 Close 1HW-126 (LP Htr 1F1 Nor Dn Ctl Vlv).

_____ 3.29.3 Place 1HW-127 (LP Htr 1F2 Nor Dn Ctl Vlv) in manual ("M").

_____ 3.29.4 Close 1HW-127 (LP Htr 1F2 Nor Dn Ctl Vlv).

_____ 3.29.5 Place 1HW-128 (LP Htr 1F3 Nor Dn Ctl Vlv) in manual ("M").

_____ 3.29.6 Close 1HW-128 (LP Htr 1F3 Nor Dn Ctl Vlv).

_____ 3.30 Between 30% (367 MWe) and 20% (245 MWe) turbine power, slowly open 1CM-81 ('F' And 'G' Htrs Bypass Vlv).

_____ 3.31 **IF** desired, secure any excess Condensate Booster pumps.

NOTE: Procedure may continue while performing Step 3.32, if applicable.

_____ 3.32 **WHEN** turbine load < 20% turbine power (245 MWe), remove Second Stage Reheater low load valves from service per power decrease enclosure of OP/1/B/6250/013 (Moisture Separator Reheater Operation).

_____ 3.33 **IF** the power reduction will be stopped above 15% and below 20% power then N/A rest of this enclosure and return to Power Increase Enclosure when reason for reduction has been resolved.

_____ 3.34 **IF** the power reduction will be to 15% with Main Turbine offline, N/A rest of this Enclosure and go to OP/1/A/6100/002 (Controlling Procedure for Unit Shutdown).

NOTE: 1. For power reductions in which the reactor will remain critical and stable, transferring AS loads is **NOT** required. A reactor power level of 9% is being selected as this threshold.

2. Procedure may continue while performing Step 3.35.

_____ 3.35 **IF** reactor power is being reduced < 9%, complete isolation of Unit 1 steam supply from SM to Unit 1 AS as follows: {PIP 96-1079}

_____ 3.35.1 Ensure 1AS-2 (Main Stm To Aux Stm) setpoint adjusted to maintain 165 psig.

CAUTION: When Unit 2 is aligned to supply Unit 1 AS, small reactivity changes may be seen on Unit 2 as the AS Header demand changes on Unit 1.

_____ 3.35.2 **IF** Unit 2 AS is going to be used to supply Unit 1 AS, adjust 2AS-2 (Main Stm To Aux Stm) setpoint to maintain 165 psig.

3.35.3 Perform one of following:

_____ • Start AEB(s) per OP/1/B/6250/007 B (Auxiliary Electric Boilers).

OR

_____ • Cross connect Unit 1 and Unit 2 AS headers per OP/0/B/6250/007 A (Auxiliary Steam System Alignment).

_____ 3.35.4 **IF** Unit 1 and Unit 2 AS headers are cross connected, notify Unit 2 Control Room Operator of following:

☐ Closing 1AS-2 (Main Stm To AS Steam) will result in an increase in Unit 2 reactor power. (R.M.)

☐ Unit 2 turbine load shall be reduced by ~ 20 MW to maintain Unit 2 reactor thermal power < 100%. (R.M.)

_____ 3.35.5 Slowly close 1AS-2 (Main Stm To AS Steam) while ensuring the AEBs or 2AS-2 (Main Stm To Aux Stm) maintain AS header pressure.

_____ 3.35.6 Close 1AS-1 (SM To AS Inlet).

_____ 3.36 **IF** reactor power is being reduced < 9%, transfer steam seal supply to AS per OP/1/B/6300/005 (Steam Seal System).

NOTE: The CF pump recirc valve for tripped CF pump must remain closed and in manual per OP/1/A/6250/001 (Condensate and Feedwater System) to reduce total CM/CF flow in order to reduce flow transients when swapping feedwater nozzles.

3.37 In manual, slowly open CF pump recirc valve for operating CF pump to increase CF suction flow by approximately 5000 gpm:

_____ 3.37.1 **IF** 1A CF Pump Turbine in service, slowly open 1CF-6 (CF Pump 1A Recirc Ctrl).

_____ 3.37.2 **IF** 1B CF Pump Turbine in service, slowly open 1CF-13 (CF Pump 1B Recirc Ctrl).

_____ 3.38 **IF** reactor power is being reduced < 9%, close following valves:

_____ 3.38.1 1SA-22 (Main Steam To CSAE) (TB-594, 1M-32)

_____ 3.38.2 1AS-10 (C Htr Extr To AS Hdr)

_____ 3.39 Prior to decreasing below 15% turbine load (184 MWe), transfer rod control to manual.

_____ 3.40 At approximately 15% turbine load (184 MWe), ensure SSRH scavenging steam automatically, or is manually realigned to condenser as follows:

3.40.1 Ensure following valves are open:

_____ • 1HS-138 (SSRH A and B Scav Stm To Cond)
_____ • 1HS-158 (SSRH C and D Scav Stm To Cond).

3.40.2 Ensure following valves are closed:

_____ • 1HS-137 (SSRH A and B Scav Stm To 1A2 Htr)
_____ • 1HS-157 (SSRH C and D Scav Stm To 1A1 Htr).

_____ 3.41 At approximately 15% turbine load (184 MWe), verify "C-5 LO TURB IMPULSE PRESS ROD BLOCK" light on 1SI-18 illuminates.

NOTE: Procedure may continue while performing Step 3.42.

_____ 3.42 **IF** a temporary PC was installed at local MSR Panel for removing MSR's from service, remove it.

_____ 3.43 **IF** further power reduction is required, go to OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown).

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

1. Limits and Precautions

1.1 This procedure is Reactivity Management related because it controls activities that can effect reactivity. (R.M.)

1.2 Low load operation limits:

1.2.1 The unit can be operated continuously at low loads when exhaust hood temperature is < 175°F. The load shall, however, be increased slowly until the temperature decreases below 125°F before increasing load at normal rate (Multipoint Recorder on 1MC3).

1.2.2 Excessive use of the exhaust hood sprays shall be avoided to prevent accelerated blade erosion.

1.3 Do **NOT** exceed the load, hydrogen pressure, and power factor limits per the Unit One Revised Data Book Figure 43.

1.4 If the limits of the Unit One Revised Data Book Figure 43 (Generator Capability Curves) are exceeded, the Turbine Generator shall be tripped.

1.5 Under certain environmental conditions, indicated condenser vacuum less than 24.3 inches Hg may be reached at full load. Exhaust hood temperatures are a more accurate indicator of true vacuum. It is recommended the turbine **NOT** be operated under the following conditions at full load:

- Exhaust Hood 1A temperature ≥ 136°F
- Exhaust Hood 1B temperature ≥ 129°F
- Exhaust Hood 1C temperature ≥ 124.5 °F

1.6 The maximum differential pressure between adjacent LP shell pressures shall **NOT** exceed 2.0 inches Hg. (main condenser vacuum gauges on 1MC13, OAC points C1P1669 (D/P between A & B Condensers) and C1P1670 (D/P between B & C Condensers) or Main Condenser graphic (CMCOND)).

1.7 A sudden downward trend on an LP turbine's lower extraction temperature shall be investigated as a possible indication of water induction into the turbine. This is indicated on the recorder on the rear of 1MC8 labeled "TURBINE WATER DETECTION", using any of the LP 8th stage lower temperatures.

1.8 A "LOAD RATE" > "6.2 MW/MIN" shall **NOT** be used during normal load changes.

1.9 Differential temperature between adjacent exhaust hoods shall **NOT** exceed 30°F unless evaluated and approved by the responsible engineer (Turbine Generator System Expert). (OAC points C1P1667 (A & B Exhaust Hoods Metal Delta Temp) and C1P1668 (B & C Exhaust Hoods Metal Delta Temp) or Main Condenser graphic (CMCOND)).

1.10 The Main Turbine OIU Work Station has the capability to perform control functions for the Main Turbine, including tripping and resetting of the turbine. If a control function window is inadvertently selected while manipulating the Main Turbine OIU Work Station, the window shall be closed to prevent actuation of the control function.

2. Initial Conditions

BB Verify Turbine Generator is On Line per Enclosure 4.1 (Turbine Generator Startup).

3. Procedure

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. 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.
4. 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 the curve in the Unit One OAC Databook "Load-Changing Recommendations".

NOTE:
- Several of the parameters required for this procedure can be found on OAC graphics, and a list of all OAC points are found on Enclosure 4.8 (Turbine Generator Roll Computer Points).
- Step 3.1 and Step 3.2 may be performed in any order.

N/A 3.1 **IF** increasing turbine generator load, perform the following:

_____ 3.1.1 Ensure the proper reactivity management controls established per AD-OP-ALL-0203 (Reactivity Management). (R.M.)

_____ 3.1.2 **WHILE** increasing Turbine Generator load, perform the following:

_____ 3.1.2.1 **IF** applicable, verify Groups B and C valves on Enclosure 4.6 (Valve Checklist) close at 15% of full load (184 MWe, 107 psig Turbine Impulse Pressure).

_____ 3.1.2.2 **IF** applicable, verify the following valves close at 15% of full load (184 MWe, 107 psig Turbine Impulse Pressure):

☐ 1SM-21 (Ctrl Vlv #2 Stm Lead Drn)

☐ 1SM-29 (Ctrl Vlv #1 Stm Lead Drn)

_____ 3.1.2.3 **IF** applicable, **WHEN** CV3 comes off of its fully closed seat (65% of full load, 796 MWe), verify 1SM-25 (Ctrl Vlv #3 Stm Lead Drn) closes.

_____ 3.1.2.4 **IF** applicable, **WHEN** CV4 comes off of its fully closed seat (92% of full load, 1127 MWe), verify 1SM-33 (Ctrl Vlv #4 Stm Lead Drn) closes.

CAUTION:
1. Until it is recognized that the first stage shell metal temperature change rate stays below the allowable limit (150°F/hr), the following loading rate shall **NOT** be exceeded:
   - 1/2%/min - First Stage Inner Shell Temperature (1MC3 or OAC point C1A1140 (Turbine Lower Inner Shell Temp)) ≤ 350°F
   - 1%/min - First Stage Inner Shell Temperature (1MC3 or OAC point C1A1140 (Turbine Lower Inner Shell Temp)) > 350°F
2. Normal steady-state load changes shall be made without exceeding the limits shown on Enclosure 4.7 (Generator Operating Limits) and in the Unit 1 OAC Databook "Recommended Startup and Loading Curves".
3. Unit One Reactor Operating Data, Section 2.4 shall be referred to for allowable ramp rates. A "LOAD RATE" > 6.2 MW/MIN shall **NOT** be used during normal load changes.

3.1.3 Increase turbine generator load by performing the following:

_____ 3.1.3.1 Select "LOAD RATE" and verify it illuminates.

_____ 3.1.3.2 Input the desired load rate.

_____ 3.1.3.3 Select "ENTER" and verify "LOAD RATE" goes dark.

_____ 3.1.3.4 Select "TARGET" and verify it illuminates.

_____ 3.1.3.5 Input the desired load target.

_____ 3.1.3.6 Select "ENTER" and verify "TARGET" light goes dark.

_____ 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:

BB 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:

_____ 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.

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.

2017 INITIAL LICENSE NRC EXAM
SCENARIO # 2

Facility:	Catawba NRC Exam 2017	Scenario No.: 2	Op Test No.: 2017301
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. 1A CA Pump is removed from service for PMs. 1A 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 initiate a VQ release from 'A' train by completing the in-progress OP/1/A/6450/017 (Containment Air Release and Addition System) Enclosure 4.2 (Air Release Mode).

Event No.	Malf. No.	Event Type*	Event Description
1		N – BOP N – SRO	VQ Release
2	SLIM05_02	C – BOP C – SRO	Letdown Heat Exchanger Temperature Control Valve (1KC-132) Failure
3	SM002B	C – RO C – SRO	S/G PORV (1SV-13) Fails Open
4	EP006C IRX009	R – RO N - BOP TS – SRO	1B GPCB Trip / No Auto Rods
5	NC013D ISE008A ISE008B	C – BOP C – SRO TS -SRO	NC System Leak (S_H Failure - Secure VQ)
6	NC013D	M – ALL	LBLOCA
7	ISE002A ISE002B	C – BOP	SI Fails to Automatically Actuate
8	CF006A	C – RO	1CF-33 (S/G 1A CF Cont Isol) Fails to Close on Feedwater Isolation
9	ND001A ND001B	C - BOP	ND Pumps Fail to Auto Start

* (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. 1A CA Pump is removed from service for PMs. 1A 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 initiate a VQ release from 'A' train by completing the in-progress OP/1/A/6450/017 (Containment Air Release and Addition System) Enclosure 4.2 (Air Release Mode).

Event 1
Initiate VQ Release.

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.

Verifiable Action – BOP will take 1KC-132 to manual and throttle it open to decrease letdown temperature. If letdown temperature exceeds 136°F, then letdown heat exchanger outlet three way valve (1NV-153A) will fail to go to the VCT position (will continue flow to NV demineralizers) and the BOP will be required to manually align to the VCT.

Event 3
1B S/G PORV (1SV-13) will fail open. 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 close 1SV-28A (S/G 1B PORV Isol) to isolate the leak. RO may decrease turbine generator load to maintain reactor power < 100%.

Event 4
1B Main Generator Breaker (GEN BKR 1B) will spuriously open resulting in a turbine runback. Control Rods will fail to automatically insert. Crew will enter AP/1/A/5500/003 (Load Rejection), Case I (Switchyard Available).

Verifiable Action – OATC will manually insert Control Rods as required. BOP will borate to restore Control Rod Insertion limits. SRO will address Tech Specs.

Event 5
A Primary Coolant system leak will develop inside containment. Crew will enter AP/1/A/5500/010 (Reactor Coolant Leak), Case II (NC System Leak). Containment Ventilation Isolation Signal (S_H) will fail to actuate on high containment radiation level (EMF-38, 39).

Verifiable Action – BOP will adjust charging to maintain Pressurizer level. BOP will secure Containment Air Release (VQ). SRO will address Tech Specs.

Event 6
A Large Break LOCA will occur. Crew will enter EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and transition to EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).

Verifiable Action – RO will manually trip the reactor. BOP will manually initiate Safety Injection.

Event 7
Safety Injection will fail to automatically actuate on High Containment Pressure or Low Pressurizer Pressure.

Verifiable Action – BOP will manually actuate both trains of Safety Injection

Event 8
1CF-33 (S/G 1A CF Cont Isol) fails to automatically close on Feedwater Isolation Signal.

Verifiable Action – RO will manually close valve.

Event 9
Both ND Pumps will fail to automatically start on Safety Injection initiation.

Verifiable Action –SRO will direct reset of D/G sequencer and ECCS. BOP will manually start 1A and 1B ND Pumps.

***Critical Task 1* – Manually actuate at least one train of SIS-actuated safeguards before transition to E-1 occurs (E-0 Step 27 RNO d).**

***Critical Task 2* – Manually start at least one low-head ECCS pump before transition out of E-0 (E-0 Step 27 RNO d).**

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)	4
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 # 158 and load Schedule file for Scenario 2.

START TIME:_____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		2	MAL-SLIM05_02 (1NVSS5590 KC-132 Raise Setpoint Pushbutton fail to position)	Button Depress-ed			:10	2
			VLV-NV035A (NV153A L/D HX DIVERSION FAIL AUTO ACTIONS)	ACTIVE				2
		3	MAL-SM002B (S/G PORV SV13 FAILURE)	100				3
		4	OVR-EP006B (GEN BKR 1B TRIP ENABLE PB)	ON				4
		4	OVR-EP006C (GEN BKR 1B TRIP PB)	ON				4
			MAL-IRX009 (RODS FAIL TO MOVE)	AUTO				4
		5	MAL-NC013D (NC COLD LEG D LEAK)	0.2				5
			MAL-ISE008A (AUTO CNT VENT SIGNAL TRN A)	BLOCK				5
			MAL-ISE008B (AUTO CNT VENT SIGNAL TRN B)	BLOCK				5
		6	MAL-NC013D (NC COLD LEG D LEAK)	27.5				6
			MAL-ISE002A (AUTO SI TRN A FAILS TO ACTUATE)	ACTIVE				7
			MAL-ISE002B (AUTO SI TRN B FAILS TO ACTUATE)	ACTIVE				7
			VLV-CF006A (CF33 CF CONT ISOL VLV 1CF033 FAIL AUTO ACTIONS)	ACTIVE				8
			MAL-ND001A (ND PUMP A FAILURE)	AUTO				9
			MAL-ND001B (ND PUMP B FAILURE)	AUTO				9
			LOA-CA017 (RACKOUT CA PUMP 1A)	RACK-OUT				
		10	LOA-CNT002 H2 ANALYZERS	BOTH	10:00			

		Ensure Red Collar is placed on 1A 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**, Initiate VQ Release

3.3 **Scenario EVENT 2**, Letdown Heat Exchanger temperature control valve (1KC-132) failure

✓	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 EVENT 3**, 1B S/G PORV (1SV-13) Fails Open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause 1B S/G PORV (1SV-13) to fail open.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1SV-13, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection notifying of steam leak from 1SV-13 failing open, **REPEAT** the information.

3.5 **Scenario EVENT 4**, Generator Breaker 1B Trip

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 4** to cause Generator Breaker 1B to trip open.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for Generator Breaker 1B or control rods failing to insert, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO to complete shutdown of the CHDPs, **REPEAT** the information..

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as the SOC reporting on runback of Unit 1, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection to sample and analyze gaseous effluents referring to SLC 16.11-6, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Primary Chemistry to sample for isotopic analysis of iodine between 2-6 hours following a power change of > 15% in a 1 hour period referring to Tech Spec 3.4.16, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Reactor Engineering reporting on runback of Unit 1, **REPEAT** the information.

3.6 **Scenario EVENT 5**, NC System Leak

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 5** to cause an NC System Leak on loop 1D.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Reactor Engineering reporting on need for shutdown of Unit 1, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Station Management for further actions, **REPORT** “Once further actions are required, station management will contact the control room.”

3.7 **Scenario EVENT 6**, Large Break LOCA

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 6** to cause a Large Break LOCA on loop 1D.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO to secure all ice condenser AHUs per G-1 Enclosure 11 and to place the H_2 Analyzers in service per OP/1/A/6450/010, **REPEAT** the information and **INSERT Trigger 10**.
	After 10 minutes, contact the control room and **REPORT** "All ice condenser AHUs 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.

Enclosure 4.2
Air Release Mode

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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

BB 2.1 Verify Containment Pressure > 0.09 psig.

BB 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)"

BB 2.3 Verify Containment pressure increase is **NOT** due to a LOCA or steam line break.

Enclosure 4.2
Air Release Mode

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BB 2.4 Verify EMF is aligned per the "SPECIAL INSTRUCTIONS FOR RELEASE" section on the Gaseous Waste Release Permit Report.

3. Procedure

BB 3.1 Ensure the following enclosures are complete:

- [X] Enclosure 4.4 (Auxiliary Building Valve Checklist)
- [X] Enclosure 4.5 (Reactor Building Valve Checklist)
- [X] Enclosure 4.6 (Auxiliary Building Independent Verification Valve Checklist)
- [X] 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 one of the following:

BB 3.2.1 **IF** 1EMF-39 (low range) is functional, perform the following:

BB 3.2.1.1 Verify 1EMF-39L is specified for use on the Gaseous Waste Release Permit Report.

BB 3.2.1.2 Verify 1EMF-39L is functional per SLC 16.11-7 using OP/0/A/6500/080 (EMF Output Modules).

BB 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).

BB 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.

Enclosure 4.2
Air Release Mode

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N/A 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 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.

Enclosure 4.2
Air Release Mode

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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.

BB 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:

BB 3.4.1 Depress the "A/M" pushbutton until the "A" light (auto) is illuminated.

BB 3.4.2 Verify "VQ0100.S" appears in the display window.

BB 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.

Enclosure 4.2
Air Release Mode

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____ 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.

N/A 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)

N/A 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".

N/A 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".

Enclosure 4.2
Air Release Mode

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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.

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Air Release Mode

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3.18 Secure the VQ train placed in service in Step 3.12 as follows:

_____ 3.18.1 **IF** 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 **IF** securing B train, perform the following:

_____ 3.18.2.1 Ensure "Cont Air Rel Fan 1B" has stopped.

_____ 3.18.2.2 Place ""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 **IF** 1EMF-39L **AND** 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.

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3.23.4 Enter the "Highest EMF Reading" during the release from one of the following:

_____ 3.23.4.1 Highest reading from the OAC.

OR

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 **IF** the OAC was used to monitor release per Step 3.3, ensure Step 3.3 has been signed off.

Enclosure 4.2
Air Release Mode

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_____ 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.

Enclosure 4.2
Air Release Mode

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_____ 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.

Note To Evaluator:

This is the end of Event 1. At the Lead Evaluators discretion, the scenario may continue by having the booth operator INSERT Trigger 2 for Event 2 (Letdown Heat Exchanger Temperature Control Valve (1KC-132) Failure).

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Event Description: Letdown Heat Exchanger Temperature Control Valve (1KC-132) Failure

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

<u>Note To Evaluator</u>:

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. The crew may either take manual control of 1KC-132 or may decrease the setpoint on the controller for 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.

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PANEL: 1AD-7

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

Note To Evaluator:

This is the end of Event 2. At the Lead Evaluators discretion, the scenario may continue by having the booth operator INSERT Trigger 3 for Event 3 (1B S/G PORV (1SV-13) Fails Open).

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Event Description: 1B S/G PORV (1SV-13) Fails Open			

Control Room Indications
OAC Alarm for 1SV-13 - OPEN
Main Steam Header Pressure - DECREASING
Turbine Generator Electrical Load - DECREASING
Reactor Power - INCREASING
RED OPEN light for 1SV-13 - LIT

Note To Evaluator:

Crew may decide to invoke OMP 1-7 guidance to isolate a known leak and not enter AP/28 (Secondary Steam Leak). AP/28 is included in this guide beginning on the following page.

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Event Description: 1B S/G PORV (1SV-13) Fails Open				

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

Enclosure 1 is included as Attachment 4.

__ 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)

Op Test No.:	301	Scenario #	2	Event #	3	Page	23	of	137

Event Description: 1B S/G PORV (1SV-13) Fails Open

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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)

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Event Description: 1B S/G PORV (1SV-13) Fails Open

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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)

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Event Description: 1B S/G PORV (1SV-13) Fails Open				

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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).

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Event Description: 1B S/G PORV (1SV-13) Fails Open				

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. **Attempt to identify and isolate leak as follows:**	
a. Verify the following conditions - NORMAL:	a. Perform the following:
__ • Containment temperature	__ 1) Evacuate containment.
__ • Containment pressure	2) Perform the following:
__ • Containment humidity	__ a) Start all lower containment ventilation units in low speed.
__ • Containment floor & equipment sump level.	__ b) Start all upper containment ventilation units.
	__ c) Place all upper and lower containment ventilation units in "MAX" cooling.
	3) IF AT ANY TIME containment pressure reaches 1.2 PSIG, THEN 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) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
	__ 4) GO TO Step 10.
__ b. Dispatch operators to locate and identify source of steam leak.	

Op Test No.: 301	Scenario # 2	Event # 3	Page 27 of 137
Event Description: 1B S/G PORV (1SV-13) Fails Open			

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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.
	N/A __ 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".
	__ 2) IF valve will not close, THEN dispatch operator to close affected condenser dump valve isolation valve.
	(RNO continued on next page)

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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".

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Event Description: 1B S/G PORV (1SV-13) Fails Open				

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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.**

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Event Description: 1B S/G PORV (1SV-13) Fails Open

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 13. **Determine long term plant status. RETURN TO procedure and step in effect.**	**Note To Evaluator:** **At this point the steam leak is isolated and the plant is stable. This is the end of Event 3. At the Lead Evaluators discretion, the scenario may continue by having the booth operator Insert Trigger 4 for Event 4 (Generator Breaker 1B Trip).**
__ 14. **Verify UST level - STABLE OR INCREASING.**	__ b. Notify Secondary Chemistry of increased makeup.
15. **Evaluate unit shutdown as follows:**	
__ a. Verify Unit 1 status - IN MODE 1 OR 2.	__ a. GO TO 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 __ • IF steam leaking from secondary heater relief OR MSR relief valve, THEN reducing turbine load may reduce pressure enough to close relief valve. __ • IF turbine trip will isolate steam leak, THEN it may be desirable to perform an orderly shutdown of the turbine and maintain reactor power in Mode 1.	

Op Test No.:	301	Scenario #	2	Event #	4	Page	31	of	137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

Control Room Indications
1AD-11, C/1 "GEN BKR A OVER CURRENT" - LIT
1AD-1, D/6 "EHC SYSTEM FAULT" - LIT
1AD-1, F/4 "TURB RUNBACK INITIATED" - LIT
Turbine Generator MW output – RAPIDLY DECREASING
Reactor Power - DECREASING

Op Test No.:	301	Scenario #	2	Event #	4	Page	32	of	137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 3 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

1. Verify turbine load - DECREASING IN AUTOMATIC.

Perform the following:

__ a. Select "MANUAL" on turbine control panel.

__ b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load as required.

2. Verify proper reactor response:

__ • Control rods - IN "AUTO" AND STEPPING IN

__ • P/R neutron flux - DECREASING.

__ IF T-Avg is 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.

Crew may elect to use AP/1/A/5500/015 to address failure of rods to move. This procedure is included as Attachment 3.

3. Verify proper steam dump operation as follows:

__ a. Verify T-Ref instrumentation - AVAILABLE.

__ a. IF T-Avg Coastdown is 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.

Op Test No.:	301	Scenario #	2	Event #	4	Page	33	of	137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 3 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

1. Verify turbine load - DECREASING IN AUTOMATIC.

Perform the following:

__ a. Select "MANUAL" on turbine control panel.

__ b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load as required.

2. Verify proper reactor response:

__ • Control rods - IN "AUTO" AND STEPPING IN

__ • P/R neutron flux - DECREASING.

__ IF T-Avg is 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.

3. Verify proper steam dump operation as follows:

__ a. Verify T-Ref instrumentation - AVAILABLE.

__ a. IF T-Avg Coastdown is 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.

Op Test No.: 301	Scenario # 2	Event # 4	Page 34	of 137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 4 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
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 are closed AND T-Avg is 3°F greater than T-Ref, THEN: __ 1) Place "STM DUMP CTRL" in manual. __ 2) Adjust "STM DUMP CTRL" to 0% demand. __ 3) Place the steam dumps in pressure mode. __ 4) Operate condenser steam dump valves to maintain T-Avg at T-Ref. __ 5) IF steam dump valves fail to operate, THEN dump steam as necessary from available S/G PORVs to maintain T-Avg at T-Ref.
__ d. T-Avg - DECREASING TO T-REF.	d. Perform the following: __ 1) Place "STM DUMP CTRL" in manual. __ 2) Adjust "STM DUMP CTRL" to 0% demand. __ 3) Place the steam dumps in pressure mode. __ 4) Operate condenser steam dump valves to maintain T-Avg at T-Ref. __ 5) 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 # 4	Page 35	of 137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 5 of 40 Revision 41

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 is less than 2315 PSIG, THEN: __ 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: __ a) Trip reactor. __ b) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
__ b. Normal Pzr spray valves - CLOSED.	b. IF Pzr pressure is less than 2150 PSIG, THEN: __ 1) CLOSE the affected spray valve(s). __ 2) REFER TO AP/1/A/5500/011 (Pressurizer Pressure Anomalies).

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 6 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Verify proper CM System operation as follows:**	
__ a. **WHEN** reactor power is 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:**	__ **Ensure turbine generator load - REDUCED TO APPROXIMATELY 48% AND THE ALARM CLEARS.**
__ • 1AD-11, C/1 "GEN BKR A OVER CURRENT"	
__ • 1AD-11, F/1 "GEN BKR B OVER CURRENT".	

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Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 7 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **Verify S/G levels are 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 is decreasing in an uncontrolled manner, THEN: __ 1) Trip reactor. __ 2) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
__ 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 reactor power between 6%-10%. d. IF AT ANY TIME reactor power is less than or equal to 5%, THEN perform the following: __ 1) Ensure turbine - TRIPPED. __ 2) Concurrently insert control rods to shutdown the reactor. REFER TO OP/1/A/6150/008 (Rod Control). __ 3) GO TO AP/1/A/5500/002 (Turbine Generator Trip). __ e. GO TO Step 10.
__ 9. **IF AT ANY TIME reactor power is less than or equal to 20%, THEN perform Step 8 RNO.**	

Op Test No.: 301	Scenario # 2	Event # 4	Page 38	of 137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 8 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 10. Verify AS header pressure - GREATER THAN OR EQUAL TO 140 PSIG.	__ Adjust 1AS-2 (Main Stm To Aux Steam) as required to maintain AS header pressure between 140 PSIG and 150 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).	Enclosure 3 is included as Attachment 5.

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Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 9 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 13. **Verify reactor power - LESS THAN 30%.** → **Perform the following:**

N/A a. IF the runback target load is less than 30%, THEN:

__ 1) WHEN time and personnel 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 is less than 30%.

__ 3) WHEN reactor power is less than 30%, THEN GO TO Step 14.

b. WHEN the appropriate runback target load is reached, THEN:

__ 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.

Note To Evaluator:

The Unit should be stabilized at approximately 48%.

Op Test No.:	301	Scenario #	2	Event #	4	Page	40	of	137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 10 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 14. **Verify the "RESET" light on "AMSAC FOR CF VALVES" switch - DARK.**	**Perform the following:** __ a. IF turbine impulse pressure is less than 190 PSIG, THEN notify IAE to correct the cause of the AMSAC failure to deactivate. __ b. Depress the "BYPASS" pushbutton on "AMSAC FOR CF VALVES" switch. __ c. WHEN 2 minutes has elapsed, THEN verify "RESET" light on "AMSAC FOR CF VALVES" switch has remained dark.

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Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 11 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. **Verify the following PCBs - CLOSED:**

__ • Generator breaker 1A
__ • Generator breaker 1B
__ • PCB 14
__ • PCB 15
__ • PCB 17
__ • PCB 18.

NOTE When separated from the grid the turbine reverts to speed control.

Perform the following:

N/A a. IF both generator PCBs are open, THEN ensure main turbine speed - MAINTAINED BETWEEN 1792 AND 1807 RPM.

N/A b. IF the turbine generator is separated from the grid, THEN:

__ 1) Ensure main turbine speed - MAINTAINED BETWEEN 1792 AND 1807 RPM.

__ 2) Ensure main generator voltage - MAINTAINED BETWEEN 21 KV AND 23 KV.

N/A c. IF load rejection caused by loss of main busline 1A or 1B, THEN:

1) Notify Transmission Control Center (TCC), using one of the following methods, to investigate and repair cause of the loss of busline:

__ • 704-382-9403
__ • 704-382-9404
__ • 704-399-9744
__ • 704-382-4413 (System Operating Center).

__ 2) WHEN notified by TCC that the affected busline is ready to be re energized, THEN restore power to the affected busline. REFER TO Enclosure 1 (Offsite Power Restoration).

Op Test No.: 301	Scenario # 2	Event # 4	Page 42	of 137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 12 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 16. **Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.**

17. **WHEN the appropriate runback target load is reached, THEN:**

__ • 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.

__ 18. **Notify System Operating Center (SOC) using the red dispatcher telephone of current unit status.**

__ 19. **Determine and correct cause of load rejection.**

Op Test No.: 301	Scenario # 2	Event # 4	Page 43	of 137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 13 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. **Shut down unnecessary plant equipment as follows:**	
a. Restore CM and CF as follows:	
__ 1) Verify C-htr drain pumps - ON.	__ 1) **WHEN** time and manpower permit, **THEN** complete the shutdown of the C-htr drain pumps. **REFER TO** OP/1/B/6250/004 (Feedwater Heater Vents, Drains and Bleed System).
__ 2) Verify both CF Pumps - IN SERVICE.	__ 2) GO TO Step 20.b.
__ 3) Shutdown one CF pump as necessary. **REFER TO** OP/1/A/6250/001 (Condensate and Feedwater System).	
__ 4) Shutdown excess Condensate Booster Pumps. **REFER TO** OP/1/A/6250/001 (Condensate and Feedwater System).	
__ 5) Shutdown excess Hotwell Pumps. **REFER TO** OP/1/A/6250/001 (Condensate and Feedwater System).	
__ b. RC pump(s) and cooling tower fans. **REFER TO** OP/1/B/6400/001A (Condenser Circulating Water System).	
21. **Reset steam dump valves as follows:**	
__ a. Verify reactor power - STABLE.	a. Perform the following: __ 1) **WHEN** reactor power is stable, **THEN** perform Steps 21.b through 21.g.
	(RNO continued on next page)

Op Test No.: 301	Scenario # 2	Event # 4	Page 44	of 137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 14 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. (Continued)	
	__ 2) GO TO Step 22.
__ b. Verify steam dump valves - IN "T-AVG" MODE.	b. Perform the following: 1) IF using S/G PORVs, THEN: __ a) WHEN T-Avg is within 1°F of T-Ref AND stable, THEN close S/G PORVs. __ b) GO TO Step 21.d. 2) WHEN T-Avg is within 1°F of T-Ref AND stable, THEN: __ a) Ensure steam dumps - CLOSED. __ b) Perform Steps 21.d through 21.g. __ 3) GO TO Step 22.
__ c. Verify steam dump valves - CLOSED.	c. Perform the following: __ 1) WHEN steam dump valves are closed, THEN perform Steps 21.d through 21.g. __ 2) GO TO Step 22.
__ d. Reset steam dump valves.	
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".	

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Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 15 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. (Continued)	
__ f. IF "T-AVG" mode of operation is available, THEN ensure steam dump valves in "T-AVG" mode.	
__ g. Verify "STM DUMP CTRL" - IN AUTO.	__ g. IF steam dumps are in "T-AVG" mode, THEN place "STM DUMP CTRL" in auto.
__ 22. **Verify reactor power - GREATER THAN 15%.**	__ **Transfer feed flow to CA nozzles. REFER TO Enclosure 2 (Transferring Feed Flow From CF To CA Nozzles).**
__ 23. **Verify CA pumps - OFF.**	**Perform the following:** __ a. WHEN CA is no longer needed to feed S/G(s), THEN shutdown the CA System following the 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. REFER TO OP/1/A/6250/008 (Steam Generator Blowdown).
__ 24. **Verify reactor power change - GREATER THAN OR EQUAL TO 15% IN A 1 HOUR PERIOD.**	__ GO TO **Step 26.**

Op Test No.:	301	Scenario #	2	Event #	4	Page	46	of	137

Event Description: Generator Breaker 1B Trip / Control Rods Fail To Auto Insert

CNS AP/1/A/5500/003	LOAD REJECTION Case I Switchyard Available	PAGE NO. 16 of 40 Revision 41

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

25. **Notify the following sections to take appropriate samples:**

__ • Radiation Protection to sample and analyze gaseous effluents. REFER TO Selected Licensee Commitments Manual, Section 16.11-6.

__ • Primary Chemistry to sample for isotopic analysis of iodine. REFER TO 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).

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

N/A • 3.1.1 (Shutdown Margin (SDM))

__ • 3.1.6 (Control Bank Insertion Limits)

N/A • 3.8.1 (AC Sources - Operating)

N/A • SLC 16.8-2 (230 KV Switchyard Systems).

Tech Spec 3.1.6:
- **Condition A applies to Initiate Boration to restore SDM to within limit in 1 hour AND Restore control bank to within limits in 2 hours.**

__ 27. **Notify Reactor Group Engineer of occurrence.**

__ 28. **Determine long term plant status. RETURN TO OP/1/A/6100/003 (Controlling Procedure For Unit Operation).**

END

Note To Evaluator:

This is the end of Event 4. At the Lead Evaluators discretion, the scenario may continue by having the booth operator INSERT Trigger 5 for Event 5 (NC System Leak).

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Event Description: NC System Leak			

Control Room Indications
1RAD-1, B/1 "1 EMF 39 CONTAINMENT GAS HI RAD" - LIT
Pressurizer Level - DECREASING
Pressurizer Pressure - DECREASING
Containment Floor and Equipment Sump Levels - INCREASING

Op Test No.:	301	Scenario #	2	Event #	5	Page	48	of	137

Event Description: NC System Leak

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Monitor Enclosure 2 (Case II NC System Leak Foldout Page).

Enclosure 2 is included as Attachment 6.

__ 2. Verify unit in Mode 5 OR Mode 6. → __ GO TO Step 4.

3. Ensure containment integrity as required:

__ a. IF leak known to be in Auxiliary Building, THEN GO TO Step 4.

__ b. Initiate Containment Closure.

__ c. Initiate additional action as required to ensure Containment Equipment Hatch - CLOSED.

__ d. Initiate additional action as required to ensure Containment Air Locks - CLOSED.

__ e. Initiate Containment Evacuation.

__ 4. Verify Pzr level - STABLE OR INCREASING. → Perform the following:

__ a. Maintain charging flow less than 180 GPM.

__ b. THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to stabilize Pzr level.

__ c. IF Pzr level is stable OR increasing, THEN GO TO Step 5.

(RNO continued on next page)

Op Test No.:	301	Scenario #	2	Event #	5	Page	49	of	137

Event Description: NC System Leak

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. (Continued)

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 is stable at 350 PSIG, THEN place 1NV-148 (Letdn Press Control) in auto.

(RNO continued on next page)

Op Test No.:	301	Scenario #	2	Event #	5	Page	50	of	137

Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 59 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. (Continued)

N/A 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 is stable at 350 PSIG, THEN place 1NV-148 (Letdn Press Control) in auto.

N/A 2) IF Pzr level continues to decrease, THEN 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).

__ 3) IF Pzr level is stable OR increasing, THEN GO TO Step 5.

(RNO continued on next page)

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Event Description: NC System Leak

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
	4) IF Pzr level continues to decrease OR cannot be maintained greater than 4%, THEN perform the following: a) IF in Modes 1, 2, or 3 with CLAs in service, THEN perform the following: __ (1) Trip reactor. __ (2) WHEN reactor trip verified, THEN initiate S/I. __ (3) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection). __ b) IF in Mode 3 with CLAs isolated OR in Mode 4, THEN GO TO AP/1/A/5500/027 (Shutdown LOCA). __ c) IF NC temperature less than or equal to 200°F, THEN GO TO AP/1/A/5500/019 (Loss Of Residual Heat Removal System), while continuing in this procedure as time allows.
__ 5. **IF AT ANY TIME Pzr level decreases in an uncontrolled manner or cannot be maintained greater than 4%, THEN GO TO Step 4.**	

Op Test No.:	301	Scenario #	2	Event #	5	Page	52	of	137

Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 61 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 6. **Verify Pzr/NC pressure - TRENDING TO OR STABLE AT DESIRED PRESSURE.**	**Perform the following:** __ a. IF Pzr level is greater than 17%, THEN ensure Pzr heaters on as required. __ b. Ensure Pzr spray valves - CLOSED. __ c. Ensure all Pzr PORVs - CLOSED. __ d. IF any Pzr PORV is leaking or has not reseated, THEN CLOSE its associated Pzr PORV isolation valve. e. IF Pzr/NC pressure is decreasing in an uncontrolled manner, THEN perform the following: 1) IF in Mode 1, 2 or 3 with CLAs in service, THEN perform the following: __ a) Initiate S/I. __ b) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection). __ 2) IF in Mode 3 with CLAs isolated OR in Mode 4, THEN GO TO AP/1/A/5500/027 (Shutdown LOCA). __ 3) IF in Mode 5, THEN GO TO AP/1/A/5500/019 (Loss of Residual Heat Removal System).
__ 7. **Dispatch operator(s) to locate and isolate NC System leak.**	
__ 8. **Verify proper VC/YC system operation. REFER TO Enclosure 11 (Control Room Ventilation System Verification).**	**Enclosure 11 is included as Attachment 7.**

Op Test No.:	301	Scenario #	2	Event #	5	Page	53	of	137

Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 62 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. **IF AT ANY TIME 1AD-7, I/1 "VCT LO LVL" alarm - LIT, THEN align NV pump suction to FWST as follows:**

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

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

__ c. CLOSE 1NV-188A (VCT Otlt Isol).

__ d. CLOSE 1NV-189B (VCT Otlt Isol).

e. IF Reactor trip breakers are closed, THEN perform the following:

__ 1) Continue concurrent use of this procedure for the NC leak.

__ 2) Trip reactor.

__ 3) IF Unit was in Mode 3 below 1955 PSIG, THEN GO TO AP/1/A/5500/005 (Reactor Trip or Inadvertent S/I Below P-11).

__ 4) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

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Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 63 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. **Determine NC leak rate by any of the following methods:**

__ • Compare charging flow and letdown flow

OR

__ • Monitor OAC NV Graphic

OR

__ • Initiate OAC Program "NSNCLEAK"

OR

__ • Monitor OAC point EROPLEAK

OR

__ • Monitor OAC point C1P0976 (Gross NC System Leak Rate, Ten Min Run Avg).

Note To Evaluator:

NC System leak should be quantified to be approximately 75 GPM. In order to accurately quantify the leak, the crew must maintain Pressurizer Level and NC temperature stable.

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Event Description: NC System Leak			

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 64 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. **Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:**

N/A • 3.4.4 RCS Loops-Modes 1 and 2

N/A • 3.4.5 RCS Loops-Mode 3

N/A • 3.4.6 RCS Loops-Mode 4

N/A • 3.4.12 Low Temperature Overpressure Protection (LTOP) System

__ • 3.4.13 (RCS Operational Leakage)

N/A • 3.4.14 (RCS Pressure Isolation Valve (PIV) Leakage)

N/A • 3.5.5 (Seal Injection Flow)

N/A • 3.6.3 Containment Isolation Valves

__ • 3.6.4 Containment Pressure

N/A • 3.6.5 Containment Air Temperature

N/A • 3.7.17 (Secondary Specific Activity)

__ • SLC 16.7-9 (Standby Shutdown System).

Tech Spec 3.4.13:
- **Condition A applies to reduce LEAKAGE to within limits in 4 hours or be Mode 3 in the following 6 hours.**

Tech Spec 3.6.4:
- **Condition A applies to restore containment pressure to within limits in 1 hour or be in Mode 3 in the following 6 hours.**

SLC 16.7-9:
- **Condition B applies to declare the Standby Makeup Pump non-functional immediately and restore SSS to FUNCTIONAL status in 7 days.**

Op Test No.:	301	Scenario #	2	Event #	5	Page	56	of	137

Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 65 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. **Verify auxiliary building radiation is normal as follows:** __ • EMF-41 (Aux Bldg Ventilation) - TRIP 1 LIGHT DARK AND COUNTRATE STABLE. __ • All area monitor EMF trip 1 lights - DARK.	**Perform the following:** NOTE • Annunciator response for EMF-41 Hi Rad lists EMF-41 sample locations. • VA OAC graphic contains EMF-41 sample point readouts. __ a. Ensure operator(s) - DISPATCHED TO IDENTIFY AND ISOLATE LEAK. __ b. IF EMF-41 (Aux Bldg Ventilation) indication is increasing OR in alarm, THEN notify RP of affected area(s). __ c. IF any area monitor EMF is in alarm, THEN notify RP of the affected area(s).

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Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 66 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Letdown flow and pressure are monitored between Letdown HX and 1NV-148 (Letdn Press Control).

__ 13. **Verify letdown line - INTACT.**

IF letdown isolation is required to stop the NC System leak, THEN perform the following:

a. Ensure the following valves - CLOSED:

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

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

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

__ • 1NV-1A (NC Letdn To Regen Hx Isol)

__ • 1NV-2A (NC Letdn To Regen Hx Isol).

b. IF Pzr level is still decreasing, THEN perform the following:

__ 1) CLOSE 1NV-15B (Letdn Cont Isol).

__ 2) IF Pzr level is still decreasing, THEN GO TO Step 14.

__ c. Establish excess letdown. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System).

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Event Description: NC System Leak

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE A significant NC leak into thermal barrier Hx may result in KC flow indicating lower than normal after the thermal barrier is filled with steam.

14. **Verify the following NC pump thermal barrier alarms - DARK:**

__ • 1AD-6, E/1, "NCP A THERMAL BARRIER KC OUTLET HI/LO FLOW"

__ • 1AD-6, E/2, "NCP B THERMAL BARRIER KC OUTLET HI/LO FLOW"

__ • 1AD-6, E/3, "NCP C THERMAL BARRIER KC OUTLET HI/LO FLOW"

__ • 1AD-6, E/4, "NCP D THERMAL BARRIER KC OUTLET HI/LO FLOW".

Perform the following:

a. Ensure valve for affected NC pump(s) - CLOSED:

__ • 1KC-394A (NC Pump 1A Therm Bar Otlt)

__ • 1KC-364B (NC Pump 1B Therm Bar Otlt)

__ • 1KC-345A (NC Pump 1C Therm Bar Otlt)

__ • 1KC-413B (NC Pump 1D Therm Bar Otlt).

(RNO continued on next page)

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Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 68 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. (Continued)

b. **IF** valve for affected NC pump will not close, **THEN** perform the following:

1) **IF** in Mode 1 or 2, **THEN** perform the following:

__ a) Place steam dumps in pressure mode.

__ b) Trip reactor.

__ c) **WHEN** reactor power is less than 5%, **THEN** trip all NC pumps.

d) **WHEN** NC pumps are tripped, **THEN** perform the following:

__ (1) Dispatch operator with radio to standby at 1KC-425A (NC Pumps Ret Hdr Cont Isol) (AB-588, GG-52, Rm 419) (Ladder needed).

__ (2) CLOSE 1KC-425A (NC Pumps Ret Hdr Cont Isol) from Control Room.

__ (3) **IF** 1KC-425A (NC Pumps Ret Hdr Cont Isol) will not close completely from Control Room, **THEN** notify dispatched operator to close 1KC-425A (NC Pumps Ret Hdr Cont Isol) (AB-588, GG-52, Rm 419) (Ladder needed).

__ (4) **WHEN** 1KC-425A (NC Pumps Ret Hdr Cont Isol) has been closed, **THEN** CLOSE 1KC-424B (NC Pumps Ret Hdr Cont Isol).

(RNO continued on next page)

Op Test No.:	301	Scenario #	2	Event #	5	Page	60	of	137

Event Description: NC System Leak

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. (Continued)

__ (5) **WHEN** 1KC-425A (NC Pumps Ret Hdr Cont Isol) is closed, **THEN** notify dispatched operator to return.

(6) CLOSE the following valves:

__ • 1KC-338B (NC Pumps Sup Hdr Cont Isol)

__ • 1KC-430A (Rx Bldg Drn Hdr Cont Isol)

__ • 1KC-429B (Rx Bldg Drn Hdr Cont Isol).

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

__ 2) Trip all NC pumps.

(RNO continued on next page)

Op Test No.: 301	Scenario # 2	Event # 5	Page 61	of 137

Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 70 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. (Continued)

3) Perform the following:

__ a) Dispatch operator with radio to standby at 1KC-425A (NC Pumps Ret Hdr Cont Isol) (AB-588, GG-52, Rm 419) (Ladder needed).

__ b) CLOSE 1KC-425A (NC Pumps Ret Hdr Cont Isol) from Control Room.

__ c) IF 1KC-425A (NC Pumps Ret Hdr Cont Isol) will not close completely from Control Room, THEN notify dispatched operator to close 1KC-425A (NC Pumps Ret Hdr Cont Isol) (AB-588, GG-52, Rm 419) (Ladder needed).

__ d) WHEN 1KC-425A (NC Pumps Ret Hdr Cont Isol) has been closed, THEN CLOSE 1KC-424B (NC Pumps Ret Hdr Cont Isol).

__ e) WHEN 1KC-425A (NC Pumps Ret Hdr Cont Isol) is closed, THEN notify dispatched operator to return.

f) CLOSE the following valves:

__ • 1KC-338B (NC Pumps Sup Hdr Cont Isol)

__ • 1KC-430A (Rx Bldg Drn Hdr Cont Isol)

__ • 1KC-429B (Rx Bldg Drn Hdr Cont Isol).

__ 4) REFER TO AP/1/A/5500/004 (Loss of Reactor Coolant Pump).

__ 5) GO TO Step 15.

(RNO continued on next page)

Op Test No.: 301	Scenario # 2	Event # 5	Page 62	of 137
Event Description: NC System Leak				

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 71 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. (Continued)

c. Verify conditions for continued NC pump operation as follows:

__ • #1 seal outlet temperature - LESS THAN 235°F

__ • Lower bearing temperature - LESS THAN 225°F.

d. IF AT ANY TIME conditions for continued NC pump operation cannot be maintained, THEN perform the following:

1) IF in Mode 1 or 2, THEN perform the following:

__ a) IF all NC pumps affected, THEN place steam dumps in pressure mode.

__ b) Trip reactor.

__ c) WHEN reactor power is less than 5%, THEN trip affected NC pump(s).

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

__ 2) Trip affected NC pump. REFER TO AP/1/A/5500/04 (Loss Of Reactor Coolant Pump).

Op Test No.:	301	Scenario #	2	Event #	5	Page	63	of	137

Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 72 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 15. **Verify 1EMF-46A and 1EMF-46B (Component Cooling) - TRIP 1 LIGHTS DARK AND COUNTRATE STABLE.**	**Perform the following:** __ a. Monitor KC surge tank levels. __ b. Notify RP and Chemistry to monitor KC System activity. __ c. IF AT ANY TIME the leak is identified in the KC System, THEN contact Station Management to evaluate isolating specific KC system loads.
16. **Verify containment conditions are normal as follows:** • Containment EMF - TRIP 1 LIGHTS DARK AND COUNTRATE STABLE: __ • 1EMF-38 (Containment Particulate) __ • 1EMF-39 (Containment Gas). __ • Containment floor and equipment sump level(s) - STABLE.	__ **Stop any VQ release in progress. REFER TO OP/1/A/6450/017 (Containment Air Release and Addition System).**
17. **Verify NCDT conditions are normal as follows:** __ • NCDT pressure - STABLE __ • NCDT level - STABLE __ • NCDT discharge flow - EQUAL TO RECIRC FLOW __ • NCDT temperature - STABLE.	__ **Monitor inputs to NCDT. REFER TO Enclosure 9 (Possible NC System Leakage Paths To NCDT).**

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Event Description: NC System Leak				

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 73 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18. **Verify PRT conditions are normal as follows:** __ • PRT pressure - LESS THAN 8 PSIG __ • PRT level - LESS THAN 89% __ • PRT temperature - LESS THAN 130°F.	__ **Monitor inputs to PRT. REFER TO Enclosure 10 (Possible NC System Leakage Paths To PRT).**
19. **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 #	2	Event #	5	Page	65	of	137

Event Description: NC System Leak

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case II NC System Leak	PAGE NO. 74 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 20. **Verify NC System leak - ISOLATED.**	**IF shutdown is required, THEN perform the following:** __ a. Notify Reactor Group Engineer of occurrence. b. IF reactor power greater than 15%, THEN perform the following: 1) Initiate unit shutdown. REFER TO: __ • OP/1/A/6100/003 (Controlling Procedure For Unit Operation) OR __ • AP/1/A/5500/009 (Rapid Downpower). __ 2) Ensure adequate shutdown margin is maintained. REFER TO ROD Book, Section 5.11. __ 3) GO TO Step 21. c. IF reactor power is less than 15%, THEN perform the following: __ 1) Initiate unit shutdown. REFER TO OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown). __ 2) Ensure adequate shutdown margin is maintained. REFER TO ROD Book, Section 5.11.
Note To Evaluator: **It is not required for this scenario for the crew to initiate shutdown of Unit 1. This is the end of Event 5. At the Lead Evaluators discretion, the scenario may continue by having the booth operator INSERT Trigger 6 for Event 6 (Large Break LOCA).**	
__ 21. **Consult with Station Management for further actions.**	
__ 22. **Determine long term plant status. RETURN TO procedure in effect.**	
END	

Op Test No.:	301	Scenario #	2	Event #	6, 7, 8, 9	Page	66	of	137

Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start

Control Room Indications
1FO-1, D/5 "HI CONT PRESS S/I RX TRIP" - LIT
DRPI Rod Bottom Lights - LIT
Pressurizer Level – DECREASING RAPIDLY
Pressurizer Pressure – DECREASING RAPIDLY
Neutron Flux Level – DECREASING RAPIDLY

Op Test No.: 301	Scenario # 2	Event # 6, 7, 8, 9	Page 67	of 137
Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 4 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Monitor Enclosure 1 (Foldout Page).

Enclosure 1 is included as Attachment 8.

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:

__ • 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:

__ 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 # 6, 7, 8, 9	Page 68	of 137
Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 5 of 47 Revision 42

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).
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. Critical Task #1 __ 2) IF S/I required, THEN initiate S/I. N/A 3) IF S/I not required, THEN concurrently: __ • 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.

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Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 6 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 6. **Announce "Unit 1 Safety Injection".**	
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.
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.
10. **Verify proper Phase B actuation 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.
	(RNO continued on next page)

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Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 7 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

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.

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).

Enclosure 5 is included as Attachment 9.

__ 6) WHEN 9 minutes elapsed, THEN verify proper VX system operation. REFER TO Enclosure 5 (VX System Operation).

__ 7) GO TO Step 11.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ b. IF AT ANY TIME containment pressure exceeds 3 PSIG while in this procedure, THEN perform Step 10.a.

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). Critical Task #2

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

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Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

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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).	**Enclosure 2 is included as Attachment 10.**

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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.
__ 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 an uncontrolled manner, THEN restart the ND pump. (RNO continued on next page)

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Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 11 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
	__ 3) GO TO Step 18.
__ c. NI pumps - INDICATING FLOW.	__ c. Start NI pump(s) and align valves.
__ 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 an uncontrolled manner, THEN restart the ND pump. __ 3) GO TO Step 18.
__ e. ND pumps - INDICATING FLOW TO C-LEGS.	__ e. Start ND pump(s) and align valves.

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Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 12 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 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).**	**G-1 Enclosure 1 is included as Attachment 12.**
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: __ • 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%.	**Note To Evaluator:** **Containment pressure has exceeded 3 PSIG, so crew should use ACC numbers in ( ) in all steps that they are included.**
__ 20. **Verify all CA isolation valves - OPEN.**	__ **OPEN valve(s).**

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 13 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 21. **Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.**	__ **Align equipment.**
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).**	**Enclosure 4 is included as Attachment 11.**
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)

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 14 of 47 Revision 42

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 H2 analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems).

c) IF 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. 15 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. (Continued)	
	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).
__ b. Normal Pzr spray valves - CLOSED.	b. IF Pzr pressure less than 2150 PSIG, THEN perform the following: __ 1) CLOSE spray valve(s). 2) 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 pump.
__ c. At least one Pzr PORV isolation valve - OPEN.	__ c. IF power available, THEN 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.**	**IF any NV OR NI pump on, THEN perform the following:** __ a. Ensure all NC pumps - OFF. __ b. Maintain seal injection flow.

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 16 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. **Verify main steamlines intact:** __ • All S/G pressures - STABLE OR INCREASING __ • ALL S/Gs - PRESSURIZED.	**IF pressure in any S/G decreasing in an uncontrolled manner OR any S/G depressurized, 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 an 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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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 17 of 47 Revision 42

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 H2 analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems).

N/A c. IF 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).

Note To Evaluator:

An ORANGE path condition may exist at this time on the NC Integrity CSF due to the cooldown of the NC System. If so, the crew will transition to FR-P.1 at this time, but will transition back to procedure and step in effect at the first step due to Large Break LOCA conditions existing.

Op Test No.:	301	Scenario #	2	Event #	6, 7, 8, 9	Page	81	of	137

Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start

CNS EP/1/A/5000/FR-P.1	RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION	PAGE NO. 2 of 48 Revision 25

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Verify NC pressure - GREATER THAN 285 PSIG.

__ IF ND flow to C-Legs is greater than 675 GPM, THEN RETURN TO procedure and step in effect.

Note To Evaluator:

The crew will now transition to E-1.

__ 2. Monitor Enclosure 1 (Foldout Page).

__ 3. Verify all NC T-Colds - STABLE OR INCREASING.

Attempt to stop NC System cooldown as follows:

__ a. Ensure all S/G PORVs - CLOSED.

__ b. IF any S/G PORV cannot be closed, THEN CLOSE its isolation valve.

__ c. Ensure all steam dump valves - CLOSED.

__ d. IF ND is in RHR mode, THEN stop any cooldown from ND System.

e. Identify faulted S/G(s) as follows:

__ • Any S/G pressure - DECREASING IN AN UNCONTROLLED MANNER

OR

__ • Any S/G - DEPRESSURIZED.

(RNO continued on next page)

Op Test No.:	301	Scenario #	2	Event #	6, 7, 8, 9	Page	82	of	137

Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 2 of 35 Revision 30

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

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

Enclosure 1 is included as Attachment 13.

__ 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 INCREASING

__ • All S/Gs - PRESSURIZED.

IF pressure in any S/G decreasing in an 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.

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 3 of 35 Revision 30

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 increase 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.

Op Test No.: 301	Scenario # 2	Event # 6, 7, 8, 9	Page 84	of 137
Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 4 of 35 Revision 30

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.	

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 5 of 35 Revision 30

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 INCREASING
__ • 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).

Op Test No.: 301	Scenario # 2	Event # 6, 7, 8, 9	Page 86	of 137
Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 6 of 35 Revision 30

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 decreases to less than 2315 PSIG, ensure PORV closes or isolated.

Op Test No.: 301	Scenario # 2	Event # 6, 7, 8, 9	Page 87	of 137
Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 7 of 35 Revision 30

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 INCREASING.

__ c. **GO TO** Step 9.f.

__ d. Pzr level - GREATER THAN 11% (30% ACC).

d. Perform the following:

__ 1) **IF** NC pressure increasing **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.

Op Test No.:	301	Scenario #	2	Event #	6, 7, 8, 9	Page	88	of	137

Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 8 of 35 Revision 30

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. **Determine if ND pumps should be stopped:**

__ a. NC pressure - GREATER THAN 285 PSIG. → __ a. **GO TO** Step 12.

__ b. NC pressure - STABLE OR INCREASING. — __ b. **GO TO** Step 11.

__ c. Any ND pump - ON. — __ c. **GO TO** Step 10.f.

__ d. Any running ND pump suction - ALIGNED TO FWST. — __ d. **GO TO** Step 11.

__ e. Stop ND pump(s) with suction aligned to FWST.

__ f. **IF AT ANY TIME** NC pressure decreases to less than 285 PSIG in uncontrolled manner, **THEN** restart ND pumps.

11. **Verify NC and S/G pressures as follows:**

__ a. All S/G pressures - STABLE OR INCREASING. — __ a. **IF** S/G pressure decreasing due to faulted S/G, **THEN RETURN TO** Step 1.

__ b. NC pressure - STABLE OR DECREASING. — __ b. **RETURN TO** Step 1.

Op Test No.: 301	Scenario # 2	Event # 6, 7, 8, 9	Page 89	of 137
Event Description:	LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start			

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 9 of 35 Revision 30

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. **Verify D/Gs should be stopped:**

__ a. Any D/G - ON.

__ a. **GO TO** 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. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power).

__ 2) **GO TO** Step 12.d.

__ c. Dispatch operator to stop 1A D/G and place in standby readiness. **REFER TO** 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. **REFER TO** AP/1/A/5500/007 (Loss of Normal Power).

__ 2) **GO TO** Step 13.

__ e. Dispatch operator to stop 1B D/G and place in standby readiness. **REFER TO** OP/1/A/6350/002 (Diesel Generator Operation).

Op Test No.: 301	Scenario # 2	Event # 6, 7, 8, 9	Page 90	of 137
Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 10 of 35 Revision 30

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).

Op Test No.: 301	Scenario # 2	Event # 6, 7, 8, 9	Page 91	of 137
Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start				

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 11 of 35 Revision 30

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 30

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) **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.

2) Verify NC to ND pressure boundary intact as follows:

__ • ND Pressure - NORMAL
__ • ND Temperature - NORMAL
__ • ND Flow - NORMAL.

__ 2) **IF** ND system parameters indicate LOCA outside containment, **THEN GO TO** EP/1/A/5000/ECA-1.2 (LOCA Outside Containment).

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 13 of 35 Revision 30

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. (Continued)

c. Determine if NC leaking into KC system as follows:

__ • 1EMF-46A (COMPONENT COOLING TRAIN A) trip 1 light - DARK

__ • 1EMF-46B (COMPONENT COOLING TRAIN B) trip 1 light - DARK.

c. Perform the following:

__ 1) Verify all NC pump KC thermal barrier flows on OAC (KC graph - turn on code "KCRX") - LESS THAN 60 GPM.

__ 2) **IF** any NC pump KC thermal barrier flow greater than 60 gpm, **THEN** isolate failed NC pump thermal barrier. **REFER TO** Enclosure 3 (Thermal Barrier Leak Isolation).

__ d. Ensure KC NC NI NM St signals - RESET.

__ e. **WHEN** TSC staffed, **THEN** 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. **IF** ND flow to C-Legs greater than 675 GPM, **THEN GO TO** Step 16.

__ b. **GO TO** EP/1/A/5000/ES-1.2 (POST LOCA Cooldown and Depressurization).

Op Test No.:	301	Scenario #	2	Event #	6, 7, 8, 9	Page	94	of	137

Event Description: LBLOCA / Failure of S/I to Actuate / 1CF-33 Fails to Close / Both ND Pumps Fail to Start

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT	PAGE NO. 14 of 35 Revision 30

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 16. **Verify Containment pressure - GREATER THAN 3 PSIG.**	**Perform the following:** __ a. **IF** starting of any VX fan previously attempted, **THEN GO TO** Step 17. b. **IF AT ANY TIME** both of the following conditions exist, **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): __ • Containment pressure - HAS REMAINED LESS THAN 3 PSIG __ • Containment pressure - BETWEEN 1 PSIG **AND** 3 PSIG.
17. **Determine if transfer to Cold Leg Recirc required as follows:**	
__ a. FWST level - LESS THAN 20% (1AD-9, D/8 "FWST 2/4 LO LEVEL" lit).	__ a. **RETURN TO** Step 14.
__ b. S/I systems - ALIGNED FOR COLD LEG RECIRC.	__ b. **GO TO** EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation).

Note To Evaluator:

At this point the crew will loop in E-1 until transfer to Cold Leg Recirculation is required. All critical tasks for this scenario are complete, and at the discretion of the Lead Evaluator, the scenario may be terminated by having the booth operator 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/5500/015 Case I (Failure Of Rods To Move)
ATTACHMENT 4 -	AP/1/A/5500/028 Enclosure 1 (Foldout Page)
ATTACHMENT 5 -	AP/1/A/5500/003 Enclosure 3 (Rod Insertion Limit Boration)
ATTACHMENT 6 -	AP/1/A/5500/010 Enclosure 2 (Case II NC System Leak Foldout Page)
ATTACHMENT 7 -	AP/1/A/5500/010 Enclosure 11 (Control Room Ventilation System Verification)
ATTACHMENT 8 -	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page)
ATTACHMENT 9 -	EP/1/A/5000/E-0 Enclosure 5 (VX System Operation)
ATTACHMENT 10 -	EP/1/A/5000/E-0 Enclosure 2 (Control Room Ventilation Verification)
ATTACHMENT 11 -	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control)
ATTACHMENT 12 -	EP/1/A/5000/G-1 Enclosure 1 (Spent Fuel Pool Monitoring)
ATTACHMENT 13 -	EP/1/A/5000/E-1 Enclosure 1 (Foldout Page)

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		1	Manually actuate at least one train of SIS-actuated safeguards before transition to E-1 occurs (E-0 Step 27 RNO d).
		2	Manually start at least one low-head ECCS pump before transition out of E-0 (E-0 Step 27 RNO d).

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION

Unit 1 Status

Power Level	Power History	NCS Boron	Xenon
100 **%**	MOL	860 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). The steps for 100% power are complete.

Other Information Needed to Assume the Shift

- Unit 1 is at 100% power at the MOL. Unit 2 is at 100% power. 1A CA Pump is removed from service for PMs. 1A 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 initiate a VQ release from 'A' train by completing the in-progress OP/1/A/6450/017 (Containment Air Release and Addition System) Enclosure 4.2 (Air Release Mode).

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/5500/015	ROD CONTROL MALFUNCTIONS Case I Failure Of Rods To Move	PAGE NO. 2 of 11 Revision 14

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Verify plant conditions - STABLE.**

Perform the following:

__ a. IF load rejection in progress, THEN do not continue in this procedure until plant conditions are stable.

b. IF power decrease in progress, THEN perform the following:

__ 1) Determine if power decrease can be stopped.

2) IF power decrease can be stopped, THEN perform the following:

__ a) Stop power decrease.

__ b) Observe Caution prior to Step 2 and GO TO Step 2.

(RNO continued on next page)

ATTACHMENT 3

CNS AP/1/A/5500/015	ROD CONTROL MALFUNCTIONS Case I Failure Of Rods To Move	PAGE NO. 3 of 11 Revision 14

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. (Continued)

3) IF power decrease must continue, THEN perform the following:

- IF auto and manual rod control not available, THEN perform one of the following:

__ • Borate to maintain T-Avg at T-Ref and RETURN TO procedure in effect.

OR

__ • Trip reactor and GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

- IF auto or manual rod control available, THEN perform the following:

a) IF AT ANY TIME two or more rods are misaligned by greater than 24 steps, THEN:

__ (1) Trip Reactor.

__ (2) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

__ b) WHEN plant conditions are stable, THEN observe Caution prior to Step 2 and GO TO Step 2.

__ c) RETURN TO procedure in effect.

__ c. IF power increase in progress, THEN stop power increase.

ATTACHMENT 3

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **Rods may be dropped if there is a logic cabinet failure and rod movement is attempted.**

__ 2. **Ensure "CRD BANK SELECT" switch - IN MANUAL.**

3. **Adjust the following as necessary to maintain T-Avg within 1°F of T-Ref:**

__ • Turbine load
__ • NC System boron concentration.

ATTACHMENT 3

CNS AP/1/A/5500/015	ROD CONTROL MALFUNCTIONS Case I Failure Of Rods To Move	PAGE NO. 5 of 11 Revision 14

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. **Verify Rod Control system failure:**

__ a. 1AD-2, A/10 "ROD CONTROL URGENT FAILURE" - LIT.

a. Verify controlling rod bank(s) operate in manual mode as follows:

__ 1) Record the initial control bank positions:

A B C D

___ ___ ___ ___

__ 2) Reposition the affected rods 6 to 10 steps.

3) Verify proper rod movement as follows:

__ • Controlling bank repositions on demand.

__ • Proper bank overlap is maintained.

__ 4) Return the affected rod bank(s) to initial position.

__ 5) IF required, THEN rods may be moved in manual.

__ 6) GO TO Step 6.

__ b. Do not move rods.

5. **Dispatch operator to verify rod control cabinet alarms.**

__ a. Verify "URGENT ALARM" - ON LOGIC CABINET.

__ a. GO TO Step 5.c.

__ b. GO TO Step 6.

ATTACHMENT 3

CNS AP/1/A/5500/015	ROD CONTROL MALFUNCTIONS Case I Failure Of Rods To Move	PAGE NO. 6 of 11 Revision 14

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. (Continued)

__ c. Verify "URGENT FAILURE" - ON POWER CABINETS OF CONTROLLING BANK(S).

NOTE Operation of control rods in "BANK SELECT" is undesirable, and should only be used if Turbine and Boron controls are not effective.

c. IF operation of control rods in "BANK SELECT" is required, THEN perform the following:

__ 1) Notify the reactor engineer that control rods will be operated in "BANK SELECT".

NOTE Key #14 is required for the following step.

2) Verify light on circuit card "K1", in all Power Cabinets - DARK

__ • 1ERCC0001 (Power Cab 1AC)
__ • 1ERCC0004 (Power Cab 2AC)
__ • 1ERCC0005 (Power Cab SCDE)
__ • 1ERCC0003 (Power Cab 2BD)
__ • 1ERCC0002 (Power Cab 1BD).

__ 3) Do not continue in this procedure until all "K1" lights have been verified.

__ 4) IF any "K1" light is lit, THEN GO TO Step 6.

__ 5) Record all control rods step demand positions in the control room log.

__ 6) Select the controlling bank in the "BANK SELECT" mode.

(RNO continued on next page)

ATTACHMENT 3

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. (Continued)

CAUTION **The "ROD CTRL ALARM RESET" should not be depressed for greater than one second.**

__ 7) Ensure "ROD CTRL ALARM" is reset.

CAUTION **When control rods are operated in "BANK SELECT", the automatic bank overlap is defeated.**

__ 8) Maintain proper bank overlap.

__ 9) Observe rod insertion limits.

__ 10) Move control rods as required to maintain T-Avg within 1°F of T-Ref.

__ 6. **Notify IAE to investigate problem.**

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

__ • 3.1.1 (Shutdown Margin (SDM))

__ • 3.1.4 (Rod Group Alignment Limits)

__ • 3.1.5 (Shutdown Bank Insertion Limits)

__ • 3.1.6 (Control Bank Insertion Limits)

__ • 3.3.1 (Reactor Trip Instrumentation).

ATTACHMENT 3

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. **Determine required notifications:**

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

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

9. **WHEN rod control problem is repaired, THEN perform the following:**

   __ a. **IF** rods were operated in "BANK SELECT", **THEN** request reactor engineer guidance prior to returning rods to "AUTO".

   __ b. Ensure T-Avg - WITHIN 1°F OF T-REF.

   __ c. **WHEN** desired, **THEN** place control rods in "AUTO".

   __ d. Ensure steam dumps - IN DESIRED MODE FOR EXISTING PLANT CONDITIONS.

__ 10. **Determine long term plant status. RETURN TO procedure in effect.**

END

ATTACHMENT 4

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 4

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 5

CNS AP/1/A/5500/003	LOAD REJECTION Enclosure 3 - Page 1 of 1 **Rod Insertion Limit Boration**	PAGE NO. 39 of 40 Revision 41

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 AP/1/A/5500/010	REACTOR COOLANT LEAK Enclosure 2 - Page 1 of 1 **Case II NC System Leak Foldout Page**	PAGE NO. 76 of 158 Revision 57

Case II (NC System Leak) Safety Injection Initiation Criteria:

a. IF Pzr level cannot be maintained greater than 4% OR Pzr/NC pressure is decreasing in an uncontrolled manner, THEN perform the following:

1) IF in Mode 1, 2 or 3 with CLAs in service, THEN perform the following:

__ a) Trip reactor.

__ b) WHEN reactor trip verified, THEN initiate S/I.

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

__ 2) IF in Mode 3 with CLAs isolated OR in Mode 4, THEN GO TO AP/1/A/5500/027 (Shutdown LOCA).

__ 3) IF in Mode 5, THEN GO TO AP/1/A/5500/019 (Loss of Residual Heat Removal System).

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify one train of the following equipment is 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 12 (Shifting Operating VC/YC Train). 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 the status of given alarms:** a. IF detectors on both unit intakes are 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 7

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 7

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 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 32 of 47 Revision 42

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 - ON
     - 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:
     - Level increasing in an uncontrolled manner or radiation level in that S/G abnormal
     - N/R level - GREATER THAN 11% (29% ACC).

ATTACHMENT 8

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 an 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).

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 9

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 5 - Page 1 of 1 **VX System Operation**	PAGE NO. 47 of 47 Revision 42

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 10

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 1 of 7 **Ventilation System Verification**	PAGE NO. 34 of 47 Revision 42

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 10

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 2 of 7 **Ventilation System Verification**	PAGE NO. 35 of 47 Revision 42

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 the 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 10

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 3 of 7 **Ventilation System Verification**	PAGE NO. 36 of 47 Revision 42

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 10

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.

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Verify proper VE System operation as follows:**	
__ a. VE fans - ON.	__ a. Start fan(s).
__ 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. (RNO continued on next page)

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
	__ 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.
	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 10

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 7 of 7 **Ventilation System Verification**	PAGE NO. 40 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Record time ventilation systems verified on following table:**

TIME	SYSTEM (VC, VE)	INITIALS

ATTACHMENT 11

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 11

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.

ATTACHMENT 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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.
9. **Attempt to stop the NC cooldown as follows:** a. Ensure all steam dumps - CLOSED. b. Ensure all S/G PORVs - CLOSED. c. Ensure S/G blowdown isolated.	b. IF any S/G PORV cannot be closed, THEN CLOSE its isolation valve.

ATTACHMENT 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. (Continued)

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.

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 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (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% (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.
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 12

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 103 Revision 10

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. **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. GO TO Enclosure 24 (Local Spent Fuel Pool Monitoring).**

ATTACHMENT 12

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 2 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 4 of 103 Revision 10

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 12

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 12

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 12

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 12

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 12

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 12

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 13

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 30**

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 decreasing 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 increases 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 13

CNS EP/1/A/5000/E-1	LOSS OF REACTOR OR SECONDARY COOLANT **Enclosure 1 - Page 2 of 3** **Foldout Page**	PAGE NO. **25 of 35** **Revision 30**

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 decreases 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 13

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 30**

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.

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

BB 2.1 Verify Containment Pressure > 0.09 psig.

BB 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)"

BB 2.3 Verify Containment pressure increase is **NOT** due to a LOCA or steam line break.

BB 2.4 Verify EMF is aligned per the "SPECIAL INSTRUCTIONS FOR RELEASE" section on the Gaseous Waste Release Permit Report.

3. Procedure

BB 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 one of the following:

BB 3.2.1 **IF** 1EMF-39 (low range) is functional, perform the following:

BB 3.2.1.1 Verify 1EMF-39L is specified for use on the Gaseous Waste Release Permit Report.

BB 3.2.1.2 Verify 1EMF-39L is functional per SLC 16.11-7 using OP/0/A/6500/080 (EMF Output Modules).

BB 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).

BB 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 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 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.

BB 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:

BB 3.4.1 Depress the "A/M" pushbutton until the "A" light (auto) is illuminated.

BB 3.4.2 Verify "VQ0100.S" appears in the display window.

BB 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 **IF** 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 **IF** 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 **IF** 1EMF-39L **AND** 1EMF-36L are non-functional, independently verify the following valves are closed:

_____ • 1VQ-2A (VQ Fan Suct From Cont Isol)
IV
_____ • 1VQ-3B (VQ Fan Suct From Cont Isol)
IV

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 one of the following:

_____ 3.23.4.1 Highest reading from the OAC.

OR

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 **IF** 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.

2017 INITIAL LICENSE NRC
SCENARIO # 3

Facility:	Catawba NRC Exam 2017	Scenario No.: 3	Op Test No.: 2017301
Examiners:		Operators:	SRO
			RO
			BOP

Initial Conditions: Unit 1 is at 50% power at the BOL. Unit 2 is at 100% power.

Turnover: Unit 1 is at 50% power at the BOL. Unit 2 is at 100% power. 1A CA Pump is removed from service for PMs. 1A 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 maintain present plant conditions.

Event No.	Malf. No.	Event Type*	Event Description
1	IDE003I	C – RO C – SRO	Condenser Dump Valve (1SB-27) Failure
2	EGB004C	C – RO C - SRO	Voltage Regulator Failure
3	KC027	C – BOP TS – SRO	1A2 KC Pump Trip
4	SG001B	C – BOP TS – SRO	1B S/G Tube Leak / Automatic Blowdown Isolation Failure
5	SG001B	N – BOP N – SRO R – RO	AP/09 Rapid Downpower
6	SG001B	M – ALL	1B S/G Tube Rupture
7	ISE007A ISE007B	C – RO	CF Isolation Failure
8	ISE038	C – BOP	B Train Phase A Isolation Failure

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

Scenario 3 – Summary

Initial Condition
Unit 1 is at 50% power at the BOL. Unit 2 is at 100% power.

Turnover:
Unit 1 is at 50% power at the BOL. Unit 2 is at 100% power. 1A CA Pump is removed from service for PMs. 1A 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 maintain present plant conditions.

Event 1
1SB-27 (SM Byp to Cond Ctrl #27) will fail open. 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 2
A failure on the Unit 1 Voltage Regulator will cause Generator Voltage to increase until the limiter becomes active and stops the increase. Crew may enter AP/1/A/5500/037 (Generator Voltage and Electric Grid Disturbances) Case I (Abnormal Generator or Grid Voltage).

Verifiable Action – The RO will manually decrease voltage back to the requirements of the voltage schedule .

Event 3
1A2 KC pump will trip. Crew will enter AP/1/A/5500/021 (Loss of Component Cooling Water) and start an available KC pump.

Verifiable Action – BOP will start an available KC pump.

Event 4
1B S/G Tube leak will develop. 1B S/G Blowdown will fail to isolate on 1EMF-33 (Condenser Air Ejector) Trip 2 actuation. Crew will enter AP/1/A/5500/010 (Reactor Coolant Leak), Case I (NC System Leak).

Verifiable Action – BOP will manually isolate 1B S/G Blowdown, re-align condenser air ejector offgas to filtered ventilation, and adjust charging to maintain Pressurizer level. SRO will address Tech Specs.

Event 5
Crew will begin a rapid downpower per AP/1/A/5500/009 (Rapid Downpower) due to the SGTL.

Verifiable Action – RO will input a Target and Load Rate into the turbine control panel and place the Main Turbine in ‘GO’. BOP will perform a boration for a normal evolution.

Event 6
1B S/G Tube Leak will transition to a Rupture. Crew will enter EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and transition to EP/1/A/5000/E-3 (Steam Generator Tube Rupture)

Verifiable Action – Crew will cooldown, depressurize, and terminate Safety Injection.

Event 7
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 8
Phase A Isolation (Train B) will fail to automatically initiate on Safety Injection signal.

Verifiable Action – BOP will manually initiate B train Phase A Isolation signal.

***Critical Task 1* – Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.**

***Critical Task 2* – Establish/maintain an RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions**

- ***Too high to maintain the minimum required subcooling***
- ***Below the RCS temperature that causes and extreme (red path) or a severe (orange path) challenge to the subcriticality and/or integrity status tree.***

***Critical Task 3* – Depressurize RCS to meet SI termination criteria before water release occurs from the ruptured S/G PORV or safety (prior to S/G NR level reaching 100% and an associated S/G PORV or Safety Valve open).**

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)	0
7. Critical tasks (2–3)	3

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

   1.1 Reset to IC # 23 and load Schedule for Scenario 3.

START TIME:_____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		1	MAL-IDE003I (STEAM DUMP VLV SB27 FAIL TO POSITION)	100		:05		1
		10	MAL-IDE003I (STEAM DUMP VLV SB27 FAIL TO POSITION)	100			:01	1
		12	LOA-IDE009 (SB26 – INLET ISOL)	0	5:00	:05		1
		2	OVR-EGB004C (VOLTAGE ADJUST RAISE PB)	ON			:10	2
		3	LOA-KC028 (RACKOUT KC PMP 1A2)	RACK-OUT				3
		4	MAL-SG001B (S/G B TUBE LEAK)	75		:30		4
			VLV-BB002 (BB73-S/G B BLOWDOWN CTRL VLV FAIL AUTO ACTIONS)	ACTIVE				4
		6	MAL-SG001B (S/G B TUBE LEAK)	400		:30		6
			MAL-ISE007A (AUTO CF ISOL SIGNAL TRN A)	BLOCK				7
			MAL-ISE007B (AUTO CF ISOL SIGNAL TRN B)	BLOCK				7
			MAL-ISE003B (AUTO PHASE A ISOL SIGNAL TRN B)	BLOCK				8
			LOA-CA017 (RACKOUT CA PUMP 1A)	RACK-OUT				
		14	LOA-CA011 (SA3 – S/G 1B TO CAPT ISOL)	0	9:30	:30		
		Ensure EVENT 10 = x02i184l | x02i186l (Steam Dump Select OFF Either Train)						
		Ensure Red Collar is placed on 1A 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**, Condenser Dump Valve (1SB-27) Fails Open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 1** to cause Condenser Dump Valve (1SB-27) to fail open.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as an AO or Unit Supervisor to create a clearance to isolate 1SB-27, **REPEAT** the information and **INSERT Trigger 12**.
	After 5 minutes, contact the control room and **REPORT** "1SB-26 is manually closed to isolate 1SB-27."

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate a W/R and NCR for 1SB-27, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection notifying of steam leak from 1SB-27 failing open, **REPEAT** the information.

3.3 **Scenario EVENT 2**, Generator Voltage Regulator Failure

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 2** to cause a Generator Voltage Regulator Failure.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as TCC to monitor Real Time Contingency Analysis and report the results to the Control Room Supervisor, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as SOC asking for voltage requirement, **REPORT** "Adjust voltage per the voltage operating schedule."

3.4 **Scenario EVENT 3**, 1A2 KC Pump Trip

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause 1A2 KC pump to trip.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as AO to perform a post start checkout of the KC pump, after 3 minutes **REPORT** "KC pump____ looks good for continued operation".

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1A2 KC pump, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Unit 2 control room to verify that one KC heat exchanger is aligned to provide miniflow for the RN system, **REPORT** "2B KC heat exchanger outlet mode switch is in MINIFLOW".

3.5 **Scenario Event 4**, 1B S/G Tube Leak / Automatic BB isolation failure

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 4** to cause a 1B S/G Tube Leak.

✓	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 Secondary Chemistry to inform of CM polishing demineralizers being bypassed, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection to notify of current size of the leak and to perform HP/0/B/1009/003, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Engineering to notify of the S/G Tube Leak, **REPEAT** the information.

3.6 **Scenario Event 5**, Rapid Downpower

3.7 **Scenario Events 6, 7, 8,** 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 6** to cause a 1B S/G Tube Rupture.

✓	BOOTH INSTRUCTOR ACTION
	If dispatched as an AO to unlock and close 1SA-1, **REPEAT** the information and **INSERT Trigger 14**.
	After 10 minutes, contact the control room and **REPORT** "1SA-1 is unlocked and closed."

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Event Description: Condenser Dump Valve (1SB-27) Fails Open

Note To Evaluator:

At the discretion of the Lead Evaluator, the scenario may begin by having the booth operator INSERT Trigger 1 for Event 1 (Condenser Dump Valve 1SB-27 Fails Open). The crew may elect to invoke OMP 1-7 guidance to isolate a known leak and elect to not enter AP/28 (Steam Leak). AP/28 actions are included in this guide beginning on the next page.

Control Room Indications
OAC Alarm for 1SB-27 - OPEN
Main Steam Header Pressure - DECREASING
Turbine Generator Electrical Load - DECREASING
Reactor Power - INCREASING
RED OPEN light for 1SB-27 - LIT

Op Test No.: 301	Scenario # 3	Event # 1	Page 10	of 171

Event Description: Condenser Dump Valve (1SB-27) Fails 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

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

Enclosure 1 is included as Attachment 3.

__ 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)

Op Test No.:	301	Scenario #	3	Event #	1	Page	11	of	171

Event Description: Condenser Dump Valve (1SB-27) Fails Open

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)

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Event Description: Condenser Dump Valve (1SB-27) Fails 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).

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Event Description: Condenser Dump Valve (1SB-27) Fails Open

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) IF AT ANY TIME containment pressure reaches 1.2 PSIG, THEN 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) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

__ 4) GO TO Step 10.

__ b. Dispatch operators to locate and identify source of steam leak.

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Event Description: Condenser Dump Valve (1SB-27) Fails 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)

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".

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Event Description: Condenser Dump Valve (1SB-27) Fails 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.**

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Event Description: Condenser Dump Valve (1SB-27) Fails Open

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. RETURN TO procedure and step in effect.**

Note To Evaluator:

This ends Event 1. At the Lead Evaluators discretion, the scenario may continue by having the booth operator INSERT Trigger 2 for Event 2 (Generator Voltage Regulator Failure).

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 OR 2. __ a. GO TO 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

__ • IF steam leaking from secondary heater relief OR MSR relief valve, THEN reducing turbine load may reduce pressure enough to close relief valve.

__ • IF turbine trip will isolate steam leak, THEN it may be desirable to perform an orderly shutdown of the turbine and maintain reactor power in Mode 1.

Op Test No.:	301	Scenario #	3	Event #	2	Page	19	of	171

Event Description: Generator Voltage Regulator Failure

Control Room Indications
OAC alarm for Generator Voltage High
Generator Voltage - INCREASING

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Event Description: Generator Voltage Regulator Failure

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 4 of 21 Revision 03

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 that 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)

Enclosure 1 can be found as Attachment 5.

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.

Op Test No.:	301	Scenario #	3	Event #	2	Page	21	of	171

Event Description: Generator Voltage Regulator Failure

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 5 of 21 Revision 03

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Adjust Generator MVARs to operate within Generator Capability Curve limits as follows:** __ • Depress "LOWER" on the VOLTAGE ADJUST to reduce lagging MVARs OR __ • Depress "RAISE" on the VOLTAGE ADJUST to reduce leading MVARs.	**Perform the following:** a. IF voltage regulator in "AUTO", THEN perform the following: __ 1) Place voltage regulator in MANUAL. __ 2) Adjust MVARs to within the GENERATOR CAPABILITY CURVE limits. b. IF unable to maintain MVARs within Generator Capability Curve limits, THEN remove generator from service as follows: 1) IF reactor power greater than or equal to 69%, THEN perform the following: __ a) Trip reactor. __ b) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection). 2) IF reactor power less than 69%, THEN perform the following: __ a) Trip turbine. __ b) GO TO AP/1/A/5500/002 (Turbine Generator Trip).
__ 4. **Notify Engineering to evaluate generator abnormal operating conditions.**	

Op Test No.:	301	Scenario #	3	Event #	2	Page	22	of	171

Event Description: Generator Voltage Regulator Failure

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 6 of 21 Revision 03

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

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.

__ 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:

__ 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 that "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.**

Op Test No.: 301	Scenario # 3	Event # 2	Page 23	of 171

Event Description: Generator Voltage Regulator Failure

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 7 of 21 Revision 03

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE When TCC "RTCA" indicates switchyard voltage would **NOT** be adequate if the unit trips, the following conditions exist:

- Both trains of offsite (normal) power are inoperable.
- Both ECCS trains are in an unanalyzed condition and inoperable.
- Shared systems (RN, VC, YC, VA) that require an operable normal power source, are inoperable.

8. **Perform Tech Spec assessment as follows:**

   a. Ensure compliance with the following Tech Specs due to both trains of the following systems inoperable:

   __ • 3.8.1 (AC Sources - Operating)

   __ • 3.5.2 (ECCS - 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. Ensure compliance with Tech Spec 3.0.3 due to both trains of ECCS, RN, VC, YC, VA inoperable.

__ 9. **Notify Regulatory Compliance to pursue licensing options due to loss of normal power source operability to shared systems.**

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Event Description: Generator Voltage Regulator Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE The TCC/SOC response to a degraded grid voltage condition may restore voltage to adequate status within one hour.

10. **Activate the TSC as follows:**

__ a. Verify TCC expects switchyard (grid) voltage restoration to adequate status in less than one hour.

a. Perform the following:

__ 1) Activate the TSC. REFER TO RP/0/B/5000/027 (Augmentation of Shift Utilizing the Emergency Response Organization without Emergency Declaration)

__ 2) Observe Note prior to Step 11 and GO TO Step 11.

__ b. Evaluate activating the TSC. REFER TO RP/0/B/5000/027 (Augmentation of Shift Utilizing the Emergency Response Organization without Emergency Declaration)

NOTE The degraded switchyard (grid) voltage condition places ECCS in an unanalyzed condition reportable per 10CFR50.72(b)(3)(ii).

11. **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 #	2	Page	25	of	171

Event Description: Generator Voltage Regulator Failure

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 9 of 21 Revision 03

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. **Evaluate the following:**

__ • Stopping in progress surveillance testing.

__ • Stopping in progress maintenance activities.

__ • Returning systems to normal/functional status.

13. **IF AT ANY TIME TCC requests actions to restore grid reliability, THEN perform the following:.**

CAUTION **The actions implemented to restore grid reliability should not exceed any regulatory or equipment operating limits.**

__ a. Notify OSM to evaluate TCC requested actions to restore grid reliability.

__ b. Notify TCC of actions that cannot be performed.

__ c. Perform OSM approved actions to restore grid reliability.

Op Test No.:	301	Scenario #	3	Event #	2	Page	26	of	171

Event Description: Generator Voltage Regulator Failure

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 10 of 21 Revision 03

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE The SOC/TCC is allowed 2 hours to restore switchyard (grid) voltage to adequate. The 2 hour time limit may be adjusted based on OSM assessment of plant or grid conditions.

14. **Do not continue in this procedure until one of the following conditions exist:**

__ • 2 hours have elapsed since TCC "RTCA" indicated switchyard voltage **NOT** adequate.

OR

__ • Notification from TCC that "RTCA" indicates switchyard voltage would be adequate should the unit trip.

OR

__ • OSM adjust 2 hour time limit based on assessment of plant conditions

Op Test No.: 301	Scenario # 3	Event # 2	Page 27	of 171
Event Description: Generator Voltage Regulator Failure				

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 11 of 21 Revision 03

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 15. **Verify TCC reported that "RTCA" indicates switchyard voltage would be adequate should the unit trip.**	**Perform the following:** **NOTE** • The jumpers bypass the 4160 degraded voltage 5 second time delay relay. • If an S/I occurs with the jumpers installed, the 4160V incoming breakers trip open when LOCA Sequencer actuates. The D/Gs will supply power. __ a. Notify SPOC to install jumpers per AM/1/A/5100/008 (4Kv Essential Power (EPC) System Degraded Voltage Logic. **NOTE** When jumpers are installed offsite power and shared systems remain inoperable until "RTCA" indicates switchyard voltage is adequate should the unit trip. __ b. **WHEN** jumpers installed per AM/1/A/5100/008 (4Kv Essential Power (EPC) System Degraded Voltage Logic, **THEN** Unit 1 exits L.C.O. 3.0.3 due to both trains of ECCS inoperable Tech Spec 3.5.2.
__ 16. **Do not continue in this procedure until TCC reports that "RTCA" indicates switchyard voltage would be adequate should the unit trip.**	

Op Test No.:	301	Scenario #	3	Event #	2	Page	28	of	171

Event Description: Generator Voltage Regulator Failure

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 12 of 21 Revision 03

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

17. **WHEN TCC reports "RTCA" indicates switchyard voltage has been returned to adequate should the unit trip, THEN perform the following:**

__ a. IF jumpers installed, THEN notify SPOC to remove jumpers per, AM/1/A/5100/008 (4Kv Essential Power (EPC) System Degraded Voltage Logic.

b. Evaluate exiting the following Tech Spec LCO actions:

__ • 3.8.1.(AC Sources - Operating)

__ • 3.5.2 (ECCS - 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)).

__ • Tech Spec LCO 3.0.3.

__ c. Notify Regulatory Compliance of Tech Spec LCO action status.

Op Test No.:	301	Scenario #	3	Event #	2	Page	29	of	171

Event Description: Generator Voltage Regulator Failure

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Case I Abnormal Generator or Grid Voltage	PAGE NO. 13 of 21 Revision 03

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Do not exceed any generator limits when adjusting generator voltage.

18. **Coordinate with the 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.

__ 19. **When SOC/TCC verifies switchyard (grid) voltage adequate and reliable, THEN RETURN TO procedure step in effect.**

END

Note To Evaluator:

This is the end of Event 2. At the Lead Evaluators discretion, the scenario may continue by having the booth operator INSERT Trigger 3 for Event 3 (1A2 KC Pump Trip).

Op Test No.:	301	Scenario #	3	Event #	3	Page	30	of	171

Event Description: 1A2 KC Pump Trips

Control Room Indications
Indicating lights for 1A2 KC pump - DARK
1AD-11, A/1 “4KV ESS PWR TRAIN A TROUBLE” - LIT
Various KC low flow alarms on the main control boards
KC discharge pressure and flow decreasing

Op Test No.: 301	Scenario # 3	Event # 3	Page 31 of 171
Event Description: 1A2 KC Pump Trips			

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 2 of 35 Revision 42

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).**

Enclosure 1 is included as Attachment 4.

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.

N/A 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)

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Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 3 of 35 Revision 42

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 an 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 are lost, THEN RETURN TO STEP 2.**

Op Test No.:	301	Scenario #	3	Event #	3	Page	33	of	171

Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 4 of 35 Revision 42

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** INCREASING.

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

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

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 5 of 35 Revision 42

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.

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)

Op Test No.:	301	Scenario #	3	Event #	3	Page	35	of	171

Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 6 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

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:

1) **IF** letdown is 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 is tripped, **THEN** attempt to establish and maintain a slow cooldown as required to maintain PZR level.

__ 2) Ensure steam dumps - IN PRESSURE MODE.

__ 3) Ensure the Reactor - TRIPPED.

(RNO continued on next page)

Op Test No.:	301	Scenario #	3	Event #	3	Page	36	of	171

Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 7 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	
	4) **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.
	__ 5) Secure any dilutions in progress.
	6) **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).

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Event Description: 1A2 KC Pump Trips				

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 8 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. **Verify KC available as follows:**

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).

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. **WHEN** OAC alarm C1D2215 (KC Train A Low-Low Level Surge Tank Isol) is "NOT ACTUATED" **AND** cause of valve closure known, **THEN** ensure the affected valve(s) are open.

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).

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. **WHEN** OAC alarm C1D2214 (KC Train B Low-Low Level Surge Tank Isol) is "NOT ACTUATED" **AND** cause of valve closure known, **THEN** ensure the affected valve(s) are 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).

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 9 of 35 Revision 42

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 the 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 is greater than or equal to 90%, **THEN** notify dispatched operator to secure makeup. __ 4) GO TO Step 11.
__ b. GO TO Step 14.	
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 is pressurized, **THEN** use it for surge tank makeup. (RNO continued on next page)

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Event Description: 1A2 KC Pump Trips				

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. (Continued)

__ 3) **IF AT ANY TIME** the 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. 11 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. (Continued)

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

__ 1) Ensure the KC pumps on the 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)

Op Test No.: 301	Scenario # 3	Event # 3	Page 41	of 171
Event Description: 1A2 KC Pump Trips				

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 12 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. (Continued)	
	__ f. **WHEN** one train's non-essential header isolation valves are opened, **THEN** perform Steps 12 through 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)

Op Test No.:	301	Scenario #	3	Event #	3	Page	42	of	171

Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 13 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. (Continued)	c. IF KC Surge Tank 1A level continues to decrease 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.
__ 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) (RNO continued on next page)

Op Test No.:	301	Scenario #	3	Event #	3	Page	43	of	171

Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 14 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

13. (Continued)

__ • 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).

__ b. Ensure both Train A KC pumps - ON.

c. IF KC Surge Tank 1B level continues to decrease OR is empty, THEN 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.

__ 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.**

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Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 15 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. **Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:**

N/A • SLC 16.9-7 (Boration Systems Flow Path - Shutdown)

N/A • SLC 16.9-8 (Boration Systems Flow Path - Operating)

N/A • SLC 16.9-9 (Boration Systems Pumps - Shutdown)

N/A • SLC 16.9-10 (Boration Systems Charging Pumps - Operating)

N/A • 3.5.2 (ECCS - Operating)

N/A • 3.5.3 (ECCS - Shutdown)

N/A • 3.6.6 (Containment Spray System)

N/A • 3.7.5 (Auxiliary Feedwater (AFW) System)

__ • 3.7.7 (Component Cooling Water (CCW) System).

Tech Spec 3.7.7:
- **Condition A applies to restore CCW train to OPERABLE status in 72 hours.**

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 is 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.

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Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 16 of 35 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

19. **Verify KC surge tanks level as follows:**

__ • Greater than 50%

__ • Stable or increasing.

__ **RETURN TO Step 9.**

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).

N/A • Return NV Pump 1A to normal cooling as applicable. REFER TO Enclosure 2 (Alternate Cooling To NV Pump 1A).

21. **Verify the following:**

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

__ • 1AD-7, H/3 "VCT HI TEMP" - DARK

__ • Normal letdown - IN SERVICE.

Perform the following:

__ a. IF letdown isolated, THEN refer to AP/1/A/5500/012 (Loss Of Charging Or Letdown).

__ b. Do not continue in this procedure until Step 21 conditions are met.

Op Test No.:	301	Scenario #	3	Event #	3	Page	46	of	171

Event Description: 1A2 KC Pump Trips

CNS AP/1/A/5500/021	LOSS OF COMPONENT COOLING	PAGE NO. 17 of 35 Revision 42

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

Note To Evaluator:

This is the end of Event 3. At the Lead Evaluators discretion, the scenario may continue by having the booth operator INSERT Trigger 4 for Event 4 (1B S/G Tube Leak).

Op Test No.: 301	Scenario # 3	Event # 4	Page 47	of 171
Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate				

Control Room Indications
1RAD-1, B/1 "1EMF-33 CSAE EXHAUST HI RAD" - LIT
1RAD-1, B/5 "1EMF-72 S/G A LEAKAGE HI RAD" - LIT
1RAD-1, C/1 "1EMF-73 S/G D LEAKAGE HI RAD" - LIT
EMF Module for 1EMF-33, 1EMF-72, and 1EMF-73 Trip 2 lights - LIT
OAC point C1P0187 (Estimated Total Pri To Sec Leakrate) - INCREASING
Pressurizer Level indication - DECREASING

Op Test No.:	301	Scenario #	3	Event #	4	Page	48	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 3 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Monitor Enclosure 1 (Case I Steam Generator Tube Leak Foldout Page).

Enclosure 1 can be found as Attachment 6.

__ 2. Verify Pzr level - STABLE OR INCREASING.

Perform the following:

__ a. Maintain charging flow less than 180 GPM.

__ b. THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to stabilize Pzr level.

N/A c. IF Pzr level stable OR increasing, THEN GO TO Step 3.

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 is stable at 350 PSIG, THEN place 1NV-148 (Letdn Press Control) in auto.

(RNO continued on next page)

Op Test No.:	301	Scenario #	3	Event #	4	Page	49	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 4 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. (Continued)

N/A 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 is stable at 350 PSIG, THEN place 1NV-148 (Letdn Press Control) in auto.

N/A 2) IF Pzr level continues to decrease, THEN 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).

__ 3) IF Pzr level stable OR increasing, THEN GO TO Step 3.

(RNO continued on next page)

Op Test No.:	301	Scenario #	3	Event #	4	Page	50	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 5 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. (Continued)	4) IF Pzr level continues to decrease OR Pzr level cannot be maintained greater than 4%, THEN perform the following: __ a) Trip reactor. __ b) WHEN reactor tripped verified, THEN initiate S/I. __ c) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
__ 3. **IF AT ANY TIME Pzr level decreases in an uncontrolled manner or cannot be maintained greater than 4%, THEN perform Step 2.**	

Op Test No.:	301	Scenario #	3	Event #	4	Page	51	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 6 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE In subsequent steps the term "affected S/G" is a S/G with primary to secondary leakage.

4. **Identify affected S/G(s) as follows:**

__ • Notify RP to frisk all cation columns.

OR

__ • Any S/G N/R level - INCREASING IN AN UNCONTROLLED MANNER.

OR

Op Test No.:	301	Scenario #	3	Event #	4	Page	52	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 7 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. (Continued)

NOTE S/G Leakage EMFs are highly sensitive which may cause EMFs located on adjacent steamline to be increasing or in alarm.

- Verify any of the following S/G leakage EMF indication(s) - INCREASING OR IN ALARM:

__ • 1EMF-71 (S/G A Leakage)
__ • 1EMF-72 (S/G B Leakage)
__ • 1EMF-73 (S/G C Leakage)
__ • 1EMF-74 (S/G D Leakage).

OR

- Verify any of the following S/G steamline EMF indication(s) - INCREASING OR IN ALARM:

__ • 1EMF-26 (Steamline 1A)
__ • 1EMF-27 (Steamline 1B)
__ • 1EMF-28 (Steamline 1C)
__ • 1EMF-29 (Steamline 1D).

OR

__ • Verify CF flow - LOWER TO ANY S/G AS COMPARED TO OTHERS.

OR

__ • Notify Secondary Chemistry to determine affected S/G by sampling.

5. **Verify VCT level able to be maintained by normal makeup as follows:**

a. One of the following conditions exists:

__ • S/G tube leak is less than 90 gpm.

OR

__ • Automatic makeup stabilizes or increases VCT level.

OR

a. Perform the following:

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

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

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

(RNO continued on next page)

Op Test No.:	301	Scenario #	3	Event #	4	Page	53	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 8 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. (Continued)

__ • Manual makeup stabilizes or increases VCT level.

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

5) IF Reactor trip breakers are closed, THEN perform the following:

__ a) Continue concurrent use of this procedure for S/G tube leak at Step 6.

__ b) Trip reactor.

__ c) IF Unit was in Mode 3 below 1955 PSIG, THEN GO TO AP/1/A/5500/005 (Reactor Trip or Inadvertent S/I Below P-11).

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

__ 6) IF Reactor trip breakers are open, THEN observe note prior to Step 6 and GO TO Step 6.

b. IF AT ANY TIME the following conditions exist:

__ • 1AD-7, I/1 "VCT LO LVL" alarm - LIT

AND

• Reactor trip breakers are closed.

__ THEN perform Step 5.a RNO.

Op Test No.:	301	Scenario #	3	Event #	4	Page	54	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 9 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- OAC calculated leak rate may be invalid during mode changes and/or transient conditions unless there is current, coordinated sampling data available.
- Tritium sampling may be the most effective method for determining leak rate for small tube leaks when in Mode 2 or 3.
- OAC Primary to Secondary Leakage points may be accessed by turn on code "GD EROSLEAK"

6. **Determine S/G leak rate by any of the following methods:**

   - Monitor the following computer points:

   __ • EROSLEAK (Primary To Secondary Leakage).

   __ • C1P0187 (Estimated Total Pri To Sec Leakrate)

   __ • C1P0189 (Pri To Sec Leakrate 15 Min Running Avg)

   OR

Note To Evaluator:

Leak rate should be determined to be approximately 55 GPM.

Op Test No.:	301	Scenario #	3	Event #	4	Page	55	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 10 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

NOTE S/G Leakage EMFs are highly sensitive which may cause EMFs located on the adjacent steamline to be increasing or in alarm.

- S/G leakage EMF indication(s):

__ • 1EMF-71 (S/G A Leakage)
__ • 1EMF-72 (S/G B Leakage)
__ • 1EMF-73 (S/G C Leakage)
__ • 1EMF-74 (S/G D Leakage).

OR

__ • Compare charging flow and letdown flow

OR

__ • Monitor OAC NV Graphic

OR

__ • Initiate OAC Program "NSNCLEAK"

OR

__ • Monitor OAC point C1P0976 (Gross NC System Leak Rate, Ten Min Run Avg).

OR

__ • Secondary Chemistry performance of PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1).

Op Test No.:	301	Scenario #	3	Event #	4	Page	56	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 11 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Minimize Secondary contamination as follows:**

   a. Remove CM polishing demineralizers from service as follows:

   __ 1) Ensure "POLSH DEMIN BYP CTRL" - IN MANUAL.

   __ 2) Ensure "POLSH DEMIN BYP CTRL" - OPEN.

   __ 3) Notify Secondary Chemistry CM polishing demineralizers have been bypassed.

   __ b. Align auxiliary systems to minimize secondary side contamination. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 2 (Minimizing Secondary Side Contamination).

   __ c. Stop any transfer of water between both Unit's CSTs.

8. **Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:**

   __ • 3.4.13 (RCS Operational Leakage)

   N/A • 3.4.14 (RCS Pressure Isolation Valve (PIV) Leakage)

   N/A • 3.5.5 (Seal Injection Flow)

   N/A • 3.7.17 (Secondary Specific Activity)

   __ • SLC 16.7-9 (Standby Shutdown System).

Tech Spec 3.4.13:
- **Condition B applies to be in Mode 3 in 6 hours AND be in Mode 5 in 36 hours.**

SLC 16.7-9:
- **Condition B applies to declare the standby makeup pump non-functional and enter Condition A immediately.**

Op Test No.:	301	Scenario #	3	Event #	4	Page	57	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 12 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 9. **Verify Unit in Mode 1.**	**Perform the following:** a. IF any of the following exist: __ • Leak rate is greater than or equal to 75 gpd in any one S/G __ • Leak rate is increasing and approaching 75 gpd in any one S/G. __ THEN stop any startup activities in progress. __ b. Notify Secondary Chemistry to validate leakage by performing PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1). __ c. IF Unit in Mode 2, THEN GO TO Step 10. __ d. GO TO Step 16.
NOTE • The following leak rates are based on leakage in one S/G. • In the event of an oscillating leak, leak rate shall be determined based on peak value of the spike.	
__ 10. **Verify leak rate - GREATER THAN OR EQUAL TO 5 GPD.**	**Perform the following:** __ a. Notify Secondary Chemistry to perform PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1). __ b. RETURN TO procedure and step in effect.

Op Test No.:	301	Scenario #	3	Event #	4	Page	58	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 13 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 11. **Verify leak rate - GREATER THAN OR EQUAL TO 30 GPD.**	**Perform the following:** a. Initiate increased monitoring as follows: 1) Notify RP of the following: __ • Current value of leakage. __ • Perform HP/0/B/1009/003 (Radiation Protection Response Following A Primary To Secondary Leak). • Reset setpoints of the following EMFs per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints): __ • 1EMF-33 (Condenser Air Ejector Exhaust) __ • 1EMF-71 (S/G A Leakage) __ • 1EMF-72 (S/G B Leakage) __ • 1EMF-73 (S/G C Leakage) __ • 1EMF-74 (S/G D Leakage). 2) Notify Secondary Chemistry of the following: __ • Current value of leakage. __ • Perform PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1) immediately **AND** increase frequency to daily. (RNO continued on next page)

Op Test No.: 301	Scenario # 3	Event # 4	Page 59	of 171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 14 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. (Continued)

3) **IF AT ANY TIME** the following conditions are met:

__ • Any main steam line N-16 radiation monitor - INOPERABLE

AND

__ • C1P0187 (Estimated Total Pri To Sec Leakrate) - INVALID.

__ **THEN** notify Secondary Chemistry determine frequency to perform PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1).

4) Monitor the following EMFs:

__ • 1EMF-33 (Condenser Air Ejector Exhaust)
__ • 1EMF-71 (S/G A Leakage)
__ • 1EMF-72 (S/G B Leakage)
__ • 1EMF-73 (S/G C Leakage)
__ • 1EMF-74 (S/G D Leakage).

5) **REFER TO** the following Tech Specs:

__ • 3.4.13 (RCS Operational Leakage)

__ • 3.7.17 (Secondary Specific Activity).

__ 6) Notify Station Management of trends.

__ b. **RETURN TO** procedure and step in effect while continuing to monitor leakage for the requirements of this procedure.

Op Test No.:	301	Scenario #	3	Event #	4	Page	60	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 15 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. **Verify at least one of the following:** __ • Leak rate is greater than or equal to 100 gpd. OR __ • Leak rate greater than or equal to 75 gpd has been sustained for at least 1 hour. OR • All of the following: __ • Leak Rate is greater than or equal to 75 gpd __ • C1P0187 (Estimated Total Pri To Sec Leakrate) - INVALID __ • Any main steam line N-16 radiation monitor - INOPERABLE.	**Perform the following:** a. Initiate increased monitoring as follows: 1) Notify RP of the following: __ a) Current value of leakage. __ b) Perform HP/0/B/1009/003 (Radiation Protection Response Following A Primary To Secondary Leak). c) IF 1RAD-1, B/1 "1EMF 33 CSAE EXHAUST HI RAD - LIT, THEN ensure blowdown flow controllers are set to 0 gpm. __ • S/G A BLDWN FLOW CTRL __ • S/G B BLDWN FLOW CTRL __ • S/G C BLDWN FLOW CTRL __ • S/G D BLDWN FLOW CTRL. d) Reset setpoints of the following EMFs per HP/0/B/1000/010 (Determination of Radiation Monitor Setpoints): __ • 1EMF-33 (Condenser Air Ejector Exhaust) __ • 1EMF-71 (S/G A Leakage) __ • 1EMF-72 (S/G B Leakage) __ • 1EMF-73 (S/G C Leakage) __ • 1EMF-74 (S/G D Leakage). 2) Notify Secondary Chemistry of the following: __ • Current value of leakage. __ • Perform PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1) immediately AND increase frequency to daily. (RNO continued on next page)

Op Test No.:	301	Scenario #	3	Event #	4	Page	61	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 16 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. (Continued)

3) **IF AT ANY TIME** the following conditions are met:

__ • Any main steam line N-16 radiation monitor - INOPERABLE

AND

__ • C1P0187 (Estimated Total Pri To Sec Leakrate) - INVALID.

__ **THEN** notify Secondary Chemistry determine frequency to perform PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1).

NOTE EMFs should be monitored every 15 minutes until leak rates have stabilized.

4) Monitor the following EMFs:

__ • 1EMF-33 (Condenser Air Ejector Exhaust)
__ • 1EMF-71 (S/G A Leakage)
__ • 1EMF-72 (S/G B Leakage)
__ • 1EMF-73 (S/G C Leakage)
__ • 1EMF-74 (S/G D Leakage).

__ 5) Initiate review of applicable procedures to be utilized by Operations, Chemistry and RP in the event leak rate increases.

__ 6) Evaluate secondary contamination potential. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 3 (Turbine Building Sump Isolation).

(RNO continued on next page)

Op Test No.:	301	Scenario #	3	Event #	4	Page	62	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 17 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. (Continued)

7) REFER TO the following Tech Specs:

__ • 3.4.13 (RCS Operational Leakage)

__ • 3.7.17 (Secondary Specific Activity).

__ 8) Notify Station Management of trends.

__ b. RETURN TO procedure and step in effect while continuing to monitor leakage for the requirements of this procedure.

13. **Perform the following:**

NOTE Leakage indications are validated by EMFs trending in the same direction. Precise duplication of leakage values is not required.

a. Verify at least one of the following EMFs validate leakage indication:

__ • 1EMF-71 (S/G A Leakage)

__ • 1EMF-72 (S/G B Leakage)

__ • 1EMF-73 (S/G C Leakage)

__ • 1EMF-74 (S/G D Leakage).

__ a. Notify Secondary Chemistry to perform PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1).

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 18 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

13. (Continued)

NOTE Unit shutdown should not be postponed while waiting for chemistry calculation results.

b. IF AT ANY TIME Chemistry calculations contradict leakage indications, THEN perform the following:

__ • Unit shutdown may be suspended

__ • RETURN TO Step 8.

NOTE EMFs should be monitored every 15 minutes.

c. Monitor the following EMFs:

__ • 1EMF-33 (Condenser Air Ejector Exhaust)
__ • 1EMF-71 (S/G A Leakage)
__ • 1EMF-72 (S/G B Leakage)
__ • 1EMF-73 (S/G C Leakage)
__ • 1EMF-74 (S/G D Leakage).

d. Notify RP of the following:

__ 1) Current value of leakage.

__ 2) Perform HP/0/B/1009/003 (Radiation Protection Response Following A Primary To Secondary Leak).

__ e. Evaluate secondary contamination potential. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 3 (Turbine Building Sump Isolation).

Op Test No.:	301	Scenario #	3	Event #	4	Page	64	of	171

Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 19 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

14. **Determine unit shutdown requirements as follows:**

a. IF AT ANY TIME leak rate is greater than or equal to 100 gpd, THEN perform the following:

__ 1) Ensure reactor power less than 50% within 1 hr.

__ 2) Ensure unit in Mode 3 within the following 2 hrs.

__ 3) IF leak rate is greater than or equal to 150 gpd, THEN ensure unit in Mode 5 within 36 hours.

__ 4) Observe Note prior to Step 15 and GO TO Step 15.

b. IF leak rate is greater than or equal to 75 gpd and less than 100 gpd, THEN perform the following:

- IF AT ANY TIME the following conditions are met:

__ • Any main steam line N-16 radiation monitor - INOPERABLE

AND

__ • C1P0187 (Estimated Total Pri To Sec Leakrate) - INVALID.

THEN perform the following:

__ 1) Ensure reactor power less than 50% within 1 hr.

__ 2) Ensure unit in Mode 3 within the following 2 hrs.

__ 3) Observe Note prior to Step 15 and GO TO Step 15.

__ c. IF leak rate is greater than or equal to 75 gpd and less than 100 gpd sustained for one hour, THEN ensure unit in Mode 3 within 24 hrs.

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Event Description: 1B S/G Tube Leak / Failure of BB to Automatically Isolate

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Case I Steam Generator Tube Leak	PAGE NO. 20 of 158 Revision 57

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE EMF indications may decrease during unit shutdown. Unit shutdown should not be suspended based solely on decreasing radiation monitor indications.

15. **Shutdown Unit as follows:**

__ a. Notify Engineering of occurrence.

__ b. Verify reactor power - GREATER THAN 15%.

b. Perform the following:

__ 1) Initiate unit shutdown. REFER TO OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown).

__ 2) Ensure adequate shutdown margin is maintained. REFER TO ROD Book, Section 5.11.

__ 3) GO TO Step 16.

c. Initiate unit shutdown. REFER TO:

__ • OP/1/A/6100/003 (Controlling Procedure For Unit Operation)

OR

__ • AP/1/A/5500/009 (Rapid Downpower).

Note To Evaluator:

At this point the crew will transition to AP/1/A/5500/009 (Rapid Downpower) to take the Unit offline. Steps from AP/09 begin on the next page.

__ d. Ensure adequate shutdown margin is maintained. REFER TO ROD Book, Section 5.11.

__ 16. **IF AT ANY TIME 1RAD-1, B/1 "1EMF-33 CSAE EXHAUST HI RAD" - LIT, THEN ensure "UNIT 1 CSAE EXH" aligned as required by annunciator response.**

Op Test No.: 301	Scenario # 3	Event # 5	Page 66	of 171

Event Description: Rapid Downpower

CNS AP/1/A/5500/009	RAPID DOWNPOWER	PAGE NO. 2 of 37 Revision 28

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Monitor Enclosure 1 (Foldout Page).

Enclosure 1 can be found as Attachment 7.

2. Determine required notifications:

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

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

__ 3. IF AT ANY TIME prompt separation from the grid is required, THEN GO TO Step 26.

N/A 4. IF load reduction is due to grid instability, THEN perform the following:

NOTE In manual mode, the control valves are capable of full travel within 3 minutes.

__ a. Select "MANUAL" and "CONTROL VALVE LOWER" to reduce turbine load as required.

__ b. GO TO Step 12.

__ 5. Verify Turbine Control - IN AUTO.

Perform the following:

__ a. IF manual turbine control desired, THEN GO TO Step 9.

b. IF auto turbine control desired, THEN perform the following:

__ 1) Verify "Auto" - FLASHING.

__ 2) Depress "Auto" pushbutton.

Op Test No.:	301	Scenario #	3	Event #	5	Page	67	of	171

Event Description: Rapid Downpower

CNS AP/1/A/5500/009	RAPID DOWNPOWER	PAGE NO. 3 of 37 Revision 28

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Verify the following load reduction criteria - KNOWN:** __ • Time required to reduce load __ • Target load power level.	**Perform the following:** __ a. **WHEN** required target power level and available time are known, **THEN** perform Steps 5 through 10. __ b. GO TO Step 10.
__ 7. **Verify time required to reduce load - GREATER THAN OR EQUAL TO 15 MINUTES.**	__ GO TO **Step 10.**

CNS AP/1/A/5500/009	RAPID DOWNPOWER	PAGE NO. 4 of 37 Revision 28

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

NOTE The following tables are estimates only and can be used for rapid entry into the turbine control panel.

__ 8. **Determine the required power reduction rate (MW/Min) from the table below:**

Time to Reduce Load (Min)	Total Power Change Required (%)									
	10	20	30	40	50	60	70	80	90	100
15	8	16	24	32	40	48	56	64	72	80
20	6	12	18	24	30	36	42	48	54	60
30	4	8	12	16	20	24	28	32	36	40
45	2.7	5.3	8	10.7	13.3	16	18.7	21.3	24	26.7
60		4	6	8	10	12	14	16	18	20
75		3.2	4.8	6.4	8	9.6	11.2	12.8	14.4	16
90		2.7	4	5.3	6.7	8	9.3	10.7	12	13.3
120			3	4	5	6	7	8	9	10
150				3.2	4	4.8	5.6	6.4	7.2	8
180					3.3	4	4.7	5.3	6	6.7
210					2.9	3.4	4	4.6	5.1	5.7
240						3	3.5	4	4.5	5
270							3.1	3.6	4	4.4
300								3.2	3.6	4
330									3.3	3.6
360									3	3.3

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Event Description: Rapid Downpower				

CNS AP/1/A/5500/009	RAPID DOWNPOWER	PAGE NO. 5 of 37 Revision 28

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 9. **Determine the target load from the table below:**

Reactor Power(%)	Target (MW)
0	40
10	120
20	240
30	360
40	480
48	576
50	600
60	720
69	828
70	840
80	960
90	1080

Op Test No.:	301	Scenario #	3	Event #	5	Page	70	of	171

Event Description: Rapid Downpower

CNS AP/1/A/5500/009	RAPID DOWNPOWER	PAGE NO. 6 of 37 Revision 28

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. **Initiate turbine load reduction as follows:**

NOTE
- Any load reduction rate of greater than 25 MW/Min must be performed in the manual mode.
- Unloading rates greater than 60 MW/Min (5%/minute) will meet C-7A interlock and may result in steam dump actuation.

__ a. Verify automatic turbine load reduction - DESIRED.

a. Manually reduce turbine load as follows:

NOTE 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) IF AT ANY TIME auto turbine control is available AND desired, THEN perform Steps 5 through 11.

__ 3) GO TO Step 12.

__ b. Enter the desired "LOAD RATE" on the turbine control panel.

__ c. Enter the desired "TARGET" on the turbine control panel.

__ d. Depress the "GO" pushbutton on the turbine control panel.

Op Test No.: 301	Scenario # 3	Event # 5	Page 71	of 171

Event Description: Rapid Downpower

CNS AP/1/A/5500/009	RAPID DOWNPOWER	PAGE NO. 7 of 37 Revision 28

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ e. Verify turbine load - DECREASING AS REQUIRED.

e. Perform the following:

NOTE 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) GO TO Step 12.

__ f. IF AT ANY TIME the turbine controls fail to respond properly, THEN perform Step 10.e.

__ 11. **IF AT ANY TIME the turbine load reduction rate OR the target load must be changed, THEN RETURN TO Step 5.**

__ 12. **Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.**

13. **Attempt to control T-Avg as follows:**

__ a. Verify T-Ref instrumentation - AVAILABLE.

__ a. IF T-Avg Coastdown is in progress, THEN determine T-Ref from table. REFER TO Enclosure 5 (T-Ref Value Following Runback/Power Reduction).

__ b. Verify control rods - IN AUTO AND STEPPING IN.

__ b. IF T-Avg is greater than 1.5°F higher than T-Ref, THEN manually insert control rods as required to maintain T-Avg within 1°F of T-Ref.

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Event Description: Rapid Downpower

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

13. (Continued)

__ c. Maintain T-Avg greater than or equal to 551°F.

__ d. Verify Reactor Engineering Power Maneuvering Guidance has been provided by Duty Reactor Engineer.

d. Perform the following:

NOTE
- The boric acid added to the NC System should be added in several increments.
- The boric acid added to the NC System should be added only during the first hour of the downpower event.

__ 1) Borate NC System as required. REFER TO R.O.D. book (section 4.8).

__ 2) GO TO Step 13.f.

__ e. Borate NC System as required. Refer to Reactor Engineering Power Maneuvering Guidance.

__ f. Ensure operator monitors Enclosure 2 (Rod Insertion Limit Boration).

Note To Evaluator:

Once the Main Turbine is in 'GO' and the BOP has performed his first required boration, and at the discretion of the Lead Evaluator, the scenario may continue by having the booth operator INSERT Trigger 6 for Event 6 (1B S/G Tube Rupture).

Op Test No.:	301	Scenario #	3	Event #	6, 7, 8	Page	73	of	171
Event Description:	1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure								

Control Room Indications
1RAD-3, E/5 "1EMF26, 27, 28, 29, S/G A, B, C, D STEAM LINE" - LIT
EMF Module for 1EMF-27 Trip 2 light - LIT
Pressurizer Level indication – DECREASING RAPIDLY

Note To Evaluator:

Crew should determine that AP/10 Enclosure 1 guidance should be taken as follows:

a. IF Pzr level cannot be maintained greater than 4%, THEN perform the following:
   - Trip reactor.
   - When reactor trip verified, THEN initiate S/I.
   - GO TO EP/1/A/5000/E-0.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 4 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Monitor Enclosure 1 (Foldout Page).

Enclosure 1 can be found as Attachment 8.

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:

__ • 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:

__ 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 Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 5 of 47 Revision 42

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).
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: __ • 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.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 6 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 6. **Announce "Unit 1 Safety Injection".**	
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.
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.
10. **Verify proper Phase B actuation 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.
	(RNO continued on next page)

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ 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.

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.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 8 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ b. IF AT ANY TIME containment pressure exceeds 3 PSIG while in this procedure, THEN perform Step 10.a.

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.

Op Test No.: 301	Scenario # 3	Event # 6, 7, 8	Page 79	of 171
Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure				

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 9 of 47 Revision 42

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).	**Enclosure 2 can be found as Attachment 9.**

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 10 of 47 Revision 42

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.
__ 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 an uncontrolled manner, THEN restart the ND pump. (RNO continued on next page)

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 11 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
	__ 3) GO TO Step 18.
__ c. NI pumps - INDICATING FLOW.	__ c. Start NI pump(s) and align valves.
__ 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 an uncontrolled manner, THEN restart the ND pump.
	__ 3) GO TO Step 18.
__ e. ND pumps - INDICATING FLOW TO C-LEGS.	__ e. Start ND pump(s) and align valves.

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 12 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 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).**	**G-1 Enclosure 1 can be found as Attachment 11.**
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: __ • 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).**

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 13 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 21. **Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.**	__ **Align equipment.**
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).**	**Enclosure 4 can be found 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)

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 14 of 47 Revision 42

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 H2 analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems).

c) IF 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: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure			

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 15 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. (Continued)	
	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).
__ b. Normal Pzr spray valves - CLOSED.	b. IF Pzr pressure less than 2150 PSIG, THEN perform the following: __ 1) CLOSE spray valve(s). 2) 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 pump.
__ c. At least one Pzr PORV isolation valve - OPEN.	__ c. IF power available, THEN 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.**	**IF any NV OR NI pump on, THEN 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 pressure in any S/G decreasing in an uncontrolled manner OR any S/G depressurized, 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 an 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). **Note To Evaluator:** **At this point, the crew will transition to EP/1/A/5000/E-3. Steps from E-3 begin on the next page.**

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Monitor Enclosure 1 (Foldout Page).

Enclosure 1 can be found as Attachment 12.

2. **Identify ruptured S/G(s) as follows:**

__ • S/G level - INCREASING IN AN UNCONTROLLED MANNER.

OR

__ • Chemistry or RP has determined ruptured S/G

OR

• Any of the following EMF trip 1 lights - LIT:

__ • 1EMF-26 (Steamline 1A)
__ • 1EMF-27 (Steamline 1B)
__ • 1EMF-28 (Steamline 1C)
__ • 1EMF-29 (Steamline 1D).

Perform the following:

__ a. Continue to monitor S/G N/R levels and steamline EMFs.

b. Notify RP to perform the following:

__ • Frisk all Unit 1 S/G cation columns for activity

__ • Notify Control Room of results.

c. IF S/G Sampling required to identify ruptured S/G(s), THEN perform the following:

1) Ensure the following signals - RESET:

__ a) Phase A Containment Isolations.

__ b) CA System valve control.

__ c) KC NC NI NM St signals.

__ 2) Align all S/Gs for Chemistry sampling.

3) Notify Chemistry to perform the following:

__ • Sample all S/Gs for activity

__ • Notify Control Room of results.

__ d. WHEN ruptured S/G(s) is identified, THEN immediately RETURN TO Step 3.

__ e. GO TO Step 11.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure				

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 3. **Verify at least one intact S/G - AVAILABLE FOR NC SYSTEM COOLDOWN.**	__ **Maintain at least one S/G available for NC System cooldown in subsequent steps.**
4. **Isolate flow from ruptured S/G(s) as follows:**	
__ a. Verify all ruptured S/G(s) PORV - CLOSED.	a. **WHEN** ruptured S/G(s) pressure less than 1090 PSIG, **THEN** perform the following: __ 1) Ensure ruptured S/G(s) PORV - CLOSED. __ 2) **IF** ruptured S/G(s) PORV will not close, **THEN** CLOSE ruptured S/G(s) PORV isolation valve. __ 3) **IF** ruptured S/G(s) PORV isolation valve will not close, **THEN** dispatch operator to close ruptured S/G(s) PORV isolation valve.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. (Continued)

__ b. Verify S/G(s) 1B and 1C - INTACT. → b. Perform the following:

N/A 1) IF both motor driven CA pumps available, THEN CLOSE "CAPT TRIP T/V CTRL".

N/A 2) IF CA Pump #1 is only source of feedwater, THEN maintain steam flow to CAPT from at least one S/G.

3) IF S/G 1B ruptured, THEN perform the following:

__ a) Dispatch two operators to unlock and close 1SA-1 (1B S/G Main Steam to CAPT Maintenance Isol) (DH-624, FF-53, Rm 572) (Breakaway lock).

N/A b) IF 1SA-1 cannot be closed, THEN dispatch two operators to unlock and close 1SA-3 (1B S/G Main Steam to CAPT Stop Check) (AB-551, DD-53, Rm 217) (Breakaway lock).

N/A 4) IF S/G 1C ruptured, THEN perform the following:

__ a) Dispatch two operators to unlock and close 1SA-4 (1C S/G Main Steam to CAPT Maintenance Isol) (DH-624, FF-53, Rm 572) (Breakaway lock installed).

__ b) IF 1SA-4 cannot be closed, THEN dispatch two operators 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).

(RNO continued on next page)

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 5 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
	__ 5) **WHEN** ruptured S/G steam supply to CA Pump #1 isolated, **THEN** OPEN "CAPT TRIP T/V CTRL".
c. Isolate blowdown and steam drain on all ruptured S/G(s) as follows:	
• S/G 1A:	
__ 1) CLOSE 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) Verify the following blowdown isolation valves - CLOSED:	
__ a) 1BB-56A (S/G 1A Bldwn Cont Isol Insd).	__ a) CLOSE valve.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 6 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
__ b) 1BB-148B (S/G 1A Bldwn Cont Isol Byp).	b) Perform the following: __ (1) CLOSE valve. (2) **IF** valve will not close **AND** 1BB-56A open, **THEN** 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).

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
__ c) 1BB-57B (S/G 1A Bldwn Cont Isol Otsd).	c) Perform the following: __ (1) CLOSE valve. (2) **IF** valve will not close **AND** 1BB-56A open, **THEN** 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).

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 8 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
• S/G 1B:	
__ 1) CLOSE 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) Verify the following blowdown isolation valves - CLOSED:	
__ a) 1BB-19A (S/G 1B Bldwn Cont Isol Insd).	__ a) CLOSE valve.
__ b) 1BB-150B (S/G 1B Bldwn Cont Isol Byp).	b) Perform the following: __ (1) CLOSE valve. (2) **IF** valve will not close **AND** 1BB-19A open, **THEN** 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 Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 9 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
__ c) 1BB-21B (S/G 1B Bldwn Cont Isol Otsd).	c) Perform the following: __ (1) CLOSE valve. (2) **IF** valve will not close **AND** 1BB-19A open, **THEN** 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).

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 10 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
• S/G 1C:	
__ 1) CLOSE 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) Verify the following blowdown isolation valves - CLOSED:	
__ a) 1BB-60A (S/G 1C Bldwn Cont Isol Insd).	__ a) CLOSE valve.
__ b) 1BB-149B (S/G 1C Bldwn Cont Isol Byp).	b) Perform the following: __ (1) CLOSE valve. (2) **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-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).

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 11 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
__ c) 1BB-61B (S/G 1C Bldwn Cont Isol Otsd).	c) Perform the following: __ (1) CLOSE valve. (2) **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).

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 12 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
• S/G 1D:	
__ 1) CLOSE 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) Verify the following blowdown isolation valves - CLOSED:	
__ a) 1BB-8A (S/G 1D Bldwn Cont Isol Insd).	__ a) CLOSE valve.
__ b) 1BB-147B (S/G 1D Bldwn Cont Isol Byp).	b) Perform the following: __ (1) CLOSE valve.
	(RNO continued on next page)

Op Test No.:	301	Scenario #	3	Event #	6, 7, 8	Page	98	of	171

Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 13 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
	(2) **IF** valve will not close **AND** 1BB-8A open, **THEN** 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).

Op Test No.:	301	Scenario #	3	Event #	6, 7, 8	Page	99	of	171

Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 14 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. (Continued)	
__ c) 1BB-10B (S/G 1D Bldwn Cont Isol Otsd).	c) Perform the following: __ (1) CLOSE valve. (2) **IF** valve will not close **AND** 1BB-8A open, **THEN** 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).

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 15 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **CLOSE the following valves on all ruptured S/G(s):** __ • MSIV __ • MSIV bypass valve. Critical Task #1	**Perform the following:** a. CLOSE the following valves on remaining S/Gs: __ • MSIV __ • MSIV bypass valve. __ b. Place "STM DUMP CTRL" in manual. __ c. Adjust "STM DUMP CTRL" output to 0%. __ d. Place "STEAM DUMP SELECT" switch in pressure mode. __ e. IF any intact S/G MSIV and associated bypass valve closed, THEN GO TO Step g. in this RNO. __ f. GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired). __ g. Place steam dump interlock bypass switches in "OFF RESET". h. Transfer turbine steam seal supply to AS as follows: __ 1) OPEN 1TL-8 (Aux Stm To Stm Seal Reg). __ 2) CLOSE 1TL-2 (Main Stm To Stm Seal Reg). (RNO continued on next page)

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. (Continued)

i. Ensure the following turbine S/V before seat drain valves - CLOSED:

__ • 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).

__ j. CLOSE 1AS-1 (SM To AS Inlet).

k. Ensure the following valves - CLOSED:

__ • 1HM-1 (MSRH 1A&1B SSRH Stm Source)

__ • 1HM-2 (MSRH 1C&1D SSRH Stm Source).

__ l. Dispatch operator to isolate steam flow from all ruptured S/G(s). REFER TO Enclosure 2 (Locally Isolating Steam Flow From Ruptured S/G(s)).

__ m. **WHEN** cooldown is initiated in subsequent steps, **THEN** use intact S/G(s) PORV for steam dump.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 17 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **Control ruptured S/G(s) N/R level as follows:**	
__ a. Verify ruptured S/G(s) N/R level - GREATER THAN 11% (29% ACC).	a. Perform the following: __ 1) IF any ruptured S/G is also faulted, THEN do not establish feed flow to ruptured S/G unless needed for NC System cooldown. 2) IF any ruptured S/G(s) is not faulted OR is required for cooldown, THEN perform the following: __ a) Establish and maintain feed flow to affected S/G(s). __ b) WHEN affected S/G(s) N/R level greater than 11% (29% ACC), THEN perform Steps 6.b and 6.c. __ 3) GO TO Step 7.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure				

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued)	
b. Isolate feed flow to all ruptured S/G(s) as follows:	
• S/G 1A:	
__ 1) CLOSE 1CA-62A (CA Pmp A Disch To S/G 1A Isol).	1) Perform the following: __ a) CLOSE 1CA-60 (CA Pump 1A Flow To S/G 1A). __ b) Dispatch operator with 14" valve wrench to close 1CA-62A (CA Pmp A Disch To S/G 1A Isol) (DH-587, DD-EE, 44-45, Rm 591).
__ 2) CLOSE 1CA-66B (CA Pmp 1 Disch To S/G 1A Isol).	2) Perform the following: __ a) CLOSE 1CA-64 (CA Pump #1 Flow To S/G 1A). __ b) Dispatch operator with 14" valve wrench to close 1CA-66B (CA Pmp 1 Disch To S/G 1A Isol) (DH-584, DD-EE, 44-45, Rm 591).

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued) • S/G 1B: __ 1) CLOSE 1CA-58A (CA Pmp A Disch To S/G 1B Isol). Critical Task #1	1) Perform the following: __ a) CLOSE 1CA-56 (CA Pump 1A Flow To S/G 1B). __ b) Dispatch operator with 14" valve wrench to close 1CA-58A (CA Pmp A Disch To S/G 1B Isol) (DH-586, DD-EE, 52-53, Rm 572).
__ 2) CLOSE 1CA-54B (CA Pmp 1 Disch To S/G 1B Isol). Critical Task #1	2) Perform the following: __ a) CLOSE 1CA-52 (CA Pump #1 Flow To S/G 1B). __ b) Dispatch operator with 14" valve wrench to close 1CA-54B (CA Pmp 1 Disch To S/G 1B Isol) (DH-584, DD-EE, 52-53, Rm 572).

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 20 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued) • S/G 1C: __ 1) CLOSE 1CA-46B (CA Pmp B Disch To S/G 1C Isol).	1) Perform the following: __ a) CLOSE 1CA-44 (CA Pump 1B Flow To S/G 1C). __ b) Dispatch operator with 14" valve wrench to close 1CA-46B (CA Pmp B Disch To S/G 1C Isol) (DH-586, DD, 53-54, Rm 572).
__ 2) CLOSE 1CA-50A (CA Pmp 1 Disch To S/G 1C Isol).	2) Perform the following: __ a) CLOSE 1CA-48 (CA Pump #1 Flow To S/G 1C). __ b) Dispatch operator with 14" valve wrench to close 1CA-50A (CA Pmp 1 Disch To S/G 1C Isol) (DH-584, EE-53, Rm 572).

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CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 21 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. (Continued) • S/G 1D: __ 1) CLOSE 1CA-42B (CA Pmp B Disch To S/G 1D Isol).	1) Perform the following: __ a) CLOSE 1CA-40 (CA Pump 1B Flow To S/G 1D). __ b) Dispatch operator with 14" valve wrench to close 1CA-42B (CA Pmp B Disch To S/G 1D Isol) (DH-586, DD-EE, 43-44, Rm 591).
__ 2) CLOSE 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol).	2) Perform the following: __ a) CLOSE 1CA-36 (CA Pump #1 Flow To S/G 1D). __ b) Dispatch operator with 14" valve wrench to close 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol) (DH-584, DD-EE, 43-44, Rm 591).
__ c. IF AT ANY TIME ruptured S/G(s) N/R level is less than 11% (29% ACC), THEN perform Step 6.	
__ 7. **Verify all ruptured S/G(s) pressure - GREATER THAN 320 PSIG.**	__ GO TO EP/1/A/5000/ECA-3.1 (**SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired**).

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 22 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 8. **Verify any NC pump - ON.**

CAUTION **NC T-Cold indication in ruptured loop may cause an invalid Integrity Status Tree condition.**

__ **Disregard NC T-Cold indication in ruptured loop, until directed by this EP or until this EP exited.**

__ 9. **Verify Pzr pressure - GREATER THAN 1955 PSIG.**

IF "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) lit, THEN perform the following:

__ a. Depress ECCS steam pressure "BLOCK" pushbuttons.

__ b. Verify main steam isolation blocked status lights (1SI-13) - LIT:

c. Maintain NC pressure less than 1955 PSIG using one of the following:

__ • Pzr spray

OR

__ • Pzr PORV.

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CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 23 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- NC pump trip criteria based on NC subcooling does not apply after starting a controlled cooldown.
- After low steamline pressure main steam isolation signal is blocked, maintaining steam pressure negative rate less than 2 PSIG per second will prevent a Main Steam Isolation.
- OAC graphic SMRATES to monitor S/G pressure rates can be accessed via a hot button in the center of the SM graphic.

10. **Initiate NC System cooldown as follows:**

__ a. Determine required core exit temperature based on lowest ruptured S/G pressure from table below:

LOWEST RUPTURED S/G PRESSURE (PSIG)	REQUIRED CORE EXIT T/Cs (°F)
EQUAL TO OR GREATER THAN 1200	532 (512 ACC)
1100 - 1199	520 (501 ACC)
1000 - 1099	507 (489 ACC)
900 - 999	494 (476 ACC)
800 - 899	479 (461 ACC)
700 - 799	462 (445 ACC)
600 - 699	442 (426 ACC)
500 - 599	420 (405 ACC)
400 - 499	392 (379 ACC)
320 - 399	364 (352 ACC)

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. (Continued)	
b. Ensure ruptured S/G(s) isolated as follows:	
1) Verify the following valves on all ruptured S/G(s) - CLOSED:	1) Ensure the following valves on at least one intact S/G - CLOSED:
__ • MSIV	__ • MSIV
__ • MSIV bypass valves.	__ • MSIV bypass valve.
__ 2) Verify S/G PORV on ruptured S/G(s) - CLOSED OR ISOLATED.	2) IF ruptured S/G(s) pressure is less than 1090 PSIG, THEN perform the following: __ a) Ensure S/G PORV on ruptured S/G(s) - CLOSED OR ISOLATED. b) IF S/G PORV on ruptured S/G(s) not closed or isolated, THEN perform the following: __ (1) Ensure operator dispatched to close ruptured S/G(s) PORV isolation valve. (2) Do not continue until affected S/G PORV(s): __ • Isolated OR __ • Determined to be unisolable.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 25 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

3) IF S/G 1B OR 1C ruptured, THEN verify one of the following CAPT steam supply valves - CLOSED:

__ • "CAPT TRIP T/V CTRL"

OR

__ • Manual isolation valve on affected S/G.

3) Perform the following:

__ a) Ensure operator dispatched to isolate CAPT steam supply from ruptured S/G.

b) Do not continue until affected CAPT steam supply:

__ • Isolated

OR

__ • Determined to be unisolable.

c. Verify condenser is available as follows:

__ • "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT

__ • MSIV on intact S/G(s) - OPEN.

__ c. GO TO Step 10.f RNO.

__ d. Verify steam dumps - IN PRESSURE MODE.

d. Place steam dumps in pressure mode as follows:

__ 1) Place "STM DUMP CTRL" slim station in manual. Critical Task #2

__ 2) Adjust "STM DUMP CTRL" slim station output to match "% STM DUMP DEMAND" (1SMP5211).

__ 3) WHEN output on "STM DUMP CTRL" slim station equal to "% STM DUMP DEMAND" (1SMP5211), THEN place steam dumps in pressure mode. Critical Task #2

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ e. **WHEN** "P-12 LO-LO TAVG" status light (1SI-18) lit, **THEN** place steam dump interlock bypass switches in "BYP INTLK."

__ f. Dump steam to condenser from intact S/G(s) at maximum rate while attempting to avoid a Main Steam Isolation. Critical Task #2

f. Perform the following:

1) **IF** any intact S/G(s) PORV isolation valve closed **AND** associated PORV operable, **THEN** perform the following:

__ a) OPEN S/G PORV isolation valve.

__ b) **IF** isolation valve will not open, **THEN** dispatch operator to open isolation valve.

__ 2) Dump steam from all intact S/G(s) at maximum rate with S/G PORV(s).

__ 3) **IF** any intact S/G PORV cannot be operated from Control Room, **THEN** dispatch operator(s) to dump steam at maximum rate from intact S/G(s) PORV. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 10 (Local Operation of S/G PORVs).

4) **IF** operator(s) dispatched to S/G PORV(s), **THEN** perform the following:

__ a) Obtain sound powered phone from storage box on rear wall of Control Room.

__ b) Connect sound powered phone to jack on 1MC-11.

__ c) Monitor sound powered phone for communication from Doghouse(s).

(RNO continued on next page)

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

5) IF any intact S/G PORV unavailable, THEN evaluate the following to dump steam:

__ • OPEN MSIVs and dump steam to condenser. REFER TO Enclosure 6 (Condenser Dump Operation).

__ • Start CA Pump #1.

6) IF no intact S/G is available for NC System cooldown, THEN contact station management to determine which of the following to perform:

__ • Use faulted S/G

OR

__ • GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

__ 7) GO TO Step 10.g.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ g. Verify main steam isolation blocked status lights (1SI-13) - LIT.

g. Perform the following:

1) Depressurize NC System to less than 1955 PSIG using one of the following:

__ • Pzr spray

OR

__ • Pzr PORV.

2) WHEN "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) lit, THEN perform the following:

__ a) Depress ECCS steam pressure "BLOCK" pushbuttons.

__ b) Verify main steam isolation blocked status lights (1SI-13) - LIT.

__ 3) Maintain NC pressure less than 1955 PSIG.

__ h. WHEN core exit T/Cs less than required temperature, THEN stabilize core exit T/Cs less than required temperature.

Critical Task #2

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. Control intact S/G levels as follows:	
__ a. Verify N/R level in all intact S/Gs - GREATER THAN 11% (29% ACC).	a. Perform the following: __ 1) Maintain total feed flow greater than 450 GPM to intact S/Gs until any intact S/G N/R level greater than 11% (29% ACC). 2) IF total feed flow greater than 450 GPM cannot be established, THEN contact station management for guidance to establish feed flow from one of the following alternate sources: __ • CF __ • CM __ • Alternate low pressure water source.
__ b. THROTTLE feed flow to maintain all intact S/G N/R levels between 16% (29% ACC) and 50%.	b. IF N/R level in any intact S/G continues to increase in an uncontrolled manner, THEN perform the following: __ 1) Stop NC system cooldown. __ 2) RETURN TO Step 1.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 30 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. **Verify Pzr PORV and isolation valve status as follows:**

__ 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 is 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.

__ 4) IF any Pzr PORV cannot be closed OR isolated, THEN GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

__ c. At least one Pzr PORV isolation valve - OPEN.

__ c. OPEN one Pzr PORV isolation valve unless it was closed to isolate an open Pzr PORV.

Op Test No.: 301	Scenario # 3	Event # 6, 7, 8	Page 116 of 171

Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 31 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. (Continued)

__ d. IF AT ANY TIME a Pzr PORV opens due to high pressure, WHEN Pzr pressure decreases to less than 2315 PSIG, ensure valve closes or is isolated.

__ d. IF Pzr PORV cannot be closed OR isolated, THEN GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

13. **Reset the following:**

__ a. ECCS.

__ a. 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.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure			

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 32 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. **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 is 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).
15. **Determine if ND pumps should be stopped:** __ a. Any ND pump - ON.	__ a. GO TO Step 15.e.
__ b. Any running ND pump suction - ALIGNED TO FWST.	__ b. GO TO Step 16.
__ c. NC pressure - GREATER THAN 285 PSIG.	__ c. GO TO Step 16.
__ d. Stop all ND pump(s) with suction aligned to FWST. __ e. IF AT ANY TIME NC pressure decreases to less than 285 PSIG in an uncontrolled manner, THEN restart ND pumps.	

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 33 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 16. **Verify ruptured S/G(s) - IDENTIFIED.**	**Perform the following:** __ a. Do not continue in this procedure until ruptured S/G(s) identified. __ b. RETURN TO Step 3.
17. **Verify if NC System cooldown should be stopped:**	
__ a. Verify core exit T/Cs - LESS THAN REQUIRED TEMPERATURE.	__ a. Do not continue in this procedure until core exit T/Cs are less than required temperature.
__ b. Stop NC System cooldown. Critical Task #2	
__ c. Stabilize core exit T/Cs - LESS THAN REQUIRED TEMPERATURE. Critical Task #2	

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 34 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. **Verify ruptured S/G(s) pressure is under operator control as follows:**

__ a. All ruptured S/G(s) pressure - STABLE OR INCREASING.

a. Perform the following:

__ 1) Ensure ruptured S/G(s) isolated. REFER TO Steps 3 through 6.

__ 2) IF ruptured S/G(s) pressure is less than intact S/G(s) used for cooldown, THEN GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

3) IF AT ANY TIME D/P between ruptured S/G(s) and intact S/G(s) used for cooldown is less than 250 PSIG, THEN perform the following:

__ • Maintain total NC System cooldown less than 100°F in an hour

__ • Dump steam from intact S/Gs to maintain intact S/G pressures 250 PSIG below ruptured S/G(s) pressure.

__ 4) IF intact S/G(s) used for cooldown cannot be maintained at least 250 PSIG below pressure of ruptured S/G(s), THEN GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

__ 5) GO TO Step 19.

__ b. IF AT ANY TIME ruptured S/G(s) pressure is decreasing while in this procedure, THEN perform Step 18.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 35 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 19. **Verify NC subcooling based on core exit T/Cs - GREATER THAN 20°F.**	__ **IF NC subcooling cannot be promptly restored to greater than 20°F, THEN GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).**
20. **Depressurize NC System using PZR Spray as follows:**	
__ a. Verify normal Pzr spray flow - AVAILABLE.	__ a. GO TO Step 21.
__ b. Initiate NC depressurization using maximum available spray. Critical Task #3	
c. IF AT ANY TIME during this step one of the following conditions exists, THEN GO TO Step 21:	
__ • Spray valves not effective in reducing NC pressure	
OR	
__ • Ruptured S/G(s) NR level approaching 83% (75% ACC).	

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CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 36 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. (Continued) d. Do not continue until at least one of the following conditions satisfied: • Both of the following: __ • NC pressure - LESS THAN RUPTURED S/G(s) PRESSURE __ • Pzr level - GREATER THAN 11% (30% ACC) OR • Both of the following: __ • NC pressure - WITHIN 300 PSIG OF RUPTURED S/G(s) PRESSURE __ • Pzr level - GREATER THAN 41% (50% ACC) OR __ • Pzr level - GREATER THAN 68% (50% ACC) OR __ • NC subcooling based on core exit T/Cs - LESS THAN 0°F.	
__ e. CLOSE normal Pzr spray valves.	e. IF spray valve(s) will not close, THEN perform the following: __ 1) Stop 1A and 1B NC pumps. __ 2) IF both 1C AND 1D NC pumps on, THEN stop one additional pump.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 37 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. (Continued)	
__ f. Verify 1NV-37A (NV Supply To Pzr Aux Spray) - CLOSED	f. Perform the following: 1) Ensure one of the following valves - OPEN: __ • 1NV-39A (NV Supply To Loop D Isol). OR __ • 1NV-32B (NV Supply To Loop A Isol). __ 2) CLOSE 1NV-37A. __ 3) Maintain charging flow less than 180 GPM. 4) IF 1NV-37A will not close, THEN ensure one of the following valves - CLOSED: __ • 1NV-312A (Chrg Line Cont Isol) OR __ • 1NV-314B (Chrg Line Cont Isol).
__ g. Observe Caution prior to Step 23 and GO TO Step 23.	
21. **Depressurize NC System using Pzr PORV as follows:**	
__ a. Verify at least one Pzr PORV - AVAILABLE.	a. Establish NV aux spray as follows: __ 1) Ensure at least one NI pump - ON. __ 2) Ensure at least one NV pump - ON. (RNO continued on next page)

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

21. (Continued)

3) Ensure the following NV pump miniflow valves - OPEN:

__ • 1NV-203A (NV Pumps A&B Recirc Isol)

__ • 1NV-202B (NV Pmps A&B Recirc Isol).

4) CLOSE the following valves:

__ • 1NI-9A (NV Pmp C/L Inj Isol)
__ • 1NI-10B (NV Pmp C/L Inj Isol).

__ 5) THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) for 32 GPM charging line flow.

__ 6) CLOSE 1NV-309 (Seal Water Injection Flow).

7) OPEN the following valves:

__ • 1NV-312A (Chrg Line Cont Isol)

__ • 1NV-314B (Chrg Line Cont Isol).

__ 8) Place 1NV-309 in auto.

__ 9) Maintain charging flow less than 180 GPM.

10) Ensure the following valves - CLOSED:

__ • 1NC-27 (Pzr Spray Ctrl Frm Loop A)

__ • 1NC-29 (Pzr Spray Ctrl Frm Loop B).

__ 11) THROTTLE 1NV-37A (NV Supply To Pzr Aux Spray) and charging flow as required to maximize spray flow.

(RNO continued on next page)

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. (Continued)	
	12) Ensure the following valves - CLOSED: __ • 1NV-39A (NV Supply To Loop D Isol) __ • 1NV-32B (NV Supply To Loop A Isol).
	__ 13) RETURN TO Step 20.d.
__ b. OPEN one Pzr PORV.	b. Perform the following: 1) 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). 2) OPEN one of the following Pzr PORVs: __ • 1NC-34A (PZR PORV) OR __ • 1NC-32B (PZR PORV)

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure			

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 40 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

21. (Continued)

c. Do not continue until at least one of the following conditions satisfied:

__ • NC subcooling based on core exit T/Cs - LESS THAN 0°F

OR

__ • Pzr level - GREATER THAN 68% (50% ACC)

OR

• Both of the following:

__ • NC pressure - LESS THAN RUPTURED S/G(s) PRESSURE

__ • Pzr level - GREATER THAN 11% (30% ACC).

__ d. CLOSE Pzr PORV.

__ d. CLOSE Pzr PORV isolation valve.

__ e. CLOSE Pzr spray valves.

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

__ 1) Stop NC pumps 1A and 1B.

__ 2) IF both 1C AND 1D NC pumps on, THEN stop one additional pump.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 41 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 22. **Verify NC pressure - INCREASING.**	**Perform the following for Pzr PORV used during depressurization:** __ a. CLOSE Pzr PORV isolation valve. b. IF 1NC-32B OR 1NC-34A cannot be closed or isolated, THEN perform the following: 1) 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). __ 2) CLOSE affected Pzr PORV. c. IF pressure continues to decrease, THEN perform the following: 1) Monitor the following conditions for indication of leakage from Pzr PORV: __ • PRT pressure __ • Pzr Relief Valve Temp. __ 2) GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 42 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **S/I must be terminated when termination criteria are satisfied to prevent overfilling ruptured S/G(s).**

23. **Verify S/I termination criteria as follows:**

__ a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.

__ a. GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

b. Verify secondary heat sink as follows:

__ • N/R level in at least one intact S/G - GREATER THAN 11% (29% ACC)

OR

__ • Total feed flow available to S/G(s) - GREATER THAN 450 GPM.

__ b. GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

__ c. NC pressure - STABLE OR INCREASING.

__ c. GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

__ d. Pzr level - GREATER THAN 11% (30% ACC).

__ d. RETURN TO Step 7.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 43 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24. Stop S/I pumps as follows:	
__ a. Stop NI pumps.	a. Isolate S/I flow from NI pump(s) as follows: __ • IF NI Pump 1A failed to trip, THEN CLOSE 1NI-118A (NI Pump 1A C-Leg Inj Isol). __ • IF NI Pump 1B failed to trip, THEN CLOSE 1NI-150B (NI Pump 1B C-Leg Inj Isol).
__ b. Ensure only one NV pump - ON.	

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO. 44 of 97 Revision 43

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. **Isolate NV S/I flowpath as follows:**	
a. Verify the following valves - OPEN:	a. IF NV pump suction aligned to discharge of ND pumps in Cold Leg Recirc, THEN perform the following:
__ • 1NV-252A (NV Pumps Suct From FWST)	__ 1) Align charging with NV miniflow isolated. GO TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 13 (Aligning Charging With NV Miniflow Valves Closed).
__ • 1NV-253B (NV Pumps Suct From FWST).	__ 2) GO TO Step 28.
b. Ensure the following valves - OPEN:	b. Perform the following:
__ • 1NV-203A (NV Pumps A&B Recirc Isol)	1) Dispatch operator to open affected valve(s):
__ • 1NV-202B (NV Pmps A&B Recirc Isol).	__ • 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).
	__ 2) GO TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 13 (Aligning Charging With NV Miniflow Valves Closed).
	__ 3) WHEN 1NV-203A AND 1NV-202B are opened, THEN charging flow may be reduced below 80 GPM.
	__ 4) GO TO Step 28.

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Event Description: 1B S/G Tube Rupture / CF Isolation Failure / 'B' Train Phase A Failure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

25. (Continued)

c. CLOSE the following valves:

__ • 1NI-9A (NV Pmp C/L Inj Isol)
__ • 1NI-10B (NV Pmp C/L Inj Isol).

Note To Evaluator:

At this point, the crew has terminated S/I. All critical tasks for this scenario are complete. At the discretion of the Lead Evaluator, the scenario may be terminated by having the booth operator place the simulator in FREEZE.

c. IF NV S/I flow exists, THEN 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) IF NC pump seal cooling is established from KC flow to thermal barrier, THEN perform the following:

__ a) Ensure all NC pumps - OFF.

__ b) Stop NV Pumps.

__ c) WHEN 1NI-9A AND 1NI-10B are closed, THEN restore NV pump to service. REFER TO Enclosure 4 (NV Pump Restart).

d) Ensure the following valves - OPEN:

__ • 1NI-115A (NI Pump 1A Miniflow Isol)

__ • 1NI-144A (NI Pump 1B Miniflow Isol)

__ • 1NI-147B (NI Miniflow Hdr To FWST 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/5500/028 Enclosure 1 (Foldout Page)
ATTACHMENT 4 -	AP/1/A/5500/021 Enclosure 1 (Foldout Page)
ATTACHMENT 5 -	AP/1/A/5500/037 Enclosure 1 (Unit 1 Generator Capability Curves)
ATTACHMENT 6 -	AP/1/A/5500/010 Enclosure 1 (Case I S/G Tube Leak Foldout Page)
ATTACHMENT 7 -	AP/1/A/5500/009 Enclosure 1 (Foldout Page)
ATTACHMENT 8 -	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page)
ATTACHMENT 9 -	EP/1/A/5000/E-0 Enclosure 2 (Control Room Ventilation Verification)
ATTACHMENT 10 -	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control)
ATTACHMENT 11 -	EP/1/A/5000/G-1 Enclosure 1 (Spent Fuel Pool Monitoring)
ATTACHMENT 12 -	EP/1/A/5000/E-3 Enclosure 1 (Foldout Page)
ATTACHMENT 13 -	OP/1/A/6150/009 Enclosure 4.2 (Boration)

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		1	Isolate feedwater into and steam flow from the ruptured S/G before a transition to ECA-3.1 occurs.
		2	Establish/maintain an RCS temperature so that the transition from E-3 does not occur because the RCS temperature is in either of the following conditions: • Too high to maintain the minimum required subcooling • Below the RCS temperature that causes an extreme (Red Path) or a severe (Orange Path) challenge to the Subcriticality and/or Integrity status tree.
		3	Depressurize RCS to meet S/I termination criteria before water release occurs from the ruptured S/G PORV or safety (prior to S/G N/R level reaching 100% and an associated S/G PORV or Safety Valve open).

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION

Unit 1 Status

Power Level	Power History	NCS Boron	Xenon
50 %	BOL	1546 PPM	per OAC

Controlling Procedure

- OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.1 (Power Increase). The steps up through 3.50 are complete.

Other Information Needed to Assume the Shift

- Unit 1 is at 50% power at the BOL. Unit 2 is at 100% power. 1A CA Pump is removed from service for PMs. 1A 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 maintain present plant conditions.

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/1/A/5500/021	LOSS OF COMPONENT COOLING Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 18 of 35 Revision 42

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 is 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 is 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) an 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 is 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).

ATTACHMENT 4

NOTE The following step prevents damage to the 1B2 KC pump as a result of deadheading. (PIP #00-5862)

3. **IF AT ANY TIME the following conditions are 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 are lost, THEN RETURN TO Section C. (Operator Actions), Step 2.**

5. **IF operators are dispatched to align alternate cooling to NV pump 1A, THEN perform the following:**

   __ a. **WHEN** alternate cooling is aligned, **THEN** perform Enclosure 5 (Maximize NV Pump Run Time), Step 7.

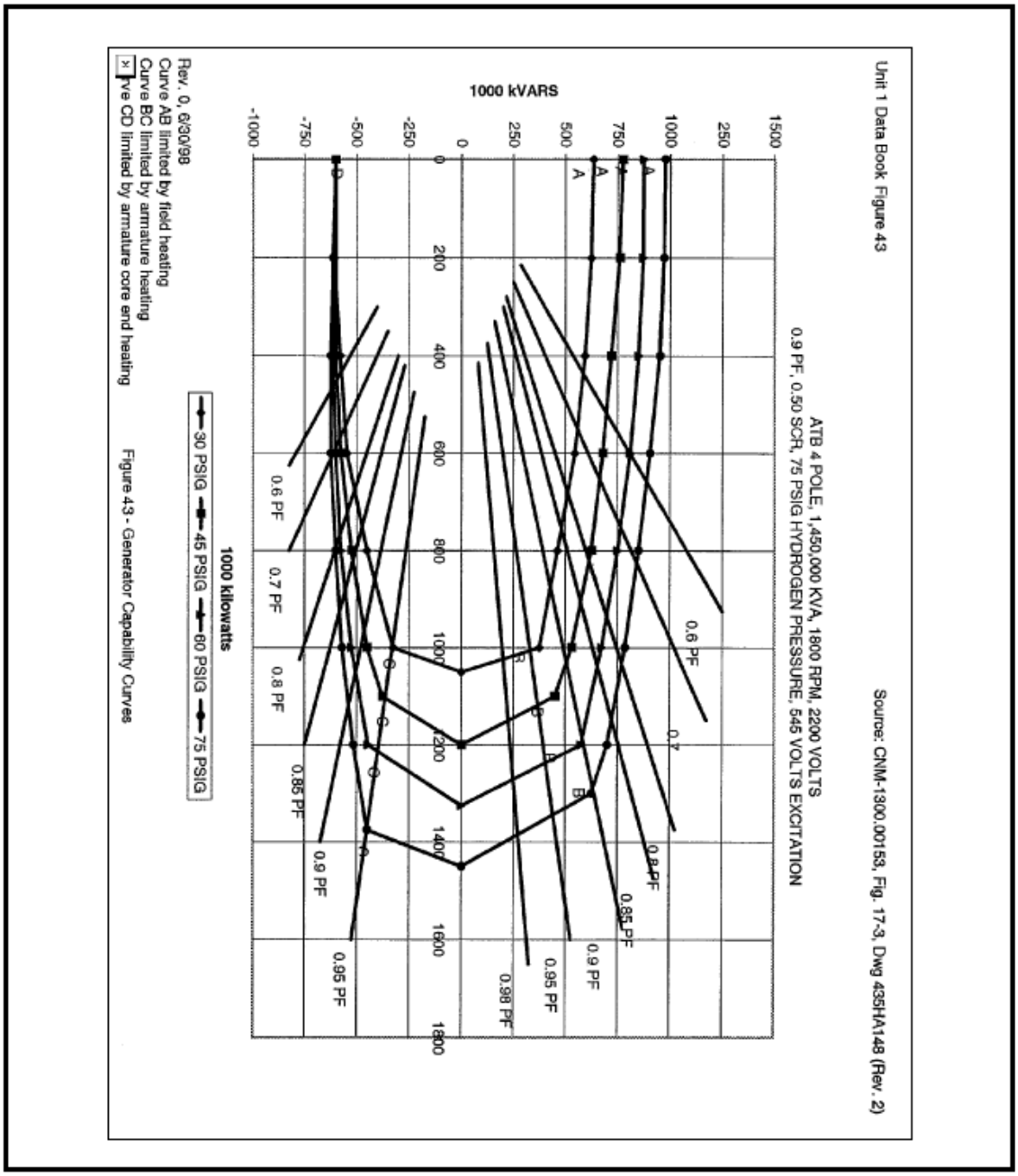
6. **IF AT ANY TIME KC cooling to operating KF pump(s) is lost, THEN perform the following:**

   __ • **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 5

CNS AP/1/A/5500/037	GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES Enclosure 1 - Page 1 of 1 **Unit 1 Generator Capability Curves**	PAGE NO. 20 of 21 Revision 03



ATTACHMENT 6

CNS AP/1/A/5500/010	REACTOR COOLANT LEAK Enclosure 1 - Page 1 of 1 **Case I Steam Generator Tube Leak Foldout Page**	PAGE NO. 75 of 158 Revision 57

Case I (Steam Generator Tube Leak) Safety Injection Initiation Criteria:

a. IF Pzr level cannot be maintained greater than 4% OR Pzr pressure is decreasing in an uncontrolled manner, THEN perform the following:

   1) Trip reactor.

   2) WHEN reactor trip verified, THEN initiate S/I.

   3) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

ATTACHMENT 7

CNS AP/1/A/5500/009	RAPID DOWNPOWER Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 29 of 37 Revision 28

1. **Turbine Trip Criteria:**
   - IF T-Avg is less than T-Ref **AND** decreasing in an uncontrolled manner, **THEN**:
     a. IF reactor power is greater than or equal to 69%, **THEN** manually trip reactor.
     b. Ensure turbine - TRIPPED.
     c. IF reactor is tripped, **THEN** GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
     d. GO TO AP/1/A/5500/02 (Turbine Generator Trip).
   - IF any turbine trip parameter is reached OR an automatic turbine trip occurs, **THEN**:
     a. IF reactor power is greater than or equal to 69%, **THEN** manually trip reactor.
     b. Ensure turbine - TRIPPED.
     c. IF reactor is tripped, **THEN** GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
     d. GO TO AP/1/A/5500/02 (Turbine Generator Trip).

2. **Reactor Trip Criteria:**

   IF any of the following conditions exist:
   - NC T-Avg cannot be maintained greater than 551°F.

   OR
   - Both of the following:
     - NC T-Avg is greater than 587°F
     - NC T-Avg is stable or increasing.

   OR
   - Any reactor trip setpoint is exceeded.

   THEN manually trip reactor and GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

3. **Manual Rod Control Operation Criterion:**
   - IF "C-5 LO TURB IMPULSE PRESS ROD BLOCK" status light (1SI-18) is lit, **THEN** ensure rod control is in manual.

ATTACHMENT 7

CNS AP/1/A/5500/009	RAPID DOWNPOWER Enclosure 1 - Page 2 of 2 **Foldout Page**	PAGE NO. 30 of 37 Revision 28

4. **IF AT ANY TIME prompt separation from the grid is required AND it is desired to carry in-house loads, THEN GO TO Section C. (Operator Actions), Step 26.**

ATTACHMENT 8

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 32 of 47 Revision 42

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 - ON
     - 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:
     - Level increasing in an uncontrolled manner or radiation level in that S/G abnormal
     - N/R level - GREATER THAN 11% (29% ACC).

ATTACHMENT 8

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 an 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).

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 9

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 1 of 7 **Ventilation System Verification**	PAGE NO. 34 of 47 Revision 42

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 9

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 2 of 7 **Ventilation System Verification**	PAGE NO. 35 of 47 Revision 42

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 the 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 9

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 3 of 7 **Ventilation System Verification**	PAGE NO. 36 of 47 Revision 42

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 9

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.

ATTACHMENT 9

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Verify proper VE System operation as follows:**	
__ a. VE fans - ON.	__ a. Start fan(s).
__ 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. (RNO continued on next page)

ATTACHMENT 9

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
	__ 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.
	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 9

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 7 of 7 **Ventilation System Verification**	PAGE NO. 40 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Record time ventilation systems verified on following table:**

TIME	SYSTEM (VC, VE)	INITIALS

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. 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 10

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.

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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.
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.	

ATTACHMENT 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. (Continued)

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.

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 10

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (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% (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.
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/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 1 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 3 of 103 Revision 10

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. **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. GO TO Enclosure 24 (Local Spent Fuel Pool Monitoring).**

ATTACHMENT 11

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 2 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 4 of 103 Revision 10

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 11

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 103 Revision 10

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 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 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.

ATTACHMENT 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 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 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 12

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 71 of 97 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 - ON

   __ • NC subcooling based on core exit T/Cs - LESS THAN OR EQUAL TO 0°F.

2. **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.

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:

     a. Perform the following as necessary to maintain subcooling greater than 0°F and Pzr level greater than 11% (30% ACC) as follows:

     __ • Start one or more S/I pumps

     __ • Align NV S/I flow path. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 14 (NV Alignment To S/I Mode).

   __ b. IF S/I reinitiation occurs after Section C. (Operator Actions), Step 24, THEN GO TO EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).

4. **Secondary Integrity Criteria:**

   __ • IF any unisolated S/G pressure decreasing in an uncontrolled manner OR has completely depressurized, THEN GO TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation) unless needed for NC System cooldown.

5. **Cold Leg Recirc Switchover Criterion:**

   __ • IF FWST level decreases 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 12

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE Enclosure 1 - Page 2 of 2 **Foldout Page**	PAGE NO. 72 of 97 Revision 43

6. **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).

7. **Multiple Tube Rupture Criteria:**

• IF level in any intact S/G increases in an uncontrolled manner OR any intact S/G indicates abnormal radiation, THEN perform the following:

__ a. Stop any operator controlled cooldown and depressurization in progress.

__ b. RETURN TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture), Step 1.

ATTACHMENT 13

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.

2. Initial Conditions

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

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

BB 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.)

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

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".

ATTACHMENT 13

☐ 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.

_____ 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.

_____ 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.

ATTACHMENT 13

_____ 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

ATTACHMENT 13

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)

ATTACHMENT 13

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.

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 Align reactor makeup water pump(s) as follows:

_____ 3.20.5.1 **IF** Unit 1 RMWST is **NOT** aligned to supply Unit 2 per OP/2/A/6200/012 (Reactor Makeup Water), ensure at least one reactor makeup water pump is in "ON".

_____ 3.20.5.2 **IF** Unit 1 RMWST is aligned to supply Unit 2 per OP/2/A/6200/012 (Reactor Makeup Water) **AND** a Unit 1 RMW Pump is **NOT** running to support Unit 2 activities, ensure at least one reactor makeup water pump is in "ON".

_____ 3.20.5.3 **IF** Unit 1 RMWST is aligned to supply Unit 2 per OP/2/A/6200/012 (Reactor Makeup Water) **AND** a Unit 1 RMW Pump is running to support Unit 2 activities, ensure the second Unit 1 reactor makeup water pump is in "ON".

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)

ATTACHMENT 13

_____ 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.

_____ 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.)

_____ 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 in the Control Copy folder of this procedure.

2017 INITIAL LICENSE NRC EXAM
SCENARIO # 4

Facility:	Catawba NRC Exam 2017	Scenario No.: 4	Op Test No.: 2017301
Examiners:		Operators:	SRO
			RO
			BOP

Initial Conditions: Unit 1 is at $7x10^{-2}$ % power at the BOL. Unit 2 is at 100% power.

Turnover: Unit 1 is at $7x10^{-2}$ % power at the BOL. Unit 2 is at 100% power. 1A Condensate Booster Pump is tagged out for emergent motor replacement. Direction for the crew is to swap operating RN pumps by starting the 1B RN pump and securing the 1A RN pump per OP/0/A/6400/006 C (Nuclear Service Water System) Enclosure 4.7 (Starting/Securing Additional RN Pumps). Initial conditions have been verified. Chemistry has been notified of the RN pump lineup being changed and has informed operations that RN Chemical Addition system has been aligned to support the RN pump swap. The Unit 1 Cation Bed Demineralizer is not in service. Unit 2 Mixed bed demineralizers have been bypassed per step 3.2.2. Crew is to begin at step 3.2.1 of Enclosure 4.7. Following the RN 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 RN pumps
2		R – RO	Increase reactor power
3	ENB008B	C – RO C – SRO TS - SRO	N36 Loss of Fission Chamber (Affects N32)
4	RL015 SG004	C – BOP TS – SRO	'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High
5	WL017D	C – BOP C – SRO	1A NCDT Pump trip
6	NCP003C	C – RO C - SRO	1C NC Pump High/High Vibration
7	EP003E EQB005A EQB006A	M – ALL	Loss of All AC Power
8	EQB005A EQB006A	C – RO	D/G Load Sequencers Fail To Actuate
9	RN003A RN003B RN003C RN003D	C – BOP C - SRO	RN Pump fails to start on power restoration

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

Scenario 4 – Summary

Initial Condition
Unit 1 is at $7x10^{-2}$ % power at the BOL. Unit 2 is at 100% power.

Turnover:
Unit 1 is at $7x10^{-2}$ % power at the BOL. Unit 2 is at 100% power. 1A Condensate Booster Pump is tagged out for emergent motor replacement. Direction for the crew is to swap operating RN pumps by starting the 1B RN pump and securing the 1A RN pump per OP/0/A/6400/006 C (Nuclear Service Water System) Enclosure 4.7 (Starting/Securing Additional RN Pumps). Initial conditions have been verified. Chemistry has been notified of the RN pump lineup being changed and has informed operations that RN Chemical Addition system has been aligned to support the RN pump swap. The Unit 1 Cation Bed Demineralizer is not in service. Unit 2 Mixed bed demineralizers have been bypassed per step 3.2.2. Crew is to begin at step 3.2.1 of Enclosure 4.7. Following the RN pump swap, the crew is to withdraw control rods to increase reactor power to ~14 % in preparation for placing the Main Turbine online.

Event 1
BOP will perform OP/0/A/6400/006 C Enclosure 4.7 to swap operating RN pumps.

Event 2
The RO will withdraw control rods to establish a positive startup rate to increase reactor power.

Event 3
A loss of fission chamber will occur affecting both Intermediate Range channel N36 and Source Range channel N32. Crew will enter AP/1/A/5500/016 (Malfunction of Nuclear Instrumentation). SRO will address Tech Specs.

Verifiable Action – The RO will insert control rods to stabilize reactor power. The BOP will remove N32 and N36 from service.

Event 4
'C' Low Pressure Service Water (RL) pump will trip. Crew will enter AP/0/A/5500/038 (Loss of Conventional Low Pressure Service Water). Five (5) minutes following the 'C' RL pump trip, 1A S/G N/R Level Channel 2 will Fail High.

Verifiable Action – BOP will start 'A' or 'B' RL pump. SRO will address Tech Specs.

Event 5
1A NCDT pump will trip. Crew will use the Annunciator Response for 1AD-13 B/2 annunciator (NCDT Recirc Lo Flow) to start 1B NCDT pump.

Verifiable Action – BOP starts 1B NCDT pump.

Event 6
1C NC pump will have a high vibration develop. The crew will use the Annunciator Response for 1AD-6 B/5 annunciator (NCP Hi-Hi Vibration) to determine that a reactor trip is required, and once reactor power is < 5%, that 1C NC pump should be secured.

Verifiable Action – RO will trip Unit 1 reactor.

Event 7
Once the reactor is tripped, a Loss of All AC power will occur on Unit 1.

Verifiable Action – RO will manually control S/G levels and the BOP will initiate S/I on both trains to start the D/Gs.

Event 8
Both trains D/G Load sequencers will fail to actuate. This will cause CAPT #1 to not receive a signal to start.

Verifiable Action – RO will manually start CAPT #1 to maintain S/G levels.

Event 9
Once S/I is initiated on both trains, the RN pumps will fail to start automatically.

Verifiable Action – BOP will reset ECCS and D/G load sequencers on both trains and start RN pumps as required.

***Critical Task 1* – Establish the minimum required AFW flow rate to the S/Gs prior to any S/G reaching dryout conditions (W/R level < 12%).**

***Critical Task 2* – Manually start Nuclear Service Water (RN) pumps such that the EDG does not fail because of damage caused by engine overheating.**

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	6
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)	2

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

   1.1 Reset to IC # 159 and load schedule file for Scenario 4.

START TIME:_____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		3	MAL-ENB008B (I/R N36 LOSS OF FISSION CHAMBER (AFFECTS N32))	ACTIVE				3
		4	LOA-RL015 (RACKOUT RL PUMP C)	RACK-OUT				4
		4	XMT-SG004 (LCF_5510 S/G 1A N/R LVL CH2 TO DCS/MCB/OAC (CFAA5510))	100	5:00			4
		5	OVR-WL017D (NCDT PMP 1A OFF PB)	ON				5
		5	OVR-WL017A (NCDT PMP 1A OFF LT)	OFF				5
		6	MAL-NCP003C (NCP C VIBRATION)	25		:15		6
		7	MAL-EP003E (ZONE 1A and 1B LOCKOUT)	ACTIVE				7
		7	MAL-EQB006A (TRN B BLACKOUT SEQUENCER BLOCK)	ACTIVE				7
		7	MAL-EQB005A (TRN A BLACKOUT SEQUENCER BLOCK)	ACTIVE				7
		7	OVR-DG014D (D/G 1A PB (11/212) OFF PB)	ON				7
		7	OVR-DG016D (D/G 1B PB (11/407) OFF PB)	ON				7
		7	MAL-RN003A (RN PMP 1A FAILURE TO STRT)	AUTO				9
		7	MAL-RN003B (RN PMP 1B FAILURE TO STRT)	AUTO				9
		7	MAL-RN003C (RN PMP 2A FAILURE TO STRT)	AUTO				9
		7	MAL-RN003D (RN PMP 2B FAILURE TO STRT)	AUTO				9
		11	OVR-DG014D (D/G 1A PB (11/212) OFF PB)	OFF				

		12	**OVR-DG016D (D/G 1B PB (11/407) OFF PB)**	**OFF**				
			ANN-AD11-B03 (TRANSFORMER A TROUBLE)	**ON**				
			ANN-AD11-E03 (TRANSFORMER B TROUBLE)	**ON**				
			LOA-CM039 (RACKOUT CBP 1A)	**RACK-OUT**				
		14	**LOA-VI011 (EMERGENCY DIESEL VI & ISOL VLV)**	**ON**	**10:00**			
		Ensure EVENT 7 = jpplp4(1) | jpplp4(2) (Reactor Trip Either Train)						
		Ensure EVENT 11 = jpplsia						
		Ensure EVENT 12 = jpplsib						
		Ensure Red Collar is placed on 1A Condensate Booster 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**, Swap Operating RN pumps

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Primary Chemistry notifying of intention to bypass Unit 1 demineralizers while changing RN Pump configuration, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection notifying of intention to bypass Unit 1 demineralizers while changing RN Pump configuration, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as the AO at the RN pump house for post start check of 1B RN pump, **REPORT** "1B RN Pump looks good for continued operation."

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Primary Chemistry notifying that Unit 1 demineralizers have been restored to service, **REPEAT** the information.

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Radiation Protection notifying that Unit 1 demineralizers have been restored to service, **REPEAT** the information.

3.3 **Scenario EVENT 2**, Withdrawing Control Rods To Increase Reactor Power

3.4 **Scenario EVENT 3**, N36 Loss of Fission Chamber (Affects N32)

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause a loss of fission chamber to N36 and N32.

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

✓	BOOTH INSTRUCTOR ACTION
	IF contacted as Reactor Engineering informing of loss of fission chamber, **REPEAT** the information.

3.5 **Scenario EVENT 4**, 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 4** to cause a trip of the 'C' RL Pump.

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

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to initiate an NCR or W/R for 1A S/G N/R Level Channel 2, **REPEAT** the information.

3.6 **Scenario EVENT 5**, 1A NCDT Pump Trip

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 5** to cause a trip of the 1A NCDT Pump.

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

3.7 **Scenario EVENT 6**, 1C NC Pump High/High Vibration

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 6** to cause a High/High Vibration on 1C NC Pump.

3.8 **Scenario EVENTS 7, 8, & 9**, Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

✓	BOOTH INSTRUCTOR ACTION
	If contacted as an AO dispatched to perform G-1 Enclosures 19 and 20, **REPEAT** the information and pull up and run schedule file **Schedule/Operations/ECA-0.0 EMXS - SSF DG – SSF pump.sch**
	After 5 minutes, contact the control room and **REPORT** "G-1 Enclosures 19 & 20 are complete. The standby makeup pump is in service."

✓	BOOTH INSTRUCTOR ACTION
	If contacted as an AO and dispatched to place the backup diesel VI compressor in service, **REPEAT** the information and **INSERT SIMULATOR Trigger 14** to start the backup diesel VI compressor and tie it to the VI header.
	After 10 minutes, contact the control room and **REPORT** "Backup Diesel VI Compressor #1 has been started and is tied to the VI header."

Enclosure 4.7
Starting/Securing Additional RN Pumps

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 Starting or stopping RN Pumps can affect KC system temperature which in turn can affect letdown temperature resulting in changes in letdown boron concentration if the demineralizers are in service. (R.M.)

1.3 After manual operation, maintenance or packing adjustment of any safety related valve, it shall be cycled electrically to insure reliable automatic operation.

1.4 RN Pump minimum flow is 8600 gpm for continuous operation. Flow rates between 8600 gpm and 4000 gpm are allowable for up to 2 hours in a 10 hour period. It is preferred to maintain RN flow ≥10,000 gpm.

1.5 The following sequence is recommended to relieve a RN Pump low flow condition:

1.5.1 Secure excess RN Pump(s).

1.5.2 Initiate manual RN Strainer backwash on non-affected RN Pump(s).

1.5.3 Establish flow through the RN Crossover Flush Header.

1.5.4 Establish flow through NS Heat Exchanger(s).

1.6 Maximum RN flow for one pump is 25,800 gpm. During pump manipulations max flow rate may be exceeded and low pressure conditions occur when reducing operating pumps while the RN system stabilizes. Stabilization is expected to occur within 10 minutes of the manipulation.

1.7 When securing one of two operating RN Pumps, RN high flow alarm may be momentarily received if total RN flow is greater than 32,000 gpm. A total flow greater than 37,000 gpm may result in momentarily exceeding of the 25,800 gpm maximum allowable flow.

1.8 Before contact with raw water or exposure to a raw water mist or spray, refer to AD-HS-ALL-0101 (Nuclear Health and Safety Handbook) for guidance and requirements on personal protective equipment, respiratory protection, personal hygiene and the posting of areas.

1.9 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}

1.10 Additions from RN Chemical Addition to the RN System must be secured at least 30 minutes before any section of RN piping that is to be drained to the WZ sump in the Auxiliary Building is isolated.

1.11 If RN is aligned to Lake Wylie and lake level is ≤ 562.0 ft, the possibility exists that running both RN pumps in either pit will result in an automatic swap to the SNSWP.

Enclosure 4.7
Starting/Securing Additional RN Pumps

OP/0/A/6400/006 C
Page 2 of 7

2. Initial Conditions

BB 2.1 Verify the RN System is in operation per Enclosure 4.1 (RN System Startup).

BB 2.2 Ensure appropriate Reactivity Management controls established per AD-OP-ALL-0203 (Reactivity Management). (R.M.)

3. Procedure

NOTE:
- If RN pumps are being swapped between trains, the RN Chemical Addition system may need to be secured or swapped as necessary.
- For operation with 2 RN Pumps in service, it is preferable to run 2 pumps in the same pit barring any other equipment issues or limitations. This provides more accurate chemical addition to the pit, helping to ensure chlorine concentrations remain below material compatability limitations for the RN System.

3.1 Perform the following:

NOTE: The time allowed for the next two steps may take up to an hour as there may be a minimum of 30 minutes of RN flow required after RN chemical addition has been secured, if required.

BB 3.1.1 Notify Chemistry that RN pump lineup is being changed. Chemistry will determine the need to change the operation of the RN Chemical Addition system.
Person notified Tony Story

NOTE: If plant conditions warrant immediate action, Step 3.1.2 may be completed later. A CR shall be written to describe actions taken.

BB 3.1.2 Chemistry has notified OPS that the RN Chemical Addition system is aligned to support pump manipulations and time requirements met.
Person contacted Tony Story

Enclosure 4.7
Starting/Securing Additional RN Pumps

OP/0/A/6400/006 C
Page 3 of 7

3.2 Align Letdown demineralizers as follows:

NOTE: Steps 3.2.1 and 3.2.2 may be performed in any order or concurrently.

____ 3.2.1 **IF** normal letdown is in service on Unit 1 per OP/1/A/6200/001 (Chemical and Volume Control System), perform the following:

BB 3.2.1.1 Verify the Cation Bed Demineralizer is **NOT** in service per OP/1/A/6200/001 (Chemical and Volume Control System).

____ 3.2.1.2 Record position of 1NV-153A (Letdn Hx Otlt 3-Way Vlv).
Recorded valve position _____

____ 3.2.1.3 **IF** letdown flow is through the demineralizers, notify Primary Chemistry that the demineralizers will be bypassed while changing RN Pump configuration.
Person notified _____

____ 3.2.1.4 **IF** letdown flow is through the demineralizers, notify Radiation Protection that the demineralizers will be bypassed while changing RN Pump configuration.
Person notified _____

____ 3.2.1.5 Place 1NV-153A (Letdn Hx Otlt 3-Way Vlv) in the "VCT" position.

BB 3.2.2 **IF** normal letdown is in service on Unit 2 per OP/2/A/6200/001 (Chemical and Volume Control System), perform the following:

BB 3.2.2.1 Verify the Cation Bed Demineralizer is **NOT** in service per OP/2/A/6200/001 (Chemical and Volume Control System).

BB 3.2.2.2 Record position of 2NV-153A (Letdn Hx Otlt 3-Way Vlv).
Recorded valve position Auto / Demin

BB 3.2.2.3 **IF** letdown flow is through the demineralizers, notify Primary Chemistry that the demineralizers will be bypassed while changing RN Pump configuration.
Person notified Greg Lancaster

BB 3.2.2.4 **IF** letdown flow is through the demineralizers, notify Radiation Protection that the demineralizers will be bypassed while changing RN Pump configuration.
Person notified Gary Beale

BB 3.2.2.5 Place 2NV-153A (Letdn Hx Otlt 3-Way Vlv) in the "VCT" position.

Enclosure 4.7
Starting/Securing Additional RN Pumps

OP/0/A/6400/006 C
Page 4 of 7

____ 3.3 **IF** starting RN pumps, perform the following:

____ 3.3.1 Evaluate in-service and available flow paths to ensure that no component flow rate limits are exceeded and RN Pump miniflow requirements will be met.

3.3.2 Start the desired RN pump:

____ • RN Pump 1A
____ • RN Pump 1B
____ • RN Pump 2A
____ • RN Pump 2B

____ 3.3.3 Verify the appropriate pump discharge valve opens:

☐ 1RN-28A (RN Pump 1A Disch Isol)
☐ 1RN-38B (RN Pump 1B Disch Isol)
☐ 2RN-28A (RN Pump 2A Disch Isol)
☐ 2RN-38B (RN Pump 2B Disch Isol)

____ 3.3.4 Verify the appropriate pump motor cooler inlet isolation opens:

☐ 1RN-11A (RN Pmp 1A Mtr Clr Inlet Isol) (indication on Monitor Light Panel 1MD-4 F/5, or on OAC graphic RNPUMPS, or OAC Point C1Q1397 (1RN11A RN Pump 1A Mtr Cooler Inlet Isol))
☐ 1RN-20B (RN Pmp 1B Mtr Clr Inlet Isol) (indication on Monitor Light Panel 1MD-4 F/8, or on OAC graphic RNPUMPS, or OAC Point C1Q1395 (1RN20B RN Pump 1B Mtr Cooler Sup Isol))
☐ 2RN-11A (RN Pmp 2A Mtr Clr Isol) (indication on Monitor Light Panel 2MD-4 F/5, or on OAC graphic RNPUMPS, or OAC Point C2Q1397 (2RN11A RN Pump 2A Mtr Cooler Inlet Isol))
☐ 2RN-20B (RN Pmp 2B Mtr Clr Isol) (indication on Monitor Light Panel 2MD-4 F/8, or on OAC graphic RNPUMPS, or OAC Point C2Q1395 (2RN20B RN Pump 2B Mtr Cooler Sup Isol))

N/A 3.3.5 **IF** RN Pump 2A was started, perform the following: {PIP 94-1591}

____ 3.3.5.1 Open equalizing valve for 2RNPG7440 (2A RN Pump Motor Cooler Outlet Flow) (RNB 605).

____ 3.3.5.2 **AFTER** 5 minutes, close equalizing valve for 2RNPG7440 (2A RN Pump Motor Cooler Outlet Flow) (RNB 605).

Enclosure 4.7
Starting/Securing Additional RN Pumps

N/A 3.3.6 **IF** RN Pump 2B was started, perform the following: {PIP 94-1591}

____ 3.3.6.1 Open equalizing valve for 2RNPG7410 (2B RN Pump Motor Cooler Outlet Flow) (RNB 605).

____ 3.3.6.2 **AFTER** 5 minutes, close equalizing valve for 2RNPG7410 (2B RN Pump Motor Cooler Outlet Flow) (RNB 605).

NOTE: When RN Essential Header temperature is ≥ 80°F, two RN Pumps are normally in service to ensure continuous flow through KC Hxs selected to "MINIFLOW".

____ 3.4 **IF** securing RN pumps, perform the following:

NOTE: To secure all RN pumps, refer to Enclosure 4.2 (Shutdown of the RN System).

3.4.1 Shutdown the desired RN pump:

____ • RN Pump 1A
____ • RN Pump 1B
____ • RN Pump 2A
____ • RN Pump 2B

____ 3.4.2 Verify the appropriate pump discharge valve closes:

☐ 1RN-28A (RN Pump 1A Disch Isol)
☐ 1RN-38B (RN Pump 1B Disch Isol)
☐ 2RN-28A (RN Pump 2A Disch Isol)
☐ 2RN-38B (RN Pump 2B Disch Isol)

____ 3.4.3 Verify the appropriate pump motor cooler inlet isolation closes:

☐ 1RN-11A (RN Pmp 1A Mtr Clr Inlet Isol) (indication on OAC graphic RNPUMPS, or OAC Point C1Q1397 (1RN11A RN Pump 1A Mtr Cooler Inlet Isol))
☐ 1RN-20B (RN Pmp 1B Mtr Clr Inlet Isol) (indication on OAC graphic RNPUMPS, or OAC Point C1Q1395 (1RN20B RN Pump 1B Mtr Cooler Sup Isol))
☐ 2RN-11A (RN Pmp 2A Mtr Clr Isol) (indication on OAC graphic RNPUMPS, or OAC Point C2Q1397 (2RN11A RN Pump 2A Mtr Cooler Inlet Isol))
☐ 2RN-20B (RN Pmp 2B Mtr Clr Isol) (indication on OAC graphic RNPUMPS, or OAC Point C2Q1395 (2RN20B RN Pump 2B Mtr Cooler Sup Isol))

Enclosure 4.7
Starting/Securing Additional RN Pumps

3.5 Align Letdown demineralizers as follows:

NOTE: Steps 3.5.1 and 3.5.2 may be performed in any order or concurrently.

_____ 3.5.1 **IF** normal letdown is in service on Unit 1 per OP/1/A/6200/001 (Chemical and Volume Control System), **WHEN** KC temperature has stabilized perform the following:

_____ 3.5.1.1 **IF** 1NV-153A (Letdn Hx Otlt 3-Way Vlv) position was recorded as "DEMIN" in Step 3.2.1.2 **AND** no other reason exists for it to remain in the "VCT" position, return it to "AUTO" as follows:

_____ A. Place 1NV-153A in the "DEMIN" position. (R.M.)

☐ B. Verify 1NV-153A returns to "AUTO".

_____ 3.5.1.2 **IF** letdown flow is through the demineralizers, notify Primary Chemistry that the demineralizers have been restored to service.
Person notified _____

_____ 3.5.1.3 **IF** letdown flow is through the demineralizers, notify Radiation Protection that the demineralizers have been restored to service.
Person notified _____

_____ 3.5.2 **IF** normal letdown is in service on Unit 2 per OP/2/A/6200/001 (Chemical and Volume Control System), **WHEN** KC temperature has stabilized perform the following:

_____ 3.5.2.1 **IF** 2NV-153A (Letdn Hx Otlt 3-Way Vlv) position was recorded as "DEMIN" in Step 3.2.2.2 **AND** no other reason exists for it to remain in the "VCT" position, return it to "AUTO" as follows:

_____ A. Place 2NV-153A in the "DEMIN" position. (R.M.)

☐ B. Verify 2NV-153A returns to "AUTO".

_____ 3.5.2.2 **IF** letdown flow is through the demineralizers, notify Primary Chemistry that the demineralizers have been restored to service.
Person notified _____

_____ 3.5.2.3 **IF** letdown flow is through the demineralizers, notify Radiation Protection that the demineralizers have been restored to service.
Person notified _____

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Event Description: Swap Operating RN (Nuclear Service Water) pumps

Enclosure 4.7

Starting/Securing Additional RN Pumps

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____ 3.6 Document the running RN Pump(s) below:

- ☐ RN Pump 1A
- ☐ RN Pump 1B
- ☐ RN Pump 2A
- ☐ RN Pump 2B

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

Note To Evaluator:

This concludes Event 1. Event 2 has the control room crew withdrawing control rods to establish a positive startup rate to increase reactor power to approximately 14 % in preparation for placing the Main Turbine online. The steps for withdrawing control rods are included starting on the next page.

n

Enclosure 4.4
Rod Withdrawal

OP/**1**/A/6150/008
Page 1 of 7

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 Criticality shall be anticipated anytime control rods are being withdrawn.

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

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

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

1.2.5 Severe reactor power tilts (in excess of Tech Spec limits) may result from a dropped rod and its recovery. The Reactor Group Engineer may restrict reactor power to ≤ 50% RTP per T. S. 3.2.4.

1.2.6 Do **NOT** attempt to achieve criticality during dropped rod retrieval.

1.2.7 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 Two or more control rod drive ventilation fans shall be in operation when either reactor coolant temperature is ≥ 350°F or control rod drive mechanisms are energized.

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

1.7 Prior to operation of CRDMs, NC System must be filled and vented with NC System pressure > 300 psig.

1.8 If the Rod Control System is capable of rod withdrawal with the Unit in Mode 3, then at least three RCS loops shall be in operation. Refer to TS 3.4.5.

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

1.10 Automatic Rod withdrawal is blocked when Control Rod Bank D is ≥ 200 steps withdrawn.

1.11 Failure to pause at each bank position with the "CRD BANK SELECT" switch may result in dropping rods.

2. Initial Conditions

BB 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

BB 2.2 **IF** 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 **IF** < P-11 **AND** 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}

☐ **IF** NC temperature ≥ 400°F, verify SDM per OP/0/A/6100/006 (Reactivity Balance Calculation) using 400°F.

☐ **IF** NC temperature < 400°F, verify SDM per OP/0/A/6100/006 (Reactivity Balance Calculation) using current NC temperature.

BB 3.2 **IF** > P-11 **OR** 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

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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:

BB 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).

BB 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.

BB 3.3.2.1 Place "CRD BANK SELECT" in the "SBA" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 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.

BB 3.3.2.6 Verify that the shutdown bank mechanisms are moving on the DRPI display.

Enclosure 4.4
Rod Withdrawal

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BB 3.3.3 **IF NOT** fully withdrawn, withdraw Shutdown Bank B as follows:

BB 3.3.3.1 Place "CRD BANK SELECT" in the "SBB" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 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.

BB 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.

BB 3.3.5 Withdraw Shutdown Bank C as follows:

BB 3.3.5.1 Place "CRD BANK SELECT" in the "SBC" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 3.3.5.5 Verify that the shutdown bank mechanisms are moving on the DRPI display.

Enclosure 4.4
Rod Withdrawal

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BB 3.3.6 Withdraw Shutdown Bank D as follows:

BB 3.3.6.1 Place "CRD BANK SELECT" in the "SBD" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 3.3.6.5 Verify that the shutdown bank mechanisms are moving on the DRPI display.

BB 3.3.7 Withdraw Shutdown Bank E as follows:

BB 3.3.7.1 Place "CRD BANK SELECT" in the "SBE" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 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.

BB 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.

BB 3.5 Place the "CRD BANK SELECT " switch in the "MAN" position.

___ 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.

___ 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

___ 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.)

___ 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
Rod Withdrawal

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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 to increase reactor power, Event 2 is complete. At the discretion of the Lead Evaluator, the scenario may continue by having the booth operator INSERT Trigger 3 for Event 3 (N36 Loss of Fission Chamber (Also Affects N32)).

Op Test No.:	301	Scenario #	4	Event #	3	Page	24	of	118

Event Description: N36 Loss of Fission Chamber (Also Affects N32)

Control Room Indications
Flux level on N36 and N32 decrease

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Event Description: N36 Loss of Fission Chamber (Also Affects N32)

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

1. **Verify at least one of the following S/R Channels - OPERABLE:**

   __ • N-31

   OR

   __ • N-32.

Note To Evaluator:

The failure of a fission chamber will affect both Intermediate Range detector N36 and Source Range detector N32. This will require performing both Case I and Case III of AP/16. The crew can start with either Case and it will direct them to the other Case once the instrument is removed from service.

Perform the following:

a. IF in Mode 2 below P-6, THEN perform the following:

__ 1) Manually trip reactor.

__ 2) GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

b. IF in Mode, 3, 4, or 5 AND the following conditions exist:

__ • Reactor Trip Breakers - CLOSED

__ • Rod control system capable of rod withdrawal.

THEN perform the following:

__ 1) Manually trip reactor.

__ 2) IF any control rods were withdrawn AND Pzr Pressure greater than 1955 PSIG, THEN GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

__ 3) IF any control rods were withdrawn AND Pzr Pressure less than 1955 PSIG, THEN REFER TO AP/1/A/5500/005 (Reactor Trip or Inadvertent S/I Below P-11).

__ c. GO TO Step 5.

__ 2. **Verify unit - IN MODE 2 BELOW P-6.** → __ **GO TO Step 5.**

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Event Description: N36 Loss of Fission Chamber (Also Affects N32)

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case I Source Range Malfunctions	PAGE NO. 3 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Limited boron concentration changes associated with NC inventory control or limited plant temperature changes are allowed.

__ 3. **Stop operations involving positive reactivity additions.**

__ 4. GO TO **Step 7.**

__ 5. **Verify unit - IN MODE 6.** → __ GO TO **Step 7.**

NOTE BDMS (Gamma Metrics) automatic actuations and alarm not required for operability during refueling operations.

6. **Verify at least two of the following neutron flux monitors - OPERABLE:**

__ • N-31

__ • N-32

__ • A Train BDMS

__ • B Train BDMS.

Perform the following:

a. Notify fuel handling operators to perform the following:

__ 1) Place components being handled in a safe position.

__ 2) Suspend Core Alterations.

__ b. Suspend operations that would cause introduction of coolant into the NC system with boron concentration less than limit specified in the COLR.

__ c. IF no neutron flux monitors operable, THEN immediately initiate actions to restore one neutron flux monitor to operable status.

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Event Description: N36 Loss of Fission Chamber (Also Affects N32)

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case I Source Range Malfunctions	PAGE NO. 4 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Identify the affected S/R channel(s):**

__ • N31

OR

__ • N32.

8. **Verify the following alarms - DARK:**

__ • 1AD-2, D/3 "S/R HI FLUX LEVEL AT SHUTDOWN"

__ • 1AD-2, D/4 "S/R HI FLUX LEVEL AT SHUTDOWN".

Perform the following:

__ a. Depress "OFF" for the containment evacuation alarm.

__ b. Notify plant personnel to disregard the containment evacuation alarm.

NOTE 1AD-2, C/4 "N/I SYS S/R & I/R TRIP BYPASS" will actuate in the following step.

__ 9. **At the affected S/R drawer, place the "LEVEL TRIP" switch for the affected channel in "BYPASS".**

__ 10. **Verify the affected S/R channel trip bypass status light (1SI-19) - LIT.**

__ **Notify OSM that due to loss of control power S/R "LEVEL TRIP" cannot be bypassed. Reactor power reduction below P-6 S/R BLOCK PERMISSIVE will result in Reactor Trip due to "N/I HI FLUX SR RX TRIP".**

__ 11. **Verify 1AD-2, C/4 "N/I SYS S/R & I/R TRIP BYPASS" - LIT.**

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Event Description: N36 Loss of Fission Chamber (Also Affects N32)

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case I Source Range Malfunctions	PAGE NO. 5 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Annunciator 1AD-2 D/2 "S/R HI SHUTDOWN FLUX ALM BLOCKED" is disabled above P-10 (10% reactor power).

12. **Block the high flux at shutdown function as follows:**

__ a. At the affected S/R drawer, ensure the "HIGH FLUX AT SHUTDOWN" switch for the affected channel in "BLOCK".

__ b. Verify 1AD-2, D/2 "S/R HI SHUTDOWN FLUX ALM BLOCKED" - LIT.

13. **Align components to operable S/R channel as follows:**

N/A • IF Audio Count Rate required to be in service, THEN align Audio Count Rate Channel "CHANNEL SELECTOR" switch to operable S/R channel.

__ • Ensure NIS RECORDER aligned to operable S/R channel.

CAUTION **Loss of S/R control power below P-6 will result in a reactor trip.**

__ 14. **Determine and correct cause of S/R malfunction.**

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

__ • 3.3.1 (Reactor Trip System (RTS) Instrumentation)

N/A • 3.9.2 (Nuclear Instrumentation)

N/A • 3.3.9 (Boron Dilution Mitigation System(BDMS)).

Tech Spec 3.3.1:
- **(Function 4) Condition F applies to reduce THERMAL POWER to < P-6 OR increase THERMAL POWER to > P-10 in 24 hours.**
- **(Function 5) Tracking entry for Source Range Instrument N32.**

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Event Description: N36 Loss of Fission Chamber (Also Affects N32)

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case I Source Range Malfunctions	PAGE NO. 6 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. **Determine required notifications:**

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

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

__ 17. **Notify Reactor Group Engineer of occurrence.**

__ 18. **WHEN the affected S/R channel is repaired, THEN ensure IAE returns the channel to service.**

NOTE IR Channel instrument power failure may cause a SR and IR channel to malfunction.

__ 19. **IF IR channel malfunction exists and not previously addressed by this procedure, THEN GO TO Case III (Intermediate Range Malfunction).**

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

END

Op Test No.:	301	Scenario #	4	Event #	3	Page	30	of	118

Event Description: N36 Loss of Fission Chamber (Also Affects N32)

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case III Intermediate Range Malfunction	PAGE NO. 8 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Verify reactor power - GREATER THAN 10%. → __ Stop any power increase.

__ 2. Verify 1AD-2, C/3 "I/R HI FLUX LEVEL ROD STOP" - DARK. — __ Adjust turbine load to maintain T-Avg at T-Ref.

3. Identify affected I/R channel:

__ • N-35

OR

__ • N-36.

NOTE 1AD-2, C/4 "N/I SYS S/R & I/R TRIP BYPASS" will actuate in the following step.

__ 4. At the affected I/R drawer, place the "LEVEL TRIP" switch for affected channel in "BYPASS".

__ 5. Verify the affected I/R channel trip bypass status light (1SI-19) - LIT. — __ Notify OSM that due to loss of control power I/R "HIGH LEVEL TRIP" cannot be bypassed. Reactor power reduction below P-10 I/R BLOCK PERMISSIVE will result in Reactor Trip due to "N/I HI FLUX IR RX TRIP".

__ 6. Verify 1AD-2, C/4 "N/I SYS S/R & I/R TRIP BYPASS" - LIT.

__ 7. Ensure operable I/R channel selected to record on NIS RECORDER.

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Event Description: N36 Loss of Fission Chamber (Also Affects N32)

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case III Intermediate Range Malfunction	PAGE NO. 9 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION
- **Loss of I/R control power below P-10 will result in reactor trip.**
- **Loss of I/R instrument power below P-10 will result in reactor trip unless affected channel "LEVEL TRIP" switch in "BYPASS".**

__ 8. **Determine and correct cause of I/R malfunction.**

__ 9. **Ensure compliance with Tech Spec 3.3.1 (Reactor Trip System (RTS) Instrumentation).**

Tech Spec 3.3.1:
- **(Function 4) Condition F applies to reduce THERMAL POWER to < P-6 OR increase THERMAL POWER to > P-10 in 24 hours.**
- **(Function 5) Tracking entry for Source Range Instrument N32.**

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 Reactor Group Engineer of occurrence.**

CAUTION Closing either I/R control power breaker or instrument power breaker with any P/R channel inoperable or in tripped condition may result in a reactor trip on P/R rate trip due to voltage spikes.

__ 12. **WHEN the affected I/R channel is repaired, THEN ensure IAE returns the channel to service.**

Op Test No.:	301	Scenario #	4	Event #	3	Page	32	of	118

Event Description: N36 Loss of Fission Chamber (Also Affects N32)

CNS AP/1/A/5500/016	MALFUNCTION OF NUCLEAR INSTRUMENTATION SYSTEM Case III Intermediate Range Malfunction	PAGE NO. 10 of 15 Revision 27

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE IR Channel instrument power failure may cause a SR and IR channel to malfunction.

__ 13. **IF SR channel malfunction exists and not previously addressed by this procedure, THEN GO TO Case I (Source Range Malfunctions).**

__ 14. **Determine long term plant status. RETURN TO procedure in effect.**

END

Note To Evaluator:

This is the end of Event 3. At the Lead Evaluators discretion, the scenario may continue by having the booth operator INSERT Trigger 4 for Event 4 ('C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High).

Op Test No.:	301	Scenario #	4	Event #	4	Page	33	of	118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

Control Room Indications
OAC alarm for RL Header Pressure Low
RL Header Pressure decreasing
Indicating lights for 'C' RL pump - DARK

Op Test No.:	301	Scenario #	4	Event #	4	Page	34	of	118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 2 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Ensure Unit 1 and Unit 2 OATC monitors Enclosure 1 (Foldout Page).

Enclosure 1 can be found as Attachment 3.

__ 2. Verify at least one RL pump in service.

Perform the following:

__ a. Start at least one RL pump.

N/A b. IF no RL pump can be placed in service, THEN perform the following:

__ 1) Dispatch operator to start Backup VI Compressor. REFER to EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 23 (Backup VI Compressor(s)).

__ 2) Dispatch operator to align RF to VI compressors. REFER TO Enclosure 4 (RF To VI Compressor Alignment)

__ 3) Align Unit 1 YV to RN cooling. REFER TO Enclosure 5 (Unit 1 YV to RN Cooling).

__ 4) Align Unit 2 YV to RN cooling. REFER TO Enclosure 6 (Unit 2 YV to RN Cooling).

5) Concurrently perform the following as required:

__ • Ensure Unit 1 Reactor - TRIPPED. GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)

AND

__ • Ensure Unit 2 Reactor - TRIPPED. GO TO EP/2/A/5000/E-0 (Reactor Trip or Safety Injection).

Note To Evaluator:

Five (5) minutes after the trip of 'C' RL pump, 1A S/G N/R Level Channel 2 will fail high causing annunciator 1AD-4 D/1 (S/G A HI-HI LEVEL ALERT). This annunciator response can be found following the steps for AP/38 in this guide.

Op Test No.: 301 Scenario # 4 Event # 4 Page 35 of 118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 3 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE 0RLP5030 is the indication used in this procedure for monitoring and controlling RL header pressure. The OAC indication C2A0017 will read lower due to the location of the pressure tap.

__ 3. **IF AT ANY TIME 0RLP5030 is out of service, THEN Unit 2 OAC point C2A0017 may be used as RL pressure indication, contingent on OWPG/ENG providing a correlation factor.**

__ 4. **Verify RL pressure greater than 60 PSIG AND stable or increasing.**

Perform the following:

__ a. Start additional RL pump(s) as required.

__ b. IF RL leak suspected, THEN dispatch operator to locate leak.

__ c. Monitor RL pressure.

__ d. IF RL pressure remains less than 60 PSIG, THEN GO TO Step 7.

__ 5. **IF AT ANY TIME RL pressure less than 60 PSIG, THEN RETURN TO Step 2.**

__ 6. **GO TO Step 17.**

__ 7. **Ensure any Liquid Waste release in progress is secured as required.**

8. **Ensure Chemistry notified to perform the following:**

__ • Secure Unit 1 cooling tower blowdown.
__ • Secure Unit 2 cooling tower blowdown.

Op Test No.: 301	Scenario # 4	Event # 4	Page 36	of 118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 4 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 9. **Verify RL pressure less than 54 PSIG AND stable or decreasing.**	**Perform the following:** __ a. Monitor RL cooled equipment for continued operation. REFER TO Enclosure 1 (Foldout Page). __ b. IF AT ANY TIME RL cooled equipment temperature approaching trip limit, THEN GO TO Step 10. __ c. IF AT ANY TIME RL pressure less than 54 psig AND stable or decreasing, THEN RETURN TO Step 9. __ d. GO TO Step 16.
10. **Ensure VI compressors aligned as follows:** __ a. Ensure operator dispatched to start Backup VI Compressor. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 23 (Backup VI Compressor(s)). __ b. Ensure operator dispatched to align RF to VI compressors. REFER TO Enclosure 4 (RF To VI Compressor Alignment).	
__ 11. **Verify RL pump(s) in service.**	**IF no RL pump can be placed in service, THEN perform the following:** __ • Shutdown Unit 1 equipment. REFER TO Enclosure 2 (Unit 1 Equipment Shutdown) __ • Shutdown Unit 2 equipment. REFER TO Enclosure 3 (Unit 2 Equipment Shutdown).

Op Test No.: 301	Scenario # 4	Event # 4	Page 37	of 118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 5 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 12. **Verify both Units on line.**	**Perform the following to maintain Cooling Tower level AND RL pressure greater than 60 PSIG:** __ a. IF Unit 1 on line, THEN reduce load as required. REFER TO AP/1/A/5500/009 (Rapid Downpower). __ b. IF Unit 2 on line, THEN reduce load as required. REFER TO AP/2/A/5500/009 (Rapid Downpower). __ c. GO TO Step 14.
13. **Reduce Unit load as follows:** __ a. Notify a second SRO to report to the Control Room. b. Initiate load reduction on both Units to 50% reactor power in 15 minutes. REFER TO the following: __ • AP/1/A/5500/009 (Rapid Downpower) __ • AP/2/A/5500/009 (Rapid Downpower).	
__ 14. **Verify 1AD-13, F/6 "YV HI TEMP" - DARK.**	**Perform the following:** __ a. IF Unit 1 YV chiller(s) tripped AND RL can support YV chiller operation, THEN dispatch operator to restore YV. REFER TO OP/1/A/6450/020 (Containment Chilled Water System). __ b. IF RL cannot support Unit 1 YV chiller operation OR any NC pump stator temperature exceeds 275°F, THEN ensure Unit 1 YV aligned to RN cooling. REFER TO Enclosure 5 (Unit 1 YV to RN Cooling).

Op Test No.: 301 Scenario # 4 Event # 4 Page 38 of 118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 6 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 15. **Verify 2AD-13, F/6 "YV HI TEMP" - DARK**	**Perform the following:** __ a. IF Unit 2 YV chiller(s) tripped AND RL can support YV chiller operation, THEN dispatch operator to restore YV. REFER TO OP/2/A/6450/020 (Containment Chilled Water System). __ b. IF RL cannot support Unit 2 YV chiller operation OR any NC pump stator temperature exceeds 275°F, THEN ensure Unit 2 YV aligned to RN cooling. REFER TO Enclosure 6 (Unit 2 YV to RN Cooling).

Op Test No.:	301	Scenario #	4	Event #	4	Page	39	of	118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 7 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

16. **IF additional RL cooling capacity needed, THEN reduce RL heat load by performing the following as required:**

__ • Evaluate securing Unit 1 S/G Blowdown. REFER TO OP/1/A/6250/008 (Steam Generator Blowdown).

__ • Evaluate securing Unit 2 S/G Blowdown. REFER TO OP/2/A/6250/008 (Steam Generator Blowdown).

__ • Evaluate NF shutdown on both Units. REFER TO Enclosure 7 (NF System Shutdown).

__ • Evaluate VS compressor(s) shutdown. REFER TO OP/0/A/6450/013 (Station Air System).

__ • Evaluate VB compressor(s) shutdown. REFER TO OP/0/A/6450/006 (Breathing Air System).

__ • Evaluate shutdown Service Building Ventilation units cooled by RL. REFER TO OP/0/B/6450/021 Service Building Chill Water and Ventilation System.

__ • Evaluate shutdown Unit 1 Turbine Building Ventilation units cooled by KR. REFER TO OP/1/B/6450/016 (Turbine Building Ventilation Systems).

__ • Evaluate shutdown Unit 2 Turbine Building Ventilation units cooled by KR. REFER TO OP/2/B/6450/016 (Turbine Building Ventilation System).

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

N/A • 3.4.5 (RCS Loops - MODE 3)

N/A • 3.6.5 (Containment Air Temperature)

N/A • 3.6.12 (Ice Bed)

Op Test No.:	301	Scenario #	4	Event #	4	Page	40	of	118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 8 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

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. **Determine and correct cause of loss of Low Pressure Service Water (RL).**

20. **WHEN plant conditions permit, THEN perform the following:**

UNIT 1

__ a. Perform required steps in OP/1/A/6100/003 (Controlling Procedure For Unit Operation).

__ b. Perform required steps in OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown).

UNIT 2

__ a. Perform required steps in OP/2/A/6100/003 (Controlling Procedure For Unit Operation).

__ b. Perform required steps in OP/2/A/6100/002 (Controlling Procedure For Unit Shutdown).

21. **WHEN RL system low pressure condition cleared and RL pressure stable, THEN perform the following:**

__ • Evaluate 1RL-199 return to desired position. REFER TO OP/0/B/6400/003 (Low Pressure Service Water System)

__ • Evaluate KR system return to normal. REFER TO OP/0/B/6400/004 (Recirculated Cooling Water System)

Op Test No.: 301	Scenario # 4	Event # 4	Page 41	of 118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 9 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

21. (Continued)

__ • Evaluate VI system return to normal. REFER TO AP/0/A/5500/022 (Loss Of Instrument Air)

__ • Evaluate Unit 1 YV system return to normal. REFER TO OP/1/A/6450/020 (Containment Chilled Water System)

__ • Evaluate Unit 2 YV system return to normal. REFER TO OP/2/A/6450/020 (Containment Chilled Water System)

__ • Evaluate NF system return. REFER TO OP/0/A/6200/008 (Ice Condenser Refrigeration System).

__ • Evaluate establishing Unit 1 S/G Blowdown. REFER TO OP/1/A/6250/008 (Steam Generator Blowdown).

__ • Evaluate establishing Unit 2 S/G Blowdown. REFER TO OP/2/A/6250/008 (Steam Generator Blowdown).

__ • Evaluate restoring VB system. REFER TO OP/0/A/6450/006 (Breathing Air System).

__ • Evaluate restoring VS system. REFER TO OP/0/A/6450/013 (Station Air System).

__ • Evaluate Service Building Ventilation return. REFER TO OP/0/B/6450/021 Service Building Chill Water and Ventilation System.

__ • Evaluate Unit 1 Turbine Building Ventilation return. REFER TO OP/1/B/6450/016 (Turbine Building Ventilation Systems).

__ • Evaluate Unit 2 Turbine Building Ventilation return. REFER TO OP/2/B/6450/016 (Turbine Building Ventilation System).

CNS AP/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER	PAGE NO. 10 of 19 Revision 2

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 22. **Determine long term plant status.**
RETURN TO procedure in effect.

END

Op Test No.:	301	Scenario #	4	Event #	4	Page	43	of	118

Event Description: 'C' RL Pump Trip / 1A S/G N/R Level Channel 2 Fails High

Panel 1AD-4

D/1

S/G A HI-HI LEVEL ALERT

SETPOINT: 1/4 narrow range level channels > 83.9%

ORIGIN:
1. 1CFLT5501 Channel 1
2. 1CFLT5510 Channel 2
3. 1CFLT5500 Channel 3
4. 1CFLT5490 Channel 4

PROBABLE CAUSE:
1. Malfunction of S/G level control
2. Instrument malfunction

AUTOMATIC ACTIONS: None

NOTE: 2/4 hi-hi level will cause:

- Turbine trip
- Feedwater pumps trip
- Feedwater isolation

IMMEDIATE ACTIONS:
1. Compare all level indication to verify alarm.
2. **IF** automatic level control is **NOT** correcting, take manual control and reduce level.

SUPPLEMENTARY ACTIONS:
1. **WHEN** malfunction is corrected **OR** bypassed, return to automatic control. Refer to AP/1/A/5500/006 (Loss of S/G Feedwater).
2. Refer to Tech Specs for operable channel requirements (TS 3.3.1, 3.3.2, 3.3.3 and 3.3.4).

Tech Spec 3.3.1 (Function 13):
- **Condition E applies to place the channel in trip in 72 hours OR be in Mode 3 in 78 hours.**

Tech Spec 3.3.2:
- **(Function 5.a(2)): Condition J applies to place channel in trip in 72 hours OR be in Mode 3 in 78 hours.**
- **(Function 5.b(2) and 6.b): Condition D applies to place the channel in trip in 72 hours OR be in Mode 3 in 78 hours AND be in Mode 4 in 84 hours.**

Tracking entries will also be made for Tech Specs 3.3.3 and 3.3.4 for the inoperable channel.

Note To Evaluator:

Once Tech Specs have been addressed and at the discretion of the Lead Evaluator, the scenario may continue to the next event by having the booth operator INSERT Trigger 5 for Event 5 (1A NCDT Pump Trip).

Op Test No.:	301	Scenario #	4	Event #	5	Page	44	of	118

Event Description: 1A NCDT Pump Trip

Control Room Indications
1AD-13, B/2 "NCDT RECIRC LO FLOW" - LIT

Note To Evaluator:

The response for this Event is located in the alarm response for 1AD-13, B/2 "NCDT RECIRC LO FLOW" which is included on the following page.

OP/1/B/6100/010N
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Panel 1AD-13

B/2

NCDT RECIRC LO FLOW

SETPOINT: 30 gpm

ORIGIN: 1WLFT5730 (RCDT Recirculation Flow)

PROBABLE CAUSE:
1. NCDT pumps tripped
2. Loss of suction to NCDT pumps (low NCDT level)
3. Malfunction of 1WL-802 (NCDT Lvl Ctrl)
4. NCDT isolated for cooldown of PRT contents

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS: Verify low recirc. flow on 1WLP5730 NCDT Recirc. Flow on 1MC9.

SUPPLEMENTARY ACTIONS:
1. Verify NCDT level on 1WLP5630 on 1MC11.
2. IF due to pump malfunction, start alternate NCDT pump.

N/A 3. IF no NCDT pumps are available, refer to OP/1/A/6500/014 (Operations Controlled Liquid Waste System).

4. Verify proper operation of 1WL-802 (NCDT Lvl Ctrl).

REFERENCES:
1. CN-1565-2.0
2. Westinghouse Setpoint Document CNM-1201.00-39

Note To Evaluator:

The concludes Event 5. At the discretion of the Lead Evaluator, the scenario may continue by having the booth operator INSERT Trigger 6 for Event 6 (1C NC Pump High/High Vibration).

Op Test No.:	301	Scenario #	4	Event #	6	Page	46	of	118
Event Description:	1C NC Pump High/High Vibration								

Control Room Indications
1AD-6, A/5 "NCP HI VIBRATION" - LIT
1AD-6, B/5 "NCP HI-HI VIBRATION" - LIT
1C NC Pump Shaft Vibration indicating 25 mils on NC Pump Vibration Monitor

Note To Evaluator:

The response for this Event is found in the alarm response for 1AD-6, B/5 (NCP HI-HI VIBRATION) which is included on the following page.

OP/1/B/6100/010 G
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PANEL: 1AD-6

B/5

NCP HI-HI VIBRATION

SETPOINT:
1. 5 mils (frame)
2. 20 mils (shaft)

ORIGIN:
1. 1 of 2 vibration pickups on 1 of 4 NC pump frames
2. 1 of 2 vibration pickups on 1 of 4 NC pump/motor shafts
3. 1RFM-2 on 1RFMP1

PROBABLE CAUSE:
1. Motor or pump imbalance
2. Changes in NC System temperature and/or pressure
3. Changes in containment temperature

AUTOMATIC ACTIONS: None

IMMEDIATE ACTIONS: None

SUPPLEMENTARY ACTIONS:
1. Verify which pump has Hi-Hi vibration, from 1EMMN5390 (NC Pump Vibration Monitor Panel System Panel (back of 1MC6).
2. Read all 4 vibration channels for the alarming pump and compare readings to determine if a real vibration problem exists.
3. **IF** a valid frame or shaft vibration indication exists, then perform the following:
   - 3.1 **IF** in Modes 1 **OR** 2:
     - 3.1.1 Trip reactor.
     - 3.1.2 **WHEN** reactor power less than 5%, **THEN** trip the affected NC pump.
     - N/A 3.1.3 **IF** A **OR** B NCP is tripped, ensure that the spray valve associated with the pump is closed.
     - 3.1.4 Go to EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
   - N/A 3.2 **IF NOT** in Modes 1 **OR** 2:
     - 3.2.1 **IF** alarm is due to frame vibration exceeding 5 mils **OR** shaft vibration exceeding 30 mils perform the following:
       - 3.2.1.1 Trip the affected NC Pump.
       - 3.2.1.2 Go to AP/1/A/5500/004 (Loss of Reactor Coolant Pump).

CONTINUED ON THE NEXT PAGE

OP/1/B/6100/010 G
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PANEL: 1AD-6

B/5

NCP HI-HI VIBRATION (Cont'd)

SUPPLEMENTARY ACTIONS: (con't)

3.2.2 **IF** shaft vibrations are > 20 mils but < 30 mils **AND** continued NC Pump operations are required to support data acquisition or short term operational needs perform the following:

- Contact Engineering to determine if continued operation is allowed.
- Contact OSM for approval for continued operation.

3.2.3 **IF** continued operation is not allowed **OR** the condition has exceeded 24 hours (PIP C-03-02132) perform the following:

3.2.1.3 Trip the affected NC Pump.

3.2.1.4 Go to AP/1/A/5500/004 (Loss of Reactor Coolant Pump).

REFERENCES:

1. CNM-1201.01-157 (NC Pump Tech Manual)
2. TS 3.4.4, 3.4.5, 3.4.6
3. CNEE-0153-01.02
4. PIP #1-C95-0437
5. PPRB OPS-8470
6. PIP #C-03-2132

Note To Evaluator:

Once the reactor is tripped, a loss of all AC power on Unit 1 will occur. The procedures for Events 7, 8, and 9 (Loss of all AC / CAPT #1 fails to auto start / RN pumps fail to start on S/I) begin on the next page.

Op Test No.:	301	Scenario #	4	Event #	7, 8, 9	Page	49	of	118

Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 4 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. Monitor Enclosure 1 (Foldout Page).

Enclosure 1 can be found as Attachment 4.

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:

__ • 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:

__ 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 #	4	Event #	7, 8, 9	Page	50	of	118

Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 5 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. Verify 1ETA and 1ETB - ENERGIZED.	Perform the following:
Note To Evaluator: **At this point the crew will transition to ECA-0.0. Once the crew manually initiates S/I in ECA-0.0, the D/Gs will start and begin loading the essential busses. The crew will transition back to E-0 at Step 4.**	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).
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: • 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.

Op Test No.:	301	Scenario #	4	Event #	7, 8, 9	Page	51	of	118

Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER	PAGE NO. 2 of 238 Revision 50

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **CSF Status trees should be monitored for information only. Do not exit this procedure to implement any of the CSF procedures.**

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

Enclosure 1 can be found as Attachment 8.

3. **Verify Reactor Trip:**

__ • All rod bottom lights - LIT

__ • Reactor trip and bypass breakers - OPEN

__ • I/R power - DECREASING.

__ **Trip reactor.**

4. **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.

Op Test No.:	301	Scenario #	4	Event #	7, 8, 9	Page	52	of	118

Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER	PAGE NO. 3 of 238 Revision 50

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. **Establish NC pump seal injection from the SSF:**

__ • 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).

__ • 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).

Op Test No.:	301	Scenario #	4	Event #	7, 8, 9	Page	53	of	118

Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER	PAGE NO. 4 of 238 Revision 50

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. **Verify NC system - ISOLATED:**

a. All 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)

__ • 1NV-1A (NC Letdn To Regen Hx Isol)

__ • 1NV-2A (NC Letdn To Regen Hx Isol)

__ • 1NV-135 (ND Flow To Letdn Hx).

__ a. CLOSE valve(s).

__ b. All Pzr PORVs - CLOSED.

__ b. **IF** Pzr pressure less than 2315 PSIG, **THEN** CLOSE Pzr PORVs.

c. All the following excess letdown isolation valves - CLOSED:

__ • 1NV-122B (Loop C To Exs Letdn Hx Isol)

__ • 1NV-123B (Loop C To Exs Letdn Hx Isol)

__ • 1NV-124B (Excess Letdn Press Ctrl).

__ c. CLOSE valve(s).

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER	PAGE NO. 5 of 238 Revision 50

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **Verify total CA flow - GREATER THAN 450 GPM.**	**Perform the following:** Critical Task #1 __ a. Ensure CA Pump #1 - RUNNING. N/A b. **IF** flow less than 450 GPM due to operator action to control CA flow, **THEN GO TO** Step 8. __ c. Ensure all CA Pump #1 flow control valves - AT 100% DEMAND POSITION. N/A d. **IF** flow less than 450 GPM, **THEN** dispatch operator to verify proper CA Pump #1 valve alignment. **REFER TO** Enclosure 2 (Local Valve Alignment for CA Pump #1).
8. **Attempt to restore power to 1ETA or 1ETB as follows:**	
__ a. Start both D/Gs from Control Room.	a. Perform the following: __ 1) Initiate both trains S/I. N/A 2) **IF** no D/G can be started, **THEN GO TO** Step 9.

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER	PAGE NO. 6 of 238 Revision 50

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

__ b. Verify both D/G load sequencers - AUTOMATICALLY LOADING BUS.

There is a critical task associated with manually starting required RN pumps prior to D/G damage occurring and subsequent D/G trip. The failure of these pumps to start once the D/G load sequencing has begun, is a failed automatic action, and the crew may decide to reset the D/G load sequencers and manually start these pumps under OMP 1-7 guidance. If the crew continues on without taking this action, steps in E-0 will start them.

b. Perform the following for affected train(s):

- 1ETA:

1) **IF** 1ETA de-energized, **THEN** perform the following:

a) Ensure the following breakers - OPEN:

__ • "ETA NORM FDR FRM ATC"

__ • "ETA ALT FDR FRM SATA".

b) **IF** 1ETA still de-energized, **THEN** perform the following:

__ (1) **IF** D/G 1A running, **THEN** depress and hold D/G "OFF" pushbutton.

__ (2) Dispatch operator to open 1EDE-F01F (Diesel Generator Load Sequencer Panel 1DGLSA) (AB-577, BB-46, Rm 496).

__ (3) **WHEN** 1EDE-F01F open, **THEN** ensure D/G "OFF" pushbutton released.

__ 2) **IF** 1ETA energized, **THEN** ensure at least one A Train RN pump on.

(RNO continued on next page)

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CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER	PAGE NO. 7 of 238 Revision 50

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	
	• 1ETB: 1) **IF** 1ETB de-energized, **THEN** perform the following: a) Ensure the following breakers - OPEN: __ • "ETB NORM FDR FRM ATD" __ • "ETB ALT FDR FRM SATB". b) **IF** 1ETB still de-energized, **THEN** perform the following: __ (1) **IF** D/G 1B running, **THEN** depress and hold D/G "OFF" pushbutton. __ (2) Dispatch operator to open 1EDF-F01F (Diesel Generator Load Sequencer Panel 1DGLSB) (AB-560, BB-46, Rm 372). __ (3) **WHEN** 1EDF-F01F open, **THEN** ensure D/G "OFF" pushbutton released. __ 2) **IF** 1ETB energized, **THEN** ensure at least one B Train RN pump on.
__ c. Verify 1ETA or 1ETB - ENERGIZED.	__ c. **GO TO** Step 9.
__ d. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).	

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CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER	PAGE NO. 8 of 238 Revision 50

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued) __ e. **RETURN TO** procedure and step in effect.	**Note To Evaluator:** **At this point the crew will transition back to E-0 beginning at Step 4.**
9. **Verify CA supply adequate as follows:**	
__ a. VI pressure - GREATER THAN 85 PSIG.	a. **REFER TO** OP/0/A/6450/005 (Instrument Air System) to perform the following: __ • Dispatch operator to start backup VI compressor. __ • **IF** 2LXH (600V Blackout Load Center) energized, **THEN** dispatch operator to place VI compressor F in service __ • **IF** 2SLXC (600V Load Center) energized, **THEN** dispatch operator to place VS compressor B in service. **REFER TO** OP/0/A/6450/013 (Station Air System).
__ b. Verify loss of power to both essential busses anticipated to continue for greater than 4 hours.	b. Perform the following: __ 1) **IF AT ANY TIME** loss of power to both essential busses anticipated to continue for greater than 4 hours, **THEN** perform Steps 9.c through 9.g. __ 2) **GO TO** Step 9.i.
c. Verify at least one of the following normal CA suction sources - INTACT: __ • Upper Surge Tank __ • Hotwell.	c. Perform the following: __ 1) Concurrently implement FG/1/A/CFLX/FSG-02 (Alternate TD CA Pump Suction Source) while continuing in this procedure. __ 2) **GO TO** Step 10.

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 5 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. Verify 1ETA and 1ETB - ENERGIZED.	Perform the following:
Note To Evaluator: **At this point the crew will transition to ECA-0.0. Once the crew manually initiates S/I in ECA-0.0, the D/Gs will start and begin loading the essential busses. The crew will transition back to E-0 at Step 4.**	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).
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: • 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.

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 6 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 6. **Announce "Unit 1 Safety Injection".**	
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.
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.
10. **Verify proper Phase B actuation 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. (RNO continued on next page)

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 7 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ 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.

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.

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 8 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ b. IF AT ANY TIME containment pressure exceeds 3 PSIG while in this procedure, THEN perform Step 10.a.

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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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.** **These steps are only critical if the RN pumps were not previously started in ECA-0.0.**	**Perform the following:** __ a. IF any Unit 2 RN pump off, THEN start affected pump(s). Critical Task #2 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). Critical Task #2 __ 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).	**Enclosure 2 can be found as Attachment 5.**

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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.
__ 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) 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 an uncontrolled manner, THEN restart the ND pump. (RNO continued on next page)

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. (Continued)	
	__ 3) GO TO Step 18.
__ c. NI pumps - INDICATING FLOW.	__ c. Start NI pump(s) and align valves.
__ 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 an uncontrolled manner, THEN restart the ND pump. __ 3) GO TO Step 18.
__ e. ND pumps - INDICATING FLOW TO C-LEGS.	__ e. Start ND pump(s) and align valves.

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 12 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 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).**	**G-1 Enclosure 1 can be found as Attachment 6.**
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: __ • 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).**

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 13 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 21. **Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.**	__ **Align equipment.**
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).**	**Enclosure 4 can be found as Attachment 7.**
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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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 H2 analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems).

c) IF 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. 15 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. (Continued)	
	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).
__ b. Normal Pzr spray valves - CLOSED.	b. IF Pzr pressure less than 2150 PSIG, THEN perform the following: __ 1) CLOSE spray valve(s). 2) 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 pump.
__ c. At least one Pzr PORV isolation valve - OPEN.	__ c. IF power available, THEN 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.**	**IF any NV OR NI pump on, THEN perform the following:** __ a. Ensure all NC pumps - OFF. __ b. Maintain seal injection flow.

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 16 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. **Verify main steamlines intact:** __ • All S/G pressures - STABLE OR INCREASING __ • ALL S/Gs - PRESSURIZED.	**IF pressure in any S/G decreasing in an uncontrolled manner OR any S/G depressurized, 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 an 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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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 17 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27. **Verify NC System intact as follows:** __ • Containment pressure - LESS THAN 1 PSIG. N/A • 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 H2 analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems). c. IF 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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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. GO TO Step 39.
b. Verify secondary heat sink as follows:	__ b. GO TO 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. GO TO Step 39.
__ d. Pzr level - GREATER THAN 11%.	d. Perform the following: __ 1) IF NC pressure increasing AND normal Pzr spray available, THEN attempt to stabilize NC pressure using normal Pzr spray. __ 2) RETURN TO Step 28.a.

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 19 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29. **Reset the following:**	
__ a. ECCS.	__ a. 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).

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 20 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 32. **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: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 21 of 47 Revision 42

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) IF 1NV-203A AND 1NV-202B open, THEN GO TO 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. GO TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 13 (Aligning Charging With NV Miniflow Valves Closed).
	__ 5) WHEN 1NV-203A AND 1NV-202B open, THEN charging flow may be reduced below 80 GPM.
	__ 6) GO TO Step 35.
b. CLOSE the following valves:	b. Dispatch operator to close affected valve(s). REFER TO the following enclosure(s) for affected valve(s):
__ • 1NI-9A (NV Pmp C/L Inj Isol)	__ • EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 5 (Locally Close 1NI-9A)
__ • 1NI-10B (NV Pmp C/L Inj Isol).	__ • EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 7 (Locally Close 1NI-10B).

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 22 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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 the 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.
__ 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.	

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CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 23 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

34. (Continued)

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). REFER TO 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).

__ 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.

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I			

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 24 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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).
36. **Ensure the following containment isolation signals - RESET:**	
__ • Phase A	
__ • Phase B.	

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION	PAGE NO. 25 of 47 Revision 42

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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. 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).
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. GO TO EP/1/A/5000/ES-1.1 (Safety Injection Termination), Step 10.	**ES-1.1 Enclosure 1 can be found as Attachment 9.**

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 11 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. Determine if NI pumps should be stopped:	
a. Verify the following: __ • NC pressure - STABLE OR INCREASING __ • NC pressure - GREATER THAN 1620 PSIG.	a. Perform the following: __ 1) IF Pzr level decreasing, THEN increase charging flow to stabilize Pzr level while maintaining less than 180 GPM. __ 2) IF T-Avg less than 350°F prior to event AND NC pressure stable or increasing, THEN GO TO Step 10.b. __ 3) GO TO Step 10.d
__ b. Stop NI pumps.	
__ c. GO TO Step 11.	
__ d. Verify Pzr spray valves - CLOSED.	d. Perform the following: __ 1) CLOSE Pzr spray valves. __ 2) IF NC pressure stable or increasing, THEN RETURN TO Step 10.a.
e. Verify main steamlines intact as follows: __ • ALL S/G pressures - STABLE OR INCREASING __ • ALL S/Gs - PRESSURIZED.	e. IF any S/G faulted, THEN do not continue until one of the following met: __ • Faulted S/G depressurization stops OR __ • NC pressure starts increasing.

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 12 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

NOTE If Pzr heaters are off, NC pressure may decrease slowly due to Pzr spray bypass flow. This may be considered "stable" pressure.

__ f. Verify NC pressure - STABLE OR INCREASING.

__ f. GO TO EP/1/A/5000/ES-1.2 (Post LOCA Cooldown And Depressurization).

__ g. Verify NC pressure - GREATER THAN 1620 PSIG.

g. Perform the following:

1) Do not continue until one of the following met:

__ • NC pressure - GREATER THAN 1620 PSIG

OR

__ • NC pressure - STABILIZES LESS THAN 1620 PSIG

OR

__ • NC pressure - DECREASING.

__ 2) IF NC pressure increases to greater than 1620 PSIG, THEN GO TO Step 10.h.

__ 3) IF NC pressure remains less than 1620 PSIG, THEN GO TO EP/1/A/5000/ES-1.2 (Post LOCA Cooldown And Depressurization).

__ h. Stop NI pumps.

__ 11. **Ensure all ND pump(s) with suction aligned to FWST - STOPPED.**

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 13 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. **Verify S/I flow not required:**	
__ a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.	a. Perform the following: 1) Increase S/I flow to restore subcooling as follows: __ • Start one or more S/I pumps. __ • IF necessary, THEN realign NV S/I flow path. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 14 (NV Alignment To S/I Mode). __ 2) GO TO EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant).
__ b. Pzr level - GREATER THAN 11% (30% ACC).	b. Perform the following: __ 1) Control charging flow to restore Pzr level. 2) IF Pzr level cannot be maintained with normal charging, THEN perform the following: __ a) Start one or more S/I pumps. __ b) IF necessary, THEN 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) GO TO EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant).

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 14 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

13. **Transfer condenser steam dump to pressure control mode as follows:**

a. Verify condenser - AVAILABLE:

__ • "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT

__ • MSIVs on intact S/G(s) - OPEN.

CAUTION **If Pzr is solid, lowering intact S/G pressures and NC T-Hots too rapidly can cause a loss of subcooling.**

NOTE Quickly stabilizing NC temperature will help prevent Pzr overfill.

a. Perform the following:

__ 1) Dump steam using intact S/G PORV(s) in subsequent steps to stabilize NC T-Hots.

N/A 2) IF Pzr is solid, THEN perform the following in subsequent steps while operating S/G PORVs:

a) IF NC pressure starts decreasing, THEN perform the following:

__ (1) IF Pzr level greater than 17%, THEN operate Pzr heaters as required to stabilize pressure.

__ (2) Increase charging flow as required to maintain NC subcooling based on core exit T/Cs greater than 0°F.

__ b) Closely monitor T-Hots until Pzr bubble established.

(RNO continued on next page)

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. (Continued)	
	3) Perform the following to place steam dumps to pressure mode:
	__ a) Reset C-7A and C-7B by momentarily placing "STEAM DUMP SELECT" switch to "RESET".
	__ b) Place "STM DUMP CTRL" in manual.
	__ c) Adjust "STM DUMP CTRL" to 0% demand.
	__ d) Place steam dumps in pressure mode.
	__ 4) GO TO Step 14.
__ b. Ensure "STM DUMP CTRL" - SET AT 1090 PSIG STEAM HEADER PRESSURE.	
c. Place steam dumps in pressure mode as follows:	
__ 1) Verify steam dumps in T-AVE mode.	__ 1) GO TO Step 13.d.
__ 2) Place "STM DUMP CTRL" slim station in manual.	
__ 3) Adjust "STM DUMP CTRL" slim station output to match "% STM DUMP DEMAND" (1SMP5211).	
__ 4) **WHEN** output on "STM DUMP CTRL" slim station equal to "% STM DUMP DEMAND" (1SMP5211), **THEN** place steam dumps in - PRESSURE MODE.	
__ 5) Place "STM DUMP CTRL" in auto.	

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 16 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. (Continued)	
__ d. **WHEN** steam dump valves closed, **THEN** Reset C-7A and C-7B by momentarily placing "STEAM DUMP SELECT" switch to "RESET".	
__ e. Verify "P-12 LO-LO TAVG" status light (1SI-18) - DARK.	__ e. Place steam dump interlock bypass switches in "BYP INTLK".
__ 14. **Verify all NC T-Hots - STABLE.**	__ **THROTTLE steam flow and total feed flow as required to maintain NC System temperatures stable.**
15. **Determine if letdown can be established:**	
__ a. Verify VI pressure - GREATER THAN 35 PSIG.	a. Perform the following: __ 1) **WHEN** VI pressure greater than 35 psig, **THEN** perform Step 15. __ 2) Observe Caution and Note prior to Step 15.i and GO TO Step 15.i.
__ b. Verify Pzr level - GREATER THAN 25% (44% ACC).	b. Perform the following: __ 1) **WHEN** Pzr level increases to greater than 25% (44% ACC), **THEN** perform Step 15. __ 2) GO TO Step 16.

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 17 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. (Continued)

__ c. Verify ND pumps - OFF.

c. Perform the following:

__ 1) Ensure sufficient KC pumps in service to support increase in KC flow prior to opening Aux Bldg Non-Ess header isolation valves in Step 15.e RNO.

__ 2) GO TO Step 15.e.

d. Ensure the following valves - CLOSED:

__ • 1KC-56A (KC To ND Hx 1A Sup Isol)

__ • 1KC-81B (KC To ND Hx 1B Sup Isol).

e. Verify KC aligned to Aux Bldg Non-essential header as follows:

1) Verify the following valves for the operating KC train(s) - OPEN:

__ 1) OPEN valve(s).

• Train A:

__ • 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol)

__ • 1KC-50A (Aux Bldg Non-Ess Hdr Isol)

OR

• Train B:

__ • 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol)

__ • 1KC-53B (Aux Bldg Non-Ess Hdr Isol)

__ 2) Ensure adequate KC pumps in service

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 18 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. (Continued)

f. Verify containment high range EMFs - LESS THAN 25 R/HR:

__ • 1EMF-53A (Containment Trn A)
__ • 1EMF-53B (Containment Trn B).

f. Perform the following:

__ 1) Establish excess letdown. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 12 (Establishing Excess Letdown).

__ 2) Notify station management to evaluate performing Step 15.g with high NC System activity.

__ 3) GO TO Step 16.

__ g. Establish normal letdown. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 21 (Establishing Normal Letdown).

Note To Evaluator:

It is not required for the crew to establish normal letdown as part of this scenario.

g. Perform the following:

__ 1) Establish excess letdown. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 12 (Establishing Excess Letdown).

__ 2) IF no letdown path available, THEN observe Note prior to Step 15.i and GO TO Step 15.i.

__ h. GO TO Step 16.

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 19 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. (Continued)

CAUTION **PRT rupture disk relieves at 100 PSIG.**

NOTE Cycling of head vents in the following step should be minimized due to water hammer concerns in vent line.

i. **IF AT ANY TIME** Pzr level approaches 96% (93% ACC), **THEN** perform the following:

1) Control Pzr level by OPENING and CLOSING the following head vent valves as required to stabilize Pzr level and limit operation of Pzr PORVs and safeties:

__ a) 1NC-250A (Rx Head Vent Block).

__ b) 1NC-251B (Rx Head Vent).

1) **IF** vent path cannot be aligned, **THEN** perform the following:

a) Ensure the following valves - CLOSED:

__ • 1NC-250A (Rx Head Vent Block)

__ • 1NC-251B (Rx Head Vent).

b) Dispatch operator to remove white tags and 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).

c) Operate the following valves as required:

__ • 1NC-252B (Rx Head Vent Block)

__ • 1NC-253A (Rx Head Vent).

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15. (Continued) 2) **WHEN** vent path no longer needed to control Pzr level, **THEN** ensure all of the following vent valves - CLOSED: __ • 1NC-250A (Rx Head Vent Block) __ • 1NC-251B (Rx Head Vent) __ • 1NC-252B (Rx Head Vent Block) __ • 1NC-253A (Rx Head Vent).	
16. **Ensure proper operation of VCT Makeup Control System as follows:**	
__ a. Determine required shutdown boron concentration. REFER TO ROD Book, Section 5.11.	
b. **WHEN** required shutdown boron concentration determined, **THEN** perform the following:	
__ 1) Verify Unit 1 RMWST aligned for VCT makeup.	1) Perform the following: __ a) Adjust VCT makeup controls for boron concentration greater than or equal to required shutdown boron concentration. REFER TO OP/1/A/6150/009 (Boron Concentration Control). __ b) GO TO Step 17.
__ 2) Adjust VCT makeup controls for boron concentration greater than or equal to required shutdown boron concentration.	
__ 3) Ensure "NC MAKEUP MODE SELECT" - IN AUTO.	
__ 4) Place "NC MAKEUP CONTROL" switch momentarily to "START" position.	

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Event Description: Loss of All AC / CAPT #1 Fails to Start on B/O / RN Pumps Fail to Start on S/I

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION	PAGE NO. 21 of 57 Revision 33

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

17. **Align NV pump suction to VCT as follows:**

a. Verify at least one of the following NV pump suction valves - OPEN:

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

OR

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

a. IF NV pump aligned to discharge of ND pumps in cold leg recirc, THEN perform the following:

__ 1) Notify station management for guidance to restore NV pump suction to VCT.

__ 2) GO TO Step 18.

b. OPEN the following valves:

__ • 1NV-188A (VCT Otlt Isol)
__ • 1NV-189B (VCT Otlt Isol).

c. CLOSE the following valves:

__ • 1NV-252A (NV Pumps Suct From FWST)
__ • 1NV-253B (NV Pumps Suct From FWST).

Note To Evaluator:

At this point, all critical tasks are complete and S/I has been terminated. At the Lead Evaluators discretion, the scenario may be terminated by having the booth operator place the simulator in FREEZE.

__ 18. **Maintain Pzr pressure stable using Pzr heaters and normal Pzr spray.**

IF normal Pzr spray not available, THEN perform the following:

__ a. IF letdown in service, THEN use NV aux spray. REFER TO Enclosure 4 (NV Aux Spray).

__ b. IF letdown not in service OR NV aux spray not available, THEN use one Pzr PORV.

Attachment List

Scenario 4

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 -	AP/0/A/5500/038 Enclosure 1 (Foldout Page)
ATTACHMENT 4 -	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page)
ATTACHMENT 5 -	EP/1/A/5000/E-0 Enclosure 2 (Control Room Ventilation Verification)
ATTACHMENT 6 -	EP/1/A/5000/G-1 Enclosure 1 (Spent Fuel Pool Monitoring)
ATTACHMENT 7 -	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control)
ATTACHMENT 8 -	EP/1/A/5000/ECA-0.0 Enclosure 1 (Foldout Page)
ATTACHMENT 9 -	EP/1/A/5000/ES-1.1 Enclosure 1 (Foldout Page)

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		1	Establish the minimum required AFW flow rate to the S/Gs prior to any S/G reaching dryout conditions (W/R S/G level < 12%).
		2	Manually start Nuclear Service Water (RN) pumps such that the EDG does not fail because of damage caused by engine overheating.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION

Unit 1 Status

Power Level	Power History	NCS Boron	Xenon
$7x10^{-2}$ %	BOL	1969 PPM	per OAC

Controlling Procedure

- OP/1/A/6100/001 (Controlling Procedure for Unit Startup), Enclosure 4.1 (Unit Startup). The steps up through 3.180 are complete.

Other Information Needed to Assume the Shift

- Unit 1 is at $7x10^{-2}$ % power at the BOL. Unit 2 is at 100% power. 1A Condensate Booster Pump is tagged out for emergent motor replacement. Direction for the crew is to swap operating RN pumps by starting the 1B RN pump and securing the 1A RN pump per OP/0/A/6400/006 C (Nuclear Service Water System) Enclosure 4.7 (Starting/Securing Additional RN Pumps). Initial conditions have been verified. Chemistry has been notified of the RN pump lineup being changed and has informed operations that RN Chemical Addition system has been aligned to support the RN pump swap. The Unit 1 Cation Bed Demineralizer is not in service. Unit 2 Mixed bed demineralizers have been bypassed per step 3.2.2. Crew is to begin at step 3.2.1 of Enclosure 4.7. Following the RN 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/0/A/5500/038	LOSS OF LOW PRESSURE SERVICE WATER Enclosure 1 - Page 1 of 1 **Foldout Page**	PAGE NO. 11 of 19 Revision 2

1. **IF AT ANY TIME RL pressure less than 60 PSIG (RLHDR Press 0RLP5030), THEN notify Chemistry to perform the following:**

__ • Secure Unit 1 cooling tower blowdown
__ • Secure Unit 2 cooling tower blowdown.

2. **IF AT ANY TIME Main Turbine Lube Oil Cooler Outlet Temperature reaches 190°F, THEN perform the following:**

__ • IF Reactor power is greater than or equal to 69%, THEN trip affected Reactor.
__ • Ensure affected Turbine - TRIPPED.

3. **IF AT ANY TIME Turbine Generator bearing metal temperatures exceed any of the following limits:**

__ • Journal Bearing Metal temperature (TGBRG) - 250°F.
__ • Thrust Bearing Metal temperature (TGBRG) - I90°F.
THEN perform the following:

__ • Ensure affected unit Reactor - TRIPPED.
__ • Ensure affected unit Turbine - TRIPPED.
__ • Break affected unit Condenser vacuum to reduce Turbine speed.

4. **Monitor the following temperatures for both Units and follow OAC Alarm Response actions.**

__ • Turb Lube Oil Cooler Outlet Temp - (TGBRG)

__ • Turbine Generator bearing temperatures - (TGBRG)

__ • Main Generator Gas temperatures - (MAINGEN)

__ • Generator Stator Cooling temperatures - (KG)

__ • CFPTs Oil and Bearing temperatures - (CFBRG1A(2A) (CFBRG1B(2B)

__ • CBP Motor and Pump Bearing temperatures - (CMCBP)

__ • Hotwell Pump Motor Bearing temperatures - (CMHWP)

__ • Heater Drain TNK Pump Bearing temperatures - (HWHP)

__ • Exciter Air Cooler Cold Air temperature - (MAINGEN)

__ • Recirculated Cooling Water - temperature - (KR)

__ • Containment Chilled Water system temperature - (YV)

ATTACHMENT 4

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 1 - Page 1 of 2 **Foldout Page**	PAGE NO. 32 of 47 Revision 42

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 - ON
     - 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:
     - Level increasing in an uncontrolled manner or radiation level in that S/G abnormal
     - N/R level - GREATER THAN 11% (29% ACC).

ATTACHMENT 4

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 an 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).

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/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 1 of 7 **Ventilation System Verification**	PAGE NO. 34 of 47 Revision 42

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 5

CNS EP/1/A/5000/E-0	REACTOR TRIP OR SAFETY INJECTION Enclosure 2 - Page 2 of 7 **Ventilation System Verification**	PAGE NO. 35 of 47 Revision 42

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 the 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 5

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 5

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.

ATTACHMENT 5

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **Verify proper VE System operation as follows:**	
__ a. VE fans - ON.	__ a. Start fan(s).
__ 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. (RNO continued on next page)

ATTACHMENT 5

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. (Continued)	
	__ 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.
	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 5

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 4. **Record time ventilation systems verified on following table:**

TIME	SYSTEM (VC, VE)	INITIALS

ATTACHMENT 6

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 103 Revision 10

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. **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. GO TO Enclosure 24 (Local Spent Fuel Pool Monitoring).**

ATTACHMENT 6

CNS EP/1/A/5000/G-1	GENERIC ENCLOSURES Enclosure 1 - Page 2 of 8 **Unit 1 Spent Fuel Pool Monitoring**	PAGE NO. 4 of 103 Revision 10

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 6

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 6

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 6

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 6

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 6

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 6

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 7

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 7

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.

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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.
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.	

ATTACHMENT 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. (Continued)

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.

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 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. (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% (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.
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 8

CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER **Enclosure 1 - Page 1 of 2** **Foldout Page**	PAGE NO. **59 of 238** **Revision 50**

CAUTION **Loss of CA Pump #1 suction requires prompt action.**

NOTE SSF, VI and normal CA suction sources are susceptible to adverse wind and seismic interaction.

1. **Ensure CA suction source availability as follows:**

   a. Monitor the following:

      1) **IF AT ANY TIME** any of the following conditions exist, **THEN GO TO** Step 1.a.2:

         - 1AD-5, E/1 "CA PUMPS TRAIN A LOSS OF NORMAL SUCTION" - LIT
         - 1AD-5, E/2 "CA PUMPS TRAIN B LOSS OF NORMAL SUCTION" - LIT
         - Unanticipated decrease in CA flow
         - Unanticipated UST level decrease.

      2) Verify loss of CA Pump #1 suction source as follows:

         - Both of the following RN suction valves - CLOSED:
           - 1RN-250A (RN Hdr A To CA Pmp Suct Isol)
           - 1RN-310B (RN Hdr B To CA Pmp Suct Isol).

         AND

         - Either of the following RC suction valves - CLOSED:
           - 1CA-174 (RC To CA Suction Isol)
           - 1CA-175 (RC To CA Suction Isol).

      3) Do not continue in this step unless loss of CA Pump #1 suction source has occurred.

   NOTE 1SA-2 and 1SA-5 fail open on loss of power or loss of VI.

   b. **IF** Loss of CA suction source has occurred, **THEN** secure CA Pump #1 as follows:

      1) Reset "CA SYS VLV CTRL TRN A".

      2) Depress "CLS/TRIP" on "CAPT TRIP T/V CTRL".

      3) **IF** loss of power anticipated to last greater than 4 hours, **THEN** concurrently implement FG/1/A/CFLX/FSG-02 (Alternate TD CA Pump Suction Source) while continuing in this procedure.

      4) **IF** loss of power anticipated to be less than 4 hours, **THEN** concurrently implement Enclosure 37 (Alternate CA Suction Strategy) while continuing in this procedure.

ATTACHMENT 8

CNS EP/1/A/5000/ECA-0.0	LOSS OF ALL AC POWER **Enclosure 1 - Page 2 of 2** **Foldout Page**	PAGE NO. **60 of 238** **Revision 50**

2. **Alternate Low Pressure Feedwater Criteria (applies after Step 25 in body of the procedure):**

   - **IF** CA Pump #1 flow lost **AND** not immediately recoverable, **THEN** perform Enclosure 44 (Feeding S/Gs with Low Pressure Source).

3. **Loss of Vital Instrumentation or Control Power:**

   - **IF** either of the following conditions occur, **THEN** perform FG/1/A/CFLX/FSG-07 (Loss of Vital Instrumentation or Control Power):
     - All essential DC bus voltages - LESS THAN 110V

       OR

     - All channels of any one of the following critical indications - LOST:
       - High priority: (FSG-7 is high priority to ensure plant control for the following):
         - S/G N/R level (all channels lost for any S/G)
         - S/G pressure (all channels lost for any S/G).
       - Low priority: (FSG-7 can be performed as time allows for the following):
         - ICCM (includes NC pressure, Core Exit T/C temperature, RVLIS)
         - Pzr Level
         - W/R Neutron Flux
         - Containment pressure
         - CA flow to S/Gs.

4. **Low Decay Heat Temperature Control:**

   - **IF** S/G pressure cannot be maintained at or above target pressure in either condition below,
     - S/G pressure 240 PSIG with Cold Leg Accumulators in service

       OR

     - S/G pressure 160 PSIG with Cold Leg Accumulators isolated or vented,

     THEN perform FG/1/A/CFLX/FSG-09 (Low Decay Heat Temperature Control).

ATTACHMENT 9

CNS EP/1/A/5000/ES-1.1	SAFETY INJECTION TERMINATION Enclosure 1 - Page 1 of 1 **Foldout Page**	PAGE NO. 38 of 57 Revision 33

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 decreasing in an uncontrolled manner OR has completely depressurized, THEN GO TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).

3. **Cold Leg Recirc Switchover Criterion:**

   - IF FWST level decreases 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).

BB 3.170 Perform approach to criticality per <u>one</u> of following: (R.M.)

☐ PT/0/A/4150/001J (Zero Power Physics Testing), if first startup following refueling.
OR
☒ PT/0/A/4150/019 (1/M Approach To Criticality), for all other startups.

BB 3.171 Record mode 2 entry time below:

Mode 2 **0000**

BB 3.172 **<u>AFTER</u>** entering Mode 2, then change the OAC to Mode 2 using the OAC "Plant Mode" application.

BB 3.173 **<u>AFTER</u>** entering Mode 2, change DCS to "Mode 2" by using the DCS graphic 6012 (PLANT MODE SELECTION).

RPJ 3.174 Ensure Unit Mode Field in the log program is manually updated for the correct Mode.
SRO

BB 3.175 **<u>IF</u>** this is the first startup after a refueling outage, notify the Security Lieutenant or designee that Unit 1 is in Mode 2 and to take the appropriate action based on SSF functionality.
Person notified **Jack Bower**

BB 3.176 Notify Radiation Protection of the reactor startup and to sample and analyze gaseous effluents per S.L.C. 16.11-6.
Person notified **Gary Beale**

BB 3.177 **<u>WHEN</u>** reactor power has been stabilized at 10^{-3} % IR, ensure at least one power range channel is selected on 1ENCR5000 (Startup, Intermediate, & Power Range NIs).

BB 3.178 Ensure Steps 3.147 - 3.149 have been completed to ensure automatic steam dump control has been established.

BB 3.179 **<u>IF</u>** a log tracking entry was made per Step 3.100 for "HI FLUX AT SHUTDOWN" switches being in "BLOCK", evaluate clearing this log entry.

NOTE: 1. CF pump recirc valves will be automatically positioned to full open condition whenever CF pump suction flow decreases to 4500 gpm or on a reactor trip signal. However, valve positioner on electronic controller will maintain manual control of valves. When the CFPT is in the tripped condition, the recirc valves need only to be adjusted manually once and subsequent signals will have no effect.

2. Based on Operating Experience when in low power operation, undesirable Main Feedwater swings have been seen when the in service CFPT recirc. valve is in auto control. Operation of the in service CFPT recirc. valve in manual has been shown to alleviate this issue while in low power operation. (PIP C-12-03706)

_____ 3.180 **IF** in service, ensure the operating CFPT recirc. valve placed in manual:

_____ • 1CF-6 (CF Pump 1A Recirc Isol)

OR

_____ • 1CF-13 (CF Pump 1B Recirc Isol)

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.)

——— 3.181 Increase reactor power to 1%. (R.M.)

_____ 3.182 Begin reviewing the items listed in Step 3.191 so that Unit 1 will **NOT** enter Mode 1 until all substeps of 3.191 are signed off.

——— 3.183 **IF** necessary, continue heatup to no load T-AVG (557°F).

——— 3.184 Maximize S/G blowdown flowrate within the guidelines of OP/1/A/6250/008 (Steam Generator Blowdown). (R.M.)

_____ 3.185 **WHILE** increasing reactor power coordinate with Chemistry to determine when blowdown flowrate can be subsequently reduced.

_____ 3.186 Verify S/G(s) reverse purge flow by performing following:

☐ 3.186.1 Record the temperature for following OAC points: (OAC Group Display GD OPCFTEMP)

- C1A0141 (S/G A After CF Isol Vlv Line Temp) _____
- C1A0148 (S/G A Inlet Temp (Feedwater)) _____
- C1A0125 (S/G B After CF Isol Vlv Line Temp) _____
- C1A0154 (S/G B Inlet Temp (Feedwater)) _____
- C1A0275 (S/G C After CF Isol Vlv Line Temp) _____
- C1A0160 (S/G C Inlet Temp (Feedwater)) _____
- C1A0815 (S/G D After CF Isol Vlv Line Temp) _____
- C1A0166 (S/G D Inlet Temp (Feedwater)) _____

☐ 3.186.2 Compare values recorded above to the values recorded in steps 3.82.14.7, 3.105.1, 3.120.1, 3.130.1 and 3.151.1 to verify reverse purge (increasing temperature).

_____ 3.186.3 **IF** no sign of reverse purge, determine what is causing loss of reverse purge and correct problem.

☐ 3.186.4 Monitor OAC Group Display OPCFTEMP for increasing temperatures as a sign of reverse purge while continuing with procedure.

_____ 3.187 **IF** CA pumps are in service, do the following:

☐ 3.187.1 Start a CF pump per OP/1/A/6250/001 (Condensate and Feedwater System).

☐ 3.187.2 Secure CA pumps per OP/1/A/6250/002 (Auxiliary Feedwater System).

☐ 3.187.3 Ensure CA is in standby readiness per OP/1/A/6250/002 (Auxiliary Feedwater System).

NOTE: 1. The CF pump recirc valves will be automatically positioned to the full open condition whenever CF pump suction flow decreases to 4500 gpm or on a reactor trip signal. However, the valve positioner on the electronic controller will maintain manual control of the valves. When the CFPT is in the tripped condition, the recirc valves need only to be adjusted manually once and subsequent signals will have no effect.

2. Based on Operating Experience when in low power operation, undesirable Main Feedwater swings have been seen when the in service CFPT recirc. valve is in auto control. Operation of the in service CFPT recirc. valve in manual has been shown to alleviate this issue while in low power operation. (PIP C-12-03706)

3.187.4 Ensure the operating CFPT recirc. valve placed in manual:

_____ • 1CF-6 (CF Pump 1A Recirc Isol)

_____ • 1CF-13 (CF Pump 1B Recirc Isol)

_____ 3.188 **IF NOT** in auto by approximately 2% reactor power, place CFPT speed control in auto as follows:

_____ 3.188.1 Ensure operating CFPT speed has been adjusted using "CFPT 1A (1B) SPEED CTRL" to obtain approximately 1200 psig discharge pressure.

3.188.2 Place operating CFPT in auto as follows:

_____ 3.188.2.1 Ensure the "CFPT RUNBK ON RX TRIP" switch is in the "NORM" position.

_____ 3.188.2.2 Place CFPT 1A (1B) SPEED CTRL" for the operating CFPT in auto.

_____ 3.188.3 Ensure CFPT **NOT** chosen for operation per Step 3.110 in the tripped condition.

NOTE: The procedure can be continued while waiting for the CF bypass valves to reach 40% open. Therefore, Step 3.189 can be signed off out of sequence if required by plant conditions. It is recommended that the CF pump be in auto before opening the isolation valves around the CF reg valves.

3.189 **WHEN** the CF bypass valves are approximately 40% open, unisolate the CF reg valves by opening following valves:

For S/G 1A

_____ • 1CF-29 (S/G 1A CF C/V Otlt Isol)

_____ • 1CF-27 (S/G 1A CF C/V Inlt Isol)

For S/G 1B

_____ • 1CF-38 (S/G 1B CF C/V Otlt Isol)

_____ • 1CF-36 (S/G 1B CF C/V Inlt Isol)

For S/G 1C

_____ • 1CF-47 (S/G 1C CF C/V Otlt Isol)

_____ • 1CF-45 (S/G 1C CF C/V Inlt Isol)

For S/G 1D

_____ • 1CF-56 (S/G 1D CF C/V Otlt Isol)

_____ • 1CF-54 (S/G 1D CF C/V Inlt Isol)

NOTE: The procedure may continue while Step 3.190 is being performed.

_____ 3.190 Per AD-WC-ALL-0101 (Nuclear Generation Department Generation Planning and Communication), notify SOC/ECC no less than four hours prior to expected sync-to-grid time.

Person notified_____

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 Criticality shall be anticipated anytime control rods are being withdrawn.

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

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

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

1.2.5 Severe reactor power tilts (in excess of Tech Spec limits) may result from a dropped rod and its recovery. The Reactor Group Engineer may restrict reactor power to ≤ 50% RTP per T. S. 3.2.4.

1.2.6 Do **NOT** attempt to achieve criticality during dropped rod retrieval.

1.2.7 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 Two or more control rod drive ventilation fans shall be in operation when either reactor coolant temperature is ≥ 350°F or control rod drive mechanisms are energized.

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

1.7 Prior to operation of CRDMs, NC System must be filled and vented with NC System pressure > 300 psig.

1.8 If the Rod Control System is capable of rod withdrawal with the Unit in Mode 3, then at least three RCS loops shall be in operation. Refer to TS 3.4.5.

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

1.10 Automatic Rod withdrawal is blocked when Control Rod Bank D is ≥ 200 steps withdrawn.

1.11 Failure to pause at each bank position with the "CRD BANK SELECT" switch may result in dropping rods.

2. Initial Conditions

BB 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

BB 2.2 **IF** 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 **IF** < P-11 **AND** 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}

☐ **IF** NC temperature ≥ 400°F, verify SDM per OP/0/A/6100/006 (Reactivity Balance Calculation) using 400°F.

☐ **IF** NC temperature < 400°F, verify SDM per OP/0/A/6100/006 (Reactivity Balance Calculation) using current NC temperature.

BB 3.2 **IF** > P-11 **OR** 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).

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:

BB 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).

BB 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.

BB 3.3.2.1 Place "CRD BANK SELECT" in the "SBA" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 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.

BB 3.3.2.6 Verify that the shutdown bank mechanisms are moving on the DRPI display.

BB 3.3.3 **IF NOT** fully withdrawn, withdraw Shutdown Bank B as follows:

BB 3.3.3.1 Place "CRD BANK SELECT" in the "SBB" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 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.

BB 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.

BB 3.3.5 Withdraw Shutdown Bank C as follows:

BB 3.3.5.1 Place "CRD BANK SELECT" in the "SBC" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 3.3.5.5 Verify that the shutdown bank mechanisms are moving on the DRPI display.

BB 3.3.6 Withdraw Shutdown Bank D as follows:

BB 3.3.6.1 Place "CRD BANK SELECT" in the "SBD" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 3.3.6.5 Verify that the shutdown bank mechanisms are moving on the DRPI display.

BB 3.3.7 Withdraw Shutdown Bank E as follows:

BB 3.3.7.1 Place "CRD BANK SELECT" in the "SBE" position on 1MC1.

BB 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).

BB 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.

BB 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.)

BB 3.3.7.5 Verify that the shutdown bank mechanisms are moving on the DRPI display.

NOTE: If the A206 circuit card "ALM" light is lit , there is the possibility that the wrong bank may move.

BB 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.

BB 3.5 Place the "CRD BANK SELECT " switch in the "MAN" position.

BB 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 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 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.)

BB 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.

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.

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 Starting or stopping RN Pumps can affect KC system temperature which in turn can affect letdown temperature resulting in changes in letdown boron concentration if the demineralizers are in service. (R.M.)

1.3 After manual operation, maintenance or packing adjustment of any safety related valve, it shall be cycled electrically to insure reliable automatic operation.

1.4 RN Pump minimum flow is 8600 gpm for continuous operation. Flow rates between 8600 gpm and 4000 gpm are allowable for up to 2 hours in a 10 hour period. It is preferred to maintain RN flow ≥10,000 gpm.

1.5 The following sequence is recommended to relieve a RN Pump low flow condition:

1.5.1 Secure excess RN Pump(s).

1.5.2 Initiate manual RN Strainer backwash on non-affected RN Pump(s).

1.5.3 Establish flow through the RN Crossover Flush Header.

1.5.4 Establish flow through NS Heat Exchanger(s).

1.6 Maximum RN flow for one pump is 25,800 gpm. During pump manipulations max flow rate may be exceeded and low pressure conditions occur when reducing operating pumps while the RN system stabilizes. Stabilization is expected to occur within 10 minutes of the manipulation.

1.7 When securing one of two operating RN Pumps, RN high flow alarm may be momentarily received if total RN flow is greater than 32,000 gpm. A total flow greater than 37,000 gpm may result in momentarily exceeding of the 25,800 gpm maximum allowable flow.

1.8 Before contact with raw water or exposure to a raw water mist or spray, refer to AD-HS-ALL-0101 (Nuclear Health and Safety Handbook) for guidance and requirements on personal protective equipment, respiratory protection, personal hygiene and the posting of areas.

1.9 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}

1.10 Additions from RN Chemical Addition to the RN System must be secured at least 30 minutes before any section of RN piping that is to be drained to the WZ sump in the Auxiliary Building is isolated.

1.11 If RN is aligned to Lake Wylie and lake level is ≤ 562.0 ft, the possibility exists that running both RN pumps in either pit will result in an automatic swap to the SNSWP.

2. Initial Conditions

BB 2.1 Verify the RN System is in operation per Enclosure 4.1 (RN System Startup).

BB 2.2 Ensure appropriate Reactivity Management controls established per AD-OP-ALL-0203 (Reactivity Management). (R.M.)

3. Procedure

NOTE:
- If RN pumps are being swapped between trains, the RN Chemical Addition system may need to be secured or swapped as necessary.
- For operation with 2 RN Pumps in service, it is preferable to run 2 pumps in the same pit barring any other equipment issues or limitations. This provides more accurate chemical addition to the pit, helping to ensure chlorine concentrations remain below material compatability limitations for the RN System.

3.1 Perform the following:

NOTE: The time allowed for the next two steps may take up to an hour as there may be a minimum of 30 minutes of RN flow required after RN chemical addition has been secured, if required.

BB 3.1.1 Notify Chemistry that RN pump lineup is being changed. Chemistry will determine the need to change the operation of the RN Chemical Addition system.
Person notified **Tony Story**

NOTE: If plant conditions warrant immediate action, Step 3.1.2 may be completed later. A CR shall be written to describe actions taken.

BB 3.1.2 Chemistry has notified OPS that the RN Chemical Addition system is aligned to support pump manipulations and time requirements met.
Person contacted **Tony Story**

3.2 Align Letdown demineralizers as follows:

NOTE:	Steps 3.2.1 and 3.2.2 may be performed in any order or concurrently.

_____ 3.2.1 **IF** normal letdown is in service on Unit 1 per OP/1/A/6200/001 (Chemical and Volume Control System), perform the following:

BB 3.2.1.1 Verify the Cation Bed Demineralizer is **NOT** in service per OP/1/A/6200/001 (Chemical and Volume Control System).

_____ 3.2.1.2 Record position of 1NV-153A (Letdn Hx Otlt 3-Way Vlv).
Recorded valve position _____

_____ 3.2.1.3 **IF** letdown flow is through the demineralizers, notify Primary Chemistry that the demineralizers will be bypassed while changing RN Pump configuration.
Person notified _____

_____ 3.2.1.4 **IF** letdown flow is through the demineralizers, notify Radiation Protection that the demineralizers will be bypassed while changing RN Pump configuration.
Person notified _____

_____ 3.2.1.5 Place 1NV-153A (Letdn Hx Otlt 3-Way Vlv) in the "VCT" position.

BB 3.2.2 **IF** normal letdown is in service on Unit 2 per OP/2/A/6200/001 (Chemical and Volume Control System), perform the following:

BB 3.2.2.1 Verify the Cation Bed Demineralizer is **NOT** in service per OP/2/A/6200/001 (Chemical and Volume Control System).

BB 3.2.2.2 Record position of 2NV-153A (Letdn Hx Otlt 3-Way Vlv).
Recorded valve position **Auto / Demin**

BB 3.2.2.3 **IF** letdown flow is through the demineralizers, notify Primary Chemistry that the demineralizers will be bypassed while changing RN Pump configuration.
Person notified **Greg Lancaster**

BB 3.2.2.4 **IF** letdown flow is through the demineralizers, notify Radiation Protection that the demineralizers will be bypassed while changing RN Pump configuration.
Person notified **Gary Beale**

BB 3.2.2.5 Place 2NV-153A (Letdn Hx Otlt 3-Way Vlv) in the "VCT" position.

_____ 3.3 **IF** starting RN pumps, perform the following:

_____ 3.3.1 Evaluate in-service and available flow paths to ensure that no component flow rate limits are exceeded and RN Pump miniflow requirements will be met.

3.3.2 Start the desired RN pump:

_____ • RN Pump 1A

_____ • RN Pump 1B

_____ • RN Pump 2A

_____ • RN Pump 2B

_____ 3.3.3 Verify the appropriate pump discharge valve opens:

☐ 1RN-28A (RN Pump 1A Disch Isol)
☐ 1RN-38B (RN Pump 1B Disch Isol)
☐ 2RN-28A (RN Pump 2A Disch Isol)
☐ 2RN-38B (RN Pump 2B Disch Isol)

_____ 3.3.4 Verify the appropriate pump motor cooler inlet isolation opens:

☐ 1RN-11A (RN Pmp 1A Mtr Clr Inlet Isol) (indication on Monitor Light Panel 1MD-4 F/5, or on OAC graphic RNPUMPS, or OAC Point C1Q1397 (1RN11A RN Pump 1A Mtr Cooler Inlet Isol))
☐ 1RN-20B (RN Pmp 1B Mtr Clr Inlet Isol) (indication on Monitor Light Panel 1MD-4 F/8, or on OAC graphic RNPUMPS, or OAC Point C1Q1395 (1RN20B RN Pump 1B Mtr Cooler Sup Isol))
☐ 2RN-11A (RN Pmp 2A Mtr Clr Isol) (indication on Monitor Light Panel 2MD-4 F/5, or on OAC graphic RNPUMPS, or OAC Point C2Q1397 (2RN11A RN Pump 2A Mtr Cooler Inlet Isol))
☐ 2RN-20B (RN Pmp 2B Mtr Clr Isol) (indication on Monitor Light Panel 2MD-4 F/8, or on OAC graphic RNPUMPS, or OAC Point C2Q1395 (2RN20B RN Pump 2B Mtr Cooler Sup Isol))

_____ 3.3.5 **IF** RN Pump 2A was started, perform the following: {PIP 94-1591}

_____ 3.3.5.1 Open equalizing valve for 2RNPG7440 (2A RN Pump Motor Cooler Outlet Flow) (RNB 605).

_____ 3.3.5.2 **AFTER** 5 minutes, close equalizing valve for 2RNPG7440 (2A RN Pump Motor Cooler Outlet Flow) (RNB 605).

_____ 3.3.6 **IF** RN Pump 2B was started, perform the following: {PIP 94-1591}

_____ 3.3.6.1 Open equalizing valve for 2RNPG7410 (2B RN Pump Motor Cooler Outlet Flow) (RNB 605).

_____ 3.3.6.2 **AFTER** 5 minutes, close equalizing valve for 2RNPG7410 (2B RN Pump Motor Cooler Outlet Flow) (RNB 605).

NOTE: When RN Essential Header temperature is ≥ 80°F, two RN Pumps are normally in service to ensure continuous flow through KC Hxs selected to "MINIFLOW".

_____ 3.4 **IF** securing RN pumps, perform the following:

NOTE: To secure all RN pumps, refer to Enclosure 4.2 (Shutdown of the RN System).

3.4.1 Shutdown the desired RN pump:

_____ • RN Pump 1A

_____ • RN Pump 1B

_____ • RN Pump 2A

_____ • RN Pump 2B

_____ 3.4.2 Verify the appropriate pump discharge valve closes:

☐ 1RN-28A (RN Pump 1A Disch Isol)
☐ 1RN-38B (RN Pump 1B Disch Isol)
☐ 2RN-28A (RN Pump 2A Disch Isol)
☐ 2RN-38B (RN Pump 2B Disch Isol)

_____ 3.4.3 Verify the appropriate pump motor cooler inlet isolation closes:

☐ 1RN-11A (RN Pmp 1A Mtr Clr Inlet Isol) (indication on OAC graphic RNPUMPS, or OAC Point C1Q1397 (1RN11A RN Pump 1A Mtr Cooler Inlet Isol))
☐ 1RN-20B (RN Pmp 1B Mtr Clr Inlet Isol) (indication on OAC graphic RNPUMPS, or OAC Point C1Q1395 (1RN20B RN Pump 1B Mtr Cooler Sup Isol))
☐ 2RN-11A (RN Pmp 2A Mtr Clr Isol) (indication on OAC graphic RNPUMPS, or OAC Point C2Q1397 (2RN11A RN Pump 2A Mtr Cooler Inlet Isol))
☐ 2RN-20B (RN Pmp 2B Mtr Clr Isol) (indication on OAC graphic RNPUMPS, or OAC Point C2Q1395 (2RN20B RN Pump 2B Mtr Cooler Sup Isol))

3.5 Align Letdown demineralizers as follows:

NOTE:	Steps 3.5.1 and 3.5.2 may be performed in any order or concurrently.

_____ 3.5.1 **IF** normal letdown is in service on Unit 1 per OP/1/A/6200/001 (Chemical and Volume Control System), **WHEN** KC temperature has stabilized perform the following:

_____ 3.5.1.1 **IF** 1NV-153A (Letdn Hx Otlt 3-Way Vlv) position was recorded as "DEMIN" in Step 3.2.1.2 **AND** no other reason exists for it to remain in the "VCT" position, return it to "AUTO" as follows:

_____ A. Place 1NV-153A in the "DEMIN" position. (R.M.)

☐ B. Verify 1NV-153A returns to "AUTO".

_____ 3.5.1.2 **IF** letdown flow is through the demineralizers, notify Primary Chemistry that the demineralizers have been restored to service.
Person notified _____

_____ 3.5.1.3 **IF** letdown flow is through the demineralizers, notify Radiation Protection that the demineralizers have been restored to service.
Person notified _____

_____ 3.5.2 **IF** normal letdown is in service on Unit 2 per OP/2/A/6200/001 (Chemical and Volume Control System), **WHEN** KC temperature has stabilized perform the following:

_____ 3.5.2.1 **IF** 2NV-153A (Letdn Hx Otlt 3-Way Vlv) position was recorded as "DEMIN" in Step 3.2.2.2 **AND** no other reason exists for it to remain in the "VCT" position, return it to "AUTO" as follows:

_____ A. Place 2NV-153A in the "DEMIN" position. (R.M.)

☐ B. Verify 2NV-153A returns to "AUTO".

_____ 3.5.2.2 **IF** letdown flow is through the demineralizers, notify Primary Chemistry that the demineralizers have been restored to service.
Person notified _____

_____ 3.5.2.3 **IF** letdown flow is through the demineralizers, notify Radiation Protection that the demineralizers have been restored to service.
Person notified _____

_____ 3.6 Document the running RN Pump(s) below:

☐ RN Pump 1A
☐ RN Pump 1B
☐ RN Pump 2A
☐ RN Pump 2B

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

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EVALUATION SHEET

Task: Emergency Borate the Reactor Coolant System

Alternate Path: Yes

Facility JPM #: NV-017

Safety Function: 1 **Title:** Reactivity Control

K/A 004 A2.14 Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Emergency Boration

Rating(s): 3.8 / 3.9 **CFR:** 41.5 / 43/5 / 45/3 / 45/5

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

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

References: EP/1/A/5000/FR-S.1 (Nuclear Power Generation/ATW) rev. 022

Task Standard: One NV pump running with its suction aligned to the FWST and isolated from the VCT.

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
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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-IPX003A (REACTOR TRIP BKR A FAILURE)	ACTIVE				
	MAL-IPX003B (REACTOR TRIP BKR B FAILURE)	ACTIVE				
	VLV-NV043F (NV236B BORIC ACID TO CHG PMP VLV FAIL TO POSITION)	0				
	MAL-MT007 (LOSS OF TURBINE LUBE OIL PRESSURE)	ACTIVE				
	Instructor will act as the OATC and be manually inserting control rods when the simulator is placed in RUN.					

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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 valid reactor trip signal has been received.**
- **The reactor will NOT trip automatically or manually.**
- **A Red Path for Subcriticality is in effect.**
- **The OATC is inserting rods manually.**

INITIATING CUES:

The Control Room Supervisor instructs you to initiate emergency boration, per EP/1/A/5000/FR-S.1, (Nuclear Power Generation/ATWS), step 4.

EXAMINER NOTE: After reading cue, provide the applicant with a copy of EP/1/A/5000/FR-S.1.

STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 4. **Initiate emergency boration of NC System as follows:** a. Ensure at least one NV pump - ON. STANDARD: Applicant verifies red "ON" light lit for "NV PMP 1A" or "1B" (1MC-10). COMMENTS:	**___ SAT** **___ UNSAT**

STEP 2 4. b. OPEN 1NV-236B (Boric Acid To NV Pumps Suct). STANDARD: Applicant depresses the red "OPEN" pushbutton for 1NV-236B and verifies the red "OPEN" light remains dark and the green "CLSD" light remains lit on 1MC-10. 1NV-236B remains closed. **Examiner Note: This begins the alternate path of this JPM.** COMMENTS:	**___ SAT** **___UNSAT**

STEP 3 4. c. Ensure both boric acid transfer pump switches - IN THE "ON" POSITION. STANDARD: Applicant rotates the switches for "B/A XFER PMP 1A" and "B/A XFER PMP 1B" to the "ON" position. COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 4 4. d. Verify emergency boration flow - GREATER THAN OR EQUAL TO 30 GPM. STANDARD: Applicant verifies "EMER BORATE FLOW" (1NVP5440) indicates 0 gpm (1MC-5) and transitions to the RNO. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 5 4. d. RNO 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). STANDARD: Applicant depresses the red "OPEN" pushbuttons for 1NV-252A and 1NV-253B and verifies the red "OPEN" light is lit and green "CLSD" light is dark for both valves. **Examiner Note: This step is critical to align borated water to the suction of the charging pumps. Only ONE of the valves opened meets the Critical Step criteria.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 6 4. d. RNO d. 2) CLOSE the following valves: • 1NV-188A (VCT Otlt Isol) • 1NV-189B (VCT Otlt Isol). STANDARD: Applicant depresses the green "CLOSE" pushbutton for 1NV-188A and 1NV-189B and verifies the green "CLSD" light lit and red "OPEN" light dark for both valves. **Examiner Note: This step is critical to prevent borated water from going to the VCT instead of the suction of the charging pumps as long as one of the valves is closed. Closing only ONE of the valves meets the intent of the Critical Step criteria.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 7 4. e. Verify the following charging line isolation valves - OPEN: • 1NV-312A (Chrg Line Cont Isol) follows: • 1NV-314B (Chrg Line Cont Isol). STANDARD: Applicant verifies the red "OPEN" lights lit and green "CLSD" lights dark on 1NV-312A and 1NV-314B. COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 8 4. f. Verify Pzr pressure - LESS THAN 2335 PSIG. STANDARD: Applicant verifies PZR pressure instruments (1NCP5161, 1NCP5150, 1NCP5170 and 1NCP5171) indicate less than 2335 psig (1MC-10). 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 valid reactor trip signal has been received.**
- **The reactor will NOT trip automatically or manually.**
- **A Red Path for Subcriticality is in effect.**
- **The OATC is inserting rods manually.**

INITIATING CUES:

The Control Room Supervisor instructs you to initiate emergency boration, per EP/1/A/5000/FR-S.1, (Nuclear Power Generation/ATWS), step 4.

Duke Energy Catawba Nuclear Station **Response to Nuclear Power Generation/ATWS** **Continuous Use**	Procedure No. **EP/1/A/5000/FR-S.1** Revision No. **022** Electronic Reference No. **CP0094DR**

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

(ISSUED) - PDF Format

A. Purpose

This procedure provides actions to add negative reactivity to a core which is observed to be critical when expected to be shutdown.

B. Symptoms or Entry Conditions

This procedure is entered from:

a. EP/1/A/5000/E-0 (Reactor Trip or Safety Injection), when reactor trip is not verified and manual trip is not effective.

b. EP/1/A/5000/F-0 (Critical Safety Function Status Trees), (SUBCRITICALITY) on either a RED or ORANGE condition.

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.**

1. **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** insert rods.

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 unload turbine by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons.
     - 3) **IF** turbine will not runback, **THEN** CLOSE the following:
       - __ All MSIVs
       - __ All MSIV bypass valves.

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).

   __ 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).

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.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

5. **Verify the following Monitor Light Panel Group 5 St lights - LIT:**

   __ • I/2

   __ • I/3

   __ • I/10

   __ • H/11.

   Ensure the following VQ isolation valves - CLOSED:

   __ • 1VQ-2A (VQ Fan Suct From Cont Isol)
   __ • 1VQ-3B (VQ Fan Suct From Cont Isol)
   __ • 1VQ-15B (Cont Air Add Cont Isol)
   __ • 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** an 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).

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EVALUATION SHEET

Task: Perform E-0 Actions To Ensure A Complete Containment Isolation

Alternate Path: Yes

Facility JPM #: N/A

Safety Function: 2 **Title:** Engineering Safety Features Actuation System

K/A 013 A4.01 Ability to manually operate and/or monitor in the control room: ESFAS-initiated equipment which fails to actuate.

Rating(s): 4.5 / 4.8 **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/E-0 (Reactor Trip or Safety Injection) Rev 42

Task Standard: At least one train of Phase A containment isolation initiated and either 1WL-825A or 1WL-827B manually closed.

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
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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.**

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event
	MAL-NC013D (NC COLD LEG D LEAK)	27.5	:10			1
	MAL-ISE003A (AUTO PHASE A ISOL SIGNAL TRN A)	BLOCK				
	MAL-ISE003B (AUTO PHASE B ISOL SIGNAL TRN B)	BLOCK				
	VLV-WL009A (WL825A CONT SUMP PMP DISCH ISOL IN FAIL AUTO ACTIONS)	ACTIVE				
	VLV-WL010A (WL827B CONT SUMP PMP DISCH ISOL OUT FAIL AUTO ACTIONS)	ACTIVE				
	When applicant is ready, INSERT EVENT 1.					

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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:

- **You are the OATC**
- **The BOP has stepped out of the control room**
- **The CRS is performing an IPTE brief on Unit 2**

INITIATING CUES:

- **Monitor your control boards**

EXAMINER NOTE: **After reading cue, and applicant has walked down the control boards, have the simulator operator INSERT EVENT 1. This will cause a safety injection on Unit 1. All E-0 immediate action steps will be met without any operator action. Once the applicant has announced that the Immediate Actions are complete, hand them a copy of E-0 beginning at step 6.**

EXAMINER CUE: **"The CRS has validated that the immediate actions are complete and directs you to continue performance of E-0, beginning at Step 6."**

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STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 6. **Announce "Unit 1 Safety Injection".** STANDARD: Applicant uses the plant paging system to make the announcement. COMMENTS:	**___ SAT** **___ UNSAT**

STEP 2 7. **Determine required notifications:** • **REFER TO** RP/0/A/5000/001 (Classification of Emergency) • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements) STANDARD: Applicant acknowledges the step and continues with E-0. COMMENTS:	**___ SAT** **___UNSAT**

STEP 3 8. **Verify all Feedwater Isolation status lights (1SI-5) – LIT.** STANDARD: Applicant verifies all Feedwater Isolation status lights lit on 1SI-5. COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 4 9. **Verify Phase A Containment Isolation status as follows:** a. Phase A "RESET" lights – DARK. STANDARD: Applicant determines that the Phase A RESET lights are lit and transitions to the RNO. COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	CRITICAL STEP / SAT/UNSAT
STEP 5 9.a.RNO. Initiate Phase A Isolation. STANDARD: Applicant depresses both of the red INITIATE pushbuttons for Train A and Train B and verifies the yellow RESET lights extinguish. **Examiner Note: It is critical for the applicant to at least initiate one train of Phase A to ensure that at least one valve in every penetration other than from the containment sump is isolated. The containment sump penetration will have to be manually isolated in the RNO for the following step.** **Examiner Note: This begins the alternate path for this JPM.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 6 9.b. Monitor Light Panel Group 5 St lights on energized train(s) – LIT. STANDARD: Applicant determines that Group 5 St lights C/3 and C/10 are dark and transitions to the RNO. **Examiner Note: It may take up to 60 seconds for all other valves to indicate isolated.** COMMENTS:	**___ SAT** **___ UNSAT**
STEP 7 9.b.RNO. Align valves as necessary to ensure each penetration isolated by at least one isolation valve. STANDARD: Applicant depresses the green CLOSE pushbuttons for 1WL-825A and 1WL-827B and verifies the green CLSD light lit and red OPEN light dark for each valve. **Examiner Note: It is critical for the applicant to close 1 of these valves to ensure the containment sump penetration is isolated.** **Examiner Cue: Once valves have been closed, "This JPM is complete."** 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:

- **You are the OATC**
- **The BOP has stepped out of the control room**
- **The CRS is performing an IPTE brief on Unit 2**

INITIATING CUES:

- **Monitor your control boards**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 6. **Announce "Unit 1 Safety Injection".**

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.

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.

10. **Verify proper Phase B actuation 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.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ 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.

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.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

__ b. **IF AT ANY TIME** containment pressure exceeds 3 PSIG while in this procedure, **THEN** perform Step 10.a.

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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EVALUATION SHEET

Task: Establish NC system Bleed and Feed per EP/1/A/5000/FR-H.1

Alternate Path: Yes

Facility JPM #: NC-046

Safety Function: 4P **Title:** Reactor Coolant System

K/A WE05EA1.1 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-**P**lant _____ **P**erform **X** **S**imulate _____

References: EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) rev. 42

Task Standard: Aligns S/I feed path using NI and NV pumps and opens 1NC-32B and 1NC-34A PZR PORVs to establish NC system bleed path

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

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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 #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
	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				
	MAL-NI001B NI PUMP B FAILURE	Auto				
	OVR-ISE043 SAFETY INJECTION INITIATE PB TRN B	Off				
	MAL-ISE002B (AUTO SI TRN B FAILS TO ACTUATE)	Active				
	VLV-NI001F (NI9A B.I.T. DISCHARGE ISOL VLV FAIL TO POSITION)	0				

Catawba Nuclear Station
JPM C
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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 reactor trip has occurred on Unit 1 due to a loss of both Main Feedwater pumps.**
- **The CA system will not function.**
- **Attempts to restart the Main CF pumps have been unsuccessful.**
- **EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) has been entered due to a "RED PATH" for the Heat Sink critical safety function while performing EP/1/A/5000/ES-0.1 (Reactor Trip Response).**
- **Bleed and Feed initiation criteria have been met.**

INITIATING CUES:

- **The CRS instructs you to initiate NC system bleed and feed beginning at step 19-24 of EP/1/A/5000/FR-H.1. Inform the CRS when the bleed and feed path has been initiated and verified.**

EXAMINER NOTE: After reading cue, provide the applicant with a copy of EP/1/A/5000/FR-H.1.

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STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 19. Perform Steps 20 through 24 quickly to establish NC heat removal by NC bleed and feed. STANDARD: Applicant acknowledges this step. COMMENTS:	**___ SAT** **___ UNSAT**

STEP 2 20. Ensure all NC pumps - OFF. STANDARD: Applicant ensures the NC pumps are off. COMMENTS:	**___ SAT** **___UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3 21. Initiate S/I. STANDARD: Applicant depresses the red train 'A' and 'B' "SAFETY INJECTION INITIATE" pushbuttons and verifies the red "SAFETY INJECTION ACTUATED" status light is lit on 1SI-13 or "ECCS TRN A" yellow reset light is dark on 1MC-11. **Examiner Note: This step is critical to start the NI pump and align the valves required for initiating an NC system feed path.** **Examiner Note: This begins the alternate path for this JPM.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 4 22. Verify NC System feed path as follows: a. Verify the following pumps - ON: • At least one NV pump • At least one NI pump. STANDARD: Applicant determines that at least one NV pump and one NI pump are running. **Examiner Note: Applicant may start 1B NI pump and 1B NV pump at this time due to it being a failed auto action. If not, the procedure will direct starting these pumps in the upcoming steps.** COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 22 b. Verify "NV S/I FLOW" – INDICATING FLOW. STANDARD: Applicant determines that 1NVP6080 (NV S/I FLOW) on 1MC-3 indicates 0 GPM and transitions to the RNO. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 6 22 b. RNO Perform the following: 1) Ensure the following pumps - ON: • NV Pumps • NI Pumps. STANDARD: Applicant ensures that all NV pumps and NI pumps are running by depressing the red ON pushbuttons for any non-running pump, and verifying the red ON lights are lit and green OFF lights are dark for all pumps. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7 22 b. RNO 2) **IF** at least one NV pump in service, **THEN** perform the following: a) Ensure the following valves - OPEN: • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST). STANDARD: Applicant verifies the red OPEN lights lit and green CLSD lights dark on 1NV-252A and 1NV-253B. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 8 22 b. RNO 2) b) Ensure the following valves - CLOSED: • 1NV-188A (VCT Otlt Isol) • 1NV-189B (VCT Otlt Isol). STANDARD: Applicant determines that the green CLSD light is lit and red OPEN light is dark on 1NV-188A. Applicant determines that the green CLSD light is dark for 1NV-189B, and depresses the green CLOSE pushbutton and verifies the green CLSD light is lit and the red OPEN light is dark COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 9 22 b. RNO 2) c) Ensure the following valves - OPEN: • 1NI-9A (NV Pmp C/L Inj Isol) • 1NI-10B (NV Pmp C/L Inj Isol). STANDARD: Applicant determines the red OPEN light is dark and green CLSD light is lit on 1NI-9A and 1NI-10B. Applicant depresses the red OPEN pushbutton for 1NI-9A but the valve will not open. Applicant depresses the red OPEN pushbutton for 1NI-10B and verifies the red OPEN light is lit and the green CLSD light is dark. **Examiner Note: This step is critical to align an NC (Reactor Coolant) system Feed path.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 10 22 b. RNO 3) **IF** NI Pump 1A is 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). STANDARD: Applicant determines that the red OPEN lights are lit and green CLSD lights are dark on valves 1NI-103A, 1NI-118A, 1NI-162A, and 1NI-100B. COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 11 22 b. RNO 4) **IF** NI Pump 1B is 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). STANDARD: Applicant verifies that the red OPEN light is lit and green CLSD light is dark on valves 1NI-135B, 1NI-150B, 1NI-162A, and 1NI-100B. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 12 22 b. RNO 5) **IF** no feed path can be aligned, **THEN** perform the following: STANDARD: Applicant determines that a feed path does exist and this step is N/A. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 13 23. Establish NC System bleed path as follows: a. Ensure all Pzr PORV isolation valves - OPEN. STANDARD: Applicant determines the RED lights are lit and GREEN lights are dark on valves 1NC-31B, 1NC-35B, and 1NC-33A. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 14 23 b. Select "OPEN" on the following PZR PORVs: • 1NC-34A (PZR PORV) • 1NC-32B (PZR PORV). STANDARD: Applicant rotates switches for 1NC-34A and 1NC-32B, clockwise to the OPEN position and verifies RED lights are lit and GREEN lights are dark on both valves. **Examiner Note: This step is critical because it establishes an NC (Reactor Coolant) system Bleed path.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 15 23 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). STANDARD: Applicant depresses the red OPEN pushbutton and verifies red OPEN light lit and green CLSD light dark on valves 1NI-438A and 1NI-439B. COMMENTS:	___ SAT ___ UNSAT
STEP 16 23 d. Verify power to all Pzr PORV isolation valves - AVAILABLE. STANDARD: Applicant verifies indicating lights lit on 1NC-31B, 1NC-35B, and 1NC-33A. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 17 24. Verify the following valves - OPEN: • 1NC-31B (PZR PORV Isol) • 1NC-32B (PZR PORV) • 1NC-33A (PZR PORV Isol) • 1NC-34A (PZR PORV). STANDARD: Applicant verifies lights on 1NC-31B, 1NC-32B, 1NC-33A and 1NC-34A indicate OPEN. 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:

- **A reactor trip has occurred on Unit 1 due to a loss of both Main Feedwater pumps.**
- **The CA system will not function.**
- **Attempts to restart the Main CF pumps have been unsuccessful.**
- **EP/1/A/5000/FR-H.1 (Response to Loss of Secondary Heat Sink) has been entered due to a "RED PATH" for the Heat Sink critical safety function while performing EP/1/A/5000/ES-0.1 (Reactor Trip Response).**
- **Bleed and Feed initiation criteria have been met.**

INITIATING CUES:

- **The CRS instructs you to initiate NC system bleed and feed beginning at step 19-24 of EP/1/A/5000/FR-H.1. Inform the CRS when the bleed and feed path has been initiated and verified.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. **Verify bleed and feed should be initiated as follows:**

    __ a. Steps 20 through 24 - HAVE BEEN PREVIOUSLY PERFORMED.

    __ a. **GO TO** Step 18.c.

    __ b. **GO TO** Step 33.

    __ c. W/R level in at least three S/Gs - LESS THAN 24% (36% ACC).

    __ c. **RETURN TO** Step 1.

__ 19. **Perform Steps 20 through 24 quickly to establish NC heat removal by NC bleed and feed.**

__ 20. **Ensure all NC pumps - OFF.**

__ 21. **Initiate S/I.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. **Verify NC System feed path as follows:**

a. Verify the following pumps - ON:

__ • At least one NV pump

__ • At least one NI pump.

a. Perform the following for affected train(s):

__ 1) Reset ECCS.

__ 2) Reset D/G load sequencer.

__ 3) Start pumps.

__ 4) **IF AT ANY TIME** a B/O occurs, **THEN** restart S/I equipment previously on.

__ 5) **IF** at least one NV pump in service, **THEN GO TO** Step 22.b.

6) **IF** all the following conditions are met, **THEN GO TO** Step 22.b:

__ • At least one NI Pump - ON

__ • Time between reactor trip and implementation of this procedure - GREATER THAN 90 MINUTES.

__ 7) Continue attempts to restore NV and NI to service.

8) **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.

__ 9) **RETURN TO** Step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. (Continued)

__ b. Verify "NV S/I FLOW" - INDICATING FLOW.

b. Perform the following:

1) Ensure the following pumps - ON:

__ • NV Pumps
__ • NI Pumps.

2) **IF** at least one NV pump in service, **THEN** perform the following:

a) Ensure the following valves - OPEN:

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

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

b) Ensure the following valves - CLOSED:

__ • 1NV-188A (VCT Otlt Isol)

__ • 1NV-189B (VCT Otlt Isol).

c) Ensure the following valves - OPEN:

__ • 1NI-9A (NV Pmp C/L Inj Isol)

__ • 1NI-10B (NV Pmp C/L Inj Isol).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. (Continued)

3) **IF** NI Pump 1A is 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).

4) **IF** NI Pump 1B is 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).

5) **IF** no feed path can be aligned, **THEN** perform the following:

__ a) Continue attempts to establish feed path.

__ b) **RETURN TO** Step 6.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. **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).

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.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. (Continued)

__ d. Verify power to all Pzr PORV isolation valves - AVAILABLE.

d. Perform the following:

1) Dispatch operator to restore power to affected Pzr PORV isolation valve(s):

__ • 1EMXD-F02C (PORV Isol Motor (1NC31B)) (AB-560, BB-50, Rm 372)

__ • 1EMXC-F03C (Pressurizer Power Operated Relief Isol. Valve 1NC33A) (AB-577, BB-50, Rm 496)

__ • 1EMXD-F05A (PORV Isol Motor (1NC35B)) (AB-560, BB-50, Rm 372).

2) **WHEN** power is 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

24. **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.

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 are open, **THEN GO TO** Step 25.

g. Align A Train 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

24. (Continued)

h. **IF** A Train vent path cannot be aligned, **THEN** align B train 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).

i. Align any low pressure water source to intact S/G(s) using the following sources:

__ • Hotwell pump

__ • RN

__ • CA (gravity feed)

__ • RF. **REFER TO** Enclosure 3 (Aligning Alternate Water Source to S/G(s)).

__ j. **IF** no low pressure water source can be aligned, **THEN GO TO** Step 25.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

24. (Continued)

__ k. Depressurize at least one intact S/G to atmospheric pressure using S/G PORV to inject the low pressure water source.

25. **WHEN manpower AND time permits, THEN verify proper system alignments as follows:**

__ • **REFER TO** Enclosure 4 (System Verification Following S/I Actuation).

__ • Notify Unit 2 operator to perform Enclosure 5 (Opposite Unit Ventilation Verification).

26. **Maintain NC System heat removal as follows:**

__ • Maintain S/I flow
__ • Maintain two Pzr PORVs - OPEN.

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EVALUATION SHEET

Task: Realign CA Suction Source

Alternate Path: Yes

Facility JPM #: CA-085

Safety Function: 4S **Title:** Auxiliary / Emergency Feedwater System

K/A 054 AA1.01 Ability to operate and/or monitor the following as they apply to the Loss of Main Feedwater (MFW): AFW controls, including the use of alternate AFW sources.

Rating(s): 4.5 / 4.4 **CFR:** 41.7 / 45.5 / 45.6

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

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

References: AP/1/A/5500/006 (Loss of S/G Feedwater) Rev 42

Task Standard: CA suction supply aligned to the RN system per AP/1/A/5500/006 Case II.

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

_____

_____

_____

_____

_____

_____

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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
	XMT-CM004 (LCS_5840 UST LVL RECORDER BLUE)	8.5				
	VLV-CM012F (CM370 COND C VACUUM BRKR FAIL TO POSTION)	0				
	VLV-CM011F (CM369 COND B VACUUM BRKR FAIL TO POSTION)	0				
	VLV-CM010F (CM368 COND A VACUUM BRKR FAIL TO POSTION)	0				
	OVR-FWP012C (CFPT 1A TRIP_RESET TRIP PB)	ON				
	OVR-FWP015C (CFPT 1B TRIP_RESET TRIP PB)	ON				
	VLV-CA002F (CA4 CA PMP SUCT FROM UST HDR ISOL FAIL TO POSITION)	1				
	Ensure CA System Valve Control is reset.					

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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 reactor trip has occurred.**
- **The crew has performed applicable actions of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and transitioned to EP/1/A/5000/ES-0.1 (Reactor Trip Response).**
- **While performing actions of ES-0.1, 1AD-8, B/1 (UST LO LEVEL) alarmed.**
- **Using guidance contained in Enclosure 1 (Foldout Page), the crew has implemented AP/1/A/5500/006 (Loss of S/G Feedwater), Case II (Loss of Normal CA Supply).**

INITIATING CUES:

The Control Room Supervisor instructs you to perform the actions of AP/06 Case II, beginning at Step 7.

EXAMINER NOTE: After reading cue, provide the applicant with a copy of AP/1/A/5500/006 Case II with steps 1-6 completed.

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STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 7. **IF AT ANY TIME UST level is less than 10% (5,000 gal), THEN perform the following:** a. Close 1CA-4 (CA Pmps Suct From UST). STANDARD: Applicant determines that UST level is <10% on chart recorder and depresses the green "CLOSE" pushbutton on 1CA-4 and verifies the red "OPEN" light remains lit (1CA-4 will not close). COMMENTS:	**___ SAT** **___ UNSAT**

STEP 2 7. b. **IF** 1CA-4 will not close, **THEN** dispatch operator to unlock and close 1CS-19 (CA Pumps Supply From Upper Surge Tank) (TB1-627, 1D-30) (Key #633). STANDARD: Applicant contacts an AO and dispatches them to unlock and close 1CS-19. **Examiner Cue: "Operator has been dispatched to unlock and close 1CS-19."** COMMENTS:	**___ SAT** **___UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3 8. Maintain total CA flow less than 600 GPM in subsequent steps. STANDARD: Applicant uses CA flow control valves to throttle total CA flow to less than 600 GPM. **Examiner Note: This step is critical to preserve the remaining inventory of available makeup water while aligning an alternate source.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 4 9. Monitor Enclosure 1 (Foldout Page). STANDARD: Applicant acknowledges step and continues. **Examiner Cue: "Another operator will monitor Enclosure 1."** COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 10. Break condenser vacuum as follows: a. Open "COND A-B-C VAC BKR VLVS" STANDARD: Applicant depresses the red "OPEN" pushbutton for "COND A-B-C VAC BKR VLVS" and notes that the red "OPEN" light remains dark (vacuum breaker valves will not open). Applicant transitions to the RNO. **Examiner Note: This begins the alternate path for this JPM.** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 6 10.a.RNO. Dispatch two (2) operators to break vacuum. **REFER TO** Enclosure 3 (Local Actions To Break Condenser Vacuum). STANDARD: Applicant dispatches two AOs to break condenser vacuum per Enclosure 3. **Examiner Cue: "Operators have been dispatched to break condenser vacuum per Enclosure 3."** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7 10.b.1) Verify condenser vacuum indication – AVAILABLE. STANDARD: Applicant verifies that condenser vacuum indication is available on both 1MC-1 and 1MC-13 control boards. COMMENTS:	___ **SAT** ___ **UNSAT**
NOTE It may take up to 10 minutes for condenser vacuum to reach 0 inches HgVac. STEP 8 10.b.2) Verify one of the following: • "CONDENSER VACUUM" (1MC-13) – 0"IN HGV" OR • Dispatched operator reports no air flow into condenser. STANDARD: Applicant verifies condenser vacuum is not broken and operators were unsuccessful in breaking vacuum. Applicant transitions to the RNO. **Examiner Cue: "Dispatched operators report that they are unable to manually open Condenser Vacuum Breaker valves."** COMMENTS:	___ **SAT** ___ **UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 9 10.b.2)RNO. Shift CA pump suction to RN as follows: a) **IF** Train A RN essential header is available, **THEN** open the following valves: • 1RN-250A (RN Hdr A To CA Pmp Suct Isol) • 1CA-116A (CA Pump #1 Suct Frm RN Isol) • 1CA-15A (CA Pump 1A Suct Frm RN Isol). STANDARD: Applicant determines Train A RN essential header is available and rotates the switches for 1RN-250A, 1CA-116A, and 1CA-15A to the "OPEN" position and verifies the red "OPEN" indicating light is lit. **Examiner Note: This step is critical to ensure a makeup source of water is available to supply S/Gs for reactor decay heat removal.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 10 10.b.2)RNO.b) **IF** Train B RN essential header is available, **THEN** open the following valves: • 1RN-310B (RN Hdr B To CA Pmp Suct Isol) • 1CA-85B (CA Pump #1 Suct Frm RN Hdr B) • 1CA-18B (CA Pump 1B Suct Frm RN Isol). STANDARD: Applicant determines Train B RN essential header is available and rotates the switches for 1RN-310B, 1CA-85B, and 1CA-18B to the "OPEN" position and verifies the red "OPEN" indicating light is lit. **Examiner Note: This step is critical to ensure a makeup source of water is available to supply S/Gs for reactor decay heat removal.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 11 10.b.2)RNO.c) Ensure 1CA-6 (CA Pmps Suct From CACST) – CLOSED. STANDARD: Applicant determines that 1CA-6 is closed (normal position of this valve is closed with power removed). COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 12 10.b.2)RNO.d) **IF** 1CA-6 will not close, **THEN** dispatch operator to unlock and close 1CS-69 (U1 CACST To U1 & U2 CA Supplies) (SB-625, T-25) (Key #633). STANDARD: Applicant determines that this step does not apply. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 13 10.b.2)RNO.e) Ensure 1CA-4 (CA Pmps Suct From UST) – CLOSED. STANDARD: Applicant depresses the green "CLOSE" pushbutton and verifies that the red "OPEN" light remains illuminated (1CA-4 will not close and an AO was previously dispatched to unlock and close 1CS-19). COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 14 10.b.2)RNO.f) **IF** 1CA-4 will not close, **THEN** dispatch operator to unlock and close 1CS-19 (CA Pumps Supply From Upper Surge Tank) (TB1-627, 1D-30) (Key #633). STANDARD: Applicant determines that an operator has been previously dispatched to perform this action. COMMENTS:	___ **SAT** ___ **UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 15 10.b.2)RNO.g) Maintain S/G N/R levels between 11% - 50%. STANDARD: Applicant acknowledges the step and attempts to adjust CA flow as required. **Examiner Cue: "Another operator will maintain S/G levels."** COMMENTS:	**___ SAT** **___ UNSAT**
STEP 16 10.b.2)RNO.h) **GO TO** Step 17. STANDARD: Applicant acknowledges the step **Examiner Cue: "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 reactor trip has occurred.**
- **The crew has performed applicable actions of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and transitioned to EP/1/A/5000/ES-0.1 (Reactor Trip Response).**
- **While performing actions of ES-0.1, 1AD-8, B/1 (UST LO LEVEL) alarmed.**
- **Using guidance contained in Enclosure 1 (Foldout Page), the crew has implemented AP/1/A/5500/006 (Loss of S/G Feedwater), Case II (Loss of Normal CA Supply).**

INITIATING CUES:

The Control Room Supervisor instructs you to perform the actions of AP/06 Case II, beginning at Step 7.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

NOTE
- If CA pumps are taking a suction on hotwell, with UST depleted, and CACST isolated and CA auto start circuitry actuated, then CA pump suction will automatically align to the RN assured makeup source.
- If CA has been reset and CA pump suction is aligned to hotwell, with UST depleted, and CACST isolated, then CA pumps will trip on low suction pressure.

1. **Verify UST and Hotwell level indication as follows:**

NOTE 1CSCR5840 has a battery backed power supply that may fail 1 - 2 hours following a loss of offsite power.

a. Indication - AVAILABLE TO 1CSCR5840 (UST Level) (1MC13).

__ a. Dispatch operator with radio to monitor UST level on sightglass 1CSLG5970 (Upper Surge Tank Level) (TB-640, 1D-32).

b. Indication - AVAILABLE TO 1CSCR5840 (Hotwell Level) (1MC13).

__ b. Dispatch operator with radio to monitor hotwell level on sightglass 1CMLG5450 (Local Full Range Hotwell Level) (TB-548, 1J-26).

__ c. **IF AT ANY TIME** UST or Hotwell level indication is lost, **THEN** perform Steps 1.a and 1.b.

2. **Verify 6.9KV Busses - ENERGIZED.**

__ **Monitor conditions for breaking condenser vacuum. REFER TO Enclosure 2 (Conditions For Breaking Condenser Vacuum).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE For the remainder of this procedure, level values in parenthesis are local indications, intended for use when control room indications are not available.

__ 3. **Verify UST level - GREATER THAN 25% (18,000 gal).**

__ **GO TO Step 7.**

__ 4. **IF AT ANY TIME UST level is less than 25% (18,000 gal), THEN GO TO Step 7.**

5. **Initiate makeup to UST as follows:**

__ • Ensure CST pumps - ON.

__ • Throttle open 1YM-100 (UST M/U Ctrl) as required to make up to UST.

6. **Determine long term plant status:**

__ a. Continue monitoring CA pump status.

__ b. Continue to monitor UST level.

__ c. **WHEN** CA is no longer required, **THEN GO TO** Step 18.

__ d. Do not continue in this procedure until UST level is less than 25% (18,000 gal).

7. **IF AT ANY TIME UST level is less than 10% (5,000 gal), THEN perform the following:**

__ a. Close 1CA-4 (CA Pmps Suct From UST).

__ b. **IF** 1CA-4 will not close, **THEN** dispatch operator to unlock and close 1CS-19 (CA Pumps Supply From Upper Surge Tank) (TB1-627, 1D-30) (Key #633).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 8. **Maintain total CA flow less than 600 GPM in subsequent steps.**

__ 9. **Monitor Enclosure 1 (Foldout Page).**

10. **Break condenser vacuum as follows:**

__ a. Open "COND A-B-C VAC BKR VLVS".

__ a. Dispatch two (2) operators to break vacuum. **REFER TO** Enclosure 3 (Local Actions To Break Condenser Vacuum).

b. Verify condenser vacuum broken as follows:

__ 1) Verify condenser vacuum indication - AVAILABLE.

__ 1) Notify dispatched operator to verify condenser vacuum broken. **REFER TO** Enclosure 3 (Local Actions To Break Condenser Vacuum).

NOTE It may take up to 10 minutes for condenser vacuum to reach 0 inches HgVac.

2) Verify one of the following:

__ • "CONDENSER VACUUM" (1MC13) - 0"IN HGV"

OR

__ • Dispatched operator reports no air flow into condenser.

2) Shift CA pump suction to RN as follows:

a) **IF** Train A RN essential header is available, **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).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

b) **IF** Train B RN essential header is available, **THEN** open the following valves:

__ • 1RN-310B (RN Hdr B To CA Pmp Suct Isol)

__ • 1CA-85B (CA Pump #1 Suct Frm RN Hdr B)

__ • 1CA-18B (CA Pump 1B Suct Frm RN Isol).

__ c) Ensure 1CA-6 (CA Pmps Suct From CACST) - CLOSED.

__ d) **IF** 1CA-6 will not close, **THEN** dispatch operator to unlock and close 1CS-69 (U1 CACST To U1 & U2 CA Supplies) (SB-625, T-25) (Key #633).

__ e) Ensure 1CA-4 (CA Pmps Suct From UST) - CLOSED.

__ f) **IF** 1CA-4 will not close, **THEN** dispatch operator to unlock and close 1CS-19 (CA Pumps Supply From Upper Surge Tank) (TB1-627, 1D-30) (Key #633).

__ g) Maintain S/G N/R levels between 11% - 50%.

__ h) **GO TO** Step 17.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. **Verify the following:**

__ • 1CA-4 (CA Pmps Suct From UST) - CLOSED

OR

__ • 1CS-19 (CA Pumps Supply From Upper Surge Tank) - CLOSED

OR

__ • UST level - LESS THAN 10% (5,000 gal).

Perform the following:

__ a. Continue monitoring CA pump status.

__ b. **WHEN** CA is no longer required, **THEN GO TO** Step 18.

NOTE UST level will deplete from 25% (18,000 gal) to 10% (5,000 gal) in the following times at the given flow rate with no makeup:

- 20 minutes at 600 GPM
- 30 minutes at 400 GPM.

__ c. **WHEN** UST level is less than 10%, **THEN GO TO** Step 12.

__ d. Do not continue in this procedure until UST level is less than 10%.

NOTE The CA pump trips on low suction pressure are being blocked in the following step so that the hotwell can be used as a CA suction source.

12. **Select "BLOCK" on the following:**

__ • "CA TD Pmp Lo Suct. Press Trip Block"

__ • "CA Pmp 1A Lo Suct. Press Trip Block"

__ • "CA Pmp 1B Lo Suct. Press Trip Block".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Preference should be given to running the motor driven CA pumps to prevent raw water from RC being delivered to the S/Gs due to low suction pressure.

13. **Control CA flow to all intact S/Gs as follows:**

__ a. Verify both motor driven CA pumps - ON.

a. Perform the following:

__ 1) **IF** one motor driven CA pump is on, **THEN GO TO** Step 13.b.

__ 2) Ensure CA Pump #1 - ON.

__ 3) Maintain total CA flow less than 600 GPM.

__ 4) Maintain all intact S/G N/R levels between 11% - 50%.

__ 5) **GO TO** Step 14.

b. Dispatch operator to open the following valves:

__ • 1CA-111 (1A & 1B CA Pump Disch X-over To S/G Isol) (AB-552, BB-50, Rm 250)

__ • 1CA-112 (1A & 1B CA Pump Disch X-over To S/G Isol) (AB-552, BB-50, Rm 250).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

13. (Continued)

c. **WHEN** 1CA-111 and 1CA-112 are open, **THEN** perform the following:

__ 1) Maintain total CA flow less than 600 GPM.

__ 2) Ensure only one motor driven CA pump - ON.

__ 3) Ensure CA Pump #1 - OFF.

__ 4) Verify CA flow to all intact S/Gs - AVAILABLE.

4) Perform the following:

__ a) Start CA pumps and align valves to provide CA flow to all intact S/Gs.

__ b) Maintain total CA flow less than 600 GPM.

__ c) Maintain all intact S/G N/R levels between 11% - 50%.

__ d) **GO TO** Step 14.

__ 5) Maintain all intact S/G N/R levels between 11% - 50%.

__ 14. **Verify 1AD-5, G/4 "SSF CA XFER TO RC" - DARK.**

Ensure CA Pump #1 suction aligned to RC as follows:

__ • 1CA-178 (RC Supply To CA Pumps Isol) - OPEN

__ • 1CA-174 (RC To CA Suction Isol) - OPEN

__ • 1CA-175 (RC To CA Suction Isol) - OPEN.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 15. **Verify 1CA-4 (CA Pmps Suct From UST) - CLOSED.**

Perform the following:

__ a. Ensure 1CA-4 (CA Pmps Suct From UST) - CLOSED.

__ b. **IF** 1CA-4 will not close, **THEN** dispatch operator to unlock and close 1CS-19 (CA Pumps Supply From Upper Surge Tank) (TB1-627, 1D-30) (Key #633).

NOTE The following step will drain remaining UST inventory to the hotwell.

16. **Dispatch operator to open the following valves:**

__ • 1CS-35 (Hotwell Recirc M/U Valves Bypass) (TB1-578, 1G-29) (Ladder needed)

__ • 1CS-36 (Hotwell Deaerated Recirc) (TB1-578, 1H-29).

__ 17. **Do not continue in this procedure until CA is no longer required.**

18. **Ensure the following valves - ALIGNED AS REQUIRED FOR CURRENT PLANT CONDITIONS:**

__ • 1YM-100 (UST M/U Ctrl)

__ • 1CS-35 (Hotwell Recirc M/U Valves Bypass) (TB1-578, 1G-29) (Ladder needed)

__ • 1CS-36 (Hotwell Deaerated Recirc) (TB1-578, 1H-29).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

19. **IF CA Suction source is aligned to RN, THEN coordinate with TSC and/or engineering staff as appropriate to perform the following:**

    __ a. Refill the condensate grade suction piping.

    __ b. Vent the condensate grade suction piping.

    __ c. Realign CA suction to condensate grade source.

__ 20. **Secure CA pumps. REFER TO OP/1/A/6250/002 (Auxiliary Feedwater System).**

__ 21. **Ensure CA aligned for current conditions. REFER TO OP/1/A/6250/002 (Auxiliary Feedwater System).**

__ 22. **Determine long term plant status. RETURN TO procedure and step in effect.**

END

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EVALUATION SHEET

Task: Operate Containment Cooling System Fans

Alternate Path: No

Facility JPM #: VV-001

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

References: AP/1/A/5500/028 (Secondary Steam Leak)

Task Standard: Place all Containment Cooling Fans in operation in "Max" cooling mode.

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

_____

_____

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_____

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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
	MAL-SM007B (STM LINE BRK INSIDE CONTAINMENT LOOP B)	**20000**				
	Ensure LCVU's 1A, 1B, and 1D are in service.					
	Ensure UCVU 1B is in service.					

DO NOT PLACE SIMULATOR IN "RUN" UNTIL APPLICANT IS READY TO BEGIN.

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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:

- **AP/1/A/5500/028 (Secondary Steam Leak) has been entered due to indications of a steam leak.**

INITIATING CUES:

- **The CRS has directed you to perform AP/1/A/5500/028, step 9.**
- **No personnel are in Containment.**

EXAMINER NOTE: After reading the cue, provide the applicant with a copy of AP/1/A/5500/028, step 9.

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START TIME: _____

STEP/STANDARD	SAT/UNSAT
STEP 1: 9. Attempt to identify and isolate the leak as follows: a. Verify the following conditions NORMAL: • Containment temperature • Containment pressure • Containment humidity • Containment floor & equipment sump level. STANDARD: Applicant determines conditions are not normal and transitions to RNO. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP 2: 9.aRNOa. Perform the following: 1) Evacuate containment. STANDARD: Applicant initiates the Containment Evacuation Alarm and may request the WCC to review the Containment Entry Logbook. **Examiner Cue: "If asked, WCC reports no personnel are listed in Containment Entry Logbook."** COMMENTS:	___ **SAT** ___**UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3: 9.aRNOa. 2) Perform the following: a) Start all lower containment ventilation units in low speed. STANDARD: Applicant rotates switch VV LCVU 1C from “OFF” to “LOW” **Examiner Note: This step is critical to ensure all Lower Containment Ventilation Units are providing cooling and available to be used in Max cooling mode in order to minimize Containment pressure.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 4: 9.aRNOa.2) b) Start all upper containment ventilation units. STANDARD: Applicant rotates the following switches from “OFF” to “NORM”: VV UCVU 1A VV UCVU 1C VV UCVU 1D **Examiner Note: This step is critical to ensure all Upper Containment Ventilation Units are providing cooling and available to be used in Max cooling mode in order to minimize Containment pressure.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5: 9.aRNOa.2) c) Place all upper and lower containment ventilation units in “MAX” cooling. STANDARD: Applicant verifies the following switches are in the “MAX” position. VV LCVU 1A MAX VV LCVU 1B MAX VV LCVU 1C MAX VV LCVU 1D MAX Applicant rotates the following switches from “NORM” to “MAX”: VV UCVU 1A VV UCVU 1B VV UCVU 1C VV UCVU 1D **Examiner Note: This step is critical to ensure all Containment Ventilation Units are providing maximum cooling in order to minimize Containment pressure.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 6: 9.aRNOa.3) **IF AT ANY TIME** containment pressure reaches 1.2 PSIG, **THEN** perform the following: STANDARD: Applicant acknowledges the continuous action statement and continues to step 4. COMMENTS:	**___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 7: 9.aRNOa.4) **GO TO** Step 10. STANDARD: **Examiner Cue: "Another operator will complete this procedure. JPM Complete"** COMMENTS: **END OF TASK**	**___ SAT** **___ UNSAT**

EXAMINER NOTE: The applicant may choose to also place Lower Containment Ventilation Units in Hi Speed per the ARP associated with 1AD-19 B/12 (LOWER CONT PRESS 0.5 PSIG INITIATE HI SPEED). This is not included in the standard of this JPM.

STOP TIME _____

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO APPLICANT:

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INITIAL CONDITIONS:

- **AP/1/A/5500/028 (Secondary Steam Leak) has been entered due to indications of a steam leak.**

INITIATING CUES:

- **The CRS has directed you to perform AP/1/A/5500/028, step 9.**
- **No personnel are in Containment.**

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) **IF AT ANY TIME** containment pressure reaches 1.2 PSIG, **THEN** 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) **GO TO** EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

   __ 4) **GO TO** Step 10.

   __ b. Dispatch operators to locate and identify source of steam leak.

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".

__ 2) **IF** valve will not close, **THEN** dispatch operator to close affected condenser dump valve isolation valve.

(RNO continued on next page)

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".

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.

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.**

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EVALUATION SHEET

EVALUATION SHEET

Task: Reset Radiation Monitor Trip Setpoints

Alternate Path: No

Facility JPM #: WE-EMF-001

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/0/A/6500/080 (EMF RP86A Output Modules) rev. 17, Enclosure 4.2 (EMF RP86A Trip Setpoint Adjustment)

Task Standard: EMF50L TRIP 1 setpoint set to 6.3 E3 CPM and the TRIP 2 setpoint set to 9.0 E3 CPM per OP/0/A/6500/080 (EMF RP86A Output Modules) Enclosure 4.2 (EMF RP86A Trip Setpoint Adjustment).

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

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COMMENTS

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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. **Ensure copy of EMF-50 setpoint log page has been replaced.**
9. **Place simulator in FREEZE until Examiner cue is given.**

✓	Instructor Action	Final	Delay	Ramp	Delete In	Event

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READ TO APPLICANT

DIRECTION TO APPLICANT:

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INITIAL CONDITIONS:

- **Unit 1 is at 100% power.**

INITIATING CUES:

Following a discussion with Glenn from RP concerning a premature gaseous release termination, the Control Room Supervisor directs you to set EMF 50L setpoints using OP/0/A/6500/080 (EMF RP86A Output Modules) Enclosure 4.2 (EMF RP86A and RM1000 Trip Setpoint Adjustment) to the following values:

- **Trip 1 = 6300 CPM**
- **Trip 2 = 9000 CPM**

OAC Program EMFLIB is currently not available.

EXAMINER NOTE: After reading the cue, provide the applicant with a copy of OP/0/A/6500/080 (EMF RP86A Output Modules) Enclosure 4.2 (EMF RP86A and RM1000 Trip Setpoint Adjustment).

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STEP/STANDARD	SAT/UNSAT

START TIME: _____

NOTE: 1. If desired, EMF setpoints adjustments may be performed from the "EMF SETPOINT" screen of OAC EMF Library (EMFLIB) Application. EMFLIB is user friendly, no procedure instructions are provided for this application.
2. The Trip Lamps can only be cleared if the activity level has decreased below the Trip Setpoint.
3. 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.

STEP 1 3.1 **IF** necessary, press the clear key [CLR] to reset trip lamps STANDARD: Applicant verifies trip lamps dark or depresses the [CLR] key to clear alarms. COMMENTS:	**___ SAT** **___ UNSAT**

STEP 2 3.2 Press the function key [FUN] to bring up the "SELECT FUNCTION" screen. STANDARD: Applicant depresses the [FUN] key to bring up the "SELECT FUNCTION" screen. **This step is critical, due to being the only way to get to the select function screen, which is required to input new Trip 1 and Trip 2 values.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3 3.3 Adjust Trip 1 Setpoint as follows: 3.3.1 Press [1] for Trip 1 setting display screen. STANDARD: Applicant depresses the [1] to bring up the Trip 1 setting display screen. **This step is critical to bring up the screen that the new Trip 1 setting will be input into.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 4 3.3.2 Key in the desired Trip 1 setpoint. STANDARD: Applicant keys in 6300 CPM using the numeric keypad. **This step is critical to input the new Trip 1 setpoint required to meet the task standard. This new setpoint is checked in the next step. The critical requirement is for the new trip setpoint of 6300 CPM to be entered by the end of this JPM.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 3.3.3 Ensure the following: 3.3.3.1 Setpoint is correctly displayed in the "ENTER" block on the setpoint display screen. 3.3.3.2 Setpoint is greater than the current EMF reading. STANDARD: Applicant ensures 6300 CPM is displayed in the ENTER block and that the setpoint is greater than the current reading on the EMF. **This step is only critical if setpoint was entered wrong in the previous step.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
NOTE: Once the enter key [ENT] is pressed, the change in Trip 1 alarm setpoint is active.	
STEP 6 3.3.4 Press the enter key [ENT]. This value is now displayed under "TRIP 1" and the "ENTER" block is cleared. STANDARD: Applicant presses the [ENT] key and verifies the correct value under the "Trip 1" on the display. **This step is critical to input the new Trip 1 setpoint. Again the critical requirement is to have the Trip 1 setpoint set to 6300 CPM by the end of the JPM.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7 3.3.5 Press the clear key [CLR] to return to the "SELECT FUNCTION" screen. STANDARD: Applicant presses the [CLR] key to return to the "SELECT FUNCTION" screen. COMMENTS:	___ SAT ___ UNSAT
STEP 8 3.4 Adjust Trip 2 Setpoint as follows: 3.4.1 Press [2] for Trip 2 setting display screen. STANDARD: Applicant presses [2] to bring up the Trip 2 setting display screen. **This step is critical to get to the required screen to input the new Trip 2 setpoint.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 9 3.4.2 Key in the desired Trip 2 setpoint. STANDARD: Applicant enters 9000 CPM using the numeric keypad. **This step is critical to input the new Trip 2 setpoint required to meet the task standard. This new setpoint is checked in the next step. The critical requirement is for the new trip setpoint of 9000 CPM to be entered by the end of this JPM.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

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STEP/STANDARD	SAT/UNSAT
STEP 10 3.4.3 Ensure the following: 3.4.3.1 Setpoint is correctly displayed in the "ENTER" block on the setpoint display screen. 3.4.3.2 Setpoint is greater than the current EMF reading. STANDARD: Applicant ensures 9000 CPM is displayed in the ENTER block and that the entered setpoint is greater than the current reading on the EMF. **This step is only critical if setpoint was entered wrong in the previous step.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
NOTE: Once the enter key [ENT] is pressed, the change in Trip 2 alarm setpoint is active.	
STEP 11 3.4.4 Press the enter key [ENT]. This value is now displayed under "TRIP 2" and the "ENTER" block is cleared. STANDARD: Applicant presses the [ENT] key and verifies the correct value under the "Trip 2" on the display. **This step is critical to input the new Trip 2 setpoint. Again the critical requirement is to have the Trip 2 setpoint set to 9000 CPM by the end of the JPM.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 12 3.5 Press the clear key [CLR] twice to return to the normal display screen. STANDARD: Applicant presses the [CLR] key twice to return to the normal display screen. **EXAMINER CUE: "Another operator will complete the procedure. 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 at 100% power.**

INITIATING CUES:

Following a discussion with Glenn from RP concerning a premature gaseous release termination, the Control Room Supervisor directs you to set EMF 50L setpoints using OP/0/A/6500/080 (EMF RP86A Output Modules) Enclosure 4.2 (EMF RP86A and RM1000 Trip Setpoint Adjustment) to the following values:

- **Trip 1 = 6300 CPM**
- **Trip 2 = 9000 CPM**

OAC Program EMFLIB is currently not available.

EMF RP86A and RM1000 Trip Setpoint Adjustment
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 adjust the EMF setpoints.

3. Procedure

NOTE: 1. If desired, EMF setpoints adjustments may be performed from the "EMF SETPOINT" screen of OAC EMF Library (EMFLIB) Application. EMFLIB is user friendly, no procedure instructions are provided for this application.

2. The Trip Lamps can only be cleared if the activity level has decreased below the Trip Setpoint.

3. 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.

3.1 **IF** necessary, press the clear key [CLR] to reset trip lamps.

3.2 Press the function key [FUN] to bring up the "SELECT FUNCTION" screen.

3.3 Adjust Trip 1 Setpoint as follows:

3.3.1 Press [1] for Trip 1 setting display screen.

3.3.2 Key in the desired Trip 1 setpoint.

3.3.3 Ensure the following:

3.3.3.1 Setpoint is correctly displayed in the "ENTER" block on the setpoint display screen.

3.3.3.2 Setpoint is greater than the current EMF reading.

NOTE: Once the enter key [ENT] is pressed, the change in Trip 1 alarm setpoint is active.

3.3.4 Press the enter key [ENT]. This value is now displayed under "TRIP 1" and the "ENTER" block is cleared.

3.3.5 Press the clear key [CLR] to return to the "SELECT FUNCTION" screen.

3.4 Adjust Trip 2 Setpoint as follows:

3.4.1 Press [2] for Trip 2 setting display screen.

3.4.2 Key in the desired Trip 2 setpoint.

3.4.3 Ensure the following:

3.4.3.1 Setpoint is correctly displayed in the "ENTER" block on the setpoint display screen.

3.4.3.2 Setpoint is greater than the current EMF reading.

NOTE: Once the enter key [ENT] is pressed, the changes in Trip 2 alarm setpoint is active.

3.4.4 Press the enter key [ENT]. This value is now displayed under "TRIP 2" and the "ENTER" block is cleared.

3.5 Press the clear key [CLR] twice to return to the normal display screen.

3.6 Enter the new EMF setpoints on the Control Room EMF Setpoint Log.

3.7 Sign the Control Room EMF Setpoint Log in the appropriate box.

3.8 **IF** applicable, document the RP personnel that supplied the setpoints in the Control Room EMF Setpoint Log.

3.9 A separate Operator shall perform the following:

3.9.1 Verify that the correct setpoints are entered in the Control Room EMF Setpoint Log.

3.9.2 Sign the IV BY block on the Control Room EMF Setpoint Log.

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EVALUATION SHEET

Task: Isolate Cold Leg Accumulators Following a Shutdown LOCA

Alternate Path: Yes

Facility JPM #: N/A

Safety Function: 3 **Title:** Emergency Core Cooling System (ECCS)

K/A 006 A1.13 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: Accumulator pressure (level, boron concentration)

Rating(s): 3.5 / 3.7 **CFR:** 41.5 / 45.5

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

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

References: AP/1/A/5500/027 (Shutdown LOCA), Enclosure 14 (Isolating Cold Leg Accumulators)

Task Standard: AP/1/A/5500/027 (Shutdown LOCA) Enclosure 14 (Isolating Cold Leg Accumulators) is performed and 1A & 1D Cold Leg Accumulators are isolated and 1B & 1C Cold Leg Accumulators are vented to containment.

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

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COMMENTS

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SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **Reset to IC # ?**
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
	ANN-AD11-B03 (TRANSFORMER A TROUBLE)	ON				
	ANN-AD11-E03 (TRANSFORMER B TROUBLE)	ON				
	MAL-NC013B (NC COLD LEG B LEAK)	0.5				
	VLV-NI008F (NI65B ACCUM ISOL VLV FAIL TO POSITION)	1				
	VLV-NI011F (NI76A ACCUM ISOL VLV FAIL TO POSITION)	1				

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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 4.**
- **Unit 1 shutdown was in progress for a refueling outage, when pressurizer pressure and level began to decrease uncontrollably.**
- **The CRS has entered AP/1/A/5500/027 (Shutdown LOCA) to address the reactor coolant system leak.**
- **Power to all CLA discharge isolation valves has been restored per EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 9 (Power Alignment for CLA Valves).**

INITIATING CUES:

- **The CRS has directed you to isolate the Unit 1 Cold Leg Accumulators by performing AP/1/A/5500/027 (Shutdown LOCA) Enclosure 14 (Isolating Cold Leg Accumulators).**

EXAMINER NOTE: After reading the cue, provide the applicant with a copy of AP/1/A/5500/027 Enclosure 14.

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START TIME: _____

STEP/STANDARD	SAT/UNSAT
STEP 1: 1. **Dispatch operator to restore power to all CLA discharge isolation valves. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 9 (Power Alignment for CLA Valves).** STANDARD: Per initiating cue, the applicant should realize that this step is complete. Also valve indication for each of the CLA discharge isolation valves is available, due to power already being aligned by the AO. COMMENTS:	**___ SAT** **___ UNSAT**

STEP 2: 2. **Ensure S/I - RESET** a. ECCS. b. D/G load sequencers. c. **IF AT ANY TIME** a B/O occurs, **THEN** restart S/I equipment previously on. STANDARD: Applicant verifies that the yellow ECCS and D/G load sequencer RESET lights are lit. Applicant acknowledges the If at any time statement. COMMENTS:	**___ SAT** **___UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3: 3. **WHEN power is aligned, THEN perform the following:** a. CLOSE the following valves: • **1NI-54A (C-Leg Accum A Disch Isol)** • 1NI-65B (C-Leg Accum B Disch Isol) • 1NI-76A (C-Leg Accum C Disch Isol) • **1NI-88B (C-Leg Accum D Disch Isol)** STANDARD: Applicant depresses the green CLOSE pushbutton for the valves listed, and verifies the green CLSD light lit and red OPEN light dark for valves 1NI-54A & 1NI-88B. Applicant also verifies the red OPEN light lit and green CLSD light dark for valves 1NI-65B & 1NI-76A and transitions to the RNO. **The critical part of this step is to close isolation valves 1NI-54A & 1NI-88B. The other 2 Cold Leg Accumulators will be vented to containment in subsequent steps in the RNO.** **EXAMINER NOTE: This begins the alternate path of this JPM.** **EXAMINER NOTE: The applicant should determine from the initiating cue that power has been aligned. If necessary, inform "Power has been aligned".** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 4: 3.RNOa. Perform the following: 1) Ensure containment isolation signals – RESET: • Phase A • Phase B STANDARD: Applicant verifies that the yellow RESET lights are lit for both trains Phase A and Phase B isolations. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 5: 3.RNOa. 2) Ensure 1VI-77B (VI Cont Isol) - OPEN STANDARD: Applicant determines that the red OPEN light lit and green CLSD light dark for 1VI-77B. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 6: 3.RNOa. 3) **IF** VI pressure is less than 85 PSIG, **THEN** dispatch operator to ensure proper VI compressor operation. STANDARD: Applicant determines that VI pressure is ~ 90 PSIG. This step is N/A. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 7: 3.RNOa.4) Vent any CLA which cannot be isolated as follows: a) OPEN 1NI-47A (C-Leg Accum N2 Sup Cont Isol) STANDARD: Applicant depresses the red OPEN pushbutton for 1NI-47A and verifies the red OPEN light lit and green CLSD light dark. COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 8: 3.RNOa.4) b) Place breaker 1CB-1 (behind 1MC-6)(Key #11) to - ON STANDARD: Applicant lifts breaker 1CB-1 fully up to the ON position. **This step is critical to place power on Cold Leg Accumulator Nitrogen supply isolation valves for 1B and 1C CLAs which will be opened in the next step to allow venting the accumulators to containment.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 9: 3.RNOa.4) c) OPEN valve for CLA(s) to be vented: • 1NI-50 (C-Leg Accum A N2 Supply Isol) • **1NI-61 (C-Leg Accum B N2 Supply Isol)** • **1NI-72 (C-Leg Accum C N2 Supply Isol)** • 1NI-84 (C-Leg Accum D N2 Supply Isol) STANDARD: Applicant depresses the red OPEN pushbutton and verifies the red OPEN light lit and green CLSD light dark for 1NI-61 and 1NI-72. **This step is critical due to not being able to isolate these CLAs. If these CLAs are not vented to reduce the N2 overpressure, it could cause a hard bubble to form in the reactor coolant system as reactor coolant pressure continues to decrease.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 10: 3.RNOa.4) d) CLOSE 1NI-47A. STANDARD: Applicant depresses the green CLOSE pushbutton and verifies the green CLSD light lit and red OPEN light dark for 1NI-47A. **This step is critical to allow venting the 1B and 1C CLAs.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 11: 3.RNOa.4) e) OPEN 1NI-83 (C-Leg Accums N2 Vent Ctrl) to depressurize affected CLA(s). STANDARD: Applicant rotates potentiometer for 1NI-83 clockwise to begin venting the 1B and 1C CLAs. **This step is critical to vent the 1B and 1C CLAs.** **NOTE TO EVALUATOR: The time to fully vent the 1B & 1C CLAs would be approximately 30 minutes. The critical steps for this JPM have been met at this point and the JPM may be terminated at your discretion.** **EVALUATOR CUE: "Another operator will continue to vent the 1B and 1C Cold Leg Accumulators. This JPM is complete."** 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:

- **Unit 1 is in Mode 4.**
- **Unit 1 shutdown was in progress for a refueling outage, when pressurizer pressure and level began to decrease uncontrollably.**
- **The CRS has entered AP/1/A/5500/027 (Shutdown LOCA) to address the reactor coolant system leak.**
- **Power to all CLA discharge isolation valves has been restored per EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 9 (Power Alignment for CLA Valves).**

INITIATING CUES:

- **The CRS has directed you to isolate the Unit 1 Cold Leg Accumulators by performing AP/1/A/5500/027 (Shutdown LOCA) Enclosure 14 (Isolating Cold Leg Accumulators).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

✓ 1. **Dispatch operator to restore power to all CLA discharge isolation valves. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 9 (Power Alignment for CLA Valves).**

2. **Ensure S/I - RESET.**

__ 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.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. **WHEN power aligned, THEN perform the following:**

   a. CLOSE the following valves:

   __ • 1NI-54A (C-Leg Accum A Disch Isol)

   __ • 1NI-65B (C-Leg Accum B Disch Isol)

   __ • 1NI-76A (C-Leg Accum C Disch Isol)

   __ • 1NI-88B (C-Leg Accum D Disch Isol).

   a. Perform the following:

      1) Ensure containment isolation signals - RESET:

      __ • Phase A

      __ • Phase B.

      __ 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.

      4) Vent any CLA which cannot be isolated as follows:

      __ a) OPEN 1NI-47A (C-Leg Accum N2 Sup Cont Isol).

      __ b) Place breaker 1CB-1 (behind 1MC-6) (Key #11) to - ON.

      c) OPEN valve for CLA(s) to be vented:

      __ • 1NI-50 (C-Leg Accum A N2 Supply Isol)

      __ • 1NI-61 (C-Leg Accum B N2 Supply Isol)

      __ • 1NI-72 (C-Leg Accum C N2 Supply Isol)

      __ • 1NI-84 (C-Leg Accum D N2 Supply Isol).

      __ d) CLOSE 1NI-47A.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. (Continued)

__ e) OPEN 1NI-83 (C-Leg Accums N2 Vent Ctrl) to depressurize affected CLA(s).

f) **WHEN** CLA(s) vented, **THEN** perform the following:

__ (1) CLOSE 1NI-83.

(2) CLOSE valve(s) previously opened:

__ • 1NI-50

__ • 1NI-61

__ • 1NI-72

__ • 1NI-84.

__ (3) Place breaker 1CB-1 to - OFF.

__ g) **IF** any unisolated CLA(s) cannot be vented, **THEN** consult station management for further actions.

__ b. Notify dispatched operator to remove power from all CLA isolation valves. **REFER TO** EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 9 (Power Alignment for CLA Valves).

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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 179

Task Standard: 1ETA power being supplied from offsite through 1ATC and 1A D/G secured from the control room without a reverse power trip.

Validation Time: 12.5 minutes **Time Critical:** Yes _____ No **X**

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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 #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

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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 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 3.2.**
- **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 with the initial conditions completed.

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STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 3.2 **IF** shutting down the diesel from the Control Room, perform the following:

3.2.1 **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.

3.2.1.1 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: 3.2.1.2 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 3.2.1.3 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. COMMENTS:	**___ 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. 3.2.1.4 As the indicator reaches 1.5 min. before the vertical (synchronized) position, close <u>one</u> of the following breakers: o ETA Norm Fdr Frm ATC OR o ETA Alt Fdr Frm SATA <u>STANDARD</u>: 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. 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.** <u>COMMENTS:</u>	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 3.2.1.5 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 3.2.1.6 **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 3.2.1.7 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 3.2.2 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 3.2.3 **IF** D/G 1A Bkr To ETA is open, go to Step 3.2.7. 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**

STEP/STANDARD	SAT/UNSAT
STEP 10 3.2.4 **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. 3.2.4.1 Reduce D/G load to 200 KW 3.2.4.2 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: Step 3.2.6 should be not applicable.** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 11 3.2.7 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 temperature is ≤ 170°F. ○ Turbocharger exhaust temperatures have stabilized. STANDARD: Applicant acknowledges step and continues. **Examiner Cue: "5 minutes has elapsed."** COMMENTS:	**___ SAT** **___ UNSAT**
STEP 12 3.2.8 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 3.2.9 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 3.2.10 **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 3.2.**
- **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 scanner or chart recorder, 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 Gould TA11 Chart Recorder is programmed to store the previous 12 minutes of run data and 4 minutes of post trigger data any time the "Power" switch is "ON" and the recorder is armed. If the D/G trips or a problem occurs, depress the "Trig" push button to store the previous 12 minutes of data and the following 4 minutes of data. Do **NOT** turn the "Power" switch "OFF". Contact IAE to download the data to assist in troubleshooting.

1.16 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.

1.17 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

BB 2.1 Verify D/G 1A is in operation and was started by an automatic signal.

RPJ 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

N/A 3.1 **IF** shutting down D/G 1A LOCALLY, perform the following:

_____ 3.1.1 Close 1VN-1 (1A D/G Eng Exhaust Silencer Drain) (DB-557, CC-38).

3.1.2 Transfer starting control to the local control panel per one of the following:

_____ 3.1.2.1 **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.

_____ 3.1.2.2 **IF** there is an emergency **OR** remote circuitry malfunction preventing Step 3.1.2.1 from being performed, actuate the "Control Room Override" at the break glass station on 1DGCPA.

_____ 3.1.3 **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.

_____ 3.1.3.1 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".

_____ 3.1.3.2 Place the "Synchroscope Selector Switch" in the "ON" position.

_____ 3.1.3.3 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.

_____ 3.1.3.4 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

_____ 3.1.3.5 Stabilize the D/G with a positive load and a lagging power factor.

_____ 3.1.3.6 **IF** the power factor meter indicates severely leading, (pegs clockwise)
AND power output decreases to 0 KW,
THEN IMMEDIATELY trip Diesel Gen Bkr 1ETA18.

_____ 3.1.3.7 Place the "Synchroscope Selector Switch" in the "OFF" position.

_____ 3.1.4 Verify one of the following breakers is closed:

☐ Normal Bkr 1ETA3

OR

☐ Stand-By Bkr 1ETA4

_____ 3.1.5 **IF** Diesel Gen Bkr 1ETA18 is open, go to Step 3.1.9.

_____ 3.1.6 **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.

_____ 3.1.6.1 Reduce D/G load to 200 KW.

_____ _____ 3.1.6.2 Trip Diesel Gen Bkr 1ETA18.

_____ 3.1.7 **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}

_____ 3.1.7.1 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.

3.1.7.2 **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.

_____ 3.1.8 **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}

_____ 3.1.8.1 Reduce load to 4800 KW (4650-4950 KW). {PIP 97-2796}

Record time_____

_____ 3.1.8.2 **AFTER** 5 minutes, reduce load to 3850 KW (3700-4000 KW).

Record time_____

_____ 3.1.8.3 **AFTER** 5 minutes, reduce load to 2900 KW (2750-3050 KW).

Record time_____

_____ 3.1.8.4 **AFTER** 5 minutes, reduce load to 2000 KW (1850-2150 KW).

Record time_____

_____ 3.1.8.5 Ensure total load reduction time is ≥ 15 minutes, prior to performing Step 3.1.8.6.

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.

3.1.8.6 **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.

_____ 3.1.9 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.

_____ 3.1.10 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.

_____ 3.1.11 Depress "STOP" pushbutton on the control panel.

_____ 3.1.12 **<u>WHEN</u>** 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.

_____ 3.1.13 Have the Control Room Operator place D/G 1A control in the "CTRL RM" position on 1MC11.

_____ 3.2 **IF** shutting down the diesel from the Control Room, perform the following:

_____ 3.2.1 **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.

_____ 3.2.1.1 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".

_____ 3.2.1.2 Place the "D/G 1A Sync" Switch in the "ON" position.

_____ 3.2.1.3 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.

_____ 3.2.1.4 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

_____ 3.2.1.5 Stabilize the D/G with a positive load and a lagging power factor.

_____ 3.2.1.6 **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.

_____ 3.2.1.7 Place the "D/G 1A Sync" Switch in the "OFF" position.

Record time_____

_____ 3.2.2 Verify one of the following breakers is closed:

☐ ETA Norm Fdr Frm ATC

OR

☐ ETA Alt Fdr Frm SATA

_____ 3.2.3 **IF** D/G 1A Bkr To ETA is open, go to Step 3.2.7.

_____ 3.2.4 **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

_____ 3.2.4.1 Reduce D/G load to 200 KW.

_____ _____ 3.2.4.2 Trip D/G 1A Bkr To ETA.

_____ 3.2.5 **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}

_____ 3.2.5.1 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.

3.2.5.2 **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.

_____ 3.2.6 **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}

_____ 3.2.6.1 Reduce load to 4800 KW (4650-4950 KW). {PIP 97-2796}

Record time_____

_____ 3.2.6.2 **AFTER** 5 minutes, reduce load to 3850 KW (3700-4000 KW).

Record time_____

_____ 3.2.6.3 **AFTER** 5 minutes, reduce load to 2900 KW (2750-3050 KW).

Record time_____

_____ 3.2.6.4 **AFTER** 5 minutes, reduce load to 2000 KW (1850-2150 KW).

Record time_____

_____ 3.2.6.5 Ensure total load reduction time is ≥ 15 minutes, prior to performing Step 3.2.6.6.

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.

3.2.6.6 **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.

_____ 3.2.7 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.

_____ 3.2.8 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.

_____ 3.2.9 Depress D/G 1A "OFF" pushbutton.

Record time _____

_____ 3.2.10 **<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.

_____ 3.3 Record total time D/G 1A was run (min) _____.

_____ 3.4 Start the Diesel Building Normal Vent Fan 1A.

_____ 3.5 **<u>IF</u>** the "Control Room Override" break glass station on 1DGCPA was used, ensure it is returned to normal as follows:

_____ 3.5.1 Reset the switch.

_____ 3.5.2 Initiate a Work Request to replace the break glass.

_____ 3.6 **<u>IF</u>** the D/G was in operation for ≥ 1 hour, drain any accumulated water from the Fuel Oil Day Tank by performing the following:

☐ 3.6.1 Place a container downstream of 1FD-96 (1A D/G Eng Fuel Oil Day Tank 1A Sample Outside Isol) (DB-557, DD-38).

_____ 3.6.2 Open 1FD-95 (1A D/G Eng Fuel Oil Day Tank 1A Sample Inside Isol) (DB-557, DD-38).

_____ 3.6.3 Slowly open 1FD-96 (1A D/G Eng Fuel Oil Day Tank 1A Sample Outside Isol).

_____ 3.6.4 **<u>WHEN</u>** the sample has been obtained, close 1FD-96 (1A D/G Eng Fuel Oil Day Tank 1A Sample Outside Isol).

☐ 3.6.5 **<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).

☐ 3.6.6 Dump container contents in waste oil container.

_____ 3.6.7 **IF** sample is **NOT** free of water, repeat Step 3.6.1 through Step 3.6.6.

3.6.8 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)

_____ 3.7 Ensure 1VN-1 (1A D/G Eng Exhaust Silencer Drain) (DB-557, CC-38) is open.

3.8 Drain any accumulated oil out of the crankcase vent drip leg as follows:

_____ 3.8.1 Verify 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain) (DB-556, DD-39) is closed.

_____ 3.8.2 Remove pipe cap downstream of 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain).

_____ 3.8.3 Place the waste oil container downstream of 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain).

_____ 3.8.4 Open 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain) to drain any accumulated oil.

_____ 3.8.5 **WHEN** oil has drained, close 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain).

_____ 3.8.6 Replace pipe cap downstream of 1ZD-1 (1A D/G Eng Crankcase Vent Drip Leg Drain).

_____ 3.9 **IF** the D/G run was normal **AND** the D/G did **NOT** trip, perform the following at the Alarm Monitor Panel (1ELMC0029):

☐ 3.9.1 Depress and hold the "Alarm Ack" button for 1 second.

☐ 3.9.2 Verify that any "A" or "B" alarm lights that were flashing are now illuminated solid.

3.10 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)

3.11 **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}

_____ 3.11.1 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

_____ 3.11.2 Verify the delta T across each is > 5°F.

☐ 1LD-17 delta T _____°F

☐ 1LD-18 delta T _____°F

_____ 3.11.3 **IF** the delta T across 1LD-17 **OR** 1LD-18 is ≤ 5°F, contact MSE for an operability determination.

Person notified _____

_____ 3.11.4 **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).

_____ 3.12 Ensure any used oil generated during this test (as a result of sampling, etc.) is properly disposed of.

_____ 3.13 Place the ES Checklist and the IV Checklist in the Control Copy folder of this procedure and route the outdated enclosures with this enclosure.

_____ 3.14 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).

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

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EVALUATION SHEET

Task: Place the 2A Hydrogen Analyzer in Service

Alternate Path: No

Facility JPM #: VX-024

Safety Function: 5 **Title:** Hydrogen Recombiner and Purge Control System (HRPS)

K/A 028 A1.01 Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: Hydrogen concentration

Rating(s): 3.4 / 3.8 **CFR:** 41.5 / 45.5

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

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

References: EP/2/A/5000/E-1 (Loss of Reactor or Secondary Coolant) Rev 26
OP/2/A/6450/010 (Containment Hydrogen Control Systems) Rev 26

Task Standard: Hydrogen Analyzer Train 2A in service monitoring upper containment via selection of Position "1".

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

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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 large break LOCA has occurred on Unit 2.**
- **The procedure currently in use is EP/2/A/5000/E-1 (Loss of Reactor or Secondary Coolant).**
- **Containment Hydrogen Analyzer 2B is tagged for maintenance.**

INITIATING CUES:

- **The Control Room Supervisor directs you to place Containment Hydrogen Analyzer 2A in service to Position "1" for sampling Upper Containment per OP/2/A/6450/010 (Containment Hydrogen Control Systems) Enclosure 4.9, step 3.1.**
- **All initial conditions are complete.**
- **Peer check has been waived.**

EXAMINER NOTE: After reading cue, provide the applicant with a copy of OP/2/A/6450/010 Enclosure 4.9 with the initial conditions completed.

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STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 3.1 Place Hydrogen Analyzer Train A **OR** Train B in service.

3.1.1 **IF** aligning Hydrogen Analyzer Train A, proceed as follows:

3.1.1.1 Obtain Hydrogen Analyzer Control Panel Train A (2ELCP0251) key (Key #225) from WCC.

STANDARD:

Applicant determines from the initiating cue that A train needs to be aligned and obtains the key #225

___ SAT

___ UNSAT

Examiner Note: Key not required to be obtained to complete this JPM task. Once key is identified give cue.

Examiner Cue: "Key 225 has been obtained."

COMMENTS:

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STEP/STANDARD	SAT/UNSAT
NOTE: Steps 3.1.1.2 – 3.1.1.5 will be performed at Hydrogen Analyzer Control Panel 2A HACP-2A 2ELCP0251 (AB-579, DD-61). STEP 2: 3.1.1.2 Select the desired sample location by positioning the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch: • Position "1" (for sampling Upper Containment) • Position "2" (for sampling operating level) • Position "3" (for sampling Steam Generator 1B cavity) • Position "ALL" for sampling ALL 3 locations) STANDARD: Applicant describes placing the HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch in position "1". **Examiner Cue: Once switch is located by applicant and operation described, "Switch is in position "1"."** **Examiner Note: This step is critical to be able to sample upper containment per the JPM standard.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 3 3.1.1.3 Verify the "POS 1: H2 ANALYZER POS 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1". STANDARD: Applicant describes verifying the switch is in “POS 1”. **Examiner Cue: Once located by applicant, “Switch is in position 1.”** COMMENTS:	___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 4 3.1.1.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch and turn to "OPEN" position. STANDARD: Applicant describes inserting the key and turning the key to the “OPEN” position. **Examiner Cue: Once applicant describes inserting the key and operation of the switch, “Key switch is in the OPEN position.”** **Examiner Note: This step is critical to open the containment isolation valves in order to be able to sample upper containment.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 5 3.1.1.5 Verify the following indicating lights are lit: • "H2 SAMPLE CONT. ISOLATION VALVES OPEN" • Sample location(s) selected in Step 3.1.1.2. STANDARD: Applicant describes verifying the red OPEN light LIT for H2 Sample Containment Isolation Valves. **Examiner Cue: Once the light is located, “Red OPEN light is lit.”** COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
NOTE: Steps 3.1.1.6 – 3.1.1.7 will be performed inside A Train Hydrogen Analyzer Control Unit (PAMS) 2MIMT5320A (AB-579, DD-61). STEP 6 3.1.1.6 Verify the "STANDBY/OFF" switch is in the "STANDBY" position. STANDARD: Applicant describes verifying the "STANDBY/OFF" switch is in the "STANDBY" position. **Examiner Cue: Once switch is located, "Switch is in the "STANDBY" position."** COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 7 3.1.1.7 Place the "ON/OFF" switch in the "ON" position. STANDARD: Applicant describes moving the ON/OFF switch up to the "ON" position. **Examiner Cue: Once operation of switch is described, "Switch is in the "ON" position and the green "ON" light is lit."** **Examiner Note: This step is critical to turn the Hydrogen Analyzer on.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 8 3.1.1.8 Monitor H_2 concentration at either of the following locations: • "Hydrogen Analyzer Control Unit "2MIMT5320A" (AB-579, DD-61) • "CONTAINMENT TRN A H2 ANAL" meter (2MIP5320) located on 2MC7. STANDARD: Applicant describes calling the control room to inform them that the hydrogen analyzers are in service and can be read on the local unit or on 2MC-7. **Examiner Cue: "Hydrogen concentration will be monitored on 2MC-7. 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 large break LOCA has occurred on Unit 2.**
- **The procedure currently in use is EP/2/A/5000/E-1 (Loss of Reactor or Secondary Coolant).**
- **Containment Hydrogen Analyzer 2B is tagged for maintenance.**

INITIATING CUES:

- **The Control Room Supervisor directs you to place Containment Hydrogen Analyzer 2A in service to Position "1" for sampling Upper Containment per OP/2/A/6450/010 (Containment Hydrogen Control Systems) Enclosure 4.9, step 3.1.**
- **All initial conditions are complete.**
- **Peer check has been waived.**

1. Limits and Precautions

1.1 Hydrogen concentrations greater than 3.5% are combustible.

1.2 The Hydrogen Analyzer Control Unit shall **NOT** be in the "ON" position when either of following conditions exists to prevent suction pump damage:

- "HYDROGEN ANALYZER CONT ISOLATION VALVES" are in the "CLOSE" position.
- "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 2".

2. Initial Conditions

N/A Verify operation of the Containment Hydrogen Analyzers is required per appropriate emergency procedures.

3. Procedure

3.1 Place Hydrogen Analyzer Train A **OR** Train B in service.

——— 3.1.1 **IF** aligning Hydrogen Analyzer Train A, proceed as follows:

☐ 3.1.1.1 Obtain Hydrogen Analyzer Control Panel Train A (2ELCP0251) key (Key #225) from WCC.

NOTE: Steps 3.1.1.2 - 3.1.1.5 will be performed at Hydrogen Analyzer Control Panel 2A HACP-2A 2ELCP0251 (AB-579, DD-61).

3.1.1.2 Select the desired sample location by positioning the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch:

☐ Position "1" (for sampling Upper Containment)
☐ Position "2" (for sampling operating level)
☐ Position "3" (for sampling Steam Generator 2B cavity)
☐ Position "ALL" (for sampling ALL 3 locations)

☐ 3.1.1.3 Verify the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1".

☐ 3.1.1.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch and turn to "OPEN" position.

☐ 3.1.1.5 Verify the following indicating lights are lit:

- "H2 SAMPLE CONT. ISOLATION VALVES OPEN"
- Sample location(s) selected in Step 3.1.1.2.

NOTE: Steps 3.1.1.6 - 3.1.1.7 will be performed inside A Train Hydrogen Analyzer Control Unit (PAMS) 2MIMT5320A (AB-579, DD-61).

☐ 3.1.1.6 Verify the "STANDBY/OFF" switch is in the "STANDBY" position.

☐ 3.1.1.7 Place the "ON/OFF" switch in the "ON" position.

3.1.1.8 Monitor H_2 concentration at either of the following locations:

- A Train "Hydrogen Analyzer Control Unit (PAMS) "2MIMT5320A" (AB-579, DD-61)
- "CONTAINMENT TRN A H2 ANAL" meter (2MIP5320) located on 2MC-7.

☐ 3.1.1.9 Verify Chart Recorder 2MICR5340 Position "2" "CONT. H2 ANALYSIS TRN A (%)" recording H2 concentration (2MC7).

——— 3.1.2 **IF** aligning Hydrogen Analyzer Train B, proceed as follows:

☐ 3.1.2.1 Obtain Hydrogen Analyzer Control Panel Train B (2ELCP0252) key (Key #226) from WCC.

NOTE: Steps 3.1.2.2 - 3.1.2.5 will be performed at Hydrogen Analyzer Control Panel 2B HACP-2B 2ELCP0252 (AB-562, DD-61).

3.1.2.2 Select desired sample location by positioning the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch:

☐ Position "1" (for sampling Upper Containment)
☐ Position "2" (for sampling operating level)
☐ Position "3" (for sampling Steam Generator 2B cavity)
☐ Position "ALL" (for sampling ALL 3 locations)

☐ 3.1.2.3 Verify the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1".

☐ 3.1.2.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch and turn to "OPEN" position.

☐ 3.1.2.5 Verify the following indicating lights are lit:

- "H2 SAMPLE CONT. ISOLATION VALVES OPEN"
- Sample location(s) selected in Step 3.1.2.2.

NOTE: Steps 3.1.2.6 - 3.1.2.7 will be performed inside B Train Hydrogen Analyzer Control Unit (PAMS) 2MIMT5330B (AB-562, DD-61).

☐ 3.1.2.6 Verify the "STANDBY/OFF" switch is in the "STANDBY" position.

☐ 3.1.2.7 Place the "ON/OFF" switch to the "ON" position.

3.1.2.8 Monitor H_2 concentration at either of the following locations:

- B Train Hydrogen Analyzer Control Unit (PAMS) "2MIMT5330B" (AB-562, DD-61)
- "CONTAINMENT TRAIN B H2 ANAL" meter (2MIP5330) on 2MC-7.

☐ 3.1.2.9 Verify Chart Recorder 2MICR5350 Position "2" "CONT. H2 ANALYSIS TRN B (%)" recording H_2 concentration (2MC7).

NOTE: It is **NOT** necessary for the hydrogen analyzer control unit (2MIMT5320A or 2MIMT5330B) to be operable for PACS alignment.

_____ 3.2 **IF** available **AND** requested by Radiation Protection per HP/2/B/1009/017 (Post-Accident Containment Air Sampling System), align the available Hydrogen Analyzer Train as follows:

——— 3.2.1 **IF** aligning Train A to PACS, perform the following at Hydrogen Analyzer Control Panel 2A HACP-2A 2ELCP0251 (AB-579, DD-61):

☐ 3.2.1.1 Obtain Hydrogen Analyzer Control Panel Train A (2ELCP0251) key (Key #225) from WCC.

☐ 3.2.1.2 Place the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch to position "2".

☐ 3.2.1.3 Place the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch in "POS. 2".

☐ 3.2.1.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch and turn to "OPEN" position.

☐ 3.2.1.5 Verify the following indicating lights are lit:

- "H2 SAMPLE CONT. ISOLATION VALVES OPEN"
- "OPERATION LEVEL SAMPLE SELECTED"

☐ 3.2.1.6 Notify Radiation Protection that the Post Accident Containment Sampling System is operable.
Person notified _____

_____ 3.2.2 **IF** aligning Train B to PACS, perform the following at Hydrogen Analyzer Control Panel 2B HACP-2B 2ELCP0252 (AB-562, DD-61):

☐ 3.2.2.1 Obtain Hydrogen Analyzer Control Panel Train B (2ELCP0252) key (Key #226) from WCC.

☐ 3.2.2.2 Place the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch to position "2".

☐ 3.2.2.3 Place the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch in "POS. 2".

☐ 3.2.2.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch and turn to "OPEN" position.

☐ 3.2.2.5 Verify the following indicating lights are lit:

- "H2 SAMPLE CONT. ISOLATION VALVES OPEN"
- "OPERATION LEVEL SAMPLE SELECTED"

☐ 3.2.2.6 Notify Radiation Protection that the Post Accident Containment Sampling System is operable.
Person notified _____

3.3 For containment Hydrogen Analyzer shutdown, proceed as follows:

_____ 3.3.1 **IF** a hydrogen analyzer train is aligned to PACS, notify Radiation Protection of the intent to shutdown.
Person notified _____

_____ 3.3.2 **IF** shutting down Hydrogen Analyzer Train A, perform the following:

NOTE: Steps 3.3.2.1 and 3.3.2.2 will be performed inside the Train A Hydrogen Analyzer Control Unit (PAMS) 2MIMT5320A (AB-579, DD-61).

☐ 3.3.2.1 Ensure the "ON/OFF" switch is in the "OFF" position.

☐ 3.3.2.2 Verify the "STANDBY/OFF" switch is in the "STANDBY" position.

NOTE: Steps 3.3.2.3 - 3.3.2.5 will be performed at Hydrogen Analyzer Control Panel 2A HACP-2A (2ELCP0251) (AB-579, DD-61).

☐ 3.3.2.3 Place the "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch in the "CLOSE" position.

☐ 3.3.2.4 Ensure the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1".

☐ 3.3.2.5 Ensure the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch is in the "ALL" position.

☐ 3.3.2.6 Return Hydrogen Analyzer Control Panel 2A key to WCC.

_____ 3.3.3 **IF** shutting down Hydrogen Analyzer Train B, perform the following:

NOTE: Steps 3.3.3.1 and 3.3.3.2 will be performed inside the Train B Hydrogen Analyzer Control Unit (PAMS) 2MIMT5330B (AB-562, DD-61).

☐ 3.3.3.1 Ensure the "ON/OFF" switch is in the "OFF" position.

☐ 3.3.3.2 Verify the "STANDBY/OFF" switch is in the "STANDBY" position.

NOTE: Steps 3.3.3.3 - 3.3.3.5 will be performed at Hydrogen Analyzer Control Panel 2B HACP-2B (2ELCP0252) (AB-562, DD-61).

☐ 3.3.3.3 Place the "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch in the "CLOSE" position.

☐ 3.3.3.4 Ensure the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1".

☐ 3.3.3.5 Ensure the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch is in the "ALL" position.

☐ 3.3.3.6 Return Hydrogen Analyzer Control Panel 2B key to WCC.

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

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EVALUATION SHEET

Task: Align Seal Injection to the Unit 1 NC Pumps

Alternate Path: No

Facility JPM #: New

Safety Function: 4S **Title:** Service Water System

K/A 076 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of SWS

Rating(s): 3.5 / 3.7 **CFR:** 41.5 / 43.5 / 45.3 / 45.13

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

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

References: AP/0/A/5500/020 (Loss of Nuclear Service Water) Rev 43

Task Standard: Standby Makeup Pump #1 in service providing seal injection to the Unit 1 NC Pumps.

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

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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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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 Loss of RN has occurred on Unit 1.**
- **Control room has entered AP/0/A/5500/020 (Loss of Nuclear Service Water).**
- **An operator has aligned the alternate power supply to 1EMXS per AP/20 Enclosure 4 (Align Alternate Power Supply To 1EMXS OR 2EMXS).**

INITIATING CUES:

- **The Control Room Supervisor directs you to place standby makeup pump #1 in service to provide seal injection to the Unit 1 NC pumps per AP/20 Enclosure 6 (Align Seal Injection to the Unit 1 NC Pumps). You are directed to use the local procedure to perform this task.**
- **Peer checks have been waived.**

EXAMINER NOTE: Once the applicant has located the local copy of the procedure, hand the applicant a copy of AP/0/A/5500/020 Enclosure 6.

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STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 1. Ensure 1NV-876 (Stdby M/U To Cont Equip Sump 1A) – CLOSED. STANDARD: Applicant verifies the green CLSD light lit and the red OPEN light dark for 1NV-876. **Examiner Cue: Once located, "Green light is lit."** COMMENTS:	**___ SAT** **___ UNSAT**

STEP 2: 2. **IF** annunciator 0AD-11, C/1 (ESS MCC 1EMXS LOSS OF VOLTAGE) LIT, **THEN**: STANDARD: Applicant verifies 0AD-11, C/1 annunciator is dark and that step 2 is not applicable. **Examiner Cue: Once the alarm window is located, "Alarm is dark."** COMMENTS:	**___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 3 3. **IF** "UNIT 1 SSF CONTROLS ENGAGED" DARK, **THEN**: STANDARD: Applicant verifies the UNIT 1 SSF CONTROLS ENGAGED light is LIT. **Examiner Cue: Once located by applicant, "Unit 1 SSF Controls Engaged light is lit."** COMMENTS:	**___ SAT** **___ UNSAT**
STEP 4 4. **IF** "UNIT 1 SSF CONTROLS ENGAGED" LIT, **THEN**: a. Ensure the following valves – OPEN: • 1NV-865A (Stdby M/U Pump Suct Frm Xfer Tube) • 1NV-872A (Stdby M/U Pmp Filt Otlt). STANDARD: Applicant describes depressing the red OPEN pushbuttons on 1NV-865A and 1NV-872A and verifying the red OPEN light is lit and green CLSD light is dark for both valves. **Examiner Cue: Once applicant describes operation of each valve, "Red indicating light is lit."** **Examiner Note: This step is critical to align a suction and discharge path for Standby Makeup Pump #1.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 5 4.b. CLOSE 1NV-89A (NC Pmps Seal Ret Cont Isol). STANDARD: Applicant depresses the green CLOSE pushbutton on 1NV-89A and verifies the green CLSD light lit and red OPEN light dark. **Examiner Cue: Once the valve control switch is located and operation described, "Green light is lit."** **Examiner Note: This step is critical to ensure any voids in the seal leakoff line are collapsed prior to initiating flow from the standby makeup pump.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 6 5. Ensure 1NV-877 (Stdby M/U To NC Pump Seal Inj) – OPEN. STANDARD: Applicant describes verifying the red OPEN light lit and green CLSD light dark for 1NV-877. **Examiner Cue: Once the valve control switch is located, "Red light is lit."** COMMENTS:	**___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 7 6. Start "STDBY M/U PUMP #1" by depressing "ON" pushbutton on SSF console. STANDARD: Applicant depresses the red ON pushbutton on switch for STDBY M/U PUMP #1 and verifies the red ON light lit and green OFF light dark. Applicant may also check for Unit 1 standby makeup flow on SSF console. **Examiner Cue: Once operation of switch is described, "Red ON light lit."** **If Unit 1 standby makeup flow is checked, "26 GPM indicated."** **Examiner Note: This step is critical to place Standby Makeup Pump #1 in service to provide seal injection flow to the Unit 1 NC Pumps.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 8 7. Notify Control Room Supervisor of status of "STDBY M/U PUMP #1". STANDARD: Applicant contacts the control room and reports that Standby Makeup Pump #1 is in service. **Examiner Cue: "Another operator will finish the procedure. 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 Loss of RN has occurred on Unit 1.**
- **Control room has entered AP/0/A/5500/020 (Loss of Nuclear Service Water).**
- **An operator has aligned the alternate power supply to 1EMXS per AP/20 Enclosure 4 (Align Alternate Power Supply To 1EMXS OR 2EMXS).**

INITIATING CUES:

- **The Control Room Supervisor directs you to place standby makeup pump #1 in service to provide seal injection to the Unit 1 NC pumps per AP/20 Enclosure 6 (Align Seal Injection to the Unit 1 NC Pumps). You are directed to use the local procedure to perform this task.**
- **Peer checks have been waived.**

__ 1. **Ensure 1NV-876 (Stdby M/U To Cont Equip Sump 1A) - CLOSED.**

2. **IF annunciator 0AD-11, C/1 (ESS MCC 1EMXS LOSS OF VOLTAGE) LIT, THEN:**

__ a. Coordinate with Control Room to ensure operator dispatched to align alternate power supply to 1EMXS.

NOTE Annunciator 0AD-11, C/1 will go dark when operator completes alternate power supply alignment to 1EMXS.

b. Do not continue until at least one of the following:

__ • Annunciator 0AD-11, C/1 - DARK.

OR

__ • Notified by operator that 1EMXS is aligned to alternate power supply.

3. **IF "UNIT 1 SSF CONTROLS ENGAGED" DARK, THEN:**

a. Notify control room to ensure the following valves - OPEN:

__ • 1NV-865A (Stdby M/U Pump Suct Frm Xfer Tube)

__ • 1NV-872A (Stdby M/U Pmp Filt Otlt).

__ b. Notify control room to close 1NV-89A (NC Pmps Seal Ret Cont Isol).

__ c. **GO TO** Step 5.

4. **IF "UNIT 1 SSF CONTROLS ENGAGED" LIT, THEN:**

a. Ensure the following valves - OPEN:

__ • 1NV-865A (Stdby M/U Pump Suct Frm Xfer Tube)

__ • 1NV-872A (Stdby M/U Pmp Filt Otlt).

__ b. CLOSE 1NV-89A (NC Pmps Seal Ret Cont Isol).

__ 5. **Ensure 1NV-877 (Stdby M/U To NC Pump Seal Inj) - OPEN.**

__ 6. **Start "STDBY M/U PUMP #1" by depressing "ON" pushbutton on SSF console.**

__ 7. **Notify Control Room Supervisor of status of "STDBY M/U PUMP #1".**

8. **IF the following breakers on 1SLXG were opened in Enclosure 5 (Establishing NC Makeup/Seal Injection From The SSF), Step 1.g, THEN close breakers at approximately 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).

9. **IF SSF D/G in service, THEN perform the following:**

__ • Adjust "SSF D/G GOV CTRL" as required to maintain frequency at 60 Hz (+1.2 Hz)

__ • Adjust "SSF D/G VOLT ADJUST" as required to maintain "VOLTS" at 600 to 660 volts

__ • Monitor SSF D/G operation. **REFER TO** OP/0/B/6350/011 (Standby Shutdown Facility Diesel Operation).

__ 10. **WHEN plant conditions allow, THEN shutdown "STDBY M/U PUMP #1". REFER TO OP/0/B/6100/013 (Standby Shutdown Facility Operations).**

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EVALUATION SHEET

Task: Align Swing Inverter 1EIE to 1ERPA

Alternate Path: No

Facility JPM #: EPL-010

Safety Function: 6 **Title:** AC Electrical Distribution System

K/A 062 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Types of loads that, if de-energized, would degrade or hinder plant operation.

Rating(s): 3.4 / 3.9 **CFR:** 41.5 / 43.5 / 45.3 / 45.13

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

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

References: OP/1/A/6350/008 (125 VDC/120 VAC Vital Instrument and Control Power System) Enclosure 4.37 Rev 73

Task Standard: 1ERPA energized with power from swing inverter 1EIE.

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

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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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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.**
- **AC Panelboard 1ERPA is currently being supplied by 1VRD with inverter 1EIA shutdown per OP/1/A/6350/008 (125 VDC/120 VAC Vital Instrument and Control Power System) Enclosure 4.9 (1EIA Shutdown and Return to Service).**

INITIATING CUES:

- **The Control Room Supervisor directs you to align Swing Inverter 1EIE to supply AC Panelboard 1ERPA per OP/1/A/6350/008 Enclosure 4.37 (Placing in Service and Removing from Service 1EIE) beginning at step 3.3.**
- **Initial conditions are complete.**
- **Breaker padlock keys #275 and #277 have been obtained.**
- **All required PPE for this task has been obtained.**
- **Independent Verification requirements have been waived for this JPM.**

EXAMINER NOTE: After reading cue, provide the applicant with a copy of OP/1/A/6350/008 Enclosure 4.37 with steps through step 3.2 complete.

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STEP/STANDARD	SAT/UNSAT
START TIME: _____	
NOTE: Perform either Step 3.3 or 3.4 as per desired supply for 1EIE. STEP 1: 3.3 **IF** Step 2.3 indicates that 1EDA is to supply 1EIE, align as follows: **NOTE:** 1EDA-F01E is padlock interlocked with 1EDC-F01D; only one breaker can be "ON". 3.3.1 Remove the padlock (key #275) on 1EDA-F01E (Channel A Feeder-Swing Inverter 1EIE). STANDARD: Applicant describes opening the padlock on 1EDA-F01E and removing it. **Examiner Cue: Once lock is located, "Padlock removed."** COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 2: 3.3.2 Place 1EDA-F01E (Channel A Feeder-Swing Inverter 1EIE) in the "ON" position. STANDARD: Applicant describes rotating breaker 1EDA-F01E clockwise to the ON position. **Examiner Cue: Once breaker is located by applicant and operation described, "Breaker is ON."** **Examiner Note: This step is critical to provide power to swing inverter 1EIE.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 3 3.3.3 Place the padlock (unlocked) near 1EDA-F01E (Channel A Feeder-Swing Inverter 1EIE). STANDARD: Applicant describes placing the padlock. **Examiner Cue: Once described by applicant, "Padlock placed."** COMMENTS:	**___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
NOTE: Step 3.3.5 must be performed immediately after Step 3.3.4 is completed. Failure to close the "DC INPUT" breaker immediately after the "PRE-CHARGE" pushbutton is released may result in blown inverter input fuses. STEP 4 3.3.4 Hold the "PRE-CHARGE" toggle switch on 1EIE in the "EDA-LEFT" position until the "PRE-CHARGE" indicator lamp has been illuminated for a minimum of 5 seconds. STANDARD: Applicant describes holding the toggle switch on 1EIE in the EDA-LEFT position and verifies the PRE-CHARGE light lit for a minimum of 5 seconds and then releases the toggle switch. **Examiner Cue: Once applicant describes holding the PRE-CHARGE switch in the proper position, "PRE-CHARGE indicator lamp has been illuminated for 5 seconds."** COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 5 3.3.5 Place 1EIE B1 (1EIE DC Input From 1EDA) on 1EIE in the "ON" position. STANDARD: Applicant describes placing breaker 1EIE B1 in the ON position. **Examiner Cue: Once the breaker is located and proper operation described, "Breaker is ON."** **Examiner Note: This step is critical to provide power to swing inverter 1EIE.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 6 3.4 **IF** Step 2.3 indicates that 1EDC is to supply 1EIE, align as follows: STANDARD: Applicant determines that this step is not applicable. COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
STEP 7 3.5 Place the sync selector switch on 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) in the "SYNC ON" position. STANDARD: Applicant describes placing the sync selector switch on 1EME to the "SYNC ON" position. **Examiner Cue: Once operation of switch is described, "Switch is in the "SYNC ON" position."** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
NOTE: Inverter fans are located in the top of the Inverter cabinet. A visual verification of the fans running requires that the upper cabinet door be opened. STEP 8 3.6 Visually verify that both fans in 1EIE are running. STANDARD: Applicant describes opening the upper cabinet door and verifying that both fans are running. **Examiner Cue: "Both fans are running."** COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
NOTE: Inverter output voltage may be higher than specified range until inverter warms up. STEP 9 3.7 **IF** inverter output voltage has NOT settled to 118 – 125 VAC within 15 minutes, contact IAE to adjust voltage. STANDARD: Applicant checks inverter output voltage and determines that this step is not applicable. **Examiner Cue: Once inverter output voltage found, "Voltage reads 120 Volts."** COMMENTS:	**___ SAT** **___ UNSAT**

STEP 10 3.8 Verify the following on 1EIE: • "INVERTER OUTPUT VOLTAGE" 118 – 125.5 V • "INVERTER OUTPUT FREQUENCY" 59.4 – 60.3 Hz STANDARD: Applicant checks inverter output voltage and frequency within limits given. **Examiner Cue: Once inverter output voltage found, "Voltage reads 120 Volts."** **Once inverter output frequency found, "Frequency reads 60 Hz."** COMMENTS:	**___ SAT** **___ UNSAT**

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STEP/STANDARD	SAT/UNSAT
STEP 11 3.9 Place 1EIE B2 (1EIE Inverter AC Output) on 1EIE in the "ON" position. STANDARD: Applicant describes placing breaker 1EIE B2 to the ON position. **Examiner Cue: Once operation of breaker is described, "Breaker is in the "ON" position."** **Examiner Note: This step is critical to be able to power 1ERPA from swing inverter 1EIE.** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**

NOTE: 1. Inverter "IN SYNC" lights may take up to 60 minutes to illuminate as inverter circuits warmup if inverter has been shutdown for ≥ 8 hours. 2. Both "IN SYNC" lamps listed in following step are powered from the same source. STEP 12 3.10 Verify at least one of the following "IN SYNC" lights is illuminated: • 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) • 1EIE (TRAIN A VITAL SWING INVERTER) STANDARD: Applicant describes verifying the IN SYNC lights lit. **Examiner Cue: Once the lights are located, "Light is lit."** COMMENTS:	**___ SAT** **___ UNSAT**

STEP/STANDARD	SAT/UNSAT
NOTE: Procedure may continue before completing following step. STEP 13 3.11 **IF** one of the above listed "IN SYNC" lights is **NOT** illuminated, initiate a work request to repair. STANDARD: Applicant determines that this step is not applicable. COMMENTS:	___ **SAT** ___ **UNSAT**
STEP 14 3.12 Place the "MANUAL BYPASS SWITCH" on 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) to the "INVERTER TO LOAD" position. STANDARD: Applicant describes placing the manual bypass switch to the INVERTER TO LOAD position. **Examiner Cue: Once operation of the manual bypass switch is described, "Manual Bypass Switch is in the INVERTER TO LOAD position."** **Examiner Note: This step is critical to power 1ERPA from swing inverter 1EIE.** COMMENTS:	**CRITICAL STEP** ___ **SAT** ___ **UNSAT**

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STEP/STANDARD	SAT/UNSAT
NOTE: Perform either Step 3.13 or 3.14 as per Step 2.2, applicable shutdown inverter. STEP 15 3.13 **IF** Step 2.2 indicates 1EIA is shutdown, verify the output Volts and Amps on 1EIE indicate approximately the same as the AC System output Volts and Amps on the following: • 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) output Volts and Amps • 1EMA (MANUAL BYPASS SWITCH FOR INVERTER 1EIA) output Volts and Amps STANDARD: Applicant checks inverter output voltage and amps and compares them with 1EME and 1EMA. **Examiner Cue: Once applicant describes how to perform the step, "Voltage and Amps are equal on 1EIE, 1EME, and 1EMA. Another operator will complete the procedure. 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 operating at 100% power.**
- **AC Panelboard 1ERPA is currently being supplied by 1VRD with inverter 1EIA shutdown per OP/1/A/6350/008 (125 VDC/120 VAC Vital Instrument and Control Power System) Enclosure 4.9 (1EIA Shutdown and Return to Service).**

INITIATING CUES:

- **The Control Room Supervisor directs you to align Swing Inverter 1EIE to supply AC Panelboard 1ERPA per OP/1/A/6350/008 Enclosure 4.37 (Placing in Service and Removing from Service 1EIE) beginning at step 3.3.**
- **Initial conditions are complete.**
- **Breaker padlock keys #275 and #277 have been obtained.**
- **All required PPE for this task has been obtained.**
- **Independent Verification requirements have been waived for this JPM.**

1. Limits and Precautions

1.1 Do **NOT** restart an inverter within 60 seconds after taking it out of service.

1.2 Tech Spec 3.8.7 and 3.8.8 are the limiting conditions for operation when removing an inverter from service.

1.3 IAE provides corrective action when voltages are **NOT** within the ranges given.

1.4 When placing an inverter in service, place the DC breaker in the "ON" position first to prevent surges in the system.

2. Initial Conditions

BB 2.1 Verify 1EIE is **NOT** in service.

BB 2.2 Indicate which Enclosure directed operator to this Enclosure:

- ☑ Enclosure 4.9 (1EIA Shutdown and Return to Service)
- ☐ Enclosure 4.11 (1EIC Shutdown and Return to Service)

RPJ SRO 2.3 Indicate which power source will supply 1EIE as per Tech Spec 3.8.7 or 3.8.8 and associated Bases.

- ☑ 1EDA
- ☐ 1EDC

3. Procedure

BB 3.1 Obtain Breaker padlock key for 1EIE as per Step 2.3 from the WCC:

- ☑ #275 1EDA to supply 1EIE
- ☑ #277 1EDC to supply 1EIE

BB 3.2 Obtain leather gloves to use during operation of the inverter DC Input and AC Output breakers.

NOTE:	Perform either Step 3.3 or Step 3.4 as per desired supply for 1EIE.

_____ 3.3 **IF** Step 2.3 indicates that 1EDA is to supply 1EIE, align as follows:

NOTE:	1EDA-F01E is padlock interlocked with 1EDC-F01D; only one breaker can be "ON".

_____ 3.3.1 Remove the padlock (key #275) on 1EDA-F01E (Channel A Feeder-Swing Inverter 1EIE).

_____ _____ 3.3.2 Place 1EDA-F01E (Channel A Feeder-Swing Inverter 1EIE) in the "ON" position.

_____ 3.3.3 Place the padlock (unlocked) near 1EDA-F01E (Channel A Feeder-Swing Inverter 1EIE).

NOTE:	Step 3.3.5 must be performed immediately after Step 3.3.4 is completed. Failure to close the "DC INPUT" breaker immediately after the "PRE-CHARGE" pushbutton is released may result in blown inverter input fuses.

_____ 3.3.4 Hold the "PRE-CHARGE" toggle switch on 1EIE in the "EDA-LEFT" position until the "PRE-CHARGE" indicator lamp has been illuminated for a minimum of 5 seconds.

_____ _____ 3.3.5 Place 1EIE B1 (1EIE DC Input From 1EDA) on 1EIE in the "ON" position.

_____ 3.4 **IF** Step 2.3 indicates that 1EDC is to supply 1EIE, align as follows:

NOTE:	1EDC-F01D is padlock interlocked with 1EDA-F01E; only one breaker can be "ON".

_____ 3.4.1 Remove the padlock (key #277) on 1EDC-F01D (Channel C Feeder-Swing Inverter 1EIE).

_____ _____ 3.4.2 Place 1EDC-F01D (Channel C Feeder-Swing Inverter 1EIE) in the "ON" position.

_____ 3.4.3 Place the padlock (unlocked) near 1EDC-F01D (Channel C Feeder-Swing Inverter 1EIE).

NOTE:	Step 3.4.5 must be performed immediately after Step 3.4.4 is completed. Failure to close the "DC INPUT" breaker immediately after the "PRE-CHARGE" pushbutton is released may result in blown inverter input fuses.

_____ 3.4.4 Hold the "PRE CHARGE" toggle switch on 1EIE in the "EDC-RIGHT" position until the "PRE CHARGE" indicator lamp has been illuminated for a minimum of 5 seconds.

_____ _____ 3.4.5 Place 1EIE B3 (1EIE DC Input From 1EDC) on 1EIE in the "ON" position.

_____ 3.5 Place the sync selector switch on 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) in the "SYNC ON" position.

NOTE:	Inverter fans are located in the top of the Inverter cabinet. A visual verification of the fans running requires that the upper cabinet door be opened.

_____ 3.6 Visually verify that both fans in 1EIE are running.

NOTE:	Inverter output voltage may be higher than specified range until inverter warms up.

_____ 3.7 **IF** inverter output voltage has **NOT** settled to 118 - 125.5 VAC within 15 minutes, contact IAE to adjust voltage.

_____ 3.8 Verify the following on 1EIE:

- ☐ "INVERTER OUTPUT VOLTAGE" 118 - 125.5 V
- ☐ "INVERTER OUTPUT FREQUENCY" 59.4 - 60.3 Hz

_____ _____ 3.9 Place 1EIE B2 (1EIE Inverter AC Output) on 1EIE in the "ON" position.

NOTE:	1. Inverter "IN SYNC" lights may take up to 60 minutes to illuminate as inverter circuits warmup if inverter has been shutdown for ≥ 8 hours. 2. Both "IN SYNC" lamps listed in following step are powered from the same source.

_____ 3.10 Verify at least one of the following "IN SYNC" lights is illuminated:

- ☐ 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE)
- ☐ 1EIE (TRAIN A VITAL SWING INVERTER)

NOTE:	Procedure may continue before completing following step.

_____ 3.11 **IF** one of the above listed "IN SYNC" lights is **NOT** illuminated, initiate a work request to repair.

_____ _____ 3.12 Place the "MANUAL BYPASS SWITCH" on 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) to the "INVERTER TO LOAD" position.

NOTE:	Perform either Step 3.13 or Step 3.14 as per Step 2.2, applicable shutdown inverter.

_____ 3.13 **IF** Step 2.2 indicates 1EIA is shutdown, verify the output Volts and Amps on 1EIE indicate approximately the same as the AC System output Volts and Amps on the following:

- 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) output Volts and Amps.
- 1EMA (MANUAL BYPASS SWITCH FOR INVERTER 1EIA) output Volts and Amps.

_____ 3.14 **IF** Step 2.2 indicates 1EIC is shutdown, verify the output Volts and Amps on 1EIE indicate approximately the same as the AC System output Volts and Amps on the following:

- 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) output Volts and Amps.
- 1EMC (MANUAL BYPASS SWITCH FOR INVERTER 1EIC) output Volts and Amps.

_____ 3.15 Arm the alarm circuits associated with Inverter 1EIE as follows:

☐ Rotate 1EIE alarm key switch to counter clockwise position.

☐ Rotate 1EME alarm key switch to clockwise position.

_____ _____ 3.16 Place 1VRD-F01B (Alternate Power Supply For 120 VAC Power Pnlbd 1ERPA or 1ERPC) in the "OFF" position.

_____ 3.17 Remove kirk key from 1VRD-F01B (Alternate Power Supply For 120VAC Power Pnlbd 1ERPA or 1ERPC).

_____ 3.18 Perform a Tech Spec assessment for one of the following as applicable being returned to a safety source:
SRO

- ☐ 1ERPA (120 VAC POWER PANELBOARD)
- ☐ 1ERPC (120 VAC POWER PANELBOARD)

_____ 3.19 Return the following keys to the WCC:

- ☐ Kirk key #684 for 1VRD
- ☐ Breaker padlock key #275 or #277

NOTE:
- At this point, 1EIE is in service supplying either AC Panelboard 1ERPA via 1EMA or AC Panelboard 1ERPC via 1EMC.
- Subsequent steps will align 1VRD to supply the applicable Panelboard.

_____ 3.20 Obtain the following keys from the WCC:

- ☐ Kirk key #684 for 1VRD
- ☐ Breaker padlock key #275 or #277 as per Step 3.1.

_____ 3.21 Obtain leather gloves to use during operation of the inverter DC Input and AC Output breakers.

_____ 3.22 Verify 1VRD is **NOT** supplying an inverter's load.

NOTE:
1. Tech Specs 3.8.7 and 3.8.8 address operability requirements.
2. RN Pit level switches, powered from 1VRD or 1EIE are operable, as per Tech Spec 3.3.2 Item 10 Bases. {PIP 06-1544}

_____ 3.23 Perform a Tech Spec assessment for required actions for one of the following as applicable being aligned to a non-safety source:
SRO

- ☐ 1ERPA (120 VAC POWER PANELBOARD)
- ☐ 1ERPC (120 VAC POWER PANELBOARD)

NOTE: 1VRD-F01B is kirk keyed with 1VRD-F01D; only one breaker can be "ON".

_____ _____ 3.24 Place 1VRD-F01B (Alternate Power Supply For 120 VAC Power Pnlbd 1ERPA or 1ERPC) in the "ON" position.

_____ 3.25 Rotate the alarm key switch on 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) to the counter clockwise position.

_____ 3.26 Verify the sync selector switch on 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) is in the "SYNC ON" position.

NOTE:	Both "IN SYNC" lamps listed in following step are powered from the same source.

_____ 3.27 Verify at least one of the following "IN SYNC" lights is illuminated:

- ☐ 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE)
- ☐ 1EIE (TRAIN A VITAL SWING INVERTER)

NOTE:	Procedure may continue before completing following step.

_____ 3.28 **IF** one of the above listed "IN SYNC" lights is **NOT** illuminated, initiate a work request to repair.

_____ 3.29 Verify the "ALTERNATE AC SOURCE OFF FREQUENCY" lamp on 1EME is **NOT** illuminated.

_____ 3.30 Verify the "ALTERNATE AC SOURCE INPUT FREQUENCY" meter on 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) indicates 59.4 - 60.3 Hz.

_____ _____ 3.31 Turn the "MANUAL BYPASS SWITCH" on 1EME (MANUAL BYPASS SWITCH FOR SWING INVERTER 1EIE) to the "ALTERNATE AC SOURCE TO LOAD" position.

_____ 3.32 Verify the "ALTERNATE AC SOURCE SUPPLYING LOAD" light illuminates on 1EIE.

_____ 3.33 Verify the load was transferred from 1EIE to 1VRD as follows:

- ☐ "INVERTER OUTPUT CURRENT"< 3 Amps (1EIE)
- ☐ "INVERTER OUTPUT VOLTAGE" 118 - 125.5 V
- ☐ "INVERTER OUTPUT FREQUENCY" 59.4 - 60.3 Hz

_____ 3.34 Rotate 1EIE alarm key switch clockwise to disable the alarm circuits associated with Inverter 1EIE.

_____ _____ 3.35 Place 1EIE B2 (1EIE Inverter AC Output) on 1EIE in the "OFF" position.

NOTE: Perform either Step 3.36 or Step 3.37 as per alignment choice for 1EIE.

_____ 3.36 **IF** 1EIE was supplied by 1EDA per Step 3.3, perform the following:

_____ _____ 3.36.1 Place 1EIE B1 (1EIE DC Input From 1EDA) on 1EIE in the "OFF" position.

_____ _____ 3.36.2 Place 1EDA-F01E (Channel A Feeder-Swing Inverter 1EIE) in the "OFF" position.

_____ 3.36.3 Install the padlock (key #275) on 1EDA-F01E (Channel A Feeder-Swing Inverter 1EIE).

_____ 3.37 **IF** 1EIE was supplied by 1EDC per Step 3.4, perform the following:

_____ _____ 3.37.1 Place 1EIE B3 (1EIE DC Input From 1EDC) on 1EIE in the "OFF" position.

_____ _____ 3.37.2 Place 1EDC-F01D (Channel C Feeder-Swing Inverter 1EIE) in the "OFF" position.

_____ 3.37.3 Install the padlock (key #277) on 1EDC-F01D (Channel C Feeder-Swing Inverter 1EIE).

NOTE: At this point, 1VRD is supplying AC Panelboard 1ERPA or AC Panelboard 1ERPC.

_____ 3.38 Return to enclosure which directed you to this enclosure, noted in Step 2.2:

☐ Enclosure 4.9 (1EIA Shutdown and Return to Service)

☐ Enclosure 4.11 (1EIC Shutdown and Return to Service)

_____ 3.39 Return Breaker padlock key #275 or #277 for 1EIE to the WCC.

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

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EVALUATION SHEET

Task: Perform Manual Shutdown Margin Calculation

Alternate Path: N/A

Facility JPM #: RB-127

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 780

Task Standard: Using OP/0/A/6100/006 Enclosure 4.3, calculates shutdown margin to be 1263 pcm and determines that adequate shutdown margin does not exist. 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

_____

_____

_____

_____

_____

_____

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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:

- **The Reactor Eng Analysis and Calc Toolkit (REACT) – CNS is inoperable.**
- **During performance of PT/0/A/4150/030 (RCCA Bank Repositioning), Shutdown Bank E (SBE) would not move.**
- **Control Rods H4 and K14 have been determined to be immovable and untrippable.**
- **IAE is investigating.**
- **Technical Specifications require that a shutdown margin calculation be performed within 1 hour.**
- **Unit 1 conditions:**
  - **Mode 1 at 100% RTP**
  - **Cycle burnup is 240 EFPD**
  - **Control Bank 'D' position is 216 steps withdrawn**
  - **All other rods are at 226 steps withdrawn**
  - **Current Boron Concentration is 1200 ppmB**

INITIATING CUES:

- **The Shift Manager has directed you to perform a shutdown margin calculation using OP/0/A/6100/006 (Reactivity Balance Calculations) Enclosure 4.3 (Shutdown Margin – Untrippable / Misaligned RCCA(s) – Modes 1 &2).**
- **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, Enclosure 4.3.

STEP / STANDARD	SAT / UNSAT

START TIME: _____

STEP / STANDARD	SAT / UNSAT

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	Todays Date & Time
3.1.3	Present Power	P1385	100 %
3.1.4	NC System Boron Concentration	Latest sample	1200 ppm
3.1.5	Current burnup	P1457	240 EFPD
3.1.6	Present control bank position	OAC or Control Board	216 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	H4 , K14

___ SAT

___ UNSAT

STANDARD:

From the cue, the applicant records the information per the table above.

COMMENTS:

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 5149 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 / STANDARD	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 **H4** 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 3.8 of R.O.D. Manual). _____ pcm STANDARD: Applicant determines the reactivity worth of rod H4 per R.O.D. Section 5.8 is 473 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 885 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	473 pcm
C. Max Stuck Rod	Step 3.3.1.3 C	885 pcm
Total untrippable RCCA Worth Penalty for Multiple RCCAs	{ [(A) - 1] X (C) } + (B)	1358 pcm

STANDARD:

Applicant calculates the Total untrippable RCCA worth penalty to be 1358 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 1358 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.)

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)	12 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**	12 **pcm**

___ SAT

___ UNSAT

STANDARD:

Applicant calculates Inserted Worth of Present rod positions to be 12 pcm.

COMMENTS:

STEP / STANDARD	SAT / UNSAT

STEP 11: 3.3.1.6 Calculate available reactivity worth of trippable RCCAs:

Description	Reference	Value
A. Total Available Rod Worth	Step 3.3.1.1	5149 pcm
B. Untrippable RCCAs Penalty	Step 3.3.1.4	1358 pcm
C. Inserted Worth of Present Position	Step 3.3.1.5	12 pcm
Available Reactivity Worth of Trippable RCCAs	**(A) - (B) - (C)**	**3779 pcm**

STANDARD:

Applicant calculates Available Reactivity Worth of Trippable RCCAs.

Examiner Note: This step is critical to ensure accurate result for final calculation.

COMMENTS:

CRITICAL STEP

___ SAT

___ UNSAT

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 this step does not apply.

COMMENTS:

___ SAT

___ UNSAT

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 3.3.1.6	3779 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	2004 pcm
D. Transient Flux Redistribution Allowance	Section 5.7 of R.O.D. manual	512
Present SDM	**(A) - (B) - (C) - (D)**	**(+) 1263 pcm**

___ SAT

___ UNSAT

STANDARD:

Applicant calculates Present SDM to be +1263 pcm.

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 1263 pcm is not adequate. Applicant records NO for 2nd part of answer. **Examiner Note: This step is critical to determine that adequate SDM does not 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), Shutdown Bank E (SBE) would not move.**
- **Control Rods H4 and K14 have been determined to be immovable and untrippable.**
- **IAE is investigating.**
- **Technical Specifications require that a shutdown margin calculation be performed within 1 hour.**
- **Unit 1 conditions:**
  - **Mode 1 at 100% RTP**
  - **Cycle burnup is 240 EFPD**
  - **Control Bank 'D' position is 216 steps withdrawn**
  - **All other rods are at 226 steps withdrawn**
  - **Current Boron Concentration is 1200 ppmB**

INITIATING CUES:

- **The Shift Manager has directed you to perform a shutdown margin calculation using OP/0/A/6100/006 (Reactivity Balance Calculations) Enclosure 4.3 (Shutdown Margin – Untrippable / Misaligned RCCA(s) – Modes 1 &2).**
- **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) _____

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 **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.

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	1
3.1.2	Date/Time	N/A	Todays Date & Time
3.1.3	Present Power	P1385	100 %
3.1.4	NC System Boron Concentration	Latest sample	1200 ppm
3.1.5	Current burnup	P1457	240 EFPD
3.1.6	Present control bank position	OAC or Control Board	216 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	H4 , K14

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 **5149** pcm (Section 5.7 of R.O.D. manual)

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:

[X] A. Determine untrippable RCCA of Step 3.1.10 with the highest reactivity worth penalty (Section 5.8 of ROD Manual).
Core Location **H4**

[X] B. Record reactivity worth of the untrippable RCCA of Step 3.3.1.3.A (Section 5.8 of ROD Manual). ___473___ pcm

[X] C. Determine maximum stuck rod worth during cycle (Section 5.7 of the R.O.D. manual). ___885___ pcm

[X] 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	473 pcm
C. Max Stuck Rod	Step 3.3.1.3 C	885 pcm
Total untrippable RCCA Worth Penalty for Multiple RCCAs	**{ [(A) - 1] X (C) } + (B)**	1358 **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. ___1358___ 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)	___12___ 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**	12 **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	**5149** pcm
B. Untrippable RCCAs Penalty	Step 3.3.1.4	**1358** pcm
C. Inserted Worth of Present Position	Step 3.3.1.5	**12** pcm
Available Reactivity Worth of Trippable RCCAs	**(A) - (B) - (C)**	**3779 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	**3779** 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	**2004** pcm
D. Transient Flux Redistribution Allowance	Section 5.7 of R.O.D. manual	**512**
Present SDM	**(A) - (B) - (C) - (D)**	**(+) 1263 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.

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Admin. JPM A.1-2R
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JPM A.1-2R

RO

Catawba Nuclear Station
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EVALUATION SHEET

Task: Calculate Boric Acid and Water Addition to FWST

Alternate Path: N/A

Facility JPM #: 2016 NRC Exam JPM A.1-2R

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/6200/014 (Refueling Water System), Enclosure 4.4 (FWST Makeup From Blender)

Task Standard: Applicant determines required boric acid addition of 368.8 gallons and reactor makeup water addition of 3402.2 gallons to complete the required FWST makeup.

Validation Time: 15 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.1-2R
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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:

- **It has been discovered that an incorrect valve lineup decreased FWST level to 95%. Current conditions as follows:**
  - **The valve lineup has been immediately corrected securing the level decrease.**
  - **Current FWST level is 95%.**
  - **Current FWST boron concentration is 2740 ppmB.**
  - **Unit 1 BAT boron concentration is 7500 ppmB.**
  - **Unit 2 BAT boron concentration is 7300 ppmB.**
  - **Unit 1 RMWST boron concentration is 4 ppmB.**

INITIATING CUES:

Using OP/1/A/6200/014 (Refueling Water System), Enclosure 4.4 (FWST Makeup From Blender), steps 3.1 – 3.4, determine the required amount of Boric Acid and RMWST water necessary to perform an FWST makeup as follows:

- **Final FWST level of 96% at 2720 ppmB**
- **S. Jackson (Primary Chemistry) has been notified and directed use of the Unit 1 BAT.**
- **Concurrent Verification is waived for this task.**
- **Round all calculations to the nearest tenth.**

Boric Acid _____ **RMWST Water** _____

EXAMINER NOTE:
After reading cue, provide applicant with a copy of OP/1/A/6200/014, Enclosure 4.4.

STEP / STANDARD	SAT / UNSAT

START TIME: _____

STEP / STANDARD	SAT / UNSAT
NOTE: To prevent an inadvertent reduction in the shutdown margin during NC fill evolutions, makeup to the FWST shall be performed with a water source having a Boron concentration which is greater than or equal to the required NC system Boron concentration. STEP 1: 3.1 Notify Chemistry that the following Boric Acid Tank will be used for Tech Spec blending calculations {PIP 91-0449}: Person notified _____ _____ Boric Acid Tank #1 _____ Boric Acid Tank #2 STANDARD: From the cue, applicant records S. Jackson as Chemistry person notified and checks Boric Acid Tank #1. COMMENTS:	___ SAT ___ UNSAT

STEP 2: 3.2 Document current boron concentration in the Boric Acid Tank as specified by Chemistry in Step 3.1 {PIP 91-0449}: _____ ppmB STANDARD: From the cue, applicant determines that BAT #1 will be used and records 7500 ppmB. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
NOTE: The final boron concentration used in the next step shall comply with COLR requirements for the current mode of operation. STEP 3: 3.3 Determine the boron concentration of the makeup water to the FWST (C_f) to attain the final boron concentration, C_{FW}. 3.3.1 Initial volume of FWST _____ = V_i. STANDARD: Using supplied information applicant enters the initial level of 373,875 gallons. COMMENTS:	___ SAT ___ UNSAT
STEP 4: 3.3.2 Final volume of FWST after makeup _____ = V_{FW}. STANDARD: Using supplied information applicant enters the final level of 377,646 gallons. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 5: 3.3.3 Compute the total gallons of makeup water to be added to the FWST _____ = V_f..	**CRITICAL STEP**
STANDARD: Applicant calculates, and records, makeup volume of 3,771 gallons. 377,646 - 373,875 = 3,771 **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	___ SAT ___ UNSAT

STEP 6: 3.3.4 Initial boron concentration of water in the FWST _____ = C_i. STANDARD: From the cue, applicant records initial FWST boron concentration of 2740 ppmB. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 7: 3.3.5 Solve for the desired makeup water boron concentration, Cf. $C_f = \frac{C_{FW} V_{FW} - C_i V_i}{V_f}$ C_f = _____ STANDARD: Applicant calculates desired concentration of makeup water to be 737.1 ppmB $C_f = (2720 \times 377646) – (2740 \times 373875) / 3771 = 737.1$ ppmB **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 8: 3.4 Determine the amount of boric acid and reactor makeup water to add as follows: 3.4.1 Boron Concentration of water in BAT _____ = C_1. STANDARD: From the cue, applicant records Unit 1 BAT boron concentration of 7500 ppmB. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 9: 3.4.2 Boron concentration of water in RMWST _____ = C_2.: STANDARD: From the cue, applicant records Unit 1 RMWST boron concentration of 4 ppmB. COMMENTS:	___ SAT ___ UNSAT
STEP 10: 3.4.3 Total gallons of makeup water to be added to FWST _____ = V_f from Step 3.3.3.: STANDARD: Applicant records total makeup volume of 3,771 from step 3.3.3. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 11: 3.4.4 Solve for the amount of boric acid to be added (V_1) using C_f obtained in Step 3.3.5. $V_1 = \frac{V_f (C_f - C_2)}{C_1 - C_2}$ V_1 = _____ STANDARD: Applicant calculates boric acid total of 368.8 gallons. $V_1 = 3771 (737.1 – 4) / (7500 – 4) = 368.8 (\pm 10)$ **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 12: 3.4.5 If V_1 is negative, contact the OWPM Staff for instruction on adjusting the boron concentration in the FWST. STANDARD: Applicant determines that this step does not apply. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 13: 3.4.6 Solve for the amount of RMWST water to be added (V_2). $V_2 = V_f - V_1$ V_2 = _____ gal. STANDARD: Applicant calculates required RMWST water to be 3402.2 gallons. 3771 – 368.8 = 3402.2 (± 10) **Examiner Note: This step is critical to ensure accurate result for final calculation.** 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:

- **It has been discovered that an incorrect valve lineup decreased FWST level to 95%. Current conditions as follows:**
  - **The valve lineup has been immediately corrected securing the level decrease.**
  - **Current FWST level is 95%.**
  - **Current FWST boron concentration is 2740 ppmB.**
  - **Unit 1 BAT boron concentration is 7500 ppmB.**
  - **Unit 2 BAT boron concentration is 7300 ppmB.**
  - **Unit 1 RMWST boron concentration is 4 ppmB.**

INITIATING CUES:

Using OP/1/A/6200/014 (Refueling Water System), Enclosure 4.4 (FWST Makeup From Blender), steps 3.1 – 3.4, determine the required amount of Boric Acid and RMWST water necessary to perform an FWST makeup as follows:

- **Final FWST level of 96% at 2720 ppmB**
- **S. Jackson (Primary Chemistry) has been notified and directed use of the Unit 1 BAT.**
- **Concurrent Verification is waived for this task.**
- **Round all calculations to the nearest tenth.**

Boric Acid _____ **RMWST Water** _____

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JPM A.1-2S

SRO

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EVALUATION SHEET

Task: Calculate Boric Acid and Water Addition to FWST and determine Tech Spec actions.

Alternate Path: N/A

Facility JPM #: 2016 NRC Exam JPM A.1-2S

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/6200/014 (Refueling Water System), Enclosure 4.4 (FWST Makeup From Blender)

Task Standard: Applicant determines required boric acid addition of 368.8 gallons and reactor makeup water addition of 3402.2 gallons to complete the required FWST makeup and determines the following SLC/TS required LCO entries: 1000 - SLC 16-9.12 Condition D and TS 3.5.4 Condition B, 1100 – SLC 16-9.12 Condition D and TS 3.5.4 Condition B and Condition C.

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

_____

_____

_____

_____

_____

_____

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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 3 during a refueling outage. The following events have occurred at the given times:

- **0945**: 1AD-9 B/8 "FWST AT MAKEUP LEVEL" annunciator received. Operators are dispatched to investigate decreasing Unit 1 FWST level.
- **1000**: Unit 1 BOP reports that FWST volume is 377,536.9 gallons.
- **1015**: An improperly executed FW system clearance is discovered and determined to be the cause of FWST level decrease.
  Current conditions are as follows:
  - The valve lineup has been immediately corrected securing the level decrease.
  - Current FWST level is 95%.
  - Current FWST boron concentration is 2740 ppmB.
  - Unit 1 BAT boron concentration is 7500 ppmB.
  - Unit 2 BAT boron concentration is 7300 ppmB.
  - Unit 1 RMWST boron concentration is 4 ppmB.
  - Total Blender Makeup flowrate = 90 gpm

INITIATING CUES:

1. **Using OP/1/A/6200/014 (Refueling Water System), Enclosure 4.4 (FWST Makeup From Blender), steps 3.1 – 3.4, determine the required amount of Boric Acid and RMWST water necessary to perform an FWST makeup as follows:**
   - **Final FWST level of 96% at 2720 ppmB.**
   - **S. Jackson (Primary Chemistry) has been notified and directed use of the Unit 1 BAT.**
   - **Concurrent Verification is waived for this task.**
   - **Round all calculations to the nearest tenth.**

   Boric Acid _____ **RMWST Water** _____

2. **Assuming the required makeup begins at time 1030, determine which Active SLC and TS LCO entries (if any) will be required at 1000 and 1100.**

1000: _____

1100: _____

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EXAMINER NOTE:
After reading cue, provide applicant with a copy of OP/1/A/6200/014, Enclosure 4.4 and JPM A.1-2R/S Reference Handout.

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STEP / STANDARD	SAT / UNSAT

QUESTION 1

START TIME: _____

STEP / STANDARD	SAT / UNSAT
NOTE: To prevent an inadvertent reduction in the shutdown margin during NC fill evolutions, makeup to the FWST shall be performed with a water source having a Boron concentration which is greater than or equal to the required NC system Boron concentration. STEP 1: 3.1 Notify Chemistry that the following Boric Acid Tank will be used for Tech Spec blending calculations {PIP 91-0449}: Person notified _____ _____ Boric Acid Tank #1 _____ Boric Acid Tank #2 STANDARD: From the cue, applicant records S. Jackson as Chemistry person notified and checks Boric Acid Tank #1. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 2: 3.2 Document current boron concentration in the Boric Acid Tank as specified by Chemistry in Step 3.1 {PIP 91-0449}: _____ ppmB STANDARD: From the cue, applicant determines that BAT #1 will be used and records 7500 ppmB. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
NOTE The final boron concentration used in the next step shall comply with COLR requirements for the current mode of operation. STEP 3: 3.3 Determine the boron concentration of the makeup water to the FWST (C_f) to attain the final boron concentration, C_{FW}. 3.3.1 Initial volume of FWST _____ = V_i. STANDARD: Using supplied information applicant enters the initial level of 373,875 gallons. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 4: 3.3.2 Final volume of FWST after makeup _____ = V_{FW}. STANDARD: Using supplied information applicant enters the final level of 377,646 gallons. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	CRITICAL STEP
STEP 5: 3.3.3 Compute the total gallons of makeup water to be added to the FWST _____ = V_f.. STANDARD: Applicant calculates, and records, makeup volume of 3,771 gallons. 377,646 - 373,875 = 3,771 **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 6: 3.3.4 Initial boron concentration of water in the FWST _____ = C_i. STANDARD: From the cue, applicant records initial FWST boron concentration of 2740 ppmB. COMMENTS:	___ SAT ___ UNSAT
STEP 7: 3.3.5 Solve for the desired makeup water boron concentration, Cf. $C_f = \frac{C_{FW} V_{FW} - C_i V_i}{V_f}$ C_f = _____ STANDARD: Applicant calculates desired concentration of makeup water to be 737.1 ppmB $C_f = (2720 \times 377646) – (2740 \times 373875) / 3771 = 737.1$ ppmB **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 8: 3.4 Determine the amount of boric acid and reactor makeup water to add as follows: 3.4.1 Boron Concentration of water in BAT _____ = C_1. STANDARD: From the cue, applicant records Unit 1 BAT boron concentration of 7500 ppmB. COMMENTS:	___ SAT ___ UNSAT

STEP 9: 3.4.2 Boron concentration of water in RMWST _____ = C_2.: STANDARD: From the cue, applicant records Unit 1 RMWST boron concentration of 4 ppmB. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 10: 3.4.3 Total gallons of makeup water to be added to FWST _____ = V_f from Step 3.3.3.: STANDARD: Applicant records total makeup volume of 3,771 from step 3.3.3. COMMENTS:	___ SAT ___ UNSAT
STEP 11: 3.4.4 Solve for the amount of boric acid to be added (V_1) using C_f obtained in Step 3.3.5. $V_1 = \frac{V_f (C_f - C_2)}{C_1 - C_2}$ V_1 = _____ STANDARD: Applicant calculates boric acid total of 368.8 gallons. $V_1 = 3771 (737.1 – 4) / (7500 – 4) = 368.8$ **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 12: 3.4.5 If V_1 is negative, contact the OWPM Staff for instruction on adjusting the boron concentration in the FWST. STANDARD: Applicant determines that this step does not apply. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	CRITICAL STEP
STEP 13: 3.4.6 Solve for the amount of RMWST water to be added (V_2). $V_2 = V_f - V_1$ V_2 = _____ gal. STANDARD: Applicant calculates required RMWST water to be 3402.2 gallons. 3771 – 368.8 = 3402.2 **Examiner Note: This step is critical to ensure accurate result for final calculation.** COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
QUESTION 2 **1000: SLC 16-9.12 Condition D / LCO 3.5.4, Condition B** The minimum volume requirement of SLC 16-9.12 (Boration Systems Borated Water Sources – Operating) is not met. Therefore, Condition D (RWST non-functional) entry will be required. The Required Action associated with this condition is to declare the RWST inoperable and enter the applicable conditions of TS 3.5.4 Immediately. The requirement of SR 3.5.4.2 (Verify RWST borated water volume is ≥ 377,537 gallons) is not met. Therefore, TS 3.5.4, Condition B (RWST inoperable for reasons other than Condition A) entry will be required. The Required Action associated with this condition is to Restore RWST to OPERABLE status within 1 hour. **NOTE:** The applicant may also determine SLC 16-9.8 (Boration Systems Flow Paths - Operating), Condition A (One required Boration System Flow Path non-functional) applies if familiar with the associated plant testing procedure. This procedure requires the FWST to be functional in order to meet the acceptance criteria. However , the surveillance requirements of this SLC do not list this particular requirement so this determination will not be critical to this task. **1100: SLC 16-9.12 Condition D / LCO 3.5.4, Conditions B & C** With an initial volume of 373,875 gallons and an available makeup rate of 90 gpm (beginning at 1030), the total FWST volume at 1100 will be 376,575 gallons which remains below the required minimum of SR 3.5.4.2. 373,875 (initial volume) + {90 gpm x 30 min} = 376,575 gallons Therefore, SLC 16-9.12 Condition D and TS 3.5.4 Condition B will remain in effect **AND** TS 3.5.4 Condition C (Required Action and associated Completion Time not met) must be entered. **Examiner Note: Determination of SLC 16-9.12 and TS 3.5.4 required actions (only) are critical to ensure proper actions are entered to address this adverse condition.** **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:

Unit 1 is in Mode 3 during a refueling outage. The following events have occurred at the given times:

- **0945**: 1AD-9 B/8 "FWST AT MAKEUP LEVEL" annunciator received. Operators are dispatched to investigate decreasing Unit 1 FWST level.
- **1000**: Unit 1 BOP reports that FWST volume is 377,536.9 gallons.
- **1015**: An improperly executed FW system clearance is discovered and determined to be the cause of FWST level decrease.
  Current conditions are as follows:
  - The valve lineup has been immediately corrected securing the level decrease.
  - Current FWST level is 95%.
  - Current FWST boron concentration is 2740 ppmB.
  - Unit 1 BAT boron concentration is 7500 ppmB.
  - Unit 2 BAT boron concentration is 7300 ppmB.
  - Unit 1 RMWST boron concentration is 4 ppmB.
  - Total Blender Makeup flowrate = 90 gpm

INITIATING CUES:

1. **Using OP/1/A/6200/014 (Refueling Water System), Enclosure 4.4 (FWST Makeup From Blender), steps 3.1 – 3.4, determine the required amount of Boric Acid and RMWST water necessary to perform an FWST makeup as follows:**
   - **Final FWST level of 96% at 2720 ppmB.**
   - **S. Jackson (Primary Chemistry) has been notified and directed use of the Unit 1 BAT.**
   - **Concurrent Verification is waived for this task.**
   - **Round all calculations to the nearest tenth.**

   Boric Acid _____ **RMWST Water** _____

2. **Assuming the required makeup begins at time 1030, determine which Active SLC and TS LCO entries (if any) will be required at 1000 and 1100.**

1000: _____

1100: _____

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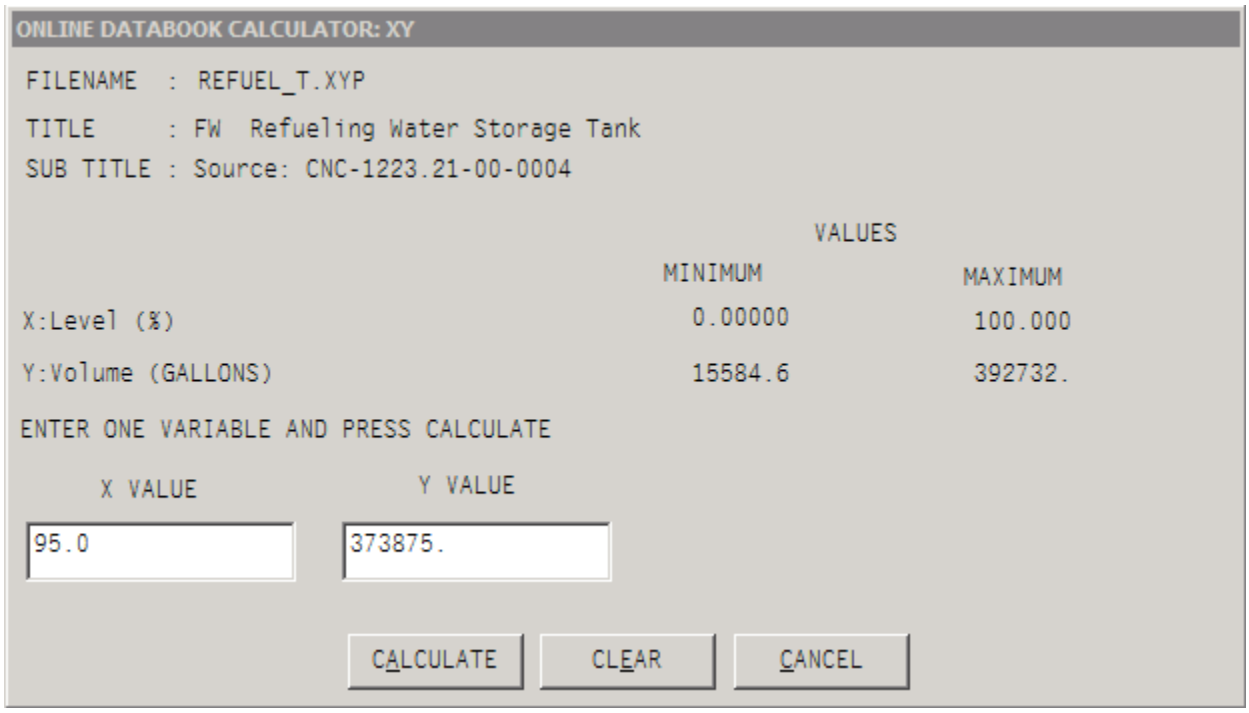
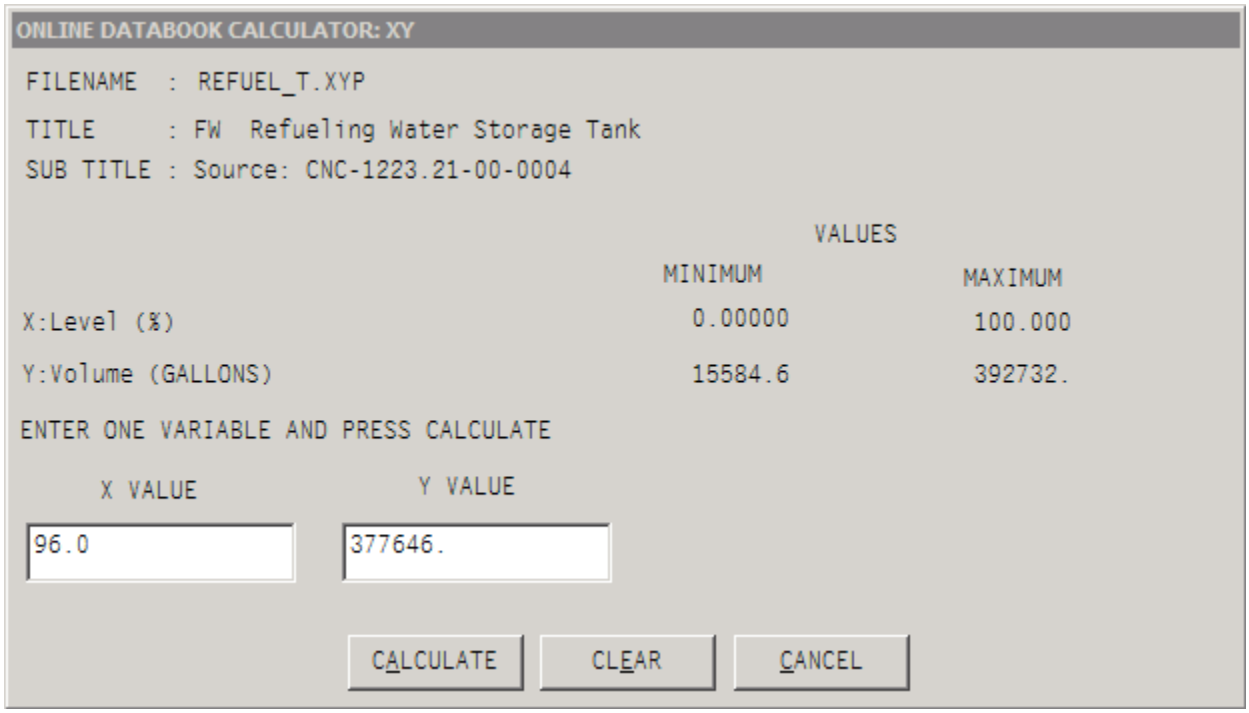
REFERENCE HANDOUT





1. Limits and Precautions

1.1 Misaligning the FW System can result in draining the Refueling Water Storage Tank (FWST).

1.2 Miscalculating an FWST addition can result in boron concentration being lower than that required by the COLR.

1.3 If a Safety Injection occurs with the FW Pump in operation, the pump will lose its flowpath due to its suction valves receiving a close signal.

1.4 If either of the following occurs, a release concern may be created:

- A large quantity (more than normal makeup) of non-degassed water is used for makeup to the FWST.

  OR

- Any quantity of water with high activity (back leakage from NC into FWST) is added to the FWST.

2. Initial Conditions

BB 2.1 Verify FWST operation per <u>one</u> of the following:

- ☒ Normal operation per Enclosure 4.1 (FWST Normal Operation)
  OR
- ☐ Purification per Enclosure 4.5 (FWST Purification) with the FW Pump secured
  OR
- ☐ Recirculation per Enclosure 4.6 (FWST Recirculation) with the FW Pump secured

BB 2.2 Verify boron concentration control systems are available per OP/1/A/6150/009 (Boron Concentration Control).

BB 2.3 **<u>IF</u>** charging has been established per OP/1/A/6200/001 (Chemical and Volume Control System), verify VCT level is adequate to allow boric acid blender alignment to the FWST for the duration of the FWST makeup.

BB 2.4 Ensure that a pre-job briefing has been performed per AD-HU-ALL-0003 (Conduct of Pre-Job Briefings and Post-Job Critiques) that includes a discussion of reactivity management concerns with this procedure.

3. Procedure

NOTE:	To prevent an inadvertent reduction in the shutdown margin during NC fill evolutions, makeup to the FWST shall be performed with a water source having a Boron concentration which is greater than or equal to the required NC system Boron concentration.

_____ 3.1 Notify Chemistry that the following Boric Acid Tank will be used for Tech Spec blending calculations {PIP 91-0449}:

Person notified _____

_____ Boric Acid Tank #1
_____ Boric Acid Tank #2

_____ 3.2 Document current boron concentration in the Boric Acid Tank as specified by Chemistry in Step 3.1 {PIP 91-0449}:

_____ ppmB

NOTE:	The final boron concentration used in the next step shall comply with COLR requirements for the current mode of operation.

_____ _____ 3.3 Determine the boron concentration of the makeup water to the FWST (C_f) to attain the final boron concentration, C_{FW}.

3.3.1 Initial volume of FWST _____ = V_i.

3.3.2 Final volume of FWST after makeup _____ = V_{FW}.

3.3.3 Compute the total gallons of makeup water to be added to the FWST _____ = V_f.

$V_f = V_{FW} - V_i$

3.3.4 Initial boron concentration of water in the FWST _____ = C_i.

3.3.5 Solve for the desired makeup water boron concentration, C_f.

$$C_f = \frac{C_{FW} V_{FW} - C_i V_i}{V_f} \qquad C_f = \_\_\_\_\_$$

_____ _____ 3.4 Determine the amount of boric acid and reactor makeup water to add as follows:

3.4.1 Boron Concentration of water in BAT _____ = C_1.

3.4.2 Boron concentration of water in RMWST _____ = C_2.

3.4.3 Total gallons of makeup water to be added to FWST _____ = V_f from Step 3.3.3.

3.4.4 Solve for the amount of boric acid to be added (V_1) using C_f obtained in Step 3.3.5.

$$V_1 = \frac{V_f (C_f - C_2)}{C_1 - C_2} \qquad V_1 = \_\_\_\_\_$$

_____ 3.4.5 **IF** V_1 is negative, contact the OWPM Staff for instructions on adjusting the boron concentration in the FWST.

3.4.6 Solve for the amount of RMWST water to be added (V_2).

$V_2 = V_f - V_1$ V_2 = _____ gal.

> **NOTE:** Step 3.5 assumes boric acid for FWST makeup will be supplied from BAT #1. If BAT #2 is aligned to Unit 1 per OP/1/A/6150/009 (Boron Concentration Control), Step 3.5 may be N/A'ed since both BATs are non-functional while in that alignment.

_____ 3.5 Determine effect on BAT #1 level as follows:

_____ 3.5.1 Record volume of BAT #1. (OAC Point C1P5645 (BAT Volume))
_____ gallons

_____ 3.5.2 Determine final BAT volume by subtracting amount of acid to be added to FWST (Step 3.4.4) from initial volume (Step 3.5.1).

( ) - ( ) = _____ gallons
Step 3.5.1 Step 3.4.4

_____ 3.5.3 **IF** final BAT volume will be less than COLR requirements, perform <u>one</u> of the following:

_____ • Place BAT #2 in service for Unit 1 per OP/1/A/6150/009 (Boron Concentration Control).
OR

_____ SRO • Declare BAT #1 non-functional per the following:
- Unit 1 boric acid flow path SLC 16.9-7 or 16.9-8
- Unit 1 borated water source SLC 16.9-11 or 16.9-12

_____ _____ 3.6 Determine the final counter readings as follows:

3.6.1 Initial TOTAL MAKEUP COUNTER reading _____ = T_{mi}.

3.6.2 Initial BORIC ACID COUNTER reading _____ = T_{Bi}.

3.6.3 Solve for final TOTAL MAKEUP COUNTER reading (T_{mf}) using V_f obtained in Step 3.3.3.

$T_{mf} = T_{mi} + V_f$ T_{mf} = _____

3.6.4 Solve for final BORIC ACID COUNTER reading (T_{Bf}) using V_1 obtained in Step 3.4.4.

$T_{Bf} = T_{Bi} + V_1$ T_{Bf} = _____

3.7 Set the following blender flow controllers to achieve the desired boron concentration and volume:

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

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

3.8 Ensure the selector switches for the following valves are in "AUTO":

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

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

3.9 Set the following counters to achieve the desired boron concentration and volume:

_____ • BORIC ACID

_____ • TOTAL MAKEUP

_____ _____ 3.10 Verify 1NI-96B (C-Leg Accum Chk Vlv Tst Isol) is closed.

_____ 3.11 Verify 1NB-5 (Unit 1 VCT To NB Evap Feed Demin Isol) (1ELCC0024) (AB-560, MM-52) is closed.

3.12 Place the switches for the following valves in the "CLOSE" position:

_____ • 1NV-181A (B/A Blender Otlt To VCT)

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

_____ 3.13 Close 1NV-187 (Boric Acid Blender Outlet To VCT Outlet Isol) (AB-583, KK-50, Rm 419).

3.14 Open 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)

_____ 3.15 Place "NC MAKEUP MODE SELECT" switch in the "MANUAL" position.

3.16 Ensure <u>one</u> of the following Reactor Makeup Water Pumps is in "AUTO":

_____ • "RX M/U WTR PUMP 1A"
OR
_____ • "RX M/U WTR PUMP 1B"

3.17 Ensure the Reactor Makeup Water Pump **<u>NOT</u>** selected to "AUTO" in Step 3.15 is in "OFF":

_____ • "RX M/U WTR PUMP 1A"
OR
_____ • "RX M/U WTR PUMP 1B"

3.18 Ensure at least <u>one</u> of the following Boric Acid Transfer Pumps is in "AUTO":

_____ • "B/A XFER PUMP 1A"
AND/OR
_____ • "B/A XFER PUMP 1B"

_____ 3.19 **<u>IF</u>** a Boric Acid Transfer Pump was **<u>NOT</u>** selected to "AUTO" in Step 3.18, ensure it is in "OFF":

_____ • "B/A XFER PUMP 1A"
OR
_____ • "B/A XFER PUMP 1B"

_____ 3.20 **IF** Unit 1 is in Mode 1, 2, 3 or 4, perform the following:

_____ 3.20.1 Step 3.20.2 is an action to maintain the FWST within analyzed conditions during a Safety Injection. The designated individuals shall sign in the indicated places to document understanding of responsibilities. All required actions are to be completed prior to reaching FWST Lo Level (20%) to ensure no air entrainment occurs due to vortex formation in the FWST.

Operator in Control Room _____

Shift Manager approval _____

_____ 3.20.2 **IF AT ANY TIME** while FWST makeup is in progress a Safety Injection occurs on Unit 1, terminate the makeup by performing the following:

_____ 3.20.2.1 Turn the "NC MAKEUP CONTROL" switch to the "STOP" position.

3.20.2.2 Ensure the following:

_____ • Selected Reactor Makeup Water Pump stops.

_____ • 1NV-238A (B/A Xfer Pmp To Blender Ctrl) closes.

_____ • 1NV-242A (RMWST To B/A Blender Ctrl) closes.

_____ 3.21 Energize makeup control circuit by turning the "NC MAKEUP CONTROL" switch to the "START" position.

3.22 Ensure the following:

_____ • Selected Reactor Makeup Water Pump starts.

_____ • Selected Boric Acid Transfer Pump starts.

_____ • 1NV-238A (B/A Xfer Pmp To Blender Ctrl) positions to produce desired boric acid flow.

_____ • 1NV-242A (RMWST To B/A Blender Ctrl) positions to produce desired total makeup flow.

_____ 3.23 **WHEN** makeup is complete, turn the "NC MAKEUP CONTROL" switch to the "STOP" position.

3.24 Ensure the following:

_____ • Selected Reactor Makeup Water Pump stops.

_____ • Selected Boric Acid Transfer Pump stops.

_____ • 1NV-238A (B/A Xfer Pmp To Blender Ctrl) closes.

_____ • 1NV-242A (RMWST To B/A Blender Ctrl) closes.

3.25 Flush the flowpath for one minute as follows:

3.25.1 Place both Boric Acid Transfer Pumps in "OFF".

_____ • "B/A XFER PUMP 1A"

_____ • "B/A XFER PUMP 1B"

_____ 3.25.2 Place the selector switch for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) in the "CLOSED" position.

_____ 3.25.3 Place the selector switch for 1NV-242A (RMWST To B/A Blender Ctrl) in the "OPEN" position.

_____ 3.25.4 Turn the "NC MAKEUP CONTROL" switch to the "START" position.

3.25.5 Ensure the following:

_____ • Selected Reactor Makeup Water Pump starts.

_____ • Total makeup flow indicates flow.

_____ 3.25.6 **WHEN** flushing is completed, turn the "NC MAKEUP CONTROL" switch to the "STOP" position.

3.25.7 Ensure the following:

_____ • Selected Reactor Makeup Water Pump stops.

_____ • Total makeup flow indicates no flow.

3.26 Place the selector switches for the following valves in "AUTO":

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

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

3.27 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)

_____ 3.28 Open 1NV-187 (Boric Acid Blender Outlet To VCT Outlet Isol) (AB-583, KK-50, Rm 419).

3.29 Place at least <u>one</u> of the following Boric Acid Transfer Pumps in "AUTO":

_____ • "B/A XFER PUMP 1A"
AND/OR
_____ • "B/A XFER PUMP 1B"

_____ 3.30 **IF** needed to support plant conditions, place desired Boric Acid Transfer Pump in "ON":

_____ • "B/A XFER PUMP 1A"
_____ • "B/A XFER PUMP 1B"

_____ 3.31 **IF** desired, place the second Reactor Makeup Water Pump in "AUTO":

_____ • "RX M/U WTR PUMP 1A"
_____ • "RX M/U WTR PUMP 1B"

_____ 3.32 **IF** needed to support plant conditions, place desired Reactor Makeup Water Pump in "ON":

_____ • "RX M/U WTR PUMP 1A"
_____ • "RX M/U WTR PUMP 1B"

3.33 Place the selector switches for the following valves in "AUTO":

_____ • 1NV-181A (B/A Blender Otlt To VCT)
_____ • 1NV-186A (B/A Blender Otlt To VCT Otlt)

_____ 3.34 Align for makeup to the VCT per OP/1/A/6150/009 (Boron Concentration Control).

NOTE: FWST sample is required within 24 hours of completion of makeup.

_____ 3.35 **IF** either of the following conditions exists, recirculate the FWST using an NS pump:

☐ A time constraint exists that prohibits the use of the normal recirculation of the FWST.
☐ Unit/WCC SRO determines that NS System Availability is **NOT** a concern, and that recirculation via the NS is desired.

_____ 3.35.1 Place the FWST in recirculation via an NS pump per OP/1/A/6200/007 (Containment Spray System) at a flow rate of 900 GPM.

_____ 3.35.2 Notify Chemistry of the following:
Person notified _____

- FWST is in recirculation with an NS Pump.
- FWST is to be sampled per OP/1/A/6200/027 (Sampling Local Primary Sample Points).

_____ 3.35.3 **WHEN** notified by Chemistry that they are ready to obtain the sample, secure the NS pump per OP/1/A/6200/007 (Containment Spray System).

NOTE: FWST sample is required within 24 hours of completion of makeup.

_____ 3.36 **IF** FWST was **NOT** recirculated with the NS pump, perform the following:

3.36.1 Place the FWST in recirculation per one of the following:

_____ • Enclosure 4.6 (FWST Recirculation).
OR
_____ • Enclosure 4.5 (FWST Purification).

_____ 3.36.2 Notify Chemistry of the following:

Person notified _____

- FWST is in recirculation with the FW Pump.
- FWST is to be sampled per OP/1/A/6200/027 (Sampling Local Primary Sample Points).

NOTE: The FWST has been returned to normal operation as defined by Enclosure 4.1 (FWST Normal Operation) of this procedure.

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

1. Limits and Precautions

1.1 Misaligning the FW System can result in draining the Refueling Water Storage Tank (FWST).

1.2 Miscalculating an FWST addition can result in boron concentration being lower than that required by the COLR.

1.3 If a Safety Injection occurs with the FW Pump in operation, the pump will lose its flowpath due to its suction valves receiving a close signal.

1.4 If either of the following occurs, a release concern may be created:

- A large quantity (more than normal makeup) of non-degassed water is used for makeup to the FWST.

  OR

- Any quantity of water with high activity (back leakage from NC into FWST) is added to the FWST.

2. Initial Conditions

_____ 2.1 Verify FWST operation per <u>one</u> of the following:

☐ Normal operation per Enclosure 4.1 (FWST Normal Operation)
OR
☐ Purification per Enclosure 4.5 (FWST Purification) with the FW Pump secured
OR
☐ Recirculation per Enclosure 4.6 (FWST Recirculation) with the FW Pump secured

_____ 2.2 Verify boron concentration control systems are available per OP/1/A/6150/009 (Boron Concentration Control).

_____ 2.3 **<u>IF</u>** charging has been established per OP/1/A/6200/001 (Chemical and Volume Control System), verify VCT level is adequate to allow boric acid blender alignment to the FWST for the duration of the FWST makeup.

_____ 2.4 Ensure that a pre-job briefing has been performed per AD-HU-ALL-0003 (Conduct of Pre-Job Briefings and Post-Job Critiques) that includes a discussion of reactivity management concerns with this procedure.

3. Procedure

NOTE:	To prevent an inadvertent reduction in the shutdown margin during NC fill evolutions, makeup to the FWST shall be performed with a water source having a Boron concentration which is greater than or equal to the required NC system Boron concentration.

_____ 3.1 Notify Chemistry that the following Boric Acid Tank will be used for Tech Spec blending calculations {PIP 91-0449}:

Person notified **Stephanie Jackson**

✓ Boric Acid Tank #1
_____ Boric Acid Tank #2

_____ 3.2 Document current boron concentration in the Boric Acid Tank as specified by Chemistry in Step 3.1 {PIP 91-0449}:

7500 ppmB

NOTE:	The final boron concentration used in the next step shall comply with COLR requirements for the current mode of operation.

_____ _____ 3.3 Determine the boron concentration of the makeup water to the FWST (C_f) to attain the final boron concentration, C_{FW}.

3.3.1 Initial volume of FWST **373,875** = V_i.

3.3.2 Final volume of FWST after makeup **377,646** = V_{FW}.

3.3.3 Compute the total gallons of makeup water to be added to the FWST **3,771** = V_f.

$V_f = V_{FW} - V_i$

3.3.4 Initial boron concentration of water in the FWST **2,740** = C_i.

3.3.5 Solve for the desired makeup water boron concentration, C_f.

$$C_f = \frac{C_{FW} V_{FW} - C_i V_i}{V_f} \qquad C_f = \frac{(2720)(377646)-(2740)(373875)}{3771}$$

$$= 737.1$$

_____ _____ 3.4 Determine the amount of boric acid and reactor makeup water to add as follows:

3.4.1 Boron Concentration of water in BAT **7,500** = C_1.

3.4.2 Boron concentration of water in RMWST **4** = C_2.

3.4.3 Total gallons of makeup water to be added to FWST **3,771** = V_f from Step 3.3.3.

3.4.4 Solve for the amount of boric acid to be added (V_1) using C_f obtained in Step 3.3.5.

$$V_1 = \frac{V_f (C_f - C_2)}{C_1 - C_2} \qquad V_1 = \frac{3771(737.1-4)}{(7500-4)} = 368.8$$

_____ 3.4.5 **IF** V_1 is negative, contact the OWPM Staff for instructions on adjusting the boron concentration in the FWST.

3.4.6 Solve for the amount of RMWST water to be added (V_2).

$V_2 = V_f - V_1$ **3771-368.8** V_2 = **3402.2** gal.

NOTE:	Step 3.5 assumes boric acid for FWST makeup will be supplied from BAT #1. If BAT #2 is aligned to Unit 1 per OP/1/A/6150/009 (Boron Concentration Control), Step 3.5 may be N/A'ed since both BATs are non-functional while in that alignment.

_____ 3.5 Determine effect on BAT #1 level as follows:

_____ 3.5.1 Record volume of BAT #1. (OAC Point C1P5645 (BAT Volume))
_____ gallons

_____ 3.5.2 Determine final BAT volume by subtracting amount of acid to be added to FWST (Step 3.4.4) from initial volume (Step 3.5.1).

( ) - ( ) = _____ gallons
Step 3.5.1 Step 3.4.4

_____ 3.5.3 **IF** final BAT volume will be less than COLR requirements, perform one of the following:

_____ • Place BAT #2 in service for Unit 1 per OP/1/A/6150/009 (Boron Concentration Control).
OR

_____ SRO • Declare BAT #1 non-functional per the following:
- Unit 1 boric acid flow path SLC 16.9-7 or 16.9-8
- Unit 1 borated water source SLC 16.9-11 or 16.9-12

_____ _____ 3.6 Determine the final counter readings as follows:

3.6.1 Initial TOTAL MAKEUP COUNTER reading _____ = T_{mi}.

3.6.2 Initial BORIC ACID COUNTER reading _____ = T_{Bi}.

3.6.3 Solve for final TOTAL MAKEUP COUNTER reading (T_{mf}) using V_f obtained in Step 3.3.3.

$T_{mf} = T_{mi} + V_f$ T_{mf} = _____

3.6.4 Solve for final BORIC ACID COUNTER reading (T_{Bf}) using V_1 obtained in Step 3.4.4.

$T_{Bf} = T_{Bi} + V_1$ T_{Bf} = _____

3.7 Set the following blender flow controllers to achieve the desired boron concentration and volume:

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

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

3.8 Ensure the selector switches for the following valves are in "AUTO":

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

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

3.9 Set the following counters to achieve the desired boron concentration and volume:

_____ • BORIC ACID

_____ • TOTAL MAKEUP

_____ _____ 3.10 Verify 1NI-96B (C-Leg Accum Chk Vlv Tst Isol) is closed.

_____ 3.11 Verify 1NB-5 (Unit 1 VCT To NB Evap Feed Demin Isol) (1ELCC0024) (AB-560, MM-52) is closed.

3.12 Place the switches for the following valves in the "CLOSE" position:

_____ • 1NV-181A (B/A Blender Otlt To VCT)

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

_____ 3.13 Close 1NV-187 (Boric Acid Blender Outlet To VCT Outlet Isol) (AB-583, KK-50, Rm 419).

3.14 Open 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)

_____ 3.15 Place "NC MAKEUP MODE SELECT" switch in the "MANUAL" position.

3.16 Ensure <u>one</u> of the following Reactor Makeup Water Pumps is in "AUTO":

_____ • "RX M/U WTR PUMP 1A"
OR
_____ • "RX M/U WTR PUMP 1B"

3.17 Ensure the Reactor Makeup Water Pump **<u>NOT</u>** selected to "AUTO" in Step 3.15 is in "OFF":

_____ • "RX M/U WTR PUMP 1A"
OR
_____ • "RX M/U WTR PUMP 1B"

3.18 Ensure at least <u>one</u> of the following Boric Acid Transfer Pumps is in "AUTO":

_____ • "B/A XFER PUMP 1A"
AND/OR
_____ • "B/A XFER PUMP 1B"

_____ 3.19 **<u>IF</u>** a Boric Acid Transfer Pump was **<u>NOT</u>** selected to "AUTO" in Step 3.18, ensure it is in "OFF":

_____ • "B/A XFER PUMP 1A"
OR
_____ • "B/A XFER PUMP 1B"

_____ 3.20 **IF** Unit 1 is in Mode 1, 2, 3 or 4, perform the following:

_____ 3.20.1 Step 3.20.2 is an action to maintain the FWST within analyzed conditions during a Safety Injection. The designated individuals shall sign in the indicated places to document understanding of responsibilities. All required actions are to be completed prior to reaching FWST Lo Level (20%) to ensure no air entrainment occurs due to vortex formation in the FWST.

Operator in Control Room _____

Shift Manager approval _____

_____ 3.20.2 **IF AT ANY TIME** while FWST makeup is in progress a Safety Injection occurs on Unit 1, terminate the makeup by performing the following:

_____ 3.20.2.1 Turn the "NC MAKEUP CONTROL" switch to the "STOP" position.

3.20.2.2 Ensure the following:

_____ • Selected Reactor Makeup Water Pump stops.

_____ • 1NV-238A (B/A Xfer Pmp To Blender Ctrl) closes.

_____ • 1NV-242A (RMWST To B/A Blender Ctrl) closes.

_____ 3.21 Energize makeup control circuit by turning the "NC MAKEUP CONTROL" switch to the "START" position.

3.22 Ensure the following:

_____ • Selected Reactor Makeup Water Pump starts.

_____ • Selected Boric Acid Transfer Pump starts.

_____ • 1NV-238A (B/A Xfer Pmp To Blender Ctrl) positions to produce desired boric acid flow.

_____ • 1NV-242A (RMWST To B/A Blender Ctrl) positions to produce desired total makeup flow.

_____ 3.23 **WHEN** makeup is complete, turn the "NC MAKEUP CONTROL" switch to the "STOP" position.

3.24 Ensure the following:

_____ • Selected Reactor Makeup Water Pump stops.

_____ • Selected Boric Acid Transfer Pump stops.

_____ • 1NV-238A (B/A Xfer Pmp To Blender Ctrl) closes.

_____ • 1NV-242A (RMWST To B/A Blender Ctrl) closes.

3.25 Flush the flowpath for one minute as follows:

3.25.1 Place both Boric Acid Transfer Pumps in "OFF".

_____ • "B/A XFER PUMP 1A"

_____ • "B/A XFER PUMP 1B"

_____ 3.25.2 Place the selector switch for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) in the "CLOSED" position.

_____ 3.25.3 Place the selector switch for 1NV-242A (RMWST To B/A Blender Ctrl) in the "OPEN" position.

_____ 3.25.4 Turn the "NC MAKEUP CONTROL" switch to the "START" position.

3.25.5 Ensure the following:

_____ • Selected Reactor Makeup Water Pump starts.

_____ • Total makeup flow indicates flow.

_____ 3.25.6 **WHEN** flushing is completed, turn the "NC MAKEUP CONTROL" switch to the "STOP" position.

3.25.7 Ensure the following:

_____ • Selected Reactor Makeup Water Pump stops.

_____ • Total makeup flow indicates no flow.

3.26 Place the selector switches for the following valves in "AUTO":

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

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

3.27 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)

_____ 3.28 Open 1NV-187 (Boric Acid Blender Outlet To VCT Outlet Isol) (AB-583, KK-50, Rm 419).

3.29 Place at least <u>one</u> of the following Boric Acid Transfer Pumps in "AUTO":

_____ • "B/A XFER PUMP 1A"
AND/OR
_____ • "B/A XFER PUMP 1B"

_____ 3.30 **IF** needed to support plant conditions, place desired Boric Acid Transfer Pump in "ON":

_____ • "B/A XFER PUMP 1A"
_____ • "B/A XFER PUMP 1B"

_____ 3.31 **IF** desired, place the second Reactor Makeup Water Pump in "AUTO":

_____ • "RX M/U WTR PUMP 1A"
_____ • "RX M/U WTR PUMP 1B"

_____ 3.32 **IF** needed to support plant conditions, place desired Reactor Makeup Water Pump in "ON":

_____ • "RX M/U WTR PUMP 1A"
_____ • "RX M/U WTR PUMP 1B"

3.33 Place the selector switches for the following valves in "AUTO":

_____ • 1NV-181A (B/A Blender Otlt To VCT)
_____ • 1NV-186A (B/A Blender Otlt To VCT Otlt)

_____ 3.34 Align for makeup to the VCT per OP/1/A/6150/009 (Boron Concentration Control).

NOTE: FWST sample is required within 24 hours of completion of makeup.

_____ 3.35 **IF** either of the following conditions exists, recirculate the FWST using an NS pump:

☐ A time constraint exists that prohibits the use of the normal recirculation of the FWST.
☐ Unit/WCC SRO determines that NS System Availability is **NOT** a concern, and that recirculation via the NS is desired.

_____ 3.35.1 Place the FWST in recirculation via an NS pump per OP/1/A/6200/007 (Containment Spray System) at a flow rate of 900 GPM.

_____ 3.35.2 Notify Chemistry of the following:
Person notified _____

- FWST is in recirculation with an NS Pump.
- FWST is to be sampled per OP/1/A/6200/027 (Sampling Local Primary Sample Points).

_____ 3.35.3 **WHEN** notified by Chemistry that they are ready to obtain the sample, secure the NS pump per OP/1/A/6200/007 (Containment Spray System).

NOTE: FWST sample is required within 24 hours of completion of makeup.

_____ 3.36 **IF** FWST was **NOT** recirculated with the NS pump, perform the following:

3.36.1 Place the FWST in recirculation per one of the following:

_____ • Enclosure 4.6 (FWST Recirculation).
OR
_____ • Enclosure 4.5 (FWST Purification).

_____ 3.36.2 Notify Chemistry of the following:

Person notified _____

- FWST is in recirculation with the FW Pump.
- FWST is to be sampled per OP/1/A/6200/027 (Sampling Local Primary Sample Points).

NOTE: The FWST has been returned to normal operation as defined by Enclosure 4.1 (FWST Normal Operation) of this procedure.

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

Catawba Nuclear Station
Admin. JPM A.2
June 2017 NRC Exam

JPM A.2

RO / SRO

Catawba Nuclear Station
Admin. JPM A.2
June 2017 NRC Exam

EVALUATION SHEET

Task: Determine and perform required actions for Unit Vent Stack Flow Meter Inoperable

Alternate Path: N/A

Facility JPM #: New

Safety Function: N/A

K/A 2.2.12 Knowledge of surveillance procedures.

Importance: 3.7 / 4.1 **CFR:** 41.10 / 45.13

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

Simulator _____ Classroom **X** Perform **X** Simulate _____

References: PT/1/A/4450/017 (Unit Vent Flow Manual Calculation)

Task Standard: Applicant performs PT/1/A/4450/017 Enclosure 13.1 and calculates the Total Unit Vent Flow to be 143,092 CFM.

Validation Time: 15 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
June 2017 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 6.**
- **The Unit Vent Stack Flow Meter is INOPERABLE.**
- **Both trains of VA are in service with 1VAP5280 (ABFXU-1 Air Flow) reading 57,000 CFM.**
- **VF train 1A is in service with 1VFP5310 (VF Otlt Air Flow Trn A) reading 33,000 CFM.**
- **VP is in service in the FUEL mode with 1VPP5200 (VP Exhaust Air Flow) and 1VPP5180 (Incore Instrument Room Exhaust Air Flow) INOPERABLE.**
- **Report from the field that 1ABUXF Discharge Air flow on 1ABUX-AFMD-1 is reading 27,000 CFM.**
- **No discharges from the WG system are in progress.**
- **The recycle evaporator is in service.**
- **The Waste Evaporator is tagged out.**

INITIATING CUE

- **You are directed to perform PT/1/A/4450/017 (Unit Vent Flow Manual Calculation) Enclosure 13.1 and record your answer below.**

Total Unit Vent Flow: _____ CFM

EXAMINER NOTE:

After reading cue, provide applicant with a copy of PT/1/A/4450/017.

Catawba Nuclear Station
Admin. JPM A.2
June 2017 NRC Exam

STEP / STANDARD	SAT / UNSAT

START TIME: _____

STEP 1: Perform PT/1/A/4450/017 Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet).

CRITICAL STEP

STANDARD:

Using supplied information from cue sheet, the applicant will fill in Enclosure 13.1 and calculate Total Unit Vent Flow to be 143,092 CFM.

Enclosure 13.1 PT/1/A/4450/017
Total Unit Vent Flow Calculation Sheet Page 1 of 1

SYSTEM	FLOW INSTRUMENT	LOCATION	READING (CFM)	INITIALS
VA	1VAP5280 ABFXU-1 Air Flow (6)	1MC3	57,000	
VE	1VEP5180 VE 1A Flow To Stack (6)	1MC5	N/A	
VE	1VEP5200 VE 1B Flow To Stack (6)	1MC5	N/A	
VF	1VFP5310 VF Otlt Air Flow Trn A (6)	1MC5	33,000	
VF	1VFP5340 VF Otlt Air Flow Trn B (6)	1MC5	N/A	
VA	1ABUXF Discharge Air Flow (1ABUX-AFMD-1) (6)	1ELCP0111 (1AB-ECP-1) AB-594, HH-55	27,000	
VP	1VPP5200 VP Exhaust Air Flow (6)	1ELCP0110 (1RB-CP-1) AB-594, LL-52	25,000	
VP	1VPP5180 Incore Instrument Room Exhaust Air Flow (6)	1ELCP0110 (1RB-CP-1) AB-594, LL-52	1,000	
WG	0WGP5941 WG Discharge Flow To Unit Vent (6)	AB-543, QQ-59 (On wall beside WG Panel)	N/A	
VQ	(1)	N/A	N/A	
TL	(2)	N/A	N/A	
NB	(3)	N/A	92	
WL	(4)	N/A	N/A	
ZJ	(5)	N/A	N/A	
TOTAL UNIT VENT FLOW (sum of all readings)			143,092	
DATE/ TIME COMPLETED				

(1) If a VQ release is in progress, use 350 CFM; otherwise, N/A.
(2) If the TL System is in operation, use 1260 CFM; otherwise, N/A.
(3) If the Recycle Evaporator is operating, use 92 CFM; otherwise, N/A.
(4) If the Waste Evaporator is operating, use 92 CFM; otherwise, N/A.
(5) If the ZJ System is in operation, use 60 CFM; otherwise, N/A.
(6) If an instrument is out of service, enter the design flow at the exhaust line (READING (CFM) column) if exhausting to the Unit Vent, or enter '0' if isolated from the Unit Vent. Design flows are listed on Enclosure 13.2 (Systems Design Rates).

___ SAT

___ UNSAT

COMMENTS:

END OF TASK

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 6.**
- **The Unit Vent Stack Flow Meter is INOPERABLE.**
- **Both trains of VA are in service with 1VAP5280 (ABFXU-1 Air Flow) reading 57,000 CFM.**
- **VF train 1A is in service with 1VFP5310 (VF Otlt Air Flow Trn A) reading 33,000 CFM.**
- **VP is in service in the FUEL mode with 1VPP5200 (VP Exhaust Air Flow) and 1VPP5180 (Incore Instrument Room Exhaust Air Flow) INOPERABLE.**
- **Report from the field that 1ABUXF Discharge Air flow on 1ABUX-AFMD-1 is reading 27,000 CFM.**
- **No discharges from the WG system are in progress.**
- **The recycle evaporator is in service.**
- **The Waste Evaporator is tagged out.**

INITIATING CUE

- **You are directed to perform PT/1/A/4450/017 (Unit Vent Flow Manual Calculation) Enclosure 13.1 and record your answer below.**

Total Unit Vent Flow: _____ CFM

Duke Energy Catawba Nuclear Station **Response to Nuclear Power Generation/ATWS** **Continuous Use**	Procedure No. **EP/ 1/A/5000/FR-S.1** Revision No. **022** Electronic Reference No. **CP0094DR**

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

(ISSUED) - PDF Format

Unit Vent Flow Manual Calculation

1. Purpose

To provide a means to calculate the flow to the Unit Vent when the Unit Vent Stack Flow Rate Meter is inoperable.

2. References

2.1 SLC 16.11-7

2.2 UFSAR Section 11.5.1.2.2.1

3. Time Required

3.1 Manpower - One AO

3.2 Time - 30 minutes

3.3 Frequency - Every four hours

4. Prerequisite Tests

None

5. Test Equipment

None

6. Limits and Precautions

None

7. Required Unit Status

None

8. Prerequisite System Conditions

_____ 8.1 The Unit Vent Stack Flow Rate Meter is inoperable.

_____ 8.2 The Unit Vent is in service.

9. Test Method

9.1 The various systems exhaust flow to the Unit Vent will be obtained using local indication and recorded on Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet).

9.2 The individual exhaust flows will be added to obtain total exhaust flow to the Unit Vent and recorded on Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet).

10. Data Required

Complete Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet).

11. Acceptance Criteria

The Unit Vent Stack Flow Rate is estimated at least once per four hours. (SLC 16.11-7)

12. Procedure

12.1 Complete Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet) as follows:

12.1.1 Record the individual systems exhaust flows.

12.1.2 Calculate the total Unit Vent exhaust flow by adding together the individual systems exhaust flows.

12.1.3 Record the date and time the calculation was completed.

NOTE: Additional copies of Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet) may be made as necessary and attached.

12.2 Repeat Step 12.1 every four hours until the Unit Vent Stack Flow Rate Meter is declared operable.

_____ 12.3 Ensure any additional copies of Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet) used are attached.

12.4 Evaluate the acceptance criteria by performing one of the following:

_____ 12.4.1 Verify the acceptance criteria specified in Section 11 is met.

OR

_____ 12.4.2 **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.

_____ 12.5 **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 Total Unit Vent Flow Calculation Sheet

13.2 Systems Design Flow Rates

Enclosure 13.1

Total Unit Vent Flow Calculation Sheet

SYSTEM	FLOW INSTRUMENT	LOCATION	READING (CFM)	INITIALS
VA	1VAP5280 ABFXU-1 Air Flow (6)	1MC3		
VE	1VEP5180 VE 1A Flow To Stack (6)	1MC5		
VE	1VEP5200 VE 1B Flow To Stack (6)	1MC5		
VF	1VFP5310 VF Otlt Air Flow Trn A (6)	1MC5		
VF	1VFP5340 VF Otlt Air Flow Trn B (6)	1MC5		
VA	1ABUXF Discharge Air Flow (1ABUX-AFMD-1) (6)	1ELCP0111 (1AB-ECP-1) AB-594, HH-55		
VP	1VPP5200 VP Exhaust Air Flow (6)	1ELCP0110 (1RB-CP-1) AB-594, LL-52		
VP	1VPP5180 Incore Instrument Room Exhaust Air Flow (6)	1ELCP0110 (1RB-CP-1) AB-594, LL-52		
WG	0WGP5941 WG Discharge Flow To Unit Vent (6)	AB-543, QQ-59 (On wall beside WG Panel)		
VQ	(1)	N/A		
TL	(2)	N/A		
NB	(3)	N/A		
WL	(4)	N/A		
ZJ	(5)	N/A		
TOTAL UNIT VENT FLOW (sum of all readings)				
DATE/ TIME COMPLETED				

(1) If a VQ release is in progress, use 350 CFM; otherwise, N/A.
(2) If the TL System is in operation, use 1260 CFM; otherwise, N/A.
(3) If the Recycle Evaporator is operating, use 92 CFM; otherwise, N/A.
(4) If the Waste Evaporator is operating, use 92 CFM; otherwise, N/A.
(5) If the ZJ System is in operation, use 60 CFM; otherwise, N/A.
(6) If an instrument is out of service, enter the design flow at the exhaust line (READING (CFM) column) if exhausting to the Unit Vent, or enter '0' if isolated from the Unit Vent. Design flows are listed on Enclosure 13.2 (Systems Design Flow Rates).

Enclosure 13.2

Systems Design Flow Rates

System	Flow Rate
VA Filtered Exhaust (two trains in service)	60,000 cfm
VA Filtered Exhaust (one train in service)	30,000 cfm
VE	9000 cfm
VF	33,130 cfm
VA Unfiltered Exhaust (two trains in service)	40,700 cfm
VA Unfiltered Exhaust (one train in service)	20,350 cfm
VP Containment Purge Exhaust	25,000 cfm
VP Incore Instrument Room Purge Exhaust	1000 cfm
WG	20 cfm

Duke Energy Catawba Nuclear Station **Response to Nuclear Power Generation/ATWS** **Continuous Use**	Procedure No. **EP/1/A/5000/FR-S.1** Revision No. **022** Electronic Reference No. **CP0094DR**

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

(ISSUED) - PDF Format

Unit Vent Flow Manual Calculation

1. Purpose

To provide a means to calculate the flow to the Unit Vent when the Unit Vent Stack Flow Rate Meter is inoperable.

2. References

2.1 SLC 16.11-7

2.2 UFSAR Section 11.5.1.2.2.1

3. Time Required

3.1 Manpower - One AO

3.2 Time - 30 minutes

3.3 Frequency - Every four hours

4. Prerequisite Tests

None

5. Test Equipment

None

6. Limits and Precautions

None

7. Required Unit Status

None

8. Prerequisite System Conditions

_____ 8.1 The Unit Vent Stack Flow Rate Meter is inoperable.

_____ 8.2 The Unit Vent is in service.

9. Test Method

9.1 The various systems exhaust flow to the Unit Vent will be obtained using local indication and recorded on Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet).

9.2 The individual exhaust flows will be added to obtain total exhaust flow to the Unit Vent and recorded on Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet).

10. Data Required

Complete Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet).

11. Acceptance Criteria

The Unit Vent Stack Flow Rate is estimated at least once per four hours. (SLC 16.11-7)

12. Procedure

12.1 Complete Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet) as follows:

12.1.1 Record the individual systems exhaust flows.

12.1.2 Calculate the total Unit Vent exhaust flow by adding together the individual systems exhaust flows.

12.1.3 Record the date and time the calculation was completed.

NOTE: Additional copies of Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet) may be made as necessary and attached.

12.2 Repeat Step 12.1 every four hours until the Unit Vent Stack Flow Rate Meter is declared operable.

_____ 12.3 Ensure any additional copies of Enclosure 13.1 (Total Unit Vent Flow Calculation Sheet) used are attached.

12.4 Evaluate the acceptance criteria by performing one of the following:

_____ 12.4.1 Verify the acceptance criteria specified in Section 11 is met.

OR

_____ 12.4.2 **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.

_____ 12.5 **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 Total Unit Vent Flow Calculation Sheet

13.2 Systems Design Flow Rates

Enclosure 13.1

Total Unit Vent Flow Calculation Sheet

SYSTEM	FLOW INSTRUMENT	LOCATION	READING (CFM)	INITIALS
VA	1VAP5280 ABFXU-1 Air Flow (6)	1MC3	**57,000**	
VE	1VEP5180 VE 1A Flow To Stack (6)	1MC5	**N/A**	
VE	1VEP5200 VE 1B Flow To Stack (6)	1MC5	**N/A**	
VF	1VFP5310 VF Otlt Air Flow Trn A (6)	1MC5	**33,000**	
VF	1VFP5340 VF Otlt Air Flow Trn B (6)	1MC5	**N/A**	
VA	1ABUXF Discharge Air Flow (1ABUX-AFMD-1) (6)	1ELCP0111 (1AB-ECP-1) AB-594, HH-55	**27,000**	
VP	1VPP5200 VP Exhaust Air Flow (6)	1ELCP0110 (1RB-CP-1) AB-594, LL-52	**25,000**	
VP	1VPP5180 Incore Instrument Room Exhaust Air Flow (6)	1ELCP0110 (1RB-CP-1) AB-594, LL-52	**1,000**	
WG	0WGP5941 WG Discharge Flow To Unit Vent (6)	AB-543, QQ-59 (On wall beside WG Panel)	**N/A**	
VQ	(1)	N/A	**N/A**	
TL	(2)	N/A	**N/A**	
NB	(3)	N/A	**92**	
WL	(4)	N/A	**N/A**	
ZJ	(5)	N/A	**N/A**	
TOTAL UNIT VENT FLOW (sum of all readings)			**143,092**	
DATE/ TIME COMPLETED				

(1) If a VQ release is in progress, use 350 CFM; otherwise, N/A.
(2) If the TL System is in operation, use 1260 CFM; otherwise, N/A.
(3) If the Recycle Evaporator is operating, use 92 CFM; otherwise, N/A.
(4) If the Waste Evaporator is operating, use 92 CFM; otherwise, N/A.
(5) If the ZJ System is in operation, use 60 CFM; otherwise, N/A.
(6) If an instrument is out of service, enter the design flow at the exhaust line (READING (CFM) column) if exhausting to the Unit Vent, or enter '0' if isolated from the Unit Vent. Design flows are listed on Enclosure 13.2 (Systems Design Flow Rates).

Enclosure 13.2

Systems Design Flow Rates

System	Flow Rate
VA Filtered Exhaust (two trains in service)	60,000 cfm
VA Filtered Exhaust (one train in service)	30,000 cfm
VE	9000 cfm
VF	33,130 cfm
VA Unfiltered Exhaust (two trains in service)	40,700 cfm
VA Unfiltered Exhaust (one train in service)	20,350 cfm
VP Containment Purge Exhaust	25,000 cfm
VP Incore Instrument Room Purge Exhaust	1000 cfm
WG	20 cfm

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JPM A.3R

RO

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EVALUATION SHEET

Task: Calculate Total RL Discharge Flow

Alternate Path: N/A

Facility JPM #: WL-002

Safety Function: 9

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 48,608 gpm (46,943 to 51,640 gpm acceptable range)

Validation Time: 22 minutes **Time Critical:** Yes _____ No **X**

Applicant:
NAME_____ Docket #_____

Time Start: _____
Time Finish: _____

Performance Rating:

Performance Time _____

SAT ____ UNSAT ____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

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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:

- **An LWR is in progress from Waste Monitor Tank "A".**
- **The RL discharge header flow instrumentation is inoperable.**
- **PT/0/A/4250/011 (RL Temperature and Discharge Flow Determination) is in progress.**

INITIATING CUES:

- **The CRS directs you to calculate and record the total RL discharge flow per Enclosure 13.2 (Total Discharge Flow Calculation Sheet) of PT/0/A/4250/011.**
- **The following plant indications are noted:**

Unit 1 Power	**100%**
Unit 2 Power	**NO Mode**
0RLP5030 (RL Discharge Pressure)	**67 psig**
0RNP7380 (Lake Elevation)	**568 feet**
C1P5856 (RN Calculate Total Flow)	**Out of service**
C1P5854 (RN Train A Calculated Total Flow)	**14130 gpm**
C1P5855 (RN Train B Calculated Total Flow)	**4840 gpm**
C1P5853 (Unit 1 Cooling Tower Evaporation)	**12260 gpm**
RL Pumps A and B are in service	
RN discharge is aligned to RL discharge header	
OAC Databook is not available	

EXAMINER NOTE:

After reading cue, provide applicant with a copy of PT/0/A/4250/011 Enclosures 13.2 and 13.7.

STEP / STANDARD	SAT / UNSAT

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: RL Disch Pressure = 0RLP5030 + 3.9 psi RL Disch Pressure = 67 + 3.9 psi = 70.9 psig Lake Elevation = 568 (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. (70.9 psig x 2.311 ft/psig) + (571.75 - 568 ft) = 167.6 ft RL Disch Pressure; Lake Elev; Total Disch Head 167 - 169 Acceptable STANDARD: Applicant Calculates Total Discharge Head of 167.6 feet. (167 -169 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 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 34,036 gpm. (32,755 – 35,244 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: 34,036 (RL Pump Flow Value) X 2 (# of pumps in operation) = 68,072 (Total RL Supply) gpm (A) STANDARD: Applicant calculates Total RL Supply to be 68,072 gpm. (65,510 – 70,488 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 14,130 gpm (RN Pump Train A Flow) _____ 1.2.2.2 Record the value of C1P5855 (RN Train B Calculated Total Flow) below: C1P5855 4,840 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	CRITICAL STEP
STEP 9: 1.2.4 Perform the following calculations to obtain Total RN Flow: 14,130 + 4,840 = 18,970 gpm (B) RN Pump Train A Flow + RN Pump Train B Flow = Total RN Flow STANDARD: Applicant calculates Total RN Flow (B) to be 18,970 gpm. **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 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 that this step is not applicable. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 12: 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. STANDARD: Applicant determines per initiating cue that Unit 2 is in No Mode and enters 0 for Unit 2 evaporation in Step 1.3.3. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	CRITICAL STEP
STEP 13: 1.3.3 Calculate Cooling Tower Total Evaporation as follows: 12,260 (Unit 1 Cooling Tower Evaporation (C1P5853 or Step 1.3.1)) + 0 (Unit 2 Cooling Tower Evaporation (C2P5853 or Step 1.3.2)) = 12,260 gpm (C) Total Evaporation STANDARD: Applicant calculates Total Evaporation (C) to be 12,260 gpm. **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 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 / STANDARD	CRITICAL STEP
STEP 15: 1.4 Perform the following to obtain Calculated Total RL Disch Flow: 68,072 + 18,970 - 12,260 = 74,782 gpm Total RL Supply (A) + Total RN Flow (B) - Total Evaporation (C) = Calculated Total RL Disch Flow 72,220 - 77,198 Acceptable STANDARD: Applicant calculates the Calculated Total RL Disch Flow to be 74,782 gpm. (72,220 – 77,198 gpm 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
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: 74,782 (Calculated Total RL Disch Flow, Step 1.4) X 0.65 = 48,608 (Total RL Disch Flow) gpm 46,943 - 50,179 Acceptable	
STANDARD: Applicant calculates Total RL Disch Flow to be 48,608 gpm. (46,943 – 50,179 gpm Acceptable)	___ SAT ___ UNSAT
Examiner Note: This step is critical to correctly determine Total RL Discharge Flow to meet the JPM standard.	
COMMENTS:	
END OF TASK	

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:

- **An LWR is in progress from Waste Monitor Tank "A".**
- **The RL discharge header flow instrumentation is inoperable.**
- **PT/0/A/4250/011 (RL Temperature and Discharge Flow Determination) is in progress.**

INITIATING CUES:

- **The CRS directs you to calculate and record the total RL discharge flow per Enclosure 13.2 (Total Discharge Flow Calculation Sheet) of PT/0/A/4250/011.**
- **The following plant indications are noted:**

Unit 1 Power	**100%**
Unit 2 Power	**NO Mode**
0RLP5030 (RL Discharge Pressure)	**67 psig**
0RNP7380 (Lake Elevation)	**568 feet**
C1P5856 (RN Calculate Total Flow)	**Out of service**
C1P5854 (RN Train A Calculated Total Flow)	**14130 gpm**
C1P5855 (RN Train B Calculated Total Flow)	**4840 gpm**
C1P5853 (Unit 1 Cooling Tower Evaporation)	**12260 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

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JPM A.3S

SRO

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EVALUATION SHEET

Task: Calculate Total RL Discharge Flow

Alternate Path: N/A

Facility JPM #: WL-001

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 48,608 gpm (46,943 to 51,640 gpm acceptable range) and determination that sufficient dilution flow exists for LWR #2017025 approval.

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

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COMMENTS

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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:

- **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	**100%**
Unit 2 Power	**NO Mode**
0RLP5030 (RL Discharge Pressure)	**67 psig**
0RNP7380 (Lake Elevation)	**568 feet**
C1P5856 (RN Calculate Total Flow)	**Out of service**
C1P5854 (RN Train A Calculated Total Flow)	**14130 gpm**
C1P5855 (RN Train B Calculated Total Flow)	**4840 gpm**
C1P5853 (Unit 1 Cooling Tower Evaporation)	**12260 gpm**
RL Pumps A and B are in service	
RN discharge is aligned to RL discharge header	
OAC Databook is not available	

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 #2017025.

STEP / STANDARD	SAT / UNSAT

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: RL Disch Pressure = 0RLP5030 + 3.9 psi RL Disch Pressure = 67 + 3.9 psi = 70.9 psig Lake Elevation = 568 (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. (70.9 psig x 2.311 ft/psig) + (571.75 - 568 ft) = 167.6 ft RL Disch Pressure; Lake Elev; Total Disch Head 167 - 169 Acceptable STANDARD: Applicant Calculates Total Discharge Head of 167.6 feet. (167 -169 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 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 34,036 gpm. (32,755 – 35,244 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: 34,036 (RL Pump Flow Value) X 2 (# of pumps in operation) = 68,072 (Total RL Supply) gpm (A) STANDARD: Applicant calculates Total RL Supply to be 68,072 gpm. (65,510 – 70,488 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 14,130 gpm (RN Pump Train A Flow) _____ 1.2.2.2 Record the value of C1P5855 (RN Train B Calculated Total Flow) below: C1P5855 4,840 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	CRITICAL STEP
STEP 9: 1.2.4 Perform the following calculations to obtain Total RN Flow: 14,130 + 4,840 = 18,970 gpm (B) RN Pump Train A Flow + RN Pump Train B Flow = Total RN Flow STANDARD: Applicant calculates Total RN Flow (B) to be 18,970 gpm. **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 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 that this step is not applicable. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 12: 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. STANDARD: Applicant determines per initiating cue that Unit 2 is in No Mode and enters 0 for Unit 2 evaporation in Step 1.3.3. COMMENTS:	___ SAT ___ UNSAT

STEP / STANDARD	CRITICAL STEP
STEP 13: 1.3.3 Calculate Cooling Tower Total Evaporation as follows: 12,260 (Unit 1 Cooling Tower Evaporation (C1P5853 or Step 1.3.1)) + 0 (Unit 2 Cooling Tower Evaporation (C2P5853 or Step 1.3.2)) = 12,260 gpm (C) Total Evaporation STANDARD: Applicant calculates Total Evaporation (C) to be 12,260 gpm. **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 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 / STANDARD	CRITICAL STEP
STEP 15: 1.4 Perform the following to obtain Calculated Total RL Disch Flow: 68,072 + 18,970 - 12,260 = 74,782 gpm Total RL Supply (A) + Total RN Flow (B) - Total Evaporation (C) = Calculated Total RL Disch Flow 72,220 - 77,198 Acceptable STANDARD: Applicant calculates the Calculated Total RL Disch Flow to be 74,782 gpm. (72,220 – 77,198 gpm 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
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. 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: 74,782 (Calculated Total RL Disch Flow, Step 1.4) X 0.65 = 48,608 (Total RL Disch Flow) gpm 46,943 - 50,179 Acceptable STANDARD: Applicant calculates Total RL Disch Flow to be 48,608 gpm. (46,943 – 50,179 gpm Acceptable) **Examiner Note: This step is critical to correctly determine Total RL Discharge Flow to meet the JPM standard.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP / STANDARD	SAT / UNSAT
STEP 17: Determine whether LWR #2017025 should be approved. STANDARD: Applicant determines that the RL Low Flow Interlock would be set for 45,000 gpm and that sufficient dilution flow exists to approve the LWR. **Examiner Note: This step is critical to correctly determine that Total RL Flow is greater than the RL Low Flow Interlock Setpoint and that sufficient dilution flow exists 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	**100%**
Unit 2 Power	**NO Mode**
0RLP5030 (RL Discharge Pressure)	**67 psig**
0RNP7380 (Lake Elevation)	**568 feet**
C1P5856 (RN Calculate Total Flow)	**Out of service**
C1P5854 (RN Train A Calculated Total Flow)	**14130 gpm**
C1P5855 (RN Train B Calculated Total Flow)	**4840 gpm**
C1P5853 (Unit 1 Cooling Tower Evaporation)	**12260 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 #2017025 approval? (YES/NO) _____

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 (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:

_____ ___ + _____ ___ - _____ ___ = _____ ___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

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: 2017025
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: 2017025

=== 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: 2017025
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: 2017025
Release ID: 1 Waste Monitor Tank "A"
Release Mode: 2 Batch

Print Name	Initials	Print Name	Initials

Enclosure 13.2

Total Discharge Flow Calculation Sheet

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 = 67 + 3.9 psi = 70.9 psig

Lake Elevation = 568 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.

(70.9 psig x 2.311 ft/psig) + (571.75 - 568 ft) = 167.6 ft

RL Disch Pressure | Lake Elev | Total Disch Head

167 - 169 Acceptable

_____ 1.1.3 Using Total Discharge Head from Step 1.1.2 obtain the RL Pump Flow value using one of the following:

☒ X 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:

34,036 X 2 = 68,072 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.

65,510 - 70,488 Acceptable based on Encl 13.7 Acceptable Range

_____ 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 14,130 gpm (RN Pump Train A Flow)

_____ 1.2.2.2 Record the value of C1P5855 (RN Train B Calculated Total Flow) below:

C1P5855 4,840 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:

14,130 + 4,840 = 18,970 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.

Enclosure 13.2

Total Discharge Flow Calculation Sheet

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:

N/A 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:

12,260 + 0 = 12,260 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:

68,072 + 18,970 - 12,260 = 74,782 gpm

Total RL Supply (A) + Total RN Flow (B) - Total Evaporation (C) = Calculated Total RL Disch Flow

72,220 - 77,198 Acceptable

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:

74,782 X 0.65 = 48,608 gpm

Calculated Total RL Disch Flow Step 1.4 — Total RL Disch Flow

46,943 - 50,179 Acceptable

Calculated By _____ _____
Operator/Initials — Date/Time

Verified By _____ _____
Operator/Initials — Date/Time

Enclosure 13.7

PT/**0**/A/4250/011

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		

Acceptable Range

JPM A.3 Answer Key

Catawba Nuclear Station
Admin. JPM A.4
June 2017 NRC Exam

JPM A.4

SRO

Catawba Nuclear Station
Admin. JPM A.4
June 2017 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 (SA9.1), and then completes the Emergency Notification Form in ≤ 15 minutes.

Validation Time: 30 minutes **Time Critical:** Yes __X__ No _____

Applicant:
NAME_____ Docket #_____

Time Start: _____
Time Finish: _____

Time Critical (<15 min):
Time Start: _____
Time Finish: _____

Performance Rating:

Performance Time _____

SAT ____ UNSAT ____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

_____

_____

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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:

- **Both Units are at 100% RTP.**
- **A tornado warning has been issued for York County.**
- **The following events have occurred:**
  - **AO on rounds contacts the control room to report a tornado sighted in the Switchyard.**
  - **A Loss of Offsite Power (LOOP) occurs on Unit 2.**
  - **A lighting pole has punctured the FWST on Unit 1 and water is spilling out into the missile shield.**

INITIATING CUES:

- **You are directed to classify this event per RP/0/A/5000/001 (Emergency 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 once the Emergency Classification is made.**

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.

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STEP / STANDARD	SAT / UNSAT

START TIME: _____

STEP / STANDARD	SAT / UNSAT
STEP 1: Classify the Event: Unit 2 is in an Unusual Event (SU1.1) due to the loss of offsite power capability for > 15 minutes. Note 1 states "The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded." Unit 1 is in an Alert (SA9.1) due to a tornado strike on site and the event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode. Since Unit 1 is in a higher classification than Unit 2, the emergency classification for the site will be an Alert (SA9.1).	**CRITICAL STEP**
STANDARD: Applicant determines from NEI Rev 6 EAL Wallchart, that Catawba is in an Alert SA9.1.	___ SAT ___ UNSAT
Examiner Note: This step is critical to determine the proper Emergency Action Level prior to notification of the States and Counties.	
COMMENTS:	

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STEP / STANDARD	SAT / UNSAT
Time Critical Start: _____ STEP 2: Fill out Emergency Notification Form: STANDARD: Applicant properly fills out the emergency notification form within 15 minutes. **Time Critical Finish:** _____ **Examiner Note: This step is critical to ensure timely and accurate notification of the States and Counties. The 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.**
- **A tornado warning has been issued for York County.**
- **The following events have occurred:**
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  - **A lighting pole has punctured the FWST on Unit 1 and water is spilling out into the missile shield.**

INITIATING CUES:

- **You are directed to classify this event per RP/0/A/5000/001 (Emergency 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 once the Emergency Classification is made.**

Declared EAL: _____

Declaration Time: _____

JPM A.4 Answer 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 # SA9.1 **Declaration Date**: ____/____/____ **Time:** _____

Termination Date: ____/____/____**Time:** _____(mark "N/A" for EAL # & Description)

EAL DESCRIPTION: The occurrence of any Table S-5 hazardous event AND EITHER: Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode

OR The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode

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.3 Answer 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)