Form 3.2-1 Administrative Topics Outline

Facility: PBAPS		Date of Examination: April 2024
Examination Level: RO X	SRO ☐	Operating Test Number: NRC 1
Administrative Topic (Step 1)	Activity and Associated K/A (Step 2)	Type Code (Step 3)
Conduct of Operations	G2.1.20 (4.6), Perform Reactor Coolant Leakage Surveillance (PLOR-159C)	R,M
Conduct of Operations	G2.1.37 (4.3), Perform APRM Scram Margin Check (PLOR-326C)	R,D
Equipment Control	G2.2.1 (4.5) Determine the Estimated Criticality Count Range (PLOR-NEW)	R,N
Radiation Control	N/A	
Emergency Plan	G2.4.43 (3.2), ERO Response Augmentation using Everbridge Web-Based Callout System (PLOR-092C)	S,D

Instructions for completing Form 3.2-1, “Administrative Topics Outline”

1. For each license level, determine the number of administrative job performance measures (JPMs) and topic areas as follows:

Topic	Number of JPMs	
	RO*	**SRO and RO Retakes**
Conduct of Operations	1 (or 2)	2
Equipment Control	1 (or 0)	1
Radiation Control	1 (or 0)	1
Emergency Plan	1 (or 0)	1
Total	**4**	**5**

* Reactor operator (RO) applicants do not need to be evaluated on every topic (i.e., “Equipment Control,” “Radiation Control,” or “Emergency Plan” can be omitted by doubling up on “Conduct of Operations”), unless the applicant is taking only the administrative topics portion of the operating test (with a waiver or excusal of the other portions).

2. Enter the associated knowledge and abilities (K/A) statement and summarize the administrative activities for each JPM.

3. For each JPM, specify the type codes for location and source as follows:

Location:

(C)ontrol room, (S)imulator, or Class(R)oom

Source and Source Criteria:

(P)revious two NRC exams (no more than one JPM that is **randomly selected** from last two NRC exams) 0

(D)irect from bank (no more than three for ROs, no more than four for SROs and RO retakes) 2

(N)ew or Significantly (M)odified from bank (no fewer than one) 2

Form 3.2-1 Administrative Topics Outline

Facility: PBAPS		Date of Examination: April 2023
Examination Level: RO ☐	SRO X	Operating Test Number: NRC 1
Administrative Topic (Step 1)	Activity and Associated K/A (Step 2)	Type Code (Step 3)
Conduct of Operations	G2.1.37 (4.6), Perform SRO Review of a Planned Reactivity Maneuver (PLOR-394C)	R,D
Conduct of Operations	G2.1.34 (3.5), Review and Evaluate Reactor Coolant Chemistry Limits (PLOR-259C)	R,M
Equipment Control	G2.2.12 (4.1), Review Primary Containment Purge/Vent Isolation Valve Cumulative Hour Log (PLOR-256C)	R,M
Radiation Control	2.3.14 (3.8), Take Actions for Accidents Involving the Transportation of Radioactive Material (PLOR-351C)	R,D
Emergency Plan	2.4.41 (4.6), EAL Classification and State/Local Notifications for Site Area Emergency – Hostile Action (PLOR-268C)	S,D

Instructions for completing Form 3.2-1, “Administrative Topics Outline”

1. For each license level, determine the number of administrative job performance measures (JPMs) and topic areas as follows:

Topic	Number of JPMs	
	RO*	**SRO and RO Retakes**
Conduct of Operations	1 (or 2)	2
Equipment Control	1 (or 0)	1
Radiation Control	1 (or 0)	1
Emergency Plan	1 (or 0)	1
Total	**4**	**5**

* Reactor operator (RO) applicants do not need to be evaluated on every topic (i.e., “Equipment Control,” “Radiation Control,” or “Emergency Plan” can be omitted by doubling up on “Conduct of Operations”), unless the applicant is taking only the administrative topics portion of the operating test (with a waiver or excusal of the other portions).

2. Enter the associated knowledge and abilities (K/A) statement and summarize the administrative activities for each JPM.

3. For each JPM, specify the type codes for location and source as follows:

Location:

(C)ontrol room, (S)imulator, or Class(R)oom

Source and Source Criteria:

(P)revious two NRC exams (no more than one JPM that is **randomly selected** from last two NRC exams) 0
(D)irect from bank (no more than three for ROs, no more than four for SROs and RO retakes) 3
(N)ew or Significantly (M)odified from bank (no fewer than one) 2

Form 3.2-2 Control Room/In-Plant Systems Outline

Facility: PBAPS Date of Examination: April 2024

Operating Test Number: NRC 1

Exam Level: X RO X SRO-I SRO-U

System/JPM Title	Type Code	Safety Function
Control Room Systems		
295037 A1.05 (3.9/3.9), Insert Control Rods using Individual Scram Test Switches (T-216-2) (PLOR-080C)	D,EN,L,S	1
295031 EA1.03 (4.3/4.3), Manually Initiate Core Spray (Alt Path – Min Flow Valves Fail to Open) (PLOR-NEW)	A,M,EN,L,S	2
241000 A4.14 (4.1/4.1), Main Turbine Startup (Alt Path – Main Turbine Lift Pumps Trip) (PLOR-400CA)	A,D,L,S	3
239001 A4.01 (4.4/4.4), Reopen the “A” Main Steam Line (PLOR-379C)	D,S	4
RO ONLY 295003 AA1.01 (4.0/4.0), Align the Electrical System for the SBO Line (PLOR-NEW)	N,L,S	6
201006 A4.07(3.2/3.2), Initialize the RWM (Alt Path – Rod Position Indication Failure) (PLOR-NEW)	A,N,S	7
300000 A2.03 (3.9/3.8), Restart a Tripped IA Compressor (Alt Path – Compressor Fails to Start) (PLOR-NEW)	A,N,S	8
233000 A4.09 (3.1/3.1), Swap Fuel Pool Service Water Booster Pumps (Alt Path – Overcurrent with Failure to Trip) (PLOR-411CA)	A,D,S	9
In-Plant Systems		
295031 EA1.10 (3.6/3.6), Maximize CRD Flow to Reactor Vessel (PLOR-055P)	D,E,L,R	1
239001 A2.11 (4.3/4.1), Closing a Stuck Open MSIV (PLOR-130P)	D,E,L,R	3
295004 AA1.01 (3.8/3.8), Bypassing the Unit 2 UPS Static Inverter (PLOR-189P)	D,E,R	6

1. Determine the number of control room system and in-plant system job performance measures (JPMs) to develop using the following table:

License Level	Control Room	In-Plant	Total
Reactor Operator (RO)	8	3	11
Senior Reactor Operator-Instant (SRO-I)	7	3	10
Senior Reactor Operator-Upgrade (SRO-U)	2 or 3	3 or 2	5

2. Select safety functions and systems for each JPM as follows:

   Refer to Section 1.9 of the applicable knowledge and abilities (K/A) catalog for the plant systems organized by safety function. For pressurized-water reactor operating tests, the primary and secondary systems listed under Safety Function 4, "Heat Removal from Reactor Core," in Section 1.9 of the applicable K/A catalog, may be treated as separate safety functions (i.e., two systems, one primary and one secondary, may be selected from Safety Function 4). From the safety function groupings identified in the K/A catalog, select the appropriate number of plant systems by safety functions to be evaluated based on the applicant's license level (see the table in step 1).

   For RO/SRO-I applicants: Each of the control room system JPMs and, separately, each of the in-plant system JPMs must evaluate a different safety function, and the same system or evolution cannot be used to evaluate more than one safety function in each location. One of the control room system JPMs must be an engineered safety feature.

   For SRO-U applicants: Evaluate SRO-U applicants on five different safety functions. One of the control room system JPMs must be an engineered safety feature, and the same system or evolution cannot be used to evaluate more than one safety function.

3. Select a task for each JPM that supports, either directly or indirectly and in a meaningful way, the successful fulfillment of the associated safety function. Select the task from the applicable K/A catalog (K/As for plant systems or emergency and abnormal plant evolutions) or the facility licensee's site-specific task list. If this task has an associated K/A, the K/A should have an importance rating of at least 2.5 in the RO column. K/As that have importance ratings of less than 2.5 may be used if justified based on plant priorities; inform the NRC chief examiner if selecting K/As with an importance rating less than 2.5. The selected tasks must be different from the events and evolutions conducted during the simulator operating test and tasks tested on the written examination. A task that is similar to a simulator scenario event may be acceptable if the actions required to complete the task are significantly different from those required in response to the scenario event.

   Apply the following specific task selection criteria:

   - At least one of the tasks shall be related to a shutdown or low-power condition.
   - Four to six of the tasks for RO and SRO-I applicants shall require execution of alternative paths within the facility licensee's operating procedures. Two to three of the tasks for SRO-U applicants shall require execution of alternative paths within the facility licensee's operating procedures.
   - At least one alternate path JPM must be new or modified from the bank.
   - At least one of the tasks conducted in the plant shall evaluate the applicant's ability to implement actions required during an emergency or abnormal condition.
   - At least one of the tasks conducted in the plant shall require the applicant to enter the radiologically controlled area. This provides an excellent opportunity for the applicant to discuss or demonstrate radiation control administrative subjects.

   If it is not possible to develop or locate a suitable task for a selected system, return to step 2 and select a different system.

4. For each JPM, specify the codes for type, source, and location:

Code	License Level Criteria		
	RO	**SRO-I**	**SRO-U**
(A)lternate path (5)	4–6	4–6	2–3
(C)ontrol room			
(D)irect from bank (7)	≤ 9	≤ 8	≤ 4
(E)mergency or abnormal in-plant (3)	≥ 1	≥ 1	≥ 1
(EN)gineered safety feature (for control room system) (2)	≥ 1	≥ 1	≥ 1
(L)ow power/shutdown (RO 6, SRO 5)	≥ 1	≥ 1	≥ 1
(N)ew or (M)odified from bank (must apply to at least one alternate path JPM) (RO 4, SRO 3)	≥ 2	≥ 2	≥ 1
(P)revious two exams (randomly selected) (0)	≤ 3	≤ 3	≤ 2
(R)adiologically controlled area (3)	≥ 1	≥ 1	≥ 1
(S)imulator (RO 8, SRO 7))			

Form 3.3-1 **Scenario Outline**

Simulation Facility **PBAPS** **Scenario No.** #1 **Op Test No.** 2024 NRC Exam
Scenario Source **NEW**

Examiners _____ **Operator** _____ CRS (SRO)

_____ _____ URO (ATC)

_____ _____ PRO (BOP)

Initial Conditions IC-165 100% Power

Turnover A Unit 2 is operating at 100% power.
No equipment is out of service.
Preparations are complete for swap of the 2B RFPT Lube Oil Pump to the B pump for maintenance.

Critical Tasks

Critical Task 1: Start diesel generator cooling water pumps within 10 minutes of diesel generators starting.

Critical Task 2: Spray the drywell before the Pressure Suppression Pressure (PSP) Limit is exceeded.

Event No.	Malfunction No.	Event Type*		Event Description
1	See Scenario Guide	N	PRO CRS	Swap RFPT Lube Oil Pumps
2	See Scenario Guide	R	URO CRS	2B Feedwater Pump Trip **New Event**
3	See Scenario Guide	C	PRO CRS	2A Drywell Chiller Trip
4	See Scenario Guide	TS	CRS	Scram Discharge Volume (SDV) Vent/Drain Fails Closed **New Event**
5	See Scenario Guide	C MC	URO CRS	RBCCW Pump Trip/Autostart Failure **New Event**

6	See Scenario Guide	C TS	ALL	2A RPS MG Output Breaker Trip **New Event**
7	See Scenario Guide	M	ALL	Loss of Offsite Power
8	See Scenario Guide	C MC	PRO CRS	DG Cooling Water Autostart Failure
9	See Scenario Guide	I MC	URO CRS	HPCI Controller Fails Low
10	See Scenario Guide	C	PRO CRS	Steam Leak in Containment

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

Scenario Summary

The scenario begins with the reactor at 100% power with no equipment out of service. Preparations have been made for placing the 2B Reactor Feedwater Pump Turbine (RFPT) Lube Oil Pump in service.

Following shift turnover, the crew will place the 2B RFPT Lube Oil Pump in service and secure the 2A RFPT Lube Oil Pump in accordance with SO 6B.6.A-2, Reactor Feedwater Pump Turbine Standby Lube Oil Pump Startup.

Once the 2B RFPT Lube Oil Pump is in service, a trip of the 2B Reactor Feedwater Pump (RFP) will occur. RPV water level will lower below +17", which will cause a Reactor Recirculation Pump (RRP) runback. The crew will enter OT-112, Unexpected/Unexplained Change in Core Flow, and insert control rods to exit Region 2 of the Power/Flow Map.

Once control rods have been inserted, the 2A Drywell Chiller will trip. The crew will perform the alarm response and place the 2C Drywell Chiller in service in accordance with SO 44A.6.A-2, Placing an Additional Drywell Chiller in Service.

Once the 2C Drywell Chiller is in service, the onboard Scram Discharge Volume (SDV)Vents and Drains will fail closed. The crew will declare the valves inoperable per T.S. 3.1.8, Condition A.

Once the tech spec declaration is made, the 2B Reactor Building Closed Cooling Water (RBCCW) pump will trip and the 2A RBCCW pump will fail to autostart. The crew will enter ON-113, Loss of RBCCW, and manually start the 2A RBCCW pump.

Once the 2A RBCCW pump is in service, the 2A Reactor Protection System Motor Generator (RPS MG) output breaker will trip. The crew will perform the alarm response and place the 2A RPS bus on the alternate power supply. Once on alternate, the crew will reset the half scram and Group II/III isolation signal. The crew will declare the 2A RPS MG set inoperable per T.S. 3.3.8.2, Condition A.

Once the 2A RPS bus is on the alternate source and the tech spec declaration is complete, a loss of offsite power will occur along with a steam leak in the drywell. The reactor will scram and the MSIVs will close. The crew will enter T-101, RPV Control, T-102, Primary Containment Control, and SE-11, Loss of Offsite Power, and control plant parameters. All 4 diesel generators will start, but the Emergency Service Water (ESW) pumps and the Emergency Cooling Water (ECW) pump will fail to automatically start. The crew will manually start the cooling water pumps to supply cooling water to the diesel generators. The High Pressure Coolant Injection (HPCI) system will automatically start on the low RPV water level, but the controller will fail low. The crew will place the controller in manual and control RPV water level. Drywell pressure will continue to rise. The crew will perform T-204, Initiation of Containment Sprays using RHR, and spray the drywell.

The scenario may be terminated when drywell sprays are in service and plant parameters are being controlled.

Form 3.3-1 **Scenario Outline**

Simulation Facility **PBAPS** **Scenario No.** #2 **Op Test No.** 2024 NRC Exam
Scenario Source **NEW**

Examiners _____ **Operator** _____ CRS (SRO)

_____ _____ URO (ATC)

_____ _____ PRO (BOP)

Initial Conditions IC-166 100% Power

Turnover A Unit 2 is operating at 100% power.
No equipment is out of service.
Preparations are complete for swap of the Turbine Building Closed Cooling Water (TBCCW) Pumps.

Critical Tasks

Critical Task 1: Attempt to shutdown the reactor within 5 minutes of an ATWS condition by performance of one of the following:

- **Initiation of Standby Liquid**
- **Venting the Scram Air Header**
- **Manually inserting control rods**

Critical Task 2: Begin lowering RPV water level to below -60" within 5 minutes of ATWS conditions.

Event No.	Malfunction No.	Event Type*		Event Description
1	See Scenario Guide	N	PRO CRS	Swap TBCCW Pumps **New Event**
2	See Scenario Guide	C	URO CRS	2A Service Water (SW) Pump Trip
3	See Scenario Guide	TS	CRS	Alternate Rod Insertion (ARI) Blown Fuse
4	See Scenario Guide	I TS	PRO CRS	Reactor Core Isolation Cooling (RCIC) Spurious Start
5	See Scenario Guide	C MC	URO CRS	Non-Regenerative Heat Exchanger (NRHX) High Temp/Isolation Failure **New Event**

6	See Scenario Guide	R C MC	ALL	2A Condensate Pump High Current **New Event**
7	See Scenario Guide	I MC	URO CRS	Recirculation Runback Failure
8	See Scenario Guide	M	ALL	Thermal Hydraulic Instabilities (THI)
9	See Scenario Guide	I	ALL	Electric Anticipated Transient Without Scram (ATWS)
10	See Scenario Guide	C	URO CRS	First Standby Liquid (SBLC) Pump Trip

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

Scenario Summary

The scenario begins with the reactor at 100% power with no equipment out of service. Preparations have been made for placing the 2B TBCCW Pump in service.

Following shift turnover, the crew will place the 2B TBCCW pump in service and place the 2A TBCCW pump in standby per SO 34.6.A-2, Placing the Standby Turbine Building Closed Cooling Water System Pump in Service.

Once the 2B TBCCW Pump is in service, the 2A SW pump will trip. The crew will enter ON-127, Loss of Service Water, and place the 2C Service Water pump in service.

Once the 2C SW pump is in service, a fuse will blow in the ARI circuit. The crew will declare ARI inoperable per T.S. 3.3.4.1, Condition A, and TRM 3.1, Condition A.

Once the tech spec declaration has been made, a spurious start of RCIC will occur. The crew will enter OT-104, Positive Reactivity Insertion, and trip RCIC. The crew will declare RCIC inoperable per T.S. 3.5.3, Condition A.

Once RCIC is tripped and the tech spec declaration is complete, the Reactor Building Closed Cooling isolation valve to the NRHX and nitrogen compressors will fail closed. The nitrogen compressors will trip and NRHX outlet temperature will rise above the isolation setpoint. The Reactor Water Cleanup (RWCU) system will fail to automatically isolate, requiring the crew to manually isolate the system.

Once the RWCU system is isolated, a high current condition will occur on the 2A Condensate pump. Current will rise above 330 amps and the 2A Condensate pump will fail to automatically trip. The crew will manually trip the 2A Condensate pump. The Reactor Recirculation pumps (RRPs) will fail to automatically runback, requiring the crew to manually initiate the runback. The crew will enter OT-112, Unexpected/Unexplained Change in Core Flow, and insert control rods to exit Region 2 of the Power/Flow map.

While control rods are being inserted, THI will begin to occur. Power oscillations will continue to get worse, requiring the crew to scram the reactor. When the reactor is scrammed, an electric ATWS will occur. The crew will enter T-101, RPV Control, and T-117, ATWS RPV Control, and attempt to shutdown the reactor. The crew will perform T-240, Termination and Prevention of Injection into the RPV, and lower RPV water level to below -60". When SBLC is attempted, the first SBLC pump will fail to start. The crew will then start the second SBLC pump to initiate Standby Liquid injection. The crew will perform T-214, Isolating and Venting the Scram Air Header, and T-220, Driving Control Rods during Failure to Scram, to manually insert the control rods. Once SBLC injection is started and RPV water level is being controlled in band, T-214 will be completed and all control rods will be inserted.

The scenario may be terminated when RPV water level is being restored to the normal band and containment parameters are being controlled.

Form 3.3-1 **Scenario Outline**

Simulation Facility **PBAPS** **Scenario No.** #3 **Op Test No.** 2024 NRC Exam
Scenario Source **NEW**

Examiners _____ **Operator** _____ CRS (SRO)

_____ _____ URO (ATC)

_____ _____ PRO (BOP)

Initial Conditions IC-167 100% Power

Turnover A Unit 2 is operating at 100% power. No equipment is out of service.

Critical Tasks

Critical Task 1: Close the stuck open SRV before Torus water temperature exceeds 110°F.

Critical Task 2: Perform an Emergency Blowdown within 10 minutes of the second Reactor Building area temperature exceeding the Action Level.

Event No.	Malfunction No.	Event Type*		Event Description
1	See Scenario Guide	N	PRO CRS	Swap Steam Jet Air Ejectors (SJAEs) **New Event**
2	See Scenario Guide	C TS	URO CRS	Control Rod Drift
3	See Scenario Guide	R	URO CRS	Turbine Stop Valve (TSV) 1 Fails Closed **New Event**
4	See Scenario Guide	C MC TS	PRO CRS	High Pressure Coolant Injection (HPCI) Steam Leak
5	See Scenario Guide	C	ALL	2H Safety Relief Valve (SRV) Fails Open
6	See Scenario Guide	M	ALL	Reactor Water Cleanup (RWCU) Steam Leak in Reactor Building/RWCU Isolation Failure
7	See Scenario Guide	C MC	PRO CRS	Standby Gas Treatment (SBGT) Auto-initiation Failure **New Event**

8	See Scenario Guide	C	PRO CRS	2A Safety Relief Valve (SRV) Fails to Open **New Event**

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

Scenario Summary

The scenario begins with the reactor at 100% power with no equipment out of service.

Following shift turnover, the crew will place the B train of SJAEs in service in accordance with SO 8.1.A-2, Off-Gas System Startup for Normal Operations.

Once B SJAE train is in service, control rod 34-23 will begin to drift into the core. The crew will enter ON-121, Drifting Control Rod, and fully insert the control rod. The control rod will be declared inoperable per T.S 3.1.3, Condition C.

Once the control rod is fully inserted and the tech spec declaration has been made, TSV-1 will spuriously close. The crew will reduce reactor power to less than 90% in accordance with GP-5, Power Operations.

Once reactor power has been lowered, a steam leak in the HPCI room will occur. HPCI room temperatures will rise above the isolation setpoint, but HPCI will fail to automatically isolate. The crew will enter T-103, Secondary Containment Control, and manually isolate HPCI and de-energize the steam supply valve. The crew will declare HPCI inoperable in accordance with T.S. 3.5.1, Condition C.

Once HPCI is isolated and the tech spec declaration is complete, the 2H SRV will fail open. The crew will enter OT-114, Inadvertent Opening of a Relief Valve, and perform actions to close the SRV. When control power fuses are removed, the H SRV will go closed.

Once the SRV is closed, a steam leak will develop in the Reactor Building from RWCU. RWCU will fail to isolate, so the crew will scram the reactor when the first area temperature reaches the Action level. The crew will enter T-101, RPV Control, and T-103, Secondary Containment Control, and control plant parameters. SBGT will fail to automatically initiate on the Group II/III signal. The crew will manually initiate SBGT.

Secondary containment temperatures will continue to worsen. When the second area temperature reaches the Action level, the crew will enter T-112, Emergency Blowdown, and perform a blowdown of the reactor. The 2A SRV will fail to open, requiring the crew to open an additional SRV to perform the blowdown. The crew may elect to anticipate the RPV Blowdown and fully open all Main Turbine Bypass Valves (BPVs) to depressurize the reactor.

The scenario may be terminated when RPV water level is being controlled and an RPV blowdown/depressurization is in progress.

Form 3.3-1 **Scenario Outline**

Simulation Facility **PBAPS** **Scenario No.** #4 **Op Test No.** 2024 NRC Exam
Scenario Source **NEW**

Examiners _____ **Operator** _____ CRS (SRO)

_____ _____ URO (ATC)

_____ _____ PRO (BOP)

Initial Conditions IC-168 100% Power

Turnover A Unit 2 is operating at 100% power. No equipment is out of service.

Critical Tasks

Critical Task 1: Manually initiate ARI to shutdown the reactor within 5 minutes of the failure to scram.

Critical Task 2: Perform an emergency blowdown before Torus water level reaches 7 feet.

Event No.	Malfunction No.	Event Type*		Event Description
1	See Scenario Guide	N	URO CRS	Swap Control Rod Drive (CRD) Pumps
2	See Scenario Guide	I TS	PRO CRS	B Emergency Service Water (ESW) Pump Spurious Start
3	See Scenario Guide	R	URO CRS	Condensate Demineralizer Resin Injection
4	See Scenario Guide	I	URO CRS	2A Reactor Recirculation Pump (RRP) Oscillations
5	See Scenario Guide	C	URO CRS	2B CRD Pump Suction Pressure Trip
6	See Scenario Guide	TS	CRS	Standby Liquid Control (SLC) Loss of Continuity
7	See Scenario Guide	I	PRO CRS	High Generator Cold Gas Temperature
8	See Scenario Guide	M	ALL	Loss of Stator Water Cooling (SWC) **New Event**
9	See Scenario Guide	I MC	PRO CRS	AO-2509 Failure to Isolate

10	See Scenario Guide	I MC	URO CRS	Failure to Scram
11	See Scenario Guide	C	PRO CRS	Torus Water Leak
12	See Scenario Guide	C	PRO CRS	First High Pressure Service Water Pump Fails to Start **New Event**

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

Scenario Summary

The scenario begins with the reactor at 100% power with no equipment out of service.

Following shift turnover, the crew will place the 2B CRD pump in service in accordance with SO 3.6.A-2, U/2 Placing Standy Control Rod Drive Hydraulic System Pump in Service.

Once the 2B CRD pump is in service, the B ESW pump will spuriously start. The crew will verify no start signal and secure the pump. The crew will declare the pump inoperable per T.S. 3.7.2, Condition A.

Once the B ESW pump is secured and the tech spec declaration is made, a resin injection from the 2A Condensate Demineralizer will occur. Main Steam Line (MSL) radiation will rise rapidly. The crew will enter ON-103, Main Steam Line High Radiation, and perform GP-9, Fast Reactor Power Reduction, to lower recirc flow to maintain radiation levels below the MSL Radiation High alarm setpoint. The crew will then dispatch equipment operators to isolate the 2A Condensate Demineralizer.

Once the Condensate Demineralizer has been isolated, the 2A RRP will begin to oscillate. Reactor power, pressure, and level will all oscillate with the RRP. The crew will place a speed hold on the 2A Recirculation pump in accordance with SO 2H.7.B, Reactor Recirculation Adjustable Speed Drive Manual Hold and Reset. Once the hold is applied, the crew will verify flow between the RRPs is within tech spec limits.

Once the speed hold is applied to the 2B RRP, the 2B CRD pump will trip due to low suction pressure. The crew will enter ON-107, Loss of CRD Regulating Function, and place the 2A CRD pump in service.

Once the 2A CRD pump is in service, a loss of continuity to the 2A SLC Squib valve will occur. The crew will declare the SBLC system inoperable per T.S. 3.1.7, Condition B.

Once the tech spec declaration has been made, a failure in the Hydrogen Cooling system will result in Main Generator cold gas temperature rising. The crew will perform the alarm response and raise cooling flow to the Main Generator to lower gas temperature back to normal.

Once cold gas temperature has been restored to normal, a complete loss of SWC will occur. The crew will enter OT-113, Loss of Stator Cooling, scram the reactor, and trip the Main Turbine. Rods will fail to insert on the scram signal. The crew will initiate ARI to fully insert the control rods. The crew will enter T-101, RPV Control, to control plant parameters. AO-2509 will fail to automatically close on the scram signal. The crew will manually close this valve.

When the reactor is scrammed, a break in the Torus will occur. The crew will enter T-102, Primary Containment Control, and align HPSW to inject water into the Torus. When the lineup is in progress, the first HPSW pump to be started

will trip, requiring alignment to the other HPSW pump. Torus water level will continue to lower, requiring the crew to enter T-112, Emergency Blowdown, and perform an RPV blowdown.

The scenario may be terminated when RPV water level is being controlled and an RPV blowdown/depressurization is in progress.

Form 4.1-BWR Boiling-Water Reactor Examination Outline

Facility: Peach Bottom **K/A Catalog Rev. 3** **Rev. 0** 06/21/2023 **Date of Exam:** 04/22/2024

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	4	3				4	3			3	20	3	4	7
	2	1	1	1				1	1			1	6	1	2	3
	Tier Totals	4	5	4				5	4			4	26	4	6	10
2. Plant Systems	1	2	3	3	3	1	2	2	2	2	3	3	26	3	2	5
	2	1	0	1	1	2	1	1	1	1	1	1	11	0 / 1	2	3
	Tier Totals	3	3	4	4	3	3	3	3	3	4	4	37	4	4	8

3. Generic Knowledge and Abilities Categories	CO	EC	RC	EM	
	2	2	1	1	6

SRO-Only Points				
CO	EC	RC	EM	
2	2	1	2	7

4. Theory	Reactor Theory	Thermodynamics	
	3	3	6

Notes: CO = Conduct of Operations; EC = Equipment Control; RC = Radiation Control;
EM = Emergency Procedures/Plan

* These systems/evolutions may be eliminated from the sample when Revision 2 of the K/A catalog is used to develop the sample plan.

** These systems/evolutions are only included as part of the sample (as applicable to the facility) when Revision 2 of the K/A catalog is used to develop the sample plan.

ES-4.1-BWR BWR Examination Outline (Peach Bottom)

Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/**SRO**)

Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
1	295001 (APE 1) PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION					X		AA2.11 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Individual loop flow(s). (CFR: 41.10 / 43.5 / 45.13)	3.6	1
2	295003 (APE 3) PARTIAL OR COMPLETE LOSS OF AC POWER	X						AK1.06 - Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF AC POWER: Station blackout. (CFR: 41.8 to 41.10)	4.3	2
3	295004 (APE 4) PARTIAL OR COMPLETE LOSS OF DC POWER				X			AA1.02 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF DC POWER: Systems necessary to ensure safe plant shutdown. (CFR: 41.7 / 45.6)	4.3	3
4	295005 (APE 5) MAIN TURBINE GENERATOR TRIP		X					AK2.01 - Knowledge of the relationship between MAIN TURBINE GENERATOR TRIP and the following systems or components: RPS. (CFR: 41.7 / 45.8)	4.1	4
5	295006 (APE 6) SCRAM				X			AA1.05 - Ability to operate and/or monitor the following as they apply to SCRAM: Neutron monitoring system. (CFR: 41.7 / 45.6)	3.9	5
6	295016 (APE 16) CONTROL ROOM ABANDONMENT			X				AK3.03 - Knowledge of the reasons for the following responses or actions as they apply to CONTROL ROOM ABANDONMENT: Disabling/transferring control room controls. (CFR: 41.5 / 45.6)	4.0	6
7	295018 (APE 18) PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER (CCW)		X					AK2.04 - Knowledge of the relationship between PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER and the following systems or components: Reactor recirculation system. (CFR: 41.7 / 45.8)	3.7	7
8	295019 (APE 19) PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR					X		AA2.01 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Instrument air pressure. (CFR: 41.10 / 43.5 / 45.13)	4.1	8
9	295021 (APE 21) LOSS OF SHUTDOWN COOLING	X						AK1.01 - Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to LOSS OF SHUTDOWN COOLING: Decay heat. (CFR: 41.8 to 41.10)	4.4	9
10	295023 (APE 23) REFUELING ACCIDENTS						X	G2.4.31 - Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.10 / 45.3)	4.2	10
11	295024 (EPE 1) HIGH DRYWELL PRESSURE		X					EK2.06 - Knowledge of the relationship between the HIGH DRYWELL PRESSURE and the following systems or components: Emergency generators. (CFR: 41.7 / 45.8)	4.2	11
12	295025 (EPE 2) HIGH REACTOR PRESSURE						X	G2.2.22 - Knowledge of limiting conditions for operation and safety limits. (CFR: 41.5 / 43.2 / 45.2)	4.0	12
13	295026 (EPE 3) SUPPRESSION POOL HIGH WATER TEMPERATURE		X					EK2.07 - Knowledge of the relationship between SUPPRESSION POOL HIGH WATER TEMPERATURE and the following systems or components: HPCI. (CFR: 41.7 / 45.8)	3.8	13

14	295028 (EPE 5) HIGH DRYWELL TEMPERATURE (MARK I AND MARK II ONLY)				X			EA1.01 - Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell spray. (CFR: 41.7 / 45.6)	4.0	14
15	295030 (EPE 7) LOW SUPPRESSION POOL WATER LEVEL					X		EA2.03 - Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Reactor pressure. (CFR: 41.10 / 43.5 / 45.13)	4.1	15
16	295031 (EPE 8) REACTOR LOW WATER LEVEL			X				EK3.04 - Knowledge of the reasons for the following responses or actions as they apply to REACTOR LOW WATER LEVEL: Steam cooling. (CFR: 41.5 / 45.6)	4.3	16
17	295037 (EPE 14) SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN	X						EK1.01 - Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Reactor pressure effects on reactor power. (CFR: 41.8 to 41.10)	4.3	17
18	295038 (EPE 15) HIGH OFFSITE RADIOACTIVITY RELEASE RATE				X			EA1.06 - Ability to operate and/or monitor the following as they apply to HIGH OFFSITE RADIOACTIVITY RELEASE RATE: Plant ventilation systems. (CFR: 41.7 / 45.6)	3.6	18
19	600000 (APE 24) PLANT FIRE ON SITE						X	G2.4.12 – Knowledge of operating crew responsibilities during emergency and abnormal operations. (CFR: 41.10 / 45.12)	4.0	19
20	700000 (APE 25) GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES			X				AK3.02 – Knowledge of the reasons for the following responses or actions as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Actions contained in abnormal operating procedure for voltage and grid disturbances. (CFR: 41.4 / 41.5 / 41.7 / 41.10 / 45.8)	3.8	20
21	**295016 (APE 16) CONTROL ROOM ABANDONMENT**						**X**	**G2 1.32 - Ability to explain and apply system precautions, limitations, notes, or cautions. (CFR: 41.10 / 43.2 / 45.12)**	**4.0**	**76**
22	**295018 (APE 18) PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER (CCW)**					**X**		**AA2.03 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Partial or complete loss. (CFR: 41.10 / 43.5 / 45.13)**	**3.5**	**77**
23	**295021) (APE 21) LOSS OF SHUTDOWN COOLING**						**X**	**G2 1.20 - Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)**	**4.6**	**78**
24	**295024 (EPE 1) HIGH DRYWELL PRESSURE**					**X**		**EA2.11 – Ability to determine and/or interpret the following as they apply to High Drywell Pressure: Drywell integrity. (CFR: 41.10 / 43.5 / 45.13)**	**4.4**	**79**
25	**295028 (EPE 5) HIGH DRYWELL TEMPERATURE (MARK I AND MARK II ONLY)**						**X**	**G2 4.20 – Knowledge of the operational implications of emergency and abnormal operating procedures warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)**	**4.3**	**80**
26	**295030 (EPE 7) LOW SUPPRESSION POOL WATER LEVEL**						**X**	**G2.4.18 – Knowledge of the specific bases for emergency and abnormal operating procedures. (CFR: 41.10 / 43.1 / 45.13)**	**4.0**	**81**
27	**700000 (APE 25) GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES**					**X**		**AA2.05 - Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Operational status of offsite circuit. (CFR: 41.5 / 43.5 / 45.5 / 45.7 / 45.8)**	**3.7**	**82**

	(295027) (EPE 4) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) / 5									
K/A Category Totals:		3	4	3	4	6	7	Group Point Total:		27

ES-4.1-BWR BWR Examination Outline (Peach Bottom)

Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/**SRO**)

Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
28	295012 (APE 12) HIGH DRYWELL TEMPERATURE						X	G2.2.42 - Ability to recognize system parameters that are entry-level conditions for technical specifications. (CFR: 41.7 / 41.10 / 43.2 / 43.3 / 45.3)	3.9	21
29	295013 (APE 13) HIGH SUPPRESSION POOL TEMPERATURE.			X				AK3.01 - Knowledge of the reasons for the following responses or actions as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Suppression pool cooling operation. (CFR: 41.5 / 45.6	4.1	22
30	295014 (APE 14) INADVERTENT REACTIVITY ADDITION		X					AK2.08 - Knowledge of the relationship between the INADVERTENT REACTIVITY ADDITION and the following systems or components: RMCS. (CFR: 41.7 / 45.8)	3.8	23
31	295017 (APE 17) HIGH OFFSITE RADIOACTIVE RELEASE RATE	X						AK1.04 - Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to the HIGH OFFSITE RADIOACTIVE RELEASE RATE: Elevated vs. ground level release. (CFR: 41.8 to 41.10)	3.7	24
32	295032 (EPE 9) HIGH SECONDARY CONTAINMENT AREA TEMPERATURE					X		EA2.01 - Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Area temperature. (CFR: 41.10 / 43.5 / 45.13)	3.9	25
33	295035 (EPE 12) SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE				X			EA1.02 - Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: SGTS/FRVS. (CFR: 41.7 / 45.6)	3.8	26
34	**295020 (APE 20) INADVERTENT CONTAINMENT ISOLATION**						**X**	**G2.2.44 - Ability to interpret control room indications to verify the status and operation of a system and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)**	**4.4**	**83**
35	**295036 (EPE 13) SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL**					**X**		**EA2.02 – 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. (CFR: 41.10 / 43.5 / 45.13)**	**3.8**	**84**
36	**500000 (EPE 16) HIGH CONTAINMENT HYDROGEN CONCENTRATION / 5**						**X**	**G2.4.6 – Knowledge of emergency and abnormal operating procedures major action categories. (CFR: 41.10 / 43.5 / 45.13)**	**4.7**	**85**
	(295002) (APE 2) LOSS OF MAIN CONDENSER VACUUM / 3									
	(295007) (APE 7) HIGH REACTOR PRESSURE / 3									
	(295008) (APE 8) HIGH REACTOR WATER LEVEL / 2									
	(295009) (APE 9) LOW REACTOR WATER LEVEL / 2									

	295010 (APE 10) HIGH DRYWELL PRESSURE									
	(295011) (APE 11) HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) / 5									
	(295022) (APE 22) LOSS OF CONTROL ROD DRIVE PUMPS / 1									
	(295029) (EPE 6) HIGH SUPPRESSION POOL WATER LEVEL / 5									
	(295033) (EPE 10) HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS / 9									
	(295034) (EPE 11) SECONDARY CONTAINMENT VENTILATION HIGH RADIATION / 9									
K/A Category Totals:		1	1	1	1	2	3	Group Point Total:		9

ES-4.1-BWR BWR Examination Outline (Peach Bottom)

Plant Systems—Tier 2/Group 1 (RO/**SRO**)

Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
37	203000 (SF2, SF4 RHR/LPCI) RHR/LPCI: INJECTION MODE		X										K2.03 - Knowledge of electrical power supplies to the following: Initiation logic. (CFR: 41.7)	3.7	27
38	205000 (SF4 SCS) SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE)						X						K6.08 - Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE): Service Water. (CFR: 41.7 / 45.7)	3.3	28
39	206000 (SF2, SF4 HPCI) HIGH PRESSURE COOLANT INJECTION SYSTEM								X				A2.10 - 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 operations: System isolation. (CFR: 41.5 / 43.5 / 45.6)	4.7	29
40	209001 (SF2, SF4 LPCS) LOW PRESSURE CORE SPRAY SYSTEM							X					A1.07 - Ability to predict and/or monitor changes in parameters associated with operation of the LOW PRESSURE CORE SPRAY SYSTEM, including: Emergency generator loading. (CFR: 41.5 / 45.5)	3.9	30
41	211000 (SF1 SLCS) STANDBY LIQUID CONTROL SYSTEM											X	G2.1.30 – Ability to locate and operate components, including local controls. (CFR: 41.7 / 45.7)	4.4	31
42	212000 (SF7 RPS) REACTOR PROTECTION SYSTEM				X								K4.03 - Knowledge of REACTOR PROTECTION SYSTEM design features and/or interlocks that provide for the following: Transferring RPS power supplies. (CFR: 41.7)	3.7	32
43	212000 (SF7 RPS) REACTOR PROTECTION SYSTEM						X						K6.12 - Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the REACTOR PROTECTION SYSTEM: Main steam system. (CFR: 41.7 / 45.7)	3.5	33
44	215003 (SF7 IRM) INTERMEDIATE RANGE MONITOR SYSTEM										X		A4.05 - Ability to manually operate and/or monitor in the control room: Trip bypasses. (CFR: 41.7 / 45.5 to 45.8)	3.5	34
45	215004 (SF7 SRMS) SOURCE RANGE MONITOR SYSTEM							X					A1.04 - Ability to predict and/or monitor changes in parameters associated with operation of the SOURCE RANGE MONITOR SYSTEM including: Control rod block status. (CFR: 41.5 / 45.5)	3.6	35

46	215005 (SF7 PRMS) AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR	X											K1.18 - Knowledge of the physical connections and/or cause and effect relationships between the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM and the following systems: OPRM. (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.9	36
47	217000 (SF2, SF4 RCIC) REACTOR CORE ISOLATION COOLING SYSTEM					X							K5.06 - Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the REACTOR CORE ISOLATION COOLING SYSTEM: Turbine operation. (CFR: 41.5 / 45.3)	3.5	37
48	(217000) (SF2, SF4 RCIC) REACTOR CORE ISOLATION COOLING SYSTEM		X										K2.03 - Knowledge of electrical power supplies to the following: RCIC flow controller. (CFR: 41.7)	3.5	38
49	218000 (SF3 ADS) AUTOMATIC DEPRESSURIZATION SYSTEM								X				A2.03 - Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of pneumatic supply to ADS valves. (CFR: 41.5 / 43.5 / 45.6)	3.9	39
50	223002 (SF5 PCIS) PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF									X			A3.02 - Ability to monitor automatic operation of the PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF including: Valve closures. (CFR: 41.7 / 45.7)	4.3	40
51	223002 (SF5 PCIS) PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF				X								K4.01 - Knowledge of PRIMARY CONTAINMENT ISOLATION SYSTEM / NUCLEAR STEAM SUPPLY SHUTOFF design features and/or interlocks that provide for the following: Redundancy. (CFR: 41.7)	3.8	41
52	239002 (SF3 SRV) SAFETY RELIEF VALVES		X										K2.01 - Knowledge of electrical power supplies to the following: SRV solenoids. (CFR: 41.7)	3.7	42
53	259002 (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM											X	G2.1.19 – Ability to use available indications to evaluate system or component status. (CFR: 41.10 / 45.12)	3.9	43
54	259002 (SF2 RWLCS) REACTOR WATER LEVEL CONTROL SYSTEM			X									K3.05 - Knowledge of the effect that a loss or malfunction of the REACTOR WATER LEVEL CONTROL SYSTEM will have on the following systems or system parameters: Recirculation flow control system. (CFR: 41.7 / 45.4 to 45.8)	3.3	44

55	261000 (SF9 SGTS) STANDBY GAS TREATMENT SYSTEM										X		A4.03 - Ability to manually operate and/or monitor in the control room: Fan. (CFR: 41.7 / 45.5 to 45.8)	3.7	45
56	262001 (SF6 AC) AC ELECTRICAL DISTRIBUTION									X			A3.04 - Ability to monitor automatic operation of the AC ELECTRICAL DISTRIBUTION including: Load sequencing. (CFR: 41.7 / 45.7)	3.8	46
57	262002 (SF6 UPS) UNINTERRUPTABLE POWER SUPPLY (AC/DC)				X								K4.01 - Knowledge of UNINTERRUPTABLE POWER SUPPLY (AC/DC) design features and/or interlocks that provide for the following: Transfer of power supplies. (CFR: 41.7)	3.5	47
58	263000 (SF6 DC) DC ELECTRICAL DISTRIBUTION	X											K1.01 -Knowledge of the physical connections and/or cause and effect relationships between the DC ELECTRICAL DISTRIBUTION and the following systems: AC electrical distribution. (CFR: 41.2 to 41.9 / 45.7 to 45.8)	4.0	48
59	264000 (SF6 EGE) EMERGENCY GENERATORS (DIESEL/JET)										X		K4.01 – Knowledge of EMERGENCY GENERATORS design features and/or interlocks that provide for the following: Generator trips. (CFR: 41.7)	4.0	49
60	300000 (SF8 IA) INSTRUMENT AIR SYSTEM			X									K3.17 - Knowledge of the effect that a loss or malfunction of the INSTRUMENT AIR SYSTEM will have on the following systems or system parameters: Heater drain system. (CFR: 41.7 / 45.4)	3.1	50
61	400000 (SF8 CCS) COMPONENT COOLING WATER SYSTEM			X									K3.01 - Knowledge of the effect that a loss or malfunction of the COMPONENT COOLING WATER SYSTEM will have on the following systems or system parameters: Loads cooled by CCW. (CFR: 41.7 / 45.6)	3.9	51
62	510000 (SF4 SWS*) SERVICE WATER SYSTEM											X	**COMPONENT 291002: Sensors and Detectors - Level:** **K1.07**: - Theory and Operation of Level Detectors (CFR: 41.3)	3.2	52
63	**206000 (SF2, SF4 HPCI) HIGH PRESSURE COOLANT INJECTION SYSTEM**											X	**G2.2.12 - Knowledge of surveillance procedures.** **(CFR: 41.10 / 43.2 / 45.13)**	**4.1**	**86**
64	**215003 (SF7 IRM) INTERMEDIATE RANGE MONITOR SYSTEM**								X				**A2.02 - Ability to (a) predict the impacts of the following on the INTERMEDIATE RANGE MONITOR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: IRM inoperable condition.** **(CFR: 41.5 / 43.5 / 45.6)**	**3.7**	**87**

65	**239002 (SF3 SRV) SAFETY RELIEF VALVES**								**X**				**A2.02 - Ability to (a) predict the impacts of the following on the SAFETY RELIEF VALVES and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Leaking SRV. (CFR: 41.5 / 43.5 / 45.6)**	**3.6**	**88**
66	**262002 (SF6 UPS) UNINTERRUPTABLE POWER SUPPLY (AC/DC)**											**X**	**G2.4.45 - Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)**	**4.3**	**89**
67	**263000 (SF6 DC) DC ELECTRICAL DISTRIBUTION**								**X**				**A2.03 - Ability to (a) predict the impacts of the following on the DC ELECTRICAL DISTRIBUTION and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Abnormal battery parameters. (CFR: 41.5 / 43.5 / 45.6)**	**3.2**	**90**
	(207000) (SF4 IC) ISOLATION (EMERGENCY) CONDENSER														
	(209002) (SF2, SF4 HPCS) HIGH PRESSURE CORE SPRAY SYSTEM														
K/A Category Totals:		2	3	3	3	1	2	2	5	2	3	5	Group Point Total:		31

ES-4.1-BWR | BWR Examination Outline (Peach Bottom)

Plant Systems—Tier 2/Group 2 (RO/**SRO**)

Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
68	202002 (SF1 RSCTL) RECIRCULATION FLOW CONTROL SYSTEM			X									K3.07 - Knowledge of the effect that a loss or malfunction of the RECIRCULATION FLOW CONTROL SYSTEM will have on the following systems or system parameters: APRM/LPRM. (CFR: 41.7 / 45.4)	4.1	53
69	204000 (SF2 RWCU) REACTOR WATER CLEANUP SYSTEM						X						K6.07 - Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the REACTOR WATER CLEANUP SYSTEM: SLCS logic. (CFR: 41.7 / 45.7)	3.7	54
70	215001 (SF7 TIP) TRAVERSING IN CORE PROBE									X			A3.03 - Ability to monitor automatic operation of the TRAVERSING IN CORE PROBE including: Valve operation (BWR 2, 3, 4, 5). (CFR: 41.7 / 45.7)	3.3	55
71	215002 (SF7 RBMS) ROD BLOCK MONITOR SYSTEM	X											K1.03 - Knowledge of the physical connections and/or cause and effect relationships between the ROD BLOCK MONITOR SYSTEM and the following systems: Reactor Manual Control System. (CFR: 41.2 to 41.9 / 45.7 to 45.8)	3.7	56
72	216000 (SF7 NBI) NUCLEAR BOILER INSTRUMENTATION					X							K5.10 - Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the NUCLEAR BOILER INSTRUMENTATION: Indicated level versus actual vessel level during vessel heatups or cooldowns. (CFR: 41.5 / 45.3)	3.5	57
73	234000 (SF8 FH) FUEL HANDLING										X		A4.03 - Ability to manually operate and/or monitor at the equipment location / control room: Mode switch. (CFR: 41.7 / 45.5 to 45.8)	3.7	58
74	241000 (SF3 RTPRS) REACTOR/TURBINE PRESSURE REGULATING SYSTEM					X							K5.04 - Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the REACTOR / TURBINE PRESSURE REGULATING SYSTEM: Turbine inlet pressure vs. reactor pressure. (CFR: 41.5 / 45.3)	3.6	59
75	245000 (SF4 MTGEN) MAIN TURBINE GENERATOR/ AUXILIARY SYSTEMS							X					A1.09 - Ability to predict and/or monitor changes in parameters associated with operation of the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS including: Lights and alarms. (CFR: 41.5 / 45.5)	3.2	60
76	(201001) (SF1 CRDH) CRD HYDRAULIC SYSTEM											X	**COMPONENT 291003: Controllers and Positioners:** **K1.01**: - Function and operation of flow controller in manual and automatic modes. (CFR: 41.7)	3.7	61

77	290002 (SF4 RVI) REACTOR VESSEL INTERNALS				X								K4.01 - Knowledge of REACTOR VESSEL AND INTERNALS design features and/or interlocks that provide for the following: 2/3 core coverage following a design-basis LOCA (BWR 3, 4, 5, 6). (CFR: 41.7)	4.6	62
78	290003 (SF9 CRV) CONTROL ROOM VENTILATION								X				A2.03 - Ability to (a) predict the impacts of the following on the CONTROL ROOM VENTILATION and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Initiation / reconfiguration failure. (CFR: 41.5 / 43.5 / 45.6)	3.5	63
79	**201006 (SF7 RWMS) ROD WORTH MINIMIZER SYSTEM**								**X**				**A2.05 - Ability to (a) predict the impacts of the following on the ROD WORTH MINIMIZER SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Out of sequence rod movement. (CFR: 41.5 / 43.5 / 45.6)**	**3.9**	**91**
80	**272000 (SF7, SF9 RMS) RADIATION MONITORING SYSTEM**											**X**	**G2.2.37 – Ability to determine operability or availability of safety-related equipment (SRO Only). (CFR: 43.2 / 43.5 / 45.1)**	**4.6**	**92**
81	**286000 (SF8 FPS) FIRE PROTECTION SYSTEM**											**X**	**G2.4.25 - Knowledge of fire protection procedures. (CFR: 41.10 / 43.5 / 45.13)**	**3.7**	**93**
	271000 (SF9 OG) OFFGAS SYSTEM														
	(201002) (SF1 RMCS) REACTOR MANUAL CONTROL SYSTEM														
	(201003) (SF1 CRDM) CONTROL ROD AND DRIVE MECHANISM														
	(201004) (SF7 RSCS) ROD SEQUENCE CONTROL SYSTEM														
	(201005) (SF1, SF7 RCIS) ROD CONTROL AND INFORMATION SYSTEM														
	(202001) (SF1, SF4 RS) RECIRCULATION SYSTEM														
	(214000) (SF7 RPIS) ROD POSITION INFORMATION SYSTEM														

	(219000) (SF5 RHR SPC) RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE															
	(223001) (SF5 PCS) PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES															
	(226001) (SF5 RHR CSS) RHR/LPCI: CONTAINMENT SPRAY MODE SYSTEM MODE															
	(230000) (SF5 RHR SPS) RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE															
	(233000) (SF9 FPCCU) FUEL POOL COOLING/CLEANUP															
	(239001) (SF3, SF4 MRSS) MAIN AND REHEAT STEAM SYSTEM															
	(239003) (SF9 MSVLCS) MAIN STEAM ISOLATION VALVE LEAKAGE CONTROL SYSTEM															
	(256000) (SF2 CDS) CONDENSATE SYSTEM															
	(259001) (SF2 FWS) FEEDWATER SYSTEM															
	(268000) (SF9 RW) RADWASTE SYSTEM															
	(288000) (SF9 PVS) PLANT VENTILATION SYSTEMS															
	(290001) (SF5 SC) SECONDARY CONTAINMENT															
	(510001) (SF8 CWS*) CIRCULATING WATER SYSTEM															
K/A Category Totals:		1	0	1	1	2	1	1	2	1	1	3	Group Point Total:			14

ES-4.1-COMMON COMMON Examination Outline (Peach Bottom)

Facility: Peach Bottom Date of Exam: 04/22/2024

Generic Knowledge and Abilities Outline (Tier 3) (RO/SRO)

Category	K/A #	Topic	Item #	RO IR	RO Q#	SRO-Only IR	SRO-Only Q#
1. Conduct of Operations	G2.1.2	Knowledge of operator responsibilities during any mode of plant operation. (CFR: 41.10 / 43.1 / 45.13)	82	4.1	64		
	G2.1.29	Knowledge of how to conduct system lineups, such as valves, breakers, or switches. (CFR: 41.10 / 45.1 / 45.12)	83	4.1	65		
	G2.1.5	**Ability to use procedures related to shift staffing, such as minimum crew complement or overtime limitations (reference potential). (CFR: 41.10 / 43.5 / 45.12)**	**84**			**3.9**	**94**
	G2.1.34	**Knowledge of RCS or balance of plant chemistry controls, including parameters measured and reasons for the control. (CFR: 41.10 / 43.5 / 45.12)**	**85**			**3.5**	**95**
	Subtotal			N/A	2	N/A	**2**
2. Equipment Control	G2.2.3	(Multi-unit license) Knowledge of the design, procedural, or operational differences between units. (CFR: 41.5 / 41.6 / 41.7 / 41.10 / 45.12)	86	3.8	66		
	G2.2.13	Knowledge of tagging and clearance procedures. (CFR: 41.10 / 43.1 / 45.13)	87	4.1	67		
	G2.2.5	**Knowledge of the process for making design or operating changes to the facility, such as 10 CFR 50.59, "Changes, Tests, and Experiments," screening and evaluation processes, administrative processes for temporary modifications, disabling annunciators, or installation of temporary equipment. (CFR: 41.10 / 43.3 / 45.13)**	**88**			**3.2**	**96**
	G2.2.17	**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)**	**89**			**3.8**	**97**
	Subtotal			N/A	2	N/A	**2**
3. Radiation Control	G2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms or personnel monitoring equipment. (CFR: 41.11 / 41.12 / 43.4 / 45.9)	90	2.9	68		
	G2.3.6	**Ability to approve liquid or gaseous release permits. (CFR: 41.13 / 43.4 / 45.10)**	**91**			**3.8**	**98**
	Subtotal			N/A	1	N/A	**1**
4. Emergency Procedures / Plan	G2.4.42	Knowledge of emergency response facilities. (CFR: 41.10 / 45.11)	92	2.6	69		
	G2.4.30	**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. (CFR: 41.10 / 43.5 / 45.11)**	**93**			**4.1**	**99**
	G2.4.40	**Knowledge of SRO responsibilities in emergency plan implementing procedures (SRO Only). (CFR: 43.5 / 45.11)**	**94**			**4.5**	**100**

	Subtotal	N/A	1	N/A	2
Tier 3 Point Total		N/A	6	N/A	7

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Peach Bottom)	
Facility: Peach Bottom		Date of Exam: 04/22/2024

Theory (Tier 4) (RO)

Category	K/A #	Topic	Item #	RO IR	RO Q#
Reactor Theory	292004 (K1.02)	REACTIVITY COEFFICIENTS – Describe the effect on the magnitude of the temperature coefficient of reactivity from changes in moderator temperature and core age. (CFR: 41.1)	95	2.6	70
	292006 (K1.14)	FISSION PRODUCT POISONS: Plot the curve and explain the reasoning for the reactivity insertion by Xenon-135 versus time for the following – Explain the process and reasons for the reactor operator to compensate for the time dependent behavior of Xenon-135 concentration in the reactor. (CFR: 41.1)	96	3.2	71
	292008 (K1.22)	REACTOR OPERATIONAL PHYSICS: Power Operation – Explain the effect that opening steam bypass valves, during power operation, will have on the reactor. (CFR: 41.1)	97	3.6	72
	Subtotal				3
Thermodynamics	293004 (K1.17)	THERMODYNAMIC PROCESS: Throttling and the Throttling Process – Determine the exit conditions for a throttling process based on the use of steam and/or water. (CFR: 41.14)	98	2.8	73
	293006 (K1.14)	FLUID STATICS AND DYNAMICS: Pumps and Pump Characteristics – Explain the results of putting centrifugal pumps in parallel or series combinations. (CFR: 41.14)	99	2.7	74
	293010 (K1.06)	BRITTLE FRACTURE AND VESSEL THERMAL STRESS – State the operational concerns of uncontrolled cooldown. (CFR: 41.14)	100	4.1	75
	Subtotal				3
Tier 3 Point Total				N/A	6

Form 4.1-1 Record of Rejected Knowledge and Abilities

Refer to Examination Standard (ES)-4.2, “Developing Written Examinations,” Section B.3, for deviations from the approved written examination outline.

Tier/Group	Randomly Selected K/A	Reason for Rejection
RO 2/1 (28)	205000 K6.03	Not applicable to Peach Bottom. Replaced with 205000 K6.08.
RO 2/1 (40)	223002 A3.04	Cannot develop sufficient distractors. Replaced with 223002 A3.02.
RO 2/1 (45)	261000 A4.01	Cannot develop sufficient question. Replaced with 261000 A4.03
RO 2/2 (56)	215002 K1.02	Not applicable to Peach Bottom. Replaced with 215002 K1.03.
RO 2/2 (61)	271000/291003 K1.01	Not applicable to Peach Bottom. No flow controller in off-gas system and could not develop an adequate GF level question related to the off-gas system. Replaced with 201001/291003 K1.01.
SRO 1/2 (85)	500000 G2.4.51	This is required RO knowledge at PBAPS. Replaced with G2.4.6.
SRO 2/1 (88)	239002 A2.01	Cannot develop SRO level question. Replaced with 239002 A2.02.
SRO 2/2 (91)	201006 A2.08	Cannot develop sufficient question due to overlap with RO section. Replaced with 201006 A2.05.