Facility: Oconee Date of Exam: June 2018

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	2	1				2	1			2	9	2	2	4
	Tier Totals	4	5	4				5	4			5	27	5	5	10
2. Plant Systems	1	3	3	2	3	2	2	2	3	3	3	2	28	3	2	5
	2	1	1	1	1	0	1	1	1	1	1	1	10	2	1	3
	Tier Totals	4	4	3	4	2	3	3	4	4	4	3	38		3	8

3. Generic Knowledge and Abilities Categories	RO 1	RO 2	RO 3	RO 4	RO Total	SRO 1	SRO 2	SRO 3	SRO 4	SRO Total
	3	3	2	2	10	2	2	1	2	7

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:
008AG2.1.30	Pressurizer Vapor Space Accident / 3	4.4	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to locate and operate components, including local controls.
011EK2.02	Large Break LOCA / 3	2.6	2.7	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Pumps
015AK2.10	RCP Malfunctions / 4	2.8	2.8	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	RCP indicators and controls
022AK1.04	Loss of Rx Coolant Makeup / 2	2.9	3	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Reason for changing from manual to automatic control of charging flow valve controller
025AA1.12	Loss of RHR System / 4	3.6	3.5	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	RCS temperature indicators
026AA2.03	Loss of Component Cooling Water / 8	2.6	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	The valve lineups necessary to restart the CCWS while bypassing the portion of the system causing the abnormal condition
027AK3.04	Pressurizer Pressure Control System Malfunction / 3	2.8	3.3	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Why, if PZR level is lost and then restored, that pressure recovers much more slowly
029EK1.03	ATWS / 1	3.6	3.8	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Effects of boron on reactivity
040AA2.03	Steam Line Rupture - Excessive Heat Transfer / 4	4.6	4.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Difference between steam line rupture and LOCA
054AA2.04	Loss of Main Feedwater / 4	4.2	4.3	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Proper operation of AFW pumps and regulating valves
055EK1.02	Station Blackout / 6	4.1	4.4	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Natural circulation cooling

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
056AA1.25	Loss of Off-site Power / 6	2.9	2.9	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Main steam supply valve control switch
057AK3.01	Loss of Vital AC Inst. Bus / 6	4.1	4.4	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Actions contained in EOP for loss of vital ac electrical instrument bus
058AA1.01	Loss of DC Power / 6	3.4	3.5	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	Cross-tie of the affected dc bus with the alternate supply
062AG2.4.3	Loss of Nuclear Svc Water / 4	3.7	3.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to identify post-accident instrumentation.
065AK3.04	Loss of Instrument Air / 8	3	3.2	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Cross-over to backup air supplies
077AK2.01	Generator Voltage and Electric Grid Disturbances / 6	3.1	3.2	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Motors
BE10EG2.4.4	Reactor Trip - Stabilization - Recovery / 1	4.2	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.

KA	NAME / SAFETY FUNCTION:	IR		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
		RO	SRO												
001AA1.02	Continuous Rod Withdrawal / 1	3.6	3.4							✔					Rod in-out-hold switch
024AA2.01	Emergency Boration / 1	3.8	4.1								✔				Whether boron flow and/or MOVs are malfunctioning from plant conditions
033AG2.1.20	Loss of Intermediate Range NI / 7	4.6	4.6											✔	Ability to execute procedure steps.
067AK3.04	Plant Fire On-site / 8	3.3	4.1			✔									Actions contained in EOP for plant fire on site
074EA1.07	Inad. Core Cooling / 4	4.2	4.3							✔					AFW System
BA04AK2.1	Turbine Trip / 4	3.5	3.3		✔										Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
BA08AK2.2	Refueling Canal Level Decrease / 8	3.8	4		✔										Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.
BE08EK1.2	LOCA Cooldown - Depress. / 4	3.5	3.8	✔											Normal, abnormal and emergency operating procedures associated with (LOCA Cooldown).
BE14EG2.4.18	EOP Enclosures	3.3	4.0											✔	Knowledge of the specific bases for EOPs.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
003K1.10	Reactor Coolant Pump	3.0	3.2	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	RCS
004A2.05	Chemical and Volume Control	4.0	4.3	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	RCP seal failures
004K6.29	Chemical and Volume Control	2.7	3.1	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Reason for excess letdown and its relationship to CCWS
005A1.02	Residual Heat Removal	3.3	3.4	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	RHR flow rate
005K2.01	Residual Heat Removal	3.0	3.2	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	RHR pumps
006A3.07	Emergency Core Cooling	3.6	3.7	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	RHR pumps
006K2.02	Emergency Core Cooling	2.5	2.9	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Valve operators for accumulators
007A4.10	Pressurizer Relief/Quench Tank	3.6	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Recognition of leaking PORV/code safety
008A1.03	Component Cooling Water	2.7	2.9	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	CCW pressure
010A2.03	Pressurizer Pressure Control	4.1	4.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	PORV failures
010K5.01	Pressurizer Pressure Control	3.5	4.0	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	Determination of condition of fluid in PZR, using steam tables

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
012A3.06	Reactor Protection	3.7	3.7									✔			Trip logic
012K4.08	Reactor Protection	2.8	3.3				✔								Logic matrix testing
013G2.2.25	Engineered Safety Features Actuation	3.2	4.2											✔	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.
013K1.03	Engineered Safety Features Actuation	3.8	4.1	✔											CCS
022K4.02	Containment Cooling	3.1	3.4				✔								Correlation of fan speed and flowpath changes with containment pressure
026K2.01	Containment Spray	3.4	3.6		✔										Containment spray pumps
039K3.06	Main and Reheat Steam	2.8	3.1			✔									SDS
059K1.02	Main Feedwater	3.4	3.4	✔											AFW system
061K6.01	Auxiliary/Emergency Feedwater	2.5	2.8						✔						Controllers and positioners
062A4.01	AC Electrical Distribution	3.3	3.1										✔		All breakers (including available switchyard)
062A4.04	AC Electrical Distribution	2.6	2.7										✔		Local operation of breakers

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
063A2.01	DC Electrical Distribution	2.5	3.2								✔				Grounds
064A3.08	Emergency Diesel Generator	3.7	4.0									✔			Consequences of automatic transfer to automatic position after the ED/G is stopped
073K5.03	Process Radiation Monitoring	2.9	3.4					✔							Relationship between radiation intensity and exposure limits
076K4.03	Service Water	2.9	3.4				✔								Automatic opening features associated with SWS isolation valves to CCW heat exchanges
078G2.1.32	Instrument Air	3.8	4.0											✔	Ability to explain and apply all system limits and precautions.
103K3.03	Containment	3.7	4.1			✔									Loss of containment integrity under refueling operations.

KA	NAME / SAFETY FUNCTION:	IR		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
		RO	SRO												
001A1.03	Control Rod Drive	3.6	3.7	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	S/G level and pressure
002K4.02	Reactor Coolant	3.5	3.8	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	Monitoring reactor vessel level
015K6.02	Nuclear Instrumentation	2.6	2.9	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	Discriminator/compensation circuits
028K2.01	Hydrogen Recombiner and Purge Control	2.5	2.8	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	Hydrogen recombiners
029K3.01	Containment Purge	2.9	3.1	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	Containment parameters
033G2.4.8	Spent Fuel Pool Cooling	3.8	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.
056A2.04	Condensate	2.6	2.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Loss of condensate pumps
072A3.01	Area Radiation Monitoring	2.9	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	Changes in ventilation alignment
075A4.01	Circulating Water	3.2	3.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	Emergency/essential SWS pumps
079K1.01	Station Air	3.0	3.1	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	IAS

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.4	Conduct of operations	3.3	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license statur, 10CFR55 etc.
G2.1.40	Conduct of operations	2.8	3.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of refueling administrative requirements
G2.1.43	Conduct of operations	4.1	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to use procedures to determine the effects on reactivity of plant changes
G2.2.11	Equipment Control	2.3	3.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for controlling temporary design changes.
G2.2.18	Equipment Control	2.6	3.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.
G2.2.4	Equipment Control	3.6	3.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	(multi-unit) Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility.
G2.3.13	Radiation Control	3.4	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiological safety procedures pertaining to licensed operator duties
G2.3.5	Radiation Control	2.9	2.9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to use radiation monitoring systems
G2.4.14	Emergency Procedures/Plans	3.8	4.5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of general guidelines for EOP usage.
G2.4.32	Emergency Procedures/Plans	3.6	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of operator response to loss of all annunciators.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
022AG2.4.30	Loss of Rx Coolant Makeup / 2	2.7	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of events related to system operations/status that must be reported to internal orginizations or outside agencies.
027AA2.08	Pressurizer Pressure Control System Malfunction / 3	3.2	3.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Letdown flow indication
038EA2.05	Steam Gen. Tube Rupture / 3	2.8	2.9	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Causes and consequences of shrink and swell in S/Gs
057AG2.4.49	Loss of Vital AC Inst. Bus / 6	4.6	4.4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.
065AG2.4.35	Loss of Instrument Air / 8	3.8	4.0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects
077AA2.08	Generator Voltage and Electric Grid Disturbances / 6	4.3	4.4	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Criteria to trip the turbine or reactor

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
003AA2.03	Dropped Control Rod / 1	3.6	3.8	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Dropped rod, using in-core/ex-core instrumentation in-core or loop temperature measurements
024AA2.01	Emergency Boration / 1	3.8	4.1	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Whether boron flow and/or MOVs are malfunctioning from plant conditions
BA05AG2.1.25	Emergency Diesel Actuation / 6	3.9	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to interpret reference materials such as graphs, monographs and tables which contain performance data.
BA07AG2.4.41	Flooding / 8	2.9	4.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the emergency action level thresholds and classifications.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
005G2.1.25	Residual Heat Removal	3.9	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to interpret reference materials such as graphs, monographs and tables which contain performance data..
012A2.05	Reactor Protection	3.1	3.2	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Faulty or erratic operation of detectors and function generators
013A2.03	Engineered Safety Features Actuation	4.4	4.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Rapid depressurization
039A2.02	Main and Reheat Steam	2.4	2.7	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	Decrease in turbine load as it relates to steam escaping from relief valves
062G2.2.36	AC Electrical Distribution	3.1	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions of operations.

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
002G2.4.8	Reactor Coolant	3.8	4.5											✔	Knowledge of how abnormal operating procedures are used in conjunction with EOPs.
027A2.01	Containment Iodine Removal	3.0	3.3								✔				High temperature in the filter system
035A2.04	Steam Generator	3.6	3.8								✔				Steam flow/feed mismatch

KA	NAME / SAFETY FUNCTION:	IR RO	IR SRO	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	TOPIC:
G2.1.21	Conduct of operations	3.5	3.6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Ability verify the controlled procedure copy.
G2.1.36	Conduct of operations	3.0	4.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of procedures and limitations involved in core alterations
G2.2.13	Equipment Control	4.1	4.3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of tagging and clearance procedures.
G2.2.17	Equipment Control	2.6	3.8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of the process for managing maintenance activities during power operations.
G2.3.15	Radiation Control	2.9	3.1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of radiation monitoring systems
G2.4.11	Emergency Procedures/Plans	4.0	4.2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of abnormal condition procedures.
G2.4.25	Emergency Procedures/Plans	3.3	3.7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	Knowledge of fire protection procedures.

ILT 18-1 NRC Exam

Facility: Oconee Nuclear Station	Date of Examination: 6/04/2018
Examination Level: RO ☒ SRO ☐	Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations [KA: G2.1.25 (3.9/4.2)] (15 min)	M, R	**ADM-113, Determine Time for SFP to Reach 180ºF**
Conduct of Operations [KA: G2.1.4 (3.3/3.8)] (15 min)	D, R	**ADM-107, Determine If RO License Requirements Are Met**
Equipment Control [KA: G2.2.44 (4.2/4.4)] (15 min)	N, R	**ADM-206, Calculate Reactor Building Normal Sump Rate Following Loss of OAC**
Radiation Control [KA: G2.3.4 (3.2/3.7)] (20 min)	M, R	**ADM-306, Determine the Maximum Permissible Stay Time Within Emergency Dose Limits (EDL)**
Emergency Plan		**N/A**

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

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

ILT 18-1 NRC Exam

Facility: Oconee Nuclear Station   Date of Examination: 6/04/2018

Examination Level: RO ☐ SRO ☒   Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations [KA: G2.1.7 (4.4/4.7)] (15 min)	M, R	**ADM-S110, Calculation of Primary to Secondary Leak Rate and Determination of Shutdown Requirements**
Conduct of Operations [KA: G2.1.25 (3.9/4.2)] (35 min)	D, R	**ADM-S105, Perform a Power Imbalance Verification and Determine any Required Actions and Completion Times**
Equipment Control [KA: G2.2.40 (3.4/4.7)] (15 min)	D, R	**ADM-S201, Determine Tech Spec Requirements for Inoperable PZR Heaters**
Radiation Control [KA: G2.3.4 (3.2/3.7)] (20 min)	N, R	**ADM-S300, Calculate Dose Received and Determine Approval Level Required to Exceed Emergency Dose Limits (EDL)**
Emergency Plan [KA: G2.4.41 (2.9/4.6)] (15 min)	N, R	**ADM-S406, Determine the Appropriate Emergency Action Level**

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

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

ILT 18-1 NRC Exam

Facility:	Oconee Nuclear Station	Date of Examination:	06/04/2018
Exam Level: RO ☒ SRO-I ☐ SRO-U ☐		Operating Test Number:	1

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U

System/JPM Title	Type Code*	Safety Function
a. **RO-302a, Perform Required Actions For Failed LPI Train** EOP Enclosure 5.1 (ES Actuation) [KA: EPE 011 EA1.04 (4.4/4.4)]	A, D, E, EN, L, S	3
b. **RO-P403a, Initiate HPI Forced Cooling** EOP Rule 4 (Initiation of HPI Forced Cooling) [KA: EPE 074 EA1.08 (4.2/4.2)]	A, E, L, M, S	4P
c. **RO-502, Reset ES Channels 7 & 8** AP/1/A/1700/042 (Inadvertent ES Actuation) [KA: SYS026 A4.05 (3.5/3.5)]	EN, N, S	5
d. **RO-104, Withdrawal of Safety Rod Group 1 to 50%** OP/1/A/1105/019 (Control Rod Drive System) Enclosure 4.3 (Withdrawal of Safety Rod Group 1 to 50%) [KA: SYS001 A4.06 (2.9/3.2)]	D, L, S	1
e. **RO-205a, Respond to RCS Leak While on DHR** AP/1/A/1700/026 (Loss of Decay Heat Removal) Enclosure 5.12 (RCS Makeup) [KA: APE025 AA1.02 (3.8/3.9)]	A, D, E, L, S	2
f. **RO-S401a, Alignment of Condensate Recirc** EOP Enclosure 5.23 (Alignment of Condensate Recirc) [KA: APE054 G2.1.20 (4.6/4.6)]	A, D, L, S	4S
g. **RO-605, Functional Verification of SK Breakers** PT/0/A/0610/017 (Operability Test of 4160V Breakers) Enclosure 13.12 (Functional Verification of SK Breakers) [KA: SYS062 A4.01 (3.3/3.1)]	N, S	6
h. **RO-801, OATC Actions For Control Room Evacuation Following a Fire** AP/1/A/1700/050 (Challenging Plant Fire) [KA: APE068 AA1.02 (4.3/4.5)]	D, E, L, S	8

ILT 18-1 NRC Exam

In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. **AO-101, Swap Control Rod Drive Filters** OP/1/A/1104/008 (Component Cooling System) Enclosure 4.19 (Placing 1A or 1B CRD Filter in Service) [KA: SYS001 G2.3.13 (3.4/3.8)]	D, R	1
j. **AO-603, Shutdown of Inverters During Station Blackout** EOP Enclosure 5.32 (Load Shed of Inverters During SBO) [KA: EPE055 G2.1.30 (4.4/4.0)]	D, E, L	6
k. **AO-802a, Isolate HPSW and LPSW During an Auxiliary Building Flood** AP/3/A/1700/030 (Auxiliary Building Flood) Enclosures 5.1 (HPSW AB Flood) & 5.2 (LPSW AB Flood) [KA: BW/A07 AA2.2 (3.3/3.7)]	A, D, E	8

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

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

ILT 18-1 NRC Exam

Facility:	Oconee Nuclear Station	Date of Examination:	06/04/2018
Exam Level: RO ☐ SRO-I ☒ SRO-U ☐		Operating Test Number:	1

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U

System/JPM Title	Type Code*	Safety Function
a. **RO-302a, Perform Required Actions For Failed LPI Train** EOP Enclosure 5.1 (ES Actuation) [KA: EPE 011 EA1.04 (4.4/4.4)]	A, D, E, EN, L, S	3
b. **RO-P403a, Initiate HPI Forced Cooling** EOP Rule 4 (Initiation of HPI Forced Cooling) [KA: EPE 074 EA1.08 (4.2/4.2)]	A, E, L, M, S	4P
c. **RO-502, Reset ES Channels 7 & 8** AP/1/A/1700/042 (Inadvertent ES Actuation) [KA: SYS026 A4.05 (3.5/3.5)]	EN, N, S	5
d. **RO-104, Withdrawal of Safety Rod Group 1 to 50%** OP/1/A/1105/019 (Control Rod Drive System) Enclosure 4.3 (Withdrawal of Safety Rod Group 1 to 50%) [KA: SYS001 A4.06 (2.9/3.2)]	D, L, S	1
e. **RO-205a, Respond to RCS Leak While on DHR** AP/1/A/1700/026 (Loss of Decay Heat Removal) Enclosure 5.12 (RCS Makeup) [KA: APE025 AA1.02 (3.8/3.9)]	A, D, E, L, S	2
f. **RO-S401a, Alignment of Condensate Recirc** EOP Enclosure 5.23 (Alignment of Condensate Recirc) [KA: APE054 G2.1.20 (4.6/4.6)]	A, D, L, S	4S
g. **RO-605, Functional Verification of SK Breakers** PT/0/A/0610/017 (Operability Test of 4160V Breakers) Enclosure 13.12 (Functional Verification of SK Breakers) [KA: SYS062 A4.01 (3.3/3.1)]	N, S	6
h. N/A		

ILT 18-1 NRC Exam

In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. **AO-101, Swap Control Rod Drive Filters** OP/1/A/1104/008 (Component Cooling System) Enclosure 4.19 (Placing 1A or 1B CRD Filter in Service) [KA: SYS001 G2.3.13 (3.4/3.8)]	D, R	1
j. **AO-603, Shutdown of Inverters During Station Blackout** EOP Enclosure 5.32 (Load Shed of Inverters During SBO) [KA: EPE055 G2.1.30 (4.4/4.0)]	D, E, L	6
k. **AO-802a, Isolate HPSW and LPSW During an Auxiliary Building Flood** AP/3/A/1700/030 (Auxiliary Building Flood) Enclosures 5.1 (HPSW AB Flood) & 5.2 (LPSW AB Flood) [KA: BW/A07 AA2.2 (3.3/3.7)]	A, D, E	8

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

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

ILT 18-1 NRC Exam

Facility:	Oconee Nuclear Station	Date of Examination:	06/04/2018
Exam Level: RO ☐ SRO-I ☐ SRO-U ☒		Operating Test Number:	1

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U

System/JPM Title	Type Code*	Safety Function
a. **RO-302a, Perform Required Actions For Failed LPI Train** EOP Enclosure 5.1 (ES Actuation) [KA: EPE 011 EA1.04 (4.4/4.4)]	A, D, E, EN, L, S	3
b. **RO-P403a, Initiate HPI Forced Cooling** EOP Rule 4 (Initiation of HPI Forced Cooling) [KA: EPE 074 EA1.08 (4.2/4.2)]	A, E, L, M, S	4P
c. **RO-502, Reset ES Channels 7 & 8** AP/1/A/1700/042 (Inadvertent ES Actuation) [KA: SYS026 A4.05 (3.5/3.5)]	EN, N, S	5
d. N/A		
e. N/A		
f. N/A		
g. N/A		
h. N/A		

ILT 18-1 NRC Exam

In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. **AO-101, Swap Control Rod Drive Filters** OP/1/A/1104/008 (Component Cooling System) Enclosure 4.19 (Placing 1A or 1B CRD Filter in Service) [KA: SYS001 G2.3.13 (3.4/3.8)]	D, R	1
j. **AO-603, Shutdown of Inverters During Station Blackout** EOP Enclosure 5.32 (Load Shed of Inverters During SBO) [KA: EPE055 G2.1.30 (4.4/4.0)]	D, E, L	6
k. N/A		

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

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

APE008 2.1.30 - Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)
APE008 GENERIC
Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)

Given the following Unit 1 conditions:

- Reactor power =100%
- Statalarm 1SA-18/A-1 (Pressurizer Relief Valve Flow) alarms
- RCS pressure = 2200 psig lowering
- 1RC-66 indicates partially open
- 1RC-4 will NOT close from the control room

1) The procedure that will dispatch an operator to open 1DIB Breaker #24 is __(1)__.

2) Opening 1DIB Breaker #24 will fail __(2)__ closed.

Which ONE of the following completes the statements above?

A. 1. AP/02 (Excessive RCS Leakage)
   2. 1RC-66

B. 1. AP/44 (Abnormal Pressurizer Pressure Control)
   2. 1RC-66

C. 1. AP/02 (Excessive RCS Leakage)
   2. 1RC-4

D. 1. AP/44 (Abnormal Pressurizer Pressure Control)
   2. 1RC-4

General Discussion

Answer A Discussion

Incorrect: 1st part is incorrect because there is no direction in AP/2 to open the breaker for 1RC-66. It is plausible because 1) you meet entry conditions for AP/2, 2) AP/44 directs entry into AP/2 and AP/2 Encl 5.9 does give direction to close 1RC-4 if leakage through 1RC-66 exceeds 1 gpm.
2nd part is correct. AP/44, Step 4.3 RNO directs opening the breaker for 1RC-66. The PORV will fail closed (unless mechanically stuck) when power is removed.

Answer B Discussion

Correct: 1st part is correct. AP/44 entry conditions are met. Step 4.3 RNO dispatches an operator to open the breaker for 1RC-66.
2nd part is correct. AP/44, Step 4.3 RNO directs opening the breaker for 1RC-66. The PORV will fail closed (unless mechanically stuck) when power is removed.

Answer C Discussion

Incorrect: 1st part is incorrect because there is no direction in AP/2 to open the breaker for 1RC-66. It is plausible because 1) you meet entry conditions for AP/2, 2) AP/44 directs entry into AP/2 and AP/2 Encl 5.9 does give direction to close 1RC-4 if leakage through 1RC-66 exceeds 1 gpm.
2nd part is incorrect because bkr # 24 is the power supply to 1RC-66. 1RC-4 is an MOV so it will fail as is. It is plausible because this is the RNO step for 1RC-4 failing to close from the control room.

Answer D Discussion

Incorrect: 1st part is correct. AP/44 entry conditions are met. Step 4.3 RNO dispatches an operator to open the breaker for 1RC-66.
2nd part is incorrect because bkr # 24 is the power supply to 1RC-66. 1RC-4 is an MOV so it will fail as is. It is plausible because this is the RNO step for 1RC-4 failing to close from the control room.

Basis for meeting the KA

This question matches the KA by requiring knowledge of the local breaker that will be opened to fail 1RC-66 (PORV) closed.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 47 Q2

Development References

ILT 47 Q2 (6/2015)
AP 44 Rev 4
EAP-AP44 Obj.04

Student References Provided

APE008 2.1.30 - Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)
APE008 GENERIC
Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)

Remarks/Status

Preview Question:

NRC Feedback:
1/31/18 - OK as is.

ILT 18-1 ONS SRO NRC Examination **QUESTION 2** 2 **B**

EPE011 EK2.02 - Large Break LOCA
Knowledge of the interrelations between the Large Break LOCA and the following: (CFR 41.7 / 45.7)
Pumps ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%

Current conditions:

- RCS pressure = 328 psig lowering
- RB pressure = 5 psig rising

1) __(1)__ Reactor Building Spray pumps are operating.

2) __(2)__ LPSW pumps are operating.

Which ONE of the following completes the statements above?

A. 1. two
 2. three

B. 1. zero
 2. three

C. 1. two
 2. ONLY two

D. 1. zero
 2. ONLY two

General Discussion

Answer A Discussion

Incorrect. First part is incorrect. Plausible if the candidate has the misconception that RBS initiates at a RB pressure of 3 psig. ES Channels 1 thru 6 actuate at 3 psig RB pressure.
Second part is correct.

Answer B Discussion

Correct. RB pressure is below the RBS setpoint of 10 psig so no RBS pumps will be operating. ES will start three LPSW pumps at 3 psig in the RB and < 550 RCS pressure.

Answer C Discussion

Incorrect. First part is incorrect. Plausible if the candidate has the misconception that RBS initiates at a RB pressure of 3 psig. ES Channels 1 thru 6 actuate at 3 psig RB pressure.
Second part is incorrect. Plausible because if it were LPI pumps, it would be correct.

Answer D Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible because if it were LPI pumps, it would be correct.

Basis for meeting the KA

Question requires knowledge of pumps that will be operating following a LBLOCA.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 42 Q4

Development References

ILT 42 Q4 (12/2012)
IC-ES Obj. 17

Student References Provided

EPE011 EK2.02 - Large Break LOCA
Knowledge of the interrelations between the Large Break LOCA and the following: (CFR 41.7 / 45.7)
Pumps ....

Remarks/Status

APE015/017 AK2.10 - Reactor Coolant Pump (RCP) Malfunctions

Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: (CFR 41.7 / 45.7) RCP indicators and controls ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 65%
- 1LPSW-6 (UNIT 1 RCP COOLERS SUPPLY) fails closed

Current conditions:

- AP/16 (Abnormal RCP Operation) in progress
- RCP Temperatures:

	1A1	1A2	1B1	1B2
Upper Guide Bearing Temp (ºF)	182	188	197	185
Upper Seal Housing Temp (ºF)	174	195	186	184

Which ONE of the following is required per AP/16?

A. Manually trip the Reactor and stop ALL RCPs

B. Manually trip the Reactor and stop RCPs 1A2 & 1B1 ONLY

C. Stop RCP 1A2 ONLY and verify FDW re-ratios properly

D. Stop RCP 1B1 ONLY and verify FDW re-ratios properly

General Discussion

Answer A Discussion

Incorrect: Plausible in that AP/24 (Loss of LPSW) directs tripping the reactor and then tripping all the RCPs. AP/24 is not in progress. Plausible if it is assumed that closing of 1LPSW-6 caused entry into AP/24.

Answer B Discussion

Incorrect: Plausible because AP/16 directs that if any RCP meets immediate trip criteria and less than 3 RCPs will remain in operation, then manually trip the Rx and immediately stop the affected RCPs. In this case only the 1B1 RCP is exceeding the Immediate Trip Criteria. However, the 1A2 Upper Seal Housing Temperature of 195 degrees is below the trip criteria of 260 degrees but is at the MTR UPPER TH BRG TEMP 1 immediate trip criteria of 195 degrees.

Answer C Discussion

Incorrect: Plausible in that failure to recognize that 1B1 RCP is above trip criteria since there are other RCP trip temperatures that are higher than 195 degrees. Using this logic, only the 1A2 RCP would be at the trip criteria and AP/16 would direct tripping the RCP and verifying FDW re-ratios.

Answer D Discussion

Correct: The 1B1 RCP is the only RCP above the trip criteria. (Upper Guide Bearing Temp is greater than 195 degrees) Since only one RCP is tripped below 70% power, a Rx trip is not required and FDW re-ratio is verified.

Basis for meeting the KA

Requires the ability to evaluate RCP indications and determine which RCPs require tripping.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 41 Q4

Development References

ILT 41 Q4
AP16 Rev 35
EAP AP16 Obj. 04

Student References Provided

APE015/017 AK2.10 - Reactor Coolant Pump (RCP) Malfunctions

Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: (CFR 41.7 / 45.7)

RCP indicators and controls ....

Remarks/Status

APE022 AK1.04 - Loss of Reactor Coolant Makeup

Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: (CFR 41.8 / 41.10 / 45.3)

Reason for changing from manual to automatic control of charging flow valve controller . . . .

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- SASS in manual
- ICCM Train B is off-line for maintenance
- PZR Level Select Pushbutton #2 is selected on 1UB1
- 1SA-02/C-3 RC (PZR Level High/Low) Statalarm is in alarm
- 1SA-02/C-4 RC (PZR Level Emergency High/Low) Statalarm is in alarm
- PZR level #2 Dixon meter on 1UB1 is failed high
- Actual PZR level is 215 inches and lowering
- 1HP-120 (RC Volume Control) is in automatic and fully closed

Current conditions:

- AP/1/A/1700/014 (Loss of Normal HPI Makeup AND/OR RCP Seal Injection) has been initiated
- PZR Level is being controlled at 220 inches with 1HP-120 in HAND

1) A condition that would allow 1HP-120 to be placed back in AUTO would be selecting PZR Level Select Pushbutton # __(1)__.

2) After the appropriate PZR Level Select Pushbutton is selected, the PZR Emergency High/Low Statalarm will __(2)__.

Which ONE of the following completes the statements above?

A. 1. 3
   2. clear

B. 1. 1
   2. clear

C. 1. 3
   2. remain in alarm

D. 1. 1
   2. remain in alarm

General Discussion

0 miss

Answer A Discussion

Incorrect: First part is incorrect since PZR level 3 is not a good signal because it is fed through ICCM Train B, which is off-line for maintenance. Plausible since it would be correct if ICCM Train B was not off-line for maintenance.
Second part is correct because the PZR Emergency High/Low Statalarm input comes from the level selected by the pushbutton

Answer B Discussion

Correct: First part is correct because PZR level 1 is a good signal since it is fed through ICCM Train A. PZR level 3 is not a good signal because it is fed through ICCM Train B, which is off-line for maintenance.
Second part is correct because the PZR Emergency High/Low Statalarm input comes from the level selected by the pushbutton.

Answer C Discussion

Incorrect: First part is incorrect since PZR level 3 is not a good signal because it is fed through ICCM Train B, which is off-line for maintenance. Plausible since it would be correct if ICCM Train B was not off-line for maintenance.
Second part is incorrect. Plausible since it would be correct for the PZR Level High/Low statalarm, which will actuate if any PZR level reaches the setpoint regardless of which level is selected by the pushbutton.

Answer D Discussion

Incorrect: First part is correct because PZR level 1 is a good signal since it is fed through ICCM Train A. PZR level 3 is not a good signal because it is fed through ICCM Train B, which is off-line for maintenance.
Second part is incorrect. Plausible since it would be correct for the PZR Level High/Low statalarm, which will actuate if any PZR level reaches the setpoint regardless of which level is selected by the pushbutton.

Basis for meeting the KA

Question matches the K/A because it requires knowledge of conditions and reason (selecting good PZR level signal) for changing from manual to automatic control of the charging flow valve controller (HP-120) following a loss of reactor coolant makeup.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 43 Q6

Development References

ILT 43 Q6 (6/2013)
AP 14 Rev 19
PNS-PZR Obj. 21
IC-RCI Obj. 10

Student References Provided

APE022 AK1.04 - Loss of Reactor Coolant Makeup

Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Makeup: (CFR 41.8 / 41.10 / 45.3)

Reason for changing from manual to automatic control of charging flow valve controller . . . .

Remarks/Status

APE025 AA1.12 - Loss of Residual Heat Removal System (RHRS)

Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: (CFR 41.7 / 45.5 / 45.6)

RCS temperature indicators ....

Given the following Unit 1 conditions:

Initial conditions:

- Mode 5
- LPI Cooler outlet = 120°F stable
- Low Range Cooldown pressure = 38 psig stable
- LPI in NORMAL DHR

Current conditions:

- Blackout occurs
- AP/1/A/1700/026 (Loss of Decay Heat Removal) initiated

1) AP/26 will direct isolation of the DHR drop line if CETCs approach a MINIMUM of __(1)__°F.

2) AP/26 __(2)__ direct performance of EOP Enclosure 5.38 (Restoration of Power).

Which ONE of the following completes the statements above?

A. 1. 246
   2. does

B. 1. 246
   2. does NOT

C. 1. 325
   2. does

D. 1. 325
   2. does NOT

General Discussion

Answer A Discussion

Correct: First part is correct. If CETCs approach 246 degrees, the DHR drop line will be isolated to prevent over-pressurization of the LPI system.
Second part is correct. AP/26 does direct performance of EOP Encl. 5.38.

Answer B Discussion

Incorrect: First part is correct.
Second part is incorrect and plausible since EOP entry conditions are not met. Since very few conditions exist where an EOP enclosure is performed without meeting EOP entry conditions, it would be reasonable to assume that an EOP Enclosure would not be performed.

Answer C Discussion

Incorrect. First part is incorrect. Plausible since 325 degrees is the temperature criteria in AP/26 to initiate Encl. 5.24 (HPI Forced Cooling on DHR).
Second part is correct.

Answer D Discussion

Incorrect. First part is incorrect. Plausible since 325 degrees is the temperature criteria in AP/26 to initiate Encl. 5.24 (HPI Forced Cooling on DHR).
Second part is incorrect and plausible since EOP entry conditions are not met. Since very few conditions exist where an EOP enclosure is performed without meeting EOP entry conditions, it would be reasonable to assume that an EOP Enclosure would not be performed.

Basis for meeting the KA

Requires knowledge of the CETC temperature that would require LPI isolation during a loss of DHR.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
AP/26 R26 EAP-AP-26 Obj. 3 and 4	

APE025 AA1.12 - Loss of Residual Heat Removal System (RHRS)
Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: (CFR 41.7 / 45.5 / 45.6)
RCS temperature indicators ....

Remarks/Status

APE026 AA2.03 - Loss of Component Cooling Water (CCW)
Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: (CFR: 43.5 / 45.13)
The valve lineups necessary to restart the CCWS while bypassing the portion of the system causing the abnormal condition ....

Given the following Unit 2 conditions:

- Reactor power = 100%
- 2A CC pump is operating with switch in the ON position
- 2B CC pump is OFF with switch in the AUTO position
- ES Channel 6 inadvertently actuates

1) __(1)__ will have to be re-opened to restore the CC System to operation.

2) 2B CC pump __(2)__ automatically start when the above valve is opened.

Which ONE of the following completes the statements above?

A. 1. 2CC-7
   2. will

B. 1. 2CC-8
   2. will

C. 1. 2CC-7
   2. will NOT

D. 1. 2CC-8
   2. will NOT

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because if ES Channel 5 had actuated, it would be correct.
Second part is correct. 2B CC Pump will auto start due to low flow when 2CC-8 is reopened.

Answer B Discussion

Correct: First part is correct. 2CC-8 is on ES Channel 6 and will close when ES-6 actuates. 2A CC pump will shutdown when 2CC-8 closes. Both CC pumps will receive a trip signal when 2CC-8 closes.
Second part is correct. 2B CC Pump will auto start due to low flow when 2CC-8 is reopened.

Answer C Discussion

Incorrect: First part is incorrect. Plausible because if ES Channel 5 had actuated, it would be correct.
Second part is incorrect. Plausible because 2B CC Pump is in AUTO rather than ON prior to the ES Channel 6 actuation.

Answer D Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible because 2B CC Pump is in AUTO rather than ON prior to the ES Channel 6 actuation.

Basis for meeting the KA

Question requires knowledge of the valve lineups required to restart the CC system following an inadvertent actuation of ES Channel 6.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT43 Q35

Development References

ILT 43 Q35
PNS-CC Obj. 6 & 13

Student References Provided

APE026 AA2.03 - Loss of Component Cooling Water (CCW)
Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: (CFR: 43.5 / 45.13)
The valve lineups necessary to restart the CCWS while bypassing the portion of the system causing the abnormal condition ....

Remarks/Status

Preview Question:

NRC Feedback:
1/31/18 - OK as is.

APE027 AK3.04 - Pressurizer Pressure Control System (PZR PCS) Malfunction

Knowledge of the reasons for the following responses as they apply to the Pressurizer Pressure Control Malfunctions: (CFR 41.5,41.10 / 45.6 / 45.13)

Why, if PZR level is lost and then restored, that pressure recovers much more slowly ....

Consider the following two scenarios:

1. Reactor trips from 100% power. Pressurizer level lowers off-scale low during the initial cooldown then returns on-scale. Lowest Subcooling margin indication during the transient = 18°F. Pressurizer level is returned to 100 inches, RCS pressure = 2100 psig, and Pressurizer temperature = 635°F.

2. From an initial Reactor power of 100%, ICS MAX Runback is used to lower power to 80% to stop the 1D2 HDP. Pressurizer level remains approximately 220 inches during the runback and when the runback is stopped, RCS pressure = 2100 psig and Pressurizer temperature = 643°F.

If ALL Pressurizer heaters are energized and Pressurizer level is maintained constant, which ONE of the following describes the response of the two scenarios if attempting to raise RCS pressure to 2200 psig and the reason for the response?

A. Scenario # 2 will reach 2200 psig first since the Pressurizer in Scenario #1 is subcooled.

B. Scenario # 1 will reach 2200 psig first since Pressurizer level is lower and therefore less heat is required to raise the temperature of the water.

C. Both scenarios would reach 2200 psig at approximately the same time since starting pressure is equal in both scenarios.

D. Neither scenario would reach 2200 psig since the spray valve will overcome the RCS pressure rise even with ALL Pressurizer heaters energized.

General Discussion

Answer A Discussion

Correct. Saturation temp for 2100 psig is approximately 643 degrees therefore Scenario 1 would require returning the pressurizer to saturation temp before RCS pressure would begin to increase.

Answer B Discussion

Incorrect. Plausible since the reason given is actually a true statement however the Pzr in scenario 1 is subcooled and would therefore require time to heat up to saturation before RCS pressure would begin to increase.

Answer C Discussion

Incorrect. This answer would be correct if both pressurizers were saturated.

Answer D Discussion

Incorrect. Plausible since the spray valve will overcome RCS pressure increasing with all Pzr heaters energized however 2200 psig is just below the setpoint for it to open (2205). It is plausible to believe the spray valve would be open since RCS pressure would be above normal operating pressure of 2155 psig.

Basis for meeting the KA

Requires knowledge of the reason it would take longer than normal to return RCS pressure to a setpoint following a transient where pressurizer level had been lost and then returned to a normal operating level. The fact that the Pzr is subcooled is the Pzr pressure control malfunction.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 2009B Q7

Development References

ILT 2009B Q7 (10/2010)
PNS-PZR Obj. 04

Student References Provided

APE027 AK3.04 - Pressurizer Pressure Control System (PZR PCS) Malfunction

Knowledge of the reasons for the following responses as they apply to the Pressurizer Pressure Control Malfunctions: (CFR 41.5,41.10 / 45.6 / 45.13)

Why, if PZR level is lost and then restored, that pressure recovers much more slowly ....

Remarks/Status

EPE029 EK1.03 - Anticipated Transient Without Scram (ATWS)

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

Effects of boron on reactivity ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- RCS pressure = 2360 psig rising

Current conditions:

- Reactor power = 7% lowering

1) With Reactor power lowering, the MINIMUM power level at which Rule 1 (ATWS/UNPP) is required to be performed to address Emergency Boration is __(1)__ percent.

2) The reason this power level is chosen is so the Boron will reduce Reactor power to __(2)__.

Which ONE of the following completes the statements above?

A. 1. 5
 2. below the point of adding heat

B. 1. 5
 2. within the capacity of the EFDW system

C. 1. 1
 2. below the point of adding heat

D. 1. 1
 2. within the capacity of the EFDW system

General Discussion

Answer A Discussion

Incorrect. First part is correct. Second part is plausible because of a misconception that power is reduced so that the no nuclear heat is being added to the system.

Answer B Discussion

Correct. During performance of IMAs, if power is greater than 5% Rule 1 must be performed. This is to reduce reactor power to within the heat removal capacity of the EFDW system.

Answer C Discussion

Incorrect. First part is plausible because HPI can be throttled below 1% power. Second part is plausible because of a misconception that power is reduced so that the no nuclear heat is being added to the system.

Answer D Discussion

Incorrect. First part is plausible because HPI can be throttled below 1% power. Second part is correct.

Basis for meeting the KA

Requires knowledge of when emergency boration is required to reduce Rx power during an ATWS and the reason for the power level.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 47 Q8

Development References

ILT 47 Q8 (6/2015)
EOP Rule 1 R1
EAP-UNPP

Student References Provided

EPE029 EK1.03 - Anticipated Transient Without Scram (ATWS)
Knowledge of the operational implications of the following concepts as they apply to the ATWS: (CFR 41.8 / 41.10 / 45.3)
Effects of boron on reactivity ....

Remarks/Status

Preview Question:

NRC Feedback:
1/31/18 - OK as is.

ILT 18-1 ONS SRO NRC Examination **QUESTION 9** 9 **D**

APE040 AA2.03 - Steam Line Rupture
Ability to determine and interpret the following as they apply to the Steam Line Rupture: (CFR: 43.5 / 45.13)
Difference between steam line rupture and LOCA ....

Given the following Unit 1 conditions:

Time = 1000:

- Reactor trips
- RB pressure = 2.8 psig
- RCS pressure = 2015 psig
- Tcold = 555°F

Time = 1001:

- RB pressure = 9.4 psig
- RCS pressure = 1356 psig
- Tcold = 520°F

1) The event causing the indications above is a __(1)__.

2) At <u>Time = 1000</u>, degraded containment conditions __(2)__ exist.

Which ONE of the following completes the statements above?

A. 1. LOCA
2. do

B. 1. LOCA
2. do NOT

C. 1. Steam line break
2. do

D. 1. Steam line break
2. do NOT

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because without the decrease in Tcold, it would be correct.
Second part is incorrect and plausible because if RB pressure were 0.2 psig higher, it would be correct. Additionally plausible since at Time = 1001, degraded containment conditions do exist.

Answer B Discussion

Incorrect: First part is incorrect. Plausible because without the decrease in Tcold, it would be correct.
Second part is correct. Degraded containment exists at 3 psig RB pressure.

Answer C Discussion

Incorrect: First part is correct. With Tcold indication lowering > 30°F, it would indicate an overcooling event is occurring.
Second part is incorrect and plausible because if RB pressure were 0.2 psig higher, it would be correct. Additionally plausible since at Time = 1001, degraded containment conditions do exist.

Answer D Discussion

Correct. First part is correct. With Tcold indication lowering > 30°F, it would indicate an overcooling event is occurring.
Second part is correct. Degraded containment exists at 3 psig RB pressure.

Basis for meeting the KA

Question requires knowledge of different indications of a steam line break vs a LOCA.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 16-2 Q10

Development References

ILT 16-2 Q10
SF-010 Obj. R9
EAP-LOSCM Obj. 05

Student References Provided

APE040 AA2.03 - Steam Line Rupture
Ability to determine and interpret the following as they apply to the Steam Line Rupture: (CFR: 43.5 / 45.13)
Difference between steam line rupture and LOCA ....

Remarks/Status

APE054 AA2.04 - Loss of Main Feedwater (MFW)

Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): (CFR: 43.5 / 45.13)

Proper operation of AFW pumps and regulating valves ....

Given the following Unit 2 conditions:

- Reactor trip from 100% power
- 2FDW-33 (2A SU FDW Block) FAILS closed

The expected Steam Generator level 20 minutes after the trip for…

1) 2A SG is __(1)__.

2) 2B SG is __(2)__.

Which ONE of the following completes the statements above?

A. 1. 12 inches SUR
   2. 25 inches SUR

B. 1. 25 inches SUR
   2. 25 inches SUR

C. 1. 30 inches XSUR
   2. 30 inches XSUR

D. 1. 30 inches XSUR
   2. 25 inches SUR

General Discussion

0 miss

Answer A Discussion

Incorrect: First part is incorrect. Plausible since this would be correct if the logic required BOTH SGs to be < 21 inches to actuate the dryout protection and start both MD EFDW pumps. 12 inches SUR is the level indicated on a dry SG.
Second part is incorrect. Plausible since 25 inches SUR is the normal post trip SG level maintained with RCPs operating.

Answer B Discussion

Incorrect: First part is incorrect. Plausible because it would be correct if 2FDW-33 was open.
Second part is incorrect. Plausible since 25 inches SUR is the normal post trip SG level maintained with RCPs operating and it would be correct if 2FDW-33 was open.

Answer C Discussion

Correct: With the SU block valve (2FDW-33) failed closed with a reactor trip, the SU control valve cannot supply FDW to the 2A SG. SG level will decrease until <21inches for 30 seconds, which will start BOTH MD EFWPs. With both MDEFWPs operating, 2FDW-315 and 2FDW-316 will control both 2A and 2B SGs at 30 inches XSUR.

Answer D Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible since 25 inches SUR is the normal post trip SG level maintained with RCPs operating and it would be correct if 2FDW-33 was open.

Basis for meeting the KA

Question requires knowledge of MD EFDW pump operation during SG dryout conditions and SG level setpoints maintained by the EFDW regulating valves following a loss of main feedwater to the 2A SG.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 37 Q45

Development References

ILT 37 Q45 (3/2010)
CF-EF Obj. 26 and 31

Student References Provided

APE054 AA2.04 - Loss of Main Feedwater (MFW)

Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): (CFR: 43.5 / 45.13)

Proper operation of AFW pumps and regulating valves ....

Remarks/Status

EPE055 EK1.02 - Loss of Offsite and Onsite Power (Station Blackout)
Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : (CFR 41.8 / 41.10 / 45.3)
Natural circulation cooling ....

Given the following Unit 1 conditions:

- Blackout tab in progress
- SSF RCMU pump operating
- Unit 1 TD EFDW pump maintaining SG levels at setpoint
- Management has determined that a Natural Circulation cooldown is required

In accordance with the Blackout tab…

1) PSW power __(1)__ be aligned to HPI to provide makeup and seal Injection prior to performing the cooldown.

2) The MAXIMUM cooldown rate allowed is__(2)__ºF per half hour.

Which ONE of the following completes the statements above?

A. 1. will
   2. 25

B. 1. will NOT
   2. 25

C. 1. will
   2. 50

D. 1. will NOT
   2. 50

General Discussion

0 miss

Answer A Discussion

Correct. First part is correct. Prior to performing a cooldown in the EOP BO tab, PSW will be aligned to supply RC makeup and seal injection due to the limited makeup capability of the SSF RCMU pump.
Second part is correct. The maximum allowed cooldown rate in the EOP BO tab is 25 degrees per half hour.

Answer B Discussion

Incorrect. First part is incorrect. Plausible since RC makeup and seal injection is already being provided by the SSF RCMU pump.
Second part is correct.

Answer C Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible because 50 degrees per half hour is the TS cooldown rate limit when >/= 270 degrees. It also appears in the same note with the Natural circ cooldown rate limit in the EOP BO tab.

Answer D Discussion

Incorrect. First part is incorrect. Plausible since RC makeup and seal injection is already being provided by the SSF RCMU pump.
Second part is incorrect. Plausible because 50 degrees per half hour is the TS cooldown rate limit when >/= 270 degrees. It also appears in the same note with the Natural circ cooldown rate limit in the EOP BO tab.

Basis for meeting the KA

Question matches the K/A by requiring knowledge of the operational implications of natural circ cooling (cooldown rate limit) during a station blackout.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 42 Q100

Development References

ILT 42 Q100
EOP BO tab R4
EAP-BO Obj. 02

Student References Provided

EPE055 EK1.02 - Loss of Offsite and Onsite Power (Station Blackout)
Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : (CFR 41.8 / 41.10 / 45.3)
Natural circulation cooling ....

Remarks/Status

APE056 AA1.25 - Loss of Offsite Power
Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: (CFR 41.7 / 45.5 / 45.6)
Main steam supply valve control switch ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- Loss of offsite power occurs

Current conditions:

- Main Feeder buses remain de-energized

1) 1MS-112 (SSRH Control) position is __(1)__.

2) 1MS-77 (MS to MSRH) __(2)__ be operated from its control room switch.

Which ONE of the following completes the statements above?

A. 1. open
 2. can

B. 1. closed
 2. can NOT

C. 1. closed
 2. can

D. 1. open
 2. can NOT

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible since 1MS-112 is normally open at 100% power and it would be logical to assume the valve would not operate without AC power.
Second part is incorrect. Plausible because other electric valves can be operated from the control room with the MFBs de-energized (Ex. CCW-8).

Answer B Discussion

Correct: 1MS-112 will close on a loss of power due to IA porting off. 1MS-77 cannot be operated from its control room switch without AC power.

Answer C Discussion

Incorrect; First part is correct.
Second part is incorrect. Plausible because other electric valves can be operated from the control room with the MFBs de-energized (Ex. CCW-8).

Answer D Discussion

Incorrect: First part is incorrect. Plausible since 1MS-112 is normally open at 100% power and it would be logical to assume the valve would not operate without AC power.
Second part is correct.

Basis for meeting the KA

Question requires the ability to determine if a main steam control valve (1MS-77) will be operable from the control room switch following a Loss of Offsite Power.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 2009B Q13

Development References

ILT 2009B Q13 (10/2010)
STG-MSR Obj. 09

Student References Provided

APE056 AA1.25 - Loss of Offsite Power
Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: (CFR 41.7 / 45.5 / 45.6)
Main steam supply valve control switch ....

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 13** 13 **B**

APE057 AK3.01 - Loss of Vital AC Electrical Instrument Bus

Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: (CFR 41.5,41.10 / 45.6 / 45.13)
Actions contained in EOP for loss of vital ac electrical instrument bus ...

Given the following Unit 1 conditions:

Initial conditions:

- A loss of both MFDW pumps occurs from 100% power
- Rule 3 (Loss of Main or Emergency FDW) is in progress
- 1FDW-315 and 1FDW-316 are maintaining SG levels at 30 inches XSUR

Current conditions:

- 1KVIC is de-energized

Assuming NO additional operator actions, which ONE of the following will be directed by the EOP and why?

A. Take manual control of 1FDW-315 since its Moore controller will automatically swap to its alternate power supply

B. Take manual control of 1FDW-316 since its Moore controller will automatically swap to its alternate power supply

C. Feed the 1A SG through 1FDW-35 (1A STARTUP FDW CONTROL) since 1FDW-315 will fail open

D. Feed the 1B SG through 1FDW-44 (1B STARTUP FDW CONTROL) since 1FDW-316 will fail open

---

General Discussion

0 miss

Answer A Discussion

Incorrect: 1KVIC does not power 1FDW-315. It is plausible because this would be correct for a loss of 1KVIB.

Answer B Discussion

Correct: When 1KVIC is lost, the 1FDW-316 controller automatically swaps to its alternate source and the valve would fail to the open position due to loss of power to the auto level control circuitry, which does not auto swap to its alternate. Rule 3 will direct attempting to control the valve with the moore controller in manual and in this case it would be successful. 1KVIC is the normal supply to the 1FDW-316 Moore controller and the
1B SG XSUR Primary level train.

Answer C Discussion

Incorrect: 1KVIC does not power 1FDW-315. It is plausible because this would be correct under the assumption that the Moore controller for 1FDW-315 did not auto swap to its alternate source of power and therefore could not be used to control valve position. If 1FDW-315 did not work in auto or manual, Rule 3 would direct initiating Enclosure 5.27 which would direct EFW flow to the SG through 1FDW-35.

Answer D Discussion

Incorrect: Power to 1FDW-316 will automatically swap to 1KVID. It is plausible since this would be correct under the assumption that the Moore controller for 1FDW-316 did not auto swap to its alternate source of power and therefore could not be used to control valve position. If 1FDW- 316 did not work in auto or manual, Rule 3 would direct initiating Enclosure 5.27 which would direct EFW flow to the SG through 1FDW-44.

Basis for meeting the KA

This question matches the K/A by requiring knowledge of the reasons for actions contained in the EOP (Rule 3) for a loss of vital AC power (1KVIC).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 47 Q13

Development References

ILT 47 Q13
CF-EF Obj. 35

Student References Provided

APE057 AK3.01 - Loss of Vital AC Electrical Instrument Bus

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

Actions contained in EOP for loss of vital ac electrical instrument bus ...

Remarks/Status

APE058 AA1.01 - Loss of DC Power
Ability to operate and / or monitor the following as they apply to the Loss of DC Power: (CFR 41.7 / 45.5 / 45.6)
Cross-tie of the affected dc bus with the alternate supply ....

Given the following plant conditions:

- 1CA Battery Charger fails - output voltage = 0 VDC
- 1CA Battery voltage = 124 VDC
- 1DCB Bus voltage = 123 VDC
- Unit 2 DCA/DCB Bus voltage = 126 VDC
- Unit 3 DCA/DCB Bus voltage = 127 VDC

Which ONE of the following will be supplying power to 1DIA panelboard?

A. 1DCB Bus

B. 1CA Battery

C. Unit 2 DC Bus

D. Unit 3 DC Bus

General Discussion

0 miss

Answer A Discussion

Incorrect. For the Vital DC system, the 1DCB bus is not aligned to the 1DCA bus.
Plausible because 1DCB Bus is aligned to backup the essential inverters.

Answer B Discussion

Incorrect: Plausible because this would be correct if the 1CA battery voltage was higher than the Unit 2 DC bus voltage .

Answer C Discussion

Correct: The voltage from the backup source (Unit 2 DC Bus) is higher than 1CA Battery voltage and will therefore supply 1DIA panelboard through the Isolating Diodes.

Answer D Discussion

Incorrect. Unit 3's DC Bus is not connected to Unit 1. Plausible because unit 3 does backup Unit 1 in the SSF power scheme.

Basis for meeting the KA

Question requires knowledge of the alternate power supplies to the DC buses.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 47 Q14

Development References

ILT 47 Q14
EL-DCD Obj. 04, 06

Student References Provided

APE058 AA1.01 - Loss of DC Power
Ability to operate and / or monitor the following as they apply to the Loss of DC Power: (CFR 41.7 / 45.5 / 45.6)
Cross-tie of the affected dc bus with the alternate supply ....

Remarks/Status

APE062 2.4.3 - Loss of Nuclear Service Water
APE062 GENERIC
Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)

Given the following plant conditions:

Initial conditions:

- Unit 1 at 100% power
- Unit 2 in Mode 5 with LPI in Normal DHR
- 'A' LPSW pump trips
- Standby LPSW pump fails to start

Current conditions:

- AP/1/A/1700/024 (Loss of LPSW) initiated
- LPSW to Unit 2 LPI Coolers is being reduced IAW Enclosure 5.2 (LPSW System Loads)

1) The Dixson flow gauges for LPSW flow to Unit 2 LPI Coolers __(1)__ supplied by Post Accident Monitoring (PAM) instruments.

2) As LPSW pressure lowers, LPSW to RBCUs will automatically isolate at a MAXIMUM LPSW header pressure of __(2)__.

Which ONE of the following completes the statements above?

A. 1. are
   2. 18

B. 1. are NOT
   2. 18

C. 1. are
   2. 25

D. 1. are NOT
   2. 25

General Discussion

Answer A Discussion

Correct: First part is correct. The Dixon LPSW to LPI Cooler flow gauges are supplied by PAM instruments.
Second part is correct. LPSW to the RBCUs is isolated at 18 psig LPSW pressure.

Answer B Discussion

Incorrect: First part is incorrect. Plausible since the LPSW flow input to the Moore controllers for 2LPSW-251/252 (LPSW to LPI Coolers) is NOT supplied by PAM instruments.
Second part is correct.

Answer C Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible since 25 psig rising LPSW pressure is where the LPSW to RBCU isolation valves will reopen.

Answer D Discussion

Incorrect: First part is incorrect. Plausible since the LPSW flow input to the Moore controllers for 2LPSW-251/252 (LPSW to LPI Coolers) is NOT supplied by PAM instruments.
Second part is incorrect. Plausible since 25 psig rising LPSW pressure is where the LPSW to RBCU isolation valves will reopen.

Basis for meeting the KA

Question requires the ability to identify post accident instrumentation associated with the Loss of LPSW.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
SSS-LPW Obj. 12 AP/24 R28	

APE062 2.4.3 - Loss of Nuclear Service Water
APE062 GENERIC
Ability to identify post-accident instrumentation. (CFR: 41.6 / 45.4)

Remarks/Status

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 ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%

Current conditions:

- IA Header pressure = 25 psig lowering
- Aux IA Header pressure = 100 psig stable
- Letdown temperature = 131°F stable

1HP-5 is __(1)__ because __(2)__.

Which ONE of the following completes the statement above?

A. 1. open
   2. it is backed up by Aux IA

B. 1. open
   2. it is backed up by Nitrogen

C. 1. closed
   2. IA Header pressure is low

D. 1. closed
   2. it closed on high Letdown temperature

General Discussion

0 miss

Answer A Discussion

Correct. 1HP-5 will be isolated from the IA system by a check valve and then supplied by the AIA system and thus will remain OPEN.

Answer B Discussion

Incorrect. First part is correct. Second part is plausible because Nitrogen does backup some air operated valves. i.e. 1FDW-315.

Answer C Discussion

Incorrect. First part is plausible because 1HP-5 will fail closed on a total loss of air. Second part is correct.

Answer D Discussion

Incorrect. First part is plausible because the given letdown temperature is above the setpoint for the high letdown temperature alarm. Second part is plausible because 1CC-8 would close on a loss of IA and this would cause a high letdown temperature which would cause 1HP-5 to close. However 1CC-8 is also backed up by AIA.

Basis for meeting the KA

Question requires knowledge of the backup air supply to 1HP-5, which is there to prevent isolating letdown on a loss of IA.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 45 Q17

Development References

ILT 45 Q17 (6/2014)
SSS-IA Obj. 27

Student References Provided

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

Preview Question

NRC Feedback:
1/31/18 - OK as is.

APE077 AK2.01 - Generator Voltage and Electric Grid Disturbances

Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8)

Motors...

Given the following Unit 1 conditions:

- Reactor power = 80%
- AP/1/A/1700/034 (Degraded Grid) has been entered
- Generator output voltage = 18.4 KV lowering

1) As voltage lowers, pump motor current will __(1)__.

2) Switchyard Isolation circuitry ensures RCPs are de-energized by providing a trip signal to the __(2)__.

Which ONE of the following completes the statements above?

A. 1. rise
   2. individual 6.9KV RCP breakers

B. 1. rise
   2. 1TA and 1TB SU 6.9KV FDR breakers

C. 1. lower
   2. individual 6.9KV RCP breakers

D. 1. lower
   2. 1TA and 1TB SU 6.9KV FDR breakers

General Discussion

Answer A Discussion

Incorrect: First part is correct. As voltage lowers, motor current will rise proportionately to the voltage decrease.
Second part is incorrect and plausible since many other pumps are tripped by circuitry that sends a trip signal to the individual pump breakers (i.e. LOCA Load Shed circuitry sends trip signals to individual CCW, HW, HD, and Condensate Booster pump breakers).

Answer B Discussion

Correct. First part is correct. As voltage lowers, motor current will rise proportionately to the voltage decrease.
Second part is correct. Switchyard Isolation circuitry sends the trip signal to TA and TB SU 6.9KV breakers.

Answer C Discussion

Incorrect. First part is incorrect and plausible because if it were frequency lowering, pump discharge pressure or flow would be affected and it would be correct. Also plausible because under normal operation, when flow is reduced (pump pumping less), current goes down.
Second part is incorrect and plausible since many other pumps are tripped by circuitry that sends a trip signal to the individual pump breakers (i.e. LOCA Load Shed circuitry sends trip signals to individual CCW, HW, HD, and Condensate Booster pump breakers).

Answer D Discussion

Incorrect. First part is incorrect and plausible because if it were frequency lowering, pump discharge pressure or flow would be affected and it would be correct. Also plausible because under normal operation, when flow is reduced (pump pumping less), current goes down.
Second part is correct.

Basis for meeting the KA

Question requires knowledge of the interrelations between generator voltage/electric grid disturbances and motors.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
EL-EPD Obj. 16	

APE077 AK2.01 - Generator Voltage and Electric Grid Disturbances

Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8)

Motors..

Remarks/Status

BWE10 2.4.4 - Post-Trip Stabilization

BWE10 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 conditions:

Time = 1200:

- Reactor trips from 100% power due to a 1A Main Steam Line Break
- BOTH 1A and 1B SG pressures rapidly lowering
- Core SCM = 0ºF

Time = 1204:

- Tcold reaches lowest value of 416ºF

Time = 1215:

- Tcold = 498ºF stable
- Core SCM = 78ºF stable
- Rule 2 (Loss of SCM) is complete

1) __(1)__ was the EOP tab that was required to be entered first from Subsequent Actions.

2) Rule 8 (Pressurized Thermal Shock) __(2)__ required to be invoked.

Which ONE of the following completes the statements above?

A. 1. Loss of SCM
   2. is NOT

B. 1. Loss of SCM
   2. is

C. 1. Excessive Heat Transfer
   2. is NOT

D. 1. Excessive Heat Transfer
   2. is

General Discussion

0 miss

Answer A Discussion

Incorrect. First part is correct. The LOSCM tab will be entered first based upon the order steps are completed in the Subsequent Actions tab. It will be determined in the LOSCM tab that SCM was lost due to EHT and then the transfer to EHT tab will be made from the LOSCM tab. Second part is incorrect because Rule 8 is required. It is plausible since there are two conditions, either of which require Rule 8. If all RCPs are off with HPI on (met) OR a cooldown below 400 degrees at > 100 degrees per hour has occurred (not met). If both were required, it would be correct.

Answer B Discussion

Correct. First part is correct. The LOSCM tab will be entered first based upon the order steps are completed in the Subsequent Actions tab. It will be determined in the LOSCM tab that SCM was lost due to EHT and then the transfer to EHT tab will be made from the LOSCM tab. Second part is correct. Per Rule 8 if "HPI has injected through an open or throttled open 1HP-26, 27, 409, 410 with all RCPs OFF" then Rule 8 would be invoked. Rule 2 has been completed so RCPs have been secured and HPI has been initiated.

Answer C Discussion

Incorrect. 1st part is incorrect because the LOSCM is higher on the SA foldout page so it will be entered. It is plausible because the steam leak is the cause of the LOSCM AND when verifying that in the LOSCM tab, it has you transfer to the excessive heat transfer tab.
Second part is incorrect because Rule 8 is required. It is plausible since there are two conditions, either of which require Rule 8. If all RCPs are off with HPI on (met) OR a cooldown below 400 degrees at > 100 degrees per hour has occurred (not met). If both were required, it would be correct.

Answer D Discussion

Incorrect. 1st part is incorrect because the LOSCM is higher on the SA foldout page so it will be entered. It is plausible because the steam leak is the cause of the LOSCM AND when verifying that in the LOSCM tab, it has you transfer to the excessive heat transfer tab.
Second part is correct. Per Rule 8 if "HPI has injected through an open or throttled open 1HP-26, 27, 409, 410 with all RCPs OFF" then Rule 8 would be evoked. Rule 2 has been completed so RCPs have been secured and HPI has been initiated.

Basis for meeting the KA

Requires knowledge of post trip abnormal indications for system operating parameters that require entry into emergency procedures (Loss of SCM and Rule 8).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 46 Q26

Development References

ILT 46 Q26 (12/2014)
EAP-LOSCM
EAP-EHT

Student References Provided

BWE10 2.4.4 - Post-Trip Stabilization

BWE10 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

401-2 wording is different than NUREG 1122 for G2.4.4

APE001 AA1.02 - Continuous Rod Withdrawal
Ability to operate and / or monitor the following as they apply to the Continuous Rod Withdrawal : (CFR 41.7 / 45.5 / 45.6)
Rod in-out-hold switch ....

Given the following Unit 1 conditions:

- Reactor power = 90%
- Controlling Tave fails low
- Plant Transient Response is performed
- Appropriate ICS stations are placed in MANUAL

1) Prior to placing ICS in manual, feedwater flow will __(1)__ due to the failure.

2) Control rods are moved to __(2)__.

Which ONE of the following completes the statements above?

A. 1. lower
   2. the pre-transient rod height

B. 1. lower
   2. match current feedwater demand

C. 1. rise
   2. the pre-transient rod height

D. 1. rise
   2. match current feedwater demand

General Discussion

1 of 8 missed.

Answer A Discussion

Incorrect: 1st part is correct. When ICS "thinks" that the RCS is too cold (Tave failing low), it will adjust control parameters to heat it back up to setpoint. With feedwater, this means lowering flow.
2nd part is incorrect because per OMP 1-18, Attachment J (Plant Transient Response), Control rods are to be inserted to match feedwater demand. It is plausible because the intent of Plant Transient Response is to stabilize the plant. If feedwater was not reduced by the same instrument failure, it could be correct. Also plausible under the assumption that stabilizing the plant following the failure requires returning to the pre-transient power level.

Answer B Discussion

Correct: 1st part is correct. When ICS "thinks" that the RCS is too cold (Tave failing low), it will adjust control parameters to heat it back up to setpoint. With feedwater, this means lowering flow.
2nd part is correct. Per OMP 1-18, Attachment J (Plant Transient Response), Control rods are to be inserted to match feedwater demand.

Answer C Discussion

Incorrect: 1st part is incorrect because feedwater demand will be reduced. It is plausible because if feedwater were increased first, Tave will respond by lowering.
2nd part is incorrect because per OMP 1-18, Attachment J (Plant Transient Response), Control rods are to be inserted to match feedwater demand. It is plausible because the intent of Plant Transient Response is to stabilize the plant. If feedwater was not reduced by the same instrument failure, it could be correct. Also plausible under the assumption that stabilizing the plant following the failure requires returning to the pre-transient power level.

Answer D Discussion

Incorrect: 1st part is incorrect because feedwater demand will be reduced. It is plausible because if feedwater were increased first, Tave will respond by decreasing.
2nd part is correct. Per OMP 1-18, Attachment J (Plant Transient Response), Control rods are to be inserted to match feedwater demand.

Basis for meeting the KA

The question matches the KA by requiring knowledge of the expectations for control rod insertion during a continuous rod withdrawal event (Tave failed low).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 47 Q19

Development References

ILT 47 Q19 (6/2015)
OMP 1-18 Rev 41
ADM-OMP Obj. 01

Student References Provided

APE001 AA1.02 - Continuous Rod Withdrawal
Ability to operate and / or monitor the following as they apply to the Continuous Rod Withdrawal : (CFR 41.7 / 45.5 / 45.6)
Rod in-out-hold switch ....

Remarks/Status

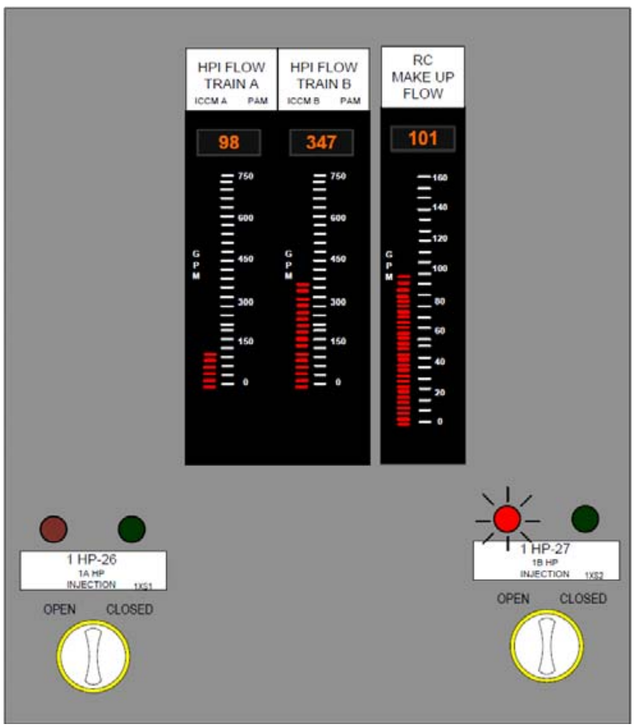
APE024 AA2.01 - Emergency Boration

Ability to determine and interpret the following as they apply to the Emergency Boration: (CFR: 43.5 / 45.13)

Whether boron flow and/or MOVs are malfunctioning, from plant conditions ....

Given the following Unit 1 conditions:

- Reactor power = 40% slowly lowering
- Rule 1 (ATWS/UNPP) in progress
- 1HP-24 and 1HP-25 are OPEN
- 1A and 1C HPI pumps operating
- When 1HP-26 switch was rotated to the OPEN position, both of its position indicator lights went dark
- HPI flow and valve indications are as indicated below



Which ONE of the following actions is directed <u>next</u> in accordance with Rule 1?

A. Open 1HP-410

B. Open 1HP-409

C. Start the 1B HPI pump

D. Dispatch operator to <u>open</u> CRD breakers

General Discussion

1 of 9 missed

Answer A Discussion

Correct: Although the position indication for 1HP-26 indicates that the breaker or thermals may have tripped, HPI flow gage indicates that 1HP-26 is closed. OMP 1-2 requires using diverse indications to verify valve position. With RC Makeup flow approximately equal to Train A flow, you can deduce that the HPI Train flow is because makeup flow is above the 60 gpm cutoff for HPI train flow gage and what you see on train flow is actually makeup flow and therefore 1HP-26 is actually closed requiring opening 1HP-410

Answer B Discussion

Incorrect: Plausible since this would be correct if the candidate had confused which trains HP-409/410 fed or if 1HP-27 was not open.

Answer C Discussion

Incorrect: Plausible since A Train flow is low and the B HPI pump feeds the A train. Starting the B pump would actually increase flow under conditions that HP-26 was open or partially open.

Answer D Discussion

Incorrect: Plausible since this would be correct if you determined that 1HP-26 was performing correctly which is plausible since there is some indication of flow in the A train.

Basis for meeting the KA

Requires using plant indications to determine that 1HP-26 has malfunctioned and is closed during alignment of emergency boration.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 40 Q20

Development References

ILT 40 Q20 (10/2011)
Rule 1 R1
ADM-OMP Obj.01
EAP UNPP (Rule 1) Obj. 04

Student References Provided

APE024 AA2.01 - Emergency Boration

Ability to determine and interpret the following as they apply to the Emergency Boration: (CFR: 43.5 / 45.13)

Whether boron flow and/or MOVs are malfunctioning, from plant conditions ....

Remarks/Status

APE033 2.1.20 - Loss of Intermediate Range Nuclear Instrumentation
APE033 GENERIC
Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)

Given the following Unit 3 conditions:

Initial conditions:

- Reactor power = 100%
- OAC is out of service

Current conditions:

- Power Range channel 3NI-5 begins to drift low and is removed from service for calibration

Which ONE of the following describes the instrumentation used to determine Quadrant Power Tilt in accordance with OP/3/A/1105/014 (Control Room Instrumentation Operation and Information)?

A. Incore Detectors

B. Backup Incore Detectors

C. The three operable PR NI channels

D. Quadrant power tilt cannot be determined

General Discussion

Answer A Discussion

Incorrect. Plausible since it would be correct if the Computer Reactor Calculation Package was operable, but with the OAC OOS, it is not.

Answer B Discussion

Correct: Per OP/1105/014, the hierarchy is: Incore Detectors (Computer Reactor Calculation Package), Outcore Detectors (Power Range NIs), Backup Incore Detectors (ref. PT/0/A/1103/019).

Answer C Discussion

Incorrect. If any Power Range NI 5 through 8 is inoperable, outcore detectors shall not be used to measure QPT. Plausible because if 3NI-5 were operable, it would be correct.

Answer D Discussion

Incorrect: Plausible since it is reasonable to believe the OAC is required for Backup Incore Detectors to be available as it is for Incore Detectors.

Basis for meeting the KA

Discussed the use of PR NIs with Chief since ONS does not have Intermediate Range NIs. Question requires knowledge of procedure requirements for determining QPT with the OAC and one of the PR NIs OOS.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 43 Q59

Development References

ILT 43 Q59 (6/2013)
OP/3/A/1105/014 R39
ADM-PIS Obj. 05, 06

Student References Provided

APE033 2.1.20 - Loss of Intermediate Range Nuclear Instrumentation
APE033 GENERIC
Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)

Remarks/Status

Per discussion with Chief Examiner on 11/06/17, we agreed to use PR NIs since ONS does not have "Intermediate" Range NIs.

APE067 AK3.04 - Plant Fire On Site

Knowledge of the reasons for the following responses as they apply to the Plant Fire on Site: (CFR 41.5,41.10 / 45.6 / 45.13)
Actions contained in EOP for plant fire on site ....

Given the following Unit 1 conditions:

- Fire in the turbine building
- Reactor has been manually tripped
- All Main and Emergency feedwater is unavailable
- SSF-ASW aligned per AP/0/A/1700/025 (SSF Operating Procedure)

1) The MAXIMUM RCS pressure maintained with SSF-ASW in accordance with AP/25 is __(1)__ psig.

2) The reason for the maximum RCS pressure is to __(2)__.

Which ONE of the following completes the statements above?

A. 1. 2355
   2. minimize RCS inventory loss via the PORV and Safety Relief valves

B. 1. 2355
   2. maximize Delta P across RCP seals to raise RCMUP seal injection

C. 1. 2250
   2. minimize RCS inventory loss via the PORV and Safety Relief valves

D. 1. 2250
   2. maximize Delta P across RCP seals to raise RCMUP seal injection

---

General Discussion

2 of 9 missed

Answer A Discussion

Incorrect: First part is plausible since the SSF RCMU pump is prevented from starting if RCS pressure is > 2355 psig.
Second part is correct.

Answer B Discussion

Incorrect: First part is plausible since the SSF RCMU pump is prevented from starting if RCS pressure is > 2355 psig.
Second part is plausible since there is a specific concern related to RCP seals and the RCMUP as described below:
RCS pressure is decreased </= 2250 psig to ensure that the pressurizer code safety valves do not lift and to ensure that RCS pressure is below the pressure where the RCMU Pump discharge relief valve could weep or leak flow. RCS pressure must be decreased </= 2250 psig to ensure that RCMU flow is not diverted from the RC pump seals.

Answer C Discussion

Correct: If RCS pressure is not ≤ 2250 psig within 20 minutes, RCS inventory loss from the PORV/Safeties (due to high pressure and lack of heat transfer) could create enough voiding to inhibit natural circulation, once the RCS is cooled to ≈ 555ºF (TC).

Answer D Discussion

Incorrect: First part is correct.
Second part is plausible since there is a specific concern related to RCP seals and the RCMUP as described below:
RCS pressure is decreased </= 2250 psig to ensure that the pressurizer code safety valves do not lift and to ensure that RCS pressure is below the pressure where the RCMU Pump discharge relief valve could weep or leak flow. RCS pressure must be decreased </= 2250 psig to ensure that RCMU flow is not diverted from the RC pump seals.

Basis for meeting the KA

Requires knowledge of the reason that RCS pressure is reduced to </= 2250 psig when using SSF-ASW via AP/25 following a plant fire

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 40 Q24

Development References

ILT 40 Q24 (10/2011)
AP 25 Rev 63
EAP-AP25 Obj. 03

Student References Provided

APE067 AK3.04 - Plant Fire On Site
Knowledge of the reasons for the following responses as they apply to the Plant Fire on Site: (CFR 41.5,41.10 / 45.6 / 45.13)
Actions contained in EOP for plant fire on site ....

Remarks/Status

EPE074 EA1.07 - Inadequate Core Cooling
Ability to operate and monitor the following as they apply to a Inadequate Core Cooling: (CFR 41.7 / 45.5 / 45.6)
AFW System ....

Given the following Unit 1 conditions:

Time = 0800:

- Reactor power = 100%
- Auxiliary Steam header is being supplied by Unit 2
- LOCA occurs

Time = 0804:

- Transition to the ICC tab is made
- The step to reduce SG pressure is initiated
- Unit 1 TDEFDW pump is the ONLY EFDW pump operating

In accordance with the Inadequate Core Cooling (ICC) tab…

1) SGs __(1)__ be fully depressurized.

2) The MAXIMUM allowable EFDW flow rate is __(2)__ gpm.

Which ONE of the following completes the statements above?

A. 1. will
2. 950

B. 1. will
2. 1000

C. 1. will NOT
2. 950

D. 1. will NOT
2. 1000

General Discussion

0 miss

Answer A Discussion

Correct: 1st part is correct. The ICC tab directs the SGs to be depressurized as rapidly as possible. Since the Aux Steam header is being supplied by Unit 2, the SGs will be fully depressurized.
Second part is correct. The ICC tab directs feeding the SGs at the maximum rate per Rule 7 Table 3 to the setpoint in Rule 7 Table 4. The maximum allowable flow per Rule 7 Table 3 for the TDEFDW pump is 950 gpm.

Answer B Discussion

Incorrect: 1st part is correct. The ICC tab directs the SGs to be depressurized as rapidly as possible. Since the Aux Steam header is being supplied by Unit 2, the SGs will be fully depressurized.
Second part is incorrect. Plausible since 1000 gpm is the maximum allowed EFDW header flow per Rule 7 Table 3. However the maximum allowed flow for the TDEFDW pump is 950 gpm. With only the TDEFDW pump available, the maximum allowable EFDW flow rate is 950 gpm.

Answer C Discussion

Incorrect: First part is incorrect. Plausible because if either Aux Steam was isolated to the TDEFDW pump or the Aux Steam header were being supplied by Unit 1, then it would be correct; SGs would only be depressurized to 250 psig.
Second part is correct.

Answer D Discussion

Incorrect: First part is incorrect. Plausible because if either Aux Steam was isolated to the TDEFDW pump or the Aux Steam header were being supplied by Unit 1, then it would be correct; SGs would only be depressurized to 250 psig.
Second part is incorrect. Plausible since 1000 gpm is the maximum allowed EFDW header flow per Rule 7 Table 3. However the maximum allowed flow for the TDEFDW pump is 950 gpm. With only the TDEFDW pump available, the maximum allowable EFDW flow rate is 950 gpm.

Basis for meeting the KA

This question matches the KA by requiring knowledge of the TDEFDW pump steam supplies and maximum allowable EFDW flow rate in accordance with the Inadequate Core Cooling tab of the EOP.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 47 Q23

Development References

ILT 47 Q23
EOP ICC tab R1
EAP-ICC Obj. 03
EOP Rule 7

Student References Provided

EPE074 EA1.07 - Inadequate Core Cooling

Ability to operate and monitor the following as they apply to a Inadequate Core Cooling: (CFR 41.7 / 45.5 / 45.6)

AFW System ....

Remarks/Status

BWA04 AK2.1 - Turbine Trip

Knowledge of the interrelations between the (Turbine Trip) 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:

- Reactor power = 100%

Which ONE of the following will result in an AUTOMATIC trip of the Main Turbine?

A. Condenser vacuum = 22 inches Hg

B. Oil Fire occurs in Front Standard of Turbine-Generator

C. 84 psig hydraulic oil pressure on BOTH Main Feedwater pumps

D. 740 psig discharge pressure on BOTH Main Feedwater pumps

General Discussion

0 miss

Answer A Discussion

Incorrect: Plausible since there is a low vacuum trip of the main turbine (21.75 in Hg) and 22 in Hg is the point at which AP/27 (loss of condenser vacuum) requires a manual trip of the Main Turbine.

Answer B Discussion

Incorrect: Plausible since a Turbine Oil Fire is a turbine trip, however it must be manually activated. There is a special trip mechanism that is manually activated during a Turbine Oil Fire that will trip the turbine and shutdown the Oil Pumps.

Answer C Discussion

Incorrect: Plausible because if it were 74 psig hydraulic oil pressure, it would be correct.

Answer D Discussion

Correct: AMSAC will trip the Main Turbine and start all operable EFWPs.
Need both channels of AMSAC/DSS to be enabled (2/2 logic) AND:
either
Both MFWPs have low hydraulic oil pressure (<75 psig)
Or
Both MFWPs have low discharge pressure (<770 psig)

Basis for meeting the KA

Requires knowledge of the interrelation between a safety system (AMSAC) and a Main Turbine trip.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 40 Q25

Development References

ILT 40 Q25 (10/2011)
STG-EHC Obj. 12
CF-EF Obl. 27

Student References Provided

BWA04 AK2.1 - Turbine Trip

Knowledge of the interrelations between the (Turbine Trip) 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

BWA08 AK2.2 - Refueling Canal Level Decrease

Knowledge of the interrelations between the (Refueling Canal Level Decrease) and the following:
(CFR: 41.7 / 45.7)

Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

Given the following Unit 1 conditions:

Initial conditions:

- Reactor in MODE 6
- LPI aligned in NORMAL Mode
- Refueling in progress
- 1B LPI pump tagged out

Current conditions:

- PZR level begins lowering

1) In accordance with OP/1/A/1104/004 (LPI System), the __(1)__ LPI pump will be in operation.

2) In accordance with AP/1/A/1700/026 (Loss of Decay Heat Removal), Refueling SRO permission __(2)__ required in order to secure ALL LPI pumps in an effort to identify the leak location.

Which ONE of the following completes the statements above?

A. 1. 1A
   2. is

B. 1. 1C
   2. is

C. 1. 1A
   2. is NOT

D. 1. 1C
   2. is NOT

ILT 18-1 ONS SRO NRC Examination **QUESTION 25** 25 **C**

General Discussion

Answer A Discussion

Incorrect. First part is correct. IAW 1104/04, "If possible, operate 1A or 1B LPI pump for DHR. These pumps automatically restart when power is regained after loss of power scenarios".
Second part is incorrect. Once you transfer to AP/26, subsequent actions will direct stopping all LPI pumps to see if it impacts the leak rate, however Refueling SRO permission is not required. Plausible since Refueling SRO permission would be required if there was not a leak and AP/26 was not in progress.

Answer B Discussion

Incorrect: First part is incorrect. Plausible since it is one of the two LPI pumps available and is the only non-ES pump. It would be logical to assume the philosophy would be to save the ECCS pump and therefore the 1C pump (non-ES) would be desired. That philosophy is plausible since until fairly recently (3-5 years) that was the philosophy used.
Second part is incorrect. Once you transfer to AP/26, subsequent actions will direct stopping all LPI pumps to see if it impacts the leak rate, however Refueling SRO permission is not required. Plausible since Refueling SRO permission would be required if there was not a leak and AP/26 was not in progress.

Answer C Discussion

Correct: First part is correct. IAW 1104/04, "If possible, operate 1A or 1B LPI pump for DHR. These pumps automatically restart when power is regained after loss of power scenarios".
Second part is correct. Stopping LPI pumps IAW AP/26 to locate the leak does not require the Refueling SRO's permission.

Answer D Discussion

Incorrect: First part is incorrect. Plausible since it is one of the two LPI pumps available and is the only non-ES pump. It would be logical to assume the philosophy would be to save the ECCS pump and therefore the 1C pump (non-ES) would be desired. That philosophy is plausible since until fairly recently (3-5 years) that was the philosophy used.
Second part is correct.

Basis for meeting the KA

Question requires knowledge of LPI System operation during a Refueling Canal level decrease as indicated by PZR level decrease.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 46 Q75

Development References

ILT 46 Q75
PNS-LPI Obj. 38
OP/1/A/1104/004 R154
AP/1/A/1700/026 R26
EAP-AP26 Obj. 04
OP/1/A/1502/007 R89

Student References Provided

BWA08 AK2.2 - Refueling Canal Level Decrease
Knowledge of the interrelations between the (Refueling Canal Level Decrease) and the following:
(CFR: 41.7 / 45.7)
Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

Remarks/Status

BWE08 EK1.2 - LOCA Cooldown

Knowledge of the operational implications of the following concepts as they apply to the (LOCA Cooldown)

(CFR: 41.8 / 41.10 / 45.3)

Normal, abnormal and emergency operating procedures associated with (LOCA Cooldown).

Given the following Unit 1 conditions:

- A Small Break LOCA has occurred
- LOCA CD tab in progress
- 1A LPI pump operating in the Piggyback alignment

Which ONE of the following describes the:

1) operational limitations on the operating LPI pump provided by the LOCA CD tab?

2) pump(s) being protected by the above limitation?

A. 1. Maximized to < 2900 gpm
   2. LPI

B. 1. Maximized to < 2900 gpm
   2. HPI

C. 1. Maximized to < 3100 gpm
   2. LPI

D. 1. Maximized to < 3100 gpm
   2. HPI

General Discussion

1 of 8 missed.

Answer A Discussion

Incorrect: First part is incorrect because the limit is 3100 gpm for the LPI pump. It is plausible since 2900 gpm is a flow limit applicable when only one LPI train is operating, however it is the LPI flow that transitions the mitigation strategy to a LBLOCA from a SBLOCA or allows securing HPI pumps following a SBLOCA..
Second part is correct. This is a flow limit for the LPI pump.

Answer B Discussion

Incorrect: First part is incorrect because the limit is 3100 gpm for the LPI pump. It is plausible since 2900 gpm is a flow limit applicable when only one LPI train is operating, however it is the LPI flow that transitions the mitigation strategy to a LBLOCA from a SBLOCA or allows securing HPI pumps following a SBLOCA..
Second part is incorrect because the limit is for the LPI pump. It is plausible since the LPI pump is supplying suction to the HPI pumps in this alignment and other conditions place strict flow limits on the HPI pumps to protect them from damage.

Answer C Discussion

Correct. With only one LPI pump operating in the Piggyback mode, LPI flow is maximized to < 3100 gpm to protect the LPI pump from runout.

Answer D Discussion

Incorrect: First part is correct. Limit for 1 LPI pump is 3100 gpm.
Second part is incorrect because the limit is for the LPI pump. It is plausible since the LPI pump is supplying suction to the HPI pumps in this alignment and other conditions place strict flow limits on the HPI pumps to protect them from damage.

Basis for meeting the KA

Requires knowledge of the operational implications of the LOCA Cooldown tab of the EOP.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 44 Q26

Development References

ILT 44 Q26 (12/2013)
LOCA CD tab Rev. 0
EAP-LCD

Student References Provided

BWE08 EK1.2 - LOCA Cooldown
Knowledge of the operational implications of the following concepts as they apply to the (LOCA Cooldown)
(CFR: 41.8 / 41.10 / 45.3)
Normal, abnormal and emergency operating procedures associated with (LOCA Cooldown).

Remarks/Status

BWE14 2.4.18 - EOP Enclosures
BWE14 GENERIC
Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- Small Break LOCA occurs

Current conditions:

- EOP Enclosure 5.12 (ECCS Suction Swap to RBES) in progress
- HPI piggyback aligned to RBES
- 1B LPI pump operating
- 1LP-15 failed closed
- 1LP-16 open

1) The MAXIMUM allowable total HPI flow is __(1)__ gpm.

2) The basis for the above HPI flow limit is __(2)__ concerns.

Which ONE of the following completes the statements above?

A. 1. 750
   2. NPSH

B. 1. 750
   2. runout

C. 1. 950
   2. NPSH

D. 1. 950
   2. runout

General Discussion

Answer A Discussion

Correct: First part is correct. When piggyback is aligned with LPI suction from the RBES and either only one piggyback valve (LP-15/LP-16) open or only one LPI pump operating, the limit on total HPI flow is 750 gpm.
Second part is correct. The concern in this alignment is NPSH.

Answer B Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible because runout is the concern when A and B HPI pumps are operating with HP-409 open.

Answer C Discussion

Incorrect: First part is incorrect. Plausible because this is the flow limit when A and B HPI pumps are operating with HP-409 open.
Second part is correct.

Answer D Discussion

Incorrect: First part is incorrect. Plausible because this is the flow limit when A and B HPI pumps are operating with HP-409 open.
Second part is incorrect. Plausible because runout is the concern when A and B HPI pumps are operating with HP-409 open

Basis for meeting the KA

Question requires knowledge of the bases for HPI flow limits in EOP Enclosure 5.12.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

EOP Encl 5.12 R0
EAP-LOSCM (5.12) Obj. 29

Student References Provided

BWE14 2.4.18 - EOP Enclosures
BWE14 GENERIC
Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)

Remarks/Status

SYS003 K1.10 - Reactor Coolant Pump System (RCPS)

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

RCS ....

Given the following Unit 1 conditions:

- Reactor power = 100% stable
- 1A1 RCP trips

1) The plant will automatically run back at __(1)__ percent per minute.

2) The PZR spray line __(2)__ on the discharge of 1A1 RCP.

Which ONE of the following completes the statements above?

A. 1. 20
   2. is

B. 1. 20
   2. is NOT

C. 1. 25
   2. is

D. 1. 25
   2. is NOT

General Discussion

Answer A Discussion

Incorrect. First part is incorrect. Plausible because 20% per min is the runback rate for loss of RC flow. The rate for loss of a RCP is 25% per min. ICS uses the fastest rate to run the plant back.
Second part is correct. 1A1 RCP is the spray pump.

Answer B Discussion

Incorrect. First part is incorrect. Plausible because 20% per min is the runback rate for loss of RC flow. The rate for loss of a RCP is 25% per min. ICS uses the fastest rate to run the plant back.
Second part is incorrect. Plausible because on Unit 2 or 3, it would be correct.

Answer C Discussion

Correct. First part is correct. The runback rate for a loss of RCP is 25% per minute.
Second part is correct. 1A1 RCP is the spray pump.

Answer D Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible because on Unit 2 or 3, it would be correct.

Basis for meeting the KA

Question requires knowledge of the physical connections of RCPs to the RCS.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 41 Q57

Development References

ILT 41 Q57
ICS-01 Obj.03
PNS-RCS Obj. 09

Student References Provided

SYS003 K1.10 - Reactor Coolant Pump System (RCPS)
Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)
RCS ....

Remarks/Status

SYS004 A2.05 - Chemical and Volume Control System

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: (CFR: 41.5/ 43/5 / 45/3 / 45/5)

RCP seal failures ....

Given the following Unit 1 conditions:

- Reactor power = 100%
- 1A2 RCP upper seal completely fails
- AP/1/A/1700/016 (Abnormal Reactor Coolant Pump Operation) initiated

1) Seal return flow will __(1)__.

2) EOP Enclosure 5.5 (Pzr and LDST Level Control) __(2)__ be initiated without SRO concurrence.

Which ONE of the following completes the statements above?

A. 1. rise
   2. can

B. 1. rise
   2. can NOT

C. 1. lower
   2. can

D. 1. lower
   2. can NOT

General Discussion

Answer A Discussion

First part is incorrect because seal return flow will decrease. It is plausible because if either the middle or lower seal failed, it would be correct.

Second part is incorrect and plausible since it would be correct if EOP entry conditions were met.

Answer B Discussion

First part is incorrect because seal return flow will decrease. It is plausible because if either the middle or lower seal failed, it would be correct.

Second part is correct. With an AP in progress, SRO concurrence is required to initiate EOP Encl 5.5 per OMP 1-18. OMP 1-18 states during abnormal events, RCS inventory functions are performed with Encl 5.5 during abnormal events when directed by the CRS.

Answer C Discussion

First part is correct. With the failure of the upper seal, upper seal cavity pressure will lower, which will lower the dp between the upper seal cavity and the LDST, thus lowering seal return flow.

Second part is incorrect and plausible since it would be correct if EOP entry conditions were met.

Answer D Discussion

Correct. With the failure of the upper seal, upper seal cavity pressure will lower, which will lower the dp between the upper seal cavity and the LDST, thus lowering seal return flow. With an AP in progress, SRO concurrence is required to initiate EOP Encl 5.5 per OMP 1-18. OMP 1-18 states during abnormal events, RCS inventory functions are performed with Encl 5.5 during abnormal events when directed by the CRS.

Basis for meeting the KA

Question requires the ability to predict the impact of a RCP upper seal failure on a component of the CVCS (seal return) and knowledge of the guidance in OMP 1-18 to maintain RCS inventory with EOP Encl 5.5

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 16-2 Q29

Development References

ILT 16-2 Q 29
PNS-CPS Obj. 08
OMP 1-18

Student References Provided

SYS004 A2.05 - Chemical and Volume Control System

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: (CFR: 41.5/ 43/5 / 45/3 / 45/5)

RCP seal failures ....

Remarks/Status

SYS004 K6.29 - Chemical and Volume Control System
Knowledge of the effect of a loss or malfunction on the following CVCS components: (CFR: 41.7 / 45.7)
Reason for excess letdown and its relationship to CCWS ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%

Current conditions:

- BOTH Main Feedwater pumps trip
- Reactor power = 60% lowering
- Letdown is maximized in accordance with UNPP (Unanticipated Nuclear Power Production) tab of the EOP

1) The reason letdown is maximized is to __(1)__.

2) The UNPP tab __(2)__ direct starting the standby CC pump prior to maximizing Letdown flow.

Which ONE of the following completes the statements above?

A. 1. offset RCS expansion caused by heatup and emergency boration
   2. will

B. 1. offset RCS expansion caused by heatup and emergency boration
   2. will NOT

C. 1. raise flow through the purification IXs due to the possibility of failed fuel
   2. will

D. 1. raise flow through the purification IXs due to the possibility of failed fuel
   2. will NOT

General Discussion

Answer A Discussion

First part is correct. Letdown is maximized during an ATWS to offset the effects of RCS expansion due to heatup and emergency boration.

Second part is incorrect and plausible since it would be correct per Rule 1 if the unit were in Mode 3 when the ATWS occurred. Per Rule 1 (ATWS/UNPP), if the unit were in Mode 3 the standby CC pump is started prior to throttling 1HP-7 to maximize letdown.

Answer B Discussion

First part is correct. Letdown is maximized during an ATWS to offset the effects of RCS expansion due to heatup and emergency boration.

Second part is correct. Since the unit was in Mode 1 when the event occurred, the standby CC pump is not started prior to maximizing letdown flow.

Answer C Discussion

First part is incorrect and plausible since the possibility of failed fuel greatly increases during an ATWS and raising flow through the purification Ixs would increase cleanup of the RCS.

Second part is incorrect and plausible since it would be correct per Rule 1 if the unit were in Mode 3 when the ATWS started. Per Rule 1 (ATWS/UNPP), if the unit were in Mode 3 the standby CC pump is started prior to throttling 1HP-7 to maximize letdown.

Answer D Discussion

First part is incorrect and plausible since the possibility of failed fuel greatly increases during an ATWS and raising flow through the purification IXs would increase cleanup of the RCS.

Second part is correct. Since the unit was in Mode 1 when the event occurred, the standby CC pump is not started prior to maximizing letdown flow.

Basis for meeting the KA

Question requires knowledge of the reason for maximizing letdown during an ATWS and the resultant effects on the Component Cooling system by having to know when the standby CC pump is started prior to maximizing letdown flow.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

PNS-CC Obj. 06
EAP-UNPP Obj. 07
Rule 1 R1
UNPP tab R0

Student References Provided

SYS004 K6.29 - Chemical and Volume Control System

Knowledge of the effect of a loss or malfunction on the following CVCS components: (CFR: 41.7 / 45.7)

Reason for excess letdown and its relationship to CCWS ....

Remarks/Status

SYS005 A1.02 - Residual Heat Removal System (RHRS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: (CFR: 41.5 / 45.5)

RHR flow rate ....

Given the following Unit 2 conditions:

- Reactor in MODE 5
- LPI in normal decay removal

In accordance with OP/2/A/1104/004 (Low Pressure Injection System)…

1) The MINIMUM allowable flow per LPI pump for unrestricted operation is __(1)__ gpm.

2) If operated below the minimum flow rate the associated LPI pump __(2)__.

Which ONE of the following completes the statements above?

A. 1. 800
   2. can remain running

B. 1. 800
   2. must be stopped immediately

C. 1. 170
   2. can remain running

D. 1. 170
   2. must be stopped immediately

General Discussion

2 of 9 miss

Answer A Discussion

Correct. The minimum flow required is 800 gpm per pump. Per the L&P of OP/1104/004 (LPI System) after exceeding the minimum flow time limit, the pump can remain operating but is technically inoperable until performance testing is completed.

Answer B Discussion

Incorrect. First part is correct. Second part is plausible because this is true after ES with the LPI pumps deadheading.

Answer C Discussion

Incorrect. First part is plausible because 170 is the minimum flow for the HPI pumps during accident conditions.

Answer D Discussion

Incorrect. First part is plausible because 170 is the minimum flow for the HPI pumps during accident conditions.
Second part is plausible because this is true after ES with the LPI pumps deadheading.

Basis for meeting the KA

Question requires knowledge of the minimum flow design limits of the LPI pumps.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 42 Q31

Development References

ILT 42 Q31 (12/2012)
PNS-LPI Obj. 40
OP/2/A/1104/004 R165

Student References Provided

SYS005 A1.02 - Residual Heat Removal System (RHRS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: (CFR: 41.5 / 45.5)

RHR flow rate ....

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 32** 32 **C**

SYS005 K2.01 - Residual Heat Removal System (RHRS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
RHR pumps ....

Which ONE of the following consists of ONLY components powered from 2TC?

A. 2A LPI pump and B LPSW pump

B. 2B LPI pump and B LPSW pump

C. 2A LPI pump and C LPSW pump

D. 2B LPI pump and C LPSW pump

General Discussion

Answer A Discussion

Incorrect: 2A LPI pump is correct. B LPSW pump is plausible because if it were C LPSW pump, it would be correct.

Answer B Discussion

Incorrect: 2B LPI pump is plausible because if it were 2A LPI pump, it would be correct. B LPSW pump is plausible because if it were C LPSW pump, it would be correct.

Answer C Discussion

Correct: 2A LPI pump and C LPSW pumps are powered from 2TC switchgear.

Answer D Discussion

Incorrect: 2B LPI pump is plausible because if it were 2A LPI pump, it would be correct. C LPSW pump is correct.

Basis for meeting the KA

Requires knowledge of the bus power supplies to the LPI pumps.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 16-1 NRC Exam Q#30

Development References

IC-ES Obj. 28
ILT 16-1 Q30

Student References Provided

SYS005 K2.01 - Residual Heat Removal System (RHRS)

Knowledge of bus power supplies to the following: (CFR: 41.7)

RHR pumps ....

Remarks/Status

SYS006 A3.07 - Emergency Core Cooling System (ECCS)
Ability to monitor automatic operation of the ECCS, including: (CFR: 41.7 / 45.5)
RHR pumps ....

Given the following Unit 3 conditions:

Time = 0400:

- Reactor trip from 100% power due to a LOCA

Time = 0430:

- RCS pressure = 45 psig slowly lowering
- 3LP-17 failed CLOSED

1) The actual RCS pressure setpoint that will cause the LPI pumps to start in the ES mode is __(1)__ psig.

2) At Time = 0430, LPI flow __(2)__ enter the core through BOTH LPI/CFT nozzles.

Which ONE of the following completes the statements above?

A. 1. 500
   2. will

B. 1. 550
   2. will

C. 1. 500
   2. will NOT

D. 1. 550
   2. will NOT

General Discussion

0 miss

Answer A Discussion

Incorrect: First part is incorrect. Plausible because 500 psig is the TS value for LPI injection.
Second part is correct. Because of the crossover mod, flow will enter the core through both LPI/CFT nozzles even with 1LP-17 closed.

Answer B Discussion

Correct. First part is correct. 550 psig is the actual setpoint for LPI ES actuation.
Second part is correct. Because of the crossover mod, flow will enter the core through both LPI/CFT nozzles even with 1LP-17 closed

Answer C Discussion

Incorrect. First part is incorrect. Plausible because 500 psig is the TS value for LPI injection.
Second part is incorrect. Plausible because the "A" LPI header injection valve is closed.

Answer D Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible because the "A" LPI header injection valve is closed.

Basis for meeting the KA

Question requires knowledge of the automatic operation of the ECCS LPI pumps during ES actuation.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 42 Q33

Development References

ILT 42 Q33 (12/2012)
PNS-LPI Obj. 01, 08

Student References Provided

SYS006 A3.07 - Emergency Core Cooling System (ECCS)
Ability to monitor automatic operation of the ECCS, including: (CFR: 41.7 / 45.5)
RHR pumps ....

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 34** 34 **D**

SYS006 K2.02 - Emergency Core Cooling System (ECCS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Valve operators for accumulators ....

Which ONE of the following is the power supply for 1CF-1 (1A CFT Outlet)?

A. 1XA

B. 1XC

C. 1XL

D. 1XO

General Discussion

Answer A Discussion

Incorrect: Plausible since it is a 600V MCC that supplies other plant valves.

Answer B Discussion

Incorrect: Plausible since it is a 600V MCC that supplies other plant valves.

Answer C Discussion

Incorrect: Plausible because it is a 600V MCC that supplies other plant valves.

Answer D Discussion

Correct. 1CF-1 is powered from 1XO.

Basis for meeting the KA

Question requires knowledge of the bus power supplies for ECCS accumulators (CFT) valve operators.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

EAP-LCD
EOP LOCA CD tab R0

Student References Provided

SYS006 K2.02 - Emergency Core Cooling System (ECCS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Valve operators for accumulators ....

Remarks/Status

SYS007 A4.10 - Pressurizer Relief Tank/Quench Tank System (PRTS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Recognition of leaking PORV/code safety ....

Given the following Unit 1 conditions:

- Reactor power = 100%
- 1RC-66 (PORV) begins leaking past its seat
- Pressurizer temperature = 648°F
- Quench tank pressure = 15 psig

1) Initially Quench Tank pressure will __(1)__.

2) The expected tailpipe temperature downstream of 1RC-66 will be __(2)__°F.

Which ONE of the following completes the statements above?

A. 1. rise
   2. 212

B. 1. rise
   2. 250

C. 1. remain approximately the same
   2. 212

D. 1. remain approximately the same
   2. 250

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. It is plausible because if there were still N2 in the Pzr, it would be correct. A prolonged period of time with the PORV open would cause QT pressure to increase as the water temperature increased.
Second part is incorrect. Plausible because this would be the answer if Quench Tank pressure is not converted to absolute pressure.

Answer B Discussion

Incorrect: First part is incorrect. It is plausible because if there were still N2 in the Pzr, it would be correct. A prolonged period of time with the PORV open would cause QT pressure to increase as the water temperature increased.
Second part is correct. The enthalpy for the steam leaving the pressurizer at 648 degrees F will be the same at 15 psig (30psia) - 1122 BTU/lb. This enthalpy at 30 psia
constitutes a wet vapor with a temperature of 250 degrees F. Throttling processes are constant enthalpy processes and energy remains approximately the same on both sides of a throttling process.

Answer C Discussion

Incorrect. First part is correct. With steam in the Pzr, it should condense when discharging into the QT and initially when the PORV begins leaking, there should
not be a pressure increase.
Second part is incorrect. Plausible because this would be the answer if Quench Tank pressure is not converted to absolute pressure.

Answer D Discussion

Correct: First part is correct. With steam in the Pzr, it should condense when discharging into the QT and initially when the PORV begins leaking, there should not be a pressure increase.
Second part is correct. The enthalpy for the steam leaving the pressurizer at 648 degrees F will be the same at 15 psig (30psia) - 1122 BTU/lb. This enthalpy at 30 psia
constitutes a wet vapor with a temperature of 250 degrees F. Throttling processes are constant enthalpy processes and energy remains approximately the same on both sides of a throttling process.

Basis for meeting the KA

Question requires knowledge of what the tailpipe temperature and Quench Tank pressure would do with the PORV leaking past its seat.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 16-2 Q36

Development References

ILT 16-2 Q36
PNS-PZR

Student References Provided

SYS007 A4.10 - Pressurizer Relief Tank/Quench Tank System (PRTS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Recognition of leaking PORV/code safety ....

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 36** 36 **A**

SYS008 A1.03 - Component Cooling Water System (CCWS)

Ability to predict and/or monitor changes in parameters to prevent exceeding design limits) associated with operating the CCWS controls including : (CFR: 41.5 / 45.5)

CCW pressure ....

Given the following Unit 1 conditions:

- Reactor power = 100%
- CC Surge Tank level is lowering at a constant rate
- CC pump pressure and flow are cycling

In accordance with AP/1/A/1700/020 (Loss of Component Cooling)…

1) Letdown __(1)__ be isolated.

2) The Reactor will be shutdown utilizing __(2)__.

Which ONE of the following completes the statements above?

A. 1. will
   2. manual Reactor trip

B. 1. will
   2. AP/1/A/1700/029 (Rapid Unit Shutdown)

C. 1. will NOT
   2. manual Reactor trip

D. 1. will NOT
   2. AP/1/A/1700/029 (Rapid Unit Shutdown)

General Discussion

Answer A Discussion

Correct: First part is correct. Pump cavitation is indicated. Letdown will be isolated by closing 1HP-5.
Second part is correct. AP/20 directs manually tripping the Reactor.

Answer B Discussion

Incorrect: First part is correct. Pump cavitation is indicated. Letdown will be isolated by closing 1HP-5.
Second part is incorrect. Plausible since AP/29 (Rapid Unit Shutdown) is directed to be used by many other APs when reactor shutdown is required.

Answer C Discussion

Incorrect: First part is incorrect. Plausible because AP/20 will initially only reduce letdown, not isolate it, when there are indications of flashing in the CC system. Letdown will only be isolated when CC is flashing if letdown temperature is > 130 degrees.
Second part is correct.

Answer D Discussion

Incorrect: First part is incorrect. Plausible because AP/20 will initially only reduce letdown, not isolate it, when there are indications of flashing in the CC system. Letdown will only be isolated when CC is flashing if letdown temperature is > 130 degrees.
Second part is incorrect. Plausible since AP/29 (Rapid Unit Shutdown) is directed to be used by many other APs when reactor shutdown is required.

Basis for meeting the KA

Question requires the ability to monitor CC parameters, one of which is CC pressure, that indicate cavitation and the knowledge of actions directed by AP/20 as a result of the cavitation (securing CC pumps, isolating letdown and tripping the reactor).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
EAP-AP-20 Obj. 04 AP/1/A/1700/020 R12	

SYS008 A1.03 - Component Cooling Water System (CCWS)

Ability to predict and/or monitor changes in parameters to prevent exceeding design limits) associated with operating the CCWS controls including : (CFR: 41.5 / 45.5)

CCW pressure ....

Remarks/Status

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:

- Reactor power = 100%
- RCS pressure = 2078 psig lowering
- Pressurizer level = 248 inches rising
- 1SA-18/A-1 (Pressurizer Relief Valve Flow) actuated
- ALL 1RC-66 flow monitor red lights are illuminated

1) **If NO operator actions are taken**, a Reactor Protection System (RPS) __(1)__ Pressure trip will actuate FIRST to insert control rods.

2) AP/1/A/1700/044 (Abnormal Pressurizer Pressure Control) Immediate Manual Actions will direct the operator to __(2)__.

A. 1. Low
   2. close 1RC-4

B. 1. Variable Low
   2. close 1RC-4

C. 1. Low
   2. manually trip the Reactor

D. 1. Variable Low
   2. manually trip the Reactor

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because if the failure were a Main Steam line break, it could be correct.
Second part is correct.

Answer B Discussion

Correct: First part is correct. With the PORV open RCS pressure will lower while RCS temperature remains relatively stable. The variable low pressure trip will be reached first.
Second part is correct. AP/44 IMAs state:
_ IAAT PORV is open,
AND RC pressure is < setpoint (2400 psig (HIGH) or 480 psig (LOW)
THEN close 1RC-4.

Answer C Discussion

Incorrect: First part is incorrect. Plausible because if the failure were a Main Steam line break, it could be correct.
Second part is incorrect. Plausible because if 1RC-4 failed to close, it would be correct.

Answer D Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible because if 1RC-4 failed to close, it would be correct.

Basis for meeting the KA

Question requires the ability to predict the impact of the PORV failing open on the PZR PCS and knowledge of the procedure guidance in AP/44 that will mitigate the consequences of the failure.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 16-1 Q36

Development References

ILT 16-1 Q36
AP/1/44 R4
EAP-AP-44 Obj. 02

Student References Provided

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

SYS010 K5.01 - Pressurizer Pressure Control System (PZR PCS)
Knowledge of the operational implications of the following concepts as the apply to the PZR PCS: (CFR: 41.5 / 45.7)
Determination of condition of fluid in PZR, using steam tables ....

Given the following Unit 3 conditions:

Initial conditions:

- Reactor power = 100%
- Switchyard Isolation occurs

Current Conditions:

- Natural Circulation established
- RCS pressure = 2155 psig
- Tcold = 550°F stable
- Pressurizer level = 220 inches stable
- Pressurizer temperature = 628°F

1) The Pressurizer is __(1)__.

2) Pressurizer Heater Bank #2 (Groups B & D) heaters are __(2)__.

Which ONE of the following completes the statements above?

A. 1. subcooled
   2. energized

B. 1. saturated
   2. energized

C. 1. subcooled
   2. NOT energized

D. 1. saturated
   2. NOT energized

ILT 18-1 ONS SRO NRC Examination **QUESTION 38** 38 **A**

General Discussion

0 miss

Answer A Discussion

Correct: 1st part is correct: With RCS pressure at 2155 psig, saturation temperature for that pressure is approximately 648 degrees F. With the Pressurizer temp at 628 degrees, the Pzr is subcooled.
2nd part is correct. Bank 2 heaters are used in the Pzr saturation recovery circuit. As long as RCS pressure is at least 20 psig from saturation pressure of the Pzr these heaters would be energized. Additionally, the heaters are fed from 3X8 which do not load shed therefore even following the Switchyard isolation, the heaters would be energized since the Pzr is subcooled by about 350 psig.

Answer B Discussion

Incorrect: First part is incorrect because the Pzr is subcooled. It is plausible since it would be correct for normal Pzr temperatures. With RCS pressure, Tcold, and Pzr level at their normal values it is plausible to believe that the Pzr is in its normal state of saturated.
Second part is correct. Bank 2 heaters are used in the Pzr saturation recovery circuit. As long as RCS pressure is at least 20 psig from saturation pressure of the Pzr these heaters would be energized. Additionally, the heaters are fed from 3X8, which does not load shed. Therefore even following the Switchyard isolation, the heaters would be energized since the Pzr is subcooled by about 280 psig.

Answer C Discussion

Incorrect: 1st part is correct: With RCS pressure at 2155 psig, saturation temperature for that pressure is approximately 648 degrees F. With the Pressurizer temp at 628 degrees, the Pzr is subcooled.
Second part is incorrect because the heater group B & D would be energized. It is plausible since RCS pressure is at 2155 therefore if the Pzr were actually saturated the Bank 2 heaters would be OFF since they turn off at 2150 psig.

Answer D Discussion

Incorrect: First part is incorrect because the Pzr is subcooled. It is plausible since it would be correct for normal Pzr temperatures. With RCS pressure, Tcold, and Pzr level at their normal values it is plausible to believe that the Pzr is in its normal state of saturated.
Second part is incorrect because the heater group B & D would be energized. It is plausible since RCS pressure is at 2155 therefore if the Pzr were actually saturated the Bank 2 heaters would be OFF since they turn off at 2150 psig.

Basis for meeting the KA

This question requires determining that the Pzr is Subcooled using steam tables and the status of Pzr heaters.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 47 Q36

Development References

ILT 47 Q36 (6/2015)
PNS-PZR Obj. 04, 13

Student References Provided

SYS010 K5.01 - Pressurizer Pressure Control System (PZR PCS)
Knowledge of the operational implications of the following concepts as the apply to the PZR PCS: (CFR: 41.5 / 45.7)
Determination of condition of fluid in PZR, using steam tables ....

Remarks/Status

SYS012 A3.06 - Reactor Protection System (RPS)
Ability to monitor automatic operation of the RPS, including: (CFR: 41.7 / 45.5)
Trip logic ....

Given the following Unit 3 conditions:

- Reactor power = 31% lowering
- Main Turbine trips

Which ONE of the following describes the plant response to the Main Turbine trip?

A. ICS runback will reduce Reactor power to 15% power and stabilize

B. ICS runback will reduce Reactor power to 20% power and stabilize

C. Reactor will trip and TBVs will use SG Outlet Pressure error as controlling signal

D. Reactor will trip and TBVs will use Turbine Header Pressure error as controlling signal

---

General Discussion

Answer A Discussion

Incorrect. Plausible since a runback would occur if power were < 27.75% and 15% is the runback setpoint for a Maximum Runback via the pushbutton on the LCP.

Answer B Discussion

Incorrect. Plausible since a runback would occur if power were < 27.75% and 20% is the runback setpoint for a runback for Both Generator Breakers Open.

Answer C Discussion

Correct. Once above 29.75% the Turbine to Rx RPS trip is activated. Since power is 31% the trip would be active therefore the Rx would trip. When the Turbine trips the Turbine bailey station will trip to Hand which results in transferring control of the TBV's from Turbine Header Pressure error to OTSG Outlet Pressure error.

Answer D Discussion

Incorrect: Plausible since a Rx trip would occur and Turbine Header Pressure error is the normal control signal for the Turbine Bypass Valves.

Basis for meeting the KA

Question requires the ability to accurately monitor automatic operation of RPS trip logic.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 40 NRC Exam Q#39

Development References

Lesson Plan IC-RPS Obj. 06
Lesson Plan ICS-02 Obj. 04
ILT 40 Q39 (10/2011)

Student References Provided

SYS012 A3.06 - Reactor Protection System (RPS)
Ability to monitor automatic operation of the RPS, including: (CFR: 41.7 / 45.5)
Trip logic ....

Remarks/Status

SYS012 K4.08 - Reactor Protection System (RPS)

Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)

Logic matrix testing ....

Given the following Unit 1 conditions:

- Reactor power = 100%
- 1A RPS channel in MANUAL BYPASS for testing

1) Tech Spec 3.3.1 (RPS Instrumentation) action statements __(1)__ required to be performed.

2) One Manual Bypass key is available for use on each __(2)__.

Which ONE of the following completes the statements above?

A. 1. are
   2. unit

B. 1. are
   2. channel

C. 1. are NOT
   2. unit

D. 1. are NOT
   2. channel

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because if 2 channels were placed in manual bypass, it would be correct.
Second part is correct

Answer B Discussion

Incorrect: First part is incorrect. Plausible because if 2 channels were placed in manual bypass, it would be correct.
Second part is incorrect. Plausible because if it were referring to Shutdown Bypass keys, it would be correct.

Answer C Discussion

Correct: First part is correct. Four RPS channels are available. Three are required per TS 3.3.1.
Second part is correct. Only one manual bypass key is available for use per unit.

Answer D Discussion

Incorrect: First part is correct. Four RPS channels are available. Three are required per TS 3.3.1.
Second part is incorrect. Plausible because if it were referring to RPS Shutdown Bypass keys, it would be correct.

Basis for meeting the KA

Question requires knowledge of RPS design features (Manual Bypass and one key per unit) which allow for logic testing.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

IC-RPS Obj. 13 and 23

Student References Provided

SYS012 K4.08 - Reactor Protection System (RPS)
Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Logic matrix testing ....

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 41** 41 **A**

SYS013 2.2.25 - Engineered Safety Features Actuation System (ESFAS)
SYS013 GENERIC
Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (CFR: 41.5 / 41.7 / 43.2)

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%

Current conditions:

- Large Break LOCA occurs
- 1XS4 de-energized
- 1A RBS pump will NOT start

1) The RBS system __(1)__ be able to perform its Safety Function.

2) When aligned in the recirculation mode, one of the RBS system purposes is to __(2)__.

Which ONE of the following completes the statements above?

A. 1. will
   2. entrain Iodine thus reducing offsite dose

B. 1. will
   2. minimize Hydrogen production due to Zirc water reaction

C. 1. will NOT
   2. entrain Iodine thus reducing offsite dose

D. 1. will NOT
   2. minimize Hydrogen production due to Zirc water reaction

---

General Discussion

Answer A Discussion

Correct. 1XS4 is the power supply for 1BS-1, which is associated with the 1A RBS pump. Therefore, only one train of RBS is unavailable. TS 3.6.5 bases states of the postulated accidents analyzed, the worst case single failure results in the loss of one ES bus during a LOCA. The loss of one ES bus results in one train of RBS system and one train of RB Cooling being inoperable. The result of the analysis concluded that one RBS train is required for RB cooling and to remove Iodine from the containment atmosphere to maintain concentrations below those assumed in the Safety Analysis.

Answer B Discussion

First part is correct.

Second part is incorrect and plausible because it would be true for Zinc and Aluminum reaction, not Zirc-water reaction.

Answer C Discussion

Incorrect. First part is incorrect. Plausible because if 1XS5 were de-energized, it would be correct. Also there are numerous systems in the plant design that do NOT have 100% capacity trains in support of performing safety functions (examples are HPI and Core Flood Tanks).

Second part is correct.

Answer D Discussion

Incorrect. First part is incorrect. Plausible because if 1XS5 were de-energized, it would be correct. Also since there are numerous systems in the plant design that do NOT have 100% capacity trains in support of performing safety functions (examples are HPI and Core Flood Tanks).

Second part is incorrect and plausible because it would be true for Zinc and Aluminum reaction, not Zirc-water reaction.

Basis for meeting the KA

Question requires knowledge of the bases of TS 3.6.5 related to Engineered Safegards equipment (RBS).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 39 Q 41

Development References

Lesson Plan PNS-BS Obj. 01
TS 3.6.5 Bases R2
ILT 39 Q41
IC-ES Obj.28

Student References Provided

SYS013 2.2.25 - Engineered Safety Features Actuation System (ESFAS)
SYS013 GENERIC
Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (CFR: 41.5 / 41.7 / 43.2)

Remarks/Status

SYS013 K1.03 - Engineered Safety Features Actuation System (ESFAS)

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

CCS ....

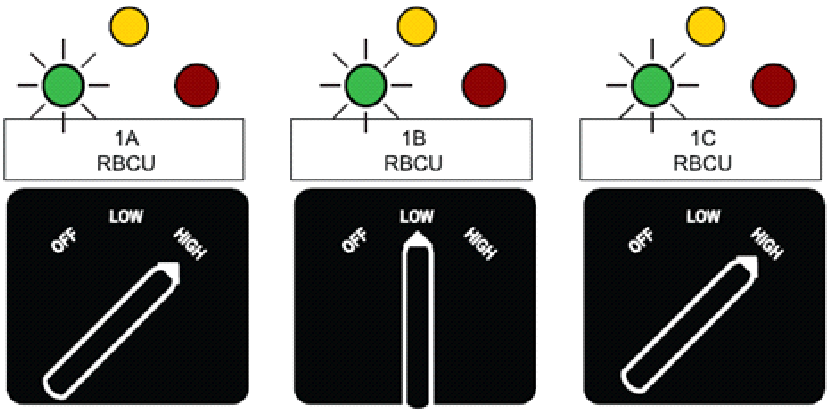
Given the following Unit 1 conditions:

Time = 0800:

- Large Break LOCA occurs
- ES channels 1-8 actuate

Time = 0802:

- Component status is pictured below



1) At Time = 0802, the Reactor Building Cooling Units __(1)__ functioning as designed.

2) 1LPSW-18 will receive a signal to open from ES Channel __(2)__.

Which ONE of the following completes the statements above?

A. 1. are
   2. 3

B. 1. are
   2. 5

C. 1. are NOT
   2. 3

D. 1. are NOT
   2. 5

General Discussion

Answer A Discussion

First part is correct.

Second part is incorrect and plausible since the LPSW pumps receive a start signal from ES channels 3&4. It would be reasonable to believe that the LPSW valves to the RBCUs would open to align more LPSW flow after all LPSW pumps are operating.

Answer B Discussion

Correct. The RBCUs should not be operating since the 3 minute time delay had not timed out (only 2 mins have elapsed). After the 3 minutes time delay expires, all 3 RBCUs will start in LOW speed. LPSW-18 is normally throttled and will receive a signal to fully open when ES channel 5 actuates.

Answer C Discussion

First part is incorrect and plausible since there are no RBCUs operating following ES 1-8 actuation. Many other ES components start immediately after ES actuation. However, there is a 3 minutes time delay on RBCU start following ES actuation to ensure adequate voltage for other ES components.

Second part is incorrect and plausible since the LPSW pumps receive a start signal from ES channels 3&4. It would be reasonable to believe that the LPSW valves to the RBCUs would open to align more LPSW flow after all LPSW pumps are operating.

Answer D Discussion

First part is incorrect and plausible since there are no RBCUs operating following ES 1-8 actuation. Many other ES components start immediately after ES actuation. However, there is a 3 minutes time delay on RBCU start following ES actuation to ensure adequate voltage for other ES components.

Second part is correct.

Basis for meeting the KA

Questions requires knowledge of connections between ES and containment cooling system (RBCUs) and how ES controls the RBCUs.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

Lesson Plan IC-ES Obj. 12
Lesson Plan PNS-RBC Obj. 01

Student References Provided

SYS013 K1.03 - Engineered Safety Features Actuation System (ESFAS)

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

CCS ....

Remarks/Status

SYS022 K4.02 - Containment Cooling System (CCS)
Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Correlation of fan speed and flowpath changes with containment pressure .

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- Reactor Building average temperature = 120°F stable
- RBCU status is as follows:
  - 1A RBCU = High Speed
  - 1B RBCU = High Speed
  - 1C RBCU = High Speed

Current conditions:

- Inadvertent ES Channel 5 actuation occurs

1) Reactor Building pressure will __(1)__.

2) TS 3.6.4 (Containment Pressure) limit for Reactor Building high pressure is less than or equal to __(2)__ psig.

Which ONE of the following completes the statements above?

A. 1. lower
   2. + 1.2

B. 1. lower
   2. + 2.45

C. 1. rise
   2. + 1.2

D. 1. rise
   2. + 2.45

General Discussion

1 of 4 miss

Answer A Discussion

First part is incorrect and plausible if the candidate fails to realize that two RBCUs will shift to low speed or that low speed will remove less heat. It is also plausible if it is misunderstood that the increase in RB temperature will not cause a corresponding increase in RB pressure.

The second part is correct. The RB high pressure limit Per TS 3.6.4 is +1.2 psig.

Answer B Discussion

First part is incorrect and plausible if the candidate fails to realize that two RBCUs will shift to low speed or that low speed will remove less heat. It is also plausible if it is misunderstood that the increase in RB temperature will not cause a corresponding increase in RB pressure.

The second part is incorrect and plausible since the low TS limit is (-) 2.45 psig not (+) 2.45 psig.

Answer C Discussion

The first part is correct. ES channel 5 actuation causes 1A & 1B RBCUs to shift to low speed after a 3 minute time delay which reduces cooling air flow. The mixed speed circuit will trip the 1C RBCU to prevent it from operating in high speed while the other two RBCUs are operating in low speed (mixed speed) which will further reduce cooling air flow. This results in less heat removal from the RB environment. RB pressure will rise due to the heat up of the containment environment.

The second part is correct. The RB high pressure limit Per TS 3.6.4 is +1.2 psig.

Answer D Discussion

The first part is correct. ES channel 5 actuation causes 1A & 1B RBCUs to shift to low speed after a 3 minute time delay which reduces cooling air flow. The mixed speed circuit will trip the 1C RBCU to prevent it from operating in high speed while the other two RBCUs are operating in low speed (mixed speed) which will further reduce cooling air flow. This results in less heat removal from the RB environment. RB pressure will rise due to the heat up of the containment environment.

The second part is incorrect and plausible since the low TS limit is (-) 2.45 psig not (+) 2.45 psig.

Basis for meeting the KA

Question requires knowledge of RBCU (CSS) interlocks and then correlate how fan speed changes will affect containment pressure.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2009 NRC Exam Q#55

Development References

Lesson Plan PNS-RBC
2009 Q55 (3/2009)

Student References Provided

SYS022 K4.02 - Containment Cooling System (CCS)
Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Correlation of fan speed and flowpath changes with containment pressure .

Remarks/Status

SYS026 K2.01 - Containment Spray System (CSS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Containment spray pumps ....

Which ONE of the following consists of ONLY components powered from the 1TD ES power string?

A. 1A RBS pump and 1B RBCU

B. 1A RBS pump and 1C RBCU

C. 1B RBS pump and 1B RBCU

D. 1B RBS pump and 1C RBCU

General Discussion

0 miss

Answer A Discussion

First part is incorrect and plausible since ONS has other pumps where the 'A' pump is powered from TD (Ex. 'A' MD EFDW pump).

Second part is incorrect and plausible if the candidate uses the TC-TD-TE → A-B-C logic which some ES components use (Ex. LPI pumps).

Answer B Discussion

First part is incorrect and plausible since ONS has other pumps where the 'A' pump is powered from TD (Ex. 'A' MD EFDW pump).

Second part is correct.

Answer C Discussion

First part is correct. 1B RBS pump is powered from 1TD.

Second part is incorrect and plausible if the candidate uses the TC-TD-TE → A-B-C logic which some ES components use (Ex. LPI pumps).

Answer D Discussion

Correct. 1B RBS pump is powered from 1TD. The 1C RBCU is powered from 1X9 which is powered from 1TD.

Basis for meeting the KA

Question requires knowledge of Reactor Building Spray (RBS) Pump power supplies.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 42 Q42

Development References

ILT 42 Q42
IC-ES Obj. 28

Student References Provided

SYS026 K2.01 - Containment Spray System (CSS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Containment spray pumps ....

Remarks/Status

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 2 conditions:

- Reactor trip from 100% power
- Controlling 2A Steam Generator Outlet Pressure fails HIGH

1) 2A TBVs will fully open __(1)__.

2) 2B TBVs will fully open __(2)__.

Which ONE of the following completes the statements above?

A. 1. and remain fully open
2. and remain fully open

B. 1. and remain fully open
2. then return to throttled position

C. 1. then return to throttled position
2. and remain fully open

D. 1. then return to throttled position
2. then return to throttled position

General Discussion

Answer A Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible since it would be correct if the candidate mistakenly applied the failed instrument to the B TBV's instead of the A TBV's,
OR if the candidate was under the misconception that both sets of TBV's control from the same SG Outlet Pressure as is the case prior to the Reactor trip when BOTH TBVs control from the same Turbine header pressure signal.

Answer B Discussion

Correct: When the reactor trips, both sets of TBV's would normally go full open in an attempt to relieve enough steam from the SG's to gain control of SG Outlet pressure. Shortly after the trip (generally less than a minute) both sets of TBV's will be back to the throttled position and in control of SG Outlet Pressure. With the controlling pressure for the A TBV failed high, the A TBV would remain full open since it will always believe that actual pressure is greater than setpoint.

Answer C Discussion

Incorrect: First part is incorrect. Plausible since it would be correct for normal post trip response without the instrument failure. Additionally plausible since the misconception that the TBV's continue to control from Turbine Header Pressure post trip would also lead to this choice. However, when the Turbine Bailey station trips to hand (which it does on a Rx trip) the controlling signal for the TBV's swaps from Turbine Header Pressure signal to Steam Generator Outlet Pressure.
Second part is incorrect. Plausible since it would be correct if the candidate mistakenly applied the failed instrument to the B TBV's instead of the A TBV's,
OR if the candidate was under the misconception that both sets of TBV's control from the same SG Outlet Pressure as is the case prior to the Reactor trip when BOTH TBVs control from the same Turbine header pressure signal.

Answer D Discussion

Incorrect: First part is incorrect. Plausible since it would be correct for normal post trip response without the instrument failure. Additionally plausible since the misconception that the TBV's continue to control from Turbine Header Pressure post trip would also lead to this choice. However, when the Turbine Bailey station trips to hand (which it does on a Rx trip) the controlling signal for the TBV's swaps from being Turbine Header Pressure to Steam Generator Outlet Pressure.
Second part is correct.

Basis for meeting the KA

Question requires knowledge of the effect that a loss or malfunction on the Main and Reheat Steam System (2A Steam Gen Outlet pressure signal fails high) will have on the Steam Dump/Turbine Bypass Valve System.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 2010A Q60

Development References

ILT 2010A Q60 (2011)
ICS-02 Obj. 04

Student References Provided

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

SYS059 K1.02 - Main Feedwater (MFW) System

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

AFW system ....

Given the following Unit 3 conditions:

Time = 1200:

- Reactor power = 100%
- 3A MD EFDWP switch in "AUTO 1" for testing
- 3B MD EFDWP switch in "AUTO 2"

Time = 1201:

- BOTH Main Feedwater pumps trip
- 3MS-87 (MS to TD EFDWP Control) fails closed

At Time = 1202, which ONE of the following describes ALL Emergency Feedwater Pumps operating?

NO OPERATOR ACTIONS ARE TAKEN

A. 3A MD EFDWP only

B. 3B MD EFDWP only

C. TD EFDWP and 3A MD EFDWP

D. TD EFDWP and 3B MD EFDWP

General Discussion

0 miss

Answer A Discussion

Incorrect: TDEFWP not starting is plausible since the Main Steam supply to the TDEFWP is not available due to the failure of 3MS-87. However Aux Steam is still available. In Auto 1, only dryout protection will start the MDEFWP and that occurs due to low SG level. 1 minute after a Rx trip, SG levels will still be well into the Operating Range.

Answer B Discussion

Incorrect: TDEFWP not starting is plausible since the Main Steam supply to the TDEFWP is not available due to the failure of 3MS-87. However Aux Steam is still available. 3B MDEFWP would start.

Answer C Discussion

Incorrect: TDEFWP is correct however in Auto 1, only dryout protection will start the MDEFWP and that occurs due to low SG level. 1 minute after a Rx trip, SG levels will still be well into the Operating Range.

Answer D Discussion

Correct. The TDEFWP still has Aux Steam available and would therefore auto start and the MDEFWP in Auto 2 (3B) will also auto start when MFWPs are lost.

Basis for meeting the KA

Requires knowledge of the effect that a loss of both Main Feedwater pumps will have on Emergency Feedwater pumps.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 40 Q45

Development References

ILT 40 Q45 (10/2011)
CF-EF Obj. 12 & 25

Student References Provided

SYS059 K1.02 - Main Feedwater (MFW) System

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

AFW system ....

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 47** 47 **D**

SYS061 K6.01 - Auxiliary / Emergency Feedwater (AFW) System
Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: (CFR: 41.7 / 45.7)
Controllers and positioners ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor tripped due to loss of Main FDW pumps
- 1A and 1B MD EFDW pumps are operating

Current conditions:

- 1FDW-315 failed closed due to controller malfunction

1) Minimum flow provided by __(1)__ protects the 1A MD EFDW pump from damage due to dead-heading.

2) The 1A MD EFDW pump recirculation flow path will be to the __(2)__.

Which ONE of the following completes the statements above?

A. 1. recirculation orifices
   2. Hotwell

B. 1. recirculation orifices
   2. Upper Surge Tank

C. 1. an automatic recirculation control valve
   2. Hotwell

D. 1. an automatic recirculation control valve
   2. Upper Surge Tank

General Discussion

0 miss

Answer A Discussion

Incorrect. First part is incorrect. Plausible because it is correct for the TDEFDW pump. Second part is incorrect. Plausible because EFDW pumps suction can be from the Hotwell and the UST provides makeup flow to the Hotwell.

Answer B Discussion

Incorrect. First part is incorrect. Plausible because it is correct for the TDEFDW pump.
Second part is correct.

Answer C Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible because EFDW pumps suction can be from the Hotwell and the UST provides makeup flow to the Hotwell.

Answer D Discussion

Correct: First part is correct. An Automatic Recirculation Control valve provides recirc flow for the MDEFDW pumps.
Second part is correct. The recirc flow path is to the Upper Surge tank.

Basis for meeting the KA

Question requires knowledge of the EFDW pump protection (recirc flowpath) available when an EFDW control valve positioner malfunctions.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 41 Q44

Development References

ILT 41 Q44 (12/2013)
CF-EF Obj.

Student References Provided

SYS061 K6.01 - Auxiliary / Emergency Feedwater (AFW) System
Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: (CFR: 41.7 / 45.7)
Controllers and positioners ....

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 48** 48 **D**

SYS062 A4.01 - AC Electrical Distribution System
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 / to 45.8)
All breakers (including available switchyard) ....

Given the following plant conditions:

- The Standby Buses are being powered from the 100 kV line
- The SL Breakers Auto/Manual Selector switches are in AUTO
- The TRIP INTERLOCK DEFEAT SWITCH is in the CENTRAL position

Which ONE of the following will cause the SL Breakers to open?

A. Lockout of CT-4 Transformer

B. Undervoltage on EITHER Standby Bus 1 or Standby Bus 2

C. The 1st level 100KV Degraded Voltage Relay has been satisfied ONLY

D. The 1st level 100KV Degraded Voltage Relay has been satisfied for 9 seconds AND the 2nd level 100KV Degraded Voltage Relay is now satisfied

---

General Discussion

Answer A Discussion

Incorrect: Plausible because if it were a lockout on CT-5 transformer, it would be correct.

Answer B Discussion

Incorrect: Plausible because undervoltage on BOTH buses would be correct.

Answer C Discussion

Incorrect: Plausible because with the Trip Interlock Defeat Switch in the Central position, if the 1st level 100KV Degraded Voltage Relay has been satisfied for 9 seconds AND the 2nd level 100KV Degraded Voltage Relay is now satisfied, the SL Breakers will trip open.

Answer D Discussion

Correct: With the Trip Interlock Defeat Switch in the Central position, if the 1st level 100KV Degraded Voltage Relay has been satisfied for 9 seconds AND the 2nd level 100KV Degraded Voltage Relay is now satisfied, the SL Breakers will trip open.

Basis for meeting the KA

Requires knowledge of the SL breaker logic and what would cause them to trip open in order to monitor for proper operation.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	ILT 16-1 Q48

Development References

ILT 16-1 Q48
EL-PSL Obj. 10

Student References Provided

SYS062 A4.01 - AC Electrical Distribution System

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

All breakers (including available switchyard) ....

Remarks/Status

SYS062 A4.04 - AC Electrical Distribution System

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

Local operation of breakers ....

Given the following Unit 2 conditions:

- 2A HPI pump breaker in TEST position
- Control power fuses installed

1) The primary breaker connection __(1)__ connected to the bus.

2) The breaker can be operated __(2)__.

Which ONE of the following completes the statements above?

A. 1. is
   2. remotely ONLY

B. 1. is
   2. locally OR remotely

C. 1. is NOT
   2. remotely ONLY

D. 1. is NOT
   2. locally OR remotely

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because if it were the secondary connection, it would be correct.
Second part is incorrect. Plausible since it is reasonable to think with the breaker in test, it can only be operated with the same control room switch used to start the pump.

Answer B Discussion

Incorrect: First part is incorrect. Plausible because if it were the secondary connection, it would be correct.
Second part is correct.

Answer C Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible since it is reasonable to think with the breaker in test, it can only be operated with the same control room switch used to start the pump.

Answer D Discussion

Correct: In the test position, the primary connection is not connected to the bus. The breaker can be operated either locally or remotely.

Basis for meeting the KA

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 16-1 Q50

Development References
EL-CB Obj. 05 ILT 16-1 Q50

Student References Provided

SYS062 A4.04 - AC Electrical Distribution System
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 / to 45.8)
Local operation of breakers ....

Remarks/Status

SYS063 A2.01 - DC Electrical Distribution System

Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; 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)

Grounds ....

Given the following Unit 1 conditions:

- Reactor power = 100%
- 1SA-04/E-6 (125 Volt Ground Trouble) actuates

1) 1SA-04/E-6 ARG directs the Operator to __(1)__ to determine if the ground is on the battery or the Bus.

2) 1SA-04/E-6 actuating indicates that the ground is located on __(2)__.

Which ONE of the following completes the statements above?

A. 1. isolate the battery from the Bus
   2. <u>any</u> Unit

B. 1. isolate the battery from the Bus
   2. Unit 1 ONLY

C. 1. rotate the Ground Relay Selector Switch
   2. <u>any</u> Unit

D. 1. rotate the Ground Relay Selector Switch
   2. Unit 1 ONLY

General Discussion

Answer A Discussion

First part is correct. The ARG directs isolating the battery from the bus to determine if the ground in on the battery or the bus.

Second part is correct. There is only one ground detection system. It is shared by all three units. The statalarm cannot be used to determine which unit is affected as all three units are normally cross connected.

Answer B Discussion

First part is correct. The ARG directs isolating the battery from the bus to determine if the ground in on the battery or the bus.

Second part is incorrect and plausible. The alarm test lights are on Unit 1. An operator could reasonably conclude that an alarm is Unit specific since each unit has a ground trouble Statalarm.

Answer C Discussion

First part is incorrect and plausible. Plausible as operation of this switch is addressed in the ARG however its purpose is to be used for testing of the ground lamp circuits

Second part is correct. There is only one ground detection system. It is shared by all three units. The statalarm cannot be used to determine which unit is affected as all three units are normally cross connected.

Answer D Discussion

First part is incorrect and plausible. Operation of this switch is addressed in the ARG however its purpose is to be used for testing of the ground lamp circuits.

Second part is incorrect and plausible. The alarm test lights are on Unit 1. An operator could reasonably conclude that an alarm is Unit specific since each unit has a ground trouble Statalarm.

Basis for meeting the KA

Question requires knowledge of actions contained in Alarm Response procedures for detecting grounds and impact of those actions on the plant.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 16-1 Q13

Development References

Lesson Plan EL-DCD
ARG 1SA-04/E-6 R20
ILT 16-1 Q13 (6/2016)

Student References Provided

SYS063 A2.01 - DC Electrical Distribution System

Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; 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)

Grounds ....

Remarks/Status

SYS059 A3.07 - Main Feedwater (MFW) System
Ability to monitor automatic operation of the MFW, including: (CFR: 41.7 / 45.5)
ICS ....

Given the following Unit 3 conditions:

Initial conditions:

- Reactor power = 40%
- Loop B FDW valve ΔP selected to 3B2

Current conditions:

- 3B2 Loop B FDW valve ΔP fails LOW

1) Feedwater flow will initially __(1)__.

2) AP/3/A/1700/028 (ICS Instrument Failures) will ensure BOTH __(2)__ are in HAND to stabilize the plant.

Which ONE of the following completes the statements above?

A. 1. rise
 2. FDW Masters

B. 1. rise
 2. Main FDW Pumps

C. 1. lower
 2. FDW Masters

D. 1. lower
 2. Main FDW Pumps

General Discussion

Answer A Discussion

Incorrect: 1st part is correct. As speed increases, FDW flow will increase initially.
Second part is incorrect because the MFW Pump ICS stations will still change FDW flow on this failure with the FDW Masters in Hand. It is plausible because both FDW masters are normally taken to hand during PTR.

Answer B Discussion

Correct. First part is correct. FDW pumps will increase speed when the valve dp fails low. As pump speed increases, FDW flow will increase initially.
2nd part is correct. MFW pumps have to be taken to HAND because they will still adjust FDWP speed based on the low valve dp signal even if the FDW Masters are taken to HAND.

Answer C Discussion

Incorrect. First part is incorrect because flow will initially increase due to MFW Pump speed increasing. It is plausible because the FDW control valves will decrease FDW flow after the FDW pumps initially increase flow.
Second part is incorrect because the MFW Pump ICS stations will still change FDW flow on this failure with the FDW Masters in Hand. It is plausible because both FDW masters are normally taken to hand during PTR.

Answer D Discussion

Incorrect. First part is incorrect because flow will initially increase due to MFP speed increasing. It is plausible because the FDW control valves will decrease FDW flow after the FDW pumps initially increase flow.
Second part is correct.

Basis for meeting the KA

Question requires knowledge of ICS as it relates to automatic operation of Main Feedwater on the failure of FDW valve dp.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 47 Q45

Development References

ILT 47 Q45
ICS-03 Obj. 09
AP/3/A/1700/028 R19

Student References Provided

SYS059 A3.07 - Main Feedwater (MFW) System
Ability to monitor automatic operation of the MFW, including: (CFR: 41.7 / 45.5)
ICS ....

Remarks/Status

Replaced KA per Chief Examiner on 12/01/17

SYS073 K5.03 - Process Radiation Monitoring (PRM) System
Knowledge of the operational implications as they apply to concepts as they apply to the PRM system: (CFR: 41.5 / 45.7)
Relationship between radiation intensity and exposure limits ....

Given the following plant conditions:

Time = 1200

- Spent Fuel Pool level = 0.1 foot stable

Time = 1215

- AP/1-2/A/1700/035 (Loss of SFP Cooling and/or Level) in progress
- Spent Fuel Pool level = (–)3.4 feet lowering
- 1RIA-6 (Spent Fuel Pool Area Monitor) in HIGH alarm
- 1RIA-41 (Spent Fuel Pool Building Gas) in HIGH alarm

Time = 1216

- An AO is being dispatched to the SFP area to investigate the cause
- The AO's dose for this year is 525 mrem
- The AO has NOT received a dose extension for this year

Which ONE of the following is the MAXIMUM TEDE dose (mrem) allowed for the AO while performing the assigned task?

A. 1,475

B. 4,475

C. 5,000

D. 10,000

General Discussion

Answer A Discussion

Incorrect. Plausible since this would be correct if EDL's were not in effect.

Answer B Discussion

Incorrect. Plausible since this would be correct under the misconception that the 5 rem EDL limit included normal occupational exposure for the associated year.

Answer C Discussion

Correct. 5 rem is the EDL limit for individual exposure.

The Note prior to step 4.15 in AP/35 gives criteria for excessive leakage as ≈ .1ft every 3 minutes. In the stem of the question, the calculated leak rate is .69 ft every 3 minutes. This classifies for excessive leakage at which point, AP/35 directs you to step 4.240. The note immediately after step 4.240 states that EDLs apply.

Answer D Discussion

Incorrect. Plausible since this is the limit for all activities during an EDL event and could be correct if the Shift Manager were consulted to allow exceeding the 5 Rem or if the actions were specifically to protect valuable property.

Basis for meeting the KA

Meets the KA because a process monitor is being used to determine the operational implications of exposure limits. RIA-41 is a process monitor which is indicating an increase in radiation intensity and that increase in intensity is (in part) a determining factor for what exposure limits apply. Since there is no direct relationship between radiation exposure limits and radiation intensity (e.g. dose limits are not variable based on radiation intensity), making the connection between an accident that causes increased radiation intensity which also impacts exposure limits is used to match the KA.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 48 NRC Exam Q#52

Development References

Lesson Plan EAP-TCA OBJ.
AP/1-2/A/1700/035 R19
ILT 48 Q52 (12/2015)

Student References Provided

SYS073 K5.03 - Process Radiation Monitoring (PRM) System

Knowledge of the operational implications as they apply to concepts as they apply to the PRM system: (CFR: 41.5 / 45.7)

Relationship between radiation intensity and exposure limits ....

Remarks/Status

SYS076 K4.03 - Service Water System (SWS)

Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41/7)

Automatic opening features associated with SWS isolation valves to CCW heat exchanges ....

During normal operation of the CC system…

1) CC flow through each letdown cooler is maintained at __(1)__ gpm.

2) If letdown flow were raised, CC outlet temperature on the in-service CC cooler would be maintained by __(2)__ operation of the associated LPSW valve.

Which ONE of the following completes the statements above?

A. 1. 200 gpm
   2. manual

B. 1. 400 gpm
   2. manual

C. 1. 200 gpm
   2. automatic

D. 1. 400 gpm
   2. automatic

General Discussion

Answer A Discussion

First part is correct. Both LD coolers are throttled to 200 gpm each during normal operation.

Second part is incorrect since the LPSW controller is an automatic control valve which controls at setpoint. It is plausible because the CC valves are all adjusted manually.

Answer B Discussion

First part is incorrect because the flow through each cooler is 200 gpm. It is plausible because the total flow through the LD coolers is 400 gpm. This flow is set up during system startup.

Second part is incorrect since the LPSW controller is an automatic control valve which controls at setpoint. It is plausible because the CC valves are all adjusted manually.

Answer C Discussion

First part is correct. Both LD coolers are throttled to 200 gpm each during normal operation.

Second part is correct. LPSW controller is an automatic control valve which controls at setpoint

Answer D Discussion

First part is incorrect because the flow through each cooler is 200 gpm. It is plausible because the total flow through the LD coolers is 400 gpm. This flow is set up during system startup.

Second part is correct. LPSW controller is an automatic control valve which controls at setpoint.

Basis for meeting the KA

This question matches the KA by requiring knowledge of LPSW valve (CC cooler outlet) automatically repositions (in the open direction) to maintain CC temperature.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 47 NRC Exam Q#53

Development References
Lesson Plan PNS-CC OBJ. ILT 47 Q53 (6/2015)

Student References Provided

SYS076 K4.03 - Service Water System (SWS)

Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41/7)

Automatic opening features associated with SWS isolation valves to CCW heat exchanges ....

Remarks/Status

SYS078 2.1.32 - Instrument Air System (IAS)
SYS078 GENERIC
Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

Given the following Unit 1 conditions:

- Instrument Air pressure = 100 psig lowering

1) The SETPOINT to start a Backup Instrument Air Compressor in "STD-BY 1" is __(1)__ psig.

2) The MINIMUM discharge temperature which will result in the automatic shutdown of a running Backup Instrument Air Compressor in accordance with the Limits and Precautions of OP/0/A/1106/027 (Instrument Air System) is __(2)__°F.

Which ONE of the following completes the statements above?

A. 1. 90
2. 380

B. 1. 90
2. 425

C. 1. 93
2. 380

D. 1. 93
2. 425

General Discussion

Answer A Discussion

First part is plausible because 90 psig is the setpoint for a compressor in Standby 2.

Second part is plausible since 380 degrees is where the L&Ps directs opening the RCW bypass valve to control temperature.

Answer B Discussion

First part is plausible because 90 psig is the setpoint for a compressor in Standby 2.

Second part is correct.

Answer C Discussion

First part is correct.

Second part is plausible since 380 degrees is where the L&Ps directs opening the RCW bypass valve to control temperature.

Answer D Discussion

First part is correct. IA header pressure of 93 psig is the setpoint to start a Backup IA compressor in "STD-BY 1".

Second part is correct. Limits & Precautions states that a Backup IA compressor should trip at 425°F.

Basis for meeting the KA

Requires the ability to apply the limit on compressor discharge line temperature and explain the consequences of exceeding the limit.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 40 NRC Exam Q#54

Development References

Lesson Plan SSS-IA OBJ
OP/1106/027 R120
ILT 40 Q54 (10/2011)

Student References Provided

SYS078 2.1.32 - Instrument Air System (IAS)
SYS078 GENERIC
Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

Remarks/Status

SYS103 K3.03 - Containment System

Knowledge of the effect that a loss or malfunction of the containment system will have on the following: (CFR: 41.7 / 45.6)

Loss of containment integrity under refueling operations. ....

Given the following Unit 1 conditions:

Time = 0805

- Reactor in MODE 6
- Fuel offload is in progress
- Reactor Building Normal Sump (RBNS) is being pumped
- A fuel assembly is dropped

Time = 0809

- A High Radiation Annunciator in the Control Room alarms
- The Reactor Building Normal Sump has failed to isolate
- AP/1/A/1700/009 (Spent Fuel Damage) is initiated

1) 1RIA __(1)__ in HIGH alarm should have caused the RBNS isolation.

2) If the RB Normal sump isolation valves are the last open penetrations to be closed and are closed at 0830, the criteria for isolating open penetrations per AP/09 __(2)__ been met.

Which ONE of the following completes the statements above?

A. 1. 4 (Reactor Building Entrance)
   2. has

B. 1. 49 (RB Gas)
   2. has

C. 1. 4 (Reactor Building Entrance)
   2. has NOT

D. 1. 49 (RB Gas)
   2. has NOT

General Discussion

Answer A Discussion

First part incorrect because RIA-4 in alarm will not isolate the RB Sump. It is plausible because, like RIA-49, it will cause a RB Evacuation alarm.

Second part is correct because the 30 minute criteria (as stated in a NOTE in AP 9) for isolating any open penetrations has been met.

Answer B Discussion

First part is correct. 1RIA-49 will sound the RB Evacuation alarm and isolate the RB sump.

Second part is correct because the 30 minute criteria (as stated in a NOTE in AP 9) for isolating any open penetrations has been met.

Answer C Discussion

First part incorrect because RIA-4 in alarm will not isolate the RB Sump. It is plausible because, like RIA-49, it will cause a RB Evacuation alarm.

Second part is incorrect because the 30 minute criteria stated in AP/9 for isolating open penetrations has been met. It is plausible because if it were at 0836, it would be correct.

Answer D Discussion

First part is correct. 1RIA-49 will sound the RB Evacuation alarm and isolate the RB sump.

Second part is incorrect because the 30 minute criteria stated in AP/09 for isolating open penetrations has been met. It is plausible because if it were at 0836, it would be correct.

Basis for meeting the KA

This question matches the KA by requiring knowledge of establishing containment integrity in the event of a malfunction (hi rad).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 47 NRC Exam Q#55

Development References

Lesson Plan RAD-RIA
AP/1/A/1700/009 R8
ILT 47 Q55 (6/2015)

Student References Provided

SYS103 K3.03 - Containment System

Knowledge of the effect that a loss or malfunction of the containment system will have on the following: (CFR: 41.7 / 45.6)

Loss of containment integrity under refueling operations. ....

Remarks/Status

SYS001 A1.03 - Control Rod Drive System

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CRDS controls including: (CFR: 41.5/45.5)

S/G level and pressure ....

Given the following Unit 1 conditions:

Initial conditions:

- Time = 0800
- Unit startup is in progress
- RCS temperature = 532°F stable
- RCS pressure = 2155 psig stable
- TBVs are in AUTO
- The OATC is preparing to reset the CRD breakers to pull Group 1 control rods to 50% in accordance with OP/1/A/1105/019 (Control Rod Drive System) Encl 4.1 (Resetting CRD Breakers)

Current conditions:

- Time = 0805
- Statalarm 1SA-02/B-12 (ICS Hand Power Failure) actuates

1) At Time = 0800, if the CRD breakers are reset with the TBVs in AUTO, Steam Generator pressure will __(1)__.

2) At Time = 0805, the TBVs are operable in __(2)__.

Which ONE of the following completes the statements above?

A. 1. lower
   2. AUTO only

B. 1. lower
   2. AUTO or HAND

C. 1. rise
   2. AUTO only

D. 1. rise
   2. AUTO or HAND

General Discussion

OP/1/A/1102/001 Encl 4.7 directs using OP/1/A/1105/019 to ensure Group 1 at 50%. CRDs are reset with 1105/019 Encl 4.1

Answer A Discussion

First part is correct.

Second part is incorrect and plausible since not all ICS stations are operable in manual when Hand power is lost.

Answer B Discussion

Correct. With the CRD breakers open, there is a +125 psig bias applied to the TBV control setpoint. With the TBVs in AUTO and the CRD breakers are reset, the 125 spig bias will be removed and the TBV control SG pressure at a lower value (885 pisg - 125 = 760 psig)

Answer C Discussion

First part is incorrect and plausible

Second part is incorrect and plausible since not all ICS stations are operable in manual when Hand power is lost.

Answer D Discussion

First part is incorrect and plausible

Second part is correct.

Basis for meeting the KA

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP/1/A/1102/001 rev 312
OP/1/A/1105/019 rev 029
Lesson Plan ICS-02 Obj 04
Lesson Plan AP-023 Obj 05

Student References Provided

SYS001 A1.03 - Control Rod Drive System

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CRDS controls including: (CFR: 41.5/45.5)

S/G level and pressure ....

Remarks/Status

Preview Question

NRC Feedback:
1/31/18 - OK as is.

SYS002 K4 02 - Reactor Coolant System (RCS)
Knowledge of RCS design feature(s) and/or interlock(s) which provide for the following : (CFR: 41.7)
Monitoring reactor vessel level ....

Given the following Unit 3 conditions:

Initial conditions:

- Mode 6
- Reactor Vessel head is removed
- 3LT-5A (Rx Vessel Level 3A) = 28 inches stable
- 3LT-5B (Rx Vessel Level 3B) = 28 inches stable

Current conditions:

- 3LT-5A ΔP cell diaphragm ruptures

1) 3LT-5A indication will __(1)__.

2) 3LT-5A and 3LT-5B level transmitters __(2)__ use the same cold leg tap.

Which ONE of the following completes the statements above?

A. 1. lower
   2. do

B. 1. lower
   2. do NOT

C. 1. rise
   2. do

D. 1. rise
   2. do NOT

General Discussion

Answer A Discussion

First part is correct. On the Reactor Vessel level (LT-5) DP cell, the variable leg is the high pressure side of the DP cell and the reference leg is the low pressure side of the DP cell. Since RV level is maintained above 0 inches, the higher the DP the higher the indicated level. When the diaphragm ruptures, DP goes to 0 and indicated level lowers.

Second part is correct. 3LT-5A & 3LT-5B share the same cold leg tap as the variable leg.

Answer B Discussion

First part is correct. On the Reactor Vessel level (LT-5) DP cell, the variable leg is the high pressure side of the DP cell and the reference leg is the low pressure side of the DP cell. Since RV level is maintained above 0 inches, the higher the DP the higher the indicated level. When the diaphragm ruptures, DP goes to 0 and indicated level lowers.

Second part is incorrect and plausible since Unit 1 & Unit 2 have separate cold leg taps for LT-5A & LT-5B.

Answer C Discussion

First part is incorrect and plausible since it would be correct if asking about a diaphragm rupture on the PZR level transmitter. The PZR level transmitter variable leg is the low pressure side of the DP cell and the reference leg is the high pressure side of the DP cell. If the diaphragm ruptures, DP would lower which would make indicated level rise.

Second part is correct. 3LT-5A & 3LT-5B share the same cold leg tap as the variable leg.

Answer D Discussion

First part is incorrect and plausible since it would be correct if asking about a diaphragm rupture on the PZR level transmitter. The PZR level transmitter variable leg is the low pressure side of the DP cell and the reference leg is the high pressure side of the DP cell. If the diaphragm ruptures, DP would lower which would make indicated level rise.

Second part is incorrect and plausible since Unit 1 & Unit 2 have separate cold leg taps for LT-5A & LT-5B.

Basis for meeting the KA

Question requires knowledge of design features that provide reactor vessel level indication. It further requires knowledge of the design differences between Unit 1&2 and Unit 3 reactor vessel level indications.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

Lesson Plan IC-RCI Obj 10

Student References Provided

SYS002 K4 02 - Reactor Coolant System (RCS)

Knowledge of RCS design feature(s) and/or interlock(s) which provide for the following : (CFR: 41.7)

Monitoring reactor vessel level ....

Remarks/Status

SYS015 K6.02 - Nuclear Instrumentation System (NIS)
Knowledge of the effect of a loss or malfunction on the following will have on the NIS: (CFR: 41.7 / 45.7)
Discriminator/compensation circuits ....

Given the following Unit 2 conditions:

Initial conditions:

- Mode 2
- 2NI-3 Source Range detector inoperable

Current conditions

- 2NI-2 Source Range detector gamma compensation circuit fails LOW
- 2NI-2 Source Range detector is declared inoperable

1) 2NI-2 will indicate __(1)__ than actual power.

2) Required Actions of TS 3.3.9 (Source Range Neutron Flux) __(2)__ required to be performed.

Which ONE of the following completes the statements above?

A. 1. lower
   2. are

B. 1. lower
   2. are NOT

C. 1. higher
   2. are

D. 1. higher
   2. are NOT

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because if the detector were over compensated, it would be correct.

Second part is incorrect. Plausible because two power range detectors OOS in Mode 2 would require TS required actions to be performed.

Answer B Discussion

Incorrect: First part is incorrect. Plausible because if the detector were over compensated, it would be correct.

Second part is correct. TS 3.3.9 LCO requires two SR Nis to be operable in Modes 2 - 5. 2NI-1 and 2NI-4 are operable.

Answer C Discussion

Incorrect: First part is correct. If the detector gamma compensation circuit is lost, the indication will be higher than actual due to decay gammas which are not proportional to reactor power in the source range.

Second part is incorrect. Plausible because two power range detectors OOS in Mode 2 would require TS required actions to be performed.

Answer D Discussion

Correct. First part is correct. If the detector gamma compensation circuit is lost, the indication will be higher than actual due to decay gammas which are not proportional to reactor power in the source range.

Second part is correct. TS 3.3.9 LCO requires two SR Nis to be operable in Modes 2 - 5. 2NI-1 and 2NI-4 are operable.

Basis for meeting the KA

Question requires knowledge of the effect on NIs (2NI-2 SR) of a failure of the gamma compensation circuit.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

IC-NI Obj. 09
TS 3.3.9 Amend. 300 300 300

Student References Provided

SYS015 K6.02 - Nuclear Instrumentation System (NIS)
Knowledge of the effect of a loss or malfunction on the following will have on the NIS: (CFR: 41.7 / 45.7)
Discriminator/compensation circuits ....

Remarks/Status

SYS011 K2.01 - Pressurizer Level Control System (PZR LCS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Charging pumps ....

Which ONE of the following sets of pumps are powered from 3TD?

A. 1. 3B HPI pump
   2. 3A MD EFDW pump

B. 1. 3C HPI pump
   2. 3A MD EFDW pump

C. 1. 3B HPI pump
   2. 3B MD EFDW pump

D. 1. 3C HPI pump
   2. 3B MD EFDW pump

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because 3B LPI pump is powered from 3TD.
Second part is correct.

Answer B Discussion

Correct: 3C HPI pump and 3A MDEFDW pump are powered from 3TD.

Answer C Discussion

Incorrect: First part is incorrect. Plausible because 3B LPI pump is powered from 3TD.
Second part is incorrect. Plausible because 3B LPI pump, 3B RBS pump, and B LPSW pump are all powered from 3TD.

Answer D Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible because 3B LPI pump, 3B RBS pump, and B LPSW pump are all powered from 3TD.

Basis for meeting the KA

Question requires knowledge of the bus power supplies for charging (HPI) pumps.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 46 Q31

Development References

ILT 46 Q31
IC-ES Obj. 28

Student References Provided

SYS011 K2.01 - Pressurizer Level Control System (PZR LCS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Charging pumps ....

Remarks/Status

Replaced KA per Chief Examiner on 12/01/17

SYS029 K3.01 - Containment Purge System (CPS)
Knowledge of the effect that a loss or malfunction of the Containment Purge System will have on the following: (CFR: 41.7 / 45.6)
Containment parameters ....

Given the following Unit 2 conditions:

- Unit is in MODE 6
- Fuel Transfer Canal is full
- RB Equipment Hatch is closed
- 2SF-1 and 2SF-2 are open
- RB Purge is in operation

1) __(1)__ will trip the Main Purge Fan.

2) If the RB Main Purge fan trips, Fuel Transfer Canal level will __(2)__.

Which ONE of the following completes the statements above?

A. 1. 2PR-3 traveling closed
   2. lower

B. 1. Suction piping vacuum = 14 inches H2O
   2. lower

C. 1. 2PR-3 traveling closed
   2. rise

D. 1. Suction piping vacuum = 14 inches H2O
   2. rise

General Discussion

Answer A Discussion

Correct: First part is correct. 2PR-3 traveling closed is an interlock that will trip the Main Purge Fan.

Second part is correct. When the RB purge fan trips, RB pressure would begin to rise which would "push" some of the water to the SFP since SF-1 & SF-2 are open which would cause SFP level to rise.

Answer B Discussion

Incorrect. First part is incorrect. Plausible because if suction piping vacuum were < 9 inches H2O, it would be correct. Also plausible since condenser vacuum of 14 inches hg would trip the Main Turbine and FDW pumps.

Second part is correct. When the RB purge fan trips, RB pressure would begin to rise which would "push" some of the water to the SFP since SF-1 & SF-2 are open which would cause SFP level to rise.

Answer C Discussion

Incorrect. First part is correct. 2PR-3 traveling closed is an interlock that will trip the Main Purge Fan.

Second part is incorrect and plausible since it would be correct for the SFP.

Answer D Discussion

Incorrect. First part is incorrect. Plausible because if suction piping vacuum were < 9 inches H2O, it would be correct. Also plausible since condenser vacuum of 14 inches hg would trip the Main Turbine and FDW pumps.

Second part is incorrect and plausible since it would be correct for the SFP.

Basis for meeting the KA

Question requires knowledge of the affect of the loss of the RB Purge Fan on containment pressure and the resultant affect on Fuel Transfer Canal level.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2009B NRC Exam Q#62

Development References

Lesson Plan PNS-RBP OBJ. 08
OP/2/A/1102/014 Rev 45
2009B Q62

Student References Provided

SYS029 K3.01 - Containment Purge System (CPS)
Knowledge of the effect that a loss or malfunction of the Containment Purge System will have on the following: (CFR: 41.7 / 45.6)
Containment parameters ....

Remarks/Status

SYS033 2.4.8 - Spent Fuel Pool Cooling System (SFPCS)
SYS033 GENERIC
Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)

Given the following plant conditions:

- A total loss of power has occurred on both Unit 1 and Unit 2
- Unit 1 and Unit 2 EOP Blackout tabs are in progress
- Unit 2 EOP Enclosure 5.44 (Parallel Actions for SBO) is initiated
- Unit 2 EOP Enclosure 5.44 directs initiating AP/1-2/A/1700/035 (Loss of SFP Cooling and/or Level) Enclosure 5.14 (SFP Temperature and Level Monitoring)

1) AP/1-2/A/1700/035 __(1)__ required to be entered prior to initiating AP/35 Enclosure 5.14.

2) Unit 1&2 Spent Fuel Pool level indication __(2)__ be available in the control room prior to restoring power to the MFBs.

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

Answer A Discussion

First part is incorrect and plausible since almost any other time, an AP is required to be entered prior to performing any part of the AP.

Second part is correct. Per the Note at step 6 in AP/35 Encl 5.14, SFP wide range level indicators are backed up by battery power and will operatate during a blackout.

Answer B Discussion

First part is incorrect and plausible since almost any other time, an AP is required to be entered prior to performing any part of the AP.

Second part is incorrect and plausible since many other indicators are lost during a total loss of power.

Answer C Discussion

First part is correct. Per a Note in the Blackout tab, it is permissible to perform AP/35 Encl 5.14 without meeting the Entry Conditions. Also, a note at step 1 in AP/35 Encl 5.14 states that other procedures direct performance of the enclosure in order to increase monitoring of the SFP and it is permissible for the enclosure to be run without meeting the Entry Conditions of the AP.

Second part is correct. Per the Note at step 6 in AP/35 Encl 5.14, SFP wide range level indicators are backed up by battery power and will operatate during a blackout.

Answer D Discussion

First part is correct. Per a Note in the Blackout tab, it is permissible to perform AP/35 Encl 5.14 without meeting the Entry Conditions. Also, a note at step 1 in AP/35 Encl 5.14 states that other procedures direct performance of the enclosure in order to increase monitoring of the SFP and it is permissible for the enclosure to be run without meeting the Entry Conditions of the AP.

Second part is incorrect and plausible since many other indicators are lost during a total loss of power.

Basis for meeting the KA

Questions requires knowledge of how AP/35 Encl 5.14 is used in conjuction with the EOP Blackout tab without the requirement to actually enter AP/35.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

U2 EOP Blackout tab R5
U2 EOP Enclosure 5.44 R5
AP/1-2/A/1700/035 rev 19

Student References Provided

SYS033 2.4.8 - Spent Fuel Pool Cooling System (SFPCS)
SYS033 GENERIC
Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

SYS056 A2.04 - Condensate System

Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; 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)

Loss of condensate pumps ....

Given the following Unit 1 conditions:

Time = 1200:00

- Reactor power = 80% stable
- 1A and 1B CBPs are operating

Time = 1201:00

- 1A CBP trips
- Feedwater Pump suction pressure = 225 psig slowly lowering

Time = 1203:00

- Feedwater Pump suction pressure = 220 slowly rising

1) The runback rate (%/min) that ICS will use at Time = 1201:00 is __(1)__.

2) The procedure that will be directed by the CRS at Time = 1203:00 is __(2)__.

Which ONE of the following completes the statements above?

A. 1. 15
   2. EOP

B. 1. 15
   2. AP/1/A/1700/001 (Unit Runback)

C. 1. 20
   2. EOP

D. 1. 20
   2. AP/1/A/1700/001 (Unit Runback)

General Discussion

Answer A Discussion

First part is incorrect because the rate would be 20%/min. It is plausible since there are ICS runbacks that incorporate the 15%/min runback rate.

Second part is correct. After 90 seconds, if FDWP suction pressure is still < 235 psig the FDWP's will trip which will trip the Rx and require entry into the EOP to mitigate the loss of main feedwater.

Answer B Discussion

First part is incorrect because the rate would be 20%/min. It is plausible since there are ICS runbacks that incorporate the 15%/min runback rate.

Second part is incorrect because after 90 seconds, if FDWP suction pressure is still < 235 psig the FDWP's will trip which will trip the Rx and require entry into the EOP to mitigate the loss of main feedwater. It is plausible because if suction pressure returned before 90 seconds, it would be correct.

Answer C Discussion

Correct. With FDWP suction pressure < 235 psig, an ICS runback is initiated. The runback rate is 20%/min to a power level of 15% or until the low suction pressure clears.

After 90 seconds, if FDWP suction pressure is still < 235 psig the FDWPs will trip which will trip the Rx and require entry into the EOP to mitigate the loss of main feedwater.

Answer D Discussion

First part is correct. With FDWP suction pressure < 235 psig, an ICS runback is initiated. The runback rate is 20%/min to a power level of 15% or until the low suction pressure clears.

Second part is incorrect because after 90 seconds, if FDWP suction pressure is still < 235 psig the FDWPs will trip which will trip the Rx and require entry into the EOP to mitigate the loss of main feedwater. It is plausible because if suction pressure returned before 90 seconds, it would be correct.

Basis for meeting the KA

Requires knowledge of the impact of a loss of Condensate Booster Pump and knowledge of the procedure that will be used to mitigate the event.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 47 NRC Exam Q#61

Development References

Lesson Plan STG-ICS Chapter 2
Lesson Plan CF-FDW
ILT 47 Q61 (6/2015)

Student References Provided

SYS056 A2.04 - Condensate System

Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; 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)

Loss of condensate pumps ....

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 63** 63 **D**

SYS072 A3.01 - Area Radiation Monitoring (ARM) System
Ability to monitor automatic operation of the ARM system, including: (CFR: 41.7 / 45.5)
Changes in ventilation alignment ....

Given the following Unit 1 conditions:

- MODE 5
- RB Purge in progress
- RB airborne activity rising

1) 1SA-8/D-9 (RM Reactor BLDG Purge Disch RAD Inhibit) will FIRST actuate when 1RIA-45 reaches the __(1)__ setpoint.

2) When 1SA-8/D-9 actuates, 1PR- __(2)__ will close.

Which ONE of the following completes the statement above?

A. 1. ALERT
   2. 1 through 6

B. 1. ALERT
   2. 2 through 5 ONLY

C. 1. HIGH
   2. 1 through 6

D. 1. HIGH
   2. 2 through 5 ONLY

ILT 18-1 ONS SRO NRC Examination **QUESTION 63** 63 **D**

General Discussion

Answer A Discussion

Incorrect. First part is incorrect. Plausible because it is correct for statalarm 1SA-8/B-9 (RM Process Monitor Radiation High).
Second part is incorrect because 1PR-1 and 1PR-6 do not close when the alarm is received. It is plausible because 1PR-1 through 1PR-6 do isolate on an ES channel 1&2 signal

Answer B Discussion

Incorrect. First part is incorrect. Plausible because it is correct for statalarm 1SA-8/B-9 (RM Process Monitor Radiation High).
Second part is correct. 1RIA-45 will only cause 1PR-2 through 1PR-5 to isolate.

Answer C Discussion

Incorrect. First part correct.
Second part is incorrect because 1PR-1 and 1PR-6 do not close when the alarm is received. It is plausible because 1PR-1 through 1PR-6 do isolate on an ES channel 1&2 signal.

Answer D Discussion

Correct. First part is correct. Statalarm 1SA-8/D-9 will actuate when 1RIA-45 reaches the HIGH alarm setpoint.
Second part is correct. 1RIA-45 will only cause valves 1PR-2 through 1PR-5 to close.

Basis for meeting the KA

Requires knowledge of automatic operation of RB Purge system ventilation alignment with increasing activity in the RB.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 16-2 Q50

Development References

Lesson Plan RAD-RIA OBJ 08
ILT 16-2 Q50 (12/2016)

Student References Provided

SYS072 A3.01 - Area Radiation Monitoring (ARM) System
Ability to monitor automatic operation of the ARM system, including: (CFR: 41.7 / 45.5)
Changes in ventilation alignment ....

Remarks/Status

Per Chief Examiner on 11/06/2017, use Process Radiation Monitor instead of Area Radiation Monitor since ONS does not have an Area monitor that affects operation of ventilation equipment.

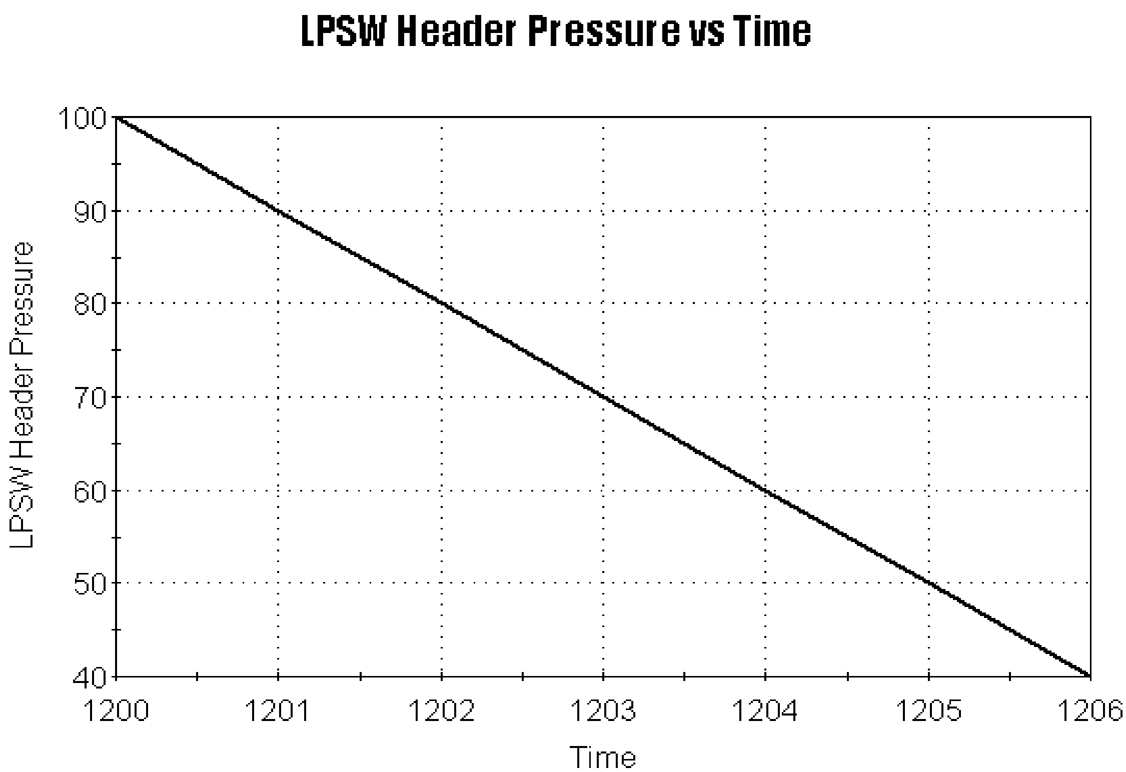
SYS075 A4.01 - Circulating Water System

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

Emergency/essential SWS pumps ....

Given the following Unit 3 conditions:

- 3A LPSW pump operating
- 3B LPSW pump in AUTO
- Unit 3 LPSW system transient occurs



The EARLIEST time that LPSW header pressure will start the timer for the Standby LPSW pump auto start circuit is _____.

Which ONE of the following completes the statement above?

A. 1205

B. 1204

C. 1203

D. 1201

General Discussion

Answer A Discussion

Incorrect. Plausible since 50 psig is the setpoint for the LPSW pump low discharge pressure light in the control room to illuminate.

Answer B Discussion

Incorrect. Plausible since 10 seconds after header pressure reaches 70 psig, the S/B LPSWP would start. The pump would start at 1203:10 therefore 1204 would be the earliest choice available that both pumps would be running.

Answer C Discussion

Correct. The Standby LPSW pump starts with low header pressure (</= 70psig) for ≥ 10 seconds (Time = 1203)

Answer D Discussion

Incorrect. Plausible since the HPSW header pressure low alarm actuates at 95 psig. Time = 1201 is the earliest choice available to be below 95 psig.

Basis for meeting the KA

Question requires knowledge of the LPSW pump auto start circuit.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 2009B Q65

Development References

ILT 2009B Q65 (10/2010)
Lesson Plan SSS-LPW

Student References Provided

SYS075 A4.01 - Circulating Water System

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

Emergency/essential SWS pumps ....

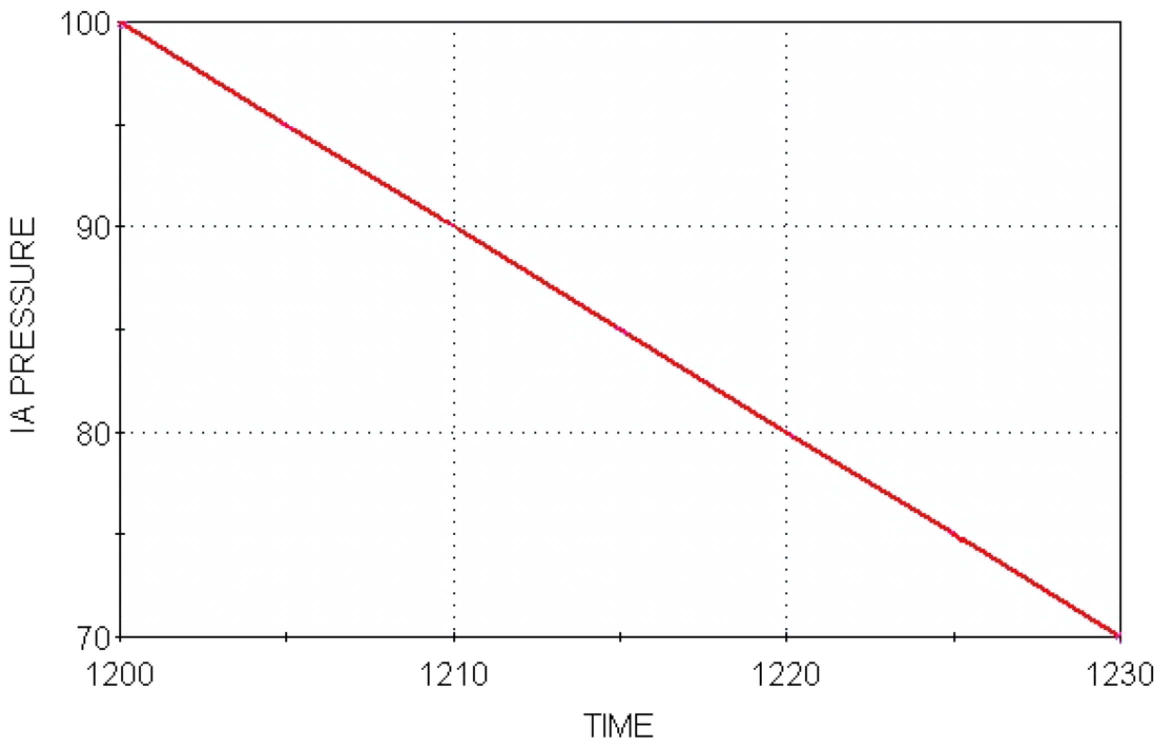
Remarks/Status

SYS079 K1.01 - Station Air System (SAS)

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

IAS ....

IA Pressure vs. Time



Based on the graph above, which ONE of the following describes the EARLIEST time at which Service Air System will automatically supply the Instrument Air System?

A. 1215

B. 1212

C. 1210

D. 1207

General Discussion

Answer A Discussion

Correct. SA to IA Controller (SA-141) valve senses the IA system pressure and opens at 85 psig to allow service air into the IA system.

Answer B Discussion

Incorrect: Plausible sine 88 psig is the pressure at which the AIA compressors will start.

Answer C Discussion

Incorrect: Plausible since 90 psig is the pressure at which the Diesel Air Compressors will start.

Answer D Discussion

Incorrect: Plausible since 93 psig is the pressure at which the Backup IA compressors will start.

Basis for meeting the KA

Requires knowledge of the setpoint where the Service Air System will automatically backup / supply the Instrument Air System.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 16-1 Q64

Development References

ILT 16-1 Q64 (6/2016)
SSS-IA Obj. 39
Lesson Plan AP-22
AP/1/A/1700/022 R29

Student References Provided

SYS079 K1.01 - Station Air System (SAS)

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

IAS ....

Remarks/Status

GEN2.1 2.1.4 - GENERIC - Conduct of Operations

Conduct of Operations

Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. (CFR: 41.10 / 43.2)

Given the following Unit 1 conditions:

Initial conditions:

- Date = 06/01
- Time = 0700
- A newly licensed RO is working under the direction of an RO with an active license

Current conditions:

- Date = 6/01
- Time = 1600
- The newly licensed RO has just completed a plant tour that lasted 4 hours with an SRO that has an active license

1) A newly Licensed RO must complete a MINIMUM of __(1)__ hours of shift functions under the direction of an Active Licensed RO before independently performing Licensed RO duties.

2) The plant tour that was completed at 1600 __(2)__ be counted towards the minimum required time stated above.

Which ONE of the following completes the statements above?

A. 1. 40
   2. can

B. 1. 40
   2. can NOT

C. 1. 60
   2. can

D. 1. 60
   2. can NOT

General Discussion

Answer A Discussion

Correct. A newly licensed operator must complete a minimum of 40 hours of shift functions (parallel time) under the direction of an operator in the position to which the individual will be assigned. The 40 hours must have included a complete tour of the plant and all required shift turnover procedures.

Answer B Discussion

First part is correct.

Second part is incorrect and plausible since performing a plant tour is not performing functions inside the control room. Also, if an RO is outside the control room with an SRO, he/she is not under the direction of an RO performing duties.

Answer C Discussion

First part is incorrect and plausible since to maintain an Active RO License, the licensee must perform the functions of an RO for a minimum of five 12 hour shifts (60 hours) per calendar quarter.

Second part is correct.

Answer D Discussion

First part is incorrect and plausible since to maintain an Active RO License, the licensee must perform the functions of an RO for a minimum of five 12 hour shifts (60 hours) per calendar quarter.

Second part is incorrect and plausible since performing a plant tour is not performing functions inside the control room. Also, if an RO is outside the control room with an SRO, he/she is not under the direction of an RO performing duties.

Basis for meeting the KA

Question requires knowledge of the requirements to activate an RO license and what can be counted towards the minimum required time.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References

NSD 512 R7
OMP 1-12 R29

Student References Provided

GEN2.1 2.1.4 - GENERIC - Conduct of Operations

Conduct of Operations

Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, “no-solo” operation, maintenance of active license status, 10CFR55, etc. (CFR: 41.10 / 43.2)

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 67** 67 **C**

GEN2.1 2.1.40 - GENERIC - Conduct of Operations
Conduct of Operations
Knowledge of refueling administrative requirements. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 1 conditions:

- Reactor in MODE 6
- RB Purge in progress
- Defueling in progress
- SF Cooling aligned in refueling mode

In accordance with MP/0/A/1500/009 (Defueling/Refueling Procedure), which ONE of the following would require immediate suspension of fuel handling?

A. 1RIA-49 fails LOW

B. “B” SFP Cooling pump trips

C. Spent Fuel Pool level is (–) 2.7 feet lowering

D. It is discovered that the Emergency air lock doors are open and a temporary cover has been installed

---

General Discussion

Answer A Discussion

Incorrect and plausible because 1RIA-49 does monitor RB atmosphere and if it were 1RIA-45 it would be correct. 1RIA-45 is required to terminate the RB purge.

Answer B Discussion

Incorrect. While the "B" SFP will be operating in the refueling alignment, its loss does not require stopping fuel movement.

Answer C Discussion

Correct. Fuel handling must be stopped if SFP/Transfer canal level is less than 1 foot.

Answer D Discussion

Incorrect and plausible because it would be correct if a cover were not in place.

Basis for meeting the KA

Question requires knowledge of administrative requirements for stopping fuel movement.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 42 NRC Exam Q#67

Development References

Lesson Plan FH-FHS
TS 3.9.3 Amend 338 339 339
MP/0/A/1500/009 R70
ILT 42 Q67 (12/2012)

Student References Provided

GEN2.1 2.1.40 - GENERIC - Conduct of Operations
Conduct of Operations
Knowledge of refueling administrative requirements. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

GEN2.1 2.1.43 - GENERIC - Conduct of Operations

Conduct of Operations

Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc. (CFR: 41.10 / 43.6 / 45.6)

Given the following Unit 3 conditions:

An Estimated Critical Position (ECP) is calculated for Unit 3 in accordance with PT/3/A/1103/015 (Reactivity Balance Procedure) with the following conditions:

- 400 EFPD
- RCS temperature = 535°F
- RCS boron concentration = 200 ppm
- Xenon/Samarium concentration = (–) 1.47% Δk/k
- Estimated Critical Position (ECP) is calculated to be CRD Group 7 at 30% withdrawn

Which ONE of the following changes to the ECP calculation data will result in an ECP of CRD Group 7 being GREATER THAN 30% withdrawn?

A. 395 EFPD

B. 537°F RCS Temperature

C. 190 ppm RCS boron concentration

D. (–) 1.26% Δk/k Xenon/Samarium concentration

General Discussion

Potentially add 2nd part?
Separate verification of ECP must be performed by a __(2)__.
Answer = Qualified Rx ENG

Distractor would be Licensed Operator since for a SDM calculation, separate verification can be performed by Licensed Operator or Qualified Rx ENG

Answer A Discussion

Incorrect. A lower EFPD increases core excess reactivity which would require group 7 to be inserted to compensate.

Answer B Discussion

Correct. Rasing RCS temperature will add negative reactivity which would require group 7 to be positioned at > 30% to compensate for the reactivity change.

Answer C Discussion

Incorrect. Lowering boron concentration will add positive reactivity which would require group 7 to be inserted to compensate for the reactivty change.

Answer D Discussion

Incorrect. Lowering Xenon/Samarium concentration would add positive reactivity which would require group 7 to be inserted to compensate for the reactivity change.

Basis for meeting the KA

Question requires the knowledge of the effect of various plant parameters on reactivity and how this would effect an ECP calculation (specifically RCS temperature and fuel depletion).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 41 NRC Exam Q#94

Development References

PT/3/A/1103/015 rev 075
ILT 41 Q94 (6/2012)

Student References Provided

GEN2.1 2.1.43 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to use procedures to determine the effects on reactivity of plant changes, such as reactor coolant system temperature, secondary plant, fuel depletion, etc. (CFR: 41.10 / 43.6 / 45.6)

Remarks/Status

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 2 conditions:

- Shutdown for refueling outage
- Condensate system is shutdown

In accordance with OMP 1-02 (Rules of Practice) and AD-EG-ALL-1132 (Preparation and Control of Design Change Engineering Changes):

1) Temporary hoses and fittings attached to the Condensate system for the purpose of draining __(1)__ required to follow the Temporary Design Change process.

2) Operations __(2)__ responsible for maintaining a log of Temporary Design Changes installed in the plant.

Which ONE of the following completes the statements above?

A. 1. are
   2. is

B. 1. are NOT
   2. is

C. 1. are
   2. is NOT

D. 1. are NOT
   2. is NOT

General Discussion

Answer A Discussion

Incorrect. First part is incorrect. Plausible because the temporary design change process could be required to be followed if attaching to an operating system.

Second part is correct.

Answer B Discussion

Correct. Per OMP 1-02 (Rules of Practice), hoses and fittings may be attached to shutdown systems without following the temporary design change process.
Per AD-EG-ALL-1132, Operations is responsible for maintaining a log of temporary design changes installed in the plant.

Answer C Discussion

Incorrect. First part is incorrect. Plausible because the temporary design change process could be required to be followed if attaching to an operating system.

Second part is incorrect and plausible since the process is "owned" by engineering.

Answer D Discussion

First part is correct.

Second part is incorrect and plausible since the process is "owned" by engineering.

Basis for meeting the KA

The question requires knowledge of the process for controlling Temporary Design Changes.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 42 NRC Exam Q#95

Development References

AD-EG-ALL-1132 R9
ILT 42 Q95 (12/2012)
OMP 1-02 Rev. 90

Student References Provided

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

GEN2.2 2.2.38 - GENERIC - Equipment Control
Equipment Control
Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)

Given the following Unit 2 conditions:

- Unit in MODE 3
- Unit shutdown in progress
- Containment declared NOT operable

1) The Tech Spec Completion Time provided to restore containment to OPERABLE in accordance with Tech Spec 3.6.1 (Containment) is __(1)__.

2) the HIGHER RCS temperature that would result in being in MODE 4 is __(2)__ºF.

A. 1. one hour
   2. 195

B. 1. immediately
   2. 195

C. 1. one hour
   2. 245

D. 1. immediately
   2. 245

General Discussion

Answer A Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible since it would be correct regarding MODE 5 entry.

Answer B Discussion

Incorrect. First part is incorrect. Immediately is a plausible completion time since the TS definition of "Immediately" as a completion time does not require the act be completed immediately, only actions taken to begin completing the act are to be initiated immediately. Additionally, this completion time is a common completion time used throughout Tech Specs.
Second part is plausible since it would be correct regarding MODE 5 entry.

Answer C Discussion

Correct. TS 3.6.1 provides 1 hour to restore containment to operable and MODE 4 entry occurs at 250 degrees lowering.

Answer D Discussion

Incorrect. First part is incorrect. Immediately is a plausible completion time since the TS definition of "Immediately" as a completion time does not require the act be completed immediately, only actions taken to begin completing the act are to be initiated immediately. Additionally, this completion time is a common completion time used throughout Tech Specs.
Second part is correct.

Basis for meeting the KA

Requires knowledge of limitations in the facility license (Tech Specs) regarding time allowed to restore Containment to Operable prior to requiring additional compensatory actions.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 2009B Q23

Development References

ILT 2009B Q23 (10/2010)
ADM-TSSC Obj. 02 and 03
ADM-ITS Intro Obj. 03
TS Definitions Amend 366 368 367

Student References Provided

GEN2.2 2.2.38 - GENERIC - Equipment Control
Equipment Control
Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)

Remarks/Status

KA replaced per Chief Examiner on 12/01/17

GEN2.2 2.2.4 - GENERIC - Equipment Control

Equipment Control

(multi-unit license) Ability to explain the variations in control board/control room layouts, systems, instrumentation, and procedural actions between units at a facility. (CFR: 41.6 / 41.7 / 41.10 / 45.1 / 45.13)

Given the following Unit 3 conditions:

- Unit is in MODE 4
- Placing LPI in service for cooldown

1) 3LP-11 and 3LP-13 (3A/3B LPI Cooler Inlet) are __(1)__ valves.

2) The LPI Decay Heat Removal Mode that will be procedurally aligned for LPI cooling is __(2)__.

Which ONE of the following completes the statements above?

A. 1. manual
   2. High Pressure

B. 1. electric
   2. High Pressure

C. 1. manual
   2. Normal Decay Removal

D. 1. electric
   2. Normal Decay Removal

General Discussion

Answer A Discussion

First part is correct. 3LP-11 and 13 are manual valves.
Second part is incorrect. Plausible because if it were on Units 1 and 2, it would be correct

Answer B Discussion

First part is incorrect. Plausible because if were on Units 1 and 2, it would be correct.
Second part is incorrect. Plausible because if it were on Units 1 and 2, it would be correct

Answer C Discussion

First part is correct. 3LP-11 and 13 are manual valves. The same valves on Units 1 and 2 are electric.
Second part is correct. Unit 3 LPI coolers are able to withstand the combined pressure of the RCS and the LPI pumps. There is no Switchover Mode, High Pressure Mode, or Series Mode involved with the Unit 3 LPI System. When LPI is initially aligned for cooldown on Unit 3, the system is aligned in the Normal Decay Heat Removal Mode.

Answer D Discussion

First part is incorrect. Plausible because if were on Units 1 and 2, it would be correct.
Second part is correct.

Basis for meeting the KA

Question requires knowledge of LPI differences between Unit 1&2 and Unit 3 which includes procedural actions taken when placing LPI in service during plant shutdown.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 16-1 NRC Exam Q#70

Development References

Lesson Plan PNS-LPI OBJ. 06, 07, 10
ILT 16-1 Q70 (6/2016)

Student References Provided

GEN2.2 2.2.4 - GENERIC - Equipment Control
Equipment Control
(multi-unit license) Ability to explain the variations in control board/control room layouts, systems, instrumentation, and procedural actions between units at a facility. (CFR: 41.6 / 41.7 / 41.10 / 45.1 / 45.13)

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 72** 72 **B**

GEN2.3 2.3.13 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)

Given the following Unit 1 conditions:

- 'A' GWD tank release in progress
- 1RIA-37 HIGH alarm actuates
- Statalarm 1SA-8/B-9 (Process Monitor Radiation High) actuates

Which ONE of the following describes the:

1) automatic actions that will occur?

2) procedure that contains actions that must be performed prior to re-initiating the release?

A. 1. Closes the GWD tank outlet valves, isolates the Waste Gas Exhauster, AND trips running GWD compressors

2. OP/1-2/A/1104/018 (GWD System) ONLY

B. 1. Closes the GWD tank outlet valves and isolates the Waste Gas Exhauster, but does NOT trip the running GWD compressors

2. OP/1-2/A/1104/018 (GWD System) ONLY

C. 1. Closes the GWD tank outlet valves, isolates the Waste Gas Exhauster, AND trips running GWD compressors

2. AP/18 (Abnormal Release of Radioactivity) and OP/1-2/A/1104/018 (GWD System) ONLY

D. 1. Closes the GWD tank outlet valves and isolates the Waste Gas Exhauster, but does NOT trip the running GWD compressors

2. AP/18 (Abnormal Release of Radioactivity) and OP/1-2/A/1104/018 (GWD System) ONLY

General Discussion

Answer A Discussion

Incorrect. First part is incorrect. Plausible since a HIGH alarm from RIA-37 will close all of the GWD tank outlet valves and isolate the Waste Gas Exhauster. Tripping the GWD compressors is also plausible under the misconception that it is the GWD compressors that are providing the driving force for the tank release.

Second part is correct.

Answer B Discussion

Correct: First part is correct. A HIGH alarm from RIA-37 will close all of the GWD tank outlet valves and isolate the Waste Gas Exhauster, however it will not trip the running GWD compressors.

Second part is correct. The associated ARG will direct going to OP/1-2/A/1104/018 (GWD System) to provide additional guidance on what to do with the release that has now been terminated. The entry conditions for AP/18 are not met.

Answer C Discussion

Incorrect. First part is incorrect. Plausible since a HIGH alarm from RIA-37 will close all of the GWD tank outlet valves and isolate the Waste Gas Exhauster. Tripping the GWD compressors is also plausible under the misconception that it is the GWD compressors that are providing the driving force for the tank release.

Second part is incorrect. Plausible since for both RIA-54 (Turbine Building Sump) and RIA-45 (RB Purge), there are actions in AP/18 that must be performed prior to going to the associated Operating Procedure to take actions to resume the release.

Answer D Discussion

Incorrect. First part is correct.

Second part is incorrect. Plausible since for both RIA-54 (Turbine Building Sump) and RIA-45 (RB Purge), there are actions in AP/18 that must be performed prior to going to the associated OP to take actions to resume the release.

Basis for meeting the KA

Requires knowledge of the Alarm Response Guide procedure for the "Process Monitor Radiation High" statalarm.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 40 NRC Exam Q#73

Development References

Lesson Plan RAD-RIA
Statalarm 1SA-8/B-9 R37
ILT 40 Q73 (10/2011)

Student References Provided

GEN2.3 2.3.13 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)

Remarks/Status

GEN2.3 2.3.5 - GENERIC - Radiation Control

Radiation Control

Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.11 / 41.12 / 43.4 / 45.9)

When the Switchover Acceptance Range Setpoint is reached, 1RIA-49 will read __(1)__ and 1RIA-49A will provide __(2)__.

Which ONE of the following completes the statement above?

A. 1. zero
   2. <u>only</u> alarm and RB radiation level indication

B. 1. zero
   2. the same interlock functions that RIA-49 performs

C. 1. offscale high
   2. <u>only</u> alarm and RB radiation level indication

D. 1. offscale high
   2. the same interlock functions that RIA-49 performs

General Discussion

Answer A Discussion

First part is correct.

Second part is incorrect. RIA-49A will provide same interlock functions as RIA-49.

Answer B Discussion

Correct. RIA-49 will read zero and RIA-49A will provide the same interlock functions as RIA-49 (which would include closing LWD-2 & sounding the RB evacuation alarm).

Answer C Discussion

First part is incorrect and plausible in that student could have a misconception and believe that RIA-49 stays off-scale high (RIA-49 will read zero).

Second part is incorrect. RIA-49A will provide the same interlock functions as RIA-49 (which would include closing LWD-2 & sounding the RB evacuation alarm).

Answer D Discussion

First part is incorrect and plausible in that student could have a misconception and believe that RIA-49 stays off-scale high (RIA- 49 will read zero). The student could have a misconception and believe that RIA-49 stays off-scale high.

Second part is correct.

Basis for meeting the KA

Question requires ability to understand a fixed radiation monitor and its alarm. The ability to determine what RIA-49 will indicate and whether RIA-49A will perform the interlocks.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	ILT 43 NRC Exam Q#72

Development References	Student References Provided
Lesson Plan RAD-RIA ILT 43 Q72 (6/2013)	

GEN2.3 2.3.5 - GENERIC - Radiation Control

Radiation Control

Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.11 / 41.12 / 43.4 / 45.9)

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 74** 74 **D**

GEN2.4 2.4.14 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of general guidelines for EOP usage. (CFR: 41.10 / 45.13)

Given the following Unit 1 conditions:

Time = 0400

- Reactor power = 100%

Time = 0405

- 1TA lockout occurs
- Reactor power = 90% lowering
- ONLY <u>one</u> RO is currently in the Unit 1 horseshoe area

1) At Time = 0405, the RO will be directed to perform __(1)__.

2) When initiated, Rule 1 __(2)__ direct tripping the Main Turbine.

Which ONE of the following completes the statements above?

A. 1. Rule 1
   2. will

B. 1. Rule 1
   2. will NOT

C. 1. Immediate Manual Actions
   2. will

D. 1. Immediate Manual Actions
   2. will NOT

General Discussion

Answer A Discussion

First part is incorrect and plausible since Rule 1 is the highest priority Rule. Only IMAs have a higher priority.

Second part is incorrect and plausible since the Main Turbine is directed to be tripped by Rule 1 if Main Feedwater is not feeding the SGs.

Answer B Discussion

First part is incorrect and plausible since Rule 1 is the highest priority Rule. Only IMAs have a higher priority.

Second part is correct.

Answer C Discussion

First part is correct.

Second part is incorrect and plausible since the Main Turbine is directed to be tripped by Rule 1 if Main Feedwater is not feeding the SGs.

Answer D Discussion

Correct. In accordance with OMP 1-18, Immediate Manual Actions take priority over all other actions. In accordance with Rule 1, if Main Feedwater is feeding the SGs the Main turbine is NOT tripped.

Basis for meeting the KA

A general guideline applicable at all times in accordance with OMP 1-18 is that Immediate Manual Actions always take priority over any other actions. Knowledge of this requirement meets the KA.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	ILT 45 NRC Exam Q#9

Development References

Lesson Plan EAP-UNPP
Lesson Plan ADM-OMP
OMP 1-18 R41
Rule 1 R1
ILT 45 Q9 (6/2014)

Student References Provided

GEN2.4 2.4.14 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of general guidelines for EOP usage. (CFR: 41.10 / 45.13)

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 75** 75 **C**

GEN2.4 2.4.27 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of "fire in the plant" procedures. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 1 conditions:

- Reactor power = 100%
- A Fire has been identified in the Reactor Building
- AP/0/A/1700/043 (Fire Brigade Response Procedure) is in progress

In accordance with AP/43…

1) a "Challenging Fire" is defined as __(1)__.

2) a method used to dispatch the full Fire Brigade is __(2)__.

Which ONE of the following completes the statements above?

A. 1. a fire in the plant that is NOT extinguished within 15 minutes of Control Room notification
   2. using the plant paging system

B. 1. a fire in the plant that is NOT extinguished within 15 minutes of Control Room notification
   2. having Security dispatch fire brigade

C. 1. a fire that is burning cables (bundles/ trays which have the potential to affect additional equipment)
   2. using the plant paging system

D. 1. a fire that is burning cables (bundles/ trays which have the potential to affect additional equipment)
   2. having Security dispatch fire brigade

General Discussion

Answer A Discussion

First part is incorrect and plausible because it is the criteria used in the E-plan for classification.

Second part is correct. Per RP/0/A/1000/029 Encl 4.1, a method to dispatch the full Fire Brigade is to use the plant PA system.

Answer B Discussion

First part is incorrect and plausible because it is the criteria used in the E-plan for classification.

Second part is incorrect because security does not dispatch the fire brigade. It is plausible because per RP/0/A/1000/029 Encl 4.1, Security is used to dispatch MERT to a medical emergency to respond along with the Fire Brigade.

Answer C Discussion

Correct: First part is correct. AP/43 describes a Challenging Fire as:
A fire that is burning cables (bundles/ trays which have the potential to affect additional equipment) outside of load center, switchgear, control board, termination cabinet or other pieces of equipment.

Second part is correct. Per RP/0/A/1000/029 Encl 4.1, a method to dispatch the full Fire Brigade is to use the plant PA system.

Answer D Discussion

First part is correct. AP/43 describes a Challenging Fire as:
A fire that is burning cables (bundles/ trays which have the potential to affect additional equipment) outside of load center, switchgear, control board, termination cabinet or other pieces of equipment.

Second part is incorrect because security does not dispatch the fire brigade. It is plausible because per RP/0/A/1000/029 Encl 4.1, Security is used to dispatch MERT to a medical emergency to respond along with the fire brigade.

Basis for meeting the KA

The question requires knowledge procedures that are used to mitigate fires at Oconee

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	ILT 16-2 Q74

Development References

ILT 16-2 Q74
EAP-AP43 Obj. 03
AP-43 Rev. 09

Student References Provided

GEN2.4 2.4.27 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of "fire in the plant" procedures. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

KA replaced per Chief Examiner on 12/01/17

APE022 2.4.30 - Loss of Reactor Coolant Makeup

APE022 GENERIC

Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator. (CFR: 41.10 / 43.5 / 45.11)

Given the following Unit 2 conditions:

Time = Tuesday at 0800:

- Reactor power = 100%
- 2HP-120 fails closed
- AP/2/A/1700/014 (Loss of Normal HPI Makeup and/or Seal Injection) initiated

In accordance with AD-OP-ALL-0101 (Event Response and Notifications), notifications to the Corporate Duty Manager are to be made ______.

Which ONE of the following completes the statement above?

REFERENCE PROVIDED

A. within 1 hour

B. within 2 hours

C. within 15 minutes

D. next business day

General Discussion

Answer A Discussion

Correct: AD-OP-ALL-0101 Attachment 3 lists the events that require notification. Entry into an AP is listed on page 2 under Undesired Conditions. It is listed as a "Next Business Day notification". However the note at the top of the table on page 1 states that "Next Business Day" items that occur during normal business hours shall be reported in accordance with the requirements for "Immediate Notifications", which is 1 hour. The time in the question is Tuesday at 0800, which is during normal business hours.

Answer B Discussion

Incorrect: Plausible since this is a time listed in Attachment 3 for notifications from the Corporate Duty Manager to additional personnel.

Answer C Discussion

Incorrect: Plausible since this is the notification time during an emergency event to off-site agencies.

Answer D Discussion

Incorrect: Plausible since this is listed as the notification time for this event in Attachment 3. However the note at the top of the table on page 1 states that "Next Business Day" items that occur during normal business hours shall be reported in accordance with the requirements for "Immediate Notifications", which is 1 hour. The time in the question is 0800 on Tuesday, which is during normal business hours.

Basis for meeting the KA

The question requires knowledge of the notification requirements for a loss of reactor coolant makeup.

Basis for Hi Cog

Basis for SRO only

Making required notifications in accordance with station procedures is an SRO task. (Task OO3610049)

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
AD-OP-ALL-0101 Rev. 08

Student References Provided
AD-OP-ALL-0101 Attachment 3 Rev. 08

APE022 2.4.30 - Loss of Reactor Coolant Makeup

APE022 GENERIC

Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator. (CFR: 41.10 / 43.5 / 45.11)

Remarks/Status

BWE04 EA2.2 - Inadequate Heat Transfer

Ability to determine and interpret the following as they apply to the (Inadequate Heat Transfer)

(CFR: 43.5 / 45.13)

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

Give the following Unit 1 conditions:

Initial conditions:

- Reactor trips from 100% power
- Both Main Feedwater pumps trip
- EFDW pumps will NOT start

Current conditions:

- Rule 3 in progress
- LOHT tab initiated
- RCS heatup results in core SCM = 0°F
- RCS pressure = 2190 psig slowly rising
- Pressurizer level = 355 inches slowly rising

1) In addition to Rule 3, Rule(s) __(1)__ will be performed.

2) LOHT will direct a transfer to the __(2)__ tab.

Which ONE of the following completes the statements above?

A. 1. 2 ONLY
   2. FCD

B. 1. 2 ONLY
   2. LOSCM

C. 1. 2 AND 4
   2. HPICD

D. 1. 2 AND 4
   2. LOSCM

General Discussion

Answer A Discussion

First part is incorrect and plausible since Rule 2 is required and the normal criteria for Rule 4 initiation (Pzr level and RCS pressure) are not met.

Second part is incorrect and plausible since the LOHT tab does direct a transfer to the FCD tab once main or emergency feedwater cooling is re-established.

Answer B Discussion

First part is incorrect and plausible since Rule 2 is required and the normal criteria for Rule 4 initiation (Pzr level and RCS pressure) are not met.

Second part is incorrect and plausible since SCM = 0 degrees.

Answer C Discussion

Correct. A note in the LOHT tab says transfer to LOSCM tab should not be performed if core SCM reaches zero due to RCS heatup. The LOHT tab does direct performing Rule 4 and then transferring to the HPICD tab with core SCM = zero.

Answer D Discussion

First part is correct.

Second part is incorrect and plausible since SCM = 0 degrees.

Basis for meeting the KA

Requires knowledge and adherence to the LOHT tab in order to operate within the limitations of the facility license.

Basis for Hi Cog

Basis for SRO only

Requires assessing plant conditions and prescribing a section of the procedure with which to proceed. Additionally requires detailed knowledge of diagnostic steps which require a transfer to event specific sub procedures.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 45 NRC Exam Q#81

Development References

Lesson Plan EAP-LOHT OBJ 02, 04, 08, 09
EOP LOHT tab R0
ILT45 Q81

Student References Provided

BWE04 EA2.2 - Inadequate Heat Transfer
Ability to determine and interpret the following as they apply to the (Inadequate Heat Transfer)
(CFR: 43.5 / 45.13)
Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

Remarks/Status

New K/A supplied by NRC Chief on 12/13/17.

New K/A supplied by Chief Examiner on 01/12/18

EPE038 EA2.09 - Steam Generator Tube Rupture (SGTR)

Ability to determine or interpret the following as they apply to a SGTR : (CFR 43.5 / 45.13)

Existence of natural circulation, using plant parameters. ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- EFPD = 400
- SGTR = 35 gpm
- 1TA and 1TB lockout occurs

Current conditions:

- Tc = 548°F
- Th = 583°F
- CETCs = 585°F
- SG Pressures = 1010 psig stable

1) Natural Circulation __(1)__ established.

2) Once Natural Circulation is established, the basis for the cooldown rate directed by the SGTR tab is to help prevent void formation in the __(2)__.

Which ONE of the following completes the statements above?

A. 1. is
   2. top of the hot legs

B. 1. is
   2. reactor vessel head

C. 1. is NOT
   2. top of the hot legs

D. 1. is NOT
   2. reactor vessel head

General Discussion

Answer A Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible because voids in the hot legs do occur during certain events, but not this one.

Answer B Discussion

Correct: First part is correct. 30 to 40 degree delta T is normal delta T for EOL Natural Circulation following a Reactor trip.
Second part is correct. The basis for the natural circ cooldown rate given in the SGTR tab is to help prevent void formation in the Reactor Vessel head due to slow cooling that occurs in that area.

Answer C Discussion

Incorrect: First part is incorrect. Plausible because if Th and CETCs were 565 degrees, it could be correct.
Second part is incorrect. Plausible because voids in the hot legs do occur during certain events, but not this one.

Answer D Discussion

Incorrect: First part is incorrect. Plausible because if Th and CETCs were 565 degrees, it could be correct.
Second part is correct.

Basis for meeting the KA

Question requires the ability to determine the existence of Natural Circulation, using plant parameters, during a SGTR.

Basis for Hi Cog

Basis for SRO only

Requires knowledge of the bases for steps in the EOP SGTR tab.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	ILT 41 Q99

Development References

ILT 41 Q99
EAP-SGTR Obj. R11

Student References Provided

EPE038 EA2.09 - Steam Generator Tube Rupture (SGTR)
Ability to determine or interpret the following as they apply to a SGTR : (CFR 43.5 / 45.13)
Existence of natural circulation, using plant parameters. ....

Remarks/Status

New K/A supplied by NRC Chief on 12/13/17.

Preview Question - Feedback: Does not match the K/A because we kind of tell them Nat Circ is occurring and ask what delta T is rather than giving parameters in the stem and asking if NC is occurring.

MODIFIED 1/23/18 - SSL

ILT 18-1 ONS SRO NRC Examination **QUESTION 79** 79 **B**

APE056 2.4.20 - Loss of Offsite Power
APE056 GENERIC
Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 2 conditions:

- SSF has been activated due to loss of power
- EOP Enclosure 5.34 (Aligning SSF-ASW for SG Feed) in progress

1) In accordance with a NOTE in Enclosure 5.34, the MAXIMUM time allowed to align the SSF Diesel Service Water discharge to the yard drain is __(1)__ from emergency start of the SSF Diesel Generator.

2) A reason for the above action is to ensure continued operability of the SSF __(2)__.

Which ONE of the following completes the statements above?

A. 1. 2 hours
   2. ASW pump

B. 1. 2 hours
   2. HVAC system

C. 1. 3 hours and 20 minutes
   2. ASW pump

D. 1. 3 hours and 20 minutes
   2. HVAC system

General Discussion

Answer A Discussion

First part is correct.

Second part is incorrect and plausible since the SSF ASW pump also takes a suction on the CCW inlet piping along with HVAC system.

Answer B Discussion

Correct. The SSF Diesel Service Water discharge must be diverted to the yard drain between 1 hour and 45 minutes and 2 hours. This is done in part to ensure SSF HVAC operability.

Answer C Discussion

First part is incorrect and plausible because the 3 hours and 20 minutes is discussed in another note in Enlosure 5.34 when the Submersible pump must be installed and started.

Second part is incorrect and plausible since the ASW pump also takes a suction on the CCW Inlet piping.

Answer D Discussion

First part is incorrect and plausible because the 3 hours and 20 minutes is discussed in another note in Enlosure 5.34 when the Submersible pump must be installed and started.

Second part is correct.

Basis for meeting the KA

Questions requires knowledge of a note in EOP Enclosure 5.34 discussing when the SSF Diesel Service Water discharge must be diverted to the yard drains. It also requires knowledge of why this action is important for continued operation of the SSF Diesel Generator.

Basis for Hi Cog

Basis for SRO only

Question requires detailed knowledge of a NOTE in an EOP enclousre and the bases for the action taken.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	ILT 41 Q#85

Development References

EOP Encl 5.34 R1
Lesson Plan EAP-DGE
Lesson Plan EAP-SSF
ILT 41 Q85

Student References Provided

APE056 2.4.20 - Loss of Offsite Power

APE056 GENERIC

Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

KA replaced per Chief Examiner 12/01/17

KA replaced per Chief Examiner 01/11/18

ILT 18-1 ONS SRO NRC Examination **QUESTION 80** 80 **C**

APE065 2.4.35 - Loss of Instrument Air
APE065 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 plant conditions:

- Loss of Instrument Air (IA) has occurred
- IA pressure = 78 psig lowering
- The Diesel Air compressors failed to start

1) Unit __(1)__ AP/22 (Loss of Instrument Air) will dispatch an operator to locally start the Diesel Air Compressors.

2) On Units without a Feedwater Accumulator, one of the bases for ensuring that the Diesel Air Compressors are operating if IA header pressure lowers below the auto start setpoint is to ensure __(2)__ FDW Control valve operability during a subsequent blackout.

Which ONE of the following completes the statements above?

A. 1. one
   2. Main and Startup

B. 1. one
   2. Emergency

C. 1. two
   2. Main and Startup

D. 1. two
   2. Emergency

General Discussion

Answer A Discussion

Incorrect. First part is incorrect and plausible since there are definitely actions that need to be taken outside of the Control Room during a loss of IA on Unit 1. However, it is the Unit 2 AP/22 that directs those actions.

Second part is correct.

Answer B Discussion

Incorrect. First part is incorrect and plausible since there are definitely actions that need to be taken outside of the Control Room during a loss of IA on Unit 1. However, it is the Unit 2 AP/22 that directs those actions.

Second part is incorrect and plausible because the Diesel Air Compressors could provide air to the Emergency FDW control valves and these valves are important to be able to control in a subsequent blackout and to isolate the SG on a Main Steam line break. On a Main Steam line break, the applicable Emergency FDW control valve must be closed, but it is a manual operator action and not a part of AFIS.

Answer C Discussion

Correct. Unit 2 AP/22 directs the actions to locally start the diesel air compressors by dispatching an operator to perform Encl 5.4 (Emergency Start of the Diesel Air Compressor). The Bases of SLC 16.9.20 states that during a LOOP, small steam line breaks could require AFIS isolation a significant amount of time after the initial break and LOOP. The IA pressure could decay such that the Feedwater Control Valves (Main and Startup) would not close if demanded by AFIS. During such an event, the Diesel Driven Service Air Compressors would automatically start and supply air to the Service Air system. If the IA system pressure decays to less than 85 psig, the Service Air system would automatically begin to supply air to the IA system. This allows the Main Feedwater Control Valves to close if demanded by AFIS.

Answer D Discussion

Incorrect. First part is correct.

Second part is incorrect and plausible because the Diesel Air Compressors could provide air to the Emergency FDW control valves and these valves are important to be able to control in a subsequent blackout and to isolate the SG on a Main Steam line break. On a Main Steam line break, the applicable Emergency FDW control valve must be closed, but it is a manual operator action and not a part of AFIS

Basis for meeting the KA

Question requires procedure selection for local AO tasks during an abnormal/emergency condition and the knowledge of the bases of SLC 16.9.20 which describes one of the purposes of the diesel air compressors following a loss of IA in conjunction with a subsequent loss of power.

Basis for Hi Cog

Basis for SRO only

Question requires detailed procedure knowledge in order to be able to select the appropriate procedure to accomplish a task. Also requires knowledge of the Bases of SLC 16.9.20.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References

SLC 16.9.20 R1
AP/2/A/1700/022 rev 41
Lesson Plan ADM-TSSS Obj 04
Lesson Plan EAP-AP-22 Obj 05

Student References Provided

APE065 2.4.35 - Loss of Instrument Air
APE065 GENERIC
Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

APE077 AA2.08 - Generator Voltage and Electric Grid Disturbances

Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 43.5 / 45.5, 45.7, and 45.8)

Criteria to trip the turbine or reactor...

Given the following Unit 1 conditions:

- Reactor Power = 55% stable
- AP/1/A/1700/034 (Generator Grid Disturbance) in progress
- Generator Output = 350 MWe
- Hydrogen pressure = 60 psig

In accordance with AP/34…

1) The MAXIMUM limit on MVARs is approximately __(1)__.

2) If operation in the acceptable region of the Generator Capability Curve can NOT be maintained following required actions in AP/34, the next required procedure transition is to initiate __(2)__.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. 425
   2. Unit 1 EOP

B. 1. 425
   2. AP/01 (Unit Runback)

C. 1. 725
   2. Unit 1 EOP

D. 1. 725
   2. AP/01 (Unit Runback)

General Discussion

Answer A Discussion

Incorrect. First part is incorrect. Plausible because it is the limit if there were a leading Power Factor, however with a positive Mvar value, PF is lagging.
Second part is correct.

Answer B Discussion

Incorrect. First part is incorrect. Plausible because it is the limit if there were a leading Power Factor, however with a positive Mvar value, PF is lagging.
Second part is incorrect. Plausible because if power were < 50%, it would be correct.

Answer C Discussion

Correct. First part is correct. AP/34 Encl 5.1 Capability curve shows that approx. 725 Mvars is the limit for the given conditions.
Second part is correct. If operation in the acceptable region of the Generator Capability Curve cannot be maintained, AP/34 will direct tripping the reactor and the next procedure transition would be to the EOP.

Answer D Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible because if power were < 50%, it would be correct.

Basis for meeting the KA

Question requires the ability to determine the criteria to trip the reactor during a Generator Voltage and Electric Grid Disturbance.

Basis for Hi Cog

Basis for SRO only

Requires assessing plant conditions and then using detailed knowledge of the procedure to make a determination of which section of the procedure to proceed with. While the ability to read the curve could be considered RO, the detailed knowledge of the procedure required to determine the correct actions based on power level and being in the acceptable region of the curve is detailed knowledge and is therefore SRO.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	ILT 46 Q81

Development References

ILT 46 Q81
AP/34 Rev 13
EAP-AP-34

Student References Provided

Gen Capability Curve

APE077 AA2.08 - Generator Voltage and Electric Grid Disturbances

Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 43.5 / 45.5, 45.7, and 45.8)

Criteria to trip the turbine or reactor...

Remarks/Status

APE003 AA2.03 - Dropped Control Rod

Ability to determine and interpret the following as they apply to the Dropped Control Rod: (CFR: 43.5 / 45.13)
Dropped rod, using in-core/ex-core instrumentation, in-core or loop temperature measurements ....

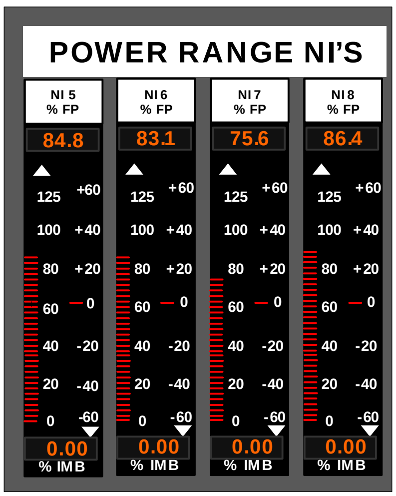
Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 85% slowly rising
- Delta Tc in HAND

Current conditions:

- ICS runback in progress
- Reactor power as indicated below



1) The reason for the ICS runback is __(1)__.

2) The consequences of operating under the conditions described above is __(2)__.

Which ONE of the following completes the statements above?

A. 1. RCP trip
   2. minimum DNBR limits could be exceeded

B. 1. RCP trip
   2. allowable Thermal Power limits of Tech Spec 3.4.4 (RCS Loops MODES 1 and 2) could be exceeded

C. 1. Dropped Control Rod
   2. maximum Linear Heat Rate could be exceeded

D. 1. Dropped Control Rod
   2. allowable Thermal Power limits of Tech Spec 3.4.4 (RCS Loops MODES 1 and 2) could be exceeded

---

General Discussion

Answer A Discussion

First part is incorrect and plausible for two reasons:
1) There is an RC Flow Runback in ICS that would attempt to perform an ICS runback on loss of a RCP at power. Reactor power is low enough in this question so that there would not be a Rx trip on flux/flow when the RCP was lost. With Delta TC in hand there would be no automatic re-ratio of feedwater which adds to plausibility of unbalanced Excore NI indications.
2) Since there are 4 pumps (one in each cold leg) it is plausible to associate a RCP with a quadrant of the core and therefore believe that a RCP trip could result in skewed power production in each core due to the flow and temperatures being believed to be different in each quadrant. With Delta TC in hand there would be no automatic re-ratio of feedwater which adds to plausibility of unbalanced Excore NI indications.

Second part is incorrect and plausible since this choice could be correct based on operation with only 3 RCPs operating. Since RC Flow is one of the major contributors to DNBR calculations and is part of the requirements of TS 3.4.1 whose purpose it to ensure DNBR criteria are met, it is plausible to believe that DNBR limits are a concern following a RCP trip

Answer B Discussion

First part is incorrect and plausible for two reasons:
1) There is an RC Flow Runback in ICS that would attempt to perform an ICS runback on loss of a RCP at power. Reactor power is low enough in this question so that there would not be a Rx trip on flux/flow when the RCP was lost. With Delta TC in hand there would be no automatic re-ratio of feedwater which adds to plausibility of unbalanced Excore NI indications.
2) Since there are 4 pumps (one in each cold leg) it is plausible to associate a RCP with a quadrant of the core and therefore believe that a RCP trip could result in skewed power production in each core due to the flow and temperatures being believed to be different in each quadrant. With Delta TC in hand there would be no automatic re-ratio of feedwater which adds to plausibility of unbalanced Excore NI indications.

Second part is incorrect and plausible since this choice could be correct based on operation with only 3 RCPs operating.

Answer C Discussion

Correct. A dropped control rod will result in lower power production in the quadrant in which the rod has dropped and depending on the proximity of the rod to other quadrant, it can cause slightly misaligned power production in other quadrants as well. The NI indications show an issue with QPT and the bases of TS 3.2.3 (QPT) describes the issue if Linear Heat Rates as a limiting factor in QPT limits.

Answer D Discussion

First part is correct.

Second part is plausible since thermal power is limited when there is a dropped control rod and the number of running RCPs determines what the limiting power level is. In summary, Thermal power with a dropped rod is limited based on the number of RCPs but TS 3.4.4 does not consider a dropped rod (only # of RCPs) when establishing the maximum allowable thermal power.

Basis for meeting the KA

Requires the ability to determine that a Control Rod has been dropped into the core based on excore power range Nis and requires an understanding of the implications of operting with a dropped rod that skews neutron flux and results in Quadrant Power Tilt issues.

Basis for Hi Cog

Basis for SRO only

In accordance with Clarification Guidance for SRO-only Questions:
This question requires knowledge from the basis of TS 3.2.3 that is not systems knowledge.
It cannot be answered by knowing 1 hr or less TS/TRM Action
It cannot be answered solely with "above the line" information.
It cannot be answered solely by knowing Safety Limits

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 42 NRC Exam Q#82

Development References

Lesson Plan ADM-TSS
ILT 42 Q82 (12/2012)

Student References Provided

APE003 AA2.03 - Dropped Control Rod

ILT 18-1 ONS SRO NRC Examination **QUESTION 82** 82 **C**

Ability to determine and interpret the following as they apply to the Dropped Control Rod: (CFR: 43.5 / 45.13)
Dropped rod, using in-core/ex-core instrumentation, in-core or loop temperature measurements ....

Remarks/Status

APE024 AA2.01 - Emergency Boration
Ability to determine and interpret the following as they apply to the Emergency Boration: (CFR: 43.5 / 45.13)
Whether boron flow and/or MOVs are malfunctioning, from plant conditions ....

Given the following Unit 1 conditions:

- Reactor power 36% lowering
- Rule 1 (ATWS/Unanticipated Nuclear Power Production) in progress
- 1HP-24 and 25 failed closed
- LPI-HPI piggyback valves were operated for emergency boration and indicate as follows:
  - 1LP-15 open
  - 1LP-16 closed
  - 1LP-9 open
  - 1LP-10 open
  - 1LP-6 open
  - 1LP-7 open

1) In accordance with Rule 1, an operator __(1)__ be dispatched to locally open 1HP-24 or 1HP-25.

2) 1LP-15 and 1LP-16 are subject to LCO __(2)__ requirements.

Which ONE of the following completes the statements above?

A. 1. will
2. 3.5.2 High Pressure Injection (HPI)

B. 1. will
2. 3.5.3 Low Pressure Injection (LPI)

C. 1. will NOT
2. 3.5.2 High Pressure Injection (HPI)

D. 1. will NOT
2. 3.5.3 Low Pressure Injection (LPI)

ILT 18-1 ONS SRO NRC Examination **QUESTION 83** 83 **C**

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because if 1LP-15 was closed, it would be correct.
Second part is correct.

Answer B Discussion

Incorrect: First part is incorrect. Plausible because if 1LP-15 was closed, it would be correct.
Second part is incorrect. Plausible since as part of the LPI-HPI flow path, the piping, instruments, valves and controls upstream of LP-15 and LP-16 are part of the LPI system and are subject to LCO 3.5.3 (Low Pressure Injection system) requirements.

Answer C Discussion

Correct: First part is correct. 1HP-24 or 25 will not be locally opened because one LPI-HPI flowpath exists.
The piping, instruments, valves and controls downstream of and including LP-15 and LP-16, are part of the HPI system and are subject to LCO 3.5.2 (High Pressure Injection system) requirements.

Answer D Discussion

Incorrect: First part is correct. 1HP-24 or 25 will not be locally opened because one LPI-HPI flowpath exists.
Second part is incorrect. Plausible since as part of the LPI-HPI flow path, the piping, instruments, valves and controls upstream of LP-15 and LP-16 are part of the LPI system and are subject to LCO 3.5.3 (Low Pressure Injection system) requirements.

Basis for meeting the KA

Question requires the ability to determine and interpret the 1LP-16 malfunction and apply in-depth procedure knowledge of Rule 1 as it relates to the malfunction, and how Tech Spec Bases describes the requirements for LP-15 and 16.

Basis for Hi Cog

Requires the candidate to determine procedure action based on plant conditions.

Basis for SRO only

Requires knowledge of TS Bases that is required to determine which LCO covers 1LP-15 and 16 since a portion of the LPI-HPI flowpath is covered in LCO 3.5.3 (LPI) and a portion is covered in TS 3.5.2 (HPI).

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References

Rule 1 Rev. 01
TS 3.5.2 Bases Rev. 03
EAP-UNPP Attach 1 (Rule 1)
EAP-UNPP
ADM-TSS Primary

Student References Provided

APE024 AA2.01 - Emergency Boration
Ability to determine and interpret the following as they apply to the Emergency Boration: (CFR: 43.5 / 45.13)
Whether boron flow and/or MOVs are malfunctioning, from plant conditions ....

Remarks/Status

BWA05 2.1.32 - Emergency Diesel Actuation
BWA05 GENERIC
Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

Given the following Unit 1 conditions:

- Reactor power = 100%
- Breaker Status:
  - o ACB 4 - Closed
  - o PCB 8 - Open
  - o PCB 9 - Open
- Statalarm SA-2/C-1 (KEOWEE PCB 9) is in alarm
- Statalarm SA-2/B-1 (DACUS BL. KEOWEE TIE PCB 8) is in alarm

1) Keowee Hydro Unit-2 __(1)__ be started in AUTOMATIC (NOT Emergency start) from the Control Room.

2) In accordance with the basis of Tech Spec 3.8.1 (AC Systems-Operating), Keowee Hydro Unit-1 is currently __(2)__.

Which ONE of the following completes the statements above?

A. 1. can
2. OPERABLE

B. 1. can NOT
2. OPERABLE

C. 1. can
2. INOPERABLE

D. 1. can NOT
2. INOPERABLE

General Discussion

Answer A Discussion

Incorrect: 1st part is incorrect because neither KHU will start in the automatic mode (this does not mean emergency start). It is plausible because KHU2 is lined up to the underground powerpath and would not go through PCB 9.
2nd part is correct. While KHU 1 is lined up to go through PCB 9, the power path is actually regarded separately from the KHU as defined in the basis of TS 3.8.1. It is a common misconception that the KHU and power path are the same component.

Answer B Discussion

Correct: First part is correct. If PCB 8 AND 9 are open, neither KHU will start in the automatic mode.
Second part is correct. While KHU 1 is lined up to go through PCB 9, the power path is actually regarded separately from the KHU as defined in the basis of TS 3.8.1. It is a common misconception that the KHU and power path are the same component.

Answer C Discussion

Incorrect: 1st part is incorrect because neither KHU will start in the automatic mode (this does not mean emergency start). It is plausible because KHU2 is lined up to the underground powerpath and would not go through PCB 9.
2nd part is incorrect because KHU 1 is still considered operable. It is plausible because the actions for TS 3.8.1 condition C cover the KHU and the overhead path.

Answer D Discussion

Incorrect: First part is correct. If PCB 8 AND 9 are open, neither KHU will start in the automatic mode.
2nd part is incorrect because KHU 1 is still considered operable. It is plausible because the actions for TS 3.8.1 condition C cover the KHU and the overhead path.

Basis for meeting the KA

Oconee uses Keowee Hydro units in lieu of Emergency DGs.
Question requires the ability to apply the limits and precautions of OP/0/A/1106/019 (Keowee Hydro at Oconee).

Basis for Hi Cog

Basis for SRO only

The question requires the applicant to know what constitutes operability for the KHUs IAW the bases of TS 3.8.1.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 46 Q85

Development References

ILT46 Q85 (12/2014)
OP/0/A/1106/019 R104
TSB 3.8.1 R3
ADM-TSS Electrical Obj. 04
EL-KHU Obj. 12

Student References Provided

BWA05 2.1.32 - Emergency Diesel Actuation
BWA05 GENERIC
Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

Remarks/Status

New K/A supplied by NRC Chief on 12/13/17.

Preview Question

NRC Feedback:
1/31/18 - OK as is.

BWA07 2.4.41 - Flooding
BWA07 GENERIC
Knowledge of the emergency action level thresholds and classifications. (CFR: 41.10 / 43.5 / 45.11)

Given the following Unit 2 conditions:

Time = 0800:

- Reactor power = 100%
- 2SA-18/A-11 (Turbine BSMT Water Level Emergency High) actuates
- AP/2/A/1700/010 (Turbine Building Flood) initiated

Time = 0900:

- Turbine Building Flood tab in progress
- Turbine Building Basement water level slowly rising
- ‘C’ LPSW pump trips
- The standby LPSW pump fails to start

1) At Time = 0900, the HIGHEST Emergency Classification is __(1)__.

2) If all LPSW is lost, the operating RCPs are stopped __(2)__.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. Unusual Event
 2. to minimize heat input to the RCS

B. 1. Unusual Event
 2. due to loss of cooling water

C. 1. Alert
 2. to minimize heat input to the RCS

D. 1. Alert
 2. due to loss of cooling water

General Discussion

Answer A Discussion

First part is incorrect and plausible since HU3.2 (Unusual Event) deals with internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a safety system component needed for the current operating mode which is true. Since the event has caused degraded performance in at least one train of a safety system, the highest classification is an Alert (SA9.1).

Second part is plausible because early in the TBF tab of the EOP three RCPs are stopped to minimize heat input into the RCS.

Answer B Discussion

First part is incorrect and plausible since HU3.2 (Unusual Event) deals with internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a safety system component needed for the current operating mode which is true. Since the event has caused degraded performance in at least one train of a safety system, the highest classification is an Alert (SA9.1).

Second part is correct.

Answer C Discussion

First part is correct.

Second part is plausible because early in the TBF tab of the EOP three RCPs are stopped to minimize heat input into the RCS.

Answer D Discussion

Correct. The emergency classification at Time 0900 is SA9.1 (Alert) which states the occurrence of any Table S-5 hazardous event (flooding) and EITHER 1) Event damage has caused indications of degraded performance in at least one train of a safety system needed for the current operating mode OR 2) the event has caused visible damage to a safety system component or structure needed for the current operating mode. The flooding event has caused a loss of 2 LPSW pumps which has caused degraded performance in the LPSW system. If all LPSW is lost, all operating RCPs are stopped due to the loss of motor cooling water (LPSW).

Basis for meeting the KA

Question requires knowledge of emergency classifications and the use of the Wallcharts to determine the event classification for flooding.

Basis for Hi Cog

Basis for SRO only

Requires knowledge of the Emergency Plan and classification of events, which are SRO Tasks.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	ILT 43 NRC Exam Q#18

Development References

EOP TBF tab
Rev 6 EAL Wallcharts
ILT43 Q18
RP/0/A/1000/001 Rev 6

Student References Provided

Rev 6 EAL Wallcharts

BWA07 2.4.41 - Flooding
BWA07 GENERIC
Knowledge of the emergency action level thresholds and classifications. (CFR: 41.10 / 43.5 / 45.11)

Remarks/Status

SYS005 2.1.25 - Residual Heat Removal System (RHRS)
SYS005 GENERIC
Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)

Given the following Unit 1 plant conditions:

- RCS temperature = 240°F
- RCS pressure = 260 psig
- No RCS Vent Paths are open
- HPI has been deactivated
- 1A and 1B CFT pressure = 500 psig
- 1CF-1 and 1CF-2 Closed and Breakers White Tagged Opened
- Pressurizer level = 235 inches stable
- LPI is in operation
- Cooldown to Mode 5 is in progress

1) The impact of the conditions above is that __(1)__.

2) The action required is to __(2)__.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. Administrative controls (Train 2) for an LTOP event are lost
2. Establish an RCS Vent Path or dedicated LTOP Operator in accordance with TS 3.4.12 (Low Temperature Over Pressure Protection)

B. 1. Administrative controls (Train 2) for an LTOP event are lost
2. Depressurize CFTs to less than RCS pressure within 1 hour in accordance with TS 3.4.12 (Low Temperature Over Pressure Protection)

C. 1. RCS pressure and temperature exceed the limits that ensure brittle fracture prevention in accordance with TS 3.4.3 (RCS Pressure and Temperature (PT) Limits)
2. Establish an RCS Vent Path or dedicated LTOP Operator

D. 1. RCS pressure and temperature exceed the limits that ensure brittle fracture prevention in accordance with TS 3.4.3 (RCS Pressure and Temperature (PT) Limits)
2. Restore RCS Pressure and Temperature to within limits in 30 minutes or less

General Discussion

Answer A Discussion

Correct. Pressurizer level is part of the administrative controls. Pressurizer level is not within LTOP limits. That means Conditons F and G of TS 3.4.12 are applicable and the actions stated are from these Conditions.

Answer B Discussion

Incorrect and plausible since it would be correct if CF-1 and/or CF-2 were open.

Answer C Discussion

Incorrect and plausible if the candidate confuses Curve 1 and Curve 2 and the actions are correct for the conditions given.

Answer D Discussion

Incorrect and plausible if the candidate confuses Curve 1 and Curve 2 The actions are plausible as they would be correct if P/T limits were being exceeded.

Basis for meeting the KA

Question requires the ability to interpret graphs/tables with the RHRS in service.

Basis for Hi Cog

Basis for SRO only

This question requires application of TS 3.4.12 in that it requires knowing how to determine actions required by the spec based on a given set of plant conditions. It also required knowledge from the basis of the spec to determine that Pzr level is one of the Admin Controls as well as to determine that a dedicated LTOP operator meets the compensatory actions requirement of condition F.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 46 NRC Exam Q#86

Development References

Lesson Plan CP-017 Obj 10
TS 3.4.12 Amend 307 307 307
TS 3.4.12 Bases 6/13/14
OP/0/A/1108/001 Encl 4.31 R112
ILT 46 Q86 (12/2014)

Student References Provided

TS 3.4.12
OP/0/A/1108/001 Encl. 4.31

SYS005 2.1.25 - Residual Heat Removal System (RHRS)
SYS005 GENERIC
Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)

Remarks/Status

Preview Question

NRC Feedback:
1/31/18 - OK as is.

SYS012 A2.05 - Reactor Protection System (RPS)

Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; 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)

Faulty or erratic operation of detectors and function generators ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- I&E performing Reactor Protective System (RPS) calibration procedure

Current conditions:

- The RCS High Pressure trip setpoint is determined to be 2351 psig in 1A and 1B RPS Channels

1) The required actual RPS trip setpoint for RCS High Pressure is __(1)__ psig.

2) In accordance with the bases of Tech Spec 3.3.1 (Reactor Protective System (RPS) Instrumentation), the 1A and 1B RCS High Pressure Trip Functions are __(2)__.

Which ONE of the following completes the statements above?

A. 1. 2355
   2. operable

B. 1. 2355
   2. inoperable

C. 1. 2345
   2. operable

D. 1. 2345
   2. inoperable

General Discussion

Answer A Discussion

First part is incorrect and plausible since 2355 psig is the allowable Tech Spec value.

Second part is correct.

Answer B Discussion

First part is incorrect and plausible since 2355 psig is the allowable Tech Spec value.

Second part is incorrect and plausible to believe the trip function is inoperable when the setpoint is found to be incorrect in the non-conservative direction, and if the setpoint was >10 psig non-conservative, it would be correct.

Answer C Discussion

Correct. The actual RPS trip setpoint for RCS High Pressure is 2345 psig. The allowable value per TS 3.3.1 is 2355 psig. According to TS Bases, when the trip setpoint is found to be incorrect, the trip functions are operable if the trip setpoint is within the allowable value.

Answer D Discussion

First part is correct.

Second part is incorrect and plausible to believe the trip function is inoperable when the setpoint is found to be incorrect in the non-conservative direction and if the setpoint was >10 psig non-conservative, it would be correct.

Basis for meeting the KA

Requires the ability to predict the impact of several malfunctions on RPS and to use Tech Specs to mitigate the consequences of the failures.

Basis for Hi Cog

Basis for SRO only

This question requires application of Tech Specs.
It cannot be answered solely by 1hr or less memory items.
It cannot be answered solely by above the line knowledge
It cannot be answered solely by knowing TS Safety Limits
It does require application of generic LCO requirements. 10 CFR 55.43(b)(2)

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 48 NRC Exam Q#87

Development References

Lesson Plan IC-RPS
TS 3.3.1 Amend 388 390 389
TS 3.3.1 Bases R3
ILT 48 Q87 (12/2015)

Student References Provided

SYS012 A2.05 - Reactor Protection System (RPS)

Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; 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)

Faulty or erratic operation of detectors and function generators ....

Remarks/Status

SYS013 A2.03 - 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)

Rapid depressurization ....

Given the following Unit 1 conditions:

- Large Break LOCA from 100% has just occurred
- RCS pressure = 843 psig lowering
- Reactor Building pressure = 12.4 psig rising

1) Engineered Safeguards channels __(1)__ have actuated.

2) In accordance with the LOSCM tab, the LOWER TOTAL (both trains) LPI flow that will allow transfer to the LOCA Cooldown tab is __(2)__ gpm.

Which ONE of the following completes the statements above?

A. 1. 1 – 8
   2. 2900

B. 1. 1 – 8
   2. 3400

C. 1. 1 – 6 ONLY
   2. 2900

D. 1. 1 – 6 ONLY
   2. 3400

General Discussion

Answer A Discussion

First part is correct.

Second part is incorrect and plausible since it would be correct if only one train of LPI were available to inject.

Answer B Discussion

Correct. ES channels 1-6 have actuated once RB pressure exceeds 3 psig and ES channels 7 and 8 actuate at 10 psig RB pressure. The transfer to LOCA Cooldown when both LPI trains are available for injection occurs at > 3400 gpm.

Answer C Discussion

First part is incorrect and plausible since RB pressure is below the TS required actuation setpoint for ES channels 7 and 8 of 15 psig.

Second part is incorrect and plausible since it would be correct if only one train of LPI were available to inject.

Answer D Discussion

First part is incorrect and plausible since RB pressure is below the TS required actuation setpoint for ES channels 7 and 8 of 15 psig.

Second part is correct.

Basis for meeting the KA

Requires predicting the impact of lowering RCS pressure on ES in that as RCS pressure is released to the RB, RB pressure rises and this question requires knowing when rising RB pressure results in ES channels 7&8 actuation. Mitigation strategy for a LBLOCA is primarily in the LOCA cooldown tab of the EOP, therefore knowing the transfer criteria to that tab demonstrates the ability to use procedures to mitigate the LBLOCA that results in rapidly lowering RCS pressure.

Basis for Hi Cog

Basis for SRO only

Knowing the setpoint for LPI flow that corresponds to a transfer to the LOCA Cooldown tab is detailed knowledge of the procedure content rather than the overall mitigation strategy. It also requires assessing plant conditions and selecting a section of the EOP with which to continue the mitigation strategy.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 45 NRC Exam Q#86

Development References

Lesson Plan IC-ES
Lesson Plan EAP-LOSCM
EOP LOSCM tab R1
ILT 45 Q86 (6/2014)

Student References Provided

SYS013 A2.03 - 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)

Rapid depressurization ....

Remarks/Status

SYS039 A2.02 - Main and Reheat Steam System (MRSS)

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

Decrease in turbine load as it relates to steam escaping from relief valves .

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%

Current conditions:

- Reactor power = 100.5% rising slowly
- AO reports a MSRV on 1A MS line is open

1) Once ICS has stabilized the unit, final Generator MWs will be __(1)__ initial Generator MWs.

2) The CRS will direct the ROs to __(2)__.

Which ONE of the following completes the statements above?

A. 1. lower than
   2. shutdown the unit per OP/1/A/1102/004 (Operation at Power)

B. 1. lower than
   2. lower MS pressure in 10 psig increments until the MSRV reseats

C. 1. the same as
   2. shutdown the unit per OP/1/A/1102/004 (Operation at Power)

D. 1. the same as
   2. lower MS pressure in 10 psig increments until the MSRV reseats

---

General Discussion

Answer A Discussion

Correct: First part is correct. ICS will return power to the pre-transient level. Turbine header pressure will lower due to steam escaping through the MSRV. ICS will close Turbine Control valves to return turbine header pressure to setpoint. This will result in lower Generator MWs.
Second part is correct. Shutdown would be required due to the steam leak.

Answer B Discussion

Incorrect: First part is correct. ICS will return power to the pre-transient level. Turbine header pressure will lower due to steam escaping through the MSRV. ICS will close Turbine Control valves to return turbine header pressure to setpoint. This will result in lower Generator MWs.
Second part is incorrect. Plausible because it would be correct if the reactor were tripped.

Answer C Discussion

Incorrect: First part is incorrect. Plausible because it would be correct for reactor power.
Second part is correct. Shutdown would be required due to the steam leak.

Answer D Discussion

Incorrect: First part is incorrect. Plausible because it would be correct for reactor power.
Second part is incorrect. Plausible because it would be correct if the reactor were tripped.

Basis for meeting the KA

Question requires the ability to predict the impact on turbine load from steam escaping from the Main Steam Relief Valves and procedures used to mitigate the consequences.

Basis for Hi Cog

Basis for SRO only

Question involves assessing plant conditions and then selecting a procedure or section of a procedure with which to proceed.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References

ICS-02 Obj. 02
EOP SA tab R1

Student References Provided

SYS039 A2.02 - Main and Reheat Steam System (MRSS)

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

Decrease in turbine load as it relates to steam escaping from relief valves .

Remarks/Status

Preview Question
Feedback - Add "Generator" in #1, then OK as is.

SYS062 2.2.36 - AC Electrical Distribution System

SYS062 GENERIC

Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. (CFR: 41.10 / 43.2 / 45.13)

Given the following Unit 1 conditions:

- Reactor power = 100%
- ACB-3 closed
- E1 Startup breaker is racked out for maintenance

1) In accordance with Tech Spec 3.8.1 (AC Sources – Operating), the Keowee Overhead power path __(1)__ operable for Unit 1.

2) In accordance with OP/0/A/1106/019 (Keowee Hydro at Oconee), if the Overhead Power Path is declared NOT operable, __(2)__ must be verified Operable within one hour.

Which ONE of the following completes the statements above?

A. 1. is
   2. KHU-1

B. 1. is
   2. the Underground Power Path

C. 1. is NOT
   2. KHU-1

D. 1. is NOT
   2. the Underground Power Path

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because either E breaker can supply power to the MFB and therefore provide power to all 3 ES power strings.
Second part is incorrect. Plausible because it would be required if the overhead power path were inoperable due to an inoperable Keowee main step-up transformer and the 28 day completion time associated with TS 3.8.1 Condition C Required Action 2.2.5 were being used. In that case C2.2.4 would require performing SR 3.8.1.16 which would require verifying (by administrative means) that the KHU associated with the overhead power path were available to be aligned to the underground power path if needed.

Answer B Discussion

Incorrect: First part is incorrect. Plausible because either E breaker can supply power to the MFB and therefore provide power to all 3 ES power strings.
Second part is correct.

Answer C Discussion

Incorrect: First part is correct.
Second part is incorrect. Plausible because it would be required if the overhead power path were inoperable due to an inoperable Keowee main step-up transformer and the 28 day completion time associated with TS 3.8.1 Condition C Required Action 2.2.5 were being used. In that case C2.2.4 would require performing SR 3.8.1.16 which would require verifying (by administrative means) that the KHU associated with the overhead power path were available to be aligned to the underground power path if needed.

Answer D Discussion

Correct: First part is correct. The bases of TS 3.8.1 states that both E breakers are required to be operable for the Overhead power path to be Operable.
Second part is correct. With the overhead power path not operable, the limits and precautions of OP/1106/019 (as well as TS 3.8.1 Condition C) requires verifying the Underground power path operable within 1 hour.

Basis for meeting the KA

Question requires the ability to analyze the effect of E1 Startup breaker maintenance on Tech Spec 3.8.1 LCO.

Basis for Hi Cog

Requires analyzing plant conditions and determining equipment operability based on plant conditions

Basis for SRO only

In accordance with Attachment 2, Clarification Guidance for SRO-only Questions:
The first part of the question is SRO knowledge since it requires using knowledge found in the bases of Tech Specs to make an operability determination. It cannot be answered based solely on systems knowledge since either E breaker is capable of powering all 3 ES power strings via the MFB's.
This question cannot be answered Solely on 1 hr or less TS knowledge.
This question cannot be answered based on "above the line" TS information.
This question cannot be answered with TS Safety Limit information.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 39 Q90

Development References

ILT 39 Q90 (5/2011)
TS 3.8.1 Amend 300 300 300
TS 3.8.1 Bases R3
ADM-TSS Obj. 05
OP/0/A/1106/019 R104

Student References Provided

SYS062 2.2.36 - AC Electrical Distribution System
SYS062 GENERIC
Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. (CFR: 41.10 / 43.2 / 45.13)

Remarks/Status

SYS002 2.4.8 - Reactor Coolant System (RCS)
SYS002 GENERIC
Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 3 conditions:

Time = 0800:

- Reactor Power = 100%
- 3A1 RCP Motor Stand vibration = 4 mils rising
- AP/3/A/1700/016 (Abnormal Reactor Coolant Pump Operation) initiated

Time = 0805:

- Reactor power = 80%
- 3SA-9/E-2 (RC PUMP VIBRATION EMERG HIGH) actuates
- 3A1 RCP Motor Stand vibration = 6 mils slowly rising

1) At Time = 0800, in accordance with AP/16, the power reduction will be performed using __(1)__.

2) At Time = 0805, in accordance with OMP 1-18 (Implementation Standard During Abnormal and Emergency Events), the CRS will direct the OATC to perform IMAs and the <u>BOP</u> to trip 3A1 RCP __(2)__ performing the EOP Symptoms Check.

Which ONE of the following completes the statements above?

A. 1. AP/3/A/1700/029 (Rapid Unit Shutdown)
   2. prior to

B. 1. AP/3/A/1700/029 (Rapid Unit Shutdown)
   2. after

C. 1. AP/3/A/1700/016 (Abnormal RCP Operation)
   2. prior to

D. 1. AP/3/A/1700/016 (Abnormal RCP Operation)
   2. after

General Discussion

Answer A Discussion

Incorrect. First part is incorrect. Plausible because not all APs have directions contained in their bodies for a rapid power reduction (i.e. AP/2), and they direct the use of AP/29. AP/29 is also used for rapid power reductions any time the crew is not in another AP.
Second part is correct.

Answer B Discussion

Incorrect. First part is incorrect. Plausible because not all APs have directions contained in their bodies for a rapid power reduction (i.e. AP/2), and they direct the use of AP/29. AP/29 is also used for rapid power reductions any time the crew is not in another AP.
Second part is incorrect. Plausible since the symptoms check is normally the first action performed by the BOP following a reactor trip, and the results must be reported to the CRS prior to performing any other actions.

Answer C Discussion

Correct. First part is correct. AP/16 will direct reducing power to < 70% to secure the 3A1 RCP based on the conditions given at Time = 0800.
Second part is correct. 3A1 RCP Motor Stand vibration of 6 mils exceeds the Immediate trip criteria of 5 mils in AP/16. With reactor power > 70%, AP/16 will direct tripping the reactor and then tripping the 3A1 RCP. OMP 1-18 states: Actions directed in an AP to be taken immediately upon a unit trip shall be performed by the BOP prior to the EOP symptoms check. Therefore, the OATC will be directed to trip the reactor and perform IMAs and the BOP will be directed to trip 3A1 RCP and then perform a symptoms check.

Answer D Discussion

Incorrect. First part is correct. AP/16 will direct reducing power to < 70% to secure the 3A1 RCP based on the conditions given at Time = 0800.
Second part is incorrect. Plausible since the symptoms check is normally the first action performed by the BOP following a reactor trip, and the results must be reported to the CRS prior to performing any other actions.

Basis for meeting the KA

Question requires knowledge of how actions in AP/16 that affect the RCS (flow) are performed in conjunction with the EOP (Symptoms check).

Basis for Hi Cog

Basis for SRO only

NUREG 1021, ES 401, Attachment 2
E. Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations. [10 CFR 55.43(b)(5)]
This 10 CFR 55.43 topic involves both 1) assessing plant conditions (normal, abnormal, or emergency) and then 2) selecting a procedure or section of a procedure to mitigate, recover, or with which to proceed. One area of SRO level knowledge (with respect to selecting a procedure) is knowledge of the content of the procedure versus knowledge of the procedure's overall mitigative strategy or purpose.
The applicant's knowledge can be evaluated at the level of 10 CFR 55.43(b)(5) by ensuring that the additional knowledge of the procedure's content is required to correctly answer the written test item, for example:
Knowledge of administrative procedures that specify hierarchy, implementation, and/or coordination of plant normal, abnormal, and emergency procedures.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	ILT 2009 Q86

Development References

ILT 2009 Q86
OMP 1-18 Rev. 41
U3 AP-16 R29

Student References Provided

SYS002 2.4.8 - Reactor Coolant System (RCS)
SYS002 GENERIC
Knowledge of how abnormal operating procedures are used in conjunction with EOPs. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

Preview Question:

NRC Feedback:
1/31/18 - NRC Chief suggestion: Remove the bullet under time = 0805 that states "Immediate trip criteria met for 3A1 RCP". Do not tell them immediate trip criteria met.
Fix discussed with Chief:
Replaced with 3A1 RCP Motor Stand vibration = 6 mils slowly rising. Then revised the second part of the question accordingly..

DONE - 1/31/18

SYS017 A2.02 - In-Core Temperature Monitor (ITM) System

Ability to (a) predict the impacts of the following malfunctions or operations on the ITM system; 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)

Core damage ....

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- 1A LPI pump tagged out of service for maintenance
- LOCA occurs

Current conditions:

- ES Channels 1 - 8 actuated
- 1B LPI pump failed to start
- RCS pressure = 150 psig lowering
- Average of five highest CETC = 713ºF

1) The core __(1)__ partially uncovered.

2) In accordance with the ICC tab, transition to the OSAG __(2)__ required.

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

Answer A Discussion

Incorrect: First part is correct.
Second part is incorrect because entry into the OSAG is not directed to the TSC unless CETCs are > 1200 degrees. It is plausible because if CETC temperatures were >1200 degrees and the TSC were operational, it would be correct.

Answer B Discussion

Incorrect: First part is incorrect. Plausible because if the core was not superheated, it would be correct.
Second part is incorrect because entry into the OSAG is not directed to the TSC unless CETCs are > 1200 degrees. It is plausible because if CETC temperatures were >1200 degrees and the TSC were operational, it would be correct.

Answer C Discussion

Correct: With the indications given, the core is superheated. When the core is superheated, it is partially uncovered.
Second part is correct. With superheated conditions in the core and CETCs <1200 degrees, the CRS will direct actions from the EOP ICC tab.

Answer D Discussion

Incorrect: First part is incorrect. Plausible because if the core was not superheated, it would be correct.
Second part is correct. With superheated conditions in the core and CETCs <1200 degrees, the CRS will direct actions from the EOP ICC tab.

Basis for meeting the KA

Question requires the ability to relate CETC temperature (superheat) with core uncovery/damage and then to select the appropriate procedure that will be used to mitigate the consequences of the core damage.

Basis for Hi Cog

Basis for SRO only

NUREG 1021, ES 401, Attachment 2
E. Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations. [10 CFR 55.43(b)(5)]
This 10 CFR 55.43 topic involves both 1) assessing plant conditions (normal, abnormal, or emergency) and then 2) selecting a procedure or section of a procedure to mitigate, recover, or with which to proceed. One area of SRO level knowledge (with respect to selecting a procedure) is knowledge of the content of the procedure versus knowledge of the procedure's overall mitigative strategy or purpose.
The applicant's knowledge can be evaluated at the level of 10 CFR 55.43(b)(5) by ensuring that the additional knowledge of the procedure's content is required to correctly answer the written test item, for example:
Knowledge of when to implement attachments and appendices, including how to coordinate these items with procedure steps.
Knowledge of diagnostic steps and decision points in the emergency operating procedures (EOP) that involve transitions to event specific sub-procedures or emergency contingency procedures.
Knowledge of administrative procedures that specify hierarchy, implementation, and/or coordination of plant normal, abnormal, and emergency procedures.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	ILT 16-2 Q93

Development References	Student References Provided
ILT 16-2 Q93 EAP-ICC Obj. 01	

SYS017 A2.02 - In-Core Temperature Monitor (ITM) System
Ability to (a) predict the impacts of the following malfunctions or operations on the ITM system; 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)
Core damage ....

Remarks/Status
KA replaced per Chief Examiner on 12/01/17

SYS035 A2.01 - 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)

Faulted or ruptured S/Gs ....

Given the following Unit 1 conditions:

Time = 0400:

- Reactor has been tripped due to SGTR in the 1A SG

Time = 0430:

- Feedwater to the 1A SG is isolated
- 1A SG level = 273 inches XSUR rising
- 1B SG level = 30 inches XSUR stable

Time = 0500:

- 1A SG level = 293 inches XSUR rising

Time = 0530:

- 1A SG reaches the Water in Steam Line Level

In accordance with the SGTR tab…

1) At Time = 0500, operators __(1)__ required to perform EOP Enclosure 5.22 (SG Blowdown).

2) At Time = 0530, operators are required to __(2)__ steaming the 1A SG.

Which ONE of the following completes the statements above?

A. 1. are
   2. stop

B. 1. are
   2. continue

C. 1. are NOT
   2. stop

D. 1. are NOT
   2. continue

General Discussion

Answer A Discussion

Correct. First part is correct. Per the SGTR tab, when level exceeds 285 inches then level will be reduced by using SG Blowdown.
Second part is correct. The SG with "Water In Steam Line Level" will not be steamed and the other SG will be.

Answer B Discussion

Incorrect. First part is correct.
Second part is incorrect. Plausible because it is correct from the time level approaches 285 inches until Water in the Steam Line level is reached.

Answer C Discussion

Incorrect. First part is incorrect. Plausible because it would be correct if SG level were < 285 inches XSUR.
Second part is correct. The SG with "Water In Steam Line Level" will not be steamed and the other SG will be

Answer D Discussion

Incorrect. First part is incorrect. Plausible because it would be correct if SG level were < 285 inches XSUR.
Second part is incorrect. Plausible because it is correct from the time level approaches 285 inches until Water in the Steam Line level is reached.

Basis for meeting the KA

Question requires the ability to determine SG overfill due to a ruptured SG and then determine the correct procedure (EOP Encl. 5.22) and the correct EOP actions required to mitigate the consequences.

Basis for Hi Cog

Basis for SRO only

In Accordance with Clarification Guidance for SRO-only Questions Attachment 2
Question requires "Assessing plant conditions (normal, abnormal, or emergency) and then selecting a procedure or section of a procedure to mitigate, recover, or with which to proceed." In this question, the candidate must determine when an EOP enclosure (Encl. 5.22) must be performed and what action to take when water reaches a certain level. This is detailed procedure knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 46 Q83

Development References

ILT 46 Q83 (12/2014)
SGTR tab
EAP-SGTR Obj. R26

Student References Provided

SYS035 A2.01 - 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)

Faulted or ruptured S/Gs ....

Remarks/Status

KA replaced per Chief Examiner 01/11/18

GEN2.1 2.1.32 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

Given the following Unit 1 conditions:

Initial conditions:

- RCS cooldown in progress
- RCS temperature = 310°F slowly lowering

Current conditions:

- Both the 1A and 1B HPI pumps have failed
- AP/1/A/1700/014 (Loss of HPI Normal Makeup and/or RCP Seal Injection) in progress
- 1C HPI pump has been aligned to provide RCS makeup

1) In accordance with OP/1/A/1104/002 (HPI System), aligning the 1C HPI pump as the RCS Makeup pump __(1)__ require the 1HP-120 Travel Stop to be re-adjusted before considering it OPERABLE for LTOP.

2) In accordance with the basis of Tech Spec 3.4.12 (LTOP), opening the breakers for 1HP-409 and 1HP-410 __(2)__ required to "deactivate" the 1A HPI train.

Which ONE of the following completes the statements above?

A. 1. does
   2. is

B. 1. does NOT
   2. is

C. 1. does
   2. is NOT

D. 1. does NOT
   2. is NOT

General Discussion

Answer A Discussion

Incorrect: First part is correct. IAW L&P's of the HPI procedure, aligning the C HPI pump to normal makeup makes the HP-120 travel stop inoperable until adjusted using the appropriate PT.
Second part is incorrect. Plausible since HP-409 and 410 can pass full HPI flow and 1HP-26 (the ES injection valve) must have its breaker tagged open.

Answer B Discussion

Incorrect. First part is incorrect. Plausible since 1HP-120 has already been setup and adjusted such that either the A or B HPI pump can be used. Since the pumps are the same type pumps it would be logical to assume that if the A and B pump are OK, the C pump should be OK as well.
Second part is incorrect. Plausible since HP-409 and 410 can pass full HPI flow and 1HP-26 (the ES injection valve) must have its breaker tagged open.

Answer C Discussion

Correct. First part is correct. IAW L&P's of the HPI procedure, aligning the C HPI pump to normal makeup makes the HP-120 travel stop inoperable until it is readjusted using the appropriate PT.
Second part is correct. The basis of TS 3.4.12 (LTOP) explains that to deactivate the 1A HPI train when the breaker to the HPI pump is racked in, 1HP-26 must be closed with breaker tagged open, but 1HP-409 and 410 must only be closed with the switches for each valve tagged in the closed position. Opening the breakers for 1HP-409/410 is not required.

Answer D Discussion

Incorrect. First part is incorrect. Plausible since 1HP-120 has already been setup and adjusted such that either the A or B HPI pump can be used. Since the pumps are the same type pumps it would be logical to assume that if the A and B pump are OK, the C pump should be OK as well.
Second part is correct.

Basis for meeting the KA

Requires the ability to apply HPI system limits and precautions found in the HPI operating procedure.

Basis for Hi Cog

Basis for SRO only

Requires application of system Limits and precautions as well as knowledge found in the bases of Tech Specs that is the basis for the specification and not system knowledge. It cannot be answered with above the line information or 1 hr or less TS Required Actions or Completion Times.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 46 Q76

Development References

ILT 46 Q76 (12/2014)
OP/1/A/1104/002 R172
TSB 3.4.12 6-13-14
PNS-HPI Obj. 24
ADM-TSS LTOP Obj. 04

Student References Provided

GEN2.1 2.1.32 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

Remarks/Status

KA replaced per Chief Examiner on 12/01/17

C

GEN2.1 2.1.36 - GENERIC - Conduct of Operations
Conduct of Operations
Knowledge of procedures and limitations involved in core alterations. (CFR: 41.10 / 43.6 / 45.7)

Given the following Unit 1 conditions:

Initial conditions:

- Re-fueling in progress

Current conditions:

- A fuel assembly is damaged while inserting into the core
- An adjacent assembly must be placed in an alternate core location while recovering the damaged assembly

Which ONE of the following states the LOWEST level of approval required to place a fuel assembly into an alternate location other than the original one assigned by the Core Reload Sequence in accordance with MP/0/A/1500/009 (Defueling/Refueling Procedure) Limits and Precautions?

A. Refueling SRO Assistant

B. Reactor Building SRO

C. Refueling SRO

D. Shift Manager

General Discussion

Answer A Discussion

Incorrect and plausible since this position is involved in the step by step implementation of the refueling procedures and this position is the one required to administratively verify that the assembly is being inserted into the position required by the procedure.

Answer B Discussion

Incorrect and plausible since this is an SRO position required to be inside the Reactor Building during core alterations and it is a position required to be staffed by SLC 16.13.1 (Minimum Station Staffing Requirements). Additionally plausible since this position is responsible for the overall conduct of fuel handling operations in the Reactor Building.

Answer C Discussion

Correct. In accordance with the procedures used to control fuel handling activities:
During refueling, IF Any Fuel Assembly must be placed in a Core location other than the one assigned in PT/0/A/0750/018 (Refueling Activities) then the alternate core location shall be evaluated by a Qualified Reactor Engineer and approved by the Refueling SRO.

Answer D Discussion

Incorrect and plausible since in general the Shift Manager is required to approve deviations from procedures. However, this specific case has more specific requirements in the procedure being used to perform the fuel movement.

Basis for meeting the KA

Requires knowledge of procedure limitations on activities that involve core alterations.

Basis for Hi Cog

Basis for SRO only

In accordance with Rev. 1 of "Clarification Guidance for SRO-only Questions":
This question requires knowledge of fuel handling procedures and knowledge of the requirements necessary to change/deviate from a plant procedure. Additionally, this requires knowledge of an activity that is defined as an SRO only activity in plant procedures.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	ILT 45 NRC Exam Q#94

Development References

Lesson Plan FH-FHS
MP/1500/009 R70
ILT 45 Q94 (6/2014)

Student References Provided

GEN2.1 2.1.36 - GENERIC - Conduct of Operations
Conduct of Operations
Knowledge of procedures and limitations involved in core alterations. (CFR: 41.10 / 43.6 / 45.7)

Remarks/Status

GEN2.2 2.2.13 - GENERIC - Equipment Control
Equipment Control
Knowledge of tagging and clearance procedures. (CFR: 41.10 / 45.13)

In accordance with AD-OP-ALL-0200 (Clearance and Tagging)…

1) Clearances __(1)__ be approved by a PREVIOUSLY licensed SRO in the Work Process Group.

2) The MINIMUM level of Operations approval for Exceptional Clearances is __(2)__.

Which ONE of the following completes the statements above?

A. 1. can
   2. Shift Manager

B. 1. can
   2. Senior Reactor Operator

C. 1. can NOT
   2. Shift Manager

D. 1. can NOT
   2. Senior Reactor Operator

ILT 18-1 ONS SRO NRC Examination **QUESTION 96** 96 **C**

General Discussion

Answer A Discussion

Incorrect: First part is incorrect. Plausible because for a clearance review, it would be correct.
Second part is correct.

Answer B Discussion

Incorrect: First part is incorrect. Plausible because for a clearance review, it would be correct.
Second part is incorrect. Plausible because for a normal clearance, it would be correct.

Answer C Discussion

Correct: First part is correct. The clearance approver must have an active SRO license.
Second part is correct. Exceptional clearances are approved by the Shift Manager and the Work Group Supervisor.

Answer D Discussion

Incorrect: First part is correct. The clearance approver must have an active SRO license.
Second part is incorrect. Plausible because for a normal clearance, it would be correct.

Basis for meeting the KA

Question requires knowledge of the tagging and clearance procedures.

Basis for Hi Cog

Basis for SRO only

Authorizing clearance to begin work is an SRO Task. (Task OO3610036)

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References	Student References Provided
AD-OP-ALL-0200 Rev. 17	

GEN2.2 2.2.13 - GENERIC - Equipment Control
Equipment Control
Knowledge of tagging and clearance procedures. (CFR: 41.10 / 45.13)

Remarks/Status

GEN2.2 2.2.17 - GENERIC - Equipment Control

Equipment Control

Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator. (CFR: 41.10 / 43.5 / 45.13)

Given the following plant conditions:

- High priority work that meets the Priority 1 criteria needs to be worked within the next 24 hours

In accordance with AD-WC-ALL-0410 (Work Activity Integrated Risk Management), which ONE of the following states the LOWEST level of management that has the authority to waive the associated risk assessment activities?

A. Shift Manager

B. Station Manager

C. Operations Manager

D. Control Room Supervisor

General Discussion

Answer A Discussion

Correct: The risk assessment activities prescribed by AD-WC-ALL-0410 may be waived by the Shift Manager when high priority (1 or 2) work needs to be performed in the next 24 hours.

Answer B Discussion

Incorrect: Plausible because the station manager along with the OPS Manager, Maintenance Manager, and Work Control Manager can waive the requirement to review a Critical Plan

Answer C Discussion

Incorrect: Plausible because the OPS manager along with the Station Manager, Maintenance Manager, and Work Control Manager can waive the requirement to review a Critical Plan

Answer D Discussion

Incorrect: Plausible since this position is a licensed SRO with an Active license who is responsible for the safe operation of the Unit and in most other situations acts as the final say for activities on the associated unit.

Basis for meeting the KA

Question requires knowledge of the process for managing maintenance activities during power operations such as risk assessments.

Basis for Hi Cog

Basis for SRO only

Question requires knowledge of Administrative requirements that are specific to the SRO position.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	MODIFIED	ILT 40 Q96

Development References

ILT 40 Q96
AD-WC-ALL-0410 R6
ADM-FSP Obj. 08

Student References Provided

GEN2.2 2.2.17 - GENERIC - Equipment Control

Equipment Control

Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

GEN2.3 2.3.15 - GENERIC - Radiation Control
Radiation Control
Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 43.4 / 45.9)

Given the following Unit 1 conditions:

Initial conditions:

- Unit is in Mode 6
- Defueling in progress
- 1RIA-3 (Fuel Transfer Canal Monitor) = 4 mr/hr stable
- Main Fuel Bridge Area Monitor = 6 mr/hr stable

Current conditions:

- 1RIA-3 local reading = 0 mr/hr
- 1RIA-3 View Node indication is magenta

The Refueling SRO will determine that Fuel Handling activities in the Reactor Building may ______ in accordance with OP/1/A/1502/007 (Operations Defueling/Refueling Responsibilities).

Which ONE of the following completes the statement above?

A. continue because only the Main Fuel Bridge Area Monitor is required

B. continue provided the audible alarm associated with 1RIA-49 (RB Normal Gas) is operable

C. NOT continue until continuous RP coverage is present on the Main Fuel Bridge

D. NOT continue until a portable area monitor with local alarm capability is in place

---

General Discussion

Answer A Discussion

Incorrect and plausible since both RIAs would help protect the fuel handlers. However both RIAs are required.

Answer B Discussion

Incorrect and plausible since RIA-49 would alarm and sound the RB evacuation alarm if highly radioactive gases were released into the RB.

Answer C Discussion

Incorrect and plausible since RP is contacted to supply the replacement instrument but is not required to provide local coverage.

Answer D Discussion

Correct. If 1RIA-3 is inoperable, RP must be contacted to provide a portable Area monitor with local alarm capability in accordance with OP/1502/007.

Basis for meeting the KA

Requires knowledge of the requirements for use of portable survey instruments.

Basis for Hi Cog

Basis for SRO only

In accordance with "Clarification Guidance for SRO-only Questions": Question requires knowledge of Fuel Handling procedures. The SRO must evaluate the RIA availability and requirements to continue fuel movement. This also meets the KA in that at the SRO level, it demonstrates knowledge of portable survey instrument requirements. Additionally SRO only since this is also SLC requirements and is applicability of the SLC. It is NOT above the line information (SLC 16.12.2).

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	ILT 16-1 Q97

Development References

Lesson Plan FH-FHS
OP/1/A/1502/007 rev 89
SLC 16.12.2 5/3/07
ILT 16-1 Q97 (06/2016)

Student References Provided

GEN2.3 2.3.15 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 43.4 / 45.9)

Remarks/Status

ILT 18-1 ONS SRO NRC Examination **QUESTION 99** 99 **A**

GEN2.4 2.4.11 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 3 conditions:

- Control room staffing at minimum
- No other SROs or the SM are available
- Time is NOT available for a procedure change
- An abnormal procedure (AP) is in progress

In accordance with OMP 1-18 (Implementation Standard During Abnormal and Emergency Events), taking actions outside of the AP is allowed if a procedure step __(1)__ and the MINIMUM level of approval required is __(2)__.

Which ONE of the following completes the statement above?

A. 1. is incorrect
   2. CRS only

B. 1. is incorrect
   2. one RO and CRS

C. 1. will result in unplanned TS entry
   2. CRS only

D. 1. will result in unplanned TS entry
   2. one RO and CRS

General Discussion

Answer A Discussion

Correct: A procedure step is incorrect is one the reasons allowed to deviate from the approved AP. Normally this requires SM approval. In lieu of the SM two SROs can approve the action. However if only the CRS is available, then he/she alone can make the determination.

Answer B Discussion

First part is correct.

Second part is incorrect and plausible because it is the preferred method if the SM is not available.

Answer C Discussion

First part is incorrect and plausible because unplanned TS entry while performing an OP would require stopping the in progress procedure and getting a procedure change prior to continuing.

Second part is correct.

Answer D Discussion

First part is incorrect and plausible because unplanned TS entry while performing an OP would require stopping the in progress procedure and getting a procedure change prior to continuing.

Second part is incorrect and plausible because it is the preferred method if the SM is not available.

Basis for meeting the KA

Requires knowledge of taking steps outside of abnormal condition procedures

Basis for Hi Cog

Basis for SRO only

Requires assessment of facility conditions and knowledge of specific administrative procedure requirements during abnormal, and/or emergency situations.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	2009 NRC Exam Q#100

Development References

OMP 1-18 R41
2009 Q100 (3/2009)

Student References Provided

GEN2.4 2.4.11 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

GEN2.4 2.4.25 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of fire protection procedures. (CFR: 41.10 / 43.5 / 45.13)

Given the following Unit 1 conditions:

Time = 0800:

- All 3 Units reactor power = 100%
- 1SA-3/B-6 (FIRE ALARM) actuated
- AOs dispatched to the Turbine Building 3rd Floor (1TA and 1TB Switchgear area)

Time = 0802:

- AO reports the fire on 1TB switchgear with heavy smoke and rolling flames
- Fire Brigade is dispatched

Time = 0820:

- Fire Brigade Leader reports flame is still visible on 1TB switchgear

1) At Time = 0820, the HIGHEST EAL classification is __(1)__.

2) In accordance with the “Fire Plan”, a water fog __(2)__ be used on the switchgear to fight the fire.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. Alert
   2. can

B. 1. Alert
   2. can NOT

C. 1. Unusual Event
   2. can

D. 1. Unusual Event
   2. can NOT

General Discussion

Answer A Discussion

Incorrect. First part is incorrect. Plausible because if the switchgear was 1TC, 1TD, or 1TE, which are safety related, it would be correct. Fire that has caused visible damage to a safety system component or structure needed for the current operating mode.

Second part is correct. In accordance with the "Fire Plan", a water fog can be used to fight this fire.

Answer B Discussion

Incorrect. First part is incorrect. Plausible because if the switchgear was 1TC, 1TD, or 1TE, which are safety related, it would be correct. Fire that has caused visible damage to a safety system component or structure needed for the current operating mode.

Second part is incorrect and plausible because a water "stream" cannot be used on this fire.

Answer C Discussion

Correct. First part is correct. The EAL classification is Unusual Event based on HU4.1 - A fire is not extinguished within 15 min of a report from the field and the fire is located within any Table H-1 area, one of which is the Turbine Building. 1TB switchgear is located on the 3rd floor of the Turbine Building.

Second part is correct. In accordance with the "Fire Plan", a water fog can be used to fight this fire.

Answer D Discussion

Incorrect. First part is correct. The EAL classification is Unusual Event based on HU4.1 - A fire is not extinguished within 15 min of a report from the field and the fire is located within any Table H-1 area, one of which is the Turbine Building. 1TB switchgear is located on the 3rd floor of the Turbine Building.

Second part is incorrect and plasuible because a water "stream" cannot be used on this fire.

Basis for meeting the KA

Requires knowledge of the fire plan (fire protection procedures) related to using water to fight an electrical fire. Also requires knowledge of the Emergency plan related to a fire.

Basis for Hi Cog

Basis for SRO only

Requires knowledge of fire protection procedures (the fire plan which states when a water fog can be used). Requires knowledge of the Emergency Plan and classification of events, which are SRO Tasks.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	ILT 42 NRC Exam Q#99

Development References

RP/0/A/1000/001 Rev 6
ILT 42 Q99 (12/2012)
ONS Rev 6 Wallcharts

Student References Provided

ONS Rev 6 Wallcharts

GEN2.4 2.4.25 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of fire protection procedures. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

Facility: **Oconee** Scenario No.: **1** Op-Test No.: 1

Examiners: ______________________ Operators: ______________________ **SRO**

______________________ ______________________ **OATC**

______________________ ______________________ **BOP**

Initial Conditions:

- Reactor Power = 75%

Turnover:

- SASS is in manual for calibration
- AMSAC/DSS is bypassed for calibration
- PSW is unavailable for Unit 1

Event No.	Malfunction No.	Event Type*	Event Description
0a	Override		Standby HPI Pump Auto Start Disabled
0b	Override		AMSAC/DSS Bypassed
0c	Override		SASS in Manual
1		N: OATC, SRO	CRD Movement PT (Group 1)
2	Override	C: BOP, SRO **(TS)**	1A CFT Low Pressure
3	MPS120	C: OATC, SRO **(TS)**	1A HPI Pump Sheared Shaft
4	MSS200 MSS200D	C: BOP, SRO **(TS)**	Condenser Vacuum Leak
5	Override	C: BOP, SRO	1A RPS Channel RC Pressure Fails High
6	MPI330	C: OATC, SRO **(TS)**	One Dropped Rod With Failure of Auto Runback Circuit
7	MSS260 MSS390	M: ALL	1B Main Steam Line Break Outside RB • 1A MD EFDW Pump Fails to Start • Diverse HPI Fails to go to Bypass

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

SCENARIO 1 EVENT SUMMARY

Event 1: When the crew takes the shift, the SRO will direct the OATC to perform PT/1/A/0600/015 Enclosure 13.2 (Control Rod Movement at Power). This will be performed for group 1 rods only.

Event 2: The pressure in the 1A Core Flood Tank (1A CFT) will be just above the alarm setpoint when the scenario begins. When this event is initiated, 1A CFT pressure will drop just low enough for the Statalarm to actuate. The BOP will then use OP/1/A/1104/001 Enclosure 4.7 to increase pressure in the 1A CFT to ≈ 600 psig. This evolution will require the SRO to enter TS 3.6.3.

Event 3: The 1A HPIP will experience a sheared shaft. Pump amps will lower to approximately 10-15 amps, discharge pressure and flow will drop to ≈ 0. The 1B HPIP will not start in automatic requiring operator action. The crew will enter AP/14 (Loss of Normal HPI Makeup and/or RCP Seal Injection), close 1HP-5, 1HP-120 and 1HP-31 and start the 1B HPIP. The crew should then restore the HPI System to normal. The SRO will enter TS for the loss of the 1A HPI Pump.

Event 4: The Main Condenser will experience a vacuum leak and will require the crew to start the Main Vacuum Pumps prior to the unit tripping on low condenser vacuum. After the crew dispatches operators to look for vacuum leaks, a report will be made to the control room and the SRO will be required to direct the AO to isolate the source of the leak. This event will require the SRO to evaluate Tech Specs and enter the appropriate conditions when the 4th CCW pump is started.

Event 5: The 1A RPS channel RCS pressure signal will fail high. The crew will refer to OP/1/A/1105/014 (Control Room Instrumentation Operation and Information) Enclosure 4.7 (Removal and Restoration of RPS Channels) to place the 1A RPS channel in Manual Bypass by procedure.

Event 6: Once the control rod drops into the core, the crew will perform Plant Transient Response (PTR) and the BOP will report that an automatic Runback is not occurring. The OATC will initiate a power reduction to ≤ 55% core thermal power at ≥ 1%/min (the power reduction must be at least 10% in order to meet the intent of the event). Since only the automatic runback has failed. The crew could enter the new desired power level and rate on CTPD and ICS will automatically reduce power. The dropped control rod will require the SRO to enter TS 3.1.4, TS 3.1.5, and TS 3.2.3.

Event 7: A MSLB will occur on the 1B SG. The SRO will direct an RO to perform a Symptoms Check. This operator should recognize the steam line break and perform Rule 5 for the steam line break. The SRO will transfer to the LOSCM tab (if SCM is lost) from the Subsequent Actions Parallel Action page, and then to the EHT tab for the steam line break. The crew will isolate the 1B SG and then transfer to the Forced Cooldown (FCD) tab.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **1**	Page 1 of 5
Event Description:	**Control Rod Movement PT (Group 1) (N: OATC, SRO)**		

Time	Position	Applicant's Actions or Behavior
		Examiner Note: During the Control Rod Movement PT, the Unit 1 CRS will assume the role of the dedicated Reactivity Management SRO.
		PT/1/A/0600/015
	SRO	**Crew response:** SRO directs the OATC to perform PT/1/A/0600/015, Encl. 13.2 (Control Rod Movement at Power).
		PT/1/A/0600/015, Encl. 13.2 Rev 29
	OATC	3.1 **WHILE** enclosure is in progress, monitor the following indications: • CRD position • Appropriate ranged NIs • RCS temperature • Neutron error
		3.2 Ensure Rx Diamond and FDW Masters in Hand per Enclosure for Placing Rx Diamond/FDW Masters To Hand of OP/1/A/1102/004 A (ICS Operation).**(already in HAND)**
		3.3 **IF AT ANY TIME** contingency actions directed by CRS, perform Section 4 (Contingency Actions)
		NOTE: When operating switches on Diamond, maintain switch depressed until light indication changes state.
		3.4 Perform the following: (R.M.) • Ensure SEQ OR is ON. • Ensure SAFETY RODS OUT BYPASS is ON. • Ensure RUN is ON. • Ensure SINGLE SELECT SWITCH selected to ALL.
		NOTE: CRD Groups 1-6 are required to be ≥ 95% withdrawn for Shutdown Margin Calculation at Power enclosure of PT/1/A/1103/015 (Reactivity Balance Procedure) to be valid.
		3.5 **IF AT ANY TIME** any CRD Group 1-6 reaches 95% during insertion, stop inserting associated group. (R.M.)

This event is complete when the Control Rod Movement PT is complete and ICS is in Auto or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **1** Page 2 of 5

Event Description: **Control Rod Movement PT (Group 1) (N: OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
		PT/1/A/0600/015
		Crew response:
		3.6 Perform the following to test CRD Group 1: (R.M.)
	SRO	___ 3.6.1 Ensure GROUP SELECT SWITCH to 1. ___ 3.6.2 Ensure Group 1 CONTROL ON lights are ON. (PI panel)
	OATC	**NOTE** • 1SA-2/C-10 "CRD Safety Rods Not At Upper Limit" will alarm when Safety Groups are inserted. • Control rods should **NOT** be left inserted. Rod withdrawal should commence immediately after insertion is complete.
		___ 3.6.3 Perform the following: A. Insert CRD Group 1. B. **WHEN** all 100% lights OFF, stop insertion. C. Withdraw Group 1 to 100% **until** CRD TRAVEL "Out" light OFF.
		___ 3.6.4 Verify all 100% lights are ON for Group 1. (PI Panel) ___ 3.6.5 Verify unit is stable.
		Examiner Note: Steps 3.7 – 3.13 test Control Rod Groups 2-8. When completing the PT on GP 1 Control Rods, they should proceed to step 3.14 to return ICS to AUTOMATIC.
		NOTE: When operating switches on Diamond, maintain switch depressed until light indication changes state.
		3.14 Perform the following: (R.M.) • Ensure SEQ is ON. • Ensure GROUP SELECT SWITCH to OFF. • Ensure SAFETY RODS OUT BYPASS is OFF.
		3.15 Return Rx Diamond and FDW Masters To Automatic per OP/1/A/1102/004 A (ICS Operation). **(Page 5)**

This event is complete when the Control Rod Movement PT is complete and ICS is in Auto or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **1** Page 3 of 5

Event Description: **Control Rod Movement PT (Group 1) (N: OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1102/004A Encl 4.1 (in progress)
		Crew Response:
		OP/1/A/1102/004A Encl 4.1 rev11
		2.9 **WHEN** required, place ICS back in auto as follows:
	SRO	2.9.1 Ensure "RATE SET" thumbwheels at 0.0.
		2.9.2 **IF** TURBINE MASTER is in manual ***[N/A]***
		2.9.3 **IF** Rx Master is in "HAND" ***[N/A]***
	OATC	2.9.4 **IF** DIAMOND is in manual, perform the following:
		A. Verify REACTOR MASTER in "AUTO".
		B. **IF** both SGs are off of Level Control, perform the following:
		1. **IF** selected Tave (O1E2086) is different from Tave setpoint (O1E2087) by more than ± 0.15°F, perform the following:
		a. Simultaneously perform the following:
		• Ensure 1A FDW MASTER in "HAND"
		• Ensure 1B FDW MASTER in "HAND"
		NOTE • Cycling the setpoint selector may result in a Star Module failure. This is expected for this condition and entry into AP/1/A/1700/028 (ICS Instrument Failures) is **NOT** required. The Star Module failure shall be cleared before the ICS is returned to Auto. • Reactor Master trips to "Hand" at 585.2%F.
		b. On REACTOR MASTER, cycle Tave setpoint selector between 567°F and 583°F five times.
		c. **IF** Star Module failed, perform the following:
		1) Initiate Work Request to repair Star Module.
		2) **WHEN** Star Module repaired, continue procedure.
		d. On REACTOR MASTER adjust Tave setpoint (O1E2087) toward selected Tave (O1E2086).
		2. Verify selected Tave is within ± 0.15°F of Tave setpoint.

This event is complete when the Control Rod Movement PT is complete and ICS is in Auto or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **1**	Page 4 of 5
Event Description:	**Control Rod Movement PT (Group 1) (N: OATC, SRO)**		

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1102/004A Encl 4.1
		<u>Crew Response</u>:
		C. **<u>IF</u>** either SG is on Level Control, adjust Tave setpoint (O1E2087) to 579°F.
	SRO	D. Place DIAMOND in "AUTO".
		2.9.5 Ensure STM GENERATOR MASTER in "AUTO".
		2.9.6 **<u>IF</u>** 1A **<u>OR</u>** 1B FDW Master is in "HAND", perform the following:
	OATC	A. Perform the following: • Select 1A FDW MASTER to "MEAS VAR" • Select 1B FDW MASTER to "MEAS VAR"
		B. **<u>IF</u>** 1A **<u>OR</u>** 1B FDW Master Measured Variable is **<u>NOT</u>** on the caret, perform the following: 1. Initiate Work Request to repair. 2. **<u>WHEN</u>** repairs are complete, continue procedure.
		C. Verify the following: • 1A FDW MASTER Measured Variable on the caret • 1B FDW MASTER Measured Variable on the caret
		D. Perform the following: • Select 1A FDW MASTER to "POS" • Select 1B FDW MASTER to "POS"
		E. <u>Simultaneously</u> perform the following: • Select 1A FDW MASTER to "AUTO" • Select 1B FDW MASTER to "AUTO"

This event is complete when the Control Rod Movement PT is complete and ICS is in Auto or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **1** Page 5 of 5

Event Description: **Control Rod Movement PT (Group 1) (N: OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1102/004A Encl 4.1
		Crew Response:
		CAUTION: Adjusting THP, Tave or Delta Tc setpoint too fast can cause plant instability.
	SRO	2.10 **IF NOT** being controlled by another procedure, perform the following:
		2.10.1 **IF** THP (O1E2088) is **NOT** ≈ 885 psig, slowly adjust THP Setpoint (O1E2089) to ≈ 885 psig. (R.M.)
	OATC	2.10.2 **IF** Tave Setpoint (O1E2087) is **NOT** at ≈ 579°F, slowly adjust Tave setpoint to ≈ 579°F. (R.M.)
		2.10.3 **IF** Delta Tc is **NOT** ≈ 0.0, adjust Delta Tc Setpoint (O1E2091) to ≈ 0.0°F. (R.M.)
		2.11 **IF** desired adjust CTP as follows: (R.M.)
		2.11.1 Review current mechanical maneuvering rates per PT/0/A/1103/020 (Power Maneuvering Predictions).
		2.11.2 **IF** desired to increase power, perform the following:
		A. **WHEN** ICS has been in full Auto (Integrated Mode) for > 10 minutes, continue at Step 2.11.3.
		2.11.3 Ensure selected "HOLD".
		2.11.4 Ensure desired setting selected ("%/MIN" or "%/HR") on "RATE" pushbuttons.
		2.11.5 Ensure desired rate selected on "RATE SET" thumbwheels.
		2.11.6 Insert desired CTPD SET using "INCREASE/DECREASE" pushbuttons.
		2.11.7 Ensure "HOLD" is **NOT** selected.
		2.11.8 **WHEN** desired CTP is achieved, return "RATE SET" thumbwheels to 0.0.

This event is complete when the Control Rod Movement PT is complete and ICS is in Auto or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **2** Page 1 of 2

Event Description: **1A CFT Low Pressure (C: BOP, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		<u>Plant Response</u>: • Statalarm 1SA-8/A-11 (Core Flood Tank A Pressure High/Low) • OAC alarm O1A0074 (Core Flood Tank 1A Press) **<u>Crew Response</u>:** **OAC Alarm O1A0074** HI-HI 1) Lower pressure per OP/1/A/1104/001 (Core Flood System) 2) Refer to TS 3.5.1 HI Evaluate lowering pressure per OP/1/A/1104/001 LO Evaluate increasing pressure and/or level per OP/1/A/1104/001 LO-LO 1) Increase pressure per OP/1/A/1104/001 2) Refer to TS 3.5.1 **Statalarm 1SA-8/A-11** 3.1 Refer to OP/1/A/1104/001 to adjust pressure as necessary 3.2 Determine cause of alarm and correct The SRO will direct the BOP to pressurize 1A CFT with nitrogen. **<u>OP/1/A/1104/001 Enclosure 4.7</u>** (Pressure Makeup to CFTs Using Nitrogen) rev 80 **1. Initial Conditions** 1.1 Verify high pressure nitrogen header in service. 1.2 Review Limits and Precautions. **<u>NOTE</u>** Nitrogen regulator pressure on N-30 and N-33 should be set at 625 psig while adding nitrogen to CFTs. **2. Procedure** 2.1 Notify operator to open 1N-137 (CFTs Supply). (A-2-Hallway) ***Booth Cue: When directed, open 1N-137 using MANUAL VALVES and open 1N-137 6% open and then notify the crew that 1N-137 is open.***

This event is complete when 1N-137 is closed (Step 2.4), or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **2** Page 2 of 2

Event Description: **1A CFT Low Pressure (C: BOP, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior

OP/1/A/1104/001

Crew response:

2.2 **IF** required to increase pressure in 1A CFT:

NOTE

TS 3.6.3 Condition 'B' requires penetration flow path to be isolated within one hour. A check valve with flow secured through the valve is considered operable.

2.2.1 Enter Technical Specification 3.6.3 Condition 'A' and 'B'.

2.2.2 Open 1N-298 (N2 FILL CORE FLOOD TANK 1A).

2.2.3 **IF** 1N-128 (CFT 1A Supply) is closed, throttle 1N-128 (CFT 1A Supply) for a rate of ≤ 100 psig per 15 minutes (≈ 6.6 psig/min). (A-4-409)

Booth Cue: If dispatched to determine position of 1N-128, notify crew 1N-128 is throttled.

2.2.4 Monitor 1A CFT pressure.

2.2.5 **IF AT ANY TIME** ES actuation occurs, close 1N-298 (N2 FILL CORE FLOOD TANK 1A).

2.2.6 **IF AT ANY TIME** 1N-298 fails to close, notify operator to close 1N-137 (CFTs Supply). (A-2-Hallway).

2.2.7 **WHEN** pressurization of 1A CFT complete, close 1N-298 (N2 FILL CORE FLOOD TANK 1A).

2.2.8 **IF** 1N-298 leaks past seat, close 1N-128 (CFT 1A Supply). (A-4-409)

2.2.9 Evaluate exiting Technical Specification 3.6.3 Condition 'A' and 'B'.

2.2.10 **IF** 1N-128 (CFT 1A Supply) closed in Step 2.2.8, place tag on 1N-128.

2.3 **IF** required to increase pressure in 1B CFT: **(not required)**

2.4 Notify an operator to close 1N-137 (CFTs Supply). (A-2-Hallway)

Booth Cue: When directed, close 1N-137 using MANUAL VALVES and notify crew 1N-137 is closed.

2.5 Verify 1A CFT pressure stable.

2.6 Verify 1B CFT pressure stable.

Examiner Note: Event 3 should begin as the BOP closes 1N-298 (Step 2.2.7) to help ensure the OATC responds to the event.

This event is complete when 1N-137 is closed (Step 2.4), or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **3**	Page 1 of 3
Event Description:	**1A HPI Pump Sheared Shaft (C: OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/014 **Plant Response:** • 1SA-2/B-2 (HP RCP Seal Injection Flow High/Low) • 1SA-2/C-2 (HP Injection Pump Disch. Header Pressure High/Low) • RC Makeup Flow ≈ 0 gpm • RCP SI flow ≈ 0 gpm • 1A HPI Pump amps low ≈ 10 amps • PZR level will begin to lower and LDST level will begin to rise • 1HP-120 throttles open due to PZR level lowering **Crew Response:** BOP may refer to ARGs (Both ARGs direct referral to AP/14) SRO will refer to AP/1/A/1700/014 ***Examiner Note: SRO may direct an RO to initiate EOP Encl 5.5.* for inventory control** (**page 60**) **AP/1/A/1700/014** (Loss of Normal HPI Makeup and/or RCP Seal Injection) rev 19 **Immediate Manual Actions** 3.1 **IAAT** RCP seal injection flow is lost, **AND** Component Cooling is lost, **THEN** perform the following: A. __ Trip the Rx. B. __ Stop all RCPs. C. __ Initiate AP/25 (SSF EOP). 3.2 **IAAT** loss of suction to operating HPI pumps is indicated: • Motor amps low or cycling • Discharge pressure low or cycling • Abnormal LDST level trend **THEN GO TO** Step 3.3. **RNO: GO TO** Step 4.7 ***Examiner Note:*** • ***The Crew should diagnose a sheared shaft and proceed to step 4.7.*** • ***The Crew may place the 1A HPIP Switch in the OFF position.***

This event is complete when 1HP-31 is placed in AUTO or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **3** Page 2 of 3

Event Description: **1A HPI Pump Sheared Shaft (C: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/014
		Crew Response:
		Subsequent Actions
		4.7 Announce AP entry using PA System.
		4.8 Verify any HPI pump operating.
		Examiner Note: With a sheared shaft on the 1A HPIP, Step 4.8 should be interpreted as no HPIPs operating
		RNO: 1. __ Close 1HP-5. 2. __ Place 1HP-120 in HAND and close. 3. __ Place 1HP-31 in HAND and close. 4. __ Attempt to start the standby HPI pump. 5. __ **IF** standby HPI pump started, **THEN GO TO** Step 4.129. 6. __ **GO TO** Step 4.14.
		Booth Cue: If notified as FIN24 to investigate/repair the 1A HPIP and 1B HPIP failure to auto start, wait 5 minutes and report that the 1A HPIP has a sheared shaft.
		Booth Cue: If notified as an AO to investigate the 1A HPIP, wait 5 minutes and report that the 1A HPIP appears to have a sheared shaft.
		4.129 Place 1HP-31 in HAND.
		4.130 Slowly open 1HP-31 in small increments until ≈ 8 gpm/RCP is achieved.
		4.131 Re-establish normal makeup through 1HP-120.
		4.132 Ensure proper operation of the Component Cooling System.
		4.133 Reduce 1HP-7 demand to 0%.
		4.134 Close 1HP-6.
		Booth Cue: If contacted as the WCC to rackout and/or tagout the 1A HPI pump, acknowledge the request. Wait 10 minutes and then use QwikStrike to remove the control power fuses from the 1A HPIP and report that the 1A HPIP has been tagged out.

This event is complete when 1HP-31 is placed in AUTO or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **3** Page 3 of 3

Event Description: **1A HPI Pump Sheared Shaft (C: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/014
		Crew Response:
		4.135 Open the following: __ 1HP-1 __ 1HP-2 __ 1HP-3 __ 1HP-4
		4.136 Open 1HP-5.
		4.137 Throttle open 1HP-7 for ≈ 20 gpm letdown flow.
		4.138 Open 1HP-6.
		4.139 Adjust 1HP-7 for desired letdown flow.
		4.140 Open the following: __ 1HP-228 __ 1HP-226 __ 1HP-232 __ 1HP-230
		4.141 Open 1HP-21.
		4.142 **IAAT** SEAL INLET HDR FLOW ≈ 32 gpm, **THEN** place 1HP-31 in AUTO.
		4.143 Monitor RCP seal parameters.
		4.144 Maintain RCP seal injection flows as required.
		4.145 Log thermal cycle of 1A HPI header.
		4.146 **WHEN** conditions permit, **THEN EXIT** this procedure.
	SRO	**TS 3.5.2 HIGH PRESSURE INJECTION (HPI)** Condition A.1 (72 hours) Restore HPI pump to OPERABLE status.

This event is complete when 1HP-31 is placed in AUTO or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **4**	Page 1 of 2
Event Description:	**Condenser Vacuum Leak (C: BOP, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/027
		<u>Plant Response</u>: • 1SA-3/A-6 (Condenser Vacuum Low) will alarm at 25" Hg
		<u>Crew Response</u>: • The SRO may direct the BOP to refer to the Alarm Response Guide for 1SA-3/A-6 • The SRO will enter AP/1/A/1700/027 (Loss of Condenser Vacuum)
		1SA-3/A-6 (Condenser Vacuum Low) rev 064 3.1 Refer to AP/1/A/1700/027 (Loss of Condenser Vacuum)
		<u>AP/1/A/1700/027</u> (Loss of Condenser Vacuum) rev 007 4.1 Announce AP entry using the PA system. 4.2 **IAAT** <u>both</u> of the following apply: __ Condenser vacuum ≤ 22″ Hg __ MODE 1 <u>or</u> 2 **THEN** trip the Rx. 4.3 Dispatch operators to perform the following: __ Perform Encl 5.1 (Main Vacuum Pump Alignment) __ Look for vacuum leaks
	CT-1	4.4 **Ensure <u>all</u> available Main Vacuum Pumps operating (A, B, & C).**
		Booth Cue: When contacted as an AO to perform AP/27 Encl 5.1, wait until after all MVPs are running and then use TIME COMPRESSION and call the Control Room to notify the crew that the Main Vacuum Pumps are aligned to Unit 1.
		4.5 Ensure 1V-186 is closed. 4.6 Ensure Steam to Steam Air Ejector A, B, C > 255 psig. 4.7 Verify Steam Seal Header Press > 1.5 psig.

This event is complete when SRO reaches Step 4.10 of AP/27, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **4**	Page 2 of 2
Event Description:	**Condenser Vacuum Leak (C: BOP, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/027 **Crew Response:** 4.8 Ensure all available CCW pumps operating. ***Examiner Note:*** ***When the 4th CCW Pump is started, the LPSW Leakage Accumulator will alarm on the OAC requiring entry into TS 3.7.7 Condition B (7 days) Restore the LPSW WPS to OPERABLE status.*** ***Booth Cue:*** ***When contacted as an AO to look for vacuum leaks, wait until the 1D CCW pump is started and then report that a leak was found on the 1B Main FDW Pump pumping trap sight glass.*** ***Booth Cue:*** ***If directed as an AO to isolate the 1B FDW Pump pumping trap sight glass, FIRE TIMER 11 to stop the vacuum leak and report that the sight glass is isolated and the vacuum leak has stopped.*** 4.9 Verify Condensate flow ≥ 2300 gpm 4.10 Verify 1SSH-1 is closed 4.11 **WHEN** condenser vacuum is stable, **AND** Encl 5.1 (Main Vacuum Pump Alignment) is complete, **THEN EXIT** this procedure ***Booth Cue:*** ***IF/when asked about the status of Encl. 5.1, respond that using time compression, Encl. 5.1 is complete.*** **TS 3.7.7 LOW PRESSURE SERVICE WATER** Condition B (7 days) Restore the LPSW WPS to OPERABLE status.
This event is complete when SRO reaches Step 4.10 of AP/27, or as directed by the Lead Examiner.		

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **5** Page 1 of 2

Event Description: **1A RPS Channel RC Pressure Fails High (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		<u>Plant response</u>: • 1SA-1/A-6 (1A HI PRESS TRIP) • 1SA-5/A-5 (1A RPS TROUBLE) actuates • OAC alarm for 1A RPS RC PRESS DEV actuates **<u>Crew response</u>:** Refer to ARG for 1SA-5/A5 (1A RPS TROUBLE) 3.1 **<u>IF</u>** Reactor trips, <u>Go</u> <u>To</u> EP/1/A/1800/001 (Emergency Operating Procedure). 3.2 Refer to OP/1/A/1105/014 (Control Room Instrumentation Operation and Information). 3.3 Initiate Work Request for I&E to investigate cause. Refer to ARG for 1SA-1/A-6 (1A HI PRESS TRIP 3.1 Check instrumentation to verify high pressure 3.2 Refer to OP/1/A/1105/014 (Control Room Instrumentation Operation and Information) **Refer to OP/1/A/1105/014** (Control Room Instrumentation Operation and Information) Enclosure 4.7 (Removal and Restoration of RPS Channels) rev 44 ***OP/1/A/1105/014*** **2. Initial Conditions** 2.1 Verify **<u>one</u>** of the following: 2.1.1 A procedure requires RPS Channel to be placed in Trip or Bypass. 2.1.2 Equipment failure requires RPS Channel to be placed in Trip or Bypass. 2.2 Identify <u>affected</u> RPS Channel **<u>1A</u>** (1A, 1B, 1C, 1D) ***Booth Cue: After being contacted as FIN24 to investigate and repair the failure in 1A RPS Channel, if the crew delays placing the channel in Manual Bypass, call the crew as FIN24 and request the 1A RPS Channel be placed in MANUAL BYPASS to investigate and repair the failure.***

This event is complete when the 1A RPS Channel is placed in Manual Bypass (Step 3.1.1.C), or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **5** Page 2 of 2

Event Description: **1A RPS Channel RC Pressure Fails High (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

OP/1/A/1105/014

Crew response:

3. Procedure

NOTE: Placing RPS channel in Manual Bypass is preferred to minimize risk of Reactor trip.

3.1 **IF** affected RPS channel is **NOT** required per TS 3.3.1, perform **one** of the following:

3.1.1 **IF** Manual Bypass of affected RPS channel is desired, perform the following:

A. Obtain Key #314

B. Declare affected RPS Channel inoperable

C. Place affected RPS Channel MANUAL BYPASS keyswitch in "BYP" (Cab. 2, 4, 6, or 8)

3.1.2 **IF** Manual Trip of affected RPS channel is desired, perform the following:

Examiner Note: Per the NOTE above, placing 1A RPS channel in Manual Bypass is preferred.

3.2 **IF** affected RPS channel is required per TS 3.3.1, perform the following:

Examiner Note: The 1A RPS channel is NOT required per TS since three RPS channels remain operable.

3.3 **IF** RPS Channel removed from service due to equipment failure, perform the following:

__ Initiate Work Request

__ **IF** required per OMP 1-14 (notifications), perform appropriate notifications

3.4 **WHEN** notified by I&E, restore RPS channels as follows:

Examiner Note: The 1A RPS channel will remain bypassed for the remainder of the scenario.

This event is complete when the 1A RPS Channel is placed in Manual Bypass (Step 3.1.1.C), or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **6**	Page 1 of 6
Event Description:	**One Dropped Control Rod With Failure of AUTO Runback Circuit (C: OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior

AP/1/A/1700/001

Plant Response:

- Group 2 Rod 6 drops into the core
- Statalarm 1SA-2/A-10 (CRD GLOBAL TROUBLE)
- Statalarm 1SA-2/B-10 (CRD ASYMMETRIC ROD POSITION ERROR)
- Statalarm 1SA-2/D-9 (CRD OUT INHIBIT)
- Statalarm 1SA-4/C-1 (QUADRANT POWER TILT) (**in at ≈ 2 minutes**)
- Statalarm 1SA-5/A-5 (1A RPS TROUBLE)
- Statalarm 1SA-5/B-5 (1B RPS TROUBLE)
- Statalarm 1SA-5/D-5 (1D RPS TROUBLE)

Crew Response:

Crew should perform Plant Transient Response (PTR)

- OATC reports to the SRO reactor power level and direction of movement.
- The BOP reports expected AUTO Runback did not occur, and monitors RCS pressure and inventory and inserts Control Rods as needed.
- The OATC will adjust FDW and/or control rods as necessary to restore reactor power to the desired control band.
- The crew may place the Diamond and FDW Masters in HAND

SRO should enter AP/1/A/1700/001 (Unit Runback)

AP/1/A/1700/001 (Unit Runback) rev 15

4.1 **GO TO** the most limiting section per the following table:

√	Section	Runback
	4H	Asymmetric Control Rod (1%/min to 55%power)

Section 4H

1 **IAAT** a more limiting runback occurs,
THEN GO TO Subsequent Actions Step 4.1.

2 **IAAT** more than one control rod is dropped or misaligned ≥ 6.5% (9″) from the group average, **THEN** trip the Rx.

NOTE
NIs should **NOT** be calibrated per guidelines contained in OP/1/A/1102/004 (Operation at Power) due to actual power re-distribution within the core as a result of a dropped/misaligned rod.

3 Verify Rx is critical.

This event is complete when Reactor power has been lowered > 10% and FDW pump suction flow has been adjusted, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **6** Page 2 of 6

Event Description: **One Dropped Control Rod With Failure of AUTO Runback Circuit (C: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/001 Section 4H

<u>Crew response</u>:

Examiner Note: A Malfunction is set to fail the Auto runback circuit. The crew will proceed to the RNO.

4. Verify power > 55% when the rod was dropped <u>or</u> misaligned.
5. Verify Rx runback to 55% <u>core</u> <u>thermal</u> <u>power</u> in progress.
   - CTPD set at 55%
   - ASYMETRIC RODS Runback Light lit
   - CTP Demand decreasing
   - Reactor power will decrease when the runback catches up with the initial power decrease from the dropped rod.

RNO: 1. Initiate power reduction to ≤ 55% core thermal power at ≥ 1%/min.

2. **IF** control rods will <u>not</u> insert manually,
THEN perform the following:
   A. Trip reactor.
   B. **GO TO** Unit 1 EOP.

6 Initiate Encl 5.1 (Control of Plant Equipment During Shutdown). **(page 20)**

<u>NOTE</u>
The following actions should be performed as quickly as possible due to the complexity of resetting RPS trip setpoints and Tech Spec time limits.

7 Notify SPOC to perform the following:
__ Investigate cause of dropped or misaligned control rod.
__ <u>Prepare</u> to reduce the following trip setpoints:
- RPS Flux/Flow-Imbalance
- RPS High Flux

8 Notify the OSM to ensure the requirements of the following Tech Specs are met: **(page 22)**
__ TS 3.1.4 (Control Rod Group Alignment Limits)
__ TS 3.1.5 (Safety Rod Position Limits)
__ TS 3.2.3 (Quadrant Power Tilt)

Booth Cue: When contacted as the SM to refer to TS 3.1.4 TS 3.1.5 & TS 3.2.3, inform the team that the SM is occupied at Unit 3 and can NOT verify TS requirements at this time.

This event is complete when Reactor power has been lowered > 10% and FDW pump suction flow has been adjusted, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **6**	Page 3 of 6

Event Description: **One Dropped Control Rod With Failure of AUTO Runback Circuit (C: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior

AP/1/A/1700/001 Section 4H

Crew response:

9. Notify OSM to make notifications as required per OMP 1-14 (Notifications).

Booth Cue: When contacted as the SM to make notifications per OMP 1-14, state that you will refer to OMP 1-14.

10 Verify > 1% SDM with allowance for the inoperable control rod per PT/1/A/1103/015 (Enclosure 13.18, Reactivity Balance Calculation) within one hour.

11 Reduce core thermal power ≤ the following limits, based on the number of RCPs operating, within two hours:

RCPs	Allowable Thermal Power (% FP)
3	45
4	**60**

NOTE

The following ensures adequate margin in preparation for resetting RPS trip setpoints.

12 **IAAT** the power decrease is complete,
AND any NI is > the following:

RCPs	Maximum NI Power (% FP)
3	40
4	**55**

THEN reduce power until all NIs are ≤ the Maximum NI Power limit for the operating RCP combination per Encl 5.4 (Power Reduction).

13. **WHEN** all NIs are ≤ the Maximum NI Power limit for the operating RCP combination, **THEN** notify SPOC to reduce RPS trip setpoints per AM/1/A/0315/017 (TXS RPS Channel A, B, C, And D Parameter Changes For Abnormal/Normal Operating Conditions)

This event is complete when Reactor power has been lowered > 10% and FDW pump suction flow has been adjusted, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **6** Page 4 of 6

Event Description: **One Dropped Control Rod With Failure of AUTO Runback Circuit (C: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/001 Enclosure 5.1

Crew response:

AP/1/A/1700/001 Enclosure 5.1

1 **IAAT** SRO determines all appropriate actions have been taken, **AND** the runback is complete, **THEN EXIT** this Enclosure.

2 Notify the WCC SRO to initiate Enclosure 5.2 (WCC SRO Support During Unit Runback;

Examiner Note: This scenario begins at 75% so steps 3 &4 have already been accomplished.

3 Start the following pumps:

__ 1A FDWP SEAL INJECTION PUMP
__ 1A FDWP AUXILIARY OIL PUMP
__ 1B FDWP AUXILIARY OIL PUMP
__ 1B FDWP SEAL INJECTION PUMP.

4 **WHEN** CTP is ≤ 80%, **THEN** stop the following pumps

__ 1E1 HTR DRN PUMP
__ 1E2 HTR DRN PUMP

5 **WHEN** CTP ≤ 65%, **THEN** continue this Enclosure.

6 Place the following in MANUAL and close:

__ 1FDW-53
__ 1FDW-65

NOTE
1B FDWP is the preferred pump to shut down first.

7 Verify both Main FDWPs operating.

8 Verify 1B FDWP to be shut down first.

9 Adjust the FWP bias counter-clockwise to lower 1B FWP suction flow ≈ 1 x 10^6 lb/hr < 1A FWP suction flow.

10 **GO TO** Step 12.

12. **IAAT** both Main FDW pumps running, **AND** both of the following exist:

__ 1B Main FDW pump is first pump to be shut down
__ Any of the following alarms occur:

- 1SA-16/A-3 (FWP B FLOW MINIMUM)
- 1SA-16/A-4 (FWP B FLOW BELOW MIN),

THEN trip 1B Main FDW Pump.

This event is complete when Reactor power has been lowered > 10% and FDW pump suction flow has been adjusted, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **6**	Page 5 of 6

Event Description: **One Dropped Control Rod With Failure of AUTO Runback Circuit (C: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/001 Enclosure 5.1

Crew response:

13 **IAAT** both Main FDW pumps running, **AND** both of the following exist:

__ 1A Main FDW pump is first pump to be shut down

__ Any of the following alarms occur:

- 1SA-16/A-1 (FWP A FLOW MINIMUM)
- 1SA-16/A-2 (FWP A FLOW BELOW MIN),

THEN trip 1A Main FDW Pump.

14 **IAAT** the operating FDWP suction flow < 1.5 x 10^6 lb/hr,
THEN slowly throttle the associated recirc control valve to establish 2300 - 6000 gpm total Condensate flow:

__ 1FDW-53

__ 1FDW-65

15 Maintain Pzr level between 220"- 250".

***Examiner Note:* *The SRO should refer to Tech Specs and make the following determinations:* (*also see page 22*)**

- ***TS 3.1.4 (Control Rod Group Alignment Limits), Condition A applies.***
- ***TS 3.1.5 (Safety Rod Position Limits), Condition A applies (Safety rods are in Groups 1 – 4)***
- ***TS 3.2.3 (Quadrant Power Tilt), Condition A applies (due to misaligned control rod) (If the highest Incore QPT exceeds +7.11 then Condition B would apply)***

Examiner Note:* *The SRO should refer to Tech Specs and make the following determinations:

TS 3.1.5 SAFETY ROD POSITION LIMITS

Condition A (1 hour) Withdraw the rod fully

OR

(1 hour) Verify SDM is within the limit specified in the COLR

OR

(1 hour) Initiate boration to restore SDM to within limit

AND

(1 hour) Declare the rod inoperable

Tech Specs are continued on the next page

This event is complete when Reactor power has been lowered > 10% and FDW pump suction flow has been adjusted, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **6** Page 6 of 6

Event Description: **One Dropped Control Rod With Failure of AUTO Runback Circuit (C: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		<u>Crew response</u>: ***Examiner Note: The SRO should refer to Tech Specs and make the following determinations:*** **<u>TS 3.1.4 CONTROL ROD GROUP ALIGNMENT LIMITS</u>** Condition A (1 hour) Restore CONTROL ROD alignment. <u>OR</u> (1 hour) Verify SDM is within the limit specified in the COLR <u>OR</u> (1 hour) Initiate boration to restore SDM to within limit <u>AND</u> (2 hours) Reduce THERMAL POWER to ≤ 60% of ALLOWABLE THERMAL POWER <u>AND</u> (10 hours) Reduce the nuclear overpower trip setpoints, based on flux and flux/flow imbalance, to ≤ 65.5% of the ALLOWABLE THERMAL POWER <u>AND</u> (72 hours) Verify the potential ejected rod worth is within the assumptions of the rod ejection analysis **<u>TS 3.2.3 QUADRANT POWER TILT</u>** Condition A (2 hours) Reduce THERMAL POWER ≥ 2% RTP from the ALLOWABLE THERMAL POWER for each 1% of QPT greater than the steady state limit <u>AND</u> (10 hours) Reduce nuclear overpower trip setpoints, based on flux and flux/flow imbalance, ≥ 2% RTP for each 1% of QPT greater than the steady state limit <u>AND</u> (24 hours) Restore QPT to ≤ the steady state limit Condition B (30 min) Reduce THERMAL POWER ≥ 2% RTP from ALLOWABLE THERMAL POWER for each 1% of QPT greater than the steady state limit <u>AND</u> (2 hours) Restore QPT to ≤ to the transient limit

This event is complete when Reactor power has been lowered > 10% and FDW pump suction flow has been adjusted, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **7**	Page 1 of 15
Event Description:	**1B Main Steam Line Break Outside RB (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		Plant response: • Steam pressure on 1B SG begins to lower • 1SA-2/A-9 (MS PRESSURE HIGH/LOW) • 1SA-1/A-1, B-1, C-1, D-1, RP Channel Trip Statalarms • ES Channels 1& 2 will actuate • 1SA-2/D-3 (RC Press High/Low)
		Crew response: ***Examiner Note: The OATC will perform Immediate Manual Actions (IMAs) and the BOP will perform a Symptoms Check.***
		Immediate Manual Actions ***EOP Immediate Manual Actions*** rev 01
	OATC	3.1 Depress REACTOR TRIP pushbutton 3.2 Verify reactor power < 5% FP and lowering 3.3 Depress the turbine TRIP pushbutton 3.4 Verify all turbine stop valves closed 3.5 Verify RCP seal injection available
		Symptoms Check
	BOP	The BOP will verify the following:

Power Range NIs **NOT** < 5% Power Range NIs **NOT** lowering	Rule 1, *ATWS/Unanticipated Nuclear Power Production*
Any SCM < 0°F	Rule 2, *Loss Of SCM*
Loss of Main and Emergency FDW (including unsuccessful manual initiation of EFDW)	Rule 3, *Loss of Main or Emerg FDW* Rule 4, *Initiation of HPI Forced Cooling* (Inability to feed SGs and > 2300 psig, NDT limit reached, or PZR level > 375")
Uncontrolled Main steam line(s) pressure decrease	Rule 5, *Main Steam Line Break*
CSAE Offgas alarms Process monitor alarms (RIA-40, 59,60), Area monitor alarms (RIA-16/17)	None (SGTR Tab is entered when identified SG Tube Leakage > 25 gpm)

If SCM lowers to ≤ 0°F, an RO will perform Rule 2 (Loss of SCM) (**page 31**)

Examiner Note: If SCM returns > 0°F quickly (< 2 min.), the CRS may direct the RO to re-perform Rule 2 and exit per step 1 RNO without securing RCPs.

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 2 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		LOSCM Tab
		An RO will perform Rule 5 (Main Steam Line Break) (**page 35**)
	SRO	SRO will review IMAs and transfer to the Subsequent Actions Tab.
		Crew Response:
		SRO will review the Subsequent Action Tab Parallel Action (Yellow) page (**page 71**) and transfer to the Loss of SCM Tab (LOSCM tab).
		If SCM is ≤ 0°F, the SRO will transfer to the LOSCM tab
		LOSCM Tab rev 01
		1. Ensure Rule 2 (Loss of SCM) is in progress or complete (page 32)
		2. Verify LOSCM caused by excessive heat transfer
		3. Verify EHT tab has been performed
		RNO: GO TO EHT tab
		EHT Tab
		EHT Tab rev 00
		SRO will review the EHT Tab Parallel Action (Yellow) page (**page 72**) and determine that ES has actuated and direct the OATC to perform Encl. 5.1 ES Actuation (**page 51**)
		Excessive Heat Transfer (EHT) Tab rev 0
		1. Verify any SG pressure < 550 psig. **[1A SG should be < 550 psig at this point]**
		2. Ensure Rule 5 (Main Steam Line Break) in progress or complete.
		3. Place the following in HAND and decrease demand to zero on all affected SGs:

	1A SG		1B SG
	1FDW-32		1FDW-41
	1FDW-35		1FDW-44

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 3 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior

EHT Tab

Crew Response:

4. Close the following on all affected SGs:

	1A SG		1B SG
	1FDW-372		1FDW-382
	1MS-17		1MS-26
	1MS-79		1MS-76
	1MS-35		1MS-36
	1MS-82		1MS-84
	1FDW-368		1FDW-369

5. Verify level in both SGs < 96% O.R.
6. **IAAT** core SCM is > 0°F, **THEN** perform Steps 7 and 8

RNO: **GO TO** Step 9

7. Throttle HPI per Rule 6 (HPI) (**page 68**)
8. Verify letdown in service

RNO: **IF** desired to restore letdown, **THEN** initiate Encl 5.5 (Pzr and LDST Level Control). (**page 60**)

9. Verify any SG has an intact secondary boundary (intact SG)
[1A SG is intact]

NOTE
If only one SG is intact and has been isolated for SGTR, the following steps will unisolate and use it for heat removal.

10. Open the following on all intact SGs:

√	1A SG	√	1B SG
	1FDW-372		1FDW-382
	1FDW-368		1FDW-369
	1MS-17		1MS-26

11. Start MDEFDWP associated with all intact SGs:

√	1A SG	√	1B SG
	1A MDEFDWP		1B MDEFDWP

RNO: Start TDEFDWP

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **7**	Page 4 of 15
Event Description:	**1B Main Steam Line Break Outside RB (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		EHT Tab **Crew Response:** 12. Feed and steam all intact SGs to stabilize RCS P/T using either: • TBVs • Dispatch two operators to perform Encl 5.24 (Operation of the ADVs) 13. **GO TO** Step 32 32. Verify any: __ HPI has operated in the injection mode while **NO** RCPs were operating __ A cooldown below 400°F at > 100°F/hr has occurred **RNO: GO TO** Step 34 33. Initiate Rule 8 (Pressurized Thermal Shock (PTS) (**Page 69**) 34. Verify both closed: __ 1MS-24 __ 1MS-33 35. Open 1AS-8 36. Close 1SSH-9 37. Perform notifications: __ Notify Chemistry to determine RCS boron concentration __ Notify Secondary Chemistry to check for indications of SGTR __ Notify RP to check for indications of SGTR 38 **IAAT** RCS boron is determined to be insufficient for adequate SDM **THEN** initiate Encl 5.11 (RCS Boration) 39. **IAAT** all exist: __ ES Bypass Permit satisfied __ All SCMs > 0°F __ RCS pressure controllable **THEN** perform Steps 40 - 41 **RNO: GO TO** Step 42

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 5 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior

EHT Tab

Crew Response:

40. Bypass applicable ES:
    To Bypass HPI:
    __ Bypass HPI ES CH A,B,C
    To Bypass LPI:
    __ Bypass LPI ES CH A,B,C
41. Bypass applicable Diverse ES:
    To Bypass HPI:
    __ Bypass Diverse HPI
    To Bypass LPI:
    __ Bypass Diverse LPI

RNO: **IF** applicable Diverse actuation circuit fails to bypass,
THEN place the applicable Diverse actuation circuit to OVERRIDE.

42. Verify any SG is dry.

NOTE

- Minimizing SCM reduces tensile stress on the SG
- PORV should be used if Pzr spray is not available
- Procedure progression may continue when actions to minimize SCM are in progress

43. Maintain minimum SCM using the following methods as necessary:
    __ De-energize all Pzr heaters
    __ Use Pzr spray
    __ Throttle HPI to maintain Pzr level > 100″ [180″ acc]
    __ Use PORV
44. Verify any RCP operating

RNO: **GO TO** Step 46.

45. Maintain RCP NPSH
    - OAC
    - Encl 5.18 (P/T Curves)

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 6 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		EHT Tab
		Crew Response:
		46. Initiate Encl 5.16 (SG Tube-to-Shell ΔT Control) **(page 70)**
		NOTE RCP 1A1 provides the best Pzr spray
		47. **IAAT** all exist: __ < one RCP operating in any loop __ All SCMs > 0°F __ RCP available in an idle loop **THEN** initiate Encl 5.6 (RCP Restart) to start one RCP in each idle loop
		48. **IAAT** all exist: __ RBS actuated __ RB pressure < 10 psig __ 1RIA-57 **NOT** in alarm __ 1RIA-58 **NOT** in alarm **THEN** stop both RBS pumps.
		49. **IAAT** Tcold approaches 470°F, **AND** all RCPs are operating, **THEN** ensure < four RCPs are operating
		50. **IAAT** BWST level is ≤ 19', **THEN** initiate Encl 5.12 (ECCS Suction Swap to RBES)
		51. Verify all SCMs > 0°F 52. Verify indications of SGTR ≥ 25 gpm.
		RNO: GO TO Step 54
		54 Verify required RCS makeup flow within normal makeup capability
		55. Verify either: __ Any SG isolated __ Any SG has an unisolable steam leak
		56. **GO TO** FCD tab

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 7 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		Forced Cooldown Tab (FCD) **<u>Crew Response</u>:** **Forced Cooldown Tab** rev 0 1. **IAAT** cooldown rate **CANNOT** be controlled within Tech Spec limits: • Tcold ≥ 270°F: ≤ 50°F / ½ hr • Tcold < 270°F: ≤ 25°F / ½ hr **THEN GO TO** EHT tab 2. Verify letdown in service **RNO:** 1. Ensure CC System in operation 2. **IF** 1A Letdown Cooler available, **THEN** open the following: __ 1HP-1 __ 1HP-3 3. **IF** 1B Letdown Cooler available, **THEN** open the following: __ 1HP-2 __ 1HP-4 4. Close the following: __ 1HP-6 __ 1HP-7 5. Open 1HP-5 6. Adjust 1HP-7 for ≈ 20 gpm letdown 7. Open 1HP-6 8. Adjust 1HP-7 to control desired letdown flow 3. Establish and maintain appropriate level per Rule 7 (SG Feed Control) <u>and</u> pressure in <u>available intact</u> SGs 4. **IAAT** Tcold approaches 470°F, **THEN** ensure < four RCPs operating

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 8 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		Forced Cooldown Tab

Crew Response:

5 **IAAT** Tcold approaches 300°F, **THEN** ensure < three RCPs operating

6. **IAAT** all the following exist:
   __ ES Bypass Permit satisfied
   __ All SCMs > 0°F
   __ RCS pressure controllable
   THEN perform Steps 7 - 8

7. Bypass applicable ES:
   To Bypass HPI:
   __ Bypass HPI ES CH A,B,C
   To Bypass LPI:
   __ Bypass LPI ES CH A,B,C

8. Bypass applicable Diverse ES:
   To Bypass HPI:
   __ Bypass Diverse HPI
   To Bypass LPI:
   __ Bypass Diverse LPI

9. **IAAT** any SG is < 700 psig, **AND** AFIS is **NOT** actuated on that SG, **THEN** select OFF on both Digital Channels 1&2 for that header:

√	A Header	√	B Header
	DIG CH 1 OFF		DIG CH 1 OFF
	DIG CH 2 OFF		DIG CH 2 OFF

10. Stabilize RCS temperature
11. Close 1HP-26
12. Stop 1C HPI pump
13. Adjust 1HP-120 for desired setpoint

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **7**	Page 9 of 15
Event Description:	**1B Main Steam Line Break Outside RB (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		RULE 2
		Crew Response:
		Rule 2 (Loss of SCM) rev 01
		1. **IAAT** all exist:
		__ Any SCM ≤ 0°F
		__ Rx power ≤ 1%
		__ ≤ 2 minutes elapsed since loss of SCM
		THEN perform Steps 2 and 3
		RNO: IF all SCMs > 0°F, **THEN:**
		A. Obtain CRS concurrence to exit Rule 2.
		B. **EXIT** Rule 2.
		Examiner Note: If SCM returns > 0°F quickly (< 2 min.), the CRS may direct the RO to re-perform Rule 2 and exit per step 1 RNO without securing RCPs.
	CT-3	2. **Stop all RCPs**
		3. Notify CRS of RCP status
		4. Verify Blackout exists
		RNO: GO TO Step 6
		6. Open 1HP-24 and 1HP-25
		7. Start all available HPI pumps
		8. **GO TO** Step 13
		13. Open 1HP-26 and 1HP-27
		14. Verify at least two HPI pumps are operating using two diverse indications

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 10 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		RULE 2

Crew Response:

Rule 2 (Loss of SCM) rev 01

15. **IAAT** ≥ 2 HPI pumps operating, **AND** HPI flow in any header is in the Unacceptable Region of Figure 1 **THEN** perform Steps 16 - 21

RNO: GO TO Step 17

17. **IAAT** flow limits are exceeded,

Pump Operation	Limit
1 HPI pump/hdr	475 gpm (incl. seal injection for A hdr
1A & 1B HPI pumps operating with 1HP-409 open	Total flow of 950 gpm (incl. seal injection)

THEN perform Steps 18-20

RNO: GO TO Step 21

18. Place Diverse HPI in BYPASS

RNO: Place Diverse HPI in OVERRIDE

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 11 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		RULE 2
		Crew Response:
		19. Perform both: __ Place ES CH 1 in MANUAL. __ Place ES CH 2 in MANUAL
		20. Throttle HPI to maximize flow ≤ flow limit
		21. Notify CRS of HPI status
		22. Verify RCS pressure > 550 psig
		23. **IAAT** either exists: __ LPI FLOW TRAIN A plus LPI FLOW TRAIN B ≥ 3400 gpm __ Only one LPI header in operation with header flow ≥ 2900 gpm **THEN GO TO** Step 24
		RNO: GO TO Step 35
		35. **IAAT** TBVs are unavailable, **THEN**: __ Dispatch two operators to perform Encl 5.24 (Operation of the ADVs) __ Notify CRS that ADVs are being aligned for use
		36. Verify 1SA-2/C-8 (AFIS HEADER A INITIATED) lit
		RNO: Select OFF for both digital channels on AFIS HEADER A
		37. Verify 1SA-2/D-8 (AFIS HEADER B INITIATED) lit
		38. Verify any EFDW pump operating
		RNO: Place in MANUAL and close: __ 1FDW-315 __ 1FDW-316
		39. Start MD EFDW pumps on all intact SGs: __ 1A MD EFDWP __ 1B MD EFDWP
		40. Verify any EFDW pump operating
		41. Verify both SGs intact
		RNO: 1. Establish 450 gpm EFDW flow to the intact SG 2. **GO TO** Step 43
		43. Verify both MD EFDWPs operating
		RNO: 1. **IF** 1 TD EFDW PUMP is operating, **OR NO** Main FDW pumps operating, **THEN GO TO** Step 45 2. **GO TO** Step 47

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 12 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		RULE 2

Crew Response:

45. Trip both Main FDW pumps
46. Place FDW block valve switches in CLOSE:

    __ 1FDW-33 __ 1FDW-31 __ 1FDW-42 __1FDW-41

NOTE

- SG levels must continue to increase until the SG Level Control Point is reached
- If Main FDW is feeding any SG, Rule 7 provides a different SG Level Control Point
- TS cooldown rates are ≤ 50°F/½ hr when Tcold ≥ 270°F and ≤ 25°F/½ hr when Tcold < 270°F

47. Begin feeding all intact SGs to the appropriate SG Level Control Point in Rule 7 (SG Feed Control) using available feed sources; EFDW/Main FDW
48. **IAAT** SG Level Control Point is reached, **THEN** maintain SG Level Control Point by feeding and steaming as necessary
49. Notify CRS of SG feed status

CAUTION

If 1 TD EFDW PUMP is being used for SG feed and Unit 1 is supplying the Auxiliary Steam header, reducing SG pressure below ≈ 250 psig can result in reduced pumping capability.

50. **IAAT** SG pressure is > RCS pressure, **THEN** reduce SG pressure < RCS pressure using either:

    __ TBVs

    __ Dispatch two operators to perform Encl 5.24 (Operation of the ADVs)
51. Verify any Main FDW pump operating

RNO: GO TO Step 58

58. Ensure Rule 3 (Loss of Main or Emergency FDW) is in progress or complete
59. **WHEN** directed by CRS, **THEN EXIT**

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **1**	Event No.: **7**	Page 13 of 15
Event Description:	**1B Main Steam Line Break Outside RB (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		RULE 5
		Crew Response:
		Rule 5 (Main Steam Line Break) rev 01
		1. Perform on affected headers:
	CT-2	(see table below)

√	**A Header**	√	**B Header**
	On AFIS HEADER A, depress CH. 1 INIT.		On AFIS HEADER B, depress CH. 1 INIT.
	On AFIS HEADER A, depress CH. 2 INIT.		On AFIS HEADER B, depress CH. 2 INIT.
	Select OFF for 1A MD EFDWP.		Select OFF for 1B MD EFDWP.
	Trip both Main FDWPTs.		Trip both Main FDWPTs.
	Close 1FDW-315.		Close 1FDW-316.
	Place 1FDW-33 switch to CLOSE.		Place 1FDW-42 switch to CLOSE.
	Place 1FDW-31 switch to CLOSE.		Place 1FDW-40 switch to CLOSE.
	Close 1PSW-22.		Close 1PSW-24.
	Close 1PSW-23.		Close 1PSW-25.

2. Verify 1 TD EFDW PUMP operating.

RNO: 1. **IF** MD EFDWP for the intact SG is operating, **THEN GO TO** Step 5. **[IT WILL NOT BE OPERATING]**

2. Start 1 TD EFDW PUMP

3. Verify 1 TD EFDW PUMP is feeding affected SGs **[1FDW-315 is closed]**

RNO: GO TO Step 5

5. Verify 1B SG is an affected SG

RNO: GO TO Step 7

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 14 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		RULE 5 **Crew Response:** 7. **WHEN** overcooling is stopped, **THEN** adjust steaming of unaffected SG to maintain CETCs constant using either: __ TBVs __ Dispatch two operators to perform Encl 5.24 (Operation of the ADVs) **CAUTION** Thermal shock conditions may develop if HPI is **NOT** throttled and RCS pressure **NOT** controlled. 8. **WHEN** all exist: __ Core SCM > 0°F __ Rx power ≤ 1% __ Pzr level increasing **THEN** continue 9. Verify ES HPI actuated 10. Place Diverse HPI in BYPASS 11. Perform both: __ Place ES CH 1 in MANUAL __ Place ES CH 2 in MANUAL 12. Perform the following to stabilize RCS P/T: __ Throttle HPI __ Reduce 1HP-120 setpoint to control at >100″ [180″ acc] __ Adjust steaming of unaffected SG as necessary to maintain CETCs constant 13. **WHEN** CETCs have stabilized, **THEN** resume use of Tc for RCS temperature control 14. Ensure Rule 3 (Loss of Main or Emergency FDW) is in progress or complete (**Page 37**) 15. Ensure Rule 8 (Pressurized Thermal Shock (PTS) is in progress or complete (**Page 69**) 16. **WHEN** directed by CRS, **THEN EXIT**

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **1** Event No.: **7** Page 15 of 15

Event Description: **1B Main Steam Line Break Outside RB (M: ALL)**

Time	Position	Applicant's Actions or Behavior

RULE 3 Rev 1

Crew Response:

Rule 3 (Loss of Main of Emergency FDW)

1. Verify loss of MFDW and/or EFDW was due to any of the following:
   __ Turbine Building Flooding
   __ Actions taken to increase SG level due to Turbine Building Flooding

RNO: GO TO Step 3

3. **IAAT NO** SGs can be fed with FDW (Main/CBP/Emergency/PSW), **AND** any of the following exist:
   __ RCS pressure reaches 2300 psig **OR** NDT limit
   __ Pzr level reaches 375" [340" acc]
   THEN PERFORM Rule 4 (Initiation of HPI Forced Cooling)
4. Start operable EFDW pumps, as required, to feed all intact SGs
5. Verify any EFDW pump operating
6. **GO TO** Step 38

38. **IAAT** an EFDW valve **CANNOT** control in AUTO, **OR** manual operation of EFDW valve is desired to control flow/level, **THEN** perform Steps 39 - 43

RNO: GO TO Step 44

44. Verify any SCM ≤ 0ºF

CAUTION

ATWS events may initially require throttling to prevent exceeding pump limits and additional throttling once the Rx is shutdown to prevent overcooling

RNO: IF overcooling, **OR** exceeding limits in Rule 7 (SG Feed Control), **THEN** throttle EFDW, as necessary

45. **IAAT** Unit 1 EFDW is in operation, **THEN** initiate Encl 5.9 (Extended EFDW Operation) (**page 38**)
46. **WHEN** directed by CRS, **THEN EXIT**

This event is complete when the crew has transferred to the FCD tab, or as directed by the Lead Examiner.

Enclosure 5.9

Extended EFDW Operation Rev 1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ Monitor EFDW parameters on EFW graphic display.	
2. __ **IAAT** UST level is < 4', **THEN GO TO** Step 120.	
3. __ **IAAT** feeding both SGs with one MD EFDWP is desired, **THEN** perform Steps 4 - 7.	__ **GO TO** Step 8.
4. Place EFDW control valve on SG with **NO** EFDW flow to MANUAL and closed: ☐ 1A SG 1FDW-315 ☐ 1B SG 1FDW-316	
5. Locally open: __ 1FDW-313 (1A EFDW Line Disch To 1A S/G X-Conn) (T-1, 1' N of M-16, 18' up) __ 1FDW-314 (1B EFDW Line Disch To 1B S/G X-Conn) (T-1, 3' S of M-24, 10' up)	
6. __ Ensure a MD EFDWP is operating.	
7. Throttle EFDW control valve on SG with **NO** EFDW flow to establish appropriate level per Rule 7 (SG Feed Control): ☐ 1A SG 1FDW-315 ☐ 1B SG 1FDW-316	
8. Perform as required to maintain UST level > 7.5': __ Makeup with demin water. __ Place CST pumps in AUTO.	
9. __ **IAAT** all exist: __ Rapid cooldown **NOT** in progress __ MD EFDWP operating for each available SG __ EFDW flow in each header < 600 gpm **THEN** place 1 TD EFDW PUMP switch in PULL TO LOCK.	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. __ Verify 1 TD EFDW PUMP operating.	__ **GO TO** Step 12.
11. __ Start TD EFDWP BEARING OIL COOLING PUMP.	

NOTE

- Loss of the condensate system for ≥ 25 minutes results in cooling down to LPI using the ADVs. If **NO** HWPs are operating, continuing this enclosure to restore the condensate system is a priority unless the CR SRO deems EOP activities higher priority. The 25 minute criterion is satisfied when a HWP is started and 1C-10 is 10% open.
- If the condensate system is operating, the remaining guidance establishes FDW recirc, monitors and maintains UST, and transfers EFDW suction to the hotwell if required.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. __ Notify CR SRO to set priority based on the NOTE above and EOP activities.	
13. __ **IAAT** it is determined that condensate flow **CANNOT** be restored within 25 minutes, **THEN GO TO** Step 90.	
14. __ Verify any HWP operating.	1. __ Place all CBP control switches to OFF. 2. __ **GO TO** Step 20.
15. __ Verify any CBP operating.	1. __ **IF** AP/11 restarted a HWP, **THEN GO TO** Step 22. 2. __ **GO TO** Step 41.
16. __ Verify 1C COND BOOSTER PUMP operating. {12}	1. __ Ensure only one CBP is operating. 2. __ **GO TO** Step 18.
17. Stop: {12} __ 1A COND BOOSTER PUMP __ 1B COND BOOSTER PUMP	
18. __ Ensure only one HWP is operating.	
19. __ **GO TO** Step 44.	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. __ Verify a loss of power event caused the loss of the secondary system.	__ **GO TO** Step 24.
21. __ <u>Ensure</u> AP/11 (Recovery From Loss of Power) is in progress.	
22. __ **WHEN** AP/11 (Recovery From Loss of Power) has restored 600v load centers, **AND** a HWP is operating, **THEN** dispatch an operator to start <u>all</u> CBP Aux Oil Pumps. (T-1/J-21)	
23. __ **WHEN** notified that <u>all</u> CBP Aux Oil pumps are operating, **THEN GO TO** Step 41.	
24. __ Place <u>all</u> HWP control switches to OFF.	
25. __ Place <u>all</u> CBP control switches to OFF.	
26. Place valve switches to close until valve travel is initiated: __ 1FDW-4 __ 1FDW-9	__ Continue.
27. Start: __ 1A FDWP AUXILIARY OIL PUMP __ 1B FDWP AUXILIARY OIL PUMP	Start as necessary: __ 1A FDWP EMERGENCY BRNG OIL PUMP __ 1B FDWP EMERGENCY BRNG OIL PUMP
28. Verify <u>both</u>: __ FWPT A BRG LUBE OIL PRESS > 4 psig __ FWPT B BRG LUBE OIL PRESS > 4 psig	1.__ **IF** <u>both</u> FDW pumps have BRG LUBE OIL PRESS < 4 psig, **THEN GO TO** Step 90. 2. Perform for the FDW pump that has BRG LUBE OIL PRESS < 4 psig: __ Close 1FDW-1 for 1A FDW pump. __ Close 1FDW-6 for 1B FDW pump.
29. Place in MANUAL <u>and</u> close: __ 1FDW-53 __ 1FDW-65	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. __ Place 1C-10 FAIL SWITCH in MANUAL.	
31. __ Close 1C-10.	
32. __ Make plant page to clear basement and third floor of non-essential personnel.	
33. __ Start <u>one</u> HWP.	
34. __ Verify < 25 minutes elapsed since loss of condensate.	1.__ Stop <u>all</u> HWPs. 2.__ **GO TO** Step 90.
35. __ Throttle 1C-10 controller 10% open to satisfy 25 minute system restart criteria.	
36. __ **WHEN** FWP SUCT HDR PRESS (1VB3) is ≥ 100 psig, **THEN** open 1C-10.	
37. __ Place 1C-10 FAIL SWITCH in FAIL OPEN.	
38. __ Dispatch an operator to start <u>all</u> CBP Aux Oil Pumps. (T-1/J-21)	
39. Maximize total recirc flow < 1200 gpm with <u>one</u> of the following: __ 1FDW-53 __ 1FDW-65	
40. __ **WHEN** five minutes have elapsed, **AND** notified that <u>all</u> CBP Aux Oil pumps are operating, **THEN** continue procedure.	
41. __ Start a second HWP.	
42. __ Start 1C COND BOOSTER PUMP. {12}	__ Start <u>one</u> available CBP.
43. __ Stop <u>one</u> operating HWP.	
44. __ Place control switch for <u>one</u> secured HWP in AUTO.	
45. __ Place control switch for <u>one</u> secured CBP in AUTO.	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
46. __ Perform the following: __ Position HWP LOAD SHED DEFEAT switch to a running HWP. __ Position CBP LOAD SHED DEFEAT switch to a running CBP.	
47. Place in MANUAL: __ 1FDW-53 __ 1FDW-65	
48. Establish 2300 - 6000 gpm total recirc flow with <u>one</u> of the following: __ 1FDW-53 __ 1FDW-65	
49. __ **IAAT** UST level **CANNOT** be maintained > 8.5', **THEN** locally open 1C-899 (Cond Recirc To UST Riser Throttle) (T-1/J-23).	
50. __ **IAAT** UST level increases > 11', **THEN** perform as required: __ Throttle demin water __ Locally throttle 1C-899 (Cond Recirc To UST Riser Throttle) (T-1/J-23)	
51. Verify closed: __ 1FDW-4 __ 1FDW-9	__ **GO TO** Step 58.

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
52. Position switches in CLOSE: __ 1FDW-33 __ 1FDW-31 __ 1FDW-42 __ 1FDW-40	
53. Ensure closed: __ 1FDW-33 __ 1FDW-31 __ 1FDW-42 __ 1FDW-40	
54. __ Locally open: 1FDW-5 (1A FDWP Discharge Bypass) (T-1/SE of D-24 12' up) 1FDW-10 (1B FDWP Discharge Bypass) (T-1/N of D-26 9' up)	
55. __ **WHEN** FWP DISCH HDR PRESS (1VB3) is approximately equal to <u>either</u> of the following: • O1A1014 (FDWP 1A DISCHARGE PRESS) • O1A1391 (FDWP 1B DISCHARGE PRESS) **THEN** open: __ 1FDW-4 __ 1FDW-9	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
56. Locally close: __ 1FDW-5 (1A FDWP Discharge Bypass) (T-1/SE of D-24 12' up) __ 1FDW-10 (1B FDWP Discharge Bypass) (T-1/N of D-26 9' up)	

NOTE
Windmill protection may have required closure of FDW pump suction valve.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
57. Verify open: __ 1FDW-1 __ 1FDW-6	1. __ **IF** required, notify the WCC SRO to initiate investigation. 2. __ Note on Turnover sheet that FDW pump associated with closed valve is not available for use until problem resolved.
58. __ **IAAT** it is desired to re-establish Main FDW, **THEN** initiate Encl (Re-establishing Main FDW) of OP/1/A/1106/002 (Condensate And FDW System).	
59. __ **IAAT** EFDW has been secured per Encl (Re-establishing Main FDW) of OP/1/A/1106/002 (Condensate And FDW System), **THEN EXIT**.	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
60. __ **WHEN** UST level is < 4', **THEN** dispatch two operators to perform Encl 5.24 (Operation of the ADVs) in preparation for loss of vacuum. (**PS**)	
61. __ Verify power available to 1V-186 by using valve position indicating light.	Dispatch an operator to be in position at 1V-186 (Vacuum Breaker) (T-3, catwalk at 1C2 waterbox).

NOTE

1C-573 will be closed after vacuum is broken.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
62. Dispatch an operator with a safety harness to 1C-573 (MD EFDWPs Suction From UST) (T-1, SW of E-24, 8' above floor) to: __ Unlock <u>and</u> remove chain from 1C-573. Establish communication with Control Room.	
63. __ **WHEN** UST level is < 3', **THEN** continue.	
64. __ Open 1V-186.	__ Notify operator to open 1V-186 (Main Condenser Vacuum Breaker) (T-3, catwalk at 1C2 waterbox).
65. __ Stop <u>all</u> main vacuum pumps.	
66. __ Stop <u>all</u> CBPs.	
67. __ Stop <u>all</u> HWPs.	
68. Close: __ 1MS-47 __ 1AS-40	Dispatch an operator to close: __ 1MS-49 (1A CSAE Steam Supply) (T-3/F-26) __ 1MS-58 (1B CSAE Steam Supply) (T-3/G-26) __ 1MS-67 (1C CSAE Steam Supply) (T-3/H-26)

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE • 1C-573 is open unless Step 75 has been completed. • While EFDW is secured, a transfer to LOHT is required only when directed by this enclosure or Rule 4 (Initiation of HPI Forced Cooling) conditions are met.	
69. __ **IAAT** UST level is < 1', **AND** 1C-573 (MD EFDWPs Suction From UST) is open, **THEN** perform Steps 70 - 71.	__ **GO TO** Step 72.
70. Perform the following: __ Stop 1A MD EFDWP. __ Stop 1B MD EFDWP.	
71. __ Verify 1C-391 open.	1. __ Stop 1TD EFDW PUMP. 2. Close: __ 1FDW-315 __ 1FDW-316
72. Perform the following: A. __ Reduce MD EFDWP flow to < 440 gpm per pump. B. __ Notify crew of MD EFDWP flow limit while aligned to hotwell.	
NOTE Vacuum gage or computer can be used. Vacuum is broken when either start to flat line. Do NOT change scale on computer trend once started.	
73. __ **WHEN** vacuum is broken, **THEN** continue.	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
74. __ **IAAT** MD EFDWPs are operating, **OR** available to operate, **THEN PERFORM** Steps 75 - 77.	__ **GO TO** Step 78.
75. __ Locally close 1C-573 (MD EFDWPs Suction From UST) (T-1, SW of E-24, 8' above floor).	1. __ **IF** 1TD EFDW PUMP is operating, **OR** operable, **THEN GO TO** Step 78. 2. __ **IF NO** EFDW pumps are operating, **THEN**: A. Notify CR SRO that a LOHT exists from loss of EFDW suction source. B. Notify CR SRO that Rule 3 will be performed to cross connect with alternate unit. C. Consider all U1 EFDW pumps inoperable, **AND GO TO** Rule 3.
76. __ Verify MD EFDWPs were stopped due to UST level < 1'.	__ **GO TO** Step 78.
77. Perform the following: A. __ Restart all MD EFDWPs that were stopped due to UST level < 1'. B. __ Resume feeding available SGs.	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
78. __ Verify 1 TD EFDW PUMP operating.	__ **GO TO** Step 82.
79. Dispatch operator to 1C-157 (TD EFDWP Suction From UST) to establish communication with CR (T-1/C-20).	
80. **WHEN** operator in place at 1C-157, **THEN** continue.	
81. __ Stop 1 TD EFDW PUMP.	
82. __ Locally close 1C-157 (TD EFDWP Suction From UST) (T-1/C-20).	1. **IF NO** EFDW pumps are operating, **THEN**: A. Notify CR SRO that a LOHT exists from loss of EFDW suction source. B. Notify CR SRO that Rule 3 will be performed to cross connect with alternate unit. C. Consider <u>all</u> U1 EFDW pumps inoperable, **AND GO TO** Rule 3. 2. __ **GO TO** Step 84.
83. Open 1C-391.	1. Attempt to locally open 1C-391 (TD EFDWP Suction From Hotwell) (T-1/C-20). 2. **IF** 1C-391 **CANNOT** be opened, **AND NO** EFDW pumps are operating, **THEN**: A. Notify CR SRO that a LOHT exists from loss of EFDW suction source. B. Notify CR SRO that Rule 3 will be performed to cross connect with alternate unit. C. Consider <u>all</u> U1 EFDW pumps inoperable, **AND GO TO** Rule 3.

Enclosure 5.9

Extended EFDW Operation

84. **IAAT** 1 TD EFDW PUMP operation is desired, **AND** all exist: __ Hotwell level is > 1″. __ Vacuum is broken. 1 TD EFDW PUMP successfully aligned to hotwell. **THEN**: A. __ Start 1 TD EFDW PUMP. B. __ Feed available SGs as required.	
85. Dispatch an operator to open: 1C-188 (Hotwell Emerg Makeup #1 Control Bypass) (T-1/W of E-24). {18} 1C-912 (UST Riser To HW Emerg Makeup #2 Auto Isol Bypass) (T-1/G-23)	
86. Notify TSC to evaluate methods to maintain secondary inventory including strategies located in EM 5.1 (Engineering Emergency Response Plan) and EM 5.2 (Evaluation By Station Management in the TSC - Beyond Design Basis Mitigation Strategies).	

Enclosure 5.9

Extended EFDW Operation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
87. **IAAT** hotwell level is ≤ 1″, **THEN**: A. __ Stop all EFDWPs. B. Consider all U-1 EFDW pumps inoperable, **AND GO TO** Rule 3.	

NOTE

- This step provides general plant directions for the SRO and Management team. The user shall continue after the notification has been made.
- Swapping from TBVs to ADVs prevents overfilling the hotwell/condenser.
- Securing steam seals limits the water (condensation) that reaches the oil systems. Vacuum must be broken to secure steam seals.
- Engineering will determine when to allow secondary system restart.
- Beginning a cooldown assumes HPI is operating. If the SSF is supplying seals, then further discussion with the Management team should be undertaken prior to cooldown.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
88. Notify the CR SRO to direct the following as time and resources allow: • Transfer steam control from TBVs to ADVs. • Operate ADVs per U1 EOP Encl 5.24 (Operation of ADVs). • Begin Unit cool down to LPI per OP/1/A/1102/010 (Controlling Procedure For Unit Shutdown) using the ADVs. • Break vacuum per OP/1-2/A/1106/016 (Condenser Vacuum System). • Secure Steam Seals per OP/1/A/1106/13 (Steam Seal System).	
89. **WHEN** directed by CR SRO, **THEN EXIT**.	

EOP Enclosure 5.1 (ES Actuation)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ Determine all ES channels that should have actuated based on RCS pressure and RB pressure:	

✓	Actuation Setpoint (psig)	Associated ES Channel
	1600 (RCS)	1 & 2
	550 (RCS)	3 & 4
	3 (RB)	1, 2, 3, 4, 5, & 6
	10 (RB)	7 & 8

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Verify all ES channels associated with actuation setpoints have actuated.	**NOTE** Voter OVERRIDE extinguishes the TRIPPED light on the associated channels that have auto actuated. Pressing TRIP on channels previously actuated will reposition components that may have been throttled or secured by this Enclosure. __ Depress TRIP on affected ES logic channels that have **NOT** previously been actuated.
3. __ **IAAT** additional ES actuation setpoints are exceeded, **THEN** perform Steps 1 - 2.	
4. __ Place Diverse HPI in BYPASS.	__ Place Diverse HPI in OVERRIDE.
5. Perform both: __ Place ES CH 1 in MANUAL. __ Place ES CH 2 in MANUAL.	**NOTE** • Voter OVERRIDE affects all channels of the affected ODD and/or EVEN channels. • In OVERRIDE, all components on the affected ODD and/or EVEN channels can be manually operated from the component switch. 1. __ **IF** ES CH 1 fails to go to MANUAL, **THEN** place ODD voter in OVERRIDE. 2. __ **IF** ES CH 2 fails to go to MANUAL, **THEN** place EVEN voter in OVERRIDE.

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ **IAAT** all exist: __ Voter associated with ES channel is in OVERRIDE __ An ES channel is manually actuated __Components on that channel require manipulation **THEN** depress RESET on the required channel.	
7. __ Verify Rule 2 in progress or complete.	__ **GOTO** Step 74.
8. __ Verify any RCP operating.	__ **GOTO** Step 10.
9. Open: __ 1HP-20 __ 1HP-21	
10. __ **IAAT** any RCP is operating, **AND** ES Channels 5 and 6 actuate, **THEN** perform Steps 11 - 15.	__ **GOTO** Step 16.
11. Perform all: __ Place ES CH 5 in MANUAL. __ Place ES CH 6 in MANUAL.	**NOTE** • Voter OVERRIDE affects all channels of the affected ODD and/or EVEN channels. • In OVERRIDE, all components on the affected ODD and/or EVEN channels can be manually operated from the component switch. 1.__ **IF** ES CH 5 fails to go to MANUAL, **THEN** place ODD voter in OVERRIDE. 2.__ **IF** ES CH 6 fails to go to MANUAL, **THEN** place EVEN voter in OVERRIDE.
12. __ Verify any RCP is operating	__ **GO TO** Step 16
13. Open: __ 1CC-7 __ 1CC-8 __ 1LPSW-15 __ 1LPSW-6	
14. __ Ensure only one CC pump operating.	
15. __ Ensure Standby CC pump in AUTO.	

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. __ **IAAT** ES Channels 3 & 4 are actuated, **THEN GO TO** Step 17.	__ **GO TO** Step 54.
17. __ Place Diverse LPI in BYPASS.	__ Place Diverse LPI in OVERRIDE.
18. Perform <u>both</u>: __ Place ES CH 3 in MANUAL. __ Place ES CH 4 in MANUAL.	**<u>NOTE</u>** • Voter OVERRIDE affects all channels of the <u>affected</u> ODD and/or EVEN channels. • In OVERRIDE, all components on the <u>affected</u> ODD and/or EVEN channels can be manually operated from the component switch. 1. __ **IF** ES CH 3 fails to go to MANUAL, **THEN** place ODD voter in OVERRIDE. 2. __ **IF** ES CH 4 fails to go to MANUAL, **THEN** place EVEN voter in OVERRIDE.

<u>CAUTION</u>

LPI pump damage may occur if operated in excess of 30 minutes against a shutoff head. {6}

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. __ **IAAT** <u>any</u> LPI pump is operating against a shutoff head, **THEN** at the CR SRO's discretion, stop <u>affected</u> LPI pumps. {6, 22}	
20. __ **IAAT** RCS pressure is < LPI pump shutoff head, **THEN** perform Steps 21 - 22.	__ **GOTO** Step 23.
21. Perform the following: __ Open 1LP-17. __ Start 1A LPI PUMP.	1. __ Stop 1A LPI PUMP. 2. __ Close 1LP-17.
22. Perform the following: __ Open 1LP-18. __ Start 1B LPI PUMP.	1. __ Stop 1B LPI PUMP. 2. __ Close 1LP-18.

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. __ **IAAT** 1A <u>and</u> 1B LPI PUMPs are off / tripped, **AND** <u>all</u> exist: __ RCS pressure < LPI pump shutoff head __ 1LP-19 closed __ 1LP-20 closed **THEN** perform Steps 24 - 25.	__ **GO TO** Step 26.
24. Open: __ 1LP-9 __ 1LP-10 __ 1LP-6 __ 1LP-7 __ 1LP-17 __ 1LP-18 __ 1LP-21 __ 1LP-22	
25. __ Start 1C LPI PUMP.	
26. __ **IAAT** 1A LPI PUMP fails while operating, **AND** 1B LPI PUMP is operating, **THEN** close 1LP-17.	
27. __ **IAAT** 1B LPI PUMP fails while operating, **AND** 1A LPI PUMP is operating, **THEN** close 1LP-18.	
28. Start: __ A OUTSIDE AIR BOOSTER FAN __ B OUTSIDE AIR BOOSTER FAN	
29. Notify Unit 3 to start: __ 3A OUTSIDE AIR BOOSTER FAN __ 3B OUTSIDE AIR BOOSTER FAN	

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. Verify open: __ 1CF-1 __ 1CF-2	__ **IF** CR SRO desires 1CF-1 and 1CF-2 open, **THEN** open: __ 1CF-1 __ 1CF-2
31. __ Verify 1HP-410 closed.	1. __ Place 1HP-120 in HAND. 2. __ Close 1HP-120.
32. __ Secure makeup to the LDST.	
33. __ Verify <u>all</u> ES channel 1 - 4 components are in the ES position.	1. __ **IF** 1HP-3 fails to close, **THEN** close 1HP-1. 2. __ **IF** 1HP-4 fails to close, **THEN** close 1HP-2. 3. __ **IF** 1HP-20 fails to close, **AND NO** RCPs operating, **THEN** close: __ 1HP-228 __ 1HP-226 __ 1HP-232 __ 1HP-230 4. __ Notify SRO to evaluate components **NOT** in ES position <u>and</u> initiate action to place in ES position if desired.
34. __ Verify Unit <u>2</u> turbine tripped.	__ **GOTO** Step 37.
35. __ Close <u>2</u>LPSW-139.	
36. __ Verify <u>total</u> LPSW flow to Unit <u>2</u> LPI coolers $\leq$ 6000 gpm.	__ Reduce LPSW to Unit <u>2</u> LPI coolers to obtain <u>total</u> LPSW flow $\leq$ 6000 gpm.
37. __ Close 1LPSW-139.	
38. Place in FAIL OPEN: __ 1LPSW-251 FAIL SWITCH __ 1LPSW-252 FAIL SWITCH	
39. __ Start <u>all available</u> LPSW pumps.	

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40. Verify <u>either</u>: __ Three LPSW pumps operating __ Two LPSW pumps operating when Tech Specs only requires two operable	__ **GOTO** Step 42.
41. Open: __ 1LPSW-4 __ 1LPSW-5	__ **IF** <u>both</u> are closed: __ 1LPSW-4 __ 1LPSW-5 **THEN** notify SRO to initiate action to open <u>at least one</u> valve prior to BWST level ≤ 19'.
42. __ **IAAT** BWST level ≤ 19', **THEN** initiate Encl 5.12 (ECCS Suction Swap to RBES).	1. __ Display BWST level using OAC Turn-on Code "SHOWDIG O1P1600". 2. __ Notify crew of BWST level IAAT step.
43. __ Dispatch an operator to perform Encl 5.2 (Placing RB Hydrogen Analyzers In Service). (**PS**)	
44. __ Select DECAY HEAT LOW FLOW ALARM SELECT switch to ON.	
45. __ **IAAT** ES channels 5 & 6 have actuated, **THEN** perform Step 46.	__ **GOTO** Step 47.

<u>NOTE</u>

RBCU transfer to low speed will **NOT** occur until 3 minute time delay is satisfied.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
46. __ Verify <u>all</u> ES channel 5 & 6 components are in the ES position.	__ Notify SRO to evaluate components **NOT** in ES position <u>and</u> initiate action to place in ES position if desired.

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
47. __ **IAAT** ES channels 7 & 8 have actuated, **THEN** perform Steps 48 - 49.	__ **GOTO** Step 50.
48. Perform all: __ Place ES CH 7 in MANUAL. __ Place ES CH 8 in MANUAL.	**NOTE** • Voter OVERRIDE affects all channels of the affected ODD and/or EVEN channels. • In OVERRIDE, all components on the affected ODD and/or EVEN channels can be manually operated from the component switch. 1. __ **IF** ES CH 7 fails to go to MANUAL, **THEN** place ODD voter in OVERRIDE. 2. __ **IF** ES CH 8 fails to go to MANUAL, **THEN** place EVEN voter in OVERRIDE.
49. __ Verify all ES channel 7 & 8 components are in the ES position.	__ Notify SRO to evaluate components **NOT** in ES position and initiate action to place in ES position if desired.
50. __ Notify U2 CR SRO that SSF is inoperable due to OTS1-1 open.	
51. __ Ensure any turnover sheet compensatory measures for ES actuation are complete as necessary.	
52. __ **IAAT** conditions causing ES actuation have cleared, **THEN** initiate Encl 5.41 (ES Recovery).	
53. __ **WHEN** CR SRO approves, **THEN EXIT**.	

••• END •••

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status ES Channels 3 & 4 have **NOT** actuated.	
54. Start: __ A OUTSIDE AIR BOOSTER FAN __ B OUTSIDE AIR BOOSTER FAN	
55. Notify Unit 3 to start: __ 3A OUTSIDE AIR BOOSTER FAN __ 3B OUTSIDE AIR BOOSTER FAN	
56. Verify open: __ 1CF-1 __ 1CF-2	__ **IF** CR SRO desires 1CF-1 and 1CF-2 open, **THEN** open: __ 1CF-1 __ 1CF-2
57. __ Verify 1HP-410 closed.	1. __ Place 1HP-120 in HAND. 2. __ Close 1HP-120.
58. __ Secure makeup to the LDST.	
59. __ Verify all ES channel 1 & 2 components are in the ES position.	1. __ **IF** 1HP-3 fails to close, **THEN** close 1HP-1. 2. __ **IF** 1HP-4 fails to close, **THEN** close 1HP-2. 3. __ **IF** 1HP-20 fails to close, **AND NO** RCPs operating, **THEN** close: __ 1HP-228 __ 1HP-226 __ 1HP-232 __ 1HP-230 4. __ Notify SRO to evaluate components **NOT** in ES position <u>and</u> initiate action to place in ES position if desired.
60. __ Verify Unit <u>2</u> turbine tripped.	__ **GOTO** Step 63.
61. __ Close <u>2</u>LPSW-139.	
62. __ Verify <u>total</u> LPSW flow to Unit <u>2</u> LPI coolers ≤ 6000 gpm.	__ Reduce LPSW to Unit <u>2</u> LPI coolers to obtain <u>total</u> LPSW flow ≤ 6000 gpm.
63. __ Close 1LPSW-139.	

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
64. Place in FAIL OPEN: __ 1LPSW-251 FAIL SWITCH __ 1LPSW-252 FAIL SWITCH	
65. __ Start <u>all available</u> LPSW pumps.	
66. Verify <u>either</u>: __ Three LPSW pumps operating __ Two LPSW pumps operating when Tech Specs only requires two operable	__ **GOTO** Step 68.
67. Open: __ 1LPSW-4 __ 1LPSW-5	__ **IF** <u>both</u> are closed: __ 1LPSW-4 __ 1LPSW-5 **THEN** notify SRO to initiate action to open <u>at least one</u> valve prior to BWST level ≤ 19'.
68. __ **IAAT** BWST level ≤ 19', **THEN** initiate Encl 5.12 (ECCS Suction Swap to RBES).	1. __ Display BWST level using OAC Turn-on Code "SHOWDIG O1P1600". 2. __ Notify crew of BWST level IAAT step.
69. __ Dispatch an operator to perform Encl 5.2 (Placing RB Hydrogen Analyzers In Service). (**PS**)	
70. __ Notify U2 CR SRO that SSF is inoperable due to OTS1-1 open.	
71. __ Ensure <u>any</u> turnover sheet compensatory measures for ES actuation are complete as necessary.	
72. __ **IAAT** conditions causing ES actuation have cleared, **THEN** initiate Encl 5.41 (ES Recovery).	
73. __ **WHEN** CR SRO approves, **THEN EXIT**.	

••• END •••

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Maintaining Pzr level >100″ [180″ acc] will ensure Pzr heater bundles remain covered.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ Utilize the following as necessary to maintain desired Pzr level: • 1A HPI Pump • 1B HPI Pump • 1HP-26 • 1HP-7 • 1HP-120 setpoint or valve demand • 1HP-5	__ **IF** 1HP-26 will **NOT** open, **THEN** throttle 1HP-410 to maintain desired Pzr level.
2. __ **IAAT** makeup to the LDST is desired, **THEN** makeup from 1A BHUT.	
3. __ **IAAT** it is desired to secure makeup to LDST, **THEN** secure makeup from 1A BHUT.	
4. __ **IAAT** it is desired to bleed letdown flow to 1A BHUT, **THEN** perform the following: A. Open: __ 1CS-26 __ 1CS-41 B. __ Position 1HP-14 to BLEED. C. __ Notify SRO.	
5. __ **IAAT** letdown bleed is **NO** longer desired, **THEN** position 1HP-14 to NORMAL.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ **IAAT** 1C HPI PUMP is required, **THEN** perform Steps 7 - 9.	__ **GO TO** Step 10.
7. __ Open: • 1HP-24 • 1HP-25	1. __ **IF** both BWST suction valves (1HP-24 and 1HP-25) are closed, **THEN** perform the following: A. __ Start 1A LPI PUMP. B. __ Start 1B LPI PUMP. C. Open: __ 1LP-15 __ 1LP-16 __ 1LP-9 __ 1LP-10 __ 1LP-6 __ 1LP-7 D. __ **IF** two LPI Pumps are running only to provide HPI pump suction, **THEN** secure one LPI pump. E. __ Dispatch an operator to open 1HP-363 (Letdown Line To LPI Pump Suction Block) (A-1-119, U1 LPI Hatch Rm, N end). F. __ **GO TO** Step 8. 2. __ **IF** only one BWST suction valve (1HP-24 or 1HP-25) is open, **THEN** perform the following: A. __ **IF** three HPI pumps are operating, **THEN** secure 1B HPI PUMP. B. __ **IF** < 2 HPI pumps are operating, **THEN** start HPI pumps to obtain two HPI pump operation, preferably in opposite headers. C. __ **GO TO** Step 9.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. __ Start 1C HPI PUMP.	__ **IF** at least two HPI pumps are operating, **THEN** throttle 1HP-409 to maintain desired Pzr level.
9. Throttle the following as required to maintain desired Pzr level: __ 1HP-26 __ 1HP-27	1. __ **IF** at least two HPI pumps are operating, **AND** 1HP-26 will **NOT** open, **THEN** throttle 1HP-410 to maintain desired Pzr level. 2. __ **IF** 1A HPI PUMP and 1B HPI PUMP are operating, **AND** 1HP-27 will **NOT** open, **THEN** throttle 1HP-409 to maintain desired Pzr level.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. __ **IAAT** LDST level **CANNOT** be maintained, **THEN** perform Step 11.	__ **GO TO** Step 12.
11. __ Perform the following: • Open 1HP-24. • Open 1HP-25. • Close 1HP-16.	1. __ **IF** both BWST suction valves (1HP-24 and 1HP-25) are closed, **THEN** perform the following: A. __ Start 1A LPI PUMP. B. __ Start 1B LPI PUMP. C. Open: __ 1LP-15 __ 1LP-16 __ 1LP-9 __ 1LP-10 __ 1LP-6 __ 1LP-7 D. __ **IF** two LPI Pumps are running only to provide HPI pump suction, **THEN** secure one LPI pump. E. __ Dispatch an operator to open 1HP-363 (Letdown Line To LPI Pump Suction Block) (A-1-119, U1 LPI Hatch Rm, N end). F. __ **GO TO** Step 13. 2. __ **IF** only one BWST suction valve (1HP-24 or 1HP-25) is open, **AND** three HPI pumps are operating, **THEN** secure 1B HPI PUMP.

NOTE

Maintaining Pzr level > 100” [180” acc] will ensure Pzr heater bundles remain covered.

12. __ Operate Pzr heaters as required to maintain heater bundle integrity.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. __ **IAAT** additional makeup flow to LDST is desired, **AND** 1A BLEED TRANSFER PUMP is operating, **THEN** dispatch an operator to close 1CS-48 (1A BHUT Recirc) (A-1-107, Unit 1 RC Bleed Transfer Pump Rm.).	
14. __ **IAAT** two Letdown Filters are desired, **THEN** perform the following: __ Open 1HP-17. __ Open 1HP-18	
15. __ **IAAT** all of the following exist: __ Letdown isolated __ LPSW available __ Letdown restoration desired **THEN** perform Steps 16 - 34. {41}	__ **GO TO** Step 35.
16. Open: __ 1CC-7 __ 1CC-8	1.__ Notify CR SRO that letdown **CANNOT** be restored due to inability to restart the CC system. 2.__ **GO TO** Step 35.
17. __ Ensure only one CC pump running.	
18. __ Place the non-running CC pump in AUTO.	
19. Verify both are open: __ 1HP-1 __ 1HP-2	1. __ **IF** 1HP-1 is closed due to 1HP-3 failing to close, **THEN GO TO** Step 21. 2. __ **IF** 1HP-2 is closed due to 1HP-4 failing to close, **THEN GO TO** Step 21.
20. __ **GO TO** Step 23.	

NOTE
Verification of leakage requires visual observation of East Penetration Room.

21. __ Verify letdown line leak in East Penetration Room has occurred.	**GO TO** Step 23.
22. __ **GO TO** Step 35.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. __ Monitor for unexpected conditions while restoring letdown.	
24. __ Verify <u>both</u> letdown coolers to be placed in service.	1. __ **IF** 1A letdown cooler is to be placed in service, **THEN** open: __ 1HP-1 __ 1HP-3 2. __ **IF** 1B letdown cooler is to be placed in service, **THEN** open: __ 1HP-2 __ 1HP-4 3. __ **GO TO** Step 26.
25. Open: __ 1HP-1 __ 1HP-2 __ 1HP-3 __ 1HP-4	
26. __ Verify <u>at least one</u> letdown cooler is aligned.	Perform the following: A. __ Notify CR SRO of problem. B. __ **GO TO** Step 35.
27. __ Close 1HP-6.	
28. __ Close 1HP-7.	
29. __ Verify letdown temperature < 125°F.	1. __ Open 1HP-13. 2. Close: __ 1HP-8 __ 1HP-9&11 3. __ **IF** <u>any</u> deborating IX is in service, **THEN** perform the following: A. __ Select 1HP-14 to NORMAL. B. __ Close 1HP-16. 4. __ Select LETDOWN HI TEMP INTLK BYP switch to BYPASS.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. __ Open 1HP-5.	
31. __ Adjust 1HP-7 for ≈ 20 gpm letdown.	
32. __ **WHEN** letdown temperature is < 125°F, **THEN** place LETDOWN HI TEMP INTLK BYP switch to NORMAL.	
33. __ Open 1HP-6.	
34. __ Adjust 1HP-7 to control desired letdown flow.	

NOTE

AP/32 (Loss of Letdown) provides direction to cool down the RCS to offset increasing pressurizer level.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
35. __ **IAAT** it is determined that letdown is unavailable due to equipment failures or letdown system leakage, **THEN** notify CR SRO to initiate AP/32 (Loss of Letdown).	
36. __ **IAAT** > 1 HPI pump is operating, **AND** additional HPI pumps are **NO** longer needed, **THEN** perform the following: A. __ Obtain SRO concurrence to reduce running HPI pumps. B. __ Secure the desired HPI pumps. C. __ Place secured HPI pump switch in AUTO, if desired.	
37. __ **IAAT** all the following conditions exist: __ Makeup from BWST **NOT** required __ LDST level > 55″ __ All control rods inserted __ Cooldown Plateau **NOT** being used **THEN** close: __ 1HP-24 __ 1HP-25	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
38. __ Verify 1CS-48 (1A BHUT Recirc) has been closed to provide additional makeup flow to LDST.	__ **GO TO** Step 40.
39. __ **WHEN** 1CS-48 (1A BHUT Recirc) is **NO** longer needed to provide additional makeup flow to LDST, **THEN** perform the following: A. __ Stop 1A BLEED TRANSFER PUMP. B. __ Locally position 1CS-48 (1A BHUT Recirc) <u>one</u> turn open (A-1-107, Unit 1 RC Bleed Transfer Pump Rm.). C. __ Close 1CS-46. D. __ Start 1A BLEED TRANSFER PUMP. E. __ Locally throttle 1CS-48 (1A BHUT Recirc) to obtain 90 - 110 psig discharge pressure. F. __ Stop 1A BLEED TRANSFER PUMP.	
40. __ Verify two Letdown Filters in service, **AND** <u>only one</u> Letdown filter is desired.	__ **GO TO** Step 42.
41. Perform <u>one</u> of the following: __ Place 1HP-17 switch to CLOSE. __ Place 1HP-18 switch to CLOSE.	
42. __ **WHEN** directed by CR SRO, **THEN EXIT** this enclosure.	

• • • END • • •

Rule 6
HPI

HPI Pump Throttling Limits

- HPI must be throttled to prevent violating the RV-P/T limit.
- HPI pump operation must be limited to two HPIPs when only one BWST suction valve (1HP-24 or 1HP-25) is open.
- HPI must be throttled ≤ 475 gpm/pump (including seal injection for A header) when only one HPI pump is operating in a header.
- Total HPI flow must be throttled ≤ 950 gpm including seal injection when 1A and 1B HPI pumps are operating with 1HP-409 open.
- Total HPI flow must be throttled < 750 gpm when all the following exist:
  - LPI suction is from the RBES
  - piggyback is aligned
  - either of the following exist:
    - only one piggyback valve is open (1LP-15 or 1LP-16)
    - only one LPI pump operating
- HPI may be throttled under the following conditions:

HPI Forced Cooling in Progress:	HPI Forced Cooling NOT in Progress:
All the following conditions must exist: • Core SCM > 0 • CETCs decreasing	All the following conditions must exist: • All WR NIs ≤ 1% • Core SCM > 0 • Pzr level increasing • SRO concurrence required if throttling following emergency boration

HPI Pump Minimum Flow Limit

- Maintain ≥ 170 gpm indicated/pump. This is an instrument error adjusted value that ensures a real value of ≥ 65 gpm/pump is maintained. HPI pump flow less than minimum is allowed for up to 4 hours.

Rule 8

Pressurized Thermal Shock (PTS) Page 1 of 1

NOTE

This rule is invoked under either of the following conditions:

- A cooldown below 400°F T_c at > 100 °F/hr has occurred.
- HPI has injected through an open or throttled open 1HP-26, 27, 409, 410 with all RCPs OFF.

- SCM must be minimized. The following methods may be used at the discretion of the CR SRO:
  - Throttling HPI per Rule 6 (HPI)
  - De-energizing Pzr heaters
  - Using Pzr normal spray
  - Using Pzr aux spray
  - Using PORV
  - Throttling LPI {22}
- Once RCS temperature is stable, a 1-hour hold of RCS temperature must be performed unless a LOCA. SGTR, or Blackout is in progress. Use T_c in loop with an operating RCP or use CETCs if **NO** RCPs are operating.
- Once invoked, SCM shall remain minimized until Engineering has performed an evaluation and determined that PTS restrictions **NO** longer apply. Starting RCPs and/or restoring cool down rates to normal values do **NOT** negate the need for this evaluation.

Enclosure 5.16
SG Tube-to-Shell ΔT Control

NOTE

- SG tube-to-shell ΔT is calculated by the OAC with points displayed on Loop P/T displays as indicated below:

1A SG ΔT	1B SG ΔT
Bottom of Loop 'A' P/T display	Bottom of Loop 'B' P/T display
S/G TUBE/SHELL DT	S/G TUBE/SHELL DT

- SG tube-to-shell ΔT limits:

Stress	OAC Indication
Tensile Stress Limit (Tubes colder than shell)	+130°F
Compressive Stress (Tubes hotter than shell)	-70°F

1. **IAAT** <u>any</u> SG tube-to-shell ΔT approaches <u>either</u> limit, **THEN** take appropriate action per the following:

Limit Approached	Action
Tensile	**GO TO** Step 2
Compressive	**GO TO** Step 50

Examiner Note: SG tube-to-shell ΔT should not approach either limit for this scenario.

Subsequent Actions

Parallel Actions

	CONDITION	ACTIONS	
1.	PR NIs ≥ 5% FP **OR** NIs **NOT** decreasing	**GO TO** UNPP tab.	**UNPP**
2.	All 4160V SWGR de-energized {13}	**GO TO** Blackout tab.	**BLACKOUT**
3.	Core SCM indicates superheat	**GO TO** ICC tab.	**ICC**
4.	Any SCM = 0°F	**GO TO** LOSCM tab.	**LOSCM**
5.	Both SGs intentionally isolated to stop excessive heat transfer	**GO TO** EHT tab.	**LOHT**
6.	Loss of heat transfer (including loss of all Main and Emergency FDW)	**GO TO** LOHT tab.	
7.	Heat transfer is or has been excessive	**GO TO** EHT tab.	**EHT**
8.	Indications of SGTR ≥ 25 gpm	**GO TO** SGTR tab.	**SGTR**
9.	Turbine Building flooding **NOT** caused by rainfall event	**GO TO** TBF tab.	**TBF**
10.	Inadvertent ES actuation occurred	Initiate AP/1/A/1700/042 (Inadvertent ES Actuation).	**ES**
11.	Valid ES actuation has occurred or should have	Initiate Encl 5.1 (ES Actuation).	**ES**
12.	Power lost to all 4160V SWGR and any 4160V SWGR re-energized	• Initiate AP/11 (Recovery from Loss of Power). • **IF** Encl 5.1 (ES Actuation) has been initiated, **THEN** reinitiate Encl 5.1.	**ROP**
13.	RCS leakage > 160 gpm with letdown isolated	Notify plant staff that Emergency Dose Limits are in affect using PA system.	**EDL**
14.	Individual available to make notifications	• Announce plant conditions using PA system. • Notify OSM to reference the Emergency Plan and AD-LS-ALL-0006 (Notification/Reportability Evaluation).	**NOTIFY**

EHT EP/1/A/1800/001

Parallel Actions Page 1 of 1

CONDITION	ACTIONS	
1. PR NIs ≥ 5% FP **OR** NIs **NOT** decreasing	**GO TO** UNPP tab.	**UNPP**
2. All 4160V SWGR de-energized	**GO TO** Blackout tab.	**BLACKOUT**
3. Core SCM indicates superheat	**GO TO** ICC tab.	**ICC**
4. Any SCM = 0°F **AND** HPI forced cooling **NOT** in progress	**IF** LOSCM tab has **NOT** been entered due to current EHT event **THEN GO TO** LOSCM tab.	**LOSCM**
5. Both SGs intentionally isolated to stop excessive heat transfer after EHT tab initiated	**RETURN TO** beginning of EHT tab.	**LOHT**
6. Loss of heat transfer **AND** at least one SG **NOT** isolated	**GO TO** LOHT tab.	
7. Indications of excessive heat transfer in another SG after EHT tab initiated	**RETURN TO** beginning of EHT tab.	**EHT**
8. Inadvertent ES actuation occurred	Initiate AP/1/A/1700/042 (Inadvertent ES Actuation).	**ES**
9. Valid ES actuation has occurred or should have	Initiate Encl 5.1 (ES Actuation).	**ES**
10. Power lost to all 4160V SWGR and any 4160V SWGR re-energized	• Initiate AP/11 (Recovery from Loss of Power). • **IF** Encl 5.1 (ES Actuation) has been initiated, **THEN** reinitiate Encl 5.1.	**ROP**
11. RCS leakage > 160 gpm with letdown isolated OR SGTR .> 25 gpm	Notify plant staff that Emergency Dose Limits are in affect using PA system.	**EDL**
12. Individual available to make notifications	• Announce plant conditions using PA system. • Notify OSM to reference the Emergency Plan and AD-LS-ALL-0006 (Notification /Reportability Evaluation).	**NOTIFY**

CRITICAL TASKS

CT-1 Ensure the Main Vacuum Pumps are operating prior to the low vacuum Turbine trip of 21.75 inches Hg.

CT-2 (BWOG CT-17) Isolate the SG that is overcooling the RCS.
Manually actuate AFIS within 10 minutes of the MSLB to isolate the SG and limit the overcooling.

CT-3 (BWOG CT-1) Secure RCPs within 2 minutes of SCM = 0ºF, unless SCM returns > 0ºF within 2 minutes and Rule 2 is exited per Step 1 RNO.

SAFETY: Take a Minute			
UNIT 0 (OSM)			
SSF Operable: No U2/U3: Yes PSW Operable: No	KHU's Operable: U1 - OH, U2 - UG	LCTs Operable: 2	Fuel Handling: No

UNIT STATUS (CR SRO)

Unit 1 Simulator	Other Units	
Mode: 1	**Unit 2**	**Unit 3**
Reactor Power: 75%	Mode: 1	Mode: 1
Gross MWE: 698	100% Power	100% Power
RCS Leakage: 0.01 gpm No WCAP Action	EFDW Backup: Yes	EFDW Backup: Yes
RBNS Rate: 0.01 gpm		

Technical Specifications/SLC Items (CR SRO)

Component/Train	OOS Date/Time	Restoration Required Date/Time	TS/SLC #
AMSAC/DSS	Today/0300	7 Days	SLC 16.7.2
SSF	Today/0100	7 Days	TS 3.10.1
PSW	Today/0600	7 Days	TS 3.7.10

Shift Turnover Items (CR SRO)

Primary

- Due to unanalyzed condition, the SSF should be considered INOPERABLE for Unit 1 if power levels are reduced below 85%. Evaluations must be performed prior to declaring the SSF operable following a return to power (after going below 85%).
- OATC is to perform PT/1/A/0600/015 Enclosure 13.2 (Control Rod Movement at Power) for Group 1 Control Rods only. While the Unit 1 SRO is in the role of Reactivity SRO, Unit 2 SRO will provide oversight for Unit 1.
- The Rx Diamond and FDW Masters are in Hand per OP/1/A/1102/004A Enclosure 4.1 (Placing Rx Diamond/FDW Masters To Hand) to perform the CRD Movement PT.
- 1RIA-3 and 5 removed from RB
- SASS is in Manual for calibration
- Holding at 75% power per dispatcher

Secondary

- AMSAC/DSS bypassed for calibration
- PSW Primary Pump is OOS. WCC preparing Protected Equipment package.
- Unit 2 is supplying the AS header
- 1SSH-1, 1SSH-3, 1SD-2, 1SD-5, 1SD-140, 1SD-303, 1SD-355, 1SD-356 and 1SD-358 are closed with power supply breakers open per the Startup Procedure for SSF Overcooling Event.

Reactivity Management (CR SRO)

RCS Boron 69 ppmB	Gp 7 Rod Position: 77% Withdrawn	Batch additions as required for volume control.

Human Performance Emphasis (OSM)

Procedure Use and Adherence

Facility: **Oconee** Scenario No.: **3** Op-Test No.: 1

Examiners: ______________________ Operators: ______________________ **SRO**

______________________ ______________________ **OATC**

______________________ ______________________ **BOP**

Initial Conditions:

- Reactor Power = 50%

Turnover:

- SASS is in manual for calibration
- AMSAC/DSS is bypassed for calibration
- PSW is unavailable for Unit 1

Event No.	Malfunction No.	Event Type*	Event Description
0a	Override		AMSAC/DSS Bypassed
0b	Override		SASS in Manual
1	Override	C: OATC, SRO	Pressurize LDST with Hydrogen
2	Override	C: BOP, SRO	1A CCW Pump Motor Stator Temperature High
3	MSS470	C: BOP, SRO **(TS)**	Recurring High Vibration on 1A RBCU
4	MPI241 MPI251	I: OATC, SRO	Loop 'B' Tcold Fails Low
5	MPS010 MPS010D	R: OATC, SRO **(TS)**	1A SGTR (≈ 60 gpm) Requiring Manual Power Reduction
6		N: BOP, SRO	Support Actions During Manual Power Reduction
7	MPI290	M: ALL	Reactor Fails to Trip (ATWS) • 1HP-27 Fails Closed

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

SCENARIO 3 EVENT SUMMARY

Event 1: When the crew takes the shift, the SRO will direct the OATC to raise pressure in the LDST using OP/1/A/1106/017 (Hydrogen System) Enclosure 4.5 (Unit 1 LDST H2 Addition). 1H-1 (Hydrogen to LDST valve) will fail open and will require an RO to contact an AO to isolate Hydrogen locally to prevent over-pressurizing the LDST.

Event 2: The 1A CCW pump motor stator temperature will begin to rise. An OAC alarm will alert the crew of the issue and the BOP will refer to the alarm response for the OAC alarm. The BOP will refer to OP/1/A/1104/012A (CCW Pump Operation) Enclosures 4.1 (CCW Pump Startup) and 4.2 (CCW Pump Shutdown) to remove the 1A CCW pump from service and start the 1D CCW pump.

Event 3: OAC alarm O1D1361 (RBCU Fan 1A Vib) will alarm and the BOP will refer to the OAC alarm response. The first time the alarm comes in, it will be reset using the OAC alarm response guidance. After the first alarm is reset, it will alarm again in ≈ 3 minutes. This time the alarm will not reset and the BOP must secure the 1A RBCU. The SRO will declare the 1A RBCU inoperable and enter TS 3.6.5.

Event 4: Loop B Tc will fail low causing control rods to withdraw and feedwater demand to lower. The crew should perform Plant Transient Response (PTR) and place the ICS Diamond and FDW Loop Masters in MANUAL. The crew will perform AP/28 (ICS Instrument Failures). ICS will remain in MANUAL for the rest of the scenario.

Event 5: The 1A SG will experience a tube leak of ≈ 60 gpm which will require entry into the SGTR tab of the EOP. The OATC will begin reducing Reactor power with ICS in manual in order to shut down the unit.

Event 6: After the power reduction begins in Event 5, the BOP will transfer auxiliary power to the startup transformer and then start the Outside Air Booster Fans.

Event 7: After Reactor power has been reduced > 10% and the Outside Air Booster Fans have been started, both Main FDW Pumps will trip but the Reactor will fail to automatically or manually trip. The SRO will transfer to the UNPP tab of the EOP to mitigate this event and the OATC will perform Rule 1 (ATWS/UNPP). 1HP-27 will fail to open and the OATC will have to open 1HP-409 to align emergency boration through both HPI headers.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **1**	Page 1 of 4

Event Description: **Pressurize LDST with H2 (1H-1 will fail open) (C: OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1106/017

Crew response:

SRO directs the OATC to add H2 to the LDST using OP/1/A/1106/017 (Hydrogen System) Enclosure 4.5 (Unit 1 LDST H2 Addition).

OP/1/A/1106/017 Enclosure 4.5 (Unit 1 LDST H2 Addition) Rev 128

2.1 Notify Chemistry of hydrogen addition prior to adding hydrogen. {21}

______________________ ______
Person Notified Date

NOTE

- OP/0/A/1108/001 (Curves And General Information) and computer may be referred to for LDST Pressure vs Level curve. {7}
- LDST Maximum Pressure vs Indicated Level Curve should **NOT** be exceeded when pressurizing LDST.
- If Unit 1 is shutdown and will be placed in MODE 5, Nitrogen should be added to LDST to maintain LDST Pressure vs Level.
- If Unit 1 is shutdown and will **NOT** be placed in MODE 5, Hydrogen should be added to LDST to maintain LDST Pressure vs Level.

2.2 Immediately prior to pressurization determine lowest reading of diverse LDST level indications: _____ inches.

2.3 For existing LDST level determine LDST Pressure allowable per LDST Pressure vs Level curve: _____ psig.

2.4 Notify Operator at H2 Cage to pressurize primary hydrogen.

NOTE: Operator should be in constant communication with CR to close 1H-26 if 1H-1 fails open.

Booth Cue: When directed to open 1H-26, use Manual Valves and position 1H-93.

2.5 Direct Operator to open 1H-26 (LDST Block). (A-2-N of LDST Rm)

This event is complete when LDST Hydrogen addition is complete and 1H-26 is closed, or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **1**	Page 2 of 4
Event Description:	**Pressurize LDST with H2 (1H-1 will fail open) (C: OATC, SRO)**		

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1106/017 **Crew response:** ***Examiner/Booth Note: Once LDST pressure is being increased, 1H-1 (LDST SUPPLY) will fail open.*** 2.6 Direct Operator to use explosive detector to monitor the following: __ Pressurized, non-welded H2 piping and fittings within local area of addition __ Loop seal (A-2-N of LDST Rm) 2.7 Cycle 1H-1 (H2 TO LDST) as required to pressurize LDST per LDST Pressure vs Level curve. ***Booth Cue: When 1H-1 is opened, Fire Timer 1 to fail it open.*** 2.8 **WHEN** Hydrogen addition complete, ensure closed 1H-1 (H2 TO LDST). ***Examiner Note: OATC should determine that 1H-1 has failed open and direct the AO to locally close 1H-26.*** 2.9 Direct Operator to close 1H-26 (LDST Block). (A-2-N of LDST Rm) 2.10 Ensure LDST pressure within LDST Pressure vs Level curve 2.11 Notify Operator at H2 Cage to isolate primary hydrogen 2.12 Log LDST Hydrogen addition in Auto Log ***Examiner Note: The SRO may decide to lower LDST pressure, those steps begin on the next page.***

This event is complete when LDST Hydrogen addition is complete and 1H-26 is closed, or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **1** Page 3 of 4

Event Description: **Pressurize LDST with H2 (1H-1 will fail open) (C: OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1104/002

Crew response:

SRO directs the OATC to vent LDST to GWD per OP/1/A/1104/002 (HPI System), Encl. 4.16, (Lowering LDST Pressure).

OP/1/A/1104/002 (HPI System) Encl. 4.16 (Lowering LDST Pressure) Rev 172

2.1 **IF** Operations requires reducing LDST Pressure, perform Section 3 (Operations Requires LDST Pressure Reduction)

3.1 Close 1GWD-20 (LDST Vent Blk). (A-2-LDST Hatch Area)

3.2 Open 1GWD-19 (LDST VENT).

CAUTION: LDST pressure should be within curves of Enclosure "LDST Pressure Vs Level" of OP/0/A/1108/001 (Curves and General Information).

NOTE: If LDST pressure is < 30 psig, leakage from BWST into HPI System may occur. (R.M.)

3.3 Throttle open 1GWD-20 (LDST Vent Blk) until LDST pressure begins to **slowly** decrease **and** GWD system can maintain vent header. (A-2-LDST Hatch Area)

3.4 **IF** required, start Standby GWD Compressor per OP/1-2/A/1104/018 (GWD System).

3.5 **WHEN** desired LDST pressure obtained, close 1GWD-19 (LDST VENT).

3.6 **IF** started, stop Standby GWD Compressor.

3.7 Throttle ≈ 1/4 turn open 1GWD-20 (LDST Vent Blk). (A-2-LDST Hatch Area)

This event is complete when LDST Hydrogen addition is complete and 1H-26 is closed, or when directed by the Lead Examiner.

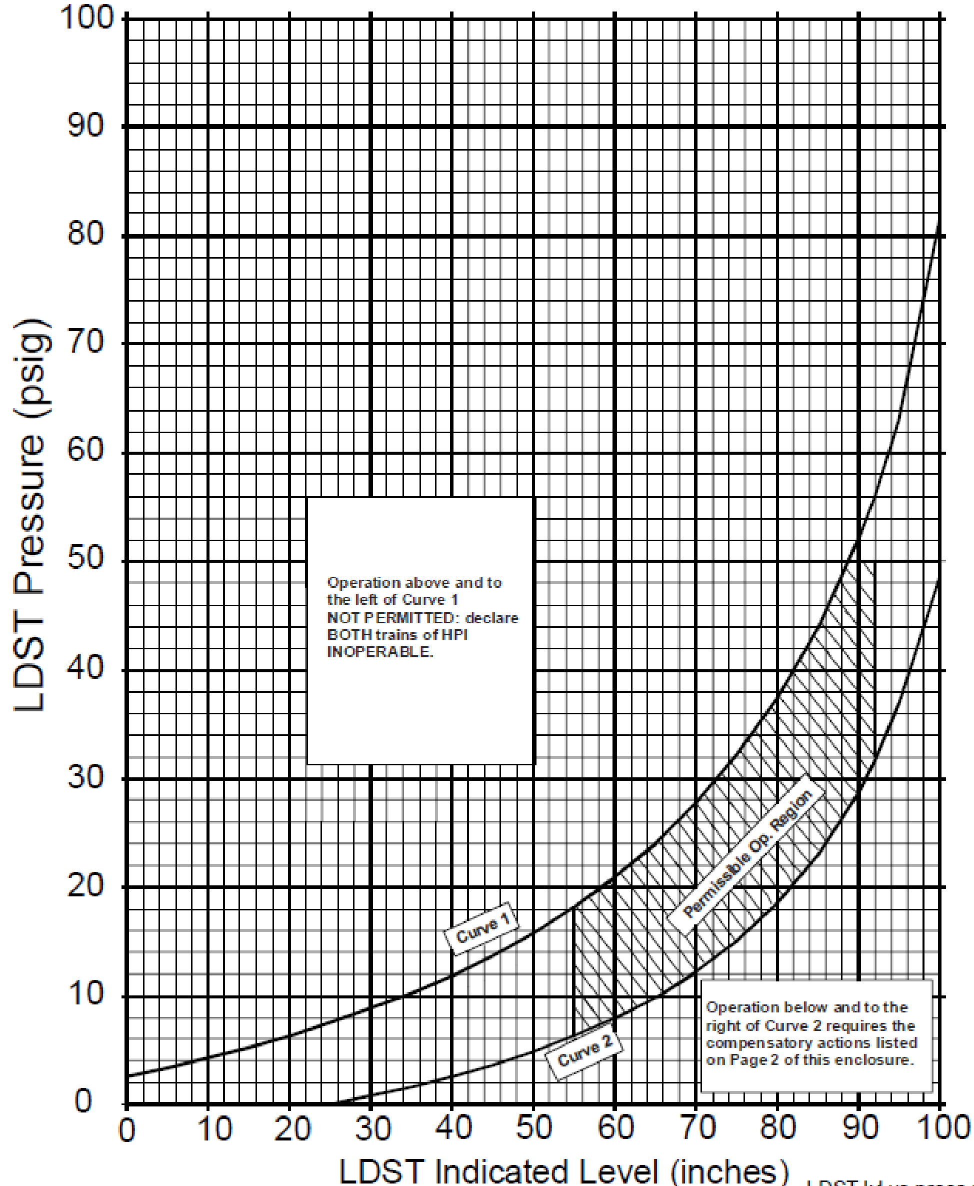
Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **1**	Page 4 of 4
Event Description:	**Pressurize LDST with H2 (1H-1 will fail open) (C: OATC, SRO)**		

Time	Position	Applicant's Actions or Behavior
		OP/0/A/1108/001 rev 112

Enclosure 4.39 OP/0/A/1108/001

LDST Pressure Vs. Level (All Units) Page 1 of 2

(Instrument Error Included)



LDST lvl vs press.des
Rev. 6
RTR 3/01/05

This event is complete when LDST Hydrogen addition is complete and 1H-26 is closed, or when directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **2** Page 1 of 4

Event Description: **1A CCW Pump Motor Stator Temperature High (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

Plant response:

OAC alarm O1A0844 (CCW 1A MTR STATOR TEMP) HI-HI

Crew response:

The BOP will refer alarm response for OAC alarm O1A0844 (CCW 1A MTR STATOR TEMP)

OAC Alarm O1A0844

Alarm Response for OAC Alarm O1A0844

HI-HI
1) Refer to OP/1/A/1104/012 A (CCW Pump Operation) to remove the CCWP from service
2) Notify System Engineer

HI Display the graphic for 1A CCWP and monitor closely

Examiner Note: It is acceptable to perform Enclosures 4.1 and 4.2 in any order.

OP/1/A/1104/012A Enclosure 4.1

OP/1/A/1104/012 A Enclosure 4.1 (CCW Pump Startup) rev 19

1. Initial Conditions

1.1 Verify seal water aligned to CCW Pump to be started per OP/0/A/1104/052 (SSW System)

1.2 **IF** this is the 4th CCW pump to be started, perform the following on all operating Amertap Trains:

- Ensure CCW Pumps in "4". (1A1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "4". (1A2 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "4". (1B1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "4". (1B2 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "4". (1C1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "4". (1C2 Amertap Train Set-up 1 Screen)

This event is complete when the 1A CCW pump is secured and the 1D CCW pump is started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **2** Page 2 of 4

Event Description: **1A CCW Pump Motor Stator Temperature High (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1104/012A Enclosure 4.1

Crew response:

1.3 **IF** this is the 1st, 2nd, **OR** 3rd CCW pump to be started, perform the following on all operating Amertap Trains:

- Ensure CCW Pumps in "3" (1A1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1A2 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1B1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1B2 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1C1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1C2 Amertap Train Set-up 1 Screen)

1.4 Review Limits and Precautions

2. Procedure

NOTE: Do **NOT** operate CCW Pumps in the same header until adjacent CCW Pump discharge valves have fully repositioned to prevent CCW Pump discharge valve malfunction.

2.1 **IF** this is the first CCW Pump to be started, verify closed CCW Pump discharge valves on adjacent CCW Pumps.

2.2 Verify closed discharge valve on CCW Pump to be started

NOTE:
- CCW Pump starts when discharge valve ≈ 20% open
- ESV Tank low vacuum alarms may occur during CCW Pump start
- LPSW Leakage Accumulator level is a function of LPSW System pressure. When CCW Pump status is changed, LPSW Leakage Accumulator level may exceed the limits of SR 3.7.7.1 until LPSW system pressure stabilizes. As a result, momentary entry into TS 3.7.7 Condition 'B' may be necessary.
- During two CCW pump operation, operating 1A CCWP and 1D CCWP should be avoided as much as possible since they are both powered from 1TC

2.3 Start desired CCW Pump: ____________.

2.4 Verify CCW Pump discharge valve opens

2.5 Ensure CCWP LOAD SHED DEFEAT switch is positioned to a running CCW Pump

This event is complete when the 1A CCW pump is secured and the 1D CCW pump is started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **2**	Page 3 of 4

Event Description: **1A CCW Pump Motor Stator Temperature High (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

OP/1/A/1104/012A Enclosure 4.2

Crew response:

OP/1/A/1104/012A Enclosure 4.2 (CCW Pump Shutdown)

1. Initial Conditions

1.1 **IF** Enclosure "Hot Lake Water Surveillance" of OP/1/A/1105/014 (Control Room Instrumentation Operation And Information) in effect, ensure System Engineer notified prior to stopping CCW Pump.

______________________ ______
Person Notified Date

1.2 Review Limits and Precautions

NOTE: LPSW Leakage Accumulator level is a function of LPSW System pressure. When CCW Pump status is changed, LPSW Leakage Accumulator level may exceed the limits of SR 3.7.7.1 until LPSW system pressure stabilizes. As a result, momentary entry into TS 3.7.7 Condition 'B' may be necessary.

2. Procedure

NOTE:
- 1A and 1B CCWPs are on same CCW header
- 1C and 1D CCWPs are on same CCW header
- The CCW header CANNOT be credited as an operable ECCW header unless a CCWP discharge valve is open
- During two CCW pump operation, operating 1A CCWP and 1D CCWP should be avoided as much as possible since they are both powered from 1TC

2.1 **IF** CCW header will still have an operating CCWP when desired CCWP is secured, perform the following:

2.1.1 Stop desired CCW Pump: ____________

2.1.2 Verify CCW Pump discharge valve closes

2.1.3 Ensure CCWP LOAD SHED DEFEAT switch is positioned to a running CCW Pump

This event is complete when the 1A CCW pump is secured and the 1D CCW pump is started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **2** Page 4 of 4

Event Description: **1A CCW Pump Motor Stator Temperature High (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

OP/1/A/1104/012A Enclosure 4.2

Crew response:

OP/1/A/1104/012A Enclosure 4.2

NOTE:
- An operable ECCW Header consists of having one of the two CCW Pump discharge valves on a CCW header open and the associated ESV Train aligned and operating
- Unit 1 and 2 can credit any combination of Unit 1 and Unit 2 ECCW headers, as long as Unit 3 is **NOT** crediting a Unit 2 ECCW Header
- Unit 1 **CANNOT** credit a Unit 3 ECCW Header
- Unit 2 ECCW headers **CANNOT** be credited for Unit 1 or 2 if being credited by Unit 3
- Unit 3 **CANNOT** credit a Unit 1 ECCW Header
- During two CCW pump operation, operating 1A CCWP and 1D CCWP should be avoided as much as possible since they are both powered from 1TC

2.2 **IF** CCW header will **NOT** have an operating CCWP when desired CCWP is secured, perform the following: **(N/A)**

Examiner Note: The 1B CCW pump will be operating so all Step 2.2 is not applicable.

2.3 **IF** 4th CCW pump was stopped, perform the following on all operating Amertap Trains:

- Ensure CCW Pumps in "3" (1A1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1A2 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1B1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1B2 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1C1 Amertap Train Set-up 1 Screen)
- Ensure CCW Pumps in "3" (1C2 Amertap Train Set-up 1 Screen)

This event is complete when the 1A CCW pump is secured and the 1D CCW pump is started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **3** Page 1 of 3

Event Description: **Recurring Vibration on 1A RBCU (C: BOP, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		Plant Response: • OAC alarm O1D1361 (RBCU Fan 1A Vib)
	BOP	**Crew response**: • Refer to OAC ARG • BOP will attempt to reset vibration alarm (Panel 1AB3) (**It will not reset**) • BOP will secure the 1A RBCU • Contact engineering
		OAC Alarm O1D1361 1) Depress the RBCU OAC Vibration alarm reset pushbutton 2) If the alarm doesn't clear stop the RBCU 3) Notify Engineering for an evaluation
	BOP	***Examiner Note: The crew may stop the 1A RBCU per the OAC alarm response guide.*** ***Booth Cue: If the crew fails to start the 1B RBCU, contact the crew as the SM and request that the 1B RBCU be started in HIGH SPEED.***
		SRO should refer to TS 3.6.5 (**page 13**)
		Examiner Note: It is acceptable to perform Section 3 and Section 4 in any order.
		OP/1/A/1104/015 Enclosure 4.3 (RBCU Operation) rev 43 **3. Stopping RBCU(s)** **NOTE:** When starting RBCUs or changing LPSW flows, RB pressure will change as RB temperature changes. 3.1 Verify RB pressure within limits of PT/1/A/0600/001 (Periodic Instrument Surveillance). 3.2 Begin monitoring the following: • RB pressure absolute pressure. (OAC Turn On 1RBPA). • RB Temperature

This event is complete when the 1A RBCU is secured and the 1B RBCU is started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **3**	Page 2 of 3
Event Description:	**Recurring Vibration on 1A RBCU (C: BOP, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1104/015 Encl 4.3
		Crew response:
		NOTE: Stopping RBCUs can affect the following: RBCU bearing temperatures, RBCU vibration, RBNS level, 1RIA-47 level, RB pressure/temperature.
	BOP	3.3 Place desired switch to "OFF": ☐ 1A RBCU ☐ 1B RBCU ☐ 1C RBCU
		NOTE: • When changing LPSW flows, RB pressure will change as RB temperature changes. • Each RBCU must have ≥ 550 gpm Inlet Flow or ≥ 750 gpm Outlet Flow to meet flow requirements of SLC 16.9.12.
		3.4 Position valves as required for RB cooling: ☐ 1LPSW-18 (1A RBCU OUTLET) ☐ 1LPSW-21 (1B RBCU OUTLET) ☐ 1LPSW-24 (1C RBCU OUTLET)
		4. Starting RBCUs
		NOTE: When starting RBCUs or changing LPSW flows, RB pressure will change as RB temperature changes.
		4.1 Verify RB pressure within limits of PT/1/A/0600/001 (Periodic Instrument Surveillance). 4.2 Begin monitoring RB pressure absolute pressure (OAC Turn On 1RBPA). 4.3 **IF** personal inside containment, announce over plant page that starting RBCU.

This event is complete when the 1A RBCU is secured and the 1B RBCU is started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **3**	Page 3 of 3
Event Description:	**Recurring Vibration on 1A RBCU (C: BOP, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1104/015 Encl 4.3
		Crew response:
		NOTE: Starting RBCUs can affect the following: RBCU bearing temperatures, RBCU vibration, RBNS level, 1RIA-47 level, RB pressure/temperature.
	BOP	4.4 Place desired switch to "HIGH or LOW": ☐ 1A RBCU ☐ 1B RBCU ☐ 1C RBCU
		Examiner Note: The 1B RBCU should be placed in HIGH speed.
		NOTE: When changing LPSW flows, RB pressure will change as RB temperature changes. Each RBCU must have ≥ 550 gpm Inlet flow or ≥ 750 gpm Outlet Flow to meet flow requirements of SLC 16.9.12.
		4.5 Position valves as required for RB cooling: ☐ 1LPSW-18 (1A RBCU OUTLET) ☐ 1LPSW-21 (1B RBCU OUTLET) ☐ 1LPSW-24 (1C RBCU OUTLET)
	SRO	SRO should refer to TS 3.6.5
		TS 3.6.5 REACTOR BUILDING SPRAY AND COOLING TRAINS Condition B (7 days) Restore Reactor Building cooling train to OPERABLE status.

This event is complete when the 1A RBCU is secured and the 1B RBCU is started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **4** Page 1 of 3

Event Description: **Loop 'B' Tcold Fails Low (I: OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
		<u>Plant response</u>: • Loop "1B" Tc Dixson meter low (520°F) • Loop "1B" ΔT Dixson meter reads 70°F • ΔTc meter reads low (+10°F; "A" loop Hot) • Controlling NR Tave digital display reads ≈ 570°F • Controlling Tave Chessell display reads ≈ 570°F • 1SA-2/B-4 (RC Average Temperature High/Low) • 1SA-2/B-5 (RC COLD LEG DIFF TEMP HIGH) • 1SA-2/A-12 (ICS Tracking)
		<u>Crew response</u>: When the Statalarms are received, the candidates should utilize the Plant Transient Response process to stabilize the plant. • Diagnose the 1B Loop Tcold failure by observing the Loop B T_C Dixson meter on 1UB1 • The OATC will place the Diamond and both FDW Masters in manual and re-ratio Feedwater to stabilize the plant

	OATC	The OATC should:
		• Communicate to the CRS the initial alarm (if applicable) followed by reactor power level and direction
		• Place the appropriate ICS stations in manual (Diamond and both FDW Masters in this case) in manual if any of the following occur:
		  ○ NI power increasing above the pre-transient power level
		  ○ Failed instrument is diagnosed
		  ○ Invalid input exists and the CRS directs the ICS be placed in manual
		• Remain focused on reactor power level and FDW response during the transient

	BOP	The BOP should: • Determine if a valid ICS runback exists and inform the CRS • Monitor plant response and verify operating limits <u>NOT</u> exceeded • If ICS is placed in Manual, remain focused on RCS pressure, SG outlet pressure and RCS inventory
	SRO	The SRO should: • Refer to AP/28 (ICS Instrument Failures) • Ensure FIN-24 (SPOC) is contacted to repair the failed instrument

This event is complete when the SRO reaches Step 6 in AP/28 Section 4A, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **4** Page 2 of 3

Event Description: **Loop 'B' Tcold Fails Low (I: OATC, SRO)**

Time	Position	Applicant's Actions or Behavior

AP/1/A/1700/028

Crew response:

AP/1/A/1700/028 (ICS Instrument Failures) rev 20

4.1 Provide control bands as required. **(OMP 1-18 Att. I)**

OMP 1-18 Attachment I:

1. Plant Conditions Stable or TPB ≤ Pre-transient Conditions

- ***NI Power ± 1% not to exceed the pre-transient or allowable power. If at the pre-transient or allowable level, band is NI Power – 1%.***
- ***Current Tave ± 2°F.***
- ***Current SG Outlet Pressure ± 10 PSIG (N/A)***
- ***Delta Tc 0°F ± 2°F.***

4.2 Initiate notification of the following:

__ OSM to reference the following:

- OMP 1-14 (Notifications)
- Emergency Plan

__ STA

4.3 Verify a power transient ≥ 5% has occurred.

RNO: GO TO Step 4.5.

4.4 Notify Rx Engineering and discuss the need for a maneuvering plan.

4.5 Use the following, as necessary, to determine the applicable section from table in Step 4.6:

- OAC alarm video
- OAC display points
- Control Board indications
- SPOC assistance, as needed

4.6 **GO TO** the applicable section per the following table:

	Section	Failure
	4A	RCS Temperature

This event is complete when the SRO reaches Step 6 in AP/28 Section 4A, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **4** Page 3 of 3

Event Description: **Loop 'B' Tcold Fails Low (I: OATC, SRO)**

Time	Position	Applicant's Actions or Behavior

		AP/1/A/1700/028 Section 4A
		Crew response:
		AP/1/A/1700/028 Section 4A (RCS Temperature Failure)
		NOTE
		• If Tave instrument circuit failed high, the following may have occurred depending on initial ICS station status:
		  • Unit to TRACK due to Rx Cross Limits
		  • Control Rod insertion
		  • Feedwater flow increase
		• If Tave instrument circuit failed low, the following may have occurred depending on initial ICS station status:
		  • Unit to TRACK due to Rx Cross Limits
		  • Control Rod withdrawal
		  • Feedwater flow decrease
		  • Feedwater re-ratio

	OATC	1. Ensure the following in HAND: __ 1A FDW MASTER __ 1B FDW MASTER 2. Ensure DIAMOND in MANUAL. 3. Notify SPOC to perform the following: __ Select a valid RCS Tave and Delta Tc input to ICS per AM/1/A/0326/020 (Control of Unit 1 Star Module Signal Selection Function). __ Investigate and repair the failed RCS temperature instrumentation.
	BOP	4. **PERFORM** an instrumentation surveillance using applicable table in Encl 5.2 (ICS Instrument Surveillances) for the failed instrument. 5. Verify instrumentation surveillance in Encl 5.2 (ICS Instrument Surveillances) was performed satisfactorily as written. **RNO:** Initiate a Surveillance Evaluation in accordance with PT/1/A/0600/001 (Periodic Instrument Surveillance) and OP/1/A/1105/014 (Control Room Instrumentation Operation And Information).
	SRO	6. **WHEN** notified by SPOC that a valid RCS Tave and Delta Tc input have been restored to ICS, **THEN GO TO** OP/1/A/1102/004 A Encl (Placing ICS Stations To Auto).

This event is complete when the SRO reaches Step 6 in AP/28 Section 4A, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **5** Page 1 of 3

Event Description: **1A SGTR (≈ 60 gpm) Requiring Manual Power Reduction (R: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		Plant response: • 1SA-8/A-9 (RM AREA MONITOR RADIATION HIGH) • 1SA-8/E-10 (N-16 RM PRIMARY TO SECONDARY TUBE LEAK) • 1SA-8/D-10 (RM CSAE EXHAUST RADIATION HIGH) • 1SA-8/B-9 (RM PROCESS MONITOR RADIATION HIGH) • 1RIA-40 in alarm • 1RIA 60 in alarm and indicating ≈ 60 gpm **Crew response**: Once S/G tube leakage exceeds 25 gpm, the SRO will enter the SGTR tab of the EOP ***SGTR Tab*** 1. Verify Rx tripped **RNO:** 1. Maintain Pzr level 220" – 260" by initiating Encl 5.5 (Pzr and LDST Level Control) 2. **GO TO** Step 10 10. **IAAT** Pzr level decreasing with all available HPI, **AND** Rx power is > 18%, **THEN** perform the following: __ Trip the Rx __ **GO TO** IMA tab 11. Verify all: __ Rx power > 40% __ 1RIA-59 operable __ 1RIA-60 operable **RNO:** 1. Estimate SGTR leak rate: _____ + _____ - _____ - _____ = _____ gpm **MU** **SI** **LD** **TSR** **LR** Where: MU = Makeup Flow SI = Seal Inlet Hdr Flow LD = Letdown Flow TSR = Total Seal Return Flow LR = Leak Rate 2. __ **GO TO** Step 13.

This event is complete when power has been reduced > 10% and the Outside Air Booster Fans have been started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **5**	Page 2 of 3
Event Description: **1A SGTR (≈ 60 gpm) Requiring Manual Power Reduction (R: OATC, SRO) (TS)**			

Time	Position	Applicant's Actions or Behavior
		SGTR Tab
		Crew response:
		NOTE 1RIA-59/60 and 1RIA-16/17 may indicate up to ≈ 2% of the value of the opposite detector due to shine effects based on the close proximity of the steam lines and detectors.
		12. Determine leak rate using: __ 1RIA-59 __ 1RIA-60
		13. Notify OSM of SGTR leak rate
		14. Verify ICS capable of power reduction in AUTO
		RNO: 1. Initiate manual power reduction to < 15% 2. **GO TO** Step 16
		NOTE Encl 5.19 (Control of Plant Equipment During Shutdown for SGTR) will swap auxiliaries
		16. Initiate Encl 5.19 (Control of Plant Equipment During Shutdown for SGTR) **(page 20)**
		17. **WHEN** both exist: __ Reactor power is ≈ 15% FP __ Unit auxiliaries have been transferred **THEN** continue
		18. Depress turbine TRIP pushbutton
		19. Verify all TURBINE STOP VALVES closed
		RNO: Place both EHC pumps in PULL TO LOCK
		20. Open: __ PCB 20 __ PCB 21
		21. Verify Generator Field Breaker open
		22. Verify EXCITATION is OFF
		23. Verify TBVs controlling SG pressure as expected
		24. Reduce Rx power to ≤ 5% FP

This event is complete when power has been reduced > 10% and the Outside Air Booster Fans have been started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **5** Page 3 of 3

Event Description: **1A SGTR (≈ 60 gpm) Requiring Manual Power Reduction (R: OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		SGTR Tab
		Crew response:
		25. Perform both: A. Depress REACTOR TRIP pushbutton B. Stabilize RCS P/T as follows: • TBVs in auto - reduce TBV setpoint, as needed, to prevent heatup • TBVs in manual - throttle TBVs closed, as needed, to prevent cooldown • ADVs in use - throttle ADVs closed, as needed, to prevent cooldown
		Examiner Note: The Reactor will fail to trip and the SRO will refer to the Parallel Actions Page and then transfer to the UNPP tab.
		26. Maintain Pzr level 140" – 180" [175" – 215" acc]
		27. Dispatch an operator to open: __ 1XD-R3C (A Turb Bldg Sump Pump Bkr) (T-1, G-27) __ 1XE-R3D (B Turb Bldg Sump Pump Bkr) (T-1, J-27)
		28. Secure any unnecessary offsite release paths. (Main Vacuum Pumps, TDEFDWP, Emergency Steam Air Ejector, etc.)
		29. Verify Main FDW or EFDW controlling properly
		30. Open: __ 1HP-24 __ 1HP-25
		31. Secure makeup to LDST
		32. Maintain both SG pressures < 950 psig using either: __ TBVs __ Dispatch two operators to perform Encl 5.24 (Operation of the ADVs) **(PS)**
		33. **IAAT** all the following exist: __ All SCMs > 0°F __ ES Bypass Permit satisfied __ RCS pressure controllable **THEN** perform Steps 34 - 35
		TS 3.4.13 RCS OPERATIONAL LEAKAGE Condition B (12 hours) Be in MODE 3 AND (36 hours) Be in MODE 5

This event is complete when power has been reduced > 10% and the Outside Air Booster Fans have been started, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **6** Page 1 of 4

Event Description: **Support Actions During Manual Power Reduction (N: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		EOP Enclosure 5.19
		Crew response:
	BOP	**EOP Enclosure 5.19 (Control of Plant Equipment During Shutdown for SGTR)**
		1. Perform the following: A. Monitor RIAs to identify all SGs with a tube rupture: • 1RIA-16 • 1RIA-17 • 1RIA-59 when Rx power > 40% • 1RIA-60 when Rx power > 40% B. Inform CRS of results
		2. Place 1TA AUTO/MAN transfer switch in MAN
		3. Place 1TB AUTO/MAN transfer switch in MAN
		4. Close 1TA SU 6.9 KV FDR
		5. Close 1TB SU 6.9 KV FDR
		6. Place MFB1 AUTO/MAN transfer switch in MAN
		7. Place MFB2 AUTO/MAN transfer switch in MAN
		8. Close $E1_1$ MFB1 STARTUP FDR
		9. Close $E2_1$ MFB1 STARTUP FDR
		10. Notify CRS that unit auxiliaries have been transferred
		11. Start: __ TURBINE TURNING GEAR OIL PUMP __ 1A through 1E TURBINE BRNG OIL LIFT PUMPs __ TURBINE MOTOR SUCTION PUMP
	CT-1	12. Start: __ A OUTSIDE AIR BOOSTER FAN __ B OUTSIDE AIR BOOSTER FAN

This event is complete when the Outside Air Booster Fans have been started (Step 12), or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **6** Page 2 of 4

Event Description: **Support Actions During Manual Power Reduction (N: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

EOP Enclosure 5.19

Crew response:

13. Notify Unit 3 to start:
    - __ 3A OUTSIDE AIR BOOSTER FAN
    - __ 3B OUTSIDE AIR BOOSTER FAN
14. Stop:
    - __ 1A MSRH DRN PUMP
    - __ 1B MSRH DRN PUMP
15. Place in manual and close:
    - __ 1FDW-53
    - __ 1FDW-65
16. Place in DUMP:
    - __ 1HD-37
    - __ 1HD-52
17. Perform the following:
    - __ Place 1A FDWP SEAL INJECTION PUMP switch to START
    - __ Place 1B FDWP SEAL INJECTION PUMP switch to START
    - __ Start 1A FDWP AUXILIARY OIL PUMP
    - __ Start 1B FDWP AUXILIARY OIL PUMP
18. **WHEN** Rx power is ≤ 80%, **THEN** stop:
    - __ 1E1 HTR DRN PUMP
    - __ 1E2 HTR DRN PUMP
19. Verify both Main FDW pumps running

NOTE

- 1B Main FDW Pump is the preferred pump to be shutdown first.
- To lower 1B Main FDW Pump suction flow, bias is adjusted counter-clockwise.
- To lower 1A Main FDW Pump suction flow, bias is adjusted clockwise.

20. Adjust bias for first Main FDW pump desired to be shutdown until suction flow is ≈ 1 x 10^6 lbm/hr less than remaining Main FDW pump suction flow

This event is complete when the Outside Air Booster Fans have been started (Step 12), or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **6** Page 3 of 4

Event Description: **Support Actions During Manual Power Reduction (N: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		EOP Enclosure 5.19

Crew response:

21. **WHEN** core thermal power is < 65% FP, **THEN** continue
22. **IAAT** both Main FDW pumps running, **AND** both of the following exist:
    - __ 1B Main FDW Pump is first pump to be shut down
    - __ Any of the following alarms occur:
      - FWP B FLOW MINIMUM (1SA-16/A-3)
      - FWP B FLOW BELOW MIN (1SA-16/A-4)

    THEN trip 1B Main FDW Pump
23. **IAAT** both Main FDW pumps running, **AND** both of the following exist:
    - __ 1A Main FDW Pump is first pump to be shut down
    - __ Any of the following alarms occur:
      - FWP A FLOW MINIMUM (1SA-16/A-1)
      - FWP A FLOW BELOW MIN (1SA-16/A-2)

    THEN trip 1A Main FDW Pump
24. Notify RP to survey both MS lines for radiation
25. **WHEN** load is ≤ 450 MWe, **THEN** continue
26. Verify 1C COND BOOSTER PUMP operating

RNO: 1. Ensure only one CBP operating
2. **GO TO** Step 28

27. Stop:
    - __ 1A COND BOOSTER PUMP
    - __ 1B COND BOOSTER PUMP
28. Place the control switch for one shutdown CBP to AUTO
29. Ensure CBP LOAD SHED DEFEAT switch positioned to a running CBP
30. **WHEN** load is ≤ 400 MWe, **THEN** stop:
    - __ 1D1 HTR DRN PUMP
    - __ 1D2 HTR DRN PUMP

This event is complete when the Outside Air Booster Fans have been started (Step 12), or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: 6 Page 4 of 4

Event Description: **Support Actions During Manual Power Reduction (N: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

EOP Enclosure 5.19

Crew response:

31. **WHEN** load is ≤ 325 MWe, **THEN** ensure only two HWPs in operation
32. Place the control switch for one shutdown HWP to AUTO
33. Ensure HWP LOAD SHED DEFEAT switch positioned to a running HWP
34. **IAAT** suction flow on the only operating Main FDW Pump is < 1.5 x 10^6 lbm/hr, **THEN** throttle operating Main FDW pump recirc control valve to establish 2300 – 6000 gpm:

√	1A Main FDW Pump	√	1B Main FDW Pump
	1FDW-53		1FDW-65

35. **WHEN** load is ≤ 225 MWe, **THEN** ensure only one HWP in operation
36. Ensure HWP LOAD SHED DEFEAT switch positioned to a running HWP
37. Notify WCC SRO to make notifications per Encl 5.2 (WCC SRO Support During Rapid Shutdown) of AP/29 (Rapid Unit Shutdown)
38. **WHEN** directed by CRS, **THEN EXIT** this enclosure

This event is complete when the Outside Air Booster Fans have been started (Step 12), or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **7**	Page 1 of 5
Event Description:	**Reactor Fails to Trip (ATWS) (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		Plant response: • 1SA-1/B-1 (1B RPS TRIP) • 1SA-1/C-1 (1C RPS TRIP) • 1SA-1/D-1 (1D RPS TRIP) ***UNPP Tab*** **Crew response**: **UNPP Tab** 1. Ensure Rule 1 (ATWS / Unanticipated Nuclear Power Production) is in progress or complete **(page 27)** 2. Verify Main FDW is operating and in AUTO 3. **IAAT** Main FDW is **NOT** operating, **THEN**: A. Trip the turbine-generator B. Start all available EFDW pumps C. Ensure Rule 3 (Loss of Main or Emergency FDW) is in progress or complete 4. **IAAT** all power range NIs are < 5% FP, **THEN** perform Steps 5 – 6 **RNO: GO TO** Step 7 5. Depress turbine TRIP pushbutton 6. Verify all turbine stop valves closed 7. Verify any wide range NI > 1% FP 8. Open 1RC-4 9. Verify 1HP-5 open 10. Maximize letdown using 1HP-7 while maintaining letdown temperature < 120°F 11. Verify Main FDW available 12. Adjust Main FDW flow as necessary to control RCS temperature 13. Verify overcooling in progress **RNO: GO TO** Step 16

This event is complete when the SRO transfers to the Subsequent Actions tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **7**	Page 2 of 5
Event Description:	**Reactor Fails to Trip (ATWS) (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		UNPP Tab
		Crew response:
		16. Secure makeup to LDST
	CT-2	17. **WHEN** all wide range NIs are ≤ 1% FP, **AND** decreasing, **THEN** continue
		18. Control RCS temperature as follows: __ Tave ≤ 555°F – Adjust SG pressure as necessary to stabilize RCS temperature using either: • TBVs • Dispatch two operators to perform Encl 5.24 (Operation of the ADVs) **(PS)** __ Tave > 555°F • Utilize Rule 7 (SG Feed Control) to control SG feed rate as necessary to maintain cooldown rate within Tech Spec limits during the approach to the SG Level Control Point
		19. Throttle HPI per Rule 6 (HPI) (**page 37**)
		20. **WHEN** RCS pressure < 2300 psig, **THEN** continue
		21. Verify PORV closed
		22. Adjust letdown flow as desired
		23. Verify RCP seal injection available
		24. **GO TO** Subsequent Actions (**next page**)
		Examiner Note: ***The SRO will transfer to the Subsequent Actions tab and then review the Parallel Actions page. The Parallel Actions page will direct the SRO to go to the SGTR tab. (page 28)***

This event is complete when the SRO transfers to the Subsequent Actions tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **7**	Page 3 of 5
Event Description:	**Reactor Fails to Trip (ATWS) (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		Subsequent Actions
		Crew response:
		Subsequent Actions
		4.1 Verify all control rods in Groups 1 – 7 fully inserted
		4.2 Verify Main FDW in operation
		4.3 Verify either: __ Main FDW overfeeding causing excessive temperature lowering __ Main FDW underfeeding causing SG level lowering below setpoint
		RNO: GO TO Step 4.5
		4.5 **IAAT** Main FDW is operating, **AND** level in any SG is > 96% on the Operating Range, **THEN** perform Steps 4.6 - 4.8
		RNO: GO TO Step 4.9
		4.9 **IAAT** TBVs **CANNOT** control SG pressure at desired setpoint, **AND** TBVs **NOT** intentionally isolated, **THEN** manually control pressure in affected SGs using either: __ TBVs __ Dispatch two operators to perform Encl 5.24 (Operation of the ADVs) **(PS)**
		4.10 Verify 1RIA-40 operable with CSAE OFF-GAS BLOWER operating
		4.11 **GO TO** Step 4.14
		4.12 Verify abnormal RCS leakage existed prior to reactor trip
		RNO: GO TO Step 4.14
		4.14 Verify both are closed: __ 1MS-17 __ 1MS-26
		RNO: Dispatch an operator with Encl 5.29 (MSRV Locations) to verify all MSRVs have reseated
		4.15 Verify ES is required
		RNO: 1. Initiate Encl 5.5 (Pzr and LDST Level Control) (**page 29**) 2. **GO TO** Step 4.17
		4.17 Open: __ PCB 20 __ PCB 21

This event is complete when the SRO transfers to the Subsequent Actions tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **3**	Event No.: **7**	Page 4 of 5
Event Description: **Reactor Fails to Trip (ATWS) (M: ALL)**			

Time	Position	Applicant's Actions or Behavior
		Rule 1 **<u>Crew response</u>:** **<u>Rule 1</u>** (ATWS/Unanticipated Nuclear Power Production) rev 01 1. Verify any Power Range NI ≥ 5% FP **RNO:** 1. **IF** in MODE 1 <u>or</u> 2, **THEN GO TO** Step 2 2. **GO TO** Step 12 2. Initiate manual control rod insertion to the IN LIMIT 3. Verify Main FDW is feeding the SGs **RNO:** Trip the turbine generator. 4. Notify CRS to **GO TO** UNPP tab **(page 24)** 5. Open: __ 1HP-24 __ 1HP-25 6. Ensure <u>at least one</u> operating: __ 1A HPI PUMP __ 1B HPI PUMP 7. Start 1C HPI PUMP 8. Open: __ 1HP-26 __ 1HP-27 **RNO:** 1. **IF** 1HP-26 will **NOT** open, **THEN** open 1HP-410 2. **IF** <u>at least two</u> HPI pumps are operating, **AND** 1HP-27 will **NOT** open, **THEN**: A. Start the standby HPI pump B. Stop 1C HPI PUMP C. Open 1HP-409 ***Examiner Note: 1HP-27 will NOT open and 1HP-409 must be opened to allow HPI flow to both HPI headers.*** 9. Dispatch <u>one</u> operator without wearing Arc Flash PPE to open 600V CRD breakers: __ 1X9-5C (U-1 CRD Norm Fdr Bkr) (U1 Equipment Rm) __ 2X1-5B (U-1 CRD Alternate Fdr Bkr) (T-3/Dd-28) 10. Verify <u>only two</u> HPI pumps operating 11. **EXIT**

This event is complete when the SRO transfers to the Subsequent Actions tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **3** Event No.: **7** Page 5 of 5

Event Description: **Reactor Fails to Trip (ATWS) (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		SGTR tab

Crew response:

SGTR tab

1. Verify Rx tripped
2. Maintain Pzr level 140" – 180" [175" – 215" acc] by initiating Encl 5.5 (Pzr and LDST Level Control) (**page 29**)
3. Ensure Parallel Actions Page reviewed (**page 38**)
4. Start:
   __ A OUTSIDE AIR BOOSTER FAN
   __ B OUTSIDE AIR BOOSTER FAN
5. Notify Unit 3 to start:
   __ 3A OUTSIDE AIR BOOSTER FAN
   __ 3B OUTSIDE AIR BOOSTER FAN
6. Perform the following:
   A. __ Monitor RIAs 16 and 17 to identify all SGs with a tube rupture
   B. __ Inform SRO of results
7. Dispatch an operator to open:
   __ 1XD-R3C (A Turb Bldg Sump Pump Bkr) (T-1, G-27)
   __ 1XE-R3D (B Turb Bldg Sump Pump Bkr) (T-1, J-27)
8. Notify RP to survey both MS lines for radiation
9. **GO TO** Step 28

28. Secure any unnecessary offsite release paths. (Main Vacuum Pumps, TDEFDWP, Emergency Steam Air Ejector, etc.)
29. Verify Main FDW or EFDW controlling properly
30. Open:
    __ 1HP-24
    __ 1HP-25
31. Secure makeup to LDST
32. Maintain both SG pressures < 950 psig using either:
    __ TBVs
    __ Dispatch two operators to perform Encl 5.24 (Operation of the ADVs)

This event is complete when the SRO transfers to the Subsequent Actions tab, or as directed by the Lead Examiner.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Maintaining Pzr level >100″ [180″ acc] will ensure Pzr heater bundles remain covered.	
1. __ Utilize the following as necessary to maintain desired Pzr level: • 1A HPI Pump • 1B HPI Pump • 1HP-26 • 1HP-7 • 1HP-120 setpoint or valve demand • 1HP-5	__ **IF** 1HP-26 will **NOT** open, **THEN** throttle 1HP-410 to maintain desired Pzr level.
2. __ **IAAT** makeup to the LDST is desired, **THEN** makeup from 1A BHUT.	
3. __ **IAAT** it is desired to secure makeup to LDST, **THEN** secure makeup from 1A BHUT.	
4. __ **IAAT** it is desired to bleed letdown flow to 1A BHUT, **THEN** perform the following: A. Open: __ 1CS-26 __ 1CS-41 B. __ Position 1HP-14 to BLEED. C. __ Notify SRO.	
5. __ **IAAT** letdown bleed is **NO** longer desired, **THEN** position 1HP-14 to NORMAL.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ **IAAT** 1C HPI PUMP is required, **THEN** perform Steps 7 - 9.	__ **GO TO** Step 10.
7. __ Open: • 1HP-24 • 1HP-25	1. __ **IF** <u>both</u> BWST suction valves (1HP-24 and 1HP-25) are closed, **THEN** perform the following: A. __ Start 1A LPI PUMP. B. __ Start 1B LPI PUMP. C. Open: __ 1LP-15 __ 1LP-16 __ 1LP-9 __ 1LP-10 __ 1LP-6 __ 1LP-7 D. __**IF** two LPI Pumps are running <u>only</u> to provide HPI pump suction, **THEN** secure one LPI pump. E. __ Dispatch an operator to open 1HP-363 (Letdown Line To LPI Pump Suction Block) (A-1-119, U1 LPI Hatch Rm, N end). F. __ **GO TO** Step 8. 2. __ **IF** <u>only one</u> BWST suction valve (1HP-24 or 1HP-25) is open, **THEN** perform the following: A.__ **IF** three HPI pumps are operating, **THEN** secure 1B HPI PUMP. B.__ **IF** < 2 HPI pumps are operating, **THEN** start HPI pumps to obtain two HPI pump operation, preferably in opposite headers. C. __ **GO TO** Step 9.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. __ Start 1C HPI PUMP.	__ **IF** at least two HPI pumps are operating, **THEN** throttle 1HP-409 to maintain desired Pzr level.
9. Throttle the following as required to maintain desired Pzr level: __ 1HP-26 __ 1HP-27	1. __ **IF** at least two HPI pumps are operating, **AND** 1HP-26 will **NOT** open, **THEN** throttle 1HP-410 to maintain desired Pzr level. 2. __ **IF** 1A HPI PUMP <u>and</u> 1B HPI PUMP are operating, **AND** 1HP-27 will **NOT** open, **THEN** throttle 1HP-409 to maintain desired Pzr level.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. __ **IAAT** LDST level **CANNOT** be maintained, **THEN** perform Step 11.	__ **GO TO** Step 12.
11. __ Perform the following: • Open 1HP-24. • Open 1HP-25. • Close 1HP-16.	1. __ **IF** both BWST suction valves (1HP-24 and 1HP-25) are closed, **THEN** perform the following: A. __ Start 1A LPI PUMP. B. __ Start 1B LPI PUMP. C. Open: __ 1LP-15 __ 1LP-16 __ 1LP-9 __ 1LP-10 __ 1LP-6 __ 1LP-7 D. __ **IF** two LPI Pumps are running only to provide HPI pump suction, **THEN** secure one LPI pump. E. __ Dispatch an operator to open 1HP-363 (Letdown Line To LPI Pump Suction Block) (A-1-119, U1 LPI Hatch Rm, N end). F. __ **GO TO** Step 13. 2. __ **IF** only one BWST suction valve (1HP-24 or 1HP-25) is open, **AND** three HPI pumps are operating, **THEN** secure 1B HPI PUMP.

NOTE

Maintaining Pzr level > 100” [180” acc] will ensure Pzr heater bundles remain covered.

12. __ Operate Pzr heaters as required to maintain heater bundle integrity.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. __ **IAAT** additional makeup flow to LDST is desired, **AND** 1A BLEED TRANSFER PUMP is operating, **THEN** dispatch an operator to close 1CS-48 (1A BHUT Recirc) (A-1-107, Unit 1 RC Bleed Transfer Pump Rm.).	
14. __ **IAAT** two Letdown Filters are desired, **THEN** perform the following: __ Open 1HP-17. __ Open 1HP-18	
15. __ **IAAT** all of the following exist: __ Letdown isolated __ LPSW available __ Letdown restoration desired **THEN** perform Steps 16 - 34. {41}	__ **GO TO** Step 35.
16. Open: __ 1CC-7 __ 1CC-8	1.__ Notify CR SRO that letdown **CANNOT** be restored due to inability to restart the CC system. 2.__ **GO TO** Step 35.
17. __ Ensure only one CC pump running.	
18. __ Place the non-running CC pump in AUTO.	
19. Verify both are open: __ 1HP-1 __ 1HP-2	1. __ **IF** 1HP-1 is closed due to 1HP-3 failing to close, **THEN GO TO** Step 21. 2. __ **IF** 1HP-2 is closed due to 1HP-4 failing to close, **THEN GO TO** Step 21.
20. __ **GO TO** Step 23.	

NOTE
Verification of leakage requires visual observation of East Penetration Room.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. __ Verify letdown line leak in East Penetration Room has occurred.	**GO TO** Step 23.
22. __ **GO TO** Step 35.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. __ Monitor for unexpected conditions while restoring letdown.	
24. __ Verify both letdown coolers to be placed in service.	1. __ **IF** 1A letdown cooler is to be placed in service, **THEN** open: __ 1HP-1 __ 1HP-3 2. __ **IF** 1B letdown cooler is to be placed in service, **THEN** open: __ 1HP-2 __ 1HP-4 3. __ **GO TO** Step 26.
25. Open: __ 1HP-1 __ 1HP-2 __ 1HP-3 __ 1HP-4	
26. __ Verify at least one letdown cooler is aligned.	Perform the following: A. __ Notify CR SRO of problem. B. __ **GO TO** Step 35.
27. __ Close 1HP-6.	
28. __ Close 1HP-7.	
29. __ Verify letdown temperature < 125°F.	1. __ Open 1HP-13. 2. Close: __ 1HP-8 __ 1HP-9&11 3. __ **IF** any deborating IX is in service, **THEN** perform the following: A. __ Select 1HP-14 to NORMAL. B. __ Close 1HP-16. 4. __ Select LETDOWN HI TEMP INTLK BYP switch to BYPASS.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. __ Open 1HP-5.	
31. __ Adjust 1HP-7 for ≈ 20 gpm letdown.	
32. __ **WHEN** letdown temperature is < 125°F, **THEN** place LETDOWN HI TEMP INTLK BYP switch to NORMAL.	
33. __ Open 1HP-6.	
34. __ Adjust 1HP-7 to control desired letdown flow.	

NOTE

AP/32 (Loss of Letdown) provides direction to cool down the RCS to offset increasing pressurizer level.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
35. __ **IAAT** it is determined that letdown is unavailable due to equipment failures <u>or</u> letdown system leakage, **THEN** notify CR SRO to initiate AP/32 (Loss of Letdown).	
36. __ **IAAT** > 1 HPI pump is operating, **AND** additional HPI pumps are **NO** longer needed, **THEN** perform the following: A. __ Obtain SRO concurrence to reduce running HPI pumps. B. __ Secure the desired HPI pumps. C. __ Place secured HPI pump switch in AUTO, if desired.	
37. __ **IAAT** <u>all</u> the following conditions exist: __ Makeup from BWST **NOT** required __ LDST level > 55″ __ <u>All</u> control rods inserted __ Cooldown Plateau **NOT** being used **THEN** close: __ 1HP-24 __ 1HP-25	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
38. __ Verify 1CS-48 (1A BHUT Recirc) has been closed to provide additional makeup flow to LDST.	__ **GO TO** Step 40.
39. __ **WHEN** 1CS-48 (1A BHUT Recirc) is **NO** longer needed to provide additional makeup flow to LDST, **THEN** perform the following: A. __ Stop 1A BLEED TRANSFER PUMP. B. __ Locally position 1CS-48 (1A BHUT Recirc) <u>one</u> turn open (A-1-107, Unit 1 RC Bleed Transfer Pump Rm.). C. __ Close 1CS-46. D. __ Start 1A BLEED TRANSFER PUMP. E. __ Locally throttle 1CS-48 (1A BHUT Recirc) to obtain 90 - 110 psig discharge pressure. F. __ Stop 1A BLEED TRANSFER PUMP.	
40. __ Verify two Letdown Filters in service, **AND** <u>only one</u> Letdown filter is desired.	__ **GO TO** Step 42.
41. Perform <u>one</u> of the following: __ Place 1HP-17 switch to CLOSE. __ Place 1HP-18 switch to CLOSE.	
42. __ **WHEN** directed by CR SRO, **THEN EXIT** this enclosure.	

• • • END • • •

Rule 6
HPI

HPI Pump Throttling Limits

- HPI must be throttled to prevent violating the RV-P/T limit.
- HPI pump operation must be limited to two HPIPs when only one BWST suction valve (1HP-24 or 1HP-25) is open.
- HPI must be throttled ≤ 475 gpm/pump (including seal injection for A header) when only one HPI pump is operating in a header.
- Total HPI flow must be throttled ≤ 950 gpm including seal injection when 1A and 1B HPI pumps are operating with 1HP-409 open.
- Total HPI flow must be throttled < 750 gpm when all the following exist:
  - LPI suction is from the RBES
  - piggyback is aligned
  - either of the following exist:
    - only one piggyback valve is open (1LP-15 or 1LP-16)
    - only one LPI pump operating
- HPI may be throttled under the following conditions:

HPI Forced Cooling in Progress:	HPI Forced Cooling NOT in Progress:
All the following conditions must exist: • Core SCM > 0 • CETCs decreasing	All the following conditions must exist: • All WR NIs ≤ 1% • Core SCM > 0 • Pzr level increasing • SRO concurrence required if throttling following emergency boration

HPI Pump Minimum Flow Limit

- Maintain ≥ 170 gpm indicated/pump. This is an instrument error adjusted value that ensures a real value of ≥ 65 gpm/pump is maintained. HPI pump flow less than minimum is allowed for up to 4 hours.

SGTR EP/1/A/1800/001 0G

Parallel Actions Page 1 of 1

CONDITION	**ACTIONS**	
1. AFTER Rx trip pushbutton depressed: PR NIs ≥ 5% FP **OR** NIs **NOT** decreasing	**GO TO** UNPP tab.	**UNPP**
2. All 4160V SWGR de-energized	**GO TO** Blackout tab.	**BLACKOUT**
3. Core SCM indicates superheat	**GO TO** ICC tab.	**ICC**
4. Any SCM = 0°F, **AND** HPI Forced cooling **NOT** in progress	**IF** NOT previously performed, **THEN GO TO** LOSCM tab.	**LOSCM**
5. Both SGs intentionally isolated to stop excessive heat transfer	**GO TO** EHT tab.	**LOHT**
6. Loss of heat transfer	**GO TO** LOHT tab.	
7. Heat transfer is or has been excessive	**GO TO** EHT tab.	**EHT**
8. Indications of SGTR in another SG after SGTR tab initiated	**RETURN TO** beginning of SGTR tab.	**SGTR**
9. Inadvertent ES actuation occurred	Initiate AP/1/A/1700/042 (Inadvertent ES Actuation).	**ES**
10. Valid ES actuation has occurred or should have	Initiate Encl 5.1 (ES Actuation).	**ES**
11. Power lost to all 4160V SWGR and any 4160V SWGR re-energized	• Initiate AP/11 (Recovery from Loss of Power). • **IF** Encl 5.1 (ES Actuation) has been initiated, **THEN** reinitiate Encl 5.1.	**ROP**
12. Individual available to make notifications	• Announce plant conditions using PA system. • Notify OSM to reference the Emergency Plan and AD-LS-ALL-0006 (Notification/Reportability Evaluation). • Notify plant staff that Emergency Dose Limits are in affect using PA system	**NOTIFY and EDL**

Subsequent Actions

Parallel Actions

EP/**1**/A/1800/001
Page 1 of 1

CONDITION	**ACTIONS**	
1. PR NIs ≥ 5% FP **OR** NIs **NOT** decreasing	**GO TO** UNPP tab.	**UNPP**
2. All 4160V SWGR de-energized {13}	**GO TO** Blackout tab.	**BLACKOUT**
3. Core SCM indicates superheat	**GO TO** ICC tab.	**ICC**
4. Any SCM = 0°F	**GO TO** LOSCM tab.	**LOSCM**
5. Both SGs intentionally isolated to stop excessive heat transfer	**GO TO** EHT tab.	**LOHT**
6. Loss of heat transfer (including loss of all Main and Emergency FDW)	**GO TO** LOHT tab.	
7. Heat transfer is or has been excessive	**GO TO** EHT tab.	**EHT**
8. Indications of SGTR ≥ 25 gpm	**GO TO** SGTR tab.	**SGTR**
9. Turbine Building flooding **NOT** caused by rainfall event	**GO TO** TBF tab.	**TBF**
10. Inadvertent ES actuation occurred	Initiate AP/1/A/1700/042 (Inadvertent ES Actuation).	**ES**
11. Valid ES actuation has occurred or should have	Initiate Encl 5.1 (ES Actuation).	**ES**
12. Power lost to all 4160V SWGR and any 4160V SWGR re-energized	• Initiate AP/11 (Recovery from Loss of Power). • **IF** Encl 5.1 (ES Actuation) has been initiated, **THEN** reinitiate Encl 5.1.	**ROP**
13. RCS leakage > 160 gpm with letdown isolated	Notify plant staff that Emergency Dose Limits are in affect using PA system.	**EDL**
14. Individual available to make notifications	• Announce plant conditions using PA system. • Notify OSM to reference the Emergency Plan and AD-LS-ALL-0006 (Notification/Reportability Evaluation).	**NOTIFY**

CRITICAL TASKS

CT-1 Start the Outside Air Booster Fans within 30 minutes of the SGTR (BWOG CT-27)

CT-2 Prior to exiting the UNPP tab, take the Reactor subcritical (i.e. < 1% power on WR NIs)

SAFETY: Take a Minute			
UNIT 0 (OSM)			
SSF Operable: No U2/U3: Yes PSW Operable: No	KHUs Operable: U1 - OH, U2 - UG	LCTs Operable: 2	Fuel Handling: No

UNIT STATUS (CR SRO)

Unit 1 Simulator	Other Units	
Mode: 1	**Unit 2**	**Unit 3**
Reactor Power: 50%	Mode: 1	Mode: 1
Gross MWE: 476	100% Power	100% Power
RCS Leakage: 0.01 gpm No WCAP Action	EFDW Backup: Yes	EFDW Backup: Yes
RBNS Rate: 0.01 gpm		

Technical Specifications/SLC Items (CR SRO)

Component/Train	OOS Date/Time	Restoration Required Date/Time	TS/SLC #
AMSAC/DSS	Today/0300	7 Days	SLC 16.7.2
SSF	Today/0100	7 Days	TS 3.10.1
PSW	Today/0600	7 Days	TS 3.7.10

Shift Turnover Items (CR SRO)

Primary

- Due to unanalyzed condition, the SSF should be considered INOPERABLE for Unit 1 if power levels are reduced below 85%. Evaluations must be performed prior to declaring the SSF operable following a return to power (after going below 85%).
- OATC is to add Hydrogen to the LDST using OP/1/A/1106/017 (Hydrogen System) Enclosure 4.5 (Unit 1 LDST H2 Addition)
- 1RIA-3 and 5 removed from RB
- SASS is in Manual for calibration

Secondary

- AMSAC/DSS bypassed for calibration
- PSW Primary Pump is OOS. WCC preparing Protected Equipment package.
- Unit 2 is supplying the AS header
- 1SSH-1, 1SSH-3, 1SD-2, 1SD-5, 1SD-140, 1SD-303, 1SD-355, 1SD-356 and 1SD-358 are closed with power supply breakers open per the Startup Procedure for SSF Overcooling Event.

Reactivity Management (CR SRO)

RCS Boron 83 ppmB	Gp 7 Rod Position: 57 % Withdrawn	Batch additions as required for volume control.

Human Performance Emphasis (OSM)

Procedure Use and Adherence

Facility: **Oconee** Scenario No.: **4** Op-Test No.: 1

Examiners: ____________________ Operators: ____________________ **SRO**

____________________ ____________________ **OATC**

____________________ ____________________ **BOP**

Initial Conditions:

- Reactor Power = 3%

Turnover:

- SASS is in Manual for calibration
- AMSAC/DSS is bypassed for calibration

Event No.	Malfunction No.	Event Type*	Event Description
0a	Override		AMSAC/DSS Bypassed
0b	Override		SASS in Manual
1		N: OATC, SRO	Swap HPI Pumps
2	Override	C: BOP, OATC, SRO **(TS)**	Inadvertent ES Channel 2 Actuation
3	Override	C: BOP, SRO	1A CBP Motor OB Bearing Temp High
4	MPI150	I: OATC, SRO **(TS)**	PZR “A” RTD Fails Low
5	MPS241	C: BOP, SRO	1A1 RCP Lower Seal Failure
6	MPS033 MPS033D MPS150 Override	M: ALL	Small Break LOCA • 1C HPI Pump Fails to Start on ES • 1HP-3 Fails to Close on ES

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

SCENARIO 4 EVENT SUMMARY

Event 1: When the crew takes the shift, the SRO will direct the OATC to perform OP/1/A/1104/002 Enclosure 4.24 (Swapping 1A and 1B HPI Pumps). The OATC will start the 1B HPI pump and secure the 1A HPI pump and then align the 1A HPI pump for automatic operation.

Event 2: This failure will result in two (2) HPI pumps operating as well as one of the BWST suction valves opening. Consequently there will be a boration of the RCS while the SRO, BOP, and OATC implement actions required by AP/1/A/1700/042 (Inadvertent ES Actuation) to return the HPI system and other ES components to their normal alignment. Two enclosures in the AP will be performed by the ROs to restore components to their normal alignment. Enclosure 5.1 (Required Operator Actions) will restore RCP support systems and RB RIAs to service. Enclosure 5.2 (Letdown Restoration) will restore letdown. The SRO will assess TS for applicability based on the failure.

Event 3: The 1A Condensate Booster Pump (CBP) Motor Outboard (OB) Bearing temperature will begin to rise. An OAC alarm will alert the operators of the rising temperature. The BOP will remove the pump from service per OP/1/A/1106/002C (HWP and CBP Operation) Enclosure 4.3 (Swapping CBPs).

Event 4: The ‘A’ PZR RTD will fail low causing PZR levels 1 & 2 to indicate low. With SASS in manual, this will cause 1HP-120 to begin throttling open in an attempt to restore the indicated PZR level. Actual PZR level will start to rise and LDST level will begin to lower. The OATC may place 1HP-120 in Hand and stabilize PZR level. The SRO may direct the OATC to select PZR Level Channel 3 prior to referring to the procedure, which is allowed due to an automatic action that failed to occur. The crew will refer to OP/1/A/1105/014 which will direct them to select PZR Level Channel 3 as the controlling channel. The OATC should then return 1HP-120 to AUTO, if required. The SRO will evaluate Tech Specs and enter the appropriate conditions.

Event 5: The 1A1 RCP lower seal will fail and the crew will refer to Alarm Response Guides, which will direct entry into AP/16 (Abnormal RCP Operation). AP/16 will direct stopping the 1A1 RCP.

Event 6: Once the event is initiated, RCS pressure will begin to rapidly lower and ES Channels 1 & 2 will actuate on low RCS pressure. Once ES Channels 1 and 2 have actuated, the SRO will direct an operator to perform EOP Enclosure 5.1 (ES Actuation). After a few minutes ES Channels 3-6 will also actuate. EOP Enclosure 5.1 will direct the operator to ensure all ES components are in their required position. 1C HPI pump will fail to start on ES and must be started manually. 1HP-3 will fail to close which will require 1HP-1 to be closed to isolate the Letdown flowpath. Shortly after ES Channels 1 & 2 actuate, the crew will observe at least one SCM indication ≤ 0°F which will require performing Rule 2 (Loss of SCM) and entry into the EOP LOSCM tab. Rule 2 requires the operator to stop all RCPs within 2 minutes of any SCM indication ≤ 0°F. While performing Rule 2, the 1C HPI pump will have to be started manually, if not already started per EOP Encl. 5.1, to obtain HPI flow in both headers. Rule 3 (Loss of Main or Emergency FDW) is performed as

directed by Rule 2 to raise SG levels to the loss of SCM setpoint. EOP Enclosure 5.9 (Extended EFDW Operation) will be performed when directed by Rule 3.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **1**	Page 1 of 1
Event Description: **Swap HPI Pumps (N: OATC, SRO)**			

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1104/002 **<u>Crew response</u>:** SRO directs the OATC to perform OP/1/A/1104/002 Enclosure 4.24 (Swapping 1A and 1B HPI Pumps) **OP/1/A/1104/002 Enclosure 4.24** (Swapping 1A and 1B HPI Pumps) rev 172 2.1.6 **<u>WHILE</u>** swapping of HPI Pumps is in progress, monitor the following indications: (R.M.) • Appropriate ranged Nis • Primary tank levels • **<u>IF</u>** applicable, Neutron error • **<u>IF</u>** applicable, CRD position 2.2 **<u>IF</u>** required to start 1A HPI Pump, perform the following: **N/A** 2.2.1 Start 1A HPI Pump 2.2.2 Stop 1B HPI Pump 2.2.3 Place 1B HPI Pump switch in "AUTO" 2.3 **<u>IF</u>** required to start 1B HPI Pump, perform the following: 2.3.1 Start 1B HPI Pump 2.3.2 Stop 1A HPI Pump 2.3.3 Place 1A HPI Pump switch in "AUTO" 2.4 **<u>IF</u>** RCS makeup is required to compensate for final RCS boron change, makeup per OP/1/A/1103/004 (Soluble Poison Control). (R.M.) 2.5 Perform the following: • Record boron in Component Boron Concentration Log for Standby HPI Pump. (R.M.) • Update Component Boron Concentration Log for HPI Pump placed in service. (R.M.)

This event is complete when the 1A HPI Pump switch is placed in AUTO, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **2** Page 1 of 9

Event Description: **Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior

Plant response:

- 1SA-1/B-10 (ES 2 Trip)
- 1SA-16/B-2 (EL CT-4 SB Bus 2 Breaker Closed)
- 2SA-17/A-5 (Keowee Statalarm Panel Alarm)
- 2SA-17/C-1 (KHU 1 Emergency Start Initiated)
- 2SA-18/C-1 (KHU 2 Emergency Start Initiated)
- 1SA-6/A-5, B-5, C-5, D-5 (RC Pump Seal Cavity Press Hi/Low) (**≈ 1 min later**)
- 1SA-6/D-7, E-5, E-6, E-7 (RC Pump Seal Return Temp High)
- Both Keowee Hydro Units Emergency Start

Examiner Note: Over time, rods may withdraw in response to BWST water injecting into the core.

AP/1/A/1700/042

Crew response:

The SRO will initiate **AP/1/A/1700/042** (Inadvertent ES Actuation) rev 04

Examiner Note: The SRO may direct either the BOP or the OATC to perform steps from this AP.

4.1 Verify any of the following have inadvertently actuated:
 __ Diverse HPI (**not actuated**)
 __ ES Channel 1 (**not actuated**)
 __ ES Channel 2

4.2 Perform the following on all inadvertently actuated system(s):
 __ Ensure DIVERSE HPI BYPASS is in BYPASS (**does not apply**)
 __ Ensure ES CH-1 is in MANUAL (**does not apply**)
 __ Ensure ES CH-2 is in MANUAL

4.3 Throttle HPI, as required, to maintain desired Pzr level

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **2**	Page 2 of 9
Event Description:	**Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/042
		Crew response:
		4.4 Verify any of the following have inadvertently actuated: __ ES Channel 5 (**not actuated**) __ ES Channel 6 (**not actuated**)
		RNO: 1. **IF** ES Channel 1, ES Channel 2, or Diverse HPI have inadvertently actuated, **AND** it is desired to restore letdown, **THEN** initiate AP/42 Encl 5.2 (Letdown Restoration) (**page 10**) 2. **GO TO** Step 4.10
		4.10 Close 1HP-24 and 1HP-25
		NOTE If personnel are available, progression should continue while Encl 5.1 (Required Operator Actions) is in progress.
		4.11 Ensure AP/42 Encl 5.1 (Required Operator Actions) is in progress (**page 8**)
		4.12 Verify any of the following have inadvertently actuated: __ Diverse LPI __ ES Channel 3 __ ES Channel 4
		RNO: **GO TO** Step 4.17
		4.17 Verify the Rx is critical
		CAUTION Do **NOT** add demin water to counter the boration until RCS boron concentration stabilizes to prevent a positive reactivity event.
		NOTE ICS in Auto means ICS is in control of Tave and Rx power.
		4.18 Verify ICS in Auto

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **2**	Page 3 of 9
Event Description:	**Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/042 **<u>Crew response</u>:** 4.19 Verify control rods are outside the desired control band **RNO: GO TO** Step 4.21 **<u>NOTE</u>** It is expected that the Control Room SRO will begin AP/39 and transfer completion of AP/42 to another licensed operator; however, priorities will depend on the specific situation. ***Examiner Note: CRS may enter AP/39 due to withdrawal of control rods from the boration. (see page 12)*** 4.20. Initiate AP/39 (Unintentional Boration) 4.21 Verify <u>any</u> of the following have <u>inadvertently actuated</u>: __ ES Channel 1 __ Diverse HPI **RNO: GO TO** Step 4.24 4.24 Notify SPOC to investigate <u>and</u> repair the cause of the inadvertent ES actuation, as necessary 4.25 Initiate logging TS/SLC Entry/Exit, as applicable, in accordance with Encl 5.4 (TS/SLC Requirements) ***(see page 11)*** 4.26 **WHEN** <u>all</u> of the following exist: __ Reason for inadvertent ES Channel <u>or</u> Diverse HPI/LPI actuation has been resolved __ ES Channel <u>or</u> Diverse HPI/LPI reset is desired __ OSM concurs **THEN** continue

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **2**	Page 4 of 9
Event Description:	**Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/42 Enclosure 5.1 **Crew response:** **AP/1/A/1700/042 Enclosure 5.1** (Required Operator Actions) 1 Initiate announcement of AP entry using the PA system 2 Verify any of the following have inadvertently actuated: __ Diverse HPI (**not actuated**) __ ES Channel 1 (**not actuated**) __ ES Channel 2 3 Open the following: __ 1HP-20 __ 1HP-21 4 Open the following for operating RCPs: __ 1HP-228 (1A1) __ 1HP-226 (1A2) __ 1HP-232 (1B1) __ 1HP-230 (1B2) 5 Verify any of the following have inadvertently actuated: __ ES Channel 7 (**not actuated**) __ ES Channel 8 (**not actuated**) **RNO: GO TO** Step 9 9 Perform the following: A. Open the following to restore RB RIAs: __ 1PR-7 __ 1PR-8 __ 1PR-9 __ 1PR-10 B. From the ENABLE CONTROLS screen on the RIA View Node, perform the following: (For RIAs-47,48,49,49A) 1. Select OFF for RB RIA sample pump 2. Start the RB RIA sample pump

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **2** Page 5 of 9

Event Description: **Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
		AP/42 Enclosure 5.1 **Crew response:** 10. Verify any of the following have inadvertently actuated: __ Diverse HPI __ ES Channel 1 11. Notify the following that the SSF is inop. due to the SSF power loss. __Unit 2 __Unit 3 __Security 12. **EXIT** this enclosure

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **2**	Page 6 of 9
Event Description:	**Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/42 Enclosure 5.2 **<u>Crew response</u>:** **AP/1/A/1700/042 <u>Enclosure 5.2</u> Letdown Restoration** 1. Verify a CC pump operating 2. Verify letdown is isolated 3. Close 1HP-5 4. Verify it is desired to place <u>both</u> letdown coolers in service 5. Open 1HP-1, 1HP-2, 1HP-3, and 1HP-4 6. Close 1HP-6 7. Close 1HP-7 8. Verify letdown temperature < 135°F 9. Open 1HP-5 10. Adjust 1HP-7 for ≈ 20 gpm letdown 11. **WHEN** letdown temperature < 130°F, **THEN** place LETDOWN HI TEMP INTLK BYP switch in NORMAL 12. Open 1HP-6 13. Adjust 1HP-7 to control desired letdown flow 14. **IAAT** it is desired to <u>bleed</u> letdown flow to 1A BHUT, **THEN** perform the following: A. Open the following: __ 1CS-26 __ 1CS-41 B. Position 1HP-14 to BLEED C. Notify SRO 15. **IAAT** letdown <u>bleed</u> is **NO** longer desired, **THEN** position 1HP-14 to NORMAL 16. **WHEN** SRO approves, **THEN EXIT** this enclosure

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **2**	Page 7 of 9
Event Description:	**Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/42 Enclosure 5.4 **Crew response:** **AP/1/A/1700/042 Enclosure 5.4** (TS/SLC Requirements) **NOTE** TS/SLCs below are included as a reference. This list may **NOT** be complete based on the specific situation. Reference TS/SLC manuals. Any ES Channel • TS 3.3.7 (Engineered Safeguards Protective System (ESPS) Digital Automatic Actuation Logic Channels) due to the automatic actuation logic being blocked if any ES channel is in MANUAL or ES Voters in OVERRIDE • TS 3.3.5 (Engineered Safeguards Protective System (ESPS) Analog Instrumentation) due to inoperable ES instrumentation • TS 3.5.4 (Borated Water Storage Tank (BWST)) BWST level ES Channel 1 or 2 • TS 3.4.15 (RCS Leakage Detection Instrumentation) due to Rx Bldg RIAs being out of service • TS 3.10.1 (Standby Shutdown Facility(SSF)) for SSF inoperability due to the SSF power loss (ES Channel 1 only) • TS 3.4.9 (Pressurizer) if PZR level is > 260″ ES Channel 3 or 4 • TS 3.7.7 (Low Pressure Service Water (LPSW) System) if LPSW leakage accumulator level is outside allowable band. Evaluate OAC point O1E0507 (LPSW LEAKAGE ACCUMULATOR LEVEL). Notify Unit 2 to evaluate OAC point O2E0507 (LPSW LEAKAGE ACCUMULATOR LEVEL). Any Diverse Actuation System • SLC 16.7.6 (Diverse Actuation Systems) due to the automatic actuation logic being blocked if any Diverse Actuation system in OVERRIDE or BYPASS.

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **2**	Page 8 of 9
Event Description:	**Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/039 **Crew response:** **AP/1/A/1700/039** (Unintentional Boration) rev 02 4.1 Announce AP entry using PA system. 4.2 **IAAT** CTP < 6%, **THEN** perform the following: A. Trip the Rx. B. **GO TO** Unit 1 EOP. 4.3 **IAAT** all the following exist: __ ICS is in Automatic __ Control rods approach upper limit of desired operating band **THEN** perform the following: A. Establish desired shutdown rate. B. Decrease CTP demand setpoint, as necessary. C. Adjust shutdown rate, as necessary, to maintain control rods within the desired band. 4.4 **IAAT** all the following exist: __ ICS is in Manual __ Tave is outside the control band **THEN** manually adjust FDW, as necessary, to maintain Tave within the control band until both SGs are on Low Level Limits. 4.5 **IAAT** a power decrease is initiated, **THEN** initiate Encl 5.1 (Unit Shutdown Support Actions). 4.6 Take action to identify and terminate the boration, as necessary. 4.7 Verify the source of the boration has been identified and terminated. **RNO:** **GO TO** Step 4.12. 4.8 Notify Chemistry to sample/analyze the following for boron concentration, as frequently as possible, until RCS boron concentration stabilizes: • RCS • LDST 4.9 Evaluate NI operability in accordance with OP/1/A/1102/004 (Operation At Power) Limits and Precautions.

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **2**	Page 9 of 9
Event Description:	**Inadvertent ES Channel 2 Actuation (C: BOP, OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/039 **Crew response**: **NOTE** Due to the power decrease initiated in this AP, the current plant configuration must be compared to the normal plant configuration in OP/1/A/1102/004 (Operation at Power) power reduction enclosure and/or OP/1/A/1102/010 (Controlling Procedure For Unit Shutdown), as appropriate. Equivalent steps performed by this AP should be signed off as intent met. Any steps NOT performed by this AP must be evaluated by the SRO in preparation for power increase or continued shutdown. 4.10 Initiate the following procedures, as appropriate based on plant conditions: __ OP/1/A/1102/004 (Operation at Power) power reduction enclosure. __ OP/1/A/1102/010 (Controlling Procedure For Unit Shutdown) Encl (SD To Mode 3 Following Rx Trip Or Rapid SD). 4.11 **WHEN** the plant is stable, **THEN** perform the following: A. Develop a Power Maneuver plan, as necessary. B. **EXIT** this procedure.
	SRO	***TS 3.3.7 ESPS DIGITAL AUTO ACTUATION LOGIC CHANNELS*** ***Condition A (1 hour) Place associated component(s) in ES configuration*** ***OR*** ***Declare the associated component(s) inoperable*** ***TS 3.4.15 RCS LEAKAGE DETECTION INSTRUMENTATION*** ***Condition B (24 hours) Analyze grab samples of the containment atmosphere*** ***(30 days) Restore required containment atmosphere radioactivity monitor to OPERABLE status*** ***TS 3.4.9 PRESSURIZER*** ***Condition A (1 hour) Restore level to within limit*** **Note: TS 3.4.9 only applies if Pzr level is ≥ 260"**

This event is complete when the SRO has referred to TS at step 4.25, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **3**	Page 1 of 3
Event Description:	**1A CBP Motor OB Bearing Temp High (C: BOP, SRO)**		

Time	Position	Applicant's Actions or Behavior
		Plant response: • OAC alarm O1A0111 (CBP 1A MTR OB BEARING TEMP) **Crew response:** • The BOP should refer to Alarm Response for OAC alarm O1A0111 OAC Alarm Response for O1A0111 (CBP 1A MTR OB BEARING TEMP) HI-HI: 1. Remove the pump from service per OP/1/A/1106/002C (HWP and CBP Operation) **(next page)** 2. If required write a work request HI: 1. Dispatch an operator to check as applicable: • Oil level, flow and any oil leaks • Cooling water flow and cooling water leaks • Air filter condition • Evidence of bearing overheating 2. Trend the computer point and monitor closely 3. Notify system engineer for evaluation 4. If required issue an R&R for cooling water temperature control bypass valve 5. If required write a work request
	BOP	***Booth Cue:*** ***If contacted as an AO to investigate the 1A CBP high OB bearing temperature, wait 5 minutes and report that the 1A CBP Motor OB Bearing is very hot to the touch.***

This event is complete when 1A CBP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **3** Page 2 of 3

Event Description: **1A CBP Motor OB Bearing Temp High (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1106/002C
		Crew response:
		OP/1/A/1106/002C Encl 4.3 (Swapping CBPs) rev 17
	BOP	**1. Initial Conditions**
		1.1 Review Limits and Precautions
		2. Procedure
		2.1 Position any of the following:
		• **IF** desired ensure closed 1XGC-F1B (1A CBP Aux Oil Pump Bkr)
		• **IF** desired ensure closed 1XGC-F1C (1B CBP Aux Oil Pump Bkr)
		• **IF** desired ensure closed 1XGC-F1D (1C CBP Aux Oil Pump Bkr)
		2.2 Position any of the following:
		• **IF** desired ensure Racked-In 1TC-7 (1A CBP Mtr)
		• **IF** desired ensure Racked-In 1TD-5 (1B CBP Mtr)
		• **IF** desired ensure Racked-In 1TE-5 (1C CBP Mtr)
		2.3 **IF** desired bypass Powdex per OP/1/A/1106/002 (Condensate And FDW System)
		NOTE: • Number of operating HWP(s) is normally ≥ number of operating CBP(s) • During FDW system startup an additional HW pump is required prior to starting CBP until Condensate and FDW systems have been filled by high flow flushes
		2.4 **IF** desired, start standby ______ HWP
		2.5 Start desired ______ CBP
		2.6 Stop desired ______ CBP
		2.7 **IF** desired, stop standby ______ HWP
		2.8 Ensure CBP LOAD SHED DEFEAT switch is positioned to running CBP
		2.9 Ensure HWP LOAD SHED DEFEAT switch is positioned to running HWP
		BOOTH CUE: When BOP goes to the Load Shed Defeat switches, proceed to Event 4.

This event is complete when 1A CBP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **3** Page 3 of 3

Event Description: **1A CBP Motor OB Bearing Temp High (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1106/002C
		Crew response:
		2.10 **IF** desired, place standby ______ HWP switch in "AUTO"
	BOP	**NOTE:** If one or two CBP(s) are operating, standby CBP CR switch should be in "AUTO". Required pump maintenance may prevent having a standby pump available.
		2.11 **IF** desired, place standby ______ CBP switch in "AUTO"
		2.12 **IF** desired, place Powdex in service per OP/1/A/1106/002 (Condensate And FDW System)
		2.13 **IF** Unit 1 is in Mode 1, perform the following: (T-5-Heater Panel) **(N/A)**
		• Ensure closed 1HD-298 (Htr 1F1 Drain Lvl Control Byp)
		• Ensure closed 1HD-303 (Htr 1F2 Drain Lvl Control Byp)
		• Ensure closed 1HD-308 (Htr 1F3 Drain Lvl Control Byp)

This event is complete when 1A CBP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **4**	Page 1 of 2
Event Description: **PZR 'A' RTD Fails Low (I: OATC, SRO) (TS)**			

Time	Position	Applicant's Actions or Behavior
		<u>Plant response</u>: • OAC alarm (RC PZR level 1&3 mismatch) • OAC alarm (RC PZR level 2&3 mismatch) • PZR level 1 and 2 indicates ≈ 95 inches • PZR level 3 indicates ≈ 120 inches and slowly increasing
	OATC	**<u>Crew response</u>:** Refer to **ARG 1SA-02/C-3** (RC Pressurizer Level High/Low): rev 034 3.1 Check alternate PZR level indications.. 3.2 Check for proper Makeup/Letdown flows and adjust to restore proper level. ***Examiner Note: The RO may take 1HP-120 to MANUAL to control Pzr level. If so, they should place it in AUTO after the failure is addressed.*** ***Examiner Note: The SRO may direct the OATC to select PZR level 3 prior to referencing OP/1/A/1105/014.*** 3.1 Refer to the following procedures as required: • AP/1/A/1700/002 (Excessive RCS Leakage) • AP/1/A/1700/014 (Loss of Normal HPI M/U and/or RCP SI) • AP/1/A/1700/032 (Loss of Letdown) 3.4 Refer to Technical Specification 3.4.9 (Pressurizer) **(does not apply)** 3.5 Refer to Technical Specification 3.3.8 (PAM Instrumentation) **(next page)** 3.6 Refer to OP/1/A/1105/014 Control Room Instrumentation Operation And Information **(next page)**

This event is complete when PZR level 3 has been selected, 1HP-120 is in Auto, and the SRO has referred to TS, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **4**	Page 2 of 2
Event Description:	**PZR 'A' RTD Fails Low (I: OATC, SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1105/014
		Crew response:
	BOP	**OP/1/A/1105/014 Enclosure 4.11** (SASS Information) rev 044 3.2 SASS (Smart Automatic Signal Selector) Manual Operation 3.2.1 **IF** "MISMATCH" light is on and "TRIP 'A'" or "TRIP 'B'" light is on, a SASS trip has occurred. A. Controlling signal will be signal selected from CR keyswitch (for parameters in ICS Cabinet #8). B. Select valid signal as controlling signal by positioning CR keyswitch or pushbutton for Pzr level to valid signal (for parameters in ICS Cabinet #8). 3.2.2 **IF** "MISMATCH" light is on, a mismatch has occurred A. Controlling signal will be signal selected from CR keyswitch (for parameters in ICS Cabinet #8). B. Select valid signal as controlling signal by positioning CR keyswitch or pushbutton for Pzr level to valid signal (for parameters in ICS Cabinet #8). (**Select Pzr Level #3**) 3.2.3 Initiate a Work Request to repair faulty signal
	SRO	**TS 3.3.8 POST ACCIDENT MONITORING (PAM) INSTRUMENTATION** Condition A (30 days) Restore required channel to OPERABLE status.

This event is complete when PZR level 3 has been selected, 1HP-120 is in Auto, and the SRO has referred to TS, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **5**	Page 1 of 9
Event Description:	**1A1 RCP Lower Seal Failure (C: BOP, SRO)**		

Time	Position	Applicant's Actions or Behavior
		Plant response: • 1SA-06/A-5 (RC PUMP 1A1 SEAL CAVITY PRESS HI/LOW) • OAC Alarm RCP 1A1 LOWER SEAL CAVITY PRESSURE HI HI • OAC Alarm RCP 1A1 UPPER SEAL CAVITY PRESSURE HI HI • OAC Alarm 1A1 UPPER & LOWER SEAL ΔP
	BOP	**Crew response:** Refer to the ARGs 3.1 Upper/Lower Seal Cavity Pressure High 3.1.1 Go To AP/1/A/1700/016, Abnormal RCP Operation, for limits and required action 3.2 Upper/Lower Seal Cavity Pressure Low 3.2.1 **IF** in Mode 1 or 2, Go To AP/1/A/1700/016, Abnormal RCP Operation, for limits and required action
		AP/1/A/1700/016 **AP/1/A/1700/016** (Abnormal RCP Operation) rev 035 4.1 **IAAT** either apply: __ Any RCP meets or approaches Immediate Trip criteria of Encl 5.1 (RCP Immediate Trip Criteria) __ There is an immediate need to stop a RCP at this time **THEN** perform Steps 4.2 - 4.12. **(Immediate trip criteria will NOT be met)** **RNO: GO TO** Step 4.13 **(page 22)** ***Examiner Note: It is acceptable for the SRO to take either procedure path to secure the 1A1 RCP. Step 4.13 is on (page 22).*** 4.2 Verify MODE 1 or 2 4.3 Verify three RCPs will remain operating after affected RCP is tripped

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **5**	Page 2 of 9
Event Description:	**1A1 RCP Lower Seal Failure (C: BOP, SRO)**		

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/016 **<u>Crew response</u>:** 4.4 Verify Immediate Trip Criteria met **RNO:** 1. **IF** Rx Power on <u>any</u> NI > 70% **AND** time permits reducing power, **THEN** perform the following: A. Reduce Rx Power ≤ 70% using Encl 5.2 (Rapid Power Reduction) B. **WHEN** Rx Power ≤ 70%, **THEN GO TO** Step 4.6 2. **IF** Rx power is ≤ 70% **THEN GO TO** Step 4.6 3. **IF** time does **NOT** permit reducing power, **THEN** perform the following: A. Trip Rx B. Stop <u>affected</u> RCP C. **GO TO** Step 4.26 4.5 Verify Rx power is ≤ 70% as indicated on <u>all</u> NIs 4.6 Verify <u>any</u> SG on Low Level Limits 4.7 Stop the <u>affected</u> RCP 4.8 **GO TO** Step 4.26 4.26 **IAAT** <u>any</u> of the following indicate external RCP seal leakage: • RB RIAs increasing <u>or</u> in alarm • RCS Tave constant with LDST level decreasing more than normal • Quench Tank level rate increasing • RB Normal Sump rate increasing • Visual confirmation **THEN** initiate AP/02 (Excessive RCS Leakage) 4.27 Initiate Encl 4.3 (Special Instructions for < 4 RCP Operation) of OP/1/A/1102/004 (Operation at Power). **(page 25)** 4.28 **IAAT** <u>either</u> of the following conditions is met: __ a RCP has been shut down for ≥ 3 hours __ a RCP with <u>high</u> oil level has been shut down **THEN** close the associated RCP motor cooler inlet/outlet valve: __ 1LPSW-7&8 (1A1 RCP) __ 1LPSW-9&10 (1B1 RCP) __ 1LPSW-13&14 (1A2 RCP) __ 1LPSW-11&12 (1B2 RCP)

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **5** Page 3 of 9

Event Description: **1A1 RCP Lower Seal Failure (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/016
		Crew response:
		4.29 Verify a power reduction was performed to lower reactor power ≤ 70%
		RNO: GO TO Step 4.31
		4.31 **IAAT** either of the following has exceeded 260°F including transient situations: __ O1A1253 - O1A1256 (RCP UPPER SEAL HOUSING TEMP) __ O1A1910 - O1A1913 (RCP SEAL RETURN TEMP) **THEN** closely monitor seal parameters for degradation until an Engineering evaluation is completed due to potential for seal ring and elastomer damage.
		NOTE Operating experience has shown that failure of RC Pump components located internal to the RCS can create loose debris which can lead to fuel clad failures. These type RC Pump failures may cause Loose Parts Monitor alarms immediately and increased RCS radioactivity later.
		4.32 Verify 1RIA 57 or 1RIA 58 have risen.
		RNO: GO TO Step 4.34
		4.34 **IAAT** a RCP has been tripped due to exceeding Immediate Trip Criteria on a RCP motor, **THEN** contact RCP engineer prior to restart.
		4.35 **IAAT** both are met: __ There has been a failure of the DELTA Tc controller __ The DELTA Tc controller has been repaired **THEN** initiate OP/1/A/1102/004 A Encl (Placing ICS Stations To Auto).
		4.36 Verify any RCP that was shut down had a high vibration alarm.
		4.37 Initiate a CR for Engineering to document potential vibration effects on RCS piping.
		4.38 **WHEN** conditions permit, **THEN EXIT** this procedure.

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **5** Page 4 of 9

Event Description: **1A1 RCP Lower Seal Failure (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

AP/1/A/1700/016

Crew response:

Alternate Path from Step 4.1

4.13 Announce AP entry using the PA system

4.14 Notify SM to request evaluation by RCP Component Engineer

4.15 **IAAT** the failure is identified, **THEN GO TO** the applicable section per the following table:

√	Section	Failure
	4A	**Seal Failure**
	4B	Abnormal Vibration
	4C	High or Low Oil Pot Level
	4D	Loss of Seal Return
	4E	Abnormal RCP Temperatures

AP/1/A/1700/016 Section 4A (RCP Seal Failure)

1. **IAAT** any RCP meets immediate trip criteria of Encl 5.1, **THEN** perform Steps 2-11 **(Immediate trip criteria will NOT be met)**

RNO: **GO TO** Step 12

12. **IAAT** any of the following indicate external RCP seal leakage:
    - RB RIAs increasing or in alarm
    - RCS Tave constant with LDST level decreasing more than normal
    - Quench Tank level rate increasing
    - RB Normal Sump rate increasing
    - Visual confirmation

    THEN initiate AP/02 (Excessive RCS Leakage)

13. Verify the following are open:

    ___ 1HP-20

    ___ 1HP-21

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **5** Page 5 of 9

Event Description: **1A1 RCP Lower Seal Failure (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

AP/1/A/1700/016

Crew response:

14. Verify the following is open for the affected RCP:
    - 1HP-228 (1A1 RCP)

NOTE

- A single failed seal can transport debris to the other seals and damage them. A RCP with a failed seal should be secured as quickly as plant conditions allow.
- Use diverse indications, such as changes in other seal pressures, to ensure abnormal parameter is not a single instrument failure. For any seal failure, upper and lower seal cavity pressures should change from normal value.

15. **IAAT** either of the following conditions apply to an operating RCP:

√	RCS Pressure	ΔP across any seal
	> 1000 psig	**≤ 100 psid**
	≤ 1000 psig	≤ 35 psid

OR shut down of an RCP is desired, **THEN** perform Steps 16-26 to shut down the affected RCP.

16. Verify MODE 1 or 2
17. Verify three RCPs will remain operating after affected RCP is tripped
18. Verify Rx power is ≤ 70% as indicated on all Nis
19. Verify any SG on Low Level Limits
20. Stop the affected RCP
21. **GO TO** Step 25

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **5** Page 6 of 9

Event Description: **1A1 RCP Lower Seal Failure (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		AP/1/A/1700/016
		Crew response:
		25. Initiate Encl. 4.3 (Special Instructions for < 4 RCP Operation) of OP/1/A/1102/004 (Operation at Power). **(page 25)**
		26. Initiate the following notifications: __ Notify SM to make required notifications of OMP 1-14 (Notifications). __ Notify Rx Engineering and request a power maneuver plan, if needed. __ Notify SOC if load reduction was required. __ Notify Chemistry to take RCS boron samples on a 1 hour frequency.
		27. **IAAT** a RCP has been shut down for ≥ 3 hours **THEN** close the associated RCP motor cooler inlet/outlet valve: __ 1LPSW-7&8 (1A1 RCP) __ 1LPSW-9&10 (1B1 RCP) __ 1LPSW-13&14 (1A2 RCP) __ 1LPSW-11&12 (1B2 RCP)
		28. Verify a power reduction was performed to lower reactor power ≤ 70%
		RNO: GO TO Step 30
		30. **IAAT** either of the following has exceeded 260°F including transient situations: __ O1A1253 - O1A1256 (RCP UPPER SEAL HOUSING TEMP) __ O1A1910 - O1A1913 (RCP SEAL RETURN TEMP) **THEN** closely monitor seal parameters for degradation until an Engineering evaluation is completed due to potential for seal ring and elastomer damage.

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **5**	Page 7 of 9

Event Description: **1A1 RCP Lower Seal Failure (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

OP/1/A/1102/004 Encl 4.3

Crew response:

OP/1/A/1102/004 (Operations At Power) Encl 4.3 (Special Instructions For < 4 RCP Operations) Rev 152

2.1 **IF** conditions permit, log the current quadrant power tilt and the position of the ΔTc controller prior to securing a RCP during power operations

2.2 Perform **one** of the following: (Continue)

- Ensure TS 3.4.4 Condition A entered when fourth RCP secured
- Verify the following:
  - __ O1E4021 (1A RPS Var Flux Trip Value) set at 79.75%
  - __ O1E4022 (1A RPS Var Flux Trip Value) set at 79.75%
  - __ O1E4023 (1A RPS Var Flux Trip Value) set at 79.75%
  - __ O1E4024 (1A RPS Var Flux Trip Value) set at 79.75%

NOTE:
- Instructions for performing OAC trends are located in Working With Trends enclosure of OP/0/A/1103/020 A (Operator Aid Computer Use)
- Only the first 6 points will be displayed initially; press "Page Down" key to see second 6 points

2.3 Using turn-on code T6 3RCP, digitally trend the following data at one minute intervals:

Point ID	Description
☐ O1P0889	CORE THERMAL POWER BEST
☐ O1P0877	INCORE IMBALANCE
☐ O1E3335	API GROUP AVE FOR GROUP 7
☐ O1E3336	API GROUP AVE FOR GROUP 8
☐ O1P0737	INCORE TILT QUADRANT W-X
☐ O1P0738	INCORE TILT QUADRANT X-Y
☐ O1P0739	INCORE TILT QUADRANT Y-Z
☐ O1P0740	INCORE TILT QUADRANT Z-W
☐ O1I0828	RC COLD LEG A1 TEMP
☐ O1I0829	RC COLD LEG A2 TEMP
☐ O1I0830	RC COLD LEG B1 TEMP
☐ O1I0831	RC COLD LEG B2 TEMP

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **5** Page 8 of 9

Event Description: **1A1 RCP Lower Seal Failure (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior

OP/1/A/1102/004 Encl 4.3

Crew response:

NOTE: The 100% Power Imbalance curves also apply for runs at reduced power.

2.4 Maintain Control Rod position and Power Imbalance within COLR limits

2.5 **IF** NI calibration **NOT** within requirements of Limit and Precaution Step 2.2.6, calibrate NIs to Thermal Power Best

2.6 Perform the following per AM/1/A/0315/017 (TXS RPS Channels A, B, C, And D Parameter Changes For Abnormal/Normal Operating Conditions):

2.6.1 Notify I&E to reset RPS Overpower High Trip Setpoint for three RCP Operation

____________________ ______
Person Notified Date

2.6.2 **IF AT ANY TIME** Quadrant Power Tilt problems exist, notify I&E to Adjust Flux/Imbalance/Flow trip setpoints as required to comply with TS 3.2.3

____________________ ______
Person Notified Date

NOTE: The Maximum Allowed Power Setpoint (Pmax) is reduced when operating for extended periods when only three RCPs operating as a conservative action.

2.6.3 **IF** expected to operate for an extended period of time with only 3 RCPs operating, notify I&E to adjust Flux/Imbalance /Flow trip setpoints for 3 RCP operation

____________________ ______
Person Notified Date

2.7 **IF AT ANY TIME** notified by I&E that RPS Overpower High Trip Setpoint adjusted for three RCP Operation, perform the following:

2.7.1 Verify the following:

__ O1E4021 (1A RPS Var Flux Trip Value) set at 79.75%
__ O1E4022 (1A RPS Var Flux Trip Value) set at 79.75%
__ O1E4023 (1A RPS Var Flux Trip Value) set at 79.75%
__ O1E4024 (1A RPS Var Flux Trip Value) set at 79.75%

2.7.2 Evaluate exiting TS 3.4.4 condition A

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **5** Page 9 of 9

Event Description: **1A1 RCP Lower Seal Failure (C: BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		OP/1/A/1102/004 Encl 4.3
		Crew response:
		2.8 Initiate review of PT/1/A/0600/001 (Periodic Instrument Surveillance) to determine if any limits approached
		NOTE: • Operations Management/Reactor Engineering Group should be consulted for value to use for high flux alarm setpoint. • Instructions for Adjusting Alarm Setpoints On The NI Recorder are in OP/0/A/1108/001 (Curves And General Information).
		2.9 Adjust high flux alarm setpoint per Operations Management/Reactor Engineering Group recommendations. (Alarm setpoint is adjusted on the NI Recorder)
		NOTE: 'D' bleed pressure may **NOT** be high enough to run the FDWP turbines.
		2.10 Maintain Auxiliary Steam available to the FDWP turbines.
		2.11 **IF** 1SSH-9 (SSH DISCH CTRL BYPASS) is being used to control Steam Seal Header pressure, throttle 1SSH-9 as required to maintain desired SSH pressure
		NOTE: RCS pressure decrease in the loop with two RCPs running is expected. This may cause acceptance criteria of PT/1/A/0600/001 (Periodic Instrument Surveillance) **NOT** to be met.
		2.12 Place note on CR turnover sheet indicating the following: "Be aware of the effect of the indicated pressure on the margin to trip setpoint for the Reactor Protective System trips associated with RCS pressure"

This event is complete when 1A1 RCP is secured, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **6**	Page 1 of 10
Event Description: **Small Break LOCA (M: ALL)**			

Time	Position	Applicant's Actions or Behavior

Plant response:

- 1SA-2/D-3 (RC PRESS HI/LOW)
- RCS pressure and PZR level lowering
- ES Channels 1-6 actuate
- RCS subcooling margin will indicate 0°F shortly after the Rx trips
- Reactor Building Emergency Sump level will begin to rise

Crew response:

OATC

The SRO will direct the OATC to perform IMAs.

3.1 Depress REACTOR TRIP pushbutton
3.2 Verify reactor power < 5% FP and lowering
3.3 Depress the turbine TRIP pushbutton
3.4 Verify all turbine stop valves closed
3.5 Verify RCP seal injection available

BOP

The SRO will direct the BOP to perform a Symptoms Check

Power Range NIs **NOT** < 5% Power Range NIs **NOT** lowering	Rule 1, *ATWS/Unanticipated Nuclear Power Production*
Any SCM < 0°F	Rule 2, *Loss Of SCM*
Loss of Main and Emergency FDW (including unsuccessful manual initiation of EFDW)	Rule 3, *Loss of Main or Emerg FDW* Rule 4, *Initiation of HPI Forced Cooling* (Inability to feed SGs and > 2300 psig, NDT limit reached, or PZR level > 375")
Uncontrolled Main steam line(s) pressure decrease	Rule 5, *Main Steam Line Break*
CSAE Offgas alarms Process monitor alarms (RIA-40, 59,60), Area monitor alarms (RIA-16/17)	None (SGTR Tab is entered when identified SG Tube Leakage > 25 gpm)

SRO will transfer from the Subsequent Actions Tab to the LOSCM tab **(page 29)** from the Parallel Actions Page **(page 56)** to direct crew activities

Once the RCS saturates, one of the ROs will perform Rule 2 **(page 33)**

The RO not performing Rule 2 will begin performing Enclosure 5.1 due to ES actuation (**page 38**)

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **6** Page 2 of 10

Event Description: **Small Break LOCA (M: ALL)**

Time	Position	Applicant's Actions or Behavior

LOSCM Tab

Crew response:

LOSCM tab rev 01

1. Ensure Rule 2 (Loss of SCM) is in progress or complete
2. Verify LOSCM caused by excessive heat transfer

RNO: GO TO Step 4

4. **IAAT** either exists:
   - LPI FLOW TRAIN A plus LPI FLOW TRAIN B ≥ 3400 gpm
   - Only one LPI header in operation with header flow ≥ 2900 gpm

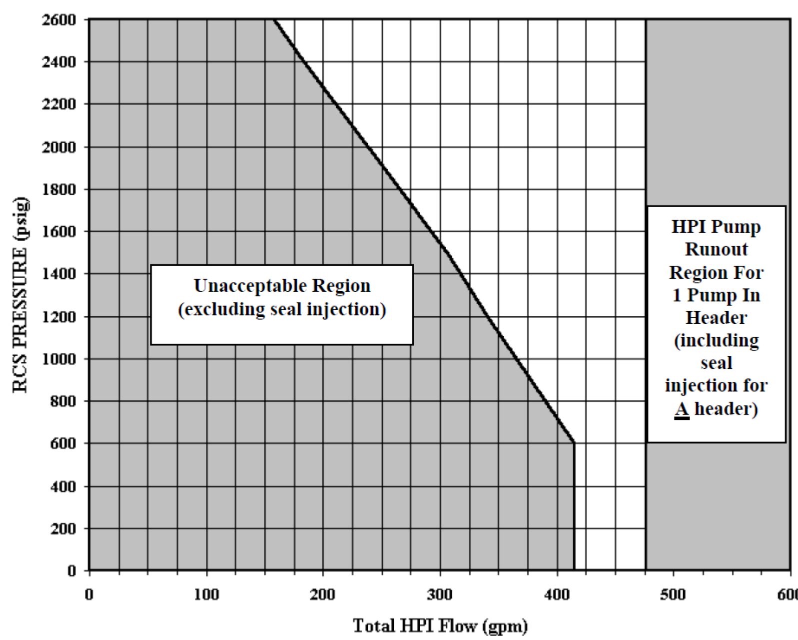
   THEN GO TO LOCA CD tab

5. Verify SSF activated per AP/25 with SSF RC Makeup required

RNO: GO TO Step 7

7. Verify all exist:
   __ **NO** RCPs operating
   __ HPI flow in both HPI headers
   __ Adequate total HPI flow per Figure 1 (Total Required HPI Flow)

Figure 1
Total Required HPI Flow



This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **6** Page 3 of 10

Event Description: **Small Break LOCA (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		Crew response: **LOSCM tab** (continued) 8. **GO TO** Step 104 104. Open 1AS-40 while closing 1MS-47 105. Verify HPI forced cooling in progress **RNO:** Close 1RC-4 106. Close 1GWD-17, 1HP-1, 1HP-2, and 1RC-3 107. Verify either: • Core superheated • Rx vessel head level at 0″ **RNO:** **GO TO** Step 109 109. **IAAT** BWST level is ≤ 19', **THEN** initiate Encl 5.12 (ECCS Suction Swap to RBES) **CAUTION** If TDEFDWP is being used for SG feed, reducing SG pressure below ≈ 250 psig can result in reduced pumping capability 110. Maintain SG pressure < RCS pressure utilizing either: __ TBVs __ ADVs 111. Verify any SG available for feeding/steaming 112. Initiate Encl 5.16 (SG Tube-to-Shell ΔT Control) (**page 57**)

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **6**	Page 4 of 10
Event Description:	**Small Break LOCA (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		<u>Crew response</u>: **LOSCM tab** (continued) 113. Verify indications of SGTR exist **RNO: GO TO** Step 116 116. Verify HPI forced cooling in progress **RNO: GO TO** Step 118 118. Verify CETCs trend decreasing 119. Verify primary to secondary heat transfer is excessive **RNO: GO TO** Step 121 121. Verify indications of SGTR $\geq$ 25 gpm **RNO: GO TO** Step 123 123. Verify required RCS makeup flow within normal makeup capability **RNO: GO TO** LOCA CD tab (**page 32**)

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **6** Page 5 of 10

Event Description: **Small Break LOCA (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		LOCA Cooldown Tab **<u>Crew response</u>:** **LOCA Cooldown Tab** rev 0 1. **IAAT** BWST level is ≤ 19', **THEN** initiate Encl 5.12 (ECCS Suction Swap to RBES) 2. Verify ES actuated 3. **GO TO** Step 7 7. Perform the following: • Ensure <u>all</u> RBCUs in low speed • Open 1LPSW-18 • Open 1LPSW-21 • Open 1LPSW-24 8. Initiate Encl 5.35 (Containment Isolation) 9. Start <u>all</u> RB Aux fans 10. **IAAT** <u>either</u> of the following exists: • LPI FLOW TRAIN A <u>plus</u> LPI FLOW TRAIN B ≥ 3400 gpm • <u>Only one</u> LPI header in operation with header flow ≥ 2900 gpm **THEN GO TO** Step 11 **RNO: GO TO** Step 43 43 Initiate Encl 5.36 (Equipment Alignment For Plant Shutdown) 44. **IAAT** <u>all</u> the following exist: __ All SCMs > 0°F __ RCS pressure > LPI shutoff head __ Required HPI within normal makeup capability **THEN GO TO** Step 45 **RNO: GO TO** Step 48 45. Verify primary to secondary heat transfer exists

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **6** Page 6 of 10

Event Description: **Small Break LOCA (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		Rule 2
		<u>Crew response</u>:
		Rule 2 (Loss of SCM) rev 01
		1. **IAAT** <u>all</u> exist: • Any SCM ≤ 0°F • Rx power ≤ 1% • ≤ 2 minutes elapsed since loss of SCM **THEN** perform steps 2 & 3
	CT-1	2. Stop <u>all</u> RCPs *(within 2 minutes of LOSCM)*
		3. Notify CRS of RCP status
		4. Verify Blackout exists
		RNO: GO TO Step 6
		6. Open 1HP-24 & 25
	CT-3	7. Start <u>all</u> <u>available</u> HPI Pumps *(within 10 minutes of LOCA)*
		Examiner Note: The 1C HPI pump will fail to start on ES signal but will start manually.
		8. **GO TO** step 13
		13. Open 1HP-26 & 27
		14. Verify <u>at least two</u> HPI pumps are operating using two diverse indications
		15. **IAAT** ≥ 2 HPI pumps operating and HPI flow in any header is in Unacceptable Region of Fig. 1, **THEN** perform Steps 16-21
		RNO: GO TO Step 17
		17. **IAAT** flow limits are exceeded **THEN** perform Steps 18 - 20
		RNO: GO TO Step 21
		18. Place Diverse HPI in BYPASS
		19. Perform <u>both</u>: • Place ES CH 1 in MANUAL • Place ES CH 2 in MANUAL
		20. Throttle HPI to maximize flow ≤ flow limit

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1** Scenario No.: **4** Event No.: **6**

Event Description: **Small Break LOCA (M: ALL)**

Time	Position	Applicant's Actions or Behavior
		Rule 2
		<u>Crew response</u>:
		Rule 2 (Loss of SCM) (Continued)
		21. Notify CRS of HPI status
		22. Verify RCS pressure >550 psig
		23. **IAAT** <u>either</u> exists:
		• LPI FLOW TRAIN A plus LPI FLOW TRAIN B ≥ 3400 gpm
		• Only one LPI header in operation with header flow ≥ 2900 gpm
		THEN GO TO Step 24
		RNO: GO TO Step 35
		35. **IAAT** TBVs are unavailable, **THEN**
		A. Dispatch <u>two</u> operators to perform Encl 5.24 (Operation of ADVs)
		B. Notify CRS the ADVs are being aligned for use
		36. Select OFF for <u>both</u> Digital Channels on AFIS HEADER A
		37. Select OFF for <u>both</u> Digital Channels on AFIS HEADER B
		38. Verify <u>any</u> EFDW pump operating
		RNO: Place 1FDW 315 and 1FDW-316 in MANUAL and close
		39. Start MD EFDW pumps on <u>all</u> <u>intact</u> SGs:
		• 1A MD EFDWP
		• 1B MD EFDWP
		40. Verify <u>any</u> EFDW pump operating
		41. Verify <u>both</u> SGs <u>intact</u>
		42. Establish 300 gpm EFDW flow to <u>each</u> SG
		43. Verify <u>both</u> MD EFDWPs operating
		44. Place 1 TD EFDW PUMP in PULL TO LOCK
		45. Trip <u>both</u> Main FDW pumps

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **6**	Page 8 of 10
Event Description:	**Small Break LOCA (M: ALL)**		

Time	Position	Applicant's Actions or Behavior
		Rule 2

Crew response:

Rule 2 (Loss of SCM) (Continued)

46. Place FDW block valve switches in CLOSE:
    - 1FDW-33
    - 1FDW-31
    - 1FDW-42
    - 1FDW-40
47. Begin feeding all intact SGs to the appropriate SG Level Control Point in Rule 7 (SG Feed Control) using available feed sources; EFDW/Main FDW
48. **IAAT** SG Level Control Point is reached, **THEN** maintain SG Level Control Point by feeding and steaming as necessary
49. Notify CRS of SG feed status

CAUTION
If 1 TD EFDW PUMP is being used for SG feed and Unit 1 is supplying the Auxiliary Steam header, reducing SG pressure below ≈ 250 psig can result in reduced pumping capability.

50. **IAAT** SG pressure is > RCS pressure, **THEN** reduce SG pressure < RCS pressure using either:
    - TBVs
    - Dispatch two operators to perform Encl 5.24 (operation of the ADVs)
51. Verify any Main FDW pump operating

RNO: GO TO Step 58

58. Ensure Rule 3 (Loss of Main or Emergency FDW) is in progress or complete (**page 36**)
59. **WHEN** directed by CRS, **THEN EXIT**

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **6**	Page 9 of 10
Event Description: **Small Break LOCA (M: ALL)**			

Time	Position	Applicant's Actions or Behavior
		Rule 3
		<u>Crew response</u>:
		Rule 3 (Loss of Main or Emergency Feedwater) rev 01
		1. Verify loss of MFDW and /or EFDW was due to <u>any</u> of the following: __ Turbine Building Flooding __ Actions taken to increase SG level due to Turbine Building Flooding
		RNO: GO TO Step 3
		3. **IAAT** NO SGs can be fed with FDW (Main/CBP/Emergency/PSW), **AND** <u>any</u> of the following exist: • RCS pressure reaches 2300 psig or NDT limit • PZR level reaches 375” (340” acc) **THEN PERFORM** Rule 4 (HPI Forced Cooling)
		4. Start <u>operable</u> EFDW pumps, as required, to feed <u>all</u> <u>intact</u> SGs
		5. Verify <u>any</u> EFDW pump operating
		6. **GO TO** Step 38
		38**.** **IAAT** an EFDW valve **CANNOT** control in AUTO, **OR** manual operation of EFDW valve is desired to control flow/level, **THEN** perform Steps 39 - 43
		RNO: GO TO Step 44
		44. Verify <u>any</u> SCM $\leq$ 0°F
		RNO: IF overcooling OR exceeding limits in Rule 7, **THEN** throttle EFDW as necessary
		45. **IAAT** Unit 1 EFDW is in operation, **THEN** initiate Encl 5.9 (Extended EFDW Operation) (**page 37**)
		46. **WHEN** directed by **CRS,** **THEN EXIT**

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

Op-Test No.: **ILT18-1**	Scenario No.: **4**	Event No.: **6**	Page 10 of 10
Event Description: **Small Break LOCA (M: ALL)**			

Time	Position	Applicant's Actions or Behavior
		EOP Encl 5.9

Crew response:

EOP Encl 5.9 (Extended EFDW Operation) rev 01

1. Monitor EFDW parameters on EFW graphic display
2. **IAAT** UST level is < 4', **THEN GO TO** Step 120
3. **IAAT** feeding both SGs with one MD EFDWP is desired, **THEN** perform steps 4 - 7

RNO: **GO TO** Step 8

8. Perform as required to maintain UST level > 7.5'
   - Makeup with demin water
   - Place CST pumps in AUTO
9. **IAAT** all exist:
   - __ Rapid cooldown **NOT** in progress
   - __ MD EFDWP operating for each available SG
   - __ EFDW flow in each header < 600 gpm

   THEN place 1 TD EFDW PUMP switch in PULL TO LOCK
10. Verify 1 TD EFDW PUMP operating

RNO: **GO TO** Step 12

11. Start TD EFDWP BEARING Oil Cooling Pump

NOTE

- Loss of the condensate system for ≥ 25 minutes results in cooling down to LPI using the ADVs. If **NO** HWPs are operating, continuing this enclosure to restore the condensate system is a priority unless the CR SRO deems EOP activities higher priority. The 25 minute criterion is satisfied when a HWP is started and 1C-10 is 10% open.
- If the condensate system is operating, the remaining guidance establishes FDW recirc, monitors and maintains UST, and transfers EFDW suction to the hotwell if required.

12. Notify CR SRO to set priority based on the NOTE above and EOP activities

Note: ***The SRO may determine that continuing in Encl 5.9 is not a priority at this time and direct the RO from the LOSCM Tab of the EOP. (page 29)***

This event is complete when the SRO transfers to the LOCA CD tab, or as directed by the Lead Examiner.

EOP Enclosure 5.1 (ES Actuation)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ Determine all ES channels that should have actuated based on RCS pressure and RB pressure: (see table below)	
2. __ Verify all ES channels associated with actuation setpoints have actuated.	**NOTE** Voter OVERRIDE extinguishes the TRIPPED light on the associated channels that have auto actuated. Pressing TRIP on channels previously actuated will reposition components that may have been throttled or secured by this Enclosure. __ Depress TRIP on affected ES logic channels that have **NOT** previously been actuated.
3. __ **IAAT** additional ES actuation setpoints are exceeded, **THEN** perform Steps 1 - 2.	
4. __ Place Diverse HPI in BYPASS.	__ Place Diverse HPI in OVERRIDE.
5. Perform both: __ Place ES CH 1 in MANUAL. __ Place ES CH 2 in MANUAL.	**NOTE** • Voter OVERRIDE affects all channels of the affected ODD and/or EVEN channels. • In OVERRIDE, all components on the affected ODD and/or EVEN channels can be manually operated from the component switch. 1. __ **IF** ES CH 1 fails to go to MANUAL, **THEN** place ODD voter in OVERRIDE. 2. __ **IF** ES CH 2 fails to go to MANUAL, **THEN** place EVEN voter in OVERRIDE.

Table for Step 1:

✓	Actuation Setpoint (psig)	Associated ES Channel
	1600 (RCS)	1 & 2
	550 (RCS)	3 & 4
	3 (RB)	1, 2, 3, 4, 5, & 6
	10 (RB)	7 & 8

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ **IAAT** all exist: __ Voter associated with ES channel is in OVERRIDE __ An ES channel is manually actuated __ Components on that channel require manipulation **THEN** depress RESET on the required channel.	
7. __ Verify Rule 2 in progress or complete.	__ **GOTO** Step 74.
8. __ Verify any RCP operating.	__ **GOTO** Step 10.
9. Open: __ 1HP-20 __ 1HP-21	
10. __ **IAAT** any RCP is operating, **AND** ES Channels 5 and 6 actuate, **THEN** perform Steps 11 - 15.	__ **GOTO** Step 16.
11. Perform all: __ Place ES CH 5 in MANUAL. __ Place ES CH 6 in MANUAL.	**NOTE** • Voter OVERRIDE affects all channels of the affected ODD and/or EVEN channels. • In OVERRIDE, all components on the affected ODD and/or EVEN channels can be manually operated from the component switch. 1. __ **IF** ES CH 5 fails to go to MANUAL, **THEN** place ODD voter in OVERRIDE. 2. __ **IF** ES CH 6 fails to go to MANUAL, **THEN** place EVEN voter in OVERRIDE.
12. __ Verify any RCP is operating	__ **GO TO** Step 16
13. Open: __ 1CC-7 __ 1CC-8 __ 1LPSW-15 __ 1LPSW-6	
14. __ Ensure only one CC pump operating.	
15. __ Ensure Standby CC pump in AUTO.	

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. __ **IAAT** ES Channels 3 & 4 are actuated, **THEN GO TO** Step 17.	__ **GO TO** Step 54.
17. __ Place Diverse LPI in BYPASS.	__ Place Diverse LPI in OVERRIDE.
18. Perform both: __ Place ES CH 3 in MANUAL. __ Place ES CH 4 in MANUAL.	**NOTE** • Voter OVERRIDE affects all channels of the affected ODD and/or EVEN channels. • In OVERRIDE, all components on the affected ODD and/or EVEN channels can be manually operated from the component switch. 1. __ **IF** ES CH 3 fails to go to MANUAL, **THEN** place ODD voter in OVERRIDE. 2. __ **IF** ES CH 4 fails to go to MANUAL, **THEN** place EVEN voter in OVERRIDE.

CAUTION

LPI pump damage may occur if operated in excess of 30 minutes against a shutoff head. {6}

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. __ **IAAT** any LPI pump is operating against a shutoff head, **THEN** at the CR SRO's discretion, stop affected LPI pumps. {6, 22}	
20. __ **IAAT** RCS pressure is < LPI pump shutoff head, **THEN** perform Steps 21 - 22.	__ **GOTO** Step 23.
21. Perform the following: __ Open 1LP-17. __ Start 1A LPI PUMP.	1. __ Stop 1A LPI PUMP. 2. __ Close 1LP-17.
22. Perform the following: __ Open 1LP-18. __ Start 1B LPI PUMP.	1. __ Stop 1B LPI PUMP. 2. __ Close 1LP-18.

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. __ **IAAT** 1A and 1B LPI PUMPs are off / tripped, **AND** all exist: __ RCS pressure < LPI pump shutoff head __ 1LP-19 closed __ 1LP-20 closed **THEN** perform Steps 24 - 25.	__ **GO TO** Step 26.
24. Open: __ 1LP-9 __ 1LP-10 __ 1LP-6 __ 1LP-7 __ 1LP-17 __ 1LP-18 __ 1LP-21 __ 1LP-22	
25. __ Start 1C LPI PUMP.	
26. __ **IAAT** 1A LPI PUMP fails while operating, **AND** 1B LPI PUMP is operating, **THEN** close 1LP-17.	
27. __ **IAAT** 1B LPI PUMP fails while operating, **AND** 1A LPI PUMP is operating, **THEN** close 1LP-18.	
28. Start: __ A OUTSIDE AIR BOOSTER FAN __ B OUTSIDE AIR BOOSTER FAN	***CT- 2***
29. Notify Unit 3 to start: __ 3A OUTSIDE AIR BOOSTER FAN __ 3B OUTSIDE AIR BOOSTER FAN	

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. Verify open: __ 1CF-1 __ 1CF-2	__ **IF** CR SRO desires 1CF-1 and 1CF-2 open, **THEN** open: __ 1CF-1 __ 1CF-2
31. __ Verify 1HP-410 closed.	1. __ Place 1HP-120 in HAND. 2. __ Close 1HP-120.
32. __ Secure makeup to the LDST.	
33. __ Verify all ES channel 1 - 4 components are in the ES position.	1. __ **IF** 1HP-3 fails to close, **THEN** close 1HP-1. 2. __ **IF** 1HP-4 fails to close, **THEN** close 1HP-2. 3. __ **IF** 1HP-20 fails to close, **AND NO** RCPs operating, **THEN** close: __ 1HP-228 __ 1HP-226 __ 1HP-232 __ 1HP-230 4. __ Notify SRO to evaluate components **NOT** in ES position and initiate action to place in ES position if desired.
34. __ Verify Unit 2 turbine tripped.	__ **GOTO** Step 37.
35. __ Close 2LPSW-139.	
36. __ Verify total LPSW flow to Unit 2 LPI coolers ≤ 6000 gpm.	__ Reduce LPSW to Unit 2 LPI coolers to obtain total LPSW flow ≤ 6000 gpm.
37. __ Close 1LPSW-139.	
38. Place in FAIL OPEN: __ 1LPSW-251 FAIL SWITCH __ 1LPSW-252 FAIL SWITCH	
39. __ Start all available LPSW pumps.	

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40. Verify <u>either</u>: __ Three LPSW pumps operating __ Two LPSW pumps operating when Tech Specs only requires two operable	__ **GOTO** Step 42.
41. Open: __ 1LPSW-4 __ 1LPSW-5	__ **IF** <u>both</u> are closed: __ 1LPSW-4 __ 1LPSW-5 **THEN** notify SRO to initiate action to open <u>at least one</u> valve prior to BWST level ≤ 19'.
42. __ **IAAT** BWST level ≤ 19', **THEN** initiate Encl 5.12 (ECCS Suction Swap to RBES).	1. __ Display BWST level using OAC Turn-on Code "SHOWDIG O1P1600". 2. __ Notify crew of BWST level IAAT step.
43. __ Dispatch an operator to perform Encl 5.2 (Placing RB Hydrogen Analyzers In Service). (**PS**)	
44. __ Select DECAY HEAT LOW FLOW ALARM SELECT switch to ON.	
45. __ **IAAT** ES channels 5 & 6 have actuated, **THEN** perform Step 46.	__ **GOTO** Step 47.

<u>NOTE</u>

RBCU transfer to low speed will **NOT** occur until 3 minute time delay is satisfied.

46. __ Verify <u>all</u> ES channel 5 & 6 components are in the ES position.	__ Notify SRO to evaluate components **NOT** in ES position <u>and</u> initiate action to place in ES position if desired.

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
47. __ **IAAT** ES channels 7 & 8 have actuated, **THEN** perform Steps 48 - 49.	__ **GOTO** Step 50.
48. Perform <u>all</u>: __ Place ES CH 7 in MANUAL. __ Place ES CH 8 in MANUAL.	**<u>NOTE</u>** • Voter OVERRIDE affects all channels of the <u>affected</u> ODD and/or EVEN channels. • In OVERRIDE, all components on the <u>affected</u> ODD and/or EVEN channels can be manually operated from the component switch. 1.__ **IF** ES CH 7 fails to go to MANUAL, **THEN** place ODD voter in OVERRIDE. 2.__ **IF** ES CH 8 fails to go to MANUAL, **THEN** place EVEN voter in OVERRIDE.
49. __ Verify <u>all</u> ES channel 7 & 8 components are in the ES position.	__ Notify SRO to evaluate components **NOT** in ES position <u>and</u> initiate action to place in ES position if desired.
50. __ Notify U2 CR SRO that SSF is inoperable due to OTS1-1 open.	
51. __ Ensure <u>any</u> turnover sheet compensatory measures for ES actuation are complete as necessary.	
52. __ **IAAT** conditions causing ES actuation have cleared, **THEN** initiate Encl 5.41 (ES Recovery).	
53. __ **WHEN** CR SRO approves, **THEN EXIT**.	

••• END •••

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status ES Channels 3 & 4 have **NOT** actuated.	
54. Start: __ A OUTSIDE AIR BOOSTER FAN __ B OUTSIDE AIR BOOSTER FAN	
55. Notify Unit 3 to start: __ 3A OUTSIDE AIR BOOSTER FAN __ 3B OUTSIDE AIR BOOSTER FAN	
56. Verify open: __ 1CF-1 __ 1CF-2	__ **IF** CR SRO desires 1CF-1 and 1CF-2 open, **THEN** open: __ 1CF-1 __ 1CF-2
57. __ Verify 1HP-410 closed.	1. __ Place 1HP-120 in HAND. 2. __ Close 1HP-120.
58. __ Secure makeup to the LDST.	
59. __ Verify all ES channel 1 & 2 components are in the ES position.	1. __ **IF** 1HP-3 fails to close, **THEN** close 1HP-1. 2. __ **IF** 1HP-4 fails to close, **THEN** close 1HP-2. 3. __ **IF** 1HP-20 fails to close, **AND NO** RCPs operating, **THEN** close: __ 1HP-228 __ 1HP-226 __ 1HP-232 __ 1HP-230 4. __ Notify SRO to evaluate components **NOT** in ES position and initiate action to place in ES position if desired.
60. __ Verify Unit 2 turbine tripped.	__ **GOTO** Step 63.
61. __ Close 2LPSW-139.	
62. __ Verify total LPSW flow to Unit 2 LPI coolers ≤ 6000 gpm.	__ Reduce LPSW to Unit 2 LPI coolers to obtain total LPSW flow ≤ 6000 gpm.
63. __ Close 1LPSW-139.	

EOP Enclosure 5.1

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
64. Place in FAIL OPEN: __ 1LPSW-251 FAIL SWITCH __ 1LPSW-252 FAIL SWITCH	
65. __ Start <u>all available</u> LPSW pumps.	
66. Verify <u>either</u>: __ Three LPSW pumps operating __ Two LPSW pumps operating when Tech Specs only requires two operable	__ **GOTO** Step 68.
67. Open: __ 1LPSW-4 __ 1LPSW-5	__ **IF** <u>both</u> are closed: __ 1LPSW-4 __ 1LPSW-5 **THEN** notify SRO to initiate action to open <u>at least one</u> valve prior to BWST level ≤ 19'.
68. __ **IAAT** BWST level ≤ 19', **THEN** initiate Encl 5.12 (ECCS Suction Swap to RBES).	1. __ Display BWST level using OAC Turn-on Code "SHOWDIG O1P1600". 2. __ Notify crew of BWST level IAAT step.
69. __ Dispatch an operator to perform Encl 5.2 (Placing RB Hydrogen Analyzers In Service). (**PS**)	
70. __ Notify U2 CR SRO that SSF is inoperable due to OTS1-1 open.	
71. __ Ensure <u>any</u> turnover sheet compensatory measures for ES actuation are complete as necessary.	
72. __ **IAAT** conditions causing ES actuation have cleared, **THEN** initiate Encl 5.41 (ES Recovery).	
73. __ **WHEN** CR SRO approves, **THEN EXIT**.	

••• END •••

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Maintaining Pzr level >100″ [180″ acc] will ensure Pzr heater bundles remain covered.	
1. __ Utilize the following as necessary to maintain desired Pzr level: • 1A HPI Pump • 1B HPI Pump • 1HP-26 • 1HP-7 • 1HP-120 setpoint or valve demand • 1HP-5	__ **IF** 1HP-26 will **NOT** open, **THEN** throttle 1HP-410 to maintain desired Pzr level.
2. __ **IAAT** makeup to the LDST is desired, **THEN** makeup from 1A BHUT.	
3. __ **IAAT** it is desired to secure makeup to LDST, **THEN** secure makeup from 1A BHUT.	
4. __ **IAAT** it is desired to bleed letdown flow to 1A BHUT, **THEN** perform the following: A. Open: __ 1CS-26 __ 1CS-41 B. __ Position 1HP-14 to BLEED. C. __ Notify SRO.	
5. __ **IAAT** letdown bleed is **NO** longer desired, **THEN** position 1HP-14 to NORMAL.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ **IAAT** 1C HPI PUMP is required, **THEN** perform Steps 7 - 9.	__ **GO TO** Step 10.
7. __ Open: • 1HP-24 • 1HP-25	1. __ **IF** both BWST suction valves (1HP-24 and 1HP-25) are closed, **THEN** perform the following: A. __ Start 1A LPI PUMP. B. __ Start 1B LPI PUMP. C. Open: __ 1LP-15 __ 1LP-16 __ 1LP-9 __ 1LP-10 __ 1LP-6 __ 1LP-7 D. __ **IF** two LPI Pumps are running only to provide HPI pump suction, **THEN** secure one LPI pump. E. __ Dispatch an operator to open 1HP-363 (Letdown Line To LPI Pump Suction Block) (A-1-119, U1 LPI Hatch Rm, N end). F. __ **GO TO** Step 8. 2. __ **IF** only one BWST suction valve (1HP-24 or 1HP-25) is open, **THEN** perform the following: A. __ **IF** three HPI pumps are operating, **THEN** secure 1B HPI PUMP. B. __ **IF** < 2 HPI pumps are operating, **THEN** start HPI pumps to obtain two HPI pump operation, preferably in opposite headers. C. __ **GO TO** Step 9.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. __ Start 1C HPI PUMP.	__ **IF** at least two HPI pumps are operating, **THEN** throttle 1HP-409 to maintain desired Pzr level.
9. Throttle the following as required to maintain desired Pzr level: __ 1HP-26 __ 1HP-27	1. __ **IF** at least two HPI pumps are operating, **AND** 1HP-26 will **NOT** open, **THEN** throttle 1HP-410 to maintain desired Pzr level. 2. __ **IF** 1A HPI PUMP and 1B HPI PUMP are operating, **AND** 1HP-27 will **NOT** open, **THEN** throttle 1HP-409 to maintain desired Pzr level.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. __ **IAAT** LDST level **CANNOT** be maintained, **THEN** perform Step 11.	__ **GO TO** Step 12.
11. __ Perform the following: • Open 1HP-24. • Open 1HP-25. • Close 1HP-16.	1. __ **IF** both BWST suction valves (1HP-24 and 1HP-25) are closed, **THEN** perform the following: A. __ Start 1A LPI PUMP. B. __ Start 1B LPI PUMP. C. Open: __ 1LP-15 __ 1LP-16 __ 1LP-9 __ 1LP-10 __ 1LP-6 __ 1LP-7 D. __ **IF** two LPI Pumps are running only to provide HPI pump suction, **THEN** secure one LPI pump. E. __ Dispatch an operator to open 1HP-363 (Letdown Line To LPI Pump Suction Block) (A-1-119, U1 LPI Hatch Rm, N end). F. __ **GO TO** Step 13. 2. __ **IF** only one BWST suction valve (1HP-24 or 1HP-25) is open, **AND** three HPI pumps are operating, **THEN** secure 1B HPI PUMP.

NOTE

Maintaining Pzr level > 100” [180” acc] will ensure Pzr heater bundles remain covered.

12. __ Operate Pzr heaters as required to maintain heater bundle integrity.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. __ **IAAT** additional makeup flow to LDST is desired, **AND** 1A BLEED TRANSFER PUMP is operating, **THEN** dispatch an operator to close 1CS-48 (1A BHUT Recirc) (A-1-107, Unit 1 RC Bleed Transfer Pump Rm.).	
14. __ **IAAT** two Letdown Filters are desired, **THEN** perform the following: __ Open 1HP-17. __ Open 1HP-18	
15. __ **IAAT** all of the following exist: __ Letdown isolated __ LPSW available __ Letdown restoration desired **THEN** perform Steps 16 - 34. {41}	__ **GO TO** Step 35.
16. Open: __ 1CC-7 __ 1CC-8	1.__ Notify CR SRO that letdown **CANNOT** be restored due to inability to restart the CC system. 2.__ **GO TO** Step 35.
17. __ Ensure only one CC pump running.	
18. __ Place the non-running CC pump in AUTO.	
19. Verify both are open: __ 1HP-1 __ 1HP-2	1. __**IF** 1HP-1 is closed due to 1HP-3 failing to close, **THEN GO TO** Step 21. 2. __**IF** 1HP-2 is closed due to 1HP-4 failing to close, **THEN GO TO** Step 21.
20. __ **GO TO** Step 23.	

NOTE
Verification of leakage requires visual observation of East Penetration Room.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. __ Verify letdown line leak in East Penetration Room has occurred.	**GO TO** Step 23.
22. __ **GO TO** Step 35.	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. __ Monitor for unexpected conditions while restoring letdown.	
24. __ Verify both letdown coolers to be placed in service.	1. __ **IF** 1A letdown cooler is to be placed in service, **THEN** open: __ 1HP-1 __ 1HP-3 2. __ **IF** 1B letdown cooler is to be placed in service, **THEN** open: __ 1HP-2 __ 1HP-4 3. __ **GO TO** Step 26.
25. Open: __ 1HP-1 __ 1HP-2 __ 1HP-3 __ 1HP-4	
26. __ Verify at least one letdown cooler is aligned.	Perform the following: A. __Notify CR SRO of problem. B. __**GO TO** Step 35.
27. __ Close 1HP-6.	
28. __ Close 1HP-7.	
29. __ Verify letdown temperature < 125°F.	1. __ Open 1HP-13. 2. Close: __ 1HP-8 __ 1HP-9&11 3. __ **IF** any deborating IX is in service, **THEN** perform the following: A. __ Select 1HP-14 to NORMAL. B. __ Close 1HP-16. 4. __ Select LETDOWN HI TEMP INTLK BYP switch to BYPASS.

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. __ Open 1HP-5.	
31. __ Adjust 1HP-7 for ≈ 20 gpm letdown.	
32. __ **WHEN** letdown temperature is < 125°F, **THEN** place LETDOWN HI TEMP INTLK BYP switch to NORMAL.	
33. __ Open 1HP-6.	
34. __ Adjust 1HP-7 to control desired letdown flow.	

NOTE
AP/32 (Loss of Letdown) provides direction to cool down the RCS to offset increasing pressurizer level.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
35. __ **IAAT** it is determined that letdown is unavailable due to equipment failures or letdown system leakage, **THEN** notify CR SRO to initiate AP/32 (Loss of Letdown).	
36. __ **IAAT** > 1 HPI pump is operating, **AND** additional HPI pumps are **NO** longer needed, **THEN** perform the following: A. __ Obtain SRO concurrence to reduce running HPI pumps. B. __ Secure the desired HPI pumps. C. __ Place secured HPI pump switch in AUTO, if desired.	
37. __ **IAAT** all the following conditions exist: __ Makeup from BWST **NOT** required __ LDST level > 55″ __ All control rods inserted __ Cooldown Plateau **NOT** being used **THEN** close: __ 1HP-24 __ 1HP-25	

Enclosure 5.5
Pzr and LDST Level Control

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
38. __ Verify 1CS-48 (1A BHUT Recirc) has been closed to provide additional makeup flow to LDST.	__ **GO TO** Step 40.
39. __ **WHEN** 1CS-48 (1A BHUT Recirc) is **NO** longer needed to provide additional makeup flow to LDST, **THEN** perform the following: A. __ Stop 1A BLEED TRANSFER PUMP. B. __ Locally position 1CS-48 (1A BHUT Recirc) <u>one</u> turn open (A-1-107, Unit 1 RC Bleed Transfer Pump Rm.). C. __ Close 1CS-46. D. __ Start 1A BLEED TRANSFER PUMP. E. __ Locally throttle 1CS-48 (1A BHUT Recirc) to obtain 90 - 110 psig discharge pressure. F. __ Stop 1A BLEED TRANSFER PUMP.	
40. __ Verify two Letdown Filters in service, **AND** <u>only one</u> Letdown filter is desired.	__ **GO TO** Step 42.
41. Perform <u>one</u> of the following: __ Place 1HP-17 switch to CLOSE. __ Place 1HP-18 switch to CLOSE.	
42. __ **WHEN** directed by CR SRO, **THEN EXIT** this enclosure.	

• • • END • • •

Rule 6
HPI

HPI Pump Throttling Limits

- HPI must be throttled to prevent violating the RV-P/T limit.
- HPI pump operation must be limited to two HPIPs when only one BWST suction valve (1HP-24 or 1HP-25) is open.
- HPI must be throttled ≤ 475 gpm/pump (including seal injection for A header) when only one HPI pump is operating in a header.
- Total HPI flow must be throttled ≤ 950 gpm including seal injection when 1A and 1B HPI pumps are operating with 1HP-409 open.
- Total HPI flow must be throttled < 750 gpm when all the following exist:

  - LPI suction is from the RBES
  - piggyback is aligned
  - either of the following exist:
    - only one piggyback valve is open (1LP-15 or 1LP-16)
    - only one LPI pump operating
- HPI may be throttled under the following conditions:

HPI Forced Cooling in Progress:	HPI Forced Cooling NOT in Progress:
All the following conditions must exist: • Core SCM > 0 • CETCs decreasing	All the following conditions must exist: • All WR NIs ≤ 1% • Core SCM > 0 • Pzr level increasing • SRO concurrence required if throttling following emergency boration

HPI Pump Minimum Flow Limit

- Maintain ≥ 170 gpm indicated/pump. This is an instrument error adjusted value that ensures a real value of ≥ 65 gpm/pump is maintained. HPI pump flow less than minimum is allowed for up to 4 hours.

Subsequent Actions

Parallel Actions

EP/**1**/A/1800/001
Page 1 of 1

CONDITION	ACTIONS	
1. PR NIs ≥ 5% FP **OR** NIs **NOT** decreasing	**GO TO** UNPP tab.	**UNPP**
2. All 4160V SWGR de-energized {13}	**GO TO** Blackout tab.	**BLACKOUT**
3. Core SCM indicates superheat	**GO TO** ICC tab.	**ICC**
4. Any SCM = 0°F	**GO TO** LOSCM tab.	**LOSCM**
5. Both SGs intentionally isolated to stop excessive heat transfer	**GO TO** EHT tab.	**LOHT**
6. Loss of heat transfer (including loss of all Main and Emergency FDW)	**GO TO** LOHT tab.	
7. Heat transfer is or has been excessive	**GO TO** EHT tab.	**EHT**
8. Indications of SGTR ≥ 25 gpm	**GO TO** SGTR tab.	**SGTR**
9. Turbine Building flooding **NOT** caused by rainfall event	**GO TO** TBF tab.	**TBF**
10. Inadvertent ES actuation occurred	Initiate AP/1/A/1700/042 (Inadvertent ES Actuation).	**ES**
11. Valid ES actuation has occurred or should have	Initiate Encl 5.1 (ES Actuation).	**ES**
12. Power lost to all 4160V SWGR and any 4160V SWGR re-energized	• Initiate AP/11 (Recovery from Loss of Power). • **IF** Encl 5.1 (ES Actuation) has been initiated, **THEN** reinitiate Encl 5.1.	**ROP**
13. RCS leakage > 160 gpm with letdown isolated	Notify plant staff that Emergency Dose Limits are in affect using PA system.	**EDL**
14. Individual available to make notifications	• Announce plant conditions using PA system. • Notify OSM to reference the Emergency Plan and AD-LS-ALL-0006 (Notification/Reportability Evaluation).	**NOTIFY**

Enclosure 5.16
SG Tube-to-Shell ΔT Control

NOTE

- SG tube-to-shell ΔT is calculated by the OAC with points displayed on Loop P/T displays as indicated below:

1A SG ΔT	1B SG ΔT
Bottom of Loop 'A' P/T display	Bottom of Loop 'B' P/T display
S/G TUBE/SHELL DT	S/G TUBE/SHELL DT

- SG tube-to-shell ΔT limits:

Stress	OAC Indication
Tensile Stress Limit (Tubes colder than shell)	+130°F
Compressive Stress (Tubes hotter than shell)	-70°F

1. **IAAT** <u>any</u> SG tube-to-shell ΔT approaches <u>either</u> limit, **THEN** take appropriate action per the following:

Limit Approached	Action
Tensile	**GO TO** Step 2
Compressive	**GO TO** Step 50

Examiner Note: ***SG tube-to-shell ΔT should not approach either limit for this scenario.***

CRITICAL TASKS

CT-1 Secure all RCPs within two minutes of SCM ≤ 0°F per Rule 2 (BWOG CT-1)

CT-2 Start Outside Air Booster Fans within 30 minutes of initiation of LOCA (BWOG CT-27)

CT-3 Start 1C HPI Pump within 10 minutes of LOCA to provide flow in both headers to preclude quarter core cooling

SAFETY: Take a Minute

UNIT 0 (OSM)

SSF Operable: No U2/U3: Yes PSW Operable: No	KHUs Operable: U1 - OH, U2 - UG	LCTs Operable: 2	Fuel Handling: No

UNIT STATUS (CR SRO)

Unit 1 Simulator	Other Units	
Mode: 1	**Unit 2**	**Unit 3**
Reactor Power: 3%	Mode: 1	Mode: 1
Gross MWE: 0	100% Power	100% Power
RCS Leakage: 0.01 gpm No WCAP Action	EFDW Backup: Yes	EFDW Backup: Yes
RBNS Rate: 0.01 gpm		

Technical Specifications/SLC Items (CR SRO)

Component/Train	OOS Date/Time	Restoration Required Date/Time	TS/SLC #
AMSAC/DSS	Today/0300	7 Days	SLC 16.7.2
SSF	Today/0100	7 Days	TS 3.10.1
PSW	Today /0600	7 Days	TS 3.7.10

Shift Turnover Items (CR SRO)

Primary

- Due to unanalyzed condition, the SSF should be considered INOPERABLE for Unit 1 if power levels are reduced below 85%. Evaluations must be performed prior to declaring the SSF operable following a return to power (after going below 85%).
- The OATC is to swap HPI pumps per OP/1/A/1104/002 Encl 4.24 (Swapping 1A and 1B HPI Pumps)
- 1RIA-3 and 5 removed from RB
- SASS is in Manual for calibration

Secondary

- AMSAC/DSS bypassed for calibration
- PSW Primary Pump is OOS. WCC preparing Protected Equipment package.
- Unit 2 is supplying the AS header
- 1SSH-1, 1SSH-3, 1SD-2, 1SD-5, 1SD-140, 1SD-303, 1SD-355, 1SD-356 and 1SD-358 are closed with power supply breakers open per the Startup Procedure for SSF Overcooling Event.

Reactivity Management (CR SRO)

RCS Boron 1723 ppmB	Gp 7 Rod Position: 8 % Withdrawn	Batch additions as required for volume control.

Human Performance Emphasis (OSM)

Procedure Use and Adherence

REGION II
JOB PERFORMANCE MEASURE

RO-104

WITHDRAWAL OF SAFETY ROD GROUP 1 TO 50%

Administrative: No

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Withdrawal of Safety Rod Group 1 To 50%

Task Number:

Alternate Path: No

Time Critical: No

Validation Time: 15 minutes

K/A Rating(s):

System: 001
K/A: A4.06
Rating: 2.9/3.2

Task Standard:

Latch Group 7 Control Rod and withdraw Safety Rod Group 1 To 50% in accordance with OP/1/A/1105/019 (Control Rod Drive System) Encl. 4.3 (Withdrawal Of Safety Rod Group 1 To 50%)

References:

OP/1/A/1105/019 (Control Rod Drive System) Encl. 4.3 (Withdrawal Of Safety Rod Group 1 To 50%)
OP/1/A/1102/001 (Controlling Procedure For Unit Startup) Enclosure 4.7 (Unit Startup From 532°F/2155 psig to MODE 1)

Tools/Equipment/Procedures Needed:

OP/1/A/1105/019 (Control Rod Drive System) Encl 4.3 (Withdrawal Of Safety Rod Group 1 To 50%)
Rev 29

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: __________

Examiner: ____________________________ ________________________________/__________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

Directions with SNAP:

1. **RECALL SNAP** 211
2. Go To **RUN**

===

Directions without a SNAP:

1. Recall IC-8

2. Come out of FDW Clean-up per OP/1106/002A

3.

4.

5.

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 startup in progress following a 28 day refueling outage

Tc = 331ºF

RCS pressure ≈ 528 psig

OP/1/A/1102/001 (Controlling Procedure For Unit Startup) Enclosure 4.6 (Unit Startup From 335°F/540 psig (MODE 3) to 532°F/2155 psig (MODE 3) is in progress at step 2.12.4

OP/1/A/1105/019 (Control Rod Drive System) Enclosure 4.3 (Withdrawal Of Safety Rod Group 1 To 50%) is in progress and has been completed up to step 2.1.

INITIATING CUE

The Control Room SRO directs you to continue with OP1/A/1105/019 (Control Rod Drive System) Enclosure 4.3 (Withdrawal Of Safety Rod Group 1 To 50%) beginning at Step 2.1.

Manual Latch of Group 1 control rods is required.

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	**2.1**	Perform **one** of the following: **NOTE:** The Reactor is manually tripped prior to the Shutdown Bypass automatic RPS trip on unit startup. For this reason, only Group 1 is required to be latched during a Unit Startup when RCS pressure < 2100 psig. ___ 2.1.1 **IF** RCS pressure < 2100 psig, perform Section 3 (Latch And PI Alignment Of Group 1 Only). ___ 2.1.2 **IF** RCS pressure ≥ 2100 psig, perform Section 4 (Latch And PI Alignment Of Group 1 Thru Group 7). **STANDARD:** Candiate determines that RCS pressure is ≈ 528 psig from the Initial Conditions on the cue sheet or verifies RCS pressure is < 2100 psig from the RCS pressure gauge on UB1 and continues to Section 3. **COMMENTS:**	___ SAT ___ UNSAT
2	**3.1**	Perform the following: ___ Ensure RUN is ON ___ Ensure SINGLE SELECT SWITCH to ALL **STANDARD:** Determine control rod speed switch is selected to RUN by observing light indication on the Diamond panel located on UB1. Determine SINGLE SELECT SWITCH is selected to ALL on the Diamond panel located on UB1. ***Examiner Note: If asked about Concurrent Verification, state that the verifier agrees with whatever actions you decide to take.*** **COMMENTS:**	___ SAT ___ UNSAT

3	**3.2**	**<u>WHILE</u>** CRDs are moving, monitor the following indications: • CRD position • Appropriate ranged Nis • Startup Rate **<u>STANDARD</u>:** As CRDs are withdrawn, monitor the above indications **<u>COMMENTS</u>:**	___ SAT ___ UNSAT

4	3.3	Perform Latch and PI alignment of Group 1, as follows: (R.M.) 3.3.1 *Ensure GROUP SELECT SWITCH to 1 3.3.2 Verify <u>only</u> Group 1 CONTROL ON lights are ON. (PI panel) 3.3.3 **<u>IF</u>** Manual Latch and PI Alignment desired, perform the following: ☐ A. *Ensure LATCH MANUAL is ON ☐ B. Ensure IN LIMIT BYPASS is ON ☐ C. *Insert Group 1 for ≈ 5 seconds ☐ D. Verify all 0% lights ON for Group 1 (PI Panel) ☐ E. Ensure LATCH MANUAL is OFF ☐ F. Ensure IN LIMIT BYPASS is OFF ☐ G. Select RPI RESET ☐ H. Verify Group 1 API/RPI indications agree (PI Panel) 3.3.4 **<u>IF</u>** Auto Latch and PI Alignment desired, perform the following: **N/A** **<u>STANDARD</u>:** *Candiate Rotates GROUP SELECT SWITCH to 1. Determines that only Group 1 CONTROL ON lights are ON on the PI panel. Determines from the cue sheet that manual latch and PI adjustment is desired. *Ensures the LATCH MANUAL light is ON by depressing the LATCH MANUAL pushbutton on the Diamond panel. Ensures IN LIMIT BYPASS light is ON by depressing the IN LIMIT BYPASS pushbutton on the Diamond panel. *Inserts Group 1 for ≈ 5 seconds. Verifies all 0% lights ON for Group 1 on the PI Panel. Ensures the LATCH MANUAL light is OFF. Ensures the IN LIMIT BYPASS light is OFF. Selects RPI RESET pushbutton on the Diamond panel. Verifies Group 1 API/RPI indications agree on the PI Panel. Determines that Auto Latch is not desired. **<u>COMMENTS</u>:**	***CRITICAL STEP** ___ SAT ___ UNSAT

5	3.4	Select FAULT RESET **<u>STANDARD</u>:** Depresses the FAULT RESET pushbutton located on the diamond panel **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
6	3.5	Select Group 1, as follows: 3.5.1 Ensure GROUP SELECT SWITCH to 1 3.5.2 Ensure <u>only</u> Group 1 CONTROL ON lights are ON (PI panel) 3.5.3 *Ensure Group 1 at 50% 3.5.4 Place GROUP SELECT SWITCH to OFF **<u>STANDARD</u>:** Ensures GROUP SELECT SWITCH is selected to 1. Determines that only Group 1 CONTROL ON lights are ON on the PI panel. *Withdraw Group 1 control rods to ≈ 50% (48 to 52%) Places GROUP SELECT SWITCH to the OFF position ***Examiner Note: If asked about Concurrent Verification, state that the verifier agrees with whatever actions you decide to take.*** **<u>COMMENTS</u>:** ***END TASK***	***CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
4	This step is required to manually latch Group 1 control rods. If performed incorrectly, the results would be the inability to withdraw Group 1 control rods to 50%.
6	This step is required to withdraw Group 1 control rods to 50%.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Unit 1 startup in progress following a 28 day refueling outage

Tc = 331ºF

RCS pressure ≈ 528 psig

OP/1/A/1102/001 (Controlling Procedure For Unit Startup) Enclosure 4.6 (Unit Startup From 335°F/540 psig (MODE 3) to 532°F/2155 psig (MODE 3) is in progress at step 2.12.4

OP/1/A/1105/019 (Control Rod Drive System) Enclosure 4.3 (Withdrawal Of Safety Rod Group 1 To 50%) is in progress and has been completed up to step 2.1.

INITIATING CUE

The Control Room SRO directs you to continue with OP1/A/1105/019 (Control Rod Drive System) Enclosure 4.3 (Withdrawal Of Safety Rod Group 1 To 50%) beginning at Step 2.1.

<u>Manual</u> Latch of Group 1 control rods is required.

REGION II
JOB PERFORMANCE MEASURE

RO-205a

RESPOND TO RCS LEAK WHILE ON DHR

Administrative: No

Alternate Path: Yes

Alt Path Description: _1A Bleed Transfer Pump Fails to Start_______________________

Time Critical: No

Time Critical Criteria: ____

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Respond to RCS Leak While on DHR

Task Number:

Alternate Path: Yes

Time Critical: No

Validation Time: 15 minutes

K/A Rating(s):

System: APE025
K/A: AA1.02
Rating: 3.8/3.9

Task Standard:

Respond to RCS Leak While on DHR in accordance with AP/1/A/1700/026 (Loss of Decay Heat Removal), Enclosure 5.12 (RCS Makeup).

References:

AP/1/A/1700/026 (Loss of Decay Heat Removal)
AP/1/A/1700/002 (Excessive RCS Leakage)

Tools/Equipment/Procedures Needed:

AP/1/A/1700/026 (Loss of Decay Heat Removal) Enclosure 5.12 (RCS Makeup) Rev 26

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ________________________________/_________

NAME SIGNATURE DATE

===

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

Directions with SNAP:

1. **RECALL SNAP** 212
2. IMPORT files for RO-205a
3.

==

Directions without a SNAP:

1. *Recall SNAP 128 (MLO)*
2.
3.
4.
5.

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 normal DHR alignment

PZR level is being maintained at 150” ± 10”

RCS is vented and the loops are “dropped”

BWST level is 37 feet

HPI is available per DID sheet

AP/02 (Excessive RCS Leakage) was entered and it directed entry into AP/26 (Loss of Decay Heat Removal)

AP/02 Encl 5.6 (RCS Makeup) was **NOT** initiated

INITIATING CUE

The Control Room Supervisor directs you to restore and maintain Pressurizer level to 140 – 160 inches using AP/1/A/1700/026 (loss of Decay Heat Removal) Enclosure 5.12 (RCS Makeup)

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	1	**IAAT** makeup is NO longer desired, **THEN GO TO** Step 67. **STANDARD:** Candidate determines that makeup is desired as directed by Control Room SRO in the Initiating Cue. **COMMENTS:**	___ SAT ___ UNSAT
2	2	**NOTE** • Makeup methods listed below are in the order of preference. • Each method is effective only as long as the limitations listed are met. • If one source of makeup is NOT adequate, try another method. • It is acceptable to utilize methods in any sequence or in parallel, as needed, however, they are listed in the order of preference. Utilize the appropriate Step as noted in table below to establish and maintain level within the desired band: (see table below) **STANDARD:** Given the note above step 2, the candidate chooses the highest order of preference available (1A Bleed Transfer Pump) and proceeds to step 3. **COMMENTS:**	___ SAT ___ UNSAT

Method	Maximum Pressure	Other limitations	GO TO Step
1A Bleed Transfer Pump	**No Requirement**		**3**
HPI Gravity makeup to RCS	RCS vented	HPI Available per DID sheet BWST level > 43'	9
HPI Injection	No Requirement	BWST level > 6' HPI Available per DID sheet	15
BWST makeup to LPI Pump (1LP-21/1LP-22)	RCS vented	BWST level > 6' LPI Pump operating in Normal Mode	26
BWST Recirc Pump	Decay Heat Line Pressure < 100 psig	Unit 1 BWST, Unit 2 BWST, or Unit 1&2 SFP in purification FTC fill/drain **NOT** in progress	34
SF Cooling Pump from Unit 1&2 SFP	Decay Heat Line Pressure < 150 psig	Unit 1&2 SFP in purification with SF Cooling Pump FTC fill/drain **NOT** in progress	51

3	3	**Unit Status** RCS Makeup using 1A Bleed Transfer Pump is desired. Ensure the following: __ 1HP-15 in manual __ 1HP-15 open **STANDARD:** Candidate ensures 1HP-15 in manual with demand at full open and valve indicates fully open. **COMMENTS:**	___ SAT ___ UNSAT
4	4	Open 1HP-16 **STANDARD:** Candidate fully opens 1HP-16 by rotating the control switch to the open position and observing RED light ON and GREEN light OFF **COMMENTS:**	___ SAT ___ UNSAT
5	5	Start 1A BLEED TRANSFER PUMP **STANDARD:** Candidate attempts to start the 1A Bleed Transfer Pump, but it will not start. Candidate then refers to Step 5 **RNO.** **COMMENTS:**	___ SAT ___ UNSAT

<table>
<tr><td>6</td><td>5
RNO</td><td>[ALTERNATE PATH]
GO TO Step 2

<u>STANDARD</u>: Candidate returns to Step 2.

<u>COMMENTS</u>:</td><td>___ SAT

___ UNSAT</td></tr>
<tr><td>7</td><td>2</td><td>Utilize the appropriate Step as noted in table below to establish <u>and</u> <u>maintain</u> level within the desired band:
<table>
<tr><th>Method</th><th>Maximum Pressure</th><th>Other limitations</th><th>GO TO Step</th></tr>
<tr><td>1A Bleed Transfer Pump</td><td>No Requirement</td><td></td><td>3</td></tr>
<tr><td>HPI Gravity makeup to RCS</td><td>RCS vented</td><td>HPI Available per DID sheet
BWST level > 43'</td><td>9</td></tr>
<tr><td>HPI Injection</td><td>No Requirement</td><td>BWST level > 6'
HPI Available per DID sheet</td><td>15</td></tr>
<tr><td>BWST makeup to LPI Pump (1LP-21/1LP-22)</td><td>RCS vented</td><td>BWST level > 6'
LPI Pump operating in <u>Normal</u> Mode</td><td>26</td></tr>
<tr><td>BWST Recirc Pump</td><td>Decay Heat Line Pressure < 100 psig</td><td>Unit 1 BWST, Unit 2 BWST, <u>or</u> Unit 1&2 SFP in purification
FTC fill/drain NOT in progress</td><td>34</td></tr>
<tr><td>SF Cooling Pump from Unit 1&2 SFP</td><td>Decay Heat Line Pressure < 150 psig</td><td>Unit 1&2 SFP in purification with SF Cooling Pump
FTC fill/drain NOT in progress</td><td>51</td></tr>
</table>

<u>STANDARD</u>: Candidate determines that the next order of priority available is “HPI Gravity Makeup to RCS”, however the table requires BWST level to be > 43 feet. Candidate determines that the BWST does not meet this requirement and proceeds to next option in table which is HPI Injection (BWST level > 6 feet and HPI available per DID sheet).
Candidate proceeds to Step 15

<u>COMMENTS</u>:</td><td>___ SAT

___ UNSAT</td></tr>
</table>

8	15	Verify power on <u>any</u> HPI Pump **<u>STANDARD</u>:** Candidate dedtermines that all 3 HPI pumps have power available **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
9	16	Open the following: __ 1HP-24 __ 1HP-25 **<u>STANDARD</u>:** Candidate opens 1HP-24 & 1HP-25 by rotating switches on 1UB1 to the open position and observing RED light illuminated and GREEN light OFF for each valve. To satisfy the critical step, at least one of these valves must be open in order to supply suction to the HPI pumps. **<u>COMMENTS</u>:**	***CRITICAL STEP** ___ SAT ___ UNSAT
10	17	Close the following: __ 1HP-409 __ 1HP-410 **<u>STANDARD</u>:** Candidate verifies 1HP-409 and 1HP-410 are closed by observing RED lights OFF and GREEN lights illuminated for both valves (These valves are already closed). **<u>COMMENTS</u>:**	___ SAT ___ UNSAT

11	18	Perform the following: __ Place 1HP-31 in HAND __ Reduce 1HP-31 demand to 0 **<u>STANDARD</u>:** Candidate verifies that 1HP-31 is in HAND and demand is zero. **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
12	19	Perform the following: __ Place 1HP-120 in HAND __ Reduce 1HP-120 demand to 0 **<u>STANDARD</u>:** Candidate verifies that 1HP-120 is in HAND and demand is zero. **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
13	20	**<u>NOTE</u>** An HPI Pump operating with 1HP-363 open will provide ≈ 35 gpm of makeup through the HPI Pump minimum recirc lines. Start 1A <u>or</u> 1B HPI Pump **<u>STANDARD</u>:** Candidate starts either the 1A or 1B HPI Pump and observes RED running light on and pump amps for the HPI pump started. **<u>COMMENTS</u>:**	***CRITICAL STEP** ___ SAT ___ UNSAT

14	21	Verify RCS loops dropped **STANDARD:** Candidate verifies the RCS loops are dropped based on the initial conditions given on the cue sheet. **COMMENTS:**	___ SAT ___ UNSAT
15	22	Throttle the following, as necessary without exceeding 475 gpm, to maintain RV level > 10” <u>and</u> within previous established level band, if possible: __ 1HP-409 __ 1HP-410 **STANDARD:** Candidate throttles 1HP-409 and/or 1HP-410 and stops the Pressurizer level decrease and begins to return Pzr level to 140” to 160” without exceeding 475 gpm in either HPI header. To satisfy the critical step, the candidate must inject enough HPI to cause Pzr level to start rising without exceeding 475 gpm in either HPI header. ***Examiner Cue: When PZR level is being controlled and has begun returning to 150”, inform the candidate that another operator will continue with this procedure.*** **COMMENTS:** ***END TASK***	***CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
9	Step is necessary to align HPI Injection to the RCS
13	Step is necessary to provide driving head for HPI Injection flow to the RCS
15	Step necessary to ensure HPI Injection flow is recovering RCS inventory

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Unit 1 is in normal DHR alignment

PZR level is being maintained at 150” ± 10”

RCS is vented and the loops are “dropped”

BWST level is 37 feet

HPI is available per DID sheet

AP/02 (Excessive RCS Leakage) was entered and it directed entry into AP/26 (Loss of Decay Heat Removal)

AP/02 Encl 5.6 (RCS Makeup) was **NOT** initiated

INITIATING CUE

The Control Room Supervisor directs you to restore and maintain Pressurizer level to 140 – 160 inches using AP/1/A/1700/026 (loss of Decay Heat Removal) Enclosure 5.12 (RCS Makeup)

REGION II
JOB PERFORMANCE MEASURE

RO-302a

PERFORM REQUIRED ACTIONS FOR FAILED LPI TRAIN

Administrative: No

Alternate Path: Yes

Alt Path Description: 1A LPIP trips after it is started, requiring 1LP-17 to be closed

Time Critical: No

Time Critical Criteria: ____________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Perform Required Actions For Failed LPI Train

Task Number:

Alternate Path: Yes

Time Critical: No

Validation Time: 10 minutes

K/A Rating(s):

System: EPE011
K/A: EA1.04
Rating: 4.4/4.4

Task Standard:

1A and 1B LPI pumps are started when RCS pressure decreases below LPI pump discharge pressure and 1LP-17 is closed after 1A LPI pump fails

References:

EOP Enclosure 5.1, ES Actuation Rev 01

Tools/Equipment/Procedures Needed:

EOP Enclosure 5.1, ES Actuation

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ________________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

Directions with SNAP:

1. **RECALL SNAP 213**
2. **IMPORT** files for RO-302a
3. **ENSURE** clean in progress Enclosure 5.1 available
4. **RESET** flags on the LPI pump switches
5. **WHEN** directed by Lead Examiner, go to **RUN**

==

Directions without a SNAP:

1. *Recall IC-41*
2. *Insert MPS400D at 27%, Insert False for variable ZLPI1AP (Gbl 00)*
3. *Manually actuate ES channels 7&8 if needed*
4. *Complete EOP Encl 5.1 up to Step 52*
5. *Set Event P2A26G1>.1 [Trips 1A LPIP After Start]*
6. *After Encl 5.1 is complete up to Step 52, save SNAP*
7. *To start JPM, insert MPS400D at 100% and go to run*

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

INITIAL CONDITIONS

A LOCA has been in progress that initially stabilized RCS pressure at ≈ 1100 psig

ES Channels 1-8 have actuated on high RB pressure

The LOCA CD Tab is in progress

Steam Generator levels are being raised to the Loss of Subcooling Margin setpoint by the OATC

The LPI pumps were secured as directed by Enclosure 5.1 (ES Actuation) to prevent pump damage

Enclosure 5.1(ES Actuation) has been completed up to Step 52 with outstanding IAATs

RCS pressure is lowering rapidly

INITIATING CUE

The Control Room Supervisor directs you, the Balance of Plant Operator, to continue in EOP Enclosure 5.1 (ES Actuation)

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	**52**	REFER TO EOP Enclosure 5.1 IAAT Steps prior to Step 52 (since this was the exit point earlier) **STANDARD:** Candidate checks IAAT steps to determine if any apply. Candidate determines that IAAT Step 20 applies once RCS pressure is < ≈ 200 psig. Candidate continues to Step 20. **COMMENTS:**	___ SAT ___ UNSAT
2	**20**	**IAAT** RCS Pressure is < LPI pump shutoff head, **THEN** perform Steps 21 - 22 **STANDARD:** Candidate determines that RCS pressure is < LPI pump shutoff head by observing RCS pressure on UB1. Candidate continues to Step 21 **COMMENTS:**	___ SAT ___ UNSAT

3	**21**	Perform the following: __ Open 1LP-17 __ Start 1A LPI PUMP **STANDARD:** Candidate determines that 1LP-17 is open by observing the Red open light lit on 1UB2. Candidate places 1A LPI pump switch to START and observes Red lights on and white light off. Continue to Step 22 **COMMENTS:**	___ SAT ___ UNSAT
4	**22**	Perform the following: __ Open 1LP-18 __ *Start 1B LPI PUMP **STANDARD:** Candidate determines that 1LP-18 is open by observing the Red open light lit on 1UB2. *Candidate places 1B LPI pump switch to START and observes Red lights on and white light off. Candidate goes back to Step 52 **COMMENTS:**	***CRITICAL STEP** ___ SAT ___ UNSAT
5	**52**	**ALTERNATE PATH** REFER TO EOP Enclosure 5.1 IAAT Steps prior to Step 52 **STANDARD:** Candidate checks IAAT steps to determine if any apply. Candidate determines that IAAT Step 26 now applies since the 1A LPI pump has tripped. Candidate continues to Step 26 **COMMENTS:**	___ SAT ___ UNSAT

6	**26**	**IAAT** 1A LPI pump fails while operating, **AND** 1B LPI pump is operating, **THEN** close 1LP-17 **STANDARD:** Candidate determines that the1A LPI Pump is off and the 1B LPI pump is operating. *Candidate closes 1LP-17 and observes the green closed light on and red open light off. ***Examiner Cue: Another Operator will continue with this procedure.*** **COMMENTS:** ***END TASK***	***CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
4	This step is required to align the LPI flowpath and start the 1B LPI pump to inject water into the core.
6	This step is required to prevent backflow and damaging the 1A LPI pump and ensure maximum cooling is available to the core.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

A LOCA has been in progress that initially stabilized RCS pressure at ≈ 1100 psig

ES Channels 1-8 have actuated on high RB pressure

The LOCA CD Tab is in progress

Steam Generator levels are being raised to the Loss of Subcooling Margin setpoint by the OATC

The LPI pumps were secured as directed by Enclosure 5.1 (ES Actuation) to prevent pump damage

Enclosure 5.1(ES Actuation) has been completed up to Step 52 with outstanding IAATs

RCS pressure is lowering rapidly

INITIATING CUE

The Control Room Supervisor directs you, the Balance of Plant Operator, to continue in EOP Enclosure 5.1 (ES Actuation)

REGION II
JOB PERFORMANCE MEASURE

RO-502

RESET ES CHANNELS 7 & 8

Administrative: No

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Reset ES Channels 7 & 8

Task Number:

Alternate Path: No

Time Critical: No

Validation Time: 5 minutes

K/A Rating(s):

System: 026
K/A: A4.05
Rating: (3.5/3.5)

Task Standard:

Reset ES Channels 7 & 8 in accordance with AP/1/A/1700/042 (Inadvertent ES Actuation)

References:

AP/1/A/1700/042 (Inadvertent ES Actuation)

Tools/Equipment/Procedures Needed:

AP/1/A/1700/042 (Inadvertent ES Actuation) Rev 004

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ______________________________ Time Start: _____________

NAME Time Finish: _____________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ______________________________/__________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

Directions with SNAP:

1. **RECALL SNAP** 215
2. Provide clean copy of in progress AP/42
3. Go To **RUN**

==

Directions without a SNAP:

1.

2.

3.

4.

5.

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

ES Channels 7 & 8 have inadvertently actuated

ES Channel 8 failed to go to Manual so the EVEN Voter was placed in OVERRIDE

The reason for inadvertent ES actuation has been resolved

The Shift Manager concurs with resetting ES

AP/1/A/1700/042 is in progress and complete up to Step 4.67

INITIATING CUE

The Control Room Supervisor directs you to continue AP/1/A/1700/042 beginning at Step 4.67 to reset ES Channels 7 & 8

START TIME: _______

<table>
<tr><th>SEQ STEP</th><th>PROC STEP</th><th>DESCRIPTION</th><th></th></tr>
<tr><td>1</td><td>4.67</td><td>Verify the following Statalarms have cleared:
__ 1SA-7/A-1 (1A1 ES TRIP)
__ 1SA-7/B-1 (1B1 ES TRIP)
__ 1SA-7/C-1 (1C1 ES TRIP)
__ 1SA-7/A-2 (1A2 ES TRIP)
__ 1SA-7/B-2 (1B2 ES TRIP)
__ 1SA-7/C-2 (1C2 ES TRIP)

<u>STANDARD</u>: Candidate verifies the above Statalarms have cleared on Statalarm panel 1SA-7 by verifying the lights are off.

<u>COMMENTS</u>:</td><td>___ SAT

___ UNSAT</td></tr>
<tr><td>2</td><td>4.68</td><td>Depress RESET on the following:
__ *ES Ch 7
__ *ES Ch 8
__ ES ODD VOTER OVERRIDE
__ *ES EVEN VOTER OVERRIDE

<u>STANDARD</u>: Candidate performs the following located on 1UB1:
*Depresses RESET on ES Ch 7
*Depresses RESET on ES Ch 8
Depresses RESET on ES ODD VOTER OVERRIDE
*Depresses RESET on ES EVEN VOTER OVERRIDE

<u>COMMENTS</u>:</td><td>*CRITICAL STEP

___ SAT

___ UNSAT</td></tr>
</table>

3	**4.69**	Verify the following: __ ES Ch 7 TRIPPED light off __ ES Ch 8 TRIPPED light off __ ES ODD VOTER OVERRIDE light off __ ES EVEN VOTER OVERRIDE light off **STANDARD:** Candidate verifies the following located on 1UB1: ES Ch 7 TRIPPED light is off ES Ch 8 TRIPPED light is off ES ODD VOTER OVERRIDE light is off ES EVEN VOTER OVERRIDE light is off **COMMENTS:** ***END TASK***	___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
2	This step is required in order to reset ES Channels 7 & 8 and ES Even Voter Override

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Unit 1 is operating at 100% power

ES Channels 7 & 8 have inadvertently actuated

ES Channel 8 failed to go to Manual so the EVEN Voter was placed in OVERRIDE

The reason for inadvertent ES actuation has been resolved

The Shift Manager concurs with resetting ES

AP/1/A/1700/042 is in progress and complete up to Step 4.67

INITIATING CUE

The Control Room Supervisor directs you to continue AP/1/A/1700/042 beginning at Step 4.67 to reset ES Channels 7 & 8

REGION II
JOB PERFORMANCE MEASURE

RO-605

FUNCTIONAL VERIFICATION OF SK BREAKERS

Administrative: No

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Funcitonal Verification of SK Breakers

Task Number:

Alternate Path: No

Time Critical: No

Validation Time: 15 minutes

K/A Rating(s):

System: 062
K/A: A4.01
Rating: 3.3/3.1

Task Standard:

SK1 and SK2 Breakers are closed and then opened after verifying ≈ 4.16KV on the respective Standby Buses.

References:

PT/0/A/0610/017 (Operablilty Test of 4160V Breakers)

Tools/Equipment/Procedures Needed:

PT/0/A/0610/017 (Operablilty Test of 4160V Breakers) Enclosure 13.12 (Functional Verification Of SK Breaker(s)) Rev 29

(Note: Below this line is used only for Initial NRC Exams)

===

Candidate: ______________________________ Time Start: _____________

NAME Time Finish: _____________

Performance Rating: SAT _____ UNSAT _____ Performance Time: ________

Examiner: __________________________ ______________________________/________

NAME SIGNATURE DATE

===

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

Directions with SNAP:

1. **RECALL SNAP** 216
2. Go To **RUN**

==

Directions without a SNAP:

1. *Recall IC-41*
2. *Use QwikStrike to place both KHUs in Remote*
3. *Auto start both KHUs and load both units to ≈ 70 MWe*
4. *Use QwikStrike place both KHUs back in Local*
5.

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 Keowee Hydro Units are generating to the grid

The Underground Power Path was removed from service to perform maintenance on SK1 and SK2 breakers

All maintenance work is complete

PT/0/A/0610/017 (Operability Test of 4160V Breakers) Enclosure 13.12 (Functional Verification of SK Breakers) is in progress to perform a functional verification of the SK breakers

INITIATING CUE

The Control Room SRO directs you to continue with PT/0/A/0610/017 (Operability Test of 4160V Breakers) Enclosure 13.12 (Functional Verification of SK Breakers) beginning at Step 4.1.

START TIME: _______

<table>
<tr><th>SEQ STEP</th><th>PROC STEP</th><th>DESCRIPTION</th><th></th></tr>
<tr><td>1</td><td>4.1</td><td><u>IF</u> functional verification of SK1 CT4 STBY BUS 1 FEEDER required, perform the following:
4.1.1 Verify ≈ 4.16 KV on CT4 Volts (2AB3)
4.1.2 Ensure CT5 BUS 1 AUTO/MAN transfer switch in "MAN"
4.1.3 *Ensure CT4 BUS 1 AUTO/MAN transfer switch in "MAN"
4.1.4 *Ensure STBY BUS 1 SYNCHRONIZING switch in "ON"
4.1.5 *Close SK1 CT4 STBY BUS 1 FEEDER
4.1.6 Verify ≈ 4.16 KV on Standby Bus 1 Volts (2AB3)
4.1.7 *Open SK1 CT4 STBY BUS 1 FEEDER
4.1.8 *Ensure STBY BUS 1 SYNCHRONIZING switch in "OFF"
4.1.9 *Ensure CT4 BUS 1 AUTO/MAN transfer switch in "AUTO"

<u>STANDARD</u>: Verifies ≈ 4.16 KV on CT4 Volts (2AB3)
Verifies the CT5 BUS 1 AUTO/MAN transfer switch in MAN
*Places the CT4 BUS 1 AUTO/MAN transfer switch in MAN
*Rotates the STBY BUS 1 SYNCHRONIZING switch to ON
*Closes SK1 CT4 STBY BUS 1 FEEDER
Verifies ≈ 4.16 KV on Standby Bus 1 Volts (2AB3)
*Opens SK1 CT4 STBY BUS 1 FEEDER
*Places the STBY BUS 1 SYNCHRONIZING switch in OFF
*Places CT4 BUS 1 AUTO/MAN transfer switch in AUTO
Examiner Note: If asked about Concurrent Verification, state that the verifier agrees with whatever actions you decide to take.

<u>COMMENTS</u>:</td><td>*CRITICAL STEP

___ SAT

___ UNSAT</td></tr>
</table>

2	4.2	**IF** functional verification of SK2 CT4 STBY BUS 2 FEEDER required, perform the following: 4.2.1 Verify ≈ 4.16 KV on CT4 Volts (2AB3) 4.2.2 Ensure CT5 BUS 2 AUTO/MAN transfer switch in "MAN" 4.2.3 *Ensure CT4 BUS 2 AUTO/MAN transfer switch in "MAN" 4.2.4 *Ensure STBY BUS 2 SYNCHRONIZING switch in "ON" 4.2.5 *Close SK2 CT4 STBY BUS 2 FEEDER 4.2.6 Verify ≈ 4.16 KV on Standby Bus 2 Volts (2AB3) 4.2.7 *Open SK2 CT4 STBY BUS 2 FEEDER 4.2.8 *Ensure STBY BUS 2 SYNCHRONIZING switch in "OFF" 4.2.9 *Ensure CT4 BUS 2 AUTO/MAN transfer switch in "AUTO" **STANDARD**: Verifies ≈ 4.16 KV on CT4 Volts (2AB3) Verifies the CT5 BUS 2 AUTO/MAN transfer switch in MAN *Places the CT4 BUS 2 AUTO/MAN transfer switch in MAN *Rotates the STBY BUS 2 SYNCHRONIZING switch to ON *Closes SK2 CT4 STBY BUS 2 FEEDER Verifies ≈ 4.16 KV on Standby Bus 2 Volts (2AB3) *Opens SK2 CT4 STBY BUS 2 FEEDER *Places the STBY BUS 2 SYNCHRONIZING switch in OFF *Places CT4 BUS 2 AUTO/MAN transfer switch in AUTO **COMMENTS**: **END TASK**	***CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
1	This step is required to complete functional verification of SK1 breaker.
2	This step is required to complete functional verification of SK2 breaker.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Both Keowee Hydro Units are generating to the grid

The Underground Power Path was removed from service to perform maintenance on SK1 and SK2 breakers

All maintenance work is complete

PT/0/A/0610/017 (Operability Test of 4160V Breakers) Enclosure 13.12 (Functional Verification of SK Breakers) is in progress to perform a functional verification of the SK breakers

INITIATING CUE

The Control Room SRO directs you to continue with PT/0/A/0610/017 (Operability Test of 4160V Breakers) Enclosure 13.12 (Functional Verification of SK Breakers) beginning at Step 4.1.

REGION II
JOB PERFORMANCE MEASURE

RO-801

OATC ACTIONS FOR CONTROL ROOM EVACUATION FOLLOWING A FIRE

Administrative: No

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: OATC Actions for Control Room Evacuation Following a Fire

Task Number:

Alternate Path: No

Time Critical: No

Validation Time: 10 minutes

K/A Rating(s):

System: APE068
K/A: AA1.02
Rating: 4.3/4.5

Task Standard:

OATC performs required actions for Control Room evacuation following a fire in accordance with AP/1/A/1700/050 (Challenging Plant Fire) Enclosure 5.5 (OATC Actions for Control Room Evacuation)

References:

AP/1/A/1700/050 (Challenging Plant Fire)

Tools/Equipment/Procedures Needed:

AP/1/A/1700/050 (Challenging Plant Fire) Encl. 5.5 (OATC Actions for Control Room Evacuation) Rev 03

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ________________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

Directions with SNAP:

1. **RECALL SNAP** 218
2. No Files
3. Go To **RUN**

==

Directions without a SNAP:

1. *Recall IC-41*
2. *Perform AP/50 up to where Encl 5.5 is initiated*
3.
4.
5.

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 fire has occurred that requires evacuation of Unit 1 Control Room.

AP/1/A/1700/050 (Challenging Plant Fire) is in progress.

INITIATING CUE

The CRS directs you to perform AP/1/A/1700/050 Encl. 5.5 (OATC Actions for Control Room Evacuation).

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	1	Position the following to OFF: __ 1A MDEFDWP __ 1B MDEFDWP **STANDARD:** Places the switches for 1A and 1B MDEFDWPs to OFF. **COMMENTS:**	___ SAT ___ UNSAT
2	2	Position 1TDEFDW Pump to PULL TO LOCK. **STANDARD:** Places the switch for 1TDEFDW Pump to PULL TO LOCK. **COMMENTS:**	___ SAT ___ UNSAT
3	3	Trip both Main FDW Pumps. **STANDARD:** Places both Main FDW Pump trip switches to trip. Observes stop valve position green closed lights illuminated and red open lights extinguished for each Main FDW Pump. **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT

4	**4**	Place in MANUAL <u>and</u> close: __ 1FDW-315 __ 1FDW-316 **STANDARD**: *Selects manual on 1FDW-315 controller. Observes the manual light illuminated and the auto light extinguished. Verifies 1FDW-315 closed by observing the green closed light illuminated and red open light extinguished. *Selects manual on 1FDW-316 controller. Observes the manual light illuminated and the auto light extinguished. Verifies 1FDW-316 closed by observing the green closed light illuminated and red open light extinguished. **COMMENTS**:	***CRITICAL STEP** ___ SAT ___ UNSAT
5	**5**	Close the following valves: __ 1HP-3 __ 1HP-4 __ 1HP-5 **STANDARD**: Places the switch for 1HP-3 to close and verifies the green closed light illuminated and the red open light extinguished. Places the switch for 1HP-4 to close and verifies the green closed light illuminated and the red open light extinguished. Places the switch for 1HP-5 to close and verifies the green closed light illuminated and the red open light extinguished. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT

6	**6**	Close the following valves: __ 1LP-21 __ 1LP-22 **<u>STANDARD</u>:** Places the switch for 1LP-21 to close and verifies the green closed light illuminated and the red open light extinguished. Places the switch for 1LP-22 to close verifies the green closed light illuminated and the red open light extinguished. **<u>COMMENTS</u>:**	**CRITICAL STEP** ___ SAT ___ UNSAT
7	**7**	Position the following to OFF: __ 1A RBS Pump __ 1B RBS Pump **<u>STANDARD</u>:** Verifies 1A and 1B RBS Pumps OFF OR places the switches for 1A and 1B RBS Pumps to OFF. **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
8	**8**	Position the following to OFF: __ Standby HPI Pump __ Operating HPI Pump **<u>STANDARD</u>:** Places the switch for the Standby HPI Pump to OFF. Places the switch for the Operating HPI Pump to OFF. Verifies the white off light illuminated and the red on lights extinguished. ***Examiner Cue: Another operator will continue with the procedure.*** **<u>COMMENTS</u>:** ***END TASK***	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
3	This step is required to secure Main Feedwater prior to evacuation.
4	This step is required to secure Emergency Feedwater prior to evacuation.
5	This step is required to isolate letdown prior to evacuation.
6	This step is required to isolate LPI suction from the BWST prior to evacuation.
8	This step is required to secure HPI prior to evacuation.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

A fire has occurred that requires evacuation of Unit 1 Control Room.

AP/1/A/1700/050 (Challenging Plant Fire) is in progress.

INITIATING CUE

The CRS directs you to perform AP/1/A/1700/050 Encl. 5.5 (OATC Actions for Control Room Evacuation).

REGION II
JOB PERFORMANCE MEASURE

RO-P403a

INITIATE HPI FORCED COOLING

Administrative: No

Alternate Path: Yes

Alt Path Description: 1HP-24 and 1HP-25 Fail Closed Requiring LPI Piggyback Alignment

Time Critical: Yes

Time Critical Criteria: HPI Forced Cooling Initiated Within 5 Minutes of Criteria Being Met

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Initiate HPI Forced Cooling

Task Number:

Alternate Path: Yes

Time Critical: Yes – HPI Forced Cooling initiated within 5 minutes of criteria being met

Validation Time: 15 minutes

K/A Rating(s):

System: EPE074
K/A: EA1.08
Rating: 4.2/4.2

Task Standard:

Perform Rule 4 (Initiate HPI Forced Cooling)

References:

EOP Rule 3 (Loss of Main or Emergency FDW)
EOP Rule 4 (Initiate HPI Forced Cooling)
TCA #26, Initiate HPI Forced Cooling when required

Tools/Equipment/Procedures Needed:

EOP Rule 3 (Loss of Main or Emergency FDW) rev. 01
EOP Rule 4 (Initiate HPI Forced Cooling) rev. 01

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ________________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

Directions with SNAP:

1. **RECALL SNAP** 214
2. **IMPORT** files for P403a
3. **RESET** flags for HPI and LPI pump switches
4. **ENSURE** clean in-progress Rule 3 available for candidate
5. **ENSURE** clean Rule 4 in place on control board
6. Go to **RUN** when directed by Lead Examiner

==

Directions without a SNAP:

1. *Recall IC-41*
2. *Insert Malfunction to trip both FDW pumps (MSS010 & MSS020) and use QwikStrike to trip CBPs.*
3. *Perform Rule 3 and secure 1A2/1B1 RCPs per the LOHT tab*
4. *Fail 1RC-1 closed and go to freeze when RCS pressure reaches ≈ 2275 psig*
5.

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

INITIAL CONDITIONS

Unit 1 has tripped following a total loss of feedwater

Immediate Manual Actions are complete

The crew has been performing Rule 3 (Loss of Main or Emergency FDW) to regain heat transfer

Condensate Booster Pump feed could NOT be established and PSW Steam Generator feed is NOT available

Efforts to restore steam generator heat transfer per Rule 3 have NOT been successful

You are at Step 23 (WHEN step) in Rule 3

INITIATING CUE

The CRS directs you to review outstanding IAAT Steps

THIS JPM IS TIME CRITICAL

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	**Rule 3 IAAT Step 3**	**IAAT NO** SGs can be fed with FDW (Main/CBP/Emergency/PSW), **AND** any of the following exist: __ RCS pressure reaches 2300 psig **OR** NDT limit __ Pzr level reaches 375" [340" acc] **THEN PERFORM** Rule 4 (Initiation of HPI Forced Cooling). **STANDARD**: Candidate announces the initiation of Rule 4 once RCS pressure reaches 2300 psig. ***Examiner Cue: If requested, provide concurrence (as CRS) for initiation of Rule 4.*** ***Examiner Note: This starts the 5 minute "Time critical" time clock.*** ***Time = __________.*** **COMMENTS**:	__ SAT __ UNSAT
2	**Rule 4 Step 1**	Verify any HPI pump powered from 1TC, 1TD, or 1TE can be operated. **STANDARD**: The candidate recognizes one HPI pump is in operation and continues to Rule 4 Step 2. **COMMENTS**:	__ SAT __ UNSAT

3	**2**	Open: __ 1HP-24 __ 1HP-25 **STANDARD**: Candidate Rotates 1HP-24 switch on 1UB1 to the OPEN position and determines that 1HP-24 will NOT open by observing the green closed light on and red open light off. Candidate Rotates 1HP-25 switch on 1UB1 to the OPEN position and determines that 1HP-25 will NOT open by observing the green closed light on and red open light off. Continue to Step 2 RNO **COMMENTS**:	__ SAT __ UNSAT

<table>
<tr>
<td>4</td>
<td>2
RNO</td>
<td>
[ALTERNATE PATH]
1. __ IF <u>both</u> BWST suction valves (1HP-24 <u>and</u> 1HP-25) are closed, THEN:
A. __ Start 1A LPI PUMP
B. __ Start 1B LPI PUMP
C. Open:
__ 1LP-15
__ 1LP-16
__ 1LP-9
__ 1LP-10
__ 1LP-6
__ 1LP-7
D. __ IF two LPI Pumps are running <u>only</u> to provide HPI pump suction, THEN secure one LPI pump
E. __ Dispatch an operator to open 1HP-363
F. __ GO TO Step 3
2. __ IF <u>only one</u> BWST suction valve (1HP-24 or 1HP-25) is open, (N/A)

<u>STANDARD</u>: *Candidate starts the 1A and 1B LPI pumps on 1UB2 by rotating the control switches to the close position and observing red lights on and white lights off. Only one LPI pump must be started to satisfy the critical step.
*Candidate opens the above valves by rotating the control switches located on 1UB2 to the open position and observing the red open lights on and green closed lights off.
Candidate stops either the 1A or 1B LPI pump by rotating the control switch on 1UB2 to the trip position and observing the red lights off and white light on.
Candidate notifies an operator to locally open 1HP-363.
Candidate continues to Step 3.

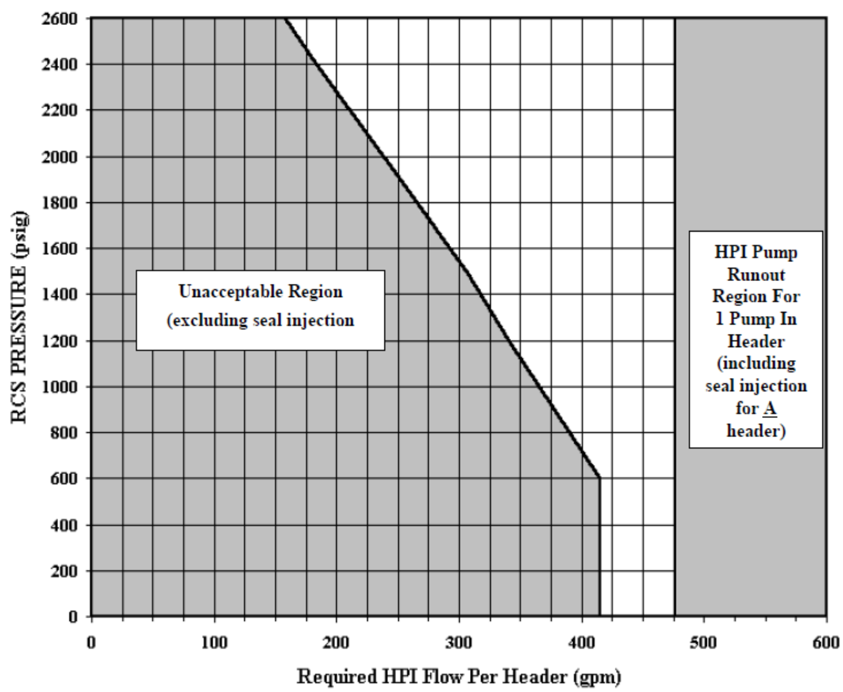
<u>COMMENTS</u>:
</td>
<td>*CRITICAL STEP

__ SAT

__ UNSAT</td>
</tr>
</table>

5	3	Start <u>all</u> <u>available</u> HPI pumps **<u>STANDARD</u>**: Candidate starts the 1B and 1C HPI pumps by rotating the 1B HPI pump control switch to the START position and rotating the 1C HPI pump control switch to the CLOSE position located on 1UB1. **<u>COMMENTS</u>:**	__ SAT __ UNSAT
6	4	Open: __ *1HP-26 __ 1HP-27 **<u>STANDARD</u>**: *The candidate Rotates and holds 1HP-26 switch on 1UB1 to the OPEN position and observes the green “CLOSED light go OFF and the red “OPEN” light come ON. The candidate locates 1HP-27 ('1B' HP Injection) on 1UB1 and verifies red 'OPEN' light is ON, and the green 'CLOSED' light is OFF Candidate continues to Step 5 **<u>COMMENTS</u>:**	***CRITICAL STEP** __ SAT __ UNSAT
7	5	Open 1RC-4 **<u>STANDARD</u>**: The candidate locates 1RC-4 control switch on 1UB1 and verifies that the red "OPEN" indication is illuminated and the green "CLOSED" indication is extinguished. ***Examiner Note: This valve will already be open.*** **<u>COMMENTS</u>:**	__ SAT __ UNSAT

8	**6**	VERIFY flow exists in <u>any</u> HPI header. **<u>STANDARD</u>**: The candidate locates HPI Flow Train A and B flow meters on 1UB1 and flow is verified. **<u>COMMENTS</u>:**	__ SAT __ UNSAT
9	**7**	Perform the following: A. Place 1RC-66 SETPOINT SELECTOR to OPEN B. Depress 1RC-66 OPEN PERMIT pushbutton **<u>STANDARD</u>**: The candidate: *Rotates 1RC-66 SETPOINT SELECTOR switch on 1UB1 to the OPEN position *Depresses 1RC-66 OPEN PERMIT pushbutton on 1UB1 Verifies PORV is open by verifying that the red "OPEN" indication is illuminated and the PORV Flow Statalarm (1SA-18/A-1) is in alarm. ***Examiner Note: This stops the 5 minute "Time Critical" time clock.*** ***Time = _____________.*** **<u>COMMENTS</u>:**	***CRITICAL STEP** __ SAT __ UNSAT
10	**8**	Verify <u>at least two</u> HPI pumps operating. **<u>STANDARD</u>**: The candidate verifies that three HPI pumps are operating. **<u>COMMENTS</u>:**	__ SAT __ UNSAT

11	9	Verify flow in <u>both</u> HPI headers is in the acceptable region of Figure 1 (Required HPI Flow Per Header). **STANDARD**: The candidate verifies flow in both HPI headers is in the acceptable region of Figure 1 below. **Figure 1** **Required HPI Flow Per Header**  **COMMENTS**:	__ SAT __UNSAT
12	10	Verify flow exists in <u>any</u> HPI header **STANDARD**: The candidate locates HPI Flow Train A and B flow meters on 1UB1. Loop A and Loop B flow is verified. ***Examiner Note: This flow has already been verified in Step 8.*** **COMMENTS**:	__ SAT __ UNSAT

13	**11**	Perform the following: A. Place 1RC-66 SETPOINT SELECTOR to OPEN B. Depress 1RC-66 OPEN PERMIT pushbutton **STANDARD**: The candidate: Verifies 1RC-66 SETPOINT SELECTOR switch on 1UB1 in the OPEN position. Depresses 1RC-66 OPEN PERMIT pushbutton on 1UB1. Verifies PORV is open by verifying that the red "OPEN" indication is illuminated and the PORV Flow Statalarm (1SA18/A1) is in alarm. ***Examiner Note: This has already been performed in Step 9.*** **COMMENTS**:	__ SAT __ UNSAT
14	**12**	Verify > one RCP operating. **STANDARD**: Candidate determines that ALL RCPs are operating. **COMMENTS**:	__ SAT __ UNSAT
15	**13**	**NOTE:** **1A1 RCP provides the best Pzr spray and is preferred to be left running in case recovery from HPI forced cooling is performed and a Pzr bubble drawn.** Stop all but one RCP. **STANDARD**: The candidate stops ALL but one RCP by rotating their control switches to “OFF” position. **COMMENTS**:	**CRITICAL STEP** __ SAT __ UNSAT

16	14	**IAAT** the following limits are exceeded, **Pump Operation** / **Limit** 1 HPI pump/hdr — 475 gpm (incl. seal injection for A hdr) 1A & 1B HPI pumps operating with 1HP-409 open — Total flow of 950 gpm (incl. seal injection) **THEN** throttle HPI to maximize flow ≤ flow limit. **STANDARD**: The candidate verifies header flows less than the limits in the table above. **COMMENTS**:	__ SAT __ UNSAT
17	15	De-energize all PZR heaters. **STANDARD**: The candidate: Rotates the PZR heater bank #1 switch on 1UB1 to the "OFF" position. Presses the OFF pushbutton controls for PZR heater banks 2, 3, and 4 on 1UB1 **COMMENTS**:	**CRITICAL STEP** __ SAT __ UNSAT

Pump Operation	Limit
1 HPI pump/hdr	475 gpm (incl. seal injection for A hdr)
1A & 1B HPI pumps operating with 1HP-409 open	Total flow of 950 gpm (incl. seal injection)

18	16	Close 1HP-5 **STANDARD**: The candidate: Rotates the switch for 1HP-5 on 1UB1 to the closed position. Observes the red OPEN light go off and the green CLOSED light come on. **COMMENTS**:	__ SAT __ UNSAT
19	17	Close: __ TBVs __ 1FDW-35 __ 1FDW-44 **STANDARD**: The candidate places the TBVs in HAND and reduces demand to zero using the toggle switch OR if the Turbine Master is in manual, verifies the TBVs are closed by observing the green closed light ON and the red open light OFF. The candidate places 1FDW-35 and 1FDW-44 to HAND and reduce demands to zero using the toggle switches. **COMMENTS**:	__ SAT __ UNSAT

20	**18**	**IAAT** <u>all</u> HPI is lost, **THEN**: A. __ Stop <u>all</u> RCPs B. __ Position 1RC-66 SETPOINT SELECTOR to HIGH **<u>STANDARD</u>**: The candidate verifies HPI is available and operating and that the step does not apply at this time. **<u>COMMENTS</u>**:	__ SAT __ UNSAT
21	**19**	**WHEN** directed by CRS, **THEN EXIT**. **<u>STANDARD</u>**: The candidate announces that Rule 4 is complete with outstanding IAATs and returns the Cue sheet to the examiner indicating they have completed the JPM. **<u>COMMENTS</u>:** ***END TASK***	__ SAT __ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
4	This step is required to align an LPI pump to supply suction to the HPI pumps.
6	This step is required to align HPI flow to both HPI headers.
9	This step is required to open the PORV to initiate HPI Forced Cooling to cool the core (TCA #26).
15	This step is required to limit the heat input to the RCS.
17	This step is required to limit the heat input to the RCS.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Unit 1 has tripped following a total loss of feedwater

Immediate Manual Actions are complete

The crew has been performing Rule 3 (Loss of Main or Emergency FDW) to regain heat transfer

Condensate Booster Pump feed could NOT be established and PSW Steam Generator feed is NOT available

Efforts to restore steam generator heat transfer per Rule 3 have NOT been successful

You are at Step 23 (WHEN step) in Rule 3

INITIATING CUE

The CRS directs you to review outstanding IAAT Steps

THIS JPM IS TIME CRITICAL

REGION II
JOB PERFORMANCE MEASURE

RO-S401a

ALIGNMENT OF CONDENSATE RECIRC

Administrative: No

Alternate Path: Yes

Alt Path Description: 1C CBP fails to start requiring either 1A or 1B CBP to be started

Time Critical: No

Time Critical Criteria: ____________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Establish Alignment of Condensate Recirc and set flow

Task Number:

Alternate Path: Yes

Time Critical: No

Validation Time: 15 minutes

K/A Rating(s):

System: APE054
K/A: G2.1.20
Rating: 4.6/4.6

Task Standard:

Perform the required actions in accordance with EOP Enclosure 5.23 (Alignment of Condensate Recirc) to establish Condensate recirculation flow of 2300-6000 gpm.

References:

EP/1/A/1800/001 (Emergency Operating Procedure) Enclosure 5.23 (Alignment of Condensate Recirc).

Tools/Equipment/Procedures Needed:

EP/1/A/1800/001 (Emergency Operating Procedure) Enclosure 5.23 (Alignment of Condensate Recirc) Rev 01.

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ______________________________ ________________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

Directions with SNAP:

1. **RECALL SNAP** 217
2. **IMPORT** files for RO-S401a
3. Go to **RUN** and acknowledge alarms
4. Go to **FREEZE**
5. **ENSURE** clean copy of procedure in place for candidate
6. Go to **RUN** when directed by Lead Examiner

==

Directions without a SNAP:

1.

2.

3.

4.

5.

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 was operating at 100% power when a SGTR occurred in the 1B Steam Generator.

During the associated Unit 1 shutdown, a Reactor trip occurred due to a loss of all 4 RCPs.

The SGTR tab is in progress.

INITIATING CUES

The CRS directs you to perform Enclosure 5.23 (Alignment of Condensate Recirc).

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	**1**	Verify <u>any</u> HWP operating. **<u>STANDARD</u>:** Determine the 1A HWP is operating (located on 1AB1) by observing the red ON lights illuminated and pump amps on scale. Continues to Step 2 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
2	**2**	Verify <u>any</u> CBP operating. **<u>STANDARD</u>:** Determine that NO CBP is operating by observing the amber off lights on 1AB1 are illuminated for each CBP and then perform the RNO. Continues to Step 2 **RNO** **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
3	**2** **RNO**	**GO TO** Step 7. **<u>STANDARD</u>:** Continues to Step 7 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT

4	**7**	Ensure <u>two</u> HWPs operating **<u>STANDARD</u>:** Determines that only the 1A HWP is operating, per step 1. Rotate the 1B HWP switch (located on 1AB1) to the START position, verify the red ON light illuminates, and verify pump amps increase and return to normal. OR Rotate the 1C HWP switch (located on 1AB1) to the START position, verify the red ON light illuminates, and verify pump amps increase and return to normal. Continues to Step 8 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
5	**8**	Locally verify 1C CBP auxiliary oil pump is operating **<u>STANDARD</u>:** Candidate directs an AO to verify 1C CBP auxiliary oil pump is operating ***Booth Cue: Report that 1C CBP auxiliary oil pump is operating.*** **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
6	**9**	Start the 1C COND BOOSTER PUMP. **<u>STANDARD</u>:** Rotate the 1C COND BOOSTER PUMP switch (located on 1AB1) to the START position. Observe that the red light is momemtarily lit and then noting the amber OFF light is illuminated and the red ON lights are OFF. Continues to **RNO** to Step 9 ***Examiner Note: The 1C Cond Booster Pump will trip immediately after starting.*** **<u>COMMENTS</u>:**	___ SAT ___ UNSAT

<table>
<tr>
<td>7</td>
<td>9
RNO</td>
<td>[ALTERNATE PATH]

1. Locally start an <u>available</u> CBP auxiliary oil pump.

2. Start <u>one</u> available CBP.

<u>STANDARD</u>: Direct an AO to locally start the 1A OR 1B CBP auxiliary oil pump

Rotate the 1A COND BOOSTER PUMP switch (located on 1AB1) to the START position. Observe the pump start by observing the Red ON lights illuminated and pump amps increase and then return to normal.

<u>OR</u>

Rotate the 1B COND BOOSTER PUMP switch (located on 1AB1) to the START position. Observe the pump start by observing the Red ON lights illuminated and pump amps increase and then return to normal.

Continues to Step 10

Booth Cue: Report the auxiliary oil pump is operating for the CBP dispatched by the candidate.

<u>COMMENTS</u>:</td>
<td>CRITICAL STEP

___ SAT

___ UNSAT</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>Stop <u>one</u> operating HWP.

<u>STANDARD</u>: Rotate the switch for a <u>running</u> HWP (Either 1A, 1B, or 1C) to the OFF position. Verify the Red ON lights OFF, and the amber OFF light illuminated.

Examiner Note: 1SA-8/C-2 (FDW PUMP SEAL DIFFERENTIAL PRESSURE LOW) will actuate. This is an expected alarm.

Continues to Step 11

<u>COMMENTS</u>:</td>
<td>___ SAT

___ UNSAT</td>
</tr>
</table>

9	**11**	Place the control switch for <u>one</u> secured HWP in AUTO **<u>STANDARD</u>:** Place a non-running HWP switch in AUTO. Continues to Step 12 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
10	**12**	Place the control switch for <u>one</u> secured CBP in AUTO. **<u>STANDARD</u>:** Places a non-running CBP (1A or 1B) switch in AUTO. Continues to Step 13 ***Examiner Note: 1C CBP switch should NOT be selected since the pump will not start.*** **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
11	**13**	Perform the following: • Position HWP LOAD SHED DEFEAT switch to a running HWP. • Position CBP LOAD SHED DEFEAT switch to a running CBP **<u>STANDARD</u>:** Position the HWP LOAD SHED DEFEAT switch to the running HWP, (1A, 1B, or 1C) Position the CBP LOAD SHED DEFEAT switch to the running CBP, (1A or 1B) Continues to Step 14 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT

12	14	Place the following in MANUAL: • 1FDW-53 • 1FDW-65 **<u>STANDARD</u>:** Locate the Moore controller on 1VB3 for each valve listed above and determine they are in MANUAL by the MANUAL light being Lit. Continues to Step 15 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
13	15	Establish 2300-6000 gpm total recirc flow with <u>one</u> of the following: • 1FDW-53 • 1FDW-65 **<u>STANDARD</u>:** Candidate locates the Moore controller for 1FDW-53 or 1FDW-65 on 1VB3 and uses the manual loader to adjust total recirc flow to 2300-6000 gpm. ***Examiner Note: Controller must be selected to the "P" position to observe flow.*** ***Examiner Cue: Inform candidate that another RO will complete this enclosure.*** **<u>COMMENTS</u>:** ***END TASK***	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
7	This step is required to properly align Condensate recirc.
13	This step is required to establish proper flow for Condensate recirc.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Unit 1 was operating at 100% power when a SGTR occurred in the 1B Steam Generator.

During the associated Unit 1 shutdown, a Reactor trip occurred due to a loss of all 4 RCPs.

The SGTR tab is in progress.

INITIATING CUES

The CRS directs you to perform Enclosure 5.23 (Alignment of Condensate Recirc).

REGION II
JOB PERFORMANCE MEASURE

AO-101

Swap Control Rod Drive Filters

Administrative: No

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Swap Control Rod Drive Filters

Task Number: N/A

Alternate Path: No

Time Critical: No

Validation Time: 15 Min

K/A Rating(s):

System: 001
K/A: G 2.3.13
Rating: 3.4/3.8

Task Standard:

Place standby CRD filter in service and remove other CRD filter from service.

References:

OP/1/A/1104/008 Component Cooling System Rev 76

Tools/Equipment/Procedures Needed:

OP/1/A/1104/008 Component Cooling System, Encl. 4.19 Placing 1A OR 1B CRD Filter In Service

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ________________________________/__________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

N/A

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

INITIAL CONDITIONS

The 1B CRD filter ΔP is 11 psid

It has been determined that the operating CRD filters have to be swapped

INITIATING CUES

The CRS directs you to place the 1A CRD filter in service and remove the 1B CRD filter from service using OP/1/A/1104/008 (Component Cooling System) Encl. 4.19 (Placing 1A OR 1B CRD Filter In Service)

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	2.1	**IF** required, place 1A CRD Filter in service: **STANDARD**: Per the cue sheet, the 1A CRD Filter will be placed in service. **COMMENTS**:	___ SAT ___ UNSAT
2	2.1.1	Ensure open 1CC-72 (1A CRD Filter Inlet). **STANDARD**: Candidate opens 1CC-72 by turning the hand wheel in the counter clockwise direction until it comes to a hard stop. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT
3	2.1.2	Open 1CC-136 (1A CRD Filter Sightglass Outlet). **STANDARD:** Candidate opens 1CC-136 by turning hand wheel in the counter clockwise direction until it comes to a hard stop. **COMMENTS**:	___ SAT ___ UNSAT
4	2.1.3	Throttle 1CC-73 (1A CRD Filter Vent) to vent 1A CRD Filter. **STANDARD**: Candidate throttles open 1CC-73 by turning the hand wheel in the counter clockwise direction until flow is noticed in the sight glass. **Examiner Cue: Several seconds after 1CC-73 is throttled open, inform the candidate that a solid stream is noticed in the sight glass.** **COMMENTS**:	___ SAT ___ UNSAT

5	**2.1.4**	**WHEN** vented, position the following: • Close 1CC-73 (1A CRD Filter Vent) • Close 1CC-136 (1A CRD Filter Sightglass Outlet) **STANDARD**: When the candidate notices a solid stream of water in the sightglass, they close1CC-73 and 1CC-136 by turning the hand wheels in the clockwise direction until they come to a hard stop. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT
6	**2.1.5**	Open 1CC-74 (1A CRD Filter Outlet). **STANDARD**: Candidate opens 1CC-74 by turning the valve in the counter clockwise direction until the handwheel comes to a hard stop. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT
7	**2.1.6**	**IF** desired, remove 1B CRD Filter from service: • Close 1CC-92 (1B CRD Filter Inlet) • Close 1CC-93 (1B CRD Filter Outlet) **STANDARD**: Candidate closes 1CC-92 and 1CC-93 by turning the hand wheels in the clockwise direction until they come to a hard stop. **COMMENTS**: **END TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
2	This step is required to allow flow into the CRD filter.
5	This step is required to prevent draining the CC system.
6	This step is required to place the 1A CRD filter in the fluid stream.
7	This step is required to remove the 1B CRD filter from service

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

The 1B CRD filter ∆P is 11 psid

It has been determined that the operating CRD filters have to be swapped

INITIATING CUES

The CRS directs you to place the 1A CRD filter in service and remove the 1B CRD filter from service using OP/1/A/1104/008 (Component Cooling System) Encl. 4.19 (Placing 1A OR 1B CRD Filter In Service)

REGION II
JOB PERFORMANCE MEASURE

AO-603

Shutdown of Inverters During Station Blackout

Administrative: No

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: Yes

Time Critical Criteria: Power is removed from Inverters KI, KU, KX, and KOAC within 30 minutes

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Shutdown of Inverters During Station Blackout

Task Number:

Alternate Path: No

Time Critical: Yes

Validation Time: 15 min

K/A Rating(s):

System: EPE 055
K/A: G2.1.30
Rating: 4.4/4.0

Task Standard:

Power is removed from Unit 2 inverters KI, KU, KX, and KOAC within 30 minutes

References:

EOP Enclosure 5.32 (Load Shed of Inverters During SBO) Rev 0

Tools/Equipment/Procedures Needed:

EOP Enclosure 5.32 (Load Shed of Inverters During SBO)

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ________________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

1. *N/A*

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 tornado which struck the Turbine Building and the Switchyard has resulted in a Loss of Onsite and Offsite Power on all three Units.

Unit 1, 2, and 3 TDEFDW Pumps are operating and feeding each units SGs respectively.

INITIATING CUES:

The Control Room Operator directs you to perform EOP Enclosure 5.32 (Load Shed of Inverters During SBO) on Unit 2.

THIS JPM IS TIME CRITICAL

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	1	Verify <u>any</u> from the U2 Control Room personnel: __ EFDW is feeding <u>any</u> SG. __ SSF is feeding <u>any</u> SG. __ PSW is feeding <u>any</u> SG. **<u>STANDARD</u>:** Candidate determines EFDW is feeding Unit 2 SGs and proceeds to step 2. ***EXAMINER CUE: If contacted as Unit 2 personnel, state that Unit 2 TDEFDW Pump is feeding Unit 2 SGs.*** **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
2	2	Open the following breakers (Unit 2 Equipment Room): • 2KI Static Inverter DC Input • 2KX Static Inverter DC Input • 2KU Static Inverter DC Input **<u>STANDARD</u>:** Locates the 2KI Static Inverter in Unit 2's Equipment Room and OPENS the DC INPUT Breaker Locates the 2KX Static Inverter in Unit 2's Equipment Room and OPENS the DC INPUT Breaker. Locates the 2KU Static Inverter in Unit 2's Equipment Room and OPENS the DC INPUT Breaker ***EXAMINER NOTE: Power must be removed from KI, KU, & KX within 30 minutes.*** **<u>COMMENTS</u>:**	**CRITICAL STEP** ___ SAT ___ UNSAT

3	**3**	Perform <u>either</u>: • Place 2DP-F6E (2KOAC Computer Static Inverter Bkr) in OFF (T-3, L-31) • Open DC INPUT breaker on 2KOAC Inverter (A-6-602, Vent Equipment Rm) **<u>STANDARD:</u>** Locates breaker F6E (2KOAC Computer Static Inverter Bkr) on MCC 2DP and places it in the "OFF" position. **OR** Opens DC INPUT breaker on 2KOAC Inverter (A-6-602, Vent Equipment Rm) ***EXAMINER NOTE: Power must be removed from KOAC within 30 minutes.*** **<u>COMMENTS</u>:** **END TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
2	This step is required to de-energize the essential inverters. Power must be removed from KI, KU, & KX within 30 minutes.
3	This step is required to de-energize the KOAC inverter. Power must be removed from KOAC within 30 minutes.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A tornado which struck the Turbine Building and the Switchyard has resulted in a Loss of Onsite and Offsite Power on all three Units.

Unit 1, 2, and 3 TDEFDW Pumps are operating and feeding each units SGs respectively.

INITIATING CUES:

The Control Room Operator directs you to perform EOP Enclosure 5.32 (Load Shed of Inverters During SBO) on Unit 2.

THIS JPM IS TIME CRITICAL

REGION II
JOB PERFORMANCE MEASURE

AO-802a

Isolate HPSW and LPSW During an Auxiliary Building Flood

Administrative: No

Alternate Path: Yes

Alt Path Description: ____HPSW-959 will not close________________________________

Time Critical: No

Time Critical Criteria: ____

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Isolate HPSW and LPSW during an AB Flood

Task Number: N/A

Alternate Path: Yes

Time Critical: No

Validation Time: 15 min

K/A Rating(s):

System: BW/A07
K/A: AA2.2
Rating: 3.3/3.7

Task Standard:

Isolate portions of the HPSW and LPSW systems during an AB Flood using AP/3/A/1700/030 AUXILIARY BUILDING FLOOD

References:

AP/3/A/1700/030 Rev 19

Tools/Equipment/Procedures Needed:

AP/3/A/1700/030 Encl. 5.1 (HPSW AB Flood Isolation) and Encl. 5.2 (LPSW AB Flood Isolation)

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ______________________________ Time Start: _____________

NAME Time Finish: _____________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ___________________________ _______________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

N/A

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

All 3 units are at 100% power

Unit 3 Auxiliary Building flooding is occurring

The source of flood water has not yet been determined

INITIATING CUE

The Control Room Supervisor directs you to perform AP/3/A/1700/030 Enclosure 5.1 (HPSW AB Flood Isolation) AND Enclosure 5.2 (LPSW AB Flood Isolation)

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1		***Examiner Note: If candidate performs Enclosure 5.2 first, it begins on JPM step 7.***	
2	**En.5.1 1**	**IAAT** the source of flooding is isolated, **THEN** notify Control Room. **STANDARD**: The candidate notes the source of flooding is not isolated. ***Examiner Cue: If asked, flooding is still occurring.*** Candidate continues to step 2. **COMMENTS**:	___ SAT ___ UNSAT

<table>
<tr>
<td>3</td>
<td>2</td>
<td>
NOTE
Keys for valve locks are available in <u>any</u> Emergency Equipment cabinet.

[ALTERNATE PATH]

Close HPSW-959 (HPSW SUPPLY TO FLOW LIMITER BLOCK VALVE) (T-1/M-21 south, west of RCW Heat Exchangers).

<u>STANDARD</u>: The candidate locates and attempts to close HPSW- 959.

Examiner Note: Operators would normally carry keys to these locks.
Examiner Cue: When the candidate locates and attempts to close HPSW-959, inform candidate that HPSW-959 chain will not move.

Candidate continues to step 2 RNO.

<u>COMMENTS</u>:
</td>
<td>___ SAT

___ UNSAT</td>
</tr>
<tr>
<td>4</td>
<td>2
RNO</td>
<td>
Close HPSW-962 (HPSW SUPPLY TO AUX BLDG BLOCK VALVE) (T-1/M-21 south, west of RCW Heat Exchangers).

<u>STANDARD</u>: The candidate locates and closes HPSW-962 rotating it in the clockwise direction until it stops.

Examiner Cue: When the candidate rotates the hand wheel in the clockwise direction, inform the candidate that HPSW-962 is fully clockwise and on the hard stop.

Candidate continues to step 3.

<u>COMMENTS</u>:
</td>
<td>CRITICAL STEP

___ SAT

___ UNSAT</td>
</tr>
</table>

5	**3**	Notify control Room HPSW isolation is complete. **<u>STANDARD</u>:** The candidate notifies the control Room HPSW isolation is complete. Candidate continues to step 4. **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
6	**4**	**EXIT** this enclosure. **<u>STANDARD</u>:** Candidate EXITS enclosure 5.1 and proceeds to Enclosure 5.2 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
7	**En.5.2** **1**	**IAAT** the source of flooding is isolated, **THEN** notify Control Room. **<u>STANDARD</u>:** The candidate notes the source of flooding is not isolated. ***Examiner Cue: If asked, flooding is still occurring.*** Candidate continues to step 2 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT

8	2	Close 3LPSW-844 (AUX BLDG AHU SUPPLY) (T-1/M-46, 6' SE). **STANDARD:** The candidate locates and closes 3LPSW-844 rotating it in the clockwise direction until it stops. ***Examiner Cue:*** ***When the candidate rotates the hand wheel in the clockwise direction, inform the candidate that the valve is fully clockwise and on the hard stop.*** Candidate continues to step 3. **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT
9	3	Close 3LPSW-770 (AUX BLDG AHU SUPPLY) (T-1/M-46, 8' S). **STANDARD:** The candidate locates and closes 3LPSW-770 rotating it in the clockwise direction until it stops.. ***Examiner Cue:*** ***When the candidate rotates the hand wheel in the clockwise direction, inform the candidate that the valve is fully clockwise and on the hard stop.*** Candidate continues to step 4. **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT

10	4	Open 3LPSW-501 (UNIT 3 AHU RETURN TO STORM DRAINS) (T-1/L-47, W 12' up). **STANDARD:** The candidate locates and opens 3LPSW-501 rotating it in the counter-clockwise direction until it stops. ***Examiner Cue:*** ***When the candidate rotates the hand wheel in the counter clockwise direction, inform the candidate that the valve is on the hard stop.*** Candidate continues to step 5. **COMMENTS:**	___ SAT ___ UNSAT
11	5	Close 3LPSW-500 (UNIT 3 AHU RETURN TO CCW DISCHARGE) (T-1/L-47, NW 12' up). **STANDARD:** The candidate locates and closes 3LPSW-500 rotating it in the clockwise direction until it stops. ***Examiner Cue:*** ***When the candidate rotates the hand wheel in the clockwise direction, inform the candidate that the valve is fully clockwise and on the hard stop.*** Candidate continues to step 6. **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT

12	6	Notify Unit 3 Control Room LPSW isolation is complete. **<u>STANDARD</u>:** The candidate notifies the Control Room LPSW isolation is complete. Candidate continues to step 7. **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
13	7	**EXIT** this enclosure. **<u>STANDARD</u>:** Candidate EXITS enclosure 5.2 and returns CUE Sheet to examiner. **<u>COMMENTS</u>:** ***END TASK***	___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
4	Step ensures proper isolation of HPSW leak.
8	Step ensures proper isolation of LPSW leak.
9	Step ensures proper isolation of LPSW leak.
11	Step ensures proper isolation of LPSW leak.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

All 3 units are at 100% power

Unit 3 Auxiliary Building flooding is occurring

The source of flood water has not yet been determined

INITIATING CUE

The Control Room Supervisor directs you to perform AP/3/A/1700/030 Enclosure 5.1 (HPSW AB Flood Isolation) AND Enclosure 5.2 (LPSW AB Flood Isolation)

REGION II
JOB PERFORMANCE MEASURE

Admin-113

Determine Time for SFP to Reach 180ºF

Alternate Path: (No)

Alt Path Failure: ______________________________

Time Critical: (No)

Time Critical Criteria: ______________________________

Prepared By: ______________________________ Date:

EP Review By: ______________________________ Date:

Reviewed By: ______________________________ Date:

Approved By: ______________________________ Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title : Determine Time for SFP to Reach 180ºF

Task Number :

Alternate Path: No

Time Critical: No

Validation Time: 15 minutes

K/A Rating(s):

System: GEN
K/A: 2.1.25
Rating: 3.9/4.2

Task Standard:

Tables in AP/1-2/A/1700/035 (Loss of SFP Cooling And/Or Level) are used to determine total time required for SFP temperature to reach 180ºF

References:

AP/1-2/A/1700/035 (Loss of SFP Cooling And/Or Level) Rev 19

Tools/Equipment/Procedures Needed:

AP/1-2/A/1700/035 Encl. 5.4 (Unit 1-2 SFP Time to Reach 180ºF, 200 ºF)

==

Candidate: ________________________________ Time Start: _____________

NAME Time Finish: _____________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ________________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

1. **N/A**

READ TO OPERATOR

DIRECTIONS TO STUDENT

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% stable
- Unit 1 EFPD = 263
- Unit 2 EFPD = 32
- Unit 2 was operating at 100% when it experienced a Unit blackout
- SSF has been activated for Unit 2
- Unit 2 RCMUP is aligned and operating
- 2HP-426 is being cycled to maintain Pressurizer Level as directed by AP/25
- AP/1-2/A/1700/035 (Loss of SFP Cooling And/Or Level) has been initiated
- Unit 1 & 2 SFP level = 0.0 ft stable
- Unit 1 & 2 SFP temperature = 112ºF

INITIATING CUES

CRS has directed you to utilize AP/35 Enclosure 5.4 and determine the time for Unit 1&2 SFP to reach 180 ºF.

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1		1. Refer to tables A, B, and C below. 2. ONLY one row from one table below applies 3. Check the row in Table A, B, or C that applies to current conditions, and then use Tables listed on subsequent pages of Encl 5.4, as directed, to calculate SFP heat up times. **STANDARD**: Candidate selects Table B and then chooses to use Table 10 based on: • SSF Event in progress for U1 or U2 with Unit letdown going to SFP AND • U1 and U2 each have 177 Fuel Assemblies in RB Candidate proceeds to Table 10 (page 33 of 63) **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT
2		Determine the Time (in days) row based on direction from page 5 of 63 **STANDARD**: Candidate selects the lower EFPD unit (Unit 2 = 32 days) and adds 20, which results in 52 days. Determines that 52 days is between 51 and 54 days on far left column of Table 10. Based on guidance in Step 7 on Page 7 of 63, candidate elects to use **51 days** (the shorter time). ***NOTE: Steps 2 and 3 can be performed in any order*** **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT

3		Determine initial Spent Fuel Pool Temperature column based on directions from page 7 of 63 Step 6. **STANDARD:** Candidate utilizes the **115** column based on: • Actual SFP temperature = 112ºF • Temperature columns available are 110 and 115 • Directions in Step 6, page 7 of 63, direct the use of the higher temperature column. ***NOTE: Steps 2 and 3 can be performed in any order*** **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT
4		Find the Time in hours based on the intersection of the **51** day row and the **115** degree column. **STANDARD**: Based on the intersection of the 60 day row and the 105 degree column, determine that **13.4 hours** is the time to reach 180ºF **COMMENTS:** **END TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
1	Required to determine the time to reach 180 ºF
2	Required to determine the time to reach 180 ºF
3	Required to determine the time to reach 180 ºF
4	Required to determine the time to reach 180 ºF

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

- Unit 1 is at 100% stable
- Unit 1 EFPD = 263
- Unit 2 EFPD = 32
- Unit 2 was operating at 100% when it experienced a Unit blackout
- SSF has been activated for Unit 2
- Unit 2 RCMUP is aligned and operating
- 2HP-426 is being cycled to maintain Pressurizer Level as directed by AP/25
- AP/1-2/A/1700/035 (Loss of SFP Cooling And/Or Level) has been initiated
- Unit 1 & 2 SFP level = 0.0 ft stable
- Unit 1 & 2 SFP temperature = 112ºF

INITIATING CUES

CRS has directed you to utilize AP/35 Enclosure 5.4 and determine the time for Unit 1&2 SFP to reach 180 ºF.

REGION II
JOB PERFORMANCE MEASURE

ADM-206

Calculate Reactor Building Normal Sump Rate Following Loss of OAC

Administrative: Yes

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title : Calculate Reactor Building Normal Sump Rate Following Loss of OAC

Task Number :

Alternate Path: No

Time Critical: No

Validation Time: 15 min

K/A Rating(s):

System: GENERIC
K/A: 2.2.44
Rating: 4.2/4.4

Task Standard:

Reactor Building Normal Sump rate agrees with attached example.

References:

PT/0/A/0600/001A (Loss of Computer) Rev. 43

Tools/Equipment/Procedures Needed:

PT/0/A/0600/001A, Enclosure 13.6 (Reactor Building Normal Sump Rate Calculation) Rev. 43
RBNS Level Visio Drawings (Attachment 1 and 2)

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: _______________

NAME Time Finish: _______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: __________

Examiner: ____________________________ ________________________________/__________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

1. *N/A*

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

Today:

Time = 1230: BOP completed pumping Unit 3 RBNS.

Time = 1231: Unit 3 Operator Aid Computer (OAC) determined to be OOS.

Time = 1232: PT/0/A/0600/001A (Loss of Computer) initiated.

INITIATING CUE

Current Time = 1236.

The CRS directs you to perform PT/0/A/0600/001A, Enclosure 13.6 (Reactor Building Normal Sump Rate Calculation).

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1		Unit:_____ Date:_________ Time of Loss of OAC:_________ **<u>STANDARD</u>:** Candidate should enter the following: Unit: 3 Date: Today Time of Loss of OAC: 1231 **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
2	2.1	Ensure RBNS level is in the range of 1-8" on RBNS Level Indication in the Control Room. **<u>STANDARD</u>:** Candidate refers to Attachment 1 and determines RBNS level = 2.1 inches, which is in the range of 1-8", and proceeds to Step 2.2. **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
3	2.2	Verify > 5 minutes have passed since last pumping of RBNS. **<u>STANDARD</u>:** Candidate determines from the cue sheet that 6 minutes have passed since pumping the RBNS and proceeds to Step 2.3. **<u>COMMENTS</u>:**	___ SAT ___ UNSAT
4	2.3	**<u>IF</u>** this is initial data collection, fill in first row, columns (1) and (3) of chart on page 2. **<u>STANDARD</u>:** Candidate enters 1236 in column (1) and 2.1 in column (3) in first row on page 2. **<u>COMMENTS</u>:**	___SAT ___UNSAT

5	2.4	After 25-35 minutes, insert data in next empty row, columns (1), (2), and (3) **STANDARD:** Candidate enters 1304 in column (1), 28 in column (2), and 3.3 in column (3) in next empty row on page 2. **COMMENTS:**	___SAT ___UNSAT
6	2.5	Calculate value for column (4) by subtracting previous RBNS Level recorded from current value. **STANDARD:** Candidate subtracts 2.1 from 3.3 and determines the Δ RBNS Level is 1.2 inches. **COMMENTS:**	**CRITICAL STEP** ___SAT ___UNSAT
7	2.6	Calculate value for column (5) by performing formula below: Leak Rate = $\frac{\text{(Chg in RBNS lvl) x (15 gal/inch)}}{\text{(minutes)}}$ = $\frac{\text{(\_\_ in) x 15 gal/in}}{\text{\_\_\_minutes}}$ = __ gpm **STANDARD:** Candidate determines the RBNS rate as follows: Leak Rate = $\frac{\text{(Chg in RBNS lvl) x (15 gal/inch)}}{\text{(minutes)}}$ Leak rate = $\frac{\text{(1.2 in) x 15 gal/in}}{\text{28 minutes}}$ = **0.64 gpm (0.64 to 0.65 gpm)** **COMMENTS:**	**CRITICAL STEP** ___SAT ___UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
6	This step is required to correctly calculate RBNS rate.
7	This step is required to correctly calculate RBNS rate.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Today:

Time = 1230: BOP completed pumping Unit 3 RBNS.
Time = 1231: Unit 3 Operator Aid Computer (OAC) determined to be OOS.
Time = 1232: PT/0/A/0600/001A (Loss of Computer) initiated.

INITIATING CUE

Current Time = 1236.

The CRS directs you to perform PT/0/A/0600/001A, Enclosure 13.6 (Reactor Building Normal Sump Rate Calculation).

(Shall be administered on same day as ADM-S300)

REGION II
JOB PERFORMANCE MEASURE

ADM-306

Determine the Maximum Permissible Stay Time Within Emergency Dose Limits (EDL)

Administrative: Yes

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Determine the Maximum Permissible Stay Time Within Emergency Dose Limits.

Task Number:

Alternate Path: No

Time Critical: No

Validation Time: 20 min

K/A Rating(s):

System: Generic
K/A: 2.3.4
Rating: *3.2/3.7*

Task Standard:

Determine the Maximum Permissible Stay Time Within the Emergency Dose Limits

References:

PD-RP-ALL-0001 Radiation Worker Responsibilities Rev 09
OMP 1-18 (Implementation Standard During Abnormal And Emergency Events) Rev 41

Tools/Equipment/Procedures Needed:

Calculator
Note tablet

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ______________________________ Time Start: _____________

NAME Time Finish: _____________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ___________________________ _______________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

1. *N/A*

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

Steam Generator Tube Rupture has occurred on Unit 3

Emergency Dose Limits are in effect

Before assuming today's shift, AO "A" has received 1.26 Rem TEDE this year, and AO "A" has not received any dose for this event except as specified below.

The following tasks are required to be performed:

#	TASK	TIME REQUIRED	DOSE RATE
1	Close 3C-573	8 min	8.45 R/hr
2	Open 3FDW-313	5 min	19.75 R/hr
3	Open all Unit 3's ADVs		9.35 R/hr

Note: No dose is received while traveling between tasks.
Tasks 1, 2, 3 are not for lifesaving or protecting valuable property.

INITIATING CUE

Refer to the above information. AO "A" has completed tasks 1 and 2 in the time required.

Determine how long (in minutes) that AO "A" has to complete task 3 without exceeding Emergency Dose Limits.

ROUND ALL CALCULATIONS TO TWO (2) DECIMAL PLACES

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1		***Examiner Note:*** • ***Candidate may perform these steps in a different order; however, the calculated stay time must be correct.*** • ***EDL is 5 Rem per event (LOCA or SGTR).*** • ***Current exposure for the year is not counted toward the Emergency Dose Limits (EDL).***	
2		Determine dose received while performing task 1. **<u>STANDARD</u>:** Determine dose received while performing task 1. 8.45 R/hr X 1hr/60 min X 8 min = 1.1266 R **(1.1 to 1.13 R)** **<u>COMMENTS</u>:**	**CRITICAL STEP** ___ SAT ___ UNSAT
3		Determine dose received while performing task 2. **<u>STANDARD:</u>** Determine dose received while performing task 2. 19.75 R/hr X 1hr/60 min X 5 min = 1.6458 R **(1.58 to 1.65 R)** **<u>COMMENTS</u>:**	**CRITICAL STEP** ___ SAT ___ UNSAT
4		Determine dose remaining from EDLs. **<u>STANDARD</u>:** Determine dose remaining from EDLs. 5R – 1.12R – 1.65R = 2.23R **(2.22 to 2.32 R)** **<u>COMMENTS</u>:**	**CRITICAL STEP** ___ SAT ___ UNSAT

5		Determine time available for the AO to complete task 3 without exceeding EDL. **STANDARD**: Stay time is calculated to be: $\frac{\text{Available Dose}}{\text{Dose Rate}} = \frac{2.23\text{R}}{9.35\text{ R/hr}} = .24\text{ hr X } \frac{60\text{ min}}{1\text{hr}} = \mathbf{14.4\ min}$ **(13.8 to 15 Minutes)** **COMMENTS:** **END TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
1	This step is required to calculate stay time.
2	This step is required to calculate stay time.
3	This step is required to calculate stay time.
4	This step is required to calculate stay time.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Steam Generator Tube Rupture has occurred on Unit 3

Emergency Dose Limits are in effect

Before assuming today's shift, AO "A" has received 1.26 Rem TEDE this year, and AO "A" has not received any dose for this event except as specified below.

The following tasks are required to be performed:

#	TASK	TIME REQUIRED	DOSE RATE
1	Close 3C-573	8 min	8.45 R/hr
2	Open 3FDW-313	5 min	19.75 R/hr
3	Open all Unit 3's ADVs		9.35 R/hr

Note: No dose is received while traveling between tasks.
Tasks 1, 2, 3 are not for lifesaving or protecting valuable property.

INITIATING CUE

Refer to the above information. AO "A" has completed tasks 1 and 2 in the time required.

Determine how long (in minutes) that AO "A" has to complete task 3 without exceeding Emergency Dose Limits.

ROUND ALL CALCULATIONS TO TWO (2) DECIMAL PLACES

REGION II
JOB PERFORMANCE MEASURE

ADMIN 107

DETERMINE IF RO LICENSE REQUIREMENTS ARE MET

Administrative: Yes

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Determine if RO License requirements are met per NSD 512 for minimum On-Shift Experience

Task Number: N/A

Alternate Path: No

Time Critical: No

Validation Time: 15 Min

K/A Rating(s):

System: Generic
K/A: 2.1.4
Rating: 3.3/3.8

Task Standard:

Completes Form 512-1 Section 3 and determines requirements of NSD 512 are NOT met.

References:

NSD 512 (Maintenance of RO/SRO NRC Licenses) Rev 7

Tools/Equipment/Procedures Needed:

NSD 512 (Maintenance of RO/SRO NRC Licenses)

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ______________________________ Time Start: ______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ___________________________ ______________________________/__________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

N/A

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

Today's date is 3/29/18. You are a Reactor Operator. Your work history for March of this year is as follows:

3/12/18	Worked 12 hours as BOP on Unit 1 (day shift). Took turnover at beginning of shift and gave turnover at end of shift.
3/13/18	Worked 8 hours as OATC on Unit 1 and 4 hours OATC doing crew JIT training on Simulator A (day shift). Took turnover at beginning and gave turnover at end of both of these assignments.
3/14/18	Worked 10 hours as BOP on Unit 1 (day shift). Took turnover at beginning of shift.
3/19/18	Worked 12 hours as BOP on Unit 1 (night shift). Took turnover at beginning of shift and gave turnover at end of shift.
3/20/18	Worked 12 hours as OATC on Unit 3 (night shift). Took turnover at beginning of shift and gave turnover at end of shift.
3/21/18	Worked 6 hours as OATC on Unit 3 and 6 hours as BOP on Unit 1 (night shift). Took turnover at beginning of shift and did NOT give turnover at end of shift.
3/27/18	Worked 12 hours as AO on Unit 3 (day shift). Took turnover at beginning of shift and gave turnover at end of shift.

INITIATING CUES

The SM directs you to review your work history for March, complete Section 3 of form NSD 512-1 based on the above work history, and determine if you meet NSD 512 requirements to maintain an active RO license for the following quarter.

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
		Examiner note: The critical element of the evaluation of each day is to determine if the requirement is met or not met.	
1		Evaluate 3/12/18 work period **STANDARD**: **Determines that requirement is met** and adds this period to Form 512-1. Required position for 12 hrs. with Turnover at beginning and end of shift. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___UNSAT
2		Evaluate 3/13/18 work period **STANDARD**: **Determines that requirement is not met** because Simulator time does not count toward maintain RO license requirements **COMMENTS**:	**CRITICAL STEP** ___ SAT ___UNSAT
3		Evaluate 3/14/18 work period **STANDARD:** **Determines that requirement is not met**. No turnover at end of shift, < 12hrs worked in position. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___UNSAT

4		Evaluate 3/19/18 work period **STANDARD**: **Determines that requirement is met** and adds this period to Form 512-1. Required position for 12 hrs. with Turnover at beginning and end of shift. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___UNSAT
5		Evaluate 3/20/18 work period **STANDARD**: **Determines that requirement is met** and adds this period to Form 512-1. Required position for 12 hrs. with Turnover at beginning and end of shift. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___UNSAT
6		Evaluate 3/21/18 work period **STANDARD**: **Determines that requirement is not met**. No turnover at end of shift and position not filled for entire shift. **COMMENTS**:	**CRITICAL STEP** ___ SAT ___UNSAT
7		Evaluate 3/27/18 work period **STANDARD**: **Determines that NEO is not a required position** and cannot be credited toward maintenance of RO license **COMMENTS**:	**CRITICAL STEP** ___ SAT ___UNSAT

8		Compares credited time vs minimum requirements **<u>STANDARD</u>: Determines that there are only 3 12 hour shifts that can be credited** and therefore the minimum fourth quarter **requirements to maintain an active RO License are not met**. **<u>COMMENTS</u>:**	**CRITICAL STEP** ___ SAT ___UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
1	Required to determine if minimum On Shift Experience requirements of NSD 512 have been met
2	Required to determine if minimum On Shift Experience requirements of NSD 512 have been met.
3	Required to determine if minimum On Shift Experience requirements of NSD 512 have been met.
4	Required to determine if minimum On Shift Experience requirements of NSD 512 have been met.
5	Required to determine if minimum On Shift Experience requirements of NSD 512 have been met.
6	Required to determine if minimum On Shift Experience requirements of NSD 512 have been met.
7	Required to determine if minimum On Shift Experience requirements of NSD 512 have been met.
8	This step makes the determination regarding minimum license requirement.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Today's date is 3/29/18. You are a Reactor Operator. Your work history for March of this year is as follows:

3/12/18	Worked 12 hours as BOP on Unit 1 (day shift). Took turnover at beginning of shift and gave turnover at end of shift.
3/13/18	Worked 8 hours as OATC on Unit 1 and 4 hours OATC doing crew JIT training on Simulator A (day shift). Took turnover at beginning and gave turnover at end of both of these assignments.
3/14/18	Worked 10 hours as BOP on Unit 1 (day shift). Took turnover at beginning of shift.
3/19/18	Worked 12 hours as BOP on Unit 1 (night shift). Took turnover at beginning of shift and gave turnover at end of shift.
3/20/18	Worked 12 hours as OATC on Unit 3 (night shift). Took turnover at beginning of shift and gave turnover at end of shift.
3/21/18	Worked 6 hours as OATC on Unit 3 and 6 hours as BOP on Unit 1 (night shift). Took turnover at beginning of shift and did NOT give turnover at end of shift.
3/27/18	Worked 12 hours as AO on Unit 3 (day shift). Took turnover at beginning of shift and gave turnover at end of shift.

INITIATING CUES

The SM directs you to review your work history for March, complete Section 3 of form NSD 512-1 based on the above work history, and determine if you meet NSD 512 requirements to maintain an active RO license for the following quarter.

REGION II
JOB PERFORMANCE MEASURE

ADM-S105

PERFORM A POWER IMBALANCE VERIFICATION AND DETERMINE ANY REQUIRED ACTIONS AND COMPLETION TIMES

Administrative: Yes

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title : Perform a power imbalance verification and determine any required actions and completion times.

Task Number : N/A

Alternate Path: No

Time Critical: No

Validation Time: 35 minutes

K/A Rating(s):

System: Generic
K/A: 2.1.25
Rating: 3.9/4.2

Task Standard:

Candidate determines that Axial Power Imbalance is NOT within the limits of the COLR and determines the appropriate TS requirements.

References:

PT/1/A/0600/001 (Periodic Instrument Surveillance) procedure and Enclosures 13.1 Rev 338
OP/1/A/1105/014 (Control Room Instrumentation Operation and Information) Rev 44
Core Operating Limits Report Rev 36
Tech Specs

Tools/Equipment/Procedures Needed:

PT/1/A/0600/001 (Periodic Instrument Surveillance) procedure and Enclosures 13.1
OP/1/A/1105/014 (Control Room Instrumentation Operation and Information)
Core Operating Limits Report
Tech Specs

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ______________________________ Time Start: ____________

NAME Time Finish: ____________

Performance Rating: SAT ______ UNSAT ______ Performance Time: ________

Examiner: __________________________ ______________________________/________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

1. **NONE**

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 had a transient from 100% power 4 hours ago.
- The current time is 2000.
- The Reactor Calculations package is **NOT** running.
- All other equipment is operable.
- PT/1/A/0600/001 (Periodic Instrument Surveillance), Enclosure 13.1 (Mode 1 & 2) has been completed up to page 7, Axial Power Imbalance Operating Limits.
- Minimum incore detector operability requirements have been verified met per PT/0/A/1103/019 (Backup Incore Detector System).

INITIATING CUE

The SRO directs you to:

1. Perform Axial Power Imbalance verification in accordance with PT/1/A/0600/001 (Periodic Instrument Surveillance), Enclosure 13.1 (Mode 1 & 2).
2. Determine all Tech Spec Conditions, Required Actions, and Completion times, if any.

TECH SPEC CONDITION (s)__________________

- **REQUIRED ACTION (s) / COMPLETION TIME (s)_________________________**

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1		PT/1/A/0600/001, SR 3.2.2.1 Axial Power Imbalance Operating Limit: **IF** > 40% RTP, verify Power imbalance within operational alarm limits in COLR. **IF** Reactor Calculations package is **NOT** running on computer, refer to OP/1/A/1105/014 (Control Room Instrumentation Operation And Information). **STANDARD:** Determine reactor power is greater than 40%. Determine Reactor Calculation package is **NOT** running per Initial Conditions and refer to OP/1/A/1105/014 (Control Room Instrumentation Operation And Information). **COMMENTS:**	___ SAT ___ UNSAT
2	**3.2.3**	OP/1/A/1105/014 Encl. 4.13 IF Reactor Calculations package is **NOT** running, verify minimum incore detector operability requirements are met. Refer to PT/0/A/1103/019 (Backup Incore Detector System). **STANDARD:** Determine the minimum incore detector operability requirements are met from the initiating cue. **COMMENTS:**	___ SAT ___ UNSAT

3	**3.2.4**	Order of preference of measurement systems to determine axial imbalance and quadrant power tilt is as follows: A. Incore Detectors (Computer Reactor Calculation Package). B. Outcore Detectors (Power Range Outcore Detectors). C. Backup Incore Detectors. Refer to PT/0/A/1103/019 (Backup Incore Detector System). **STANDARD:** Candidate reviews step and determines Outcore Detectors should be used. Continues to Step 3.2.5 **COMMENTS:**	___ SAT ___ UNSAT
4	**3.2.5**	**IF** at least one power range outcore detector is **NOT** operable in each quadrant (NI-5 thru NI-8), outcore detectors shall **NOT** be used to measure axial imbalance or quadrant power tilt **STANDARD:** Determine NI-5 thru NI-8 are operable and can be used to measure axial imbalance. **COMMENTS:**	___ SAT ___ UNSAT
5	**3.2.6**	**IF** Outcore Detectors (Power Range Outcore Detectors) are needed for tilt calculations, contact Rx Engineering group to perform PT/0/A/1103/018 (Excore Tilt Calculations). **STANDARD:** Determine this step does not apply because they are not determining tilt calculation at this time. ***EXAMINER CUE: If asked, notify the candidate that tilt calculations are not required.*** **COMMENTS:**	___ SAT ___ UNSAT

6	3.2.7	**IF** Outcore Detectors (Power Range Outcore Detectors) are needed for imbalance calculations, refer to the following alternate method for determining (%) Reactor Power Axial Imbalance: $\frac{\text{NI-5* + NI-6* + NI-7* + NI-8*}}{4}$ = % Imbalance (Avg.) * Use Imbalance CR gauges reading for each NI. **STANDARD:** Using the attached NI graphic determine that % Imbalance (Avg.) is **- 19.2%.** **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT
7		Refer to the Unit 1 COLR to determine if the calculated outcore imbalance is within the limit for current plant conditions. **STANDARD:** Determine the calculated outcore imbalance (- 19.2%) exceeds the limit (- 17.7%) for current plant conditions. **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT
8		Reference Tech Specs to determine required actions. **STANDARD:** Enter TS 3.2.2 Condition A: Restore AXIAL POWER IMBALANCE to within limits within 2 hours. **COMMENTS:** **END TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
6	This step is required to determine average imbalance.
7	This step is required to determine if imbalance is within the limits of the COLR.
8	This step is required to determine actions required by Tech Specs.

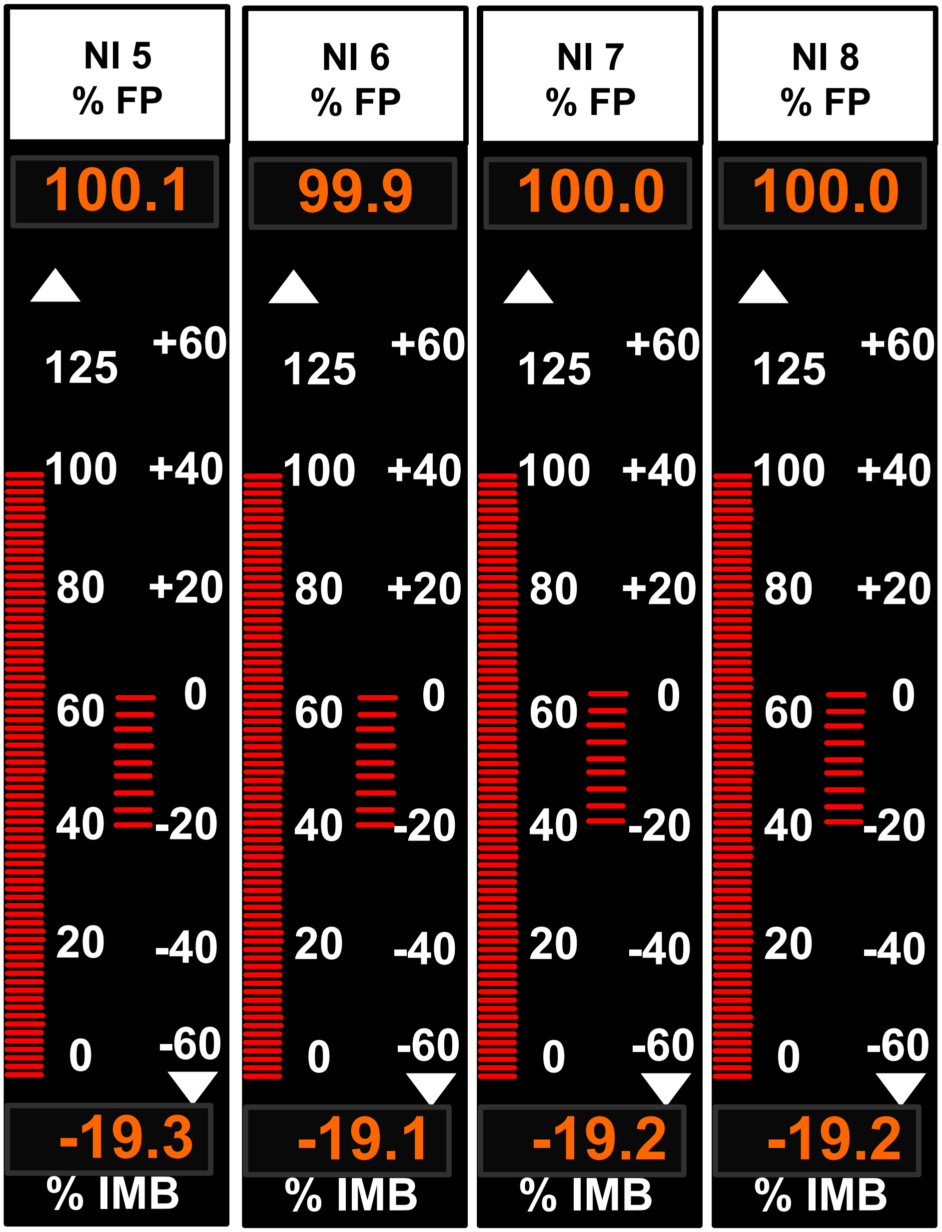
BACKUP INCORE CHART "A"		
POINT #	%	Location
1	158.6	G09-L2
2	112.1	G09-L4
3	98.6	G09-L6
4	159.2	E09-L2
5	111.8	E09-L4
6	98.4	E09-L6
7	158.8	G05-L2
8	97.5	G05-L6
9	159.9	M07-L2
10	99.2	M07-L6
11	158.6	K11-L2
12	98.1	K11-L6
13	157.8	F13-L2
14	158.6	D05-L2
15	112.3	F13-L4
16	158.1	C06-L2
17	99.6	C06-L6
18	98.8	F13-L6
19	97.6	O10-L6
20	98.3	L03-L6
21	159.6	L03-L2
22	98.6	D05-L6
23	158.7	O10-L2
24	111.9	D05-L4

BACKUP INCORE CHART "B"		
POINT #	%	Location
1	98.6	E07-L6
2	97.4	G11-L6
3	99.2	M09-L6
4	*OOS	K05-L6
5	*OOS	K05-L4
6	*OOS	L06-L2
7	*OOS	L06-L4
8	*OOS	L06-L6
9	156.2	M09-L2
10	*OOS	K05-L2
11	159.2	G11-L2
12	*OOS	E07-L2
13	158.2	C10-L2
14	98.1	C10-L6
15	*OOS	F03-L2
16	98.5	F03-L6
17	*OOS	N04-L2
18	112.1	N04-L4
19	*OOS	N04-L6
20	159.3	O06-L2
21	*OOS	O06-L4
22	*OOS	O06-L6
23	*OOS	L13-L2
24	98.8	L13-L6

Note: Listed points with values are "in calibration".

* Work Request written

POWER RANGE NI'S



CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

- Unit 1 had a transient from 100% power 4 hours ago.
- The current time is 2000.
- The Reactor Calculations package is **NOT** running.
- All other equipment is operable.
- PT/1/A/0600/001 (Periodic Instrument Surveillance), Enclosures 13.1 (Mode 1 & 2) has been completed up to page 7, Axial Power Imbalance Operating Limits.
- Minimum incore detector operability requirements have been verified met per PT/0/A/1103/019 (Backup Incore Detector System).

INITIATING CUE

The SRO directs you to:

1. Perform Axial Power Imbalance verification in accordance with PT/1/A/0600/001 (Periodic Instrument Surveillance), Enclosure 13.1 (Mode 1 & 2).

2. Determine all Tech Spec Conditions, Required Actions, and Completion times, if any.

TECH SPEC CONDITION (s) ____________________

- **REQUIRED ACTION (s) / COMPLETION TIME (s)**______________________

REGION II
JOB PERFORMANCE MEASURE

Admin-S110

CALCULATION OF PRIMARY TO SECONDARY LEAK RATE
AND DETERMINATION OF SHUTDOWN REQUIREMENTS

Alternate Path: (No)

Alt Path Failure: ______________________________

Time Critical: (No)

Time Critical Criteria: ______________________________

Prepared By: ______________________________ Date:

EP Review By: ______________________________ Date:

Reviewed By: ______________________________ Date:

Approved By: ______________________________ Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title : Calculation of Primary to Secondary Leak Rate and determination of shutdown requirements

Task Number :

Alternate Path: (No)

Time Critical: (No)

Validation Time: 15 Minutes

K/A Rating(s):

System: Gen
K/A: 2.1.7
Rating: 4.4/4.7

Task Standard:

Utilize AP/1/A/1700/031 (Primary to Secondary Leakage) Subsequent Actions to determine correct calculation enclosure to use to quantify the leak rate, and enclosure to determine unit shutdown requirements.

Utilize AP/1/A/1700/031 (Primary to Secondary Leakage) Enclosure 5.5 (Calculation of Primary to Secondary Leak Rate using 1RIA-40) and RCS Samples to correctly calculate SG Tube Leak flow rate.

Utilize AP/1/A/1700/031 (Primary to Secondary Leakage), Enclosure 5.1 (Unit Shutdown Requirements) to determine shutdown requirements based on quantified leak rate from Enclosure 5.5.

References:
AP/1/A/1700/031, Primary to Secondary Leakage Rev 21

Tools/Equipment/Procedures Needed:
AP/1/A/1700/031 complete up thru Step 4.25
Calculator

==

Candidate: ______________________________ Time Start: _____________
NAME Time Finish: _____________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ ______________________________/_________
NAME SIGNATURE DATE
==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

1. **N/A**

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 Reactor power = 37% stable
- AP/1/A/1700/031 (Primary to Secondary Leakage) entered due to suspected leakage > 5 gpd but < 25 gpm
- 1RIA-40 (from View Node information) = 768 cpm
  - ➢ Spiked as high as 1063 cpm approximately 2 hours ago
- Off Gas Blower is in operation
- OAC primary to secondary leak rate calculation became unavailable at shift turnover
- RP and Primary Chemistry sample results are as follows:
  - ➢ Total Xe 133 equivalent activity (from RP CSAE off-gas sample) = 2.1 E-5 μCi/ml
  - ➢ Total Xe 133 activity (from RP CSAE off-gas sample) = 2.23 E-5 μCi/ml
  - ➢ RCS Xe 133 equivalent corrected (from Primary Chemistry RCS sample) = 0.328 μCi/ml
  - ➢ RCS Xe 133 activity (from Primary Chemistry RCS sample) = 0.301 μCi/ml
  - ➢ CSAE off-gas flow = 12.5 scfm

INITIATING CUES

AP/1/A/1700/031 is complete up thru Step 4.25. You are to continue in the AP and determine the primary to secondary leak rate and make a recommendation for required time to shutdown based on the calculated leak rate. Document the primary to secondary leak rate and your operational recommendation below.

Another operator will make all required log entries.

LEAK RATE _______________

TIME REQUIRED TO BE IN MODE 3 _______________

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	**4.26**	**PERFORM** Encl.5.5 (Calculation of Primary to Secondary Leak Rate using 1RIA-40). **STANDARD**: Candidate proceeds to Enclosure 5.5 **COMMENTS**:	___ SAT ___ UNSAT
2	**Encl 5.5 1**	Obtain RCS Xe 133 equivalent corrected from latest available Primary Chemistry RCS sample. ___________________(mCi/ml) **STANDARD**: Candidate must pick the RCS Xe 133 equivalent corrected from the Initial conditions (0.328 µCi/ml). **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT
3	2	**NOTE** The maximum indicated 1RIA-40 count rate (the peak of any spikes) should be used to calculate leak rate. {15} Obtain 1RIA-40 counts from the Control Room RIA View Node. (1VB2) __________________ cpm **STANDARD**: Candidate obtains the 1RIA-40 spike counts (from initial conditions) per the NOTE preceding Step 2 (1063 cpm). **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT

<table>
<tr>
<td>4</td>
<td>3</td>
<td>
NOTE
Total CSAE off-gas flow has been conservatively assumed, as required by PIP O-07-5869 CA 1, to be 100 ft3/min . This may cause indicated SG tube leak rate to be greater than actual SG tube leak rate.

Determine primary to secondary leak rate from the following formulas:

$\text{Leak rate} = 100\ \text{ft}^3/\text{min} \times \dfrac{\text{1RIA-40 (cpm)}}{\text{RCS Xe 133 eq corr } (\mu\text{Ci/ml})} \times \dfrac{3.67\text{E-4 (gal)(min)}(\mu\text{Ci/ml})}{(\text{ft}^3)(\text{day})(\text{cpm})}$

$\text{Leak rate} = \dfrac{100\ \text{ft}^3}{\text{min}} \times \dfrac{\text{cpm}}{\mu\text{Ci/ml}} \times \dfrac{3.67\text{E-4 (gal)(min)}(\mu\text{Ci/ml})}{(\text{ft}^3)(\text{day})(\text{cpm})} = \_\_\_\_\_\_\_\_\_ \text{ gpd}$

STANDARD: Candidate calculates the SGTL size as follows per Encl. 5.5. formula, determines leak rate is 118.9 gpd (118 to 119 gpd).
Candidate exits enclosure 5.5. Returns to step 4.27.

COMMENTS:
</td>
<td>CRITICAL STEP

___ SAT

___ UNSAT</td>
</tr>
<tr>
<td>5</td>
<td>4.27</td>
<td>
GO TO the appropriate step based on Primary to Secondary Leak Rate:

STANDARD: Candidate determines that the GO TO step is 4.93 based on leak rate calculation 100 gpd to < 25 gpm, and proceeds to that step.

COMMENTS:
</td>
<td>___ SAT

___ UNSAT</td>
</tr>
</table>

6	**4.93**	Initiate log readings from the following every 15 minutes in the Auto Log: • 1RIA-16 • 1RIA-17 • 1RIA-40 • 1RIA-59 (when Rx power > 40 %) • 1RIA-60 (when Rx power > 40 %) **STANDARD**: Per the cue sheet, another operator will make all log entries. **COMMENTS**:	___ SAT ___ UNSAT
7	**4.94**	Initiate a unit shutdown to meet requirements of Encl 5.1 (Unit Shutdown Requirements) using the following, as applicable: • AP/29 (Rapid Unit Shutdown) • OP/1/A/1102/004 (Operation at Power) • OP/1/A/1102/010 (Controlling Procedure for Unit Shutdown) **STANDARD**: Candidate proceeds to Enclosure 5.1 **COMMENTS**:	___ SAT ___ UNSAT

<table>
<tr>
<td>8</td>
<td>Encl
5.1</td>
<td>
<u>NOTE</u>

The time limits for all conditions begin when the associated leak rate is first quantified, typically by OAC point O1P1599 or 1RIA-59/60 reading. Although grab samples may be collected to validate leak size, the time limits begin from the first quantified leak rate.
For items 1&2, shutdown must commence immediately.
For items 3-5, commencement of shutdown may be delayed until leak rate is confirmed by grab samples, however the time limit begins when the leak rate was first quantified.
Continuous Primary to Secondary Leakage Monitoring is provided by the following methods:
1-OAC Point O1P1599 (EST TOTAL PRI TO SEC LEAKRATE) including 1RIA-40 operable with CSAE OFF-GAS BLOWER operating
2-1RIA-59 and 1RIA-60 operable with power > 40%
If shutdown begins based on crediting 1RIA-59 and 1RIA-60 (1RIA-40 inoperable), the time limit does NOT change when Rx power is decreased below 40%.

<u>STANDARD</u>: Candidate utilizes the Table and Notes in AP/31 Encl. 5.1, Unit Shutdown Requirements, and determines the time to be in Mode 3 based on a leak rate of 118.9 gpd to be 3 hours from the time of quantification. Unit 1 must be shut down and in Mode 3 within 3 hours.

Leak Rate = 118 - 119 gpd

Time Required to be in Mode 3 = 3 hours

<u>COMMENTS</u>:

END TASK
</td>
<td>CRITICAL STEP

___ SAT

___ UNSAT</td>
</tr>
</table>

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
2	Required to calculate the leak rate correctly
3	Required to calculate the leak rate correctly
4	Required to calculate the leak rate correctly
8	Required to determine time of shutdown to Mode 3

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

- Unit 1 Reactor power = 37% stable
- AP/1/A/1700/031 (Primary to Secondary Leakage) entered due to suspected leakage

  > 5 gpd but < 25 gpm
- 1RIA-40 (from View Node information) = 768 cpm
  - ➢ Spiked as high as 1063 cpm approximately 2 hours ago
- Off Gas Blower is in operation
- OAC primary to secondary leak rate calculation became unavailable at shift turnover
- RP and Primary Chemistry sample results are as follows:
  - ➢ Total Xe 133 equivalent activity (from RP CSAE off-gas sample) = 2.1 E-5 µCi/ml
  - ➢ Total Xe 133 activity (from RP CSAE off-gas sample) = 2.23 E-5 µCi/ml
  - ➢ RCS Xe 133 equivalent corrected (from Primary Chemistry RCS sample) = 0.328 µCi/ml
  - ➢ RCS Xe 133 activity (from Primary Chemistry RCS sample) = 0.301 µCi/ml
  - ➢ CSAE off-gas flow = 12.5 scfm

INITIATING CUES

AP/1/A/1700/031 is complete up thru Step 4.25. You are to continue in the AP and determine the primary to secondary leak rate and make a recommendation for required time to shutdown based on the calculated leak rate. Document the primary to secondary leak rate and your operational recommendation below.

Another operator will make all required log entries.

LEAK RATE _______________

TIME REQUIRED TO BE IN MODE 3 _______________

REGION II
JOB PERFORMANCE MEASURE

ADM-S201

DETERMINE TECH SPEC REQUIREMENTS FOR INOPERABLE PZR HEATERS

Administrative: Yes

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title : Determine Tech Spec Requirements for Inoperable PZR Heaters

Task Number :

Alternate Path: No

Time Critical: No

Validation Time: 15 min

K/A Rating(s):

System: Generic
K/A: 2.2.40
Rating: 3.4/4.7

Task Standard:

Determine that minimum number of PZR heaters for SSF operability are NOT operable and as a result TS 3.10.1 Condition A must be entered. The Required Action and Completion Time is to restore SSF ASW system to Operable within 7 days.

References:

Technical Specifications

Tools/Equipment/Procedures Needed:

Technical Specifications

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ________________________________ Time Start: _______________

NAME Time Finish: ______________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ____________________________ _________________________________/_________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

1. *N/A*

READ TO OPERATOR

DIRECTIONS TO STUDENT

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

INITIAL CONDITIONS

Unit 2 is operating at 100% power.

Pressurizer Steam Space Leakage = 0.0 gpm

Number of SSF Bank 2 Pressurizer Heaters available = 16

INITIATING CUES

The SM directs you to:

1. Evaluate TS 3.10 (SSF) and determine if the required Pressurizer heaters are operable.

As a result of your evaluation above, document all applicable Conditions, Required Actions, and Completion Times (if any) below.

TECH SPEC CONDITION (s) ______________________

- **REQUIRED ACTION (s) / COMPLETION TIME (s)** ____________________________

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1		Candidate will evaluate Tech Spec requirements. • Evaluate TS B 3.10.1 for Unit 2 **STANDARD:** Determine that: • For Unit 2 the maximum allowed PZR Steam Space Leakage is 0.0 gpm. • Number of Bank 2 PZR heaters required is 17. • As a result the minimum number of PZR heaters for SSF operability are NOT operable. **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT
2		Candidate will evaluate the Table on Page B 3.10.1-4. **STANDARD:** Determine that the SSF ASW system inoperable, • TS 3.10.1 Condition A should be entered. • Required Action and Completion Time is to restore SSF ASW system to Operable within 7 days ***EXAMINER NOTE: Normally the SSF ASW System being inoperable would render ALL of the SSF systems inoperable. However, if the SSF ASW System is inoperable due to inoperable PZR heaters, the other SSF systems remain operable.*** **COMMENTS:** **END OF TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
1	This step is required to determine if required SSF PZR heaters are operable.
2	This step is required to ensure compliance with Tech Specs.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Unit 2 is operating at 100% power.

Pressurizer Steam Space Leakage = 0.0 gpm

Number of SSF Bank 2 Pressurizer Heaters available = 16

INITIATING CUES

The SM directs you to:

1. Evaluate TS 3.10 (SSF) and determine if the required Pressurizer heaters are operable.

As a result of your evaluation above, document all applicable Conditions, Required Actions, and Completion Times (if any) below.

TECH SPEC CONDITION (s) ________________________

- **REQUIRED ACTION (s) / COMPLETION TIME (s) ________________________________**

(Shall be administered on same day as ADM-306)

REGION II
JOB PERFORMANCE MEASURE

ADM-S300

Calculate Dose Received and Determine Approval Level Required to Exceed Emergency Dose Limits (EDL)

Administrative: Yes

Alternate Path: No

Alt Path Description: ______________________________

Time Critical: No

Time Critical Criteria: ______________________________

Prepared By:		Date:
EP Review By:		Date:
Reviewed By:		Date:
Approved By:		Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Calculate Dose Received and Determine Approval Level Required to Exceed Emergency Dose Limits (EDL)

Task Number:

Alternate Path: No

Time Critical: No

Validation Time: 20 min

K/A Rating(s):

System: Generic
K/A: 2.3.4
Rating: *3.2/3.7*

Task Standard:

Calculate Dose Received and Determine Approval Level Required to Exceed Emergency Dose Limits (EDL)

References:

PD-RP-ALL-0001 (Radiation Worker Responsibilities) Rev 09
OMP 1-18 (Implementation Standard During Abnormal And Emergency Events) Rev 41
AD-EP-ALL-0205 (Emergency Exposure Controls) Rev 1

Tools/Equipment/Procedures Needed:

Calculator
Note tablet

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ______________________________ Time Start: _____________

NAME Time Finish: _____________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: __________________________ ______________________________/__________

NAME SIGNATURE DATE

==

Comments

SIMULATOR OPERATOR JPM SETUP INSTRUCTIONS

1. *N/A*

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 3

TSC and OSC are activated

Emergency Dose Limits are in effect

The following tasks are required to be performed:

TASK	TIME REQUIRED	DOSE RATE
1	8 min	12.45 R/hr
2	11 min	16.75 R/hr
3	9 min	9.35 R/hr

Note: No dose is received while traveling between tasks.

INITIATING CUE

Refer to the above information. Tasks 1, 2, and 3 have been assigned to AO “A”.

Determine the total dose that AO “A” will receive while completing the above tasks.

State the approval level position(s), if any, required to allow completion of the above tasks for the purpose of protecting valuable property.

ROUND ALL CALCULATIONS TO TWO (2) DECIMAL PLACES

AO “A” TOTAL DOSE ______________________

APPROVAL LEVEL REQUIRED ______________________________________

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1		Determine dose received while performing task 1. **STANDARD:** Determine dose received while performing task 1. 12.45 R/hr X 1hr/60 min X 8 min = 1.66 R **(1.62 to 1.67 R)** **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT
2		Determine dose received while performing task 2. **STANDARD:** Determine dose received while performing task 2. 16.75 R/hr X 1hr/60 min X 11 min = 3.07 R **(3.02 to 3.08 R)** **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT
3		Determine dose received while performing task 3. **STANDARD:** Determine dose received while performing task 3. 9.35 R/hr X 1hr/60 min X 9 min = 1.40 R **(1.39 to 1.41 R)** **COMMENTS:**	**CRITICAL STEP** ___ SAT ___ UNSAT

4		Determine the total dose that will be received from performing Tasks 1, 2, and 3. **STANDARD**: Determine the total dose that will be received from performing Tasks 1, 2, and 3: 1.66 R + 3.07 R + 1.40 R = **6.13 R (6.04 R to 6.20 R)** **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT
5		State the approval level position(s), if any, required to allow completion of the above tasks to protect valuable property. **STANDARD**: Candidate determines the dose required to complete Tasks 1, 2, and 3 is > 5 Rem and will require approval from the: • **Emergency Coordinator (EC)** **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
1	This step is required to calculate total dose received.
2	This step is required to calculate total dose received.
3	This step is required to calculate total dose received.
4	This step is required to calculate total dose received.
5	This step is required to determine approval level required.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

A Large Break LOCA has occurred on Unit 3

TSC and OSC are activated

Emergency Dose Limits are in effect

The following tasks are required to be performed:

TASK	TIME REQUIRED	DOSE RATE
1	8 min	12.45 R/hr
2	11 min	16.75 R/hr
3	9 min	9.35 R/hr

Note: No dose is received while traveling between tasks.

INITIATING CUE

Refer to the above information. Tasks 1, 2, and 3 have been assigned to AO "A".

Determine the total dose that AO "A" will receive while completing the above tasks.

State the approval level position(s), if any, required to allow completion of the above tasks for the purpose of protecting valuable property.

ROUND ALL CALCULATIONS TO TWO (2) DECIMAL PLACES

AO "A" TOTAL DOSE ______________________

APPROVAL LEVEL REQUIRED ______________________________________

REGION II
JOB PERFORMANCE MEASURE

ADM-S406

DETERMINE THE APPROPRIATE EMERGENCY ACTION LEVEL

Alternate Path: No

Alt Path Description: N/A

Time Critical: Yes

Time Critical Criteria: EAL determined within 15 minutes

Prepared By: ____________________ Date:

EP Review By: ____________________ Date:

Reviewed By: ____________________ Date:

Approved By: ____________________ Date:

REGION II
JOB PERFORMANCE MEASURE

Task Title: Determine the Appropriate Emergency Action Level

Task Number:

Alternate Path: No

Time Critical: Yes

Validation Time: 15 min

K/A Rating(s):

System: Generic
K/A: 2.4.41
Rating: 2.9/4.6

Task Standard:

Appropriate Emergency Action Level is determined for given plant conditions.

References:

RP/0/A/1000/01 (Emergency Classification) Rev 6
EAL Wallcharts
BASIS Document (Volume "A", Section "D" of the Emergency Plan)

Tools/Equipment/Procedures Needed:

RP/0/A/1000/01 (Emergency Classification) Rev 6
EAL Wallcharts
BASIS Document (Volume "A", Section "D" of the Emergency Plan)

(Note: Below this line is used only for Initial NRC Exams)

==

Candidate: ______________________________ Time Start: _____________

NAME Time Finish: _____________

Performance Rating: SAT ______ UNSAT ______ Performance Time: _________

Examiner: ___________________________ ______________________________/_________

NAME SIGNATURE DATE

==

Comments

READ TO OPERATOR

DIRECTIONS TO STUDENT

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 3 at 100% power

B6T-06 (PSW Primary Pump Bkr) is out of service for PM

Both Unit 3 LPSW pumps fail due to rapid clogging of the LPSW Pump's suction strainers

Unit 3 reactor is manually tripped

3A, 3B, and 3C Hotwell Pumps trip and lockout

U3 TD EFDW pump tripped

3A and 3B MD EFDW pumps fail due to loss of cooling water

AOs are unable to cross-connect with Unit 1 or 2 Emergency Feedwater

Rule 4 (Initiation of HPI Forced Cooling) initiated

INITIATING CUE

The CRS directs you to determine the appropriate Emergency Action Level, per the above information

Inform the examiner when you have made the classification

THIS IS A TIME CRITICAL JPM

Note: Do not use Emergency Coordinator's judgment as the basis for classifying the event

START TIME: _______

SEQ STEP	PROC STEP	DESCRIPTION	
1	1	Determine the Emergency Action Level. **STANDARD**: Candidate refers to the EAL Wallchart EAL- HOT MODES 1, 2, 3 & 4, Table F-1 Fission Product Barrier Threshold Matrix and determines HPI forced cooling initiated is a Potential Loss of the RCS Barrier. F-1, B.2 Candidate then refers to **F** Fission Product Barriers FA1.1 - **Any** loss or **any** potential loss of either Fuel Clad or RCS barrier (Table F-1). F-1, A.1 Candidate classifies the event as: **ALERT (FA1.1)** **COMMENTS**:	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: ________

CRITICAL STEP EXPLANATIONS

SEQ STEP #	Explanation
1	This step is required for the candidate to utilize the EAL Wallchart and determine the conditions meet an Alert classification within 15 minutes.

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

Unit 3 at 100% power

B6T-06 (PSW Primary Pump Bkr) is out of service for PM

Both Unit 3 LPSW pumps fail due to rapid clogging of the LPSW Pump's suction strainers

Unit 3 reactor is manually tripped

3A, 3B, and 3C Hotwell Pumps trip and lockout

U3 TD EFDW pump tripped

3A and 3B MD EFDW pumps fail due to loss of cooling water

AOs are unable to cross-connect with Unit 1 or 2 Emergency Feedwater

Rule 4 (Initiation of HPI Forced Cooling) initiated

INITIATING CUE

The CRS directs you to determine the appropriate Emergency Action Level, per the above information

Inform the examiner when you have made the classification

THIS IS A TIME CRITICAL JPM

Note: Do not use Emergency Coordinator's judgment as the basis for classifying the event

---

Operator Note: Complete ALL blanks below.

OPERATOR NAME: ______________________________________

EAL CLASSIFICATION: (Include EAL #)

____