

Facility: <u>Hope Creek Generating Station</u>		Date of Examination: <u>8/12/2019</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: _____

  

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	S,D	Complete The Daily Surveillance Logs
Conduct of Operations	S,M	Perform A Shift Turnover As On-Coming/Off-Going NCO
Equipment Control	S,D	Perform Actions to Achieve Criticality and Raise Power to the Point of Adding Heat
Radiation Control	R,D	Purge The Containment
Emergency Plan		

**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 ( $\leq 3$  for ROs;  $\leq 4$  for SROs and RO retakes)
- (N)ew or (M)odified from bank ( $\geq 1$ )
- (P)revious 2 exams ( $\leq 1$ , randomly selected)

Facility: Hope Creek Generating StationDate of Examination: 8/12/2019Examination Level: RO ☐ SRO ☒

Operating Test Number: \_\_\_\_\_

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,D,P	Ensure The Operating Shift Is Adequately Manned
Conduct of Operations	R,D	Review All Operations Logs In Use During A Shift Including Computer Logs
Equipment Control	R,M	Complete an Action Statement Log Sheet
Radiation Control	R,D	Verify Compliance with Gaseous Release Permit
Emergency Plan	R,M	Utilize The ECG To Determine The Emergency Classification

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 ( $\leq 3$  for ROs;  $\leq 4$  for SROs and RO retakes)  
 (N)ew or (M)odified from bank ( $\geq 1$ )  
 (P)revious 2 exams ( $\leq 1$ , randomly selected)

Facility: <u>Hope Creek Generating Station</u>	Date of Examination: <u>8/12/2019</u>	
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	Operating Test Number: _____	
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. A.C. Electrical Dist. / Respond To A Turbine Generator Malfunction	A,D,L,S	6
b. Reactor Core Isolation Cooling / Reduce Torus Level Using RCIC System	D,S	4
c. Component Cooling Water / Transfer TACS To The Standby SACS Loop	D,S	8
d. Low Pressure Core Spray /Manually Start the Core Spray System	A,D,EN,S	2
e. Control Rod and Drive Mechanism / Respond To A Control Rod High Temperature	A,M,S	1
f. Primary Containment System and Auxiliaries / Operate The PCIG System During Post LOCA/Isolation Conditions	A,D,EN,S	5
g. Average Power Range Monitor/Local Power Range Monitor / Respond To A Recirculation Pump Malfunction	D,S	7
h. Reactor/Turbine Pressure Regulating / Perform a Cooldown Using Bypass Valves	D,L,P,S	3
In-Plant Systems: 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. Component Cooling Water / Respond To A SACS Malfunction	D,EN,R	8
j. Uninterruptable Power Supply (A.C. /D.C.) / Remove 120 VAC Electrical Distribution System From Service	A,D	6
k. Primary Containment System and Auxiliaries / Purge the Vent line	E,EN,L,N	5
<p>* 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.</p>		
* Type Codes	Criteria for R /SRO-I/SRO-U	
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power/Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6/4-6 /2-3  $\leq 9/\leq 8/\leq 4$ $\geq 1/\geq 1/\geq 1$ $\geq 1/\geq 1/\geq 1$ (control room system) $\geq 1/\geq 1/\geq 1$ $\geq 2/\geq 2/\geq 1$ $\leq 3/\leq 3/\leq 2$ (randomly selected) $\geq 1/\geq 1/\geq 1$	

Facility:	Hope Creek Generating Station	Date of Examination:	8/12/2019
Exam Level:	RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>	Operating Test Number:	
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. A.C. Electrical Dist. / Respond To A Turbine Generator Malfunction	A,D,L,S	6	
b. Reactor Core Isolation Cooling / Reduce Torus Level Using RCIC System	D,S	4	
c. Component Cooling Water / Transfer TACS To The Standby SACS Loop	D,S	8	
d. Low Pressure Core Spray /Manually Start the Core Spray System	A,D,EN,S	2	
e. Control Rod and Drive Mechanism / Respond To A Control Rod High Temperature	A,M,S	1	
f. Primary Containment System and Auxiliaries / Operate The PCIG System During Post LOCA/Isolation Conditions	A,D,EN,S	5	
g. Average Power Range Monitor/Local Power Range Monitor / Respond To A Recirculation Pump Malfunction	D,S	7	
h.			
In-Plant Systems: * 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U			
i. Component Cooling Water / Respond To A SACS Malfunction	D,EN,R	8	
j. Uninterruptable Power Supply (A.C. /D.C.) / Remove 120 VAC Electrical Distribution System From Service	A,D	6	
k. Primary Containment System and Auxiliaries / Purge the Vent line	E,EN,L,N	5	
<p>* 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.</p>			
* Type Codes	Criteria for R /SRO-I/SRO-U		
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power/Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6/4-6 /2-3  $\leq 9/\leq 8/\leq 4$ $\geq 1/\geq 1/\geq 1$ $\geq 1/\geq 1/\geq 1$ (control room system) $\geq 1/\geq 1/\geq 1$ $\geq 2/\geq 2/\geq 1$ $\leq 3/\leq 3/\leq 2$ (randomly selected) $\geq 1/\geq 1/\geq 1$		

Facility: <u>Hope Creek Generating Station</u>		Date of Examination: <u>8/12/2019</u>
Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>		Operating Test Number:
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. A.C. Electrical Dist. / Respond To A Turbine Generator Malfunction	A,D,L,S	6
b.		
c.		
d. BE005; Manually Start the Core Spray System	A,D,EN,S	2
e. Control Rod and Drive Mechanism / Respond To A Control Rod High Temperature	A,M,S	1
f.		
g.		
h.		
In-Plant Systems: * 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. Component Cooling Water / Respond To A SACS Malfunction	D,EN,R	8
j.		
k. Primary Containment System and Auxiliaries / Purge the Vent line	E,EN,L,N	5
* 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	$\leq 9/\leq 8/\leq 4$	
(E)mergency or abnormal in-plant	$\geq 1/\geq 1/\geq 1$	
(EN)gineered safety feature	$\geq 1/\geq 1/\geq 1$ (control room system)	
(L)ow-Power/Shutdown	$\geq 1/\geq 1/\geq 1$	
(N)ew or (M)odified from bank including 1(A)	$\geq 2/\geq 2/\geq 1$	
(P)revious 2 exams	$\leq 3/\leq 3/\leq 2$ (randomly selected)	
(R)CA	$\geq 1/\geq 1/\geq 1$	
(S)imulator		

Facility: Hope Creek Scenario No.: 1 Op-Test No.: \_\_\_\_\_

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: Plant is operating at approximately 75% power.

Turnover: Lower power to approximately 70%. Remove a RFP from service.

Critical Tasks: 1. Manually initiate ARI to shut down the reactor. 2. Place HPCI in service  
to restore and maintain Reactor water level.

Event No.	Malf. No.	Event Type*	Event Description
1		R	Lower Reactor Power with Recirculation System
2		N	Remove RFP In Service
3	RM9635	I	Radiation Monitor Failure
4	CU07	C	RWCU Leak Into RACS
5	ED09D2	C	Loss of 1DD482
6	RR31	M	LOCA
7	RP04	C	RPS Failure-ATWS/ARI Scram Successful
8	FW30/ HP14/5	C	Loss of Condensate-HPCI Injection Valves' Failure
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Hope Creek Scenario No.: 2 Op-Test No.: \_\_\_\_\_

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_

Initial Conditions: Approximately 95% Reactor power with a startup in progress. SSW Pump C tagged out for maintenance.

Turnover: Secure Drywell makeup. Raise Reactor Power to 100% Power.

Critical Tasks: 1. Start the A EDG. 2. Isolate HPCI steam leak. 3. Initiate actions to Emergency Depressurize the reactor/Restore RPV Level.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Secure containment makeup
2		R	Raise power with Recirculation Pumps
3	SL03	I	Inadvertent SBLC Initiation
4	ED11B	C	Loss of 10D420 125 VDC Bus
5	5A127	C	Secondary Condensate Pump Malfunction
6	EG12	M	Loss of Offsite Power
7	DG07A	C	Auto Start Failure of EDG/LOP Sequencer Failure
8	HP09	C	Steam Leak in HPCI Room with Auto Isolation Failure

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

Facility: Hope Creek Scenario No.: 3 Op-Test No.: \_\_\_\_\_

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: 100% power.

Turnover: \_\_\_\_\_

Critical Tasks: 1. Trip and isolates RR pump before DRWL pressure reaches 1.68 psig.

2. Open five SRVs after determining SC pressure cannot be maintained below PSP curve.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Swap In-feeds to Non-1E bus
2	RR19	I	Recirculation flow transmitter failure
3	RC08	C	RCIC Suppression Pool Suction Valve Failure
4	RR26	C	Reactor Recirculation Pump Seal Failures
5	CR02	R	Core Instabilities
6	MS15	I	Spurious Group 1 MSIV Isolation
7	RR31	M	LOCA
8	QQ21	C	RHR Pump Failure
9	RH20	C	Drywell Spray Valve Failure/Downcomer Failure

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



Facility: <b>Hope Creek</b>																	Date of Exam: <b>2019</b>						
Tier	Group	RO K/A Category Points												SRO-Only Points									
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2		G*	Total						
1. Emergency and Abnormal Plant Evolutions	1	3	3	3	N/A			3	4	N/A			4	20	3		4	7					
	2	1	1	1				1	2				1	7	2	1	3						
	Tier Totals	4	4	4				4	6				5	27	5	5	10						
2. Plant Systems	1	3	2	3	3	1	2	3	2	2	2	3	26	3		2	5						
	2	2	0	2	1	1	1	1	1	1	1	1	12	0	1	2	3						
	Tier Totals	5	2	5	4	2	3	4	3	3	3	4	38	4		4	8						
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	1	2	3	4	7					
					3		2		2		3			2	2	1	2						

- Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it 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  $\pm 1$  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 outline. Systems or evolutions that do not apply at the facility should be deleted with justification. Operationally important, site-specific systems/evolutions 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. 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 K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' 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 a category 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.

G\* Generic K/As

- \* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.
- \*\* These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
295016 (APE 16) Control Room Abandonment / 7						X	G 2.4.35 Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	4.0	76
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8					X		AA2.01 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Instrument air system pressure	3.6	77
295021 (APE 21) Loss of Shutdown Cooling / 4						X	G 2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	4.2	78
295023 (APE 23) Refueling Accidents / 8					X		AA2.04 Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS: †Occurrence of fuel handling accident	4.1	79
295024 High Drywell Pressure / 5						X	G 2.2.40 Ability to apply Technical Specifications for a system.	4.7	80
295025 (EPE 2) High Reactor Pressure / 3					X		EA2.01 Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE: Reactor pressure	4.3	81
295031 (EPE 8) Reactor Low Water Level / 2						X	G 2.1.32 Ability to explain and apply system limits and precautions.	4.0	82
295001 (APE 1) Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4					X		AA2.06 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Nuclear boiler instrumentation	3.2	1
295003 (APE 3) Partial or Complete Loss of AC Power / 6						X	G 2.2.39 Knowledge of less than or equal to one hour Technical Specification action statements for systems.	3.9	2
295004 (APE 4) Partial or Total Loss of DC Power / 6	X						AK1.05 Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Loss of breaker protection	3.3	3
295005 (APE 5) Main Turbine Generator Trip / 3		X					AK2.05 Knowledge of the interrelations between MAIN TURBINE GENERATOR TRIP and the following: Extraction steam system	2.6	4
295006 (APE 6) Scram / 1			X				AK3.04 Knowledge of the reasons for the following responses as they apply to SCRAM: Reactor water level setpoint setdown: Plant-Specific	3.1	5
295016 (APE 16) Control Room Abandonment / 7				X			AA1.05 Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT: D.C. electrical distribution	2.8	6
295018 (APE 18) Partial or Complete Loss of CCW / 8					X		AA2.03 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Cause for partial or complete loss	3.2	7
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8						X	G 2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	3.1	8
295021 (APE 21) Loss of Shutdown Cooling / 4	X						AK1.02 Knowledge of the operational implications of the following concepts as they apply to LOSS OF SHUTDOWN COOLING: Thermal stratification	3.3	9
295023 (APE 23) Refueling Accidents / 8		X					AK2.03 Knowledge of the interrelations between REFUELING ACCIDENTS and the following: Radiation monitoring equipment	3.4	10

295024 High Drywell Pressure / 5			X			EK3.02 Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE: Suppression pool spray operation: Plant-Specific	3.5	11
295025 (EPE 2) High Reactor Pressure / 3				X		EA1.04 Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE: HPCI: Plant-Specific	3.8	12
295026 (EPE 3) Suppression Pool High Water Temperature / 5					X	EA1.01 Ability to operate and/or monitor the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Suppression pool cooling	4.1	13
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5					X	G 2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	14
295030 (EPE 7) Low Suppression Pool Water Level / 5	X					EK1.03 Knowledge of the operational implications of the following concepts as they apply to LOW SUPPRESSION POOL WATER LEVEL: Heat capacity	3.8	15
295031 (EPE 8) Reactor Low Water Level / 2		X				EK2.05 Knowledge of the interrelations between REACTOR LOW WATER LEVEL and the following: Low pressure coolant injection (RHR)	4.2	16
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1			X			EK3.01 Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Recirculation pump trip/runback: Plant-Specific	4.1	17
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9				X		EA1.05 Ability to operate and/or monitor the following as they apply to HIGH OFF-SITE RELEASE RATE: Post accident sample system (PASS): Plant-Specific	3.0	18
600000 (APE 24) Plant Fire On Site / 8					X	AA2.10 Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Time limit of long-term-breathing air system for control room	2.9	19
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6					X	G 2.2.22 Knowledge of limiting conditions for operations and safety limits.	4.0	20
K/A Category Totals:	3	3	3	3	4/3	4/4	Group Point Total:	20/7

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
295007 (APE 7) High Reactor Pressure / 3					X		AA2.02 Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE: Reactor power	4.1	83
295009 (APE 9) Low Reactor Water Level / 2						X	G 2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.1	84
295034 (EPE 11) Secondary Containment Ventilation High Radiation / 9					X		EA2.01 Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: Ventilation radiation levels	4.2	85
295002 (APE 2) Loss of Main Condenser Vacuum / 3					X		AA2.02 Ability to determine and/or interpret the following as they apply to LOSS OF MAIN CONDENSER VACUUM: Reactor power: Plant-Specific	3.2	21
295010 (APE 10) High Drywell Pressure / 5						X	G 2.4.31 Knowledge of annunciator alarms, indications, or response procedures.	4.2	22
295014 (APE 14) Inadvertent Reactivity Addition / 1	X						AK1.03 Knowledge of the operational implications of the following concepts as they apply to INADVERTENT REACTIVITY ADDITION: Shutdown margin	3.7	23
295015 (APE 15) Incomplete Scram / 1		X					AK2.11 Knowledge of the interrelations between INCOMPLETE SCRAM and the following: Instrument air	3.5	24
295017 (APE 17) Abnormal Offsite Release Rate / 9			X				AK3.02 Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: Plant ventilation	3.3	25
295029 (EPE 6) High Suppression Pool Water Level / 5				X			EA1.03 Ability to operate and/or monitor the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL: RHR/LPCI	2.9	26
295036 (EPE 13) Secondary Containment High Sump/Area Water Level / 5					X		EA2. Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL: Water level in the affected area	3.1	27
K/A Category Point Totals:	1	1	1	1	2/2	1/1	Group Point Total:		7/3

BWR Examination Outline													Form ES-401-1	
Plant Systems—Tier 2/Group 1 (RO/SRO)														
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
203000 (SF2, SF4 RHR/LPCI) RHR/LPCI: Injection Mode								X				A2.01 Ability to (a) predict the impacts of the following on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Inadequate net positive suction head	3.4	86
215004 (SF7 SRMS) Source-Range Monitor											X	G 2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	87
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor								X				A2.08 Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A2.08 Faulty or erratic operation of detectors/systems	3.4	88
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)											X	G 2.1.20 Ability to interpret and execute procedure steps.	4.6	89
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection								X				A2.01 Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Turbine trips: BWR-2,3,4	4.0	90
203000 (SF2, SF4 RHR/LPCI) RHR/LPCI: Injection Mode											X	G 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	28
205000 (SF4 SCS) Shutdown Cooling											X	G 2.4.30 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.	2.7	29
205000 (SF4 SCS) Shutdown Cooling	X											K1.08 Knowledge of the physical connections and/or cause/effect relationships between SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) and the following: LPCI	3.9	30
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection		X										K2.04 Knowledge of electrical power supplies to the following: Turbine control circuits: BWR-2,3,4	2.5	31
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray			X									K3.01 Knowledge of the effect that a loss or malfunction of the LOW PRESSURE CORE SPRAY SYSTEM will have on following: Reactor water level	3.8	32
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray				X								K4.07 Knowledge of LOW PRESSURE CORE SPRAY SYSTEM design feature(s) and/or interlocks which provide for the following: Pump operability testing	2.8	33
211000 (SF1 SLCS) Standby Liquid Control				X								K4.03 Knowledge of STANDBY LIQUID CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: Keeping sodium pentaborate in solution	3.8	34
212000 (SF7 RPS) Reactor Protection	X											K1.10 Knowledge of the physical connections and/or cause/effect relationships between REACTOR PROTECTION SYSTEM and the following: Main turbine	3.2	35

212000 (SF7 RPS) Reactor Protection				X							K5.01 Knowledge of the operational implications of the following concepts as they apply to REACTOR PROTECTION SYSTEM: Fuel thermal time constant	2.7	36
215003 (SF7 IRM) Intermediate-Range Monitor					X						K6.03 Knowledge of the effect that a loss or malfunction of the following will have on the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM: Detector drive motor	2.8	37
215004 (SF7 SRMS) Source-Range Monitor						X					A1.06 Ability to predict and/or monitor changes in parameters associated with operating the SOURCE RANGE MONITOR (SRM) SYSTEM controls including: Lights and alarms	3.1	38
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor							X				A2.10 Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Changes in void concentration	2.8	39
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling								X			A3.02 Ability to monitor automatic operations of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) including: Turbine startup	3.6	40
218000 (SF3 ADS) Automatic Depressurization									X		A4.07 Ability to manually operate and/or monitor in the control room: ADS valve acoustical monitor noise: Plant-Specific	3.5	41
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff										X	G 2.4.50 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.2	42
239002 (SF3 SRV) Safety Relief Valves	X										K1.04 Knowledge of the physical connections and/or cause/effect relationships between RELIEF/SAFETY VALVES and the following: Main steam	3.6	43
259002 (SF2 RWLCS) Reactor Water Level Control		X									K2.02 Knowledge of electrical power supplies to the following: Feedwater coolant injection (FWCI) initiation logic: FWCI/HPCI	3.5	44
261000 (SF9 SGTs) Standby Gas Treatment									X		A4.08 Ability to manually operate and/or monitor in the control room: System temperature	2.6	45
261000 (SF9 SGTs) Standby Gas Treatment			X								K3.01 Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on following: Secondary containment and environment differential pressure.	3.3	46
262001 (SF6 AC) AC Electrical Distribution				X							K4.06 Knowledge of A.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the following: Redundant power sources to vital buses.	3.6	47
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)							X				A1.02 Ability to predict and/or monitor changes in parameters associated with operating the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) controls including: Motor generator outputs	2.5	48
263000 (SF6 DC) DC Electrical Distribution						X					K6.01 Knowledge of the effect that a loss or malfunction of the following will have on the D.C. ELECTRICAL DISTRIBUTION: A.C. electrical distribution	3.2	49
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG							X				A1.03 Ability to predict and/or monitor changes in parameters associated with operating the EMERGENCY GENERATORS (DIESEL/JET) controls including: Operating voltages, currents, and temperatures	2.8	50
300000 (SF8 IA) Instrument Air			X								K3.02 Knowledge of the effect that a loss or malfunction of the INSTRUMENT AIR SYSTEM will have on the following: Systems having pneumatic valves and controls	3.3	51

300000 (SF8 IA) Instrument Air									X				A2.01 Ability to (a) predict the impacts of the following on the INSTRUMENT AIR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Air dryer and filter malfunctions	2.9	52
400000 (SF8 CCS) Component Cooling Water										X			A3.01 Ability to monitor automatic operations of the CCWS including: Setpoints on instrument signal levels for normal operations, warnings, and trips that are applicable to the CCWS	3.0	53
K/A Category Point Totals:	3	2	3	3	1	2	3	2/3	2	2	3/2		Group Point Total:		26/5

ES-401		BWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)											Form ES-401-1	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
201001 (SF1 CRDH) CRD Hydraulic											X	G 2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.	4.3	91
214000 (SF1 RPIS) Rod Position Information								X				A2.02 Ability to (a) predict the impacts of the following on the ROD POSITION INFORMATION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor SCRAM	3.7	92
272000 (SF7, SF9 RMS) Radiation Monitoring											X	G 2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.3	93
201002 (SF1 RMCS) Reactor Manual Control	X											K1.03 Knowledge of the physical connections and/or cause/effect relationships between REACTOR MANUAL CONTROL SYSTEM and the following: Control rod block interlocks/power operation & refueling.	3.4	54
201003 (SF1 CRDM) Control Rod and Drive Mechanism			X									K3.02 Knowledge of the effect that a loss or malfunction of the CONTROL ROD AND DRIVE MECHANISM will have on following: †Flux shaping	2.8	55
202001 (SF1, SF4 RS) Recirculation				X								K4.01 Knowledge of RECIRCULATION System design feature(s) and/or interlocks which provide for the following: 2/3 core coverage: Plant-Specific	3.9	56
204000 (SF2 RWCU) Reactor Water Cleanup					X							K5.05 Knowledge of the operational implications of the following concepts as they apply to REACTOR WATER CLEANUP SYSTEM: Flow controllers	2.6	57
216000 (SF7 NBI) Nuclear Boiler Instrumentation						X						K6.02 Knowledge of the effect that a loss or malfunction of the following will have on the NUCLEAR BOILER INSTRUMENTATION: D.C. electrical distribution	2.8	58
223001 (SF5 PCS) Primary Containment and Auxiliaries							X					A1.09 Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES controls including: Suppression pool temperature.	3.5	59
256000 (SF2 CDS) Condensate								X				A2.01 Ability to (a) predict the impacts of the following on the REACTOR CONDENSATE SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Pump trips	3.3	60
259001 (SF2 FWS) Feedwater									X			A3.09 Ability to monitor automatic operations of the REACTOR FEEDWATER SYSTEM including: Lights and alarms	3.0	61
268000 (SF9 RW) Radwaste										X		A4.01 Ability to manually operate and/or monitor in the control room: A4.01 Sump integrators	3.4	62



271000 (SF9 OG) Offgas												X	G 2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	63
288000 (SF9 PVS) Plant Ventilation	X												K1.04 Knowledge of the physical connections and/or cause/effect relationships between PLANT VENTILATION SYSTEMS and the following: Applicable component cooling water system; Plant Specific	2.6	64
290001 (SF5 SC) Secondary Containment			X										K3.01 Knowledge of the effect that a loss or malfunction of the SECONDARY CONTAINMENT will have on following: †Off-site radioactive release rates	4.0	65
K/A Category Point Totals:	2	0	2	1	1	1	1	1/1	1	1	1/2		Group Point Total:		12/3

Facility: <b>Hope Creek</b>		Date of Exam: <b>2019</b>				
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.4	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.	3.3	66		
	2.1.9	Ability to direct personnel activities inside the control room.	2.9	67		
	2.1.34	Knowledge of primary and secondary plant chemistry limits.	2.7	68		
	2.1.2	Knowledge of operator responsibilities during all modes of plant operation.			4.4	94
	2.1.29	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.			4.0	95
	Subtotal					
2. Equipment Control	2.2.6	Knowledge of the process for making changes to procedures.	3.0	69		
	2.2.13	Knowledge of tagging and clearance procedures.	4.1	70		
	2.2.5	Knowledge of the process for making design or operating changes to the facility.			3.2	96
	2.2.18	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.			3.9	97
	Subtotal					
3. Radiation Control	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	71		
	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions.	3.5	72		
	2.3.11	Ability to control radiation releases.			4.3	98
	Subtotal					
4. Emergency Procedures/Plan	2.4.2	Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	73		
	2.4.26	Knowledge of facility protection requirements, including fire brigade and portable firefighting equipment usage.	3.1	74		
	2.4.29	Knowledge of the emergency plan.	3.1	75		
	2.4.38	Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required.			4.4	99
	2.4.39	Knowledge of RO responsibilities in emergency plan implementation.			3.8	100
	Subtotal					
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
1/1 (#8)	295019 / G 2.2.36	<p>Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.</p> <p>Cannot write a TS question for instrument air.</p> <p>Randomly re-selected G 2.4.50</p>
1/1 (#14)	295028 / G 2.4.49	<p>Ability to perform without reference to procedures those actions that   require immediate operation of system components and controls- High Drywell Temperature</p> <p>No Immediate Operator Actions for Hi Drywell Temperature condition.</p> <p>Randomly re-selected G 2.1.23</p>
1/1 (#18)	295038 / EA1.05	<p>Ability to operate and/or monitor the following as they apply to HIGH OFF-SITE RELEASE RATE: Post accident sample system (PASS): Plant-Specific</p> <p>The PASS system is no longer used at Hope Creek. There are other means used for sampling post-accident.</p> <p>Randomly re-selected EA1.04</p>
1/1 (#19)	600000 / AA2.10	<p>Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Time limit of long-term-breathing air system for control room.</p> <p>There is no long-term breathing air system at Hope Creek. OBAs are used for this purpose.</p> <p>Randomly re-selected AA2.17</p>
1/1 (#20)	700000 / G 2.2.22	<p>Knowledge of limiting conditions for operations and safety limits.</p> <p>There are no technical specification associated safety limits for Generator voltage and Electric Grid Disturbances.</p> <p>Randomly re-selected G 2.4.47</p>

Tier / Group	Randomly Selected K/A	Reason for Rejection
2/1 (#29)	205000 / G 2.4.30	<p>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.</p> <p>Reportable (ECG) is at the SRO level.</p> <p>Randomly re-selected G 2.4.47</p>
2/1 (#36)	212000 / K5.01	<p>Knowledge of the operational implications of the following concepts as they apply to REACTOR PROTECTION SYSTEM: Fuel thermal time constant.</p> <p>Cannot write an operationally valid question for fuel thermal time constant.</p> <p>Randomly selected K5.02</p>
2/1 (#39)	215005 / A2.10	<p>Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Changes in void concentration</p> <p>GFES- Thermodynamics. There are no mitigating strategies (procedures) for changes in void concentration specifically.</p> <p>Randomly selected A2.01</p>
2/2 (#55)	201003 / K3.02	<p>Knowledge of the effect that a loss or malfunction of the CONTROL ROD AND DRIVE MECHANISM will have on following: †Flux shaping</p> <p>Cannot write an operationally valid question.</p> <p>Randomly selected K3.01</p>
3/1 (#67)	G 2.1.9	<p>Ability to direct personnel activities inside the control room.</p> <p>K/A is not an RO level question.</p> <p>Randomly selected G 2.1.31</p>

Tier / Group	Randomly Selected K/A	Reason for Rejection
3/1 (#68)	2.1.34	Knowledge of primary and secondary plant chemistry limits. K/A is likely to require a reference, such as an entire procedure (DLU).  Cannot write a discriminating question.  Randomly reselected 2.1.1
3/3 (#71)	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.  Cannot write a discriminating question.  Randomly reselected 2.3.12
3/4 (#74)	2.4.26	Knowledge of facility protection requirements, including fire brigade and portable firefighting equipment usage.  Cannot write a discriminating question.  Randomly selected 2.4.39
1/1 (#82)	2.1.32	Cannot write a discriminating question.  Randomly selected 2.1.20
1/2 (#83)	295007 / A2.02	Cannot write an SRO level discriminating question for this APE. Added in EPE 295031 to Tier 1 Group 2 IAW ES-401, Attachment 1 as a site specific K/A that is operationally important pertaining to this facility but was not originally included on the generic Tier 1 Group 2 list.  Randomly selected 295031 / A2.02
2/1 (#86)	A2.01	Cannot write a discriminating question.  Randomly selected A2.04
3/4 (#100)	2.4.39	Cannot write a discriminating question.  Randomly selected 2.4.25
2/1 (#45)	A4.08	HC does not monitor system temperature from the control room for standby gas.  Randomly reselected A4.07
2/2 (#58)	K6.02	Cannot write an operationally valid question regarding DC for nuclear boiler.

		Randomly reselected K6.01
2/2 (#65)	K3.01	Cannot write a discriminating question of appropriate level of difficulty. Randomly reselected K6.01
1/2 (#84)	2.1.28	K/A is more suited for RO level knowledge. Randomly reselected 2.1.20
2/1 (#87)	2.4.9	K/A is more suited for RO level knowledge. Randomly reselected 2.2.40
2/1 (#31)	206000 / K2.04	This K/A overlaps substantially with question #44. Randomly reselected K2.01
2/1 (#46)	261000 / K3.01	Cannot write a discriminating question. Randomly reselected K3.04