Facility Browns Ferry NPP Date of Examination: 5/17/21

Examination Level: RO ☒ SRO ☐ Operating Test Number: 21-04

Administrative Topic (see Note)	Type Code*	Describe activity to be performed	
Conduct of Operations	R, M	JPM 516	Determine Control Rod Withdrawal Requirements
		K/A 2.1.37 (RO 4.3)	Knowledge of procedures, guidelines, or limitations associated with reactivity management.
Conduct of Operations	R, D	JPM 745	Place an RPS Channel in Trip
		K/A 2.1.25 (RO 3.9)	Ability to interpret reference materials, such as graphs, curves, tables, etc.
Equipment Control	R, D	JPM 510	Evaluate Recombiner Performance
		K/A 2.2.44 (RO 4.2)	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.
Radiation Control	R, D	JPM 682	Review a Radiological Work Permit (RWP)
		K/A 2.3.7 (RO 3.5)	Ability to comply with radiation work permit requirements during normal or abnormal conditions.
Emergency Plan	N/A	N/A	

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

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

Reactor Operator

1. Conduct of Ops - Determine Control Rod Withdrawal Requirements

Given initial and current SRM readings, determine how Control Rods should be withdrawn in accordance with GOI-100-1A, Unit Startup and Power Operation.

K/A 2.1.37: Knowledge of procedures, guidelines, or limitations associated with reactivity management. (RO 4.3)

2. Conduct of Ops – Place an RPS Channel in Trip

Given a failed Reactor High Pressure RPS instrument, determine how to place the RPS instrument channel in trip in accordance with OI-99, Reactor Protection System.

K/A 2.1.25: Ability to interpret reference materials, such as graphs, curves, tables, etc. (RO 3.9)

3. Equipment Control - Evaluate Recombiner Performance

Evaluate Off-Gas Recombiner Performance to determine if it meets Acceptance Criteria in accordance OI-66, Off-Gas System.

K/A 2.2.44. 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. (RO 4.2)

4. Radiation Control – Review a Radiological Work Permit (RWP)

Given an RWP and dose rates for a task to be performed, calculate the expected dose to determine if the task can or cannot be performed in accordance with NPG-SPP-05.18, Radiation Work Permits.

K/A 2.3.7: Ability to comply with radiation work permit requirements during normal or abnormal conditions. (RO 3.5)

5. Emergency Plan – N/A

Facility Browns Ferry NPP — Date of Examination: 5/17/21

Examination Level: RO ☐ SRO ☒ — Operating Test Number: 21-04

Administrative Topic (see Note)	Type Code*	Describe activity to be performed	
Conduct of Operations	R, D	JPM 678	Determine Crew Shift Staffing Requirements
		K/A 2.1.5 (SRO 3.9)	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.
Conduct of Operations	R, D	JPM 745	Place an RPS Channel in trip and determine REQUIRED ACTIONS in accordance with Technical Specifications
		K/A 2.1.25 (SRO 4.2)	Ability to interpret reference materials, such as graphs, curves, tables, etc.
Equipment Control	R, N	JPM 746	Review a completed Surveillance (SR)
		K/A 2.2.22 (SRO 4.7)	Knowledge of limiting conditions for operations and safety limits
Radiation Control	R, N	JPM 749	Determine ACTIONS required to allow releases in accordance with 0-ODCM-001, OFFSITE DOSE CALCULATION MANUAL
		K/A 2.3.11 (SRO 4.3)	Ability to control radiation releases
Emergency Plan	R, N	JPM 738	Emergency Action Level Classification
		K/A 2.4.41 (SRO 4.6)	Knowledge of the Emergency Action Level thresholds and Classifications

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

Senior Reactor Operator

1. Conduct of Ops - Determine Crew Shift Staffing Requirements

Given a Shift Manager's Staffing Sheet, determine if Shift Staffing Requirements are met or if a callout is required in accordance with OPDP-1, Conduct of Operations Attachment 1, NPG-SPP-03.21, Nuclear Fatigue Management Program, Section 3.2.7, 2.a., and OSIL-25, TVA BFN Operations Section Instruction Letter Overtime, Leave, and Relief Policy, Attachment 2.

K/A 2.1.5: Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (SRO 3.9)

2. Conduct of Ops – Place an RPS Channel in trip and determine REQUIRED ACTIONS in accordance with Technical Specifications

Given a failed Reactor High Pressure RPS instrument, determine Technical Specification 3.3.1.1, RPS Instrumentation REQUIRED ACTION and how to place the RPS instrument channel in trip in accordance with 2-OI-99, Reactor Protection System.

K/A 2.1.25: Ability to interpret reference materials, such as graphs, curves, tables, etc. (SRO 4.2)

3. Equipment Control – Review a completed Surveillance (SR)

Given a completed 3-SR-3.8.7.1, Weekly Check of Power Availability to Required AC and DC Power Distribution Subsystems, determine if the SR has been completed correctly and address Technical Specification Requirements.

K/A 2.2.22: Knowledge of limiting conditions for operations and safety limits. (SRO 4.7)

4. Radiation Control – Determine ACTIONS required to allow releases in accordance with 0-ODCM-001, OFFSITE DOSE CALCULATION MANUAL

Given that an exhaust radiation monitor is taken out of service for maintenance, determine the governing procedure and determine what ACTIONS must be taken to allow continued releases via the affected pathway.

K/A 2.3.11: Ability to control radiation releases (SRO 4.3)

5. Emergency Plan – Emergency Action Level Classification

Given plant conditions, classifies an Event as an Alert (RA2), and completes the Initial Notification Form with correct information within the required time in accordance with the EPIPs.

K/A 2.4.41: Knowledge of the Emergency Action Level thresholds and classifications. (SRO 4.6)

Facility: Browns Ferry NPP Date of Examination: 5/17/21

Exam Level: ☒ RO ☐ SRO-I ☐ SRO-U Operating Test No.: 21-04

Control Room Systems:@ 8 for RO, 7 for SRO-I, 2 or 3 for SRO-U, including 1 ESF			
System / JPM Title		**Type Code***	**Safety Function**
a. JPM 80A	Respond to a Control Rod Drift in accordance with AOI-85-5, Rod Drift In	A, D, S	1
b. JPM 18A	Inject to the Reactor in accordance with EOI Appendix-5C, Injection System Lineup-RCIC	A, D, P, L, S	2
c. JPM 743A	Alternate Generator Bus Duct Fans in accordance with OI-47, Turbine-Generator System	A, N, S	4
d. JPM 747	Purge the Drywell with the Primary Containment Purge Filter Fan in accordance with OI-64, Primary Containment System	N, S	5
e. JPM 631	Restore Offsite Power to a 4KV Shutdown Board at Panel 9-23 in accordance with 0-OI-82, Standby Diesel Generator (EDG) System	D, S	6
f. JPM 748	Recover from a loss of RPS in accordance with AOI-99-1, Loss of Power to One RPS Bus	N, S	7
g. JPM 602A	Respond to a Loss of Reactor Building Closed Cooling Water (RBCCW) in accordance with AOI-70-1, Loss of Reactor Building Closed Cooling Water	A, D, S	8
h. JPM 55	Emergency Vent Primary Containment in accordance with EOI Appendix-13, Emergency Venting Primary Containment	D, EN, L, S	9
In-Plant Systems:@ 3 for RO, 3 for SRO-I, 3 or 2 for SRO-U			
i. JPM 247	Perform Field Actions for a Stuck Open Main Steam Relief Valve (MSRV) per AOI-1-1, Relief Valve Stuck Open	D, E, EN	3
j. JPM 733A	Locally Start an EHPM Pump per EOI Appendix-7L, Alternate Injection System Lineup EHPM System	A, E, N, R	2
k. JPM 306	Place the Division I ECCS ATU Inverter in Service per 0-OI-57C, 208V / 120V AC Electrical System	D, L	6

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

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

Reactor Operator

Job Performance Measures

a. JPM 80A **Title:** Respond to a Control Rod Drift in accordance with AOI-85-5, Rod Drift In

Description: The candidate will perform Surveillance 3.1.3.3, Control Rod Exercise Test for Withdrawn Control Rods, Step 7.3, Exercising a Partially Withdrawn Control Rod. During the performance of the surveillance, a Control Rod will drift in, requiring the candidate to respond in accordance with AOI-85-5, Rod Drift In. During the actions required by AOI-85-5, other Control Rods will drift in and the candidate will insert a manual Reactor SCRAM.

K/A: 201002 Reactor Manual Control System A2.02; Ability to (a) predict the impacts of the following on the REACTOR MANUAL CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Rod Drift Alarm (3.2)

b. JPM 18A **Title:** Inject to the Reactor in accordance with EOI Appendix-5C, Injection System Lineup - RCIC

Description: The candidate will inject to the Reactor using Reactor Core Isolation Cooling (RCIC) to maintain Reactor Water Level in accordance with EOI-Appendix 5C, Injection System Lineup – RCIC. After injection has begun, the RCIC Flow Controller will fail to operate in automatic, and the candidate will take manual control of the RCIC Flow Controller to continue injection.

K/A 217000 Reactor Core Isolation Cooling System (RCIC) A1.01; Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including: RCIC Flow (3.7)

c. JPM 743A **Title:** Alternate Generator Bus Duct Fans in accordance with OI-47, Turbine-Generator System

Description: The candidate will alternate Turbine-Generator Bus Duct Cooling Fans in accordance with OI-47, Turbine-Generator System, Section 6.11.1, Alternating Operating Bus Duct Cooling Fans. When the standby Bus Duct Fan is started it will trip, and no Bus Duct Fans will be able to be started. The candidate will respond in accordance with Alarm Response Procedures and insert a manual Reactor SCRAM and trip the Main Turbine.

K/A 245000 Main Turbine Generator and Auxiliary Systems A4.02: Ability to manually operate and/or monitor in the control room: Generator controls (3.1)

d. JPM 747 **Title:** Purge the Drywell with the Primary Containment Purge Filter Fan in accordance with OI-64, Primary Containment System

Description: The candidate will perform operations necessary to air purge the Drywell with the Primary Containment Purge Filter Fan for Drywell entry in accordance with OI-64, Purging the Drywell with Primary Containment Purge Filter Fan, Section 8.2.

K/A 223001 Primary Containment System and Auxiliaries A4.05: Ability to manually operate and/or monitor in the Control Room: Containment/Drywell oxygen concentration (3.6)

e. JPM 631 **Title:** Restore Offsite Power to a 4KV Shutdown Board at Panel 9-23 in accordance with 0-OI-82, Standby Diesel Generator (EDG) System

Description: The candidate will restore Offsite Power to a 4KV Shutdown Board in accordance with OI-82, Standby Diesel Generator System, Section 8.3, Restoring Offsite Power to 4-kV Shutdown Board at Panel 9-23. The candidate will parallel Offsite power to the running Diesel Generator.

K/A 262001 A.C. Electrical Distribution; A4.02 Ability to manually operate and/or monitor in the control room: Synchroscope, including understanding of running and incoming voltages (3.4)

f. JPM 748 **Title:** Recover from a loss of RPS in accordance with AOI-99-1, Loss of Power to One RPS Bus

Description: The candidate will perform operations required to restore systems following a loss of one RPS Bus in accordance with AOI-99-1, Loss of Power to One RPS Bus, Section 4.2 [12].

K/A 212000 Reactor Protection System A2.01; Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: RPS motor-generator set failure (3.7)

g. JPM 602A **Title:** Respond to a loss of Reactor Building Closed Cooling Water (RBCCW) in accordance with AOI-70-1, Loss Reactor Building Closed Cooling Water

Description: The candidate will respond to a trip of an RBCCW pump in accordance with AOI-70-1, Loss of Reactor Building Closed Cooling Water. While performing actions in accordance with AOI-70-1, a total loss of RBCCW will occur, forcing the Operator to insert a Core Flow Runback and a manual Reactor SCRAM.

K/A 400000 Component Cooling Water System A2.01: Ability to (a) predict the impacts of the following on the CCWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Loss of CCW pump (3.3)

h. JPM 55 **Title:** Emergency Vent Primary Containment in accordance with EOI Appendix-13, Emergency Venting Primary Containment

Description: The candidate will perform operations required to Emergency Vent the Primary Containment in accordance with EOI-Appendix-13, Emergency Venting Primary Containment.

K/A 288000 Plant Ventilation Systems A2.01: Ability to (a) predict the impacts of the following on the PLANT VENTILATION SYSTEMS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High Drywell Pressure: Plant-Specific (3.3)

i. JPM 247 **Title:** Perform Field Actions for Stuck Open Main Steam Relief Valve (MSRV) in accordance with AOI-1-1, Relief Valve Stuck Open

Description: The candidate will perform field actions necessary to close a stuck Open MSRV in accordance with AOI-1-1, Relief Valve Stuck Open, Step 4.2.3[2].

K/A 239002 Relief/Safety Relief Valves A2.03; Ability to (a) predict the impacts of the following on the RELIEF/SAFETY RELIEF VALVES; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Stuck open SRV (4.1)

j. JPM 733A **Title:** Locally Start an EHPM Pump in accordance with EOI Appendix-7L, Alternate Injection System Lineup EHPM System

Description: The candidate will perform the actions necessary in accordance with EOI-Appendix-7L, Alternate RPV Injection System Lineup EHPM System to locally start an EHPM from the local control panel (LPNL-925-6000) to raise Reactor Water Level to (+)2 to (+)51 inches. The candidate will be required to take action to provide a power source to the EHPM in accordance with Attachment 1, EHPM Pump Operation from Local Control Panel LNPL-925-6000.

K/A 295009 Low Reactor Water Level AA1.02; Ability to operate and/or monitor the following as they apply to LOW REACTOR WATER LEVEL: Reactor Water Level Control (4.0)

k. JPM 306 **Title:** Place the Division I ECCS ATU Inverter in Service in accordance with 0-OI-57C, 208V / 120V AC Electrical System

Description: The candidate will perform operations necessary to return the Division I ECCS Analog Trip Unit Inverter to service in accordance with 0-OI-57C, 208V/120V AC Electrical System.

K/A 263000 D.C. Electrical Distribution A3.01; Ability to monitor automatic operations of D.C. ELECTRICAL DISTRIBUTION including: Meters, dials, recorders, alarms, and indicating lights (3.2)

Facility: Browns Ferry NPP Date of Examination: 5/17/21

Exam Level: ☐ RO ☒ SRO-I ☐ SRO-U Operating Test No.: 21-04

Control Room Systems:@ 8 for RO, 7 for SRO-I, 2 or 3 for SRO-U, including 1 ESF			
System / JPM Title		Type Code*	Safety Function
a. JPM 80A	Respond to a Control Rod Drift in accordance with AOI-85-5, Rod Drift In	A, D, S	1
b. JPM 18A	Inject to the Reactor in accordance with EOI Appendix-5C, Injection System Lineup-RCIC	A, D, P, L, S	2
c. JPM 743A	Alternate Generator Bus Duct Fans in accordance with OI-47, Turbine-Generator System	A, N, S	4
d. JPM 747	Purge the Drywell with the Primary Containment Purge Filter Fan in accordance with OI-64, Primary Containment System	N, S	5
e. N/A			
f. JPM 748	Recover from a loss of RPS in accordance with AOI-99-1, Loss of Power to One RPS Bus	N, S	7
g. JPM 602A	Respond to a Loss of Reactor Building Closed Cooling Water (RBCCW) in accordance with AOI-70-1, Loss of Reactor Building Closed Cooling Water	A, D, S	8
h. JPM 55	Emergency Vent Primary Containment in accordance with EOI Appendix-13, Emergency Venting Primary Containment	D, EN, L, S	9
In-Plant Systems:@ 3 for RO, 3 for SRO-I, 3 or 2 for SRO-U			
i. JPM 247	Perform Field Actions for a Stuck Open Main Steam Relief Valve (MSRV) in accordance with AOI-1-1, Relief Valve Stuck Open	D, E, EN	3
j. JPM 733A	Locally Start an EHPM Pump in accordance with EOI Appendix-7L, Alternate Injection System Lineup EHPM System	A, E, N, R	2
k. JPM 306	Place the Division I ECCS ATU Inverter in Service in accordance with0-OI-57C, 208V / 120V AC Electrical System	D, L	6

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

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

Senior Reactor Operator (Instant)

Job Performance Measures

a. JPM 80A **Title:** Respond to a Control Rod Drift in accordance with AOI-85-5, Rod Drift In

Description: The candidate will perform Surveillance 3.1.3.3, Control Rod Exercise Test for Withdrawn Control Rods, Step 7.3, Exercising a Partially Withdrawn Control Rod. During the performance of the surveillance, a Control Rod will drift in, requiring the candidate to respond in accordance with AOI-85-5, Rod Drift In. During the actions required by AOI-85-5, other Control Rods will drift in and the candidate will insert a manual Reactor SCRAM.

K/A: 201002 Reactor Manual Control System A2.02; Ability to (a) predict the impacts of the following on the REACTOR MANUAL CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Rod Drift Alarm (3.3)

b. JPM 18A **Title:** Inject to the Reactor in accordance with EOI Appendix-5C, Injection System Lineup - RCIC

Description: The candidate will inject to the Reactor using Reactor Core Isolation Cooling (RCIC) to maintain Reactor Water Level in accordance with EOI-Appendix 5C, Injection System Lineup – RCIC. After injection has begun, the RCIC Flow Controller will fail to operate in automatic, and the candidate will take manual control of the RCIC Flow Controller to continue injection.

K/A 217000 Reactor Core Isolation Cooling System (RCIC) A1.01; Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including: RCIC Flow (3.7)

c. JPM 743A **Title:** Alternate Generator Bus Duct Fans in accordance with OI-47, Turbine-Generator System

Description: The candidate will alternate Turbine-Generator Bus Duct Cooling Fans in accordance with OI-47, Turbine-Generator System, Section 6.11.1, Alternating Operating Bus Duct Cooling Fans. When the standby Bus Duct Fan is started it will trip, and no Bus Duct Fans will be able to be started. The candidate will respond in accordance with Alarm Response Procedures and insert a manual Reactor SCRAM and trip the Main Turbine.

K/A 245000 Main Turbine Generator and Auxiliary Systems A4.02: Ability to manually operate and/or monitor in the control room: Generator controls (2.9)

d. JPM 747 **Title:** Purge the Drywell with the Primary Containment Purge Filter Fan in accordance with OI-64, Primary Containment System

Description: The candidate will perform operations necessary to air purge the Drywell with the Primary Containment Purge Filter Fan for Drywell entry in accordance with OI-64, Purging the Drywell with Primary Containment Purge Filter Fan, Section 8.2.

K/A 223001 Primary Containment System and Auxiliaries A4.05: Ability to manually operate and/or monitor in the Control Room: Containment/Drywell oxygen concentration (3.6)

e. N/A

f. JPM 748 **Title:** Recover from a loss of RPS in accordance with AOI-99-1, Loss of Power to One RPS Bus

Description: The candidate will perform operations required to restore systems following a loss of one RPS Bus in accordance with AOI-99-1, Loss of Power to One RPS Bus, Section 4.2 [12].

K/A 212000 Reactor Protection System A2.01; Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: RPS motor-generator set failure (3.9)

g. JPM 602A **Title:** Respond to a loss of Reactor Building Closed Cooling Water (RBCCW) in accordance with AOI-70-1, Loss Reactor Building Closed Cooling Water

Description: The candidate will respond to a trip of an RBCCW pump in accordance with AOI-70-1, Loss of Reactor Building Closed Cooling Water. While performing actions in accordance with AOI-70-1, a total loss of RBCCW will occur, forcing the Operator to insert a Core Flow Runback and a manual Reactor SCRAM.

K/A 400000 Component Cooling Water System A2.01: Ability to (a) predict the impacts of the following on the CCWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Loss of CCW pump (3.4)

h. JPM 55 **Title:** Emergency Vent Primary Containment in accordance with EOI Appendix-13, Emergency Venting Primary Containment

Description: The candidate will perform operations required to Emergency Vent the Primary Containment in accordance with EOI-Appendix-13, Emergency Venting Primary Containment.

K/A 288000 Plant Ventilation Systems A2.01: Ability to (a) predict the impacts of the following on the PLANT VENTILATION SYSTEMS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High Drywell Pressure: Plant-Specific (3.4)

i. JPM 247 **Title:** Perform Field Actions for Stuck Open Main Steam Relief Valve (MSRV) in accordance with AOI-1-1, Relief Valve Stuck Open

Description: The candidate will perform field actions necessary to close a stuck Open MSRV in accordance with AOI-1-1, Relief Valve Stuck Open, Step 4.2.3[2].

K/A 239002 Relief/Safety Relief Valves A2.03; Ability to (a) predict the impacts of the following on the RELIEF/SAFETY RELIEF VALVES; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Stuck open SRV (4.2*)

j. JPM 733A **Title:** Locally Start an EHPM Pump in accordance with EOI Appendix-7L, Alternate Injection System Lineup EHPM System

Description: The candidate will perform the actions necessary in accordance with EOI-Appendix-7L, Alternate RPV Injection System Lineup EHPM System to locally start an EHPM from the local control panel (LPNL-925-6000) to raise Reactor Water Level to (+)2 to (+)51 inches. The candidate will be required to take action to provide a power source to the EHPM in accordance with Attachment 1, EHPM Pump Operation from Local Control Panel LNPL-925-6000.

K/A 295009 Low Reactor Water Level AA1.02; Ability to operate and/or monitor the following as they apply to LOW REACTOR WATER LEVEL: Reactor Water Level Control (4.0)

k. JPM 306 **Title:** Place the Division I ECCS ATU Inverter in Service in accordance with 0-OI-57C, 208V / 120V AC Electrical System

Description: The candidate will perform operations necessary to return the Division I ECCS Analog Trip Unit Inverter to service in accordance with 0-OI-57C, 208V/120V AC Electrical System.

K/A 263000 D.C. Electrical Distribution A3.01; Ability to monitor automatic operations of D.C. ELECTRICAL DISTRIBUTION including: Meters, dials, recorders, alarms, and indicating lights (3.2)

Facility: Browns Ferry NPP Date of Examination: 5/17/21

Exam Level: ☐ RO ☐ SRO-I ☒ SRO-U Operating Test No.: 21-04

Control Room Systems:@ 8 for RO, 7 for SRO-I, 2 or 3 for SRO-U, including 1 ESF			
	System / JPM Title	**Type Code***	**Safety Function**
a. N/A			
b. N/A			
c. JPM 743A	Alternate Generator Bus Duct Fans per OI-47, Turbine-Generator System	A, N, S	4
d. N/A			
e. N/A			
f. N/A			
g. JPM 602A	Respond to a Loss of Reactor Building Closed Cooling Water (RBCCW) per AOI-70-1, Loss of Reactor Building Closed Cooling Water	A, D, S	8
h. JPM 55	Emergency Vent Primary Containment per EOI Appendix-13, Emergency Venting Primary Containment	D, EN, L, S	9
In-Plant Systems:@ 3 for RO, 3 for SRO-I, 3 or 2 for SRO-U			
i. N/A			
j. JPM 733A	Locally Start an EHPM Pump per EOI Appendix-7L, Alternate Injection System Lineup EHPM System	A, E, N, R	2
k. JPM 306	Place the Division I ECCS ATU Inverter in Service per 0-OI-57C, 208V / 120V AC Electrical System	D, L	6

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

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

Senior Reactor Operator (Upgrade)

Job Performance Measures

a. N/A

b. N/A

c. JPM 743A **Title:** Alternate Generator Bus Duct Fans per OI-47, Turbine-Generator System

Description: The candidate will alternate Turbine-Generator Bus Duct Cooling Fans in accordance with OI-47, Turbine-Generator System, Section 6.11.1, Alternating Operating Bus Duct Cooling Fans. When the standby Bus Duct Fan is started it will trip, and no Bus Duct Fans will be able to be started. The candidate will respond in accordance with Alarm Response Procedures and insert a manual Reactor SCRAM and trip the Main Turbine.

K/A 245000 Main Turbine Generator and Auxiliary Systems A4.02: Ability to manually operate and/or monitor in the control room: Generator controls (2.9)

d. N/A

e. N/A

f. N/A

g. JPM 602A **Title:** Respond to a loss of Reactor Building Closed Cooling Water (RBCCW) per AOI-70-1, Loss Reactor Building Closed Cooling Water

Description: The candidate will respond to a trip of an RBCCW pump in accordance with AOI-70-1, Loss of Reactor Building Closed Cooling Water. While performing actions in accordance with AOI-70-1, a total loss of RBCCW will occur, forcing the Operator to insert a Core Flow Runback and a manual Reactor SCRAM.

K/A 400000 Component Cooling Water System A2.01: Ability to (a) predict the impacts of the following on the CCWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Loss of CCW pump (3.3)

h. JPM 55 **Title:** Emergency Vent Primary Containment per EOI Appendix-13, Emergency Venting Primary Containment

Description: The candidate will perform operations required to Emergency Vent the Primary Containment in accordance with EOI-Appendix-13, Emergency Venting Primary Containment.

K/A 288000 Plant Ventilation Systems A2.01: Ability to (a) predict the impacts of the following on the PLANT VENTILATION SYSTEMS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High Drywell Pressure: Plant-Specific (3.4)

i. N/A

j. JPM 733A **Title:** Locally Start an EHPM Pump per EOI Appendix-7L, Alternate Injection System Lineup EHPM System

Description: The candidate will perform the actions necessary in accordance with EOI-Appendix-7L, Alternate RPV Injection System Lineup EHPM System to locally start an EHPM from the local control panel (LPNL-925-6000) to raise Reactor Water Level to (+)2 to (+)51 inches. The candidate will be required to take action to provide a power source to the EHPM in accordance with Attachment 1, EHPM Pump Operation from Local Control Panel LNPL-925-6000.

K/A 295009 Low Reactor Water Level AA1.02; Ability to operate and/or monitor the following as they apply to LOW REACTOR WATER LEVEL: Reactor Water Level Control (4.0)

k. JPM 306 **Title:** Place the Division I ECCS ATU Inverter in Service per 0-OI-57C, 208V / 120V AC Electrical System

Description: The candidate will perform operations necessary to return the Division I ECCS Analog Trip Unit Inverter to service in accordance with 0-OI-57C, 208V/120V AC Electrical System.

K/A 263000 D.C. Electrical Distribution A3.01; Ability to monitor automatic operations of D.C. ELECTRICAL DISTRIBUTION including: Meters, dials, recorders, alarms, and indicating lights (3.2)

ES-301 **Operating Test Review Worksheet** **Form ES-301-7**

Facility: Browns Ferry			**Exam Date: 17 May 2021**										
Admin JPMs	1 ADMIN Topic and K/A	2 LOD (1-5)	3 Attributes							4 Job Content		5 U/E/S	6 Explanation
			I/C Focus	Cues	Critical Steps	Scope (N/B)	Overlap	Perf. Std.	Key	Minutia	Job Link		
RO JPM 516	COO 2.1.37	1						X				U S	1. Task standard needs to be more specific. From NUREG-1021 Appendix C B.3 on page C-3, the JPM must clearly identify the task standard (i.e., the predetermined qualitative or quantitative outcome) against which task performance will be measured. 2. Unsatisfactory due to LOD = 1. This is mostly a calculator exercise with the pre-filled procedure given. Reading through the step that is given in the initiating cue only has one choice for a method of rod withdrawal that you could pick. Consider having the applicants find the procedure themselves. 3/23/2021 – Licensee made changes to the JPM to address the concerns listed above. The JPM is now Satisfactory.
RO JPM 745	COO 2.1.25	2		X				X				E S	1. This seems to be more of an equipment control JPM based on the task that is performed. See NUREG-1021 ES 301 B.1 and D.3. The chief examiner did not identify this concern during the outline review. This does, however, meet the Conduct of Operations K/A that was selected. Discussed with IOLB and this task will be allowed for this exam. Please review the examples and overall intent of the topic types for future exams. I understand there is some overlap. 2. The task standard needs to be more specific. 3. The initiating cue is too vague. Need to specify in some way that exact nomenclature is required. From the cue alone, the applicant could believe that they only had to say that they would pull the power supply fuse on the applicable drawer. 3/23/2021 – Licensee made changes to the JPM to address the concerns listed above. The JPM is now Satisfactory.
RO JPM 510	EC 2.2.44	2						X				S	1. The task standard needs to be more specific. 2. The initiating cue to identify if any actions are required is too vague. They may think that they need to identify the actual actions that are required. Why not just ask them to state the results of the evaluation and the reasons for their determination? 3/24/2021 – Licensee submitted changes to address the concerns listed above. The JPM is now satisfactory.
RO JPM 682	RAD 2.3.7	2						X				E	1. The task standard needs to be more specific. 3/23/2021 – Licensee submitted changes to address the concern listed above. The task standard still does not

													identify the predetermined qualitative or quantitative outcome.
SRO JPM 678	COO 2.1.5	2		X				X	X			E	1. The task standard needs to be more specific. 2. Is the Night Shift STA qualified? It appears that there is no one STA qualified Night Shift. 3. The procedure for staffing that the applicant needs to reference should not be provided in the cue. Does someone tell the SM what procedure he should use to verify staffing when taking the shift? 4. This task is not discriminating. The way that the step standards are written combined with the Shift Manager Staffing roster that is given could allow the applicants to simply conduct a call-in for all empty slots on the roster and pass the JPM. What knowledge would they really require? 3/23/2021 – Licensee submitted changes to address the concerns listed above. The task standard still does not identify the predetermined qualitative or quantitative outcome.
SRO JPM 745	COO 2.1.25	2		X				X				E	1. The initiating cue informs the applicant that there is only one technical specification and action to be concerned about. Use (is/are), (s), and (if any) as applicable for any question. 2. Specifically ask the condition(s) and action(s). 3. Do we really need to tell the applicants that failing acceptance criteria results in the instrument being inoperable? 4. The task standard needs to be more specific. 3/23/2021 – Licensee submitted changes to address the concerns listed above. The task standard still does not identify the predetermined qualitative or quantitative outcome.
SRO JPM 746	EC 2.2.22	2		X				X				E	1. The task standard needs to be more specific. 2. The examiner cue prior to step 4 does not seem to be needed because they have the references on a computer. Also, they have a copy of the actual surveillance, therefore they have the LCO provided in the surveillance number. 3. The second cue does not need to specify TS 3.8.7. They have the surveillance. Ask them something like, “Determine what, if any, additional action(s) are required in accordance with Technical Specifications.” 3/23/2021 – Licensee submitted changes to address the concerns listed above. The task standard still does not identify the predetermined qualitative or quantitative outcome.
SRO JPM 682	RAD 2.3.7	2		X				X			X	U	1. The task standard needs to be more specific. 2. The second part of the task is not at the SRO level. Any Rad Worker is required to know their exposure limit.

SRO JPM 749												E	JPM is Unacceptable due to not having an SRO level component. 3. Level of difficulty would have even been too low for the second part when you give them the procedure in the initiating cue. 3/23/2021 – Licensee submitted a new JPM (SRO JPM 749) to address the concerns listed above. 1. The task standard for the new JPM does not identify the predetermined qualitative or quantitative outcome.
SRO JPM 738	EP 2.4.41	2						X	X			E	1. The task standard needs to be more specific. 2. The key seems to be for a LORP JPM. 3. The key is Attachment 1, but the procedure seems to be Attachment A. The forms need to be up to date with the current or frozen revision. 4. What blocks are the applicants supposed to check for offsite releases? Do we give them enough information to check anything? 3/23/2021 – Licensee submitted changes to address the concerns listed above. The task standard still does not identify the predetermined qualitative or quantitative outcome.

Facility: Browns Ferry												**Exam Date: 17 May 2021**	
Simulator JPMs	1 Safety Function and K/A	2 LOD (1-5)	3 Attributes							4 Job Content		5 U/E/S	6 Explanation
			I/C Focus	Cues	Critical Steps	Scope (N/B)	Overlap	Perf. Std.	Key	Minutia	Job Link		
JPM 80A	1 201002 A2.02	2			X			X				E S	1. The task standard needs to be more specific. 2. I believe JPM step 8 should be a critical step. Need to discuss. 3/23/2021- Licensee explained that the action in step 8 will occur due to the malfunction regardless of the applicant's actions. I agree that it is not critical. The licensee edited the task standard to include the predetermined qualitative outcome. The JPM is now satisfactory.
JPM 18A	2 217000 A1.01	2										S	
JPM 743A	4 245000 A4.02	2										S	
JPM 747	5 223001 A4.05	2										S	
JPM 631	6 262001 A4.02	2										S	
JPM 748	7 212000 A2.01	2										S	
JPM 602A	8 400000 A2.01	2						X				E	1. The task standard needs to be more specific. Licensee submitted change to address the concern listed above. The task standard still does not identify the predetermined qualitative or quantitative outcome.
JPM 55	9 288000 A2.01	2										S	

Facility: Browns Ferry												**Exam Date: 17 May 2021**	
In-Plant JPMs	1 Safety Function and K/A	2 LOD (1-5)	3 Attributes							4 Job Content		5 U/E/S	6 Explanation
			I/C Focus	Cues	Critical Steps	Scope (N/B)	Overlap	Perf. Std.	Key	Minutia	Job Link		
JPM 247	3 239002 A2.03	2										S	
JPM 733A	2 295009 AA1.02	2						X				E	1. The task standard needs to be more specific. 2. Need to discuss if monitoring RPV Level A and B is a critical step. 3/23/2021 – Licensee submitted changes to address the concerns listed above. The task standard still does not identify the predetermined qualitative or quantitative outcome.
JPM 306	6 263000 A3.01	2										E S	1. Validation time is blank for Unit 1 JPM. 2. Second page has Task Expected Actions vice Task Standard. 3/23/2021 – Licensee submitted changes to address the concerns listed above. The JPM is now satisfactory.

Instructions for Completing This Table:

Check or mark any item(s) requiring a comment and explain the issue in the space provided using the guide below.

1. Check each JPM for appropriate administrative topic requirements (COO, EC, Rad, and EP) or safety function requirements and corresponding K/A. Mark in column 1. (ES-301, D.3 and D.4)

2. Determine the level of difficulty (LOD) using an established 1–5 rating scale. Levels 1 and 5 represent an inappropriate (low or high) discriminatory level for the license that is being tested. Mark in column 2 (Appendix D, C.1.f)

3. In column 3, "Attributes," check the appropriate box when an attribute is **not met**:
   - ☐ The initial conditions and/or initiating cue is clear to ensure the operator understands the task and how to begin. (Appendix C, B.4)
   - ☐ The JPM contains appropriate cues that clearly indicate when they should be provided to the examinee. Cues are objective and not leading. (Appendix C, D.1)
   - ☐ All critical steps (elements) are properly identified.
   - ☐ The scope of the task is not too narrow (N) or too broad (B).
   - ☐ Excessive overlap does not occur with other parts of the operating test or written examination. (ES-301, D.1.a, and ES-301, D.2.a)
   - ☐ The task performance standard clearly describes the expected outcome (i.e., end state). Each performance step identifies a standard for successful completion of the step.
   - ☐ A valid marked up key was provided (e.g., graph interpretation, initialed steps for handouts).
4. For column 4, "Job Content," check the appropriate box if the job content flaw **does not meet** the following elements:
   - ☐ Topics are linked to the job content (e.g., not a disguised task, task required in real job).
   - ☐ The JPM has meaningful performance requirements that will provide a legitimate basis for evaluating the applicant's understanding and ability to safely operate the plant. (ES-301, D.2.c)

5. Based on the reviewer's judgment, is the JPM as written (U)nacceptable (requiring repair or replacement), in need of (E)nhancement, or (S)atisfactory? Mark the answer in column 5.

6. In column 6, provide a brief description of any (U)nacceptable or (E)nhancement rating from column 5.

Save initial review comments and detail subsequent comment resolution so that each exam-bound JPM is marked by a (S)atisfactory resolution on this form.

ES-301 **Operating Test Review Worksheet** **Form ES-301-7**

Facility: Browns Ferry					**Scenario: 1**				**Exam Date: 17 May 2021**
1 Event	2 Realism/Cred.	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scen. Overlap	9 U/E/S	10 Explanation
1								E	1. NRC note on page 1 says see page 9 of xx. (for U3 guide)
2								S	
3							X	S	
4					X			E	1. Page numbers/event numbers throughout event 4 need to be completed. (for U3 guide)
5					X			S	
6								S	
7						X		E	1. Page numbers for NRC notes need to be completed. (for U3 guide)
8						X	X	S	
9								S	
9	0	0	0		2	2	7	E	

ES-301 **Operating Test Review Worksheet** **Form ES-301-7**

Facility: Browns Ferry					**Scenario: 2**				**Exam Date: 17 May 2021**
1 Event	2 Realism/Cred.	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scen. Overlap	9 U/E/S	10 Explanation
1								S	
2					X			S	
3								S	
4					X		X	S	1. Event number and page numbers on page 11 of 50 need to be completed for Unit 3.
5								S	
6							X	S	
7						X(2)	X	E	1. Critical task has notes and highlighting to evaluate wording for Unit 2.
8								S	
9								S	
9	0	0	0		2	2	6	E	

ES-301 **Operating Test Review Worksheet** **Form ES-301-7**

Facility: Browns Ferry					**Scenario: 3**				**Exam Date: 17 May 2021**
1 Event	2 Realism/Cred.	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scen. Overlap	9 U/E/S	10 Explanation
1								S	
2								S	
3								S	
4					X			E	1. Page numbers missing for NRC note on page 2 of 4 (Unit 2&3). 2. Event number and page number is missing on page 3 of 4 (Unit 3).
5								S	
6					X			E	1. Event numbers are missing (Unit 3).
7						X(2)		E	1. Page numbers missing for NRC note on page 6.7, and 10 of 10 (Unit 2&3). 2. Critical tasks are not identified in the guide as they are for other scenarios (Unit 2&3).
8								E	1. Many page numbers missing on event 9 (Unit 2&3).
9							X	E	1. Page numbers missing for NRC note on page 1 of 4 (Unit 2).
9	0	0	0		2	2	8	E	

ES-301 **Operating Test Review Worksheet** **Form ES-301-7**

Facility: Browns Ferry					**Scenario: 4**				**Exam Date: 17 May 2021**
1 Event	2 Realism/Cred.	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scen. Overlap	9 U/E/S	10 Explanation
1								S	
2							X	S	
3								S	
4								S	
5					X			S	
6					X		X	S	
7						X	X	S	
8							X	S	
9						X		S	
9	0	0	0		2	2	5	S	

Instructions for Completing This Table:

Use this table for each scenario for evaluation.

2 Check this box if the events are not related (e.g., seismic event followed by a pipe rupture) **OR** if the events do not obey the laws of physics and thermodynamics.

3, 4 In columns 3 and 4, check the box if there is **no** verifiable or required action, as applicable. Examples of required actions are as follows: (ES-301, D.5f)

- opening, closing, and throttling valves
- starting and stopping equipment
- raising and lowering level, flow, and pressure
- making decisions and giving directions
- acknowledging or verifying key alarms and automatic actions (Uncomplicated events that require no operator action beyond this should **not** be included on the operating test unless they are necessary to set the stage for subsequent events. (Appendix D, B.3).)

5 Check this box if the level of difficulty is **not** appropriate.

6 Check this box if the event has a TS.

7 Check this box if the event has a critical task (CT). If the same CT covers more than one event, check the event where the CT started **only.**

8 Check this box if the event overlaps with another event on any of the last two NRC examinations. (Appendix D, C.1.f)

9 Based on the reviewer's judgment, is the event as written (U)nacceptable (requiring repair or replacement), in need of (E)nhancement, or (S)atisfactory? Mark the answer in column 9.

10 Record any explanations of the events here.

In the shaded boxes, sum the number of check marks in each column.

- In column 1, sum the number of events.
- In columns 2–4, record the total number of check marks for each column.
- In column 5, based on the reviewer's judgement, place a checkmark only if the scenario's LOD is not appropriate.
- In column 6, TS are required to be ≥ 2 for each scenario. (ES-301, D.5.d)
- In column 7, preidentified CTs should be ≥ 2 for each scenario. (Appendix D; ES-301, D.5.d; ES-301-4)
- In column 8, record the number of events not used on the two previous NRC initial licensing exams. A scenario is considered unsatisfactory if there is < 2 new events. (ES-301, D.5.b; Appendix D, C.1.f)
- In column 9, record whether the scenario as written (U)nacceptable, in need of (E)nhancement, or (S)atisfactory from column 11 of the simulator scenario table.

Site name: Browns Ferry **Exam Date: 17 May 2021**

OPERATING TEST TOTALS

	Total	Total Unsat.	Total Edits	Total Sat.	% Unsat.	Explanation
Admin. JPMs	9	2	7	0		See comments on individual JPMs. All JPMs will be further evaluated during onsite validation week.
Sim./In-Plant JPMs	11	0	4	7		See comments on individual JPMs. All JPMs will be further evaluated during onsite validation week.
Scenarios	4	0	3	1		See comments on individual scenarios. All scenarios will be further evaluated during onsite validation week.
Op. Test Totals:	24	2	14	8	8.3	

Instructions for Completing This Table:

Update data for this table from quality reviews and totals in the previous tables and then calculate the percentage of total items that are unsatisfactory and give an explanation in the space provided.

1. Enter the total number of items submitted for the operating test in the "Total" column. For example, if nine administrative JPMs were submitted, enter "9" in the "Total" items column for administrative JPMs. For scenarios, enter the total number of simulator scenarios.

2. Enter the total number of (U)nsatisfactory JPMs and scenarios from the two JPMs column 5 and simulator scenarios column 9 in the previous tables. Provide an explanation in the space provided.

3. Enter totals for (E)nhancements needed and (S)atisfactory JPMs and scenarios from the previous tables. This task is for tracking only.

4. Total each column and enter the amounts in the "Op. Test Totals" row.

5. Calculate the percentage of the operating test that is (U)nsatisfactory (Op. Test Total Unsat.)/(Op. Test Total) and place this value in the bolded "% Unsat." cell.

   Refer to ES-501, E.3.a, to rate the overall operating test as follows:
   - satisfactory, if the "Op. Test Total" "% Unsat." is ≤ 20%
   - unsatisfactory, if "Op. Test Total" "% Unsat." is > 20%

6. Update this table and the tables above with post-exam changes if the "as-administered" operating test required content changes, including the following:
   - The JPM performance standards were incorrect.
   - The administrative JPM tasks/keys were incorrect.
   - CTs were incorrect in the scenarios (not including postscenario critical tasks defined in Appendix D).
   - The EOP strategy was incorrect in a scenario(s).
   - TS entries/actions were determined to be incorrect in a scenario(s).

Facility: Browns Ferry Date of Exam: May 17, 2021

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	4	N/A			4	3	N/A		3	20	4	3	7
	2	1	2	1				1	1			1	7	2	1	3
	Tier Totals	4	5	5				5	4			4	27	6	4	10
2. Plant Systems	1	3	2	2	2	2	1	3	2	3	3	3	26	3	2	5
	2	1	1	1	1	1	1	1	1	1	2	1	12	0 2	1	3
	Tier Totals	4	3	3	3	3	2	4	3	4	5	4	38	5	3	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1 2 3 4		7
		2			3			3			2			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 ±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	#
295001 (APE 1) Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4						X	2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	
					X		AA2.03 Actual core flow	3.3	
295003 (APE 3) Partial or Complete Loss of AC Power / 6				X			AA1.03 Systems necessary to assure safe plant shutdown	4.4	
295004 (APE 4) Partial or Total Loss of DC Power / 6			X				AK3.02 Ground isolation/fault determination	2.9	
					X		AA2.03 Battery voltage	2.9	
295005 (APE 5) Main Turbine Generator Trip / 3			X				AK3.05 Extraction steam/moisture separator isolations	2.5	
295006 (APE 6) Scram / 1						X	2.4.1 Knowledge of EOP entry conditions and immediate action steps.	4.6	
					X		AA2.01 Reactor power	4.6	
295016 (APE 16) Control Room Abandonment / 7					X		AA2.05 Drywell pressure	3.8	
295018 (APE 18) Partial or Complete Loss of CCW / 8	X						AK1.01 Effects on component/system operations	3.5	
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8				X			AA1.02 Instrument air system valves: Plant-Specific	3.3	
295021 (APE 21) Loss of Shutdown Cooling / 4	X						AK1.01 Decay heat	3.6	
295023 (APE 23) Refueling Accidents / 8		X					AK2.03 Radiation monitoring equipment	3.4	
295024 High Drywell Pressure / 5			X				EK3.06 Reactor SCRAM	4.0	
						X	2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	4.2	
295025 (EPE 2) High Reactor Pressure / 3		X					EK2.08 Reactor/turbine pressure regulating system: Plant-Specific	3.7	
295026 (EPE 3) Suppression Pool High Water Temperature / 5					X		EA2.02 Suppression pool level	3.8	
						X	2.4.18 Knowledge of the specific bases for EOPs.	4.0	
295027 (EPE 4) High Containment Temperature (Mark III Containment Only) / 5							N/A for BFN		
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5			X				EK3.05 Reactor SCRAM	3.6	
					X		EA2.01 Drywell temperature	4.1	
295030 (EPE 7) Low Suppression Pool Water Level / 5						X	2.2.42 Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	3.9	
295031 (EPE 8) Reactor Low Water Level / 2					X		EA2.01 Reactor water level	4.6	

295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1				X		X	EA1.04 SBLC 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.	4.5 4.2	
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9				X			EA1.05 Post accident sample system (PASS): Plant-Specific	3.0	
600000 (APE 24) Plant Fire On Site / 8	X						AK1.01 Fire Classifications by type	2.5	
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6		X					AK2.02 Breakers, relays	3.1	
K/A Category Totals:							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	#
295002 (APE 2) Loss of Main Condenser Vacuum / 3	X						AK1.04 Increased off-gas flow	3.0	
295007 (APE 7) High Reactor Pressure / 3									
295008 (APE 8) High Reactor Water Level / 2									
295009 (APE 9) Low Reactor Water Level / 2		X					AK2.04 Reactor water cleanup	2.6	
295010 (APE 10) High Drywell Pressure / 5					X		AA2.01 Leak rates	3.8	
295011 (APE 11) High Containment Temperature (Mark III Containment only) / 5									
295012 (APE 12) High Drywell Temperature / 5									
295013 (APE 13) High Suppression Pool Temperature. / 5									
295014 (APE 14) Inadvertent Reactivity Addition / 1									
295015 (APE 15) Incomplete Scram / 1					X		AA2.02 Control rod position	4.2	
295017 (APE 17) Abnormal Offsite Release Rate / 9					X		AA2.03 Radiation levels: Plant-Specific	3.1	
295020 (APE 20) Inadvertent Containment Isolation / 5 & 7				X			AA1.02 Drywell ventilation/cooling system	3.2	
295022 (APE 22) Loss of Control Rod Drive Pumps / 1									
295029 (EPE 6) High Suppression Pool Water Level / 5						X	2.2.22 Knowledge of limiting conditions for operations and safety limits.	4.7	
295032 (EPE 9) High Secondary Containment Area Temperature / 5			X				EK3.01 Emergency/normal depressurization	3.5	
295033 (EPE 10) High Secondary Containment Area Radiation Levels / 9									
295034 (EPE 11) Secondary Containment Ventilation High Radiation / 9						X	2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	
295035 (EPE 12) Secondary Containment High Differential Pressure / 5									
295036 (EPE 13) Secondary Containment High Sump/Area Water Level / 5		X					EK2.01 Secondary containment equipment and floor drain system	3.1	
500000 (EPE 16) High Containment Hydrogen Concentration / 5									
K/A Category Point Totals:							Group Point Total:		7/3

ES-401	BWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)											Form ES-401-1	
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			A3.01 Valve operation	3.8	
205000 (SF4 SCS) Shutdown Cooling							X					A1.03 Recirculation loop temperatures	3.3	
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection					X							K5.06 Turbine speed measurement: BWR-2,3,4	2.6	
207000 (SF4 IC) Isolation (Emergency) Condenser												N/A for BFN		
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray											X	2.4.31 Knowledge of annunciator alarms, indications, or response procedures. A2.06 Inadequate system flow	4.2 3.2	
								X						
209002 (SF2, SF4 HPCS) High-Pressure Core Spray												N/A for BFN		
211000 (SF1 SLCS) Standby Liquid Control	X										X	K1.03 Plant air systems: Plant-Specific 2.2.40 Ability to apply Technical Specifications for a system.	2.5 4.7	
212000 (SF7 RPS) Reactor Protection			X									K3.05 RPS logic channels	3.7	
215003 (SF7 IRM) Intermediate-Range Monitor		X							X			A3.03 RPS status K2.01 IRM channels/detectors	3.7 2.5	
215004 (SF7 SRMS) Source-Range Monitor	X											K1.06 Reactor vessel	2.8	
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor						X						K6.04 Trip units	3.1	
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling		X										K2.02 RCIC initiation signals (logic) A2.07 Loss of lube oil	2.8 3.1	
								X						
218000 (SF3 ADS) Automatic Depressurization								X				A2.02 Large break LOCA	3.5	
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff										X		A4.01 Valve closures	3.6	
											X	2.1.32 Ability to explain and apply system limits and precautions.	3.8	
239002 (SF3 SRV) Safety Relief Valves											X	**2.2.44 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.**	4.2	
											X	**2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.**	4.6	
259002 (SF2 RWLCS) Reactor Water Level Control	X											K1.11 Drywell pressure: FWCI/HPCI	3.0	
			X									K3.06 Main turbine	2.8	
261000 (SF9 SGTS) Standby Gas Treatment										X		A4.01 Off-site release levels: Plant-Specific	3.2	
								X				A2.12 High fuel pool ventilation radiation: Plant-Specific	3.4	
262001 (SF6 AC) AC Electrical Distribution				X								K4.04 Protective relaying	2.8	
262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)							X					A1.02 Motor generator outputs	2.5	

263000 (SF6 DC) DC Electrical Distribution				X			X					A1.01 Battery charging/discharging rate K4.01 Manual/ automatic transfers of control: Plant-Specific	2.5 3.1	
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG					X					X		A4.02 Synchroscope K5.05 Paralleling A.C. power sources	3.4 3.4	
300000 (SF8 IA) Instrument Air								X				A2.01 Air dryer and filter malfunctions	2.9	
400000 (SF8 CCS) Component Cooling Water									X			A3.01 Setpoints on instrument signal levels for normal operations, warnings, and trips that are applicable to the CCWS	3.0	
510000 (SF4 SWS*) Service Water (Normal and Emergency)												N/A- Sample plan generated using Rev.2 Supp. 1 of NUREG-123		
K/A Category Point Totals:												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														
201002 (SF1 RMCS) Reactor Manual Control										X		A4.05 Rod select matrix	3.1	
201003 (SF1 CRDM) Control Rod and Drive Mechanism											X	2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	
201004 (SF7 RSCS) Rod Sequence Control														
201005 (SF1, SF7 RCIS) Rod Control and Information														
201006 (SF7 RWMS) Rod Worth Minimizer											X	2.4.6 Knowledge of EOP mitigation strategies.	3.7	
202001 (SF1, SF4 RS) Recirculation		X										K2.01 Recirculation pumps: Plant-Specific	3.2	
202002 (SF1 RSCTL) Recirculation Flow Control						X						K6.02 D.C. power	2.6	
204000 (SF2 RWCU) Reactor Water Cleanup														
214000 (SF7 RPIS) Rod Position Information														
215001 (SF7 TIP) Traversing In-Core Probe	X											K1.10 Area radiation monitoring system: (Not-BWR1)	2.6	
215002 (SF7 RBMS) Rod Block Monitor										X		A4.02 RBM back panel switches, meters and indicating lights: BWR-3,4,5	2.9	
216000 (SF7 NBI) Nuclear Boiler Instrumentation														
219000 (SF5 RHR SPC) RHR/LPCI: Torus/Suppression Pool Cooling Mode														
223001 (SF5 PCS) Primary Containment and Auxiliaries			X									K3.01 Secondary containment	3.6	
226001 (SF5 RHR CSS) RHR/LPCI: Containment Spray Mode								X				A2.08 Pump seal failure	2.5	
230000 (SF5 RHR SPS) RHR/LPCI: Torus/Suppression Pool Spray Mode														
233000 (SF9 FPCCU) Fuel Pool Cooling/Cleanup														
234000 (SF8 FH) Fuel-Handling Equipment				X								K4.02 Prevention of control rod movement during core alterations	3.3	
239001 (SF3, SF4 MRSS) Main and Reheat Steam								X				A2.12 PCIS/NSSSS actuation	4.3	
239003 (SF9 MSVLCS) Main Steam Isolation Valve Leakage Control														
241000 (SF3 RTPRS) Reactor/Turbine Pressure Regulating							X					A1.23 Main turbine vibration	2.8	
245000 (SF4 MTGEN) Main Turbine Generator/Auxiliary														
256000 (SF2 CDS) Condensate														
259001 (SF2 FWS) Feedwater								X				A2.06 Loss of A.C. electrical power	3.2	
268000 (SF9 RW) Radwaste														
271000 (SF9 OG) Offgas														
272000 (SF7, SF9 RMS) Radiation Monitoring														
286000 (SF8 FPS) Fire Protection														
288000 (SF9 PVS) Plant Ventilation														
290001 (SF5 SC) Secondary Containment														
290003 (SF9 CRV) Control Room Ventilation									X			A3.01 Initiation/reconfiguration	3.3	
290002 (SF4 RVI) Reactor Vessel Internals					X							K5.07 Safety Limits	3.9	
51001 (SF8 CWS*) Circulating Water												N/A- Sample plan generated using Rev.2 Supp. 1 of NUREG-123		

K/A Category Point Totals:											Group Point Total:		12/3

ES-401	Generic Knowledge and Abilities Outline (Tier 3)	Form ES-401-3

Facility: Browns Ferry		Date of Exam: May 2021				
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements.	3.8			
	2.1.29	Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	4.1			
	2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.			4.7	
	2.1.41	Knowledge of the refueling process.			3.7	
	2.1.					
	2.1.					
	Subtotal			2		2
2. Equipment Control	2.2.35	Ability to determine Technical Specification Mode of Operation.	3.6			
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings.	3.5			
	2.2.12	Knowledge of surveillance procedures.	3.7			
	2.2.14	Knowledge of the process for controlling equipment configuration or status.			4.3	
	2.2.6	Knowledge of the process for making changes to procedures.			3.6	
	2.2.					
	Subtotal			3		2
3. Radiation Control	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.4			
	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2			
	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			
	2.3.11	Ability to control radiation releases.			4.3	
	2.3.					
	2.3.					
	Subtotal			3		1
4. Emergency Procedures/Plan	2.4.27	Knowledge of “fire in the plant” procedures.	3.4			
	2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4.0			
	2.4.40	2.4.40 Knowledge of SRO responsibilities in emergency plan implementation.			4.5	

	2.4.43	Knowledge of emergency communications systems and techniques.			3.8	
	2.4.					
	2.4.					
	Subtotal					
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO 1/1	295030 (EPE 7) Low Suppression Pool Water Level / 5 **G2.2.39** Knowledge of less than or equal to one hour Technical Specification action statements for systems.	Rejected K/A G2.2.39 on the premise that there are no one hour Technical Specification requirements that apply to low Suppression Pool Water Level, and therefore a valid question for Unit Operators cannot be written for this K/A. *Resolution: Replaced K/A 2.2.39 with a randomly chosen K/A from the same Generic K/A Section, yielding G2.2.42: Ability to recognize system parameters that are entry-level conditions for Technical Specifications.*
RO 2/2	290002 (SF4 RVI) Reactor Vessel Internals **K5.03** Knowledge of the operational implications of the following concepts as they apply to REACTOR VESSEL INTERNALS: Burnable poisons	Rejected K/A K5.03 on the premise that a valid question cannot be written for this K/A without the question being considered Generic Fundamentals. Extensive time has been spent on several attempts to draft a discriminating question based on this K/A, and all of them resulted in what could be considered a Fundamental question. *Resolution: Replaced K/A K5.03 with a randomly chosen K/A from the same Plant Systems Section, yielding K5.07: Safety Limits.*
SRO 2/2	271000 (SF9 OG) Offgas **A2.12** Ability to (a) predict the impacts of the following on the OFFGAS SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Recombiner high temperature	Rejected System 271000 on the premise that a valid SRO Level question could not be written for this system given the A2 K/A selection. *Resolution: Replaced System 271000 with a randomly selected a different system and maintained K/A A2.12, yielding 239001, Main and Reheat Steam System: Ability to (a) predict the impacts of the following on the MAIN AND REHEAT STEAM SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:* ♦ *PCIS / NSSSS actuation*

Tier / Group	Randomly Selected K/A	Reason for Rejection
SRO 3	**G2.4.43** Knowledge of emergency communications systems and techniques.	Rejected K/A 2.4.43 on the premise that a valid question could not be written at the SRO level given the 2.2.43 K/A selection. *Resolution: Replaced K/A 2.4.43 with a randomly chosen K/A from the same Generic K/A Section, yielding 2.4.44: Knowledge of emergency plan protective action recommendations.*

Facility: Browns Ferry NPP | Date of Exam: 05/17/21 | Exam Level: RO ☒ SRO ☒

	Item Description	Initial a	Initial b*	Initial c*#
1.	Questions and answers are technically accurate and applicable to the facility.	✓	✓	DB
2.	a. NRC K/As are referenced for all questions. b. Facility learning objectives are referenced as available.	✓	✓	DB
3.	SRO questions are appropriate in accordance with Section D.2.d of ES-401	✓	✓	DB
4	The sampling process was random and systematic (If more than 4 RO or 2 SRO questions were repeated from the last two NRC licensing exams, consult the NRR/NRO OL program office).	✓	✓	DB
5.	Question duplication from the licensee screening/audit exam was controlled as indicated below (check the item that applies) and appears appropriate __ The audit exam was systematically and randomly developed; or X the audit exam was completed before the license exam was started; or __ the examinations were developed independently; or __ the licensee certifies that there is no duplication; or __ other (explain)	✓	✓	DB

		Bank	Modified	New			
6.	Bank use meets limits (no more than 75 percent from the bank, at least 10 percent new, and the rest new or modified); enter the actual RO / SRO-only question distribution(s) at right	22 / 10	35 / 6	18 / 9	✓	✓	DB

		Memory	C/A			
7.	Between 50 and 60 percent of the questions on the RO exam are written at the comprehension/ analysis level; the SRO exam may exceed 60 percent if the randomly selected K/As support the higher cognitive levels; enter the actual RO / SRO question distribution(s) at right.	35 / 9	40 / 16	✓	✓	DB

8.	References/handouts provided do not give away answers or aid in the elimination of distractors.	✓	✓	DB
9.	Question content conforms to specific K/A statements in the previously approved examination outline and is appropriate for the tier to which they are assigned; deviations are justified.	✓	✓	DB
10.	Question psychometric quality and format meet the guidelines in ES Appendix B.	✓	✓	DB
11.	The exam contains the required number of one-point, multiple choice items; the total is correct and agrees with the value on the cover sheet.	✓	✓	DB

		Printed Name / Signature	Date
a.	Author	Michael Schulte /	05/06/2021
b.	Facility Reviewer (*)	Eric Lambert /	5-6-2021
c.	NRC Chief Examiner (#)	Daniel M. Bacon — Digitally signed by Daniel M. Bacon Date: 2021.05.10 12:08:14 -04'00'	
d.	NRC Regional Supervisor	Gerald J. McCoy — Digitally signed by Gerald J. McCoy Date: 2021.06.29 08:31:32 -04'00'	

Note: * The facility reviewer's initials or signature are not applicable for NRC-developed examinations.
Independent NRC reviewer initials items in Column "c"; chief examiner concurrence required.

ES-401 **Written Examination Review Worksheet** **Form ES-401-9**

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6.	7.	8.
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	B/M/N	U/E/S	Explanation
1	F	2												B	S	K/A 202001 K2.01 T2 G2 (Used on 2017 NRC exam) Question is Satisfactory.
2	H	2	X	X		X								M	E S	K/A 295001 G2.4.49 T1 G1 (Question submitted for preliminary review) 1. If you are recovering from an inadvertent trip of a recirc pump (as listed in the stem) it doesn't seem that scramming or commencing a shutdown would be plausible. You could reword to say that you are performing the actions of AOI-68-1. 2.The explanation for Choice B talks about opening the recirc pump discharge valve (as given), but this is not given in the modified question. 3. How could you be certain you needed to insert control rods to less than a certain load line if the initial condition is not given? 2/19/21 – Licensee addressed all of the items discussed above by changing the question stem and explanation. The question is now Satisfactory.
3	H	2												M	S	K/A 295037 EA1.04 T1 G1 Question is Satisfactory.
4	H	2												M	S	K/A 239002 G2.2.44 T2 G1 Question is Satisfactory.
5	H	2												N	S	K/A 259002 K1.11 T2 G1 Question is Satisfactory.
6	F	2												M	S	K/A 215004 K1.06 T2 G1 Question is Satisfactory.
7	H	2												B	S	K/A 223002 A4.01 T2 G1 Question is Satisfactory.
8	F	2												M	S	K/A 700000 AK2.02 T1 G1 Question is Satisfactory.
9	F	2												B	S	K/A 264000 A4.02 T2 G1 (Used on 2011 Dresden NRC exam) Question is Satisfactory.
10	F	2												M	S	K/A 264000 K5.05 T2 G1 Question is Satisfactory.
11	F	2												B	S	K/A G2.1.1 T3 (Used on 2019 NRC exam) Question is Satisfactory.
12	H	2												M	S	K/A 295003 AA1.03 T1 G1 Question is Satisfactory.
13	F	2												M	S	K/A 295006 G2.4.1 T1 G1 Since this is a modified question, I need changes noted or parent attached. 2/19/21 – Licensee attached parent question. Question is now Satisfactory.
14	F	2												B	S	K/A 295025 EK2.08 T1 G1 (Used on 2012 NRC exam) Question is Satisfactory.
15	H	2												B	S	K/A 295017 AA2.03 T1 G2 (Used on 2019 NRC Exam) Question is Satisfactory.
16	F	2												N	S	K/A 295024 EK3.06 T1 G1 Question is Satisfactory.
17	H	2												M	S	K/A 295005 AK3.05 T1 G1 Question is Satisfactory.
18	H	2												N	S	K/A 295016 AA2.05 T1 G1 Question is Satisfactory.

Browns Ferry 2021-301 Initial Operator License Exam

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6.	7.	8.
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	B/M/N	U/E/S	Explanation
19	H	2												M	S	K/A 295018 AK1.01 T1 G1 Question is Satisfactory.
20	H	2	X											B	E S	K/A 295023 AK2.03 T1 G1 Need parenthesis around the last “s” in “isolates” in the question stem. 2/19/21 – Licensee made changes as requested. Question is now Satisfactory.
21	H	2												M	S	K/A 295026 EA2.02 T1 G1 Question is Satisfactory.
22	F	2												M	S	K/A 215003 K2.01 T2 G1 Question is Satisfactory.
23	H	2												M	S	K/A 295031 EA2.01 T1 G1 Question is Satisfactory.
24	H	2												M	S	K/A 218000 A2.02 T2 G1 Question is Satisfactory.
25	H	2												M	S	K/A 295002 AK1.04 T1 G2 Question is Satisfactory.
26	F	2												M	S	K/A 261000 A4.01 T2 G1 Question is Satisfactory.
27	H	2												N	S	K/A 295020 AA1.02 T1 G2 Question is Satisfactory.
28	F	2												M	S	K/A 295032 EK3.01 T1 G2 (Question submitted for preliminary review) Potential overlap with Scenario #1. 2/19/21 – This question is based on temperature vice radiation in the scenario. There is no overlap. Question is Satisfactory.
29	F	2												M	S	K/A 295036 EK2.01 T1 G2 Question is Satisfactory.
30	H	3												B	S	K/A 203000 A3.01 T2 G1 Question is Satisfactory.
31	F	2												M	S	K/A 206000 K5.06 T2 G1 Question is Satisfactory.
32	H	2												M	S	K/A 209001 G2.4.31 T2 G1 Question is Satisfactory.
33	F	3												B	S	K/A 211000 K1.03 T2 G1 Question is Satisfactory.
34	H	3												N	S	K/A 212000 K3.05 T2 G1 Question is Satisfactory.
35	H	3												B	S	K/A 215003 A3.03 T2 G1 (Used on 2017 NRC exam) Question is Satisfactory.
36	H	2												B	S	K/A 295030 G2.2.42 T1 G1 (Used on 2017 NRC exam) Question is Satisfactory.
37	H	2	X											N	S	K/A 215005 K6.04 T2 G1 Question is Satisfactory.
38	H	2										X		M N	U S	K/A 295038 T1 G1 (Question submitted for preliminary review) Unsatisfactory due to not meeting the K/A. I may be missing something, but do not see the tie to PASS. 2/19/21 – Licensee submitted new question that meets the K/a. The question is Satisfactory.
39	H	2												M	S	K/A 295009 T1 G2 Question is Satisfactory.

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Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6.	7.	8.
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	B/M/N	U/E/S	Explanation
40	H	2												M	S	K/A 262001 K4.04 T2 G1 Question is Satisfactory.
41	F	2												N	S	K/A 201006 G2.4.6 T2 G2 Question is Satisfactory.
42	F	2												M	S	K/A G2.4.21 T3 Question is Satisfactory.
43	F	2												N	S	K/A 202002 K6.02 T2 G2 Question is Satisfactory.
44	F	2												M	S	K/A 259002 K3.06 T2 G1 The RO level justification describes this as a memory level question. I agree with that assessment. The question cognitive level, however, is checked off as comprehension or analysis on the ES-401-5 form. How was this counted for the ES-401-6 form? The question itself is Satisfactory. 2/19/21- License changed one part of question to make it a higher cognitive level and still test the same information. The question is Satisfactory.
45	F	2												N	S	K/A 215001 K1.10 T2 G2 Question is Satisfactory.
46	H	2												N	S	K/A 215002 A4.02 T2 G2 Question is Satisfactory.
47	H	2												M	S	K/A 223001 K3.01 T2 G2 Question is Satisfactory.
48	H	2												B	S	K/A 234000 K4.02 T2 G2 Question is Satisfactory.
49	F	2												N	S	K/A 263000 K4.01 T2 G1 Question is Satisfactory.
50	H	2												M	S	K/A 241000 A1.23 T2 G2 Question is Satisfactory.
51	H	2												N	S	K/A 295004 AK3.02 T1 G1 Question is Satisfactory.
52	H	2												M	S	K/A 295019 AA1.02 T1 G1 Question is Satisfactory.
53	H	2												B	S	K/A 295021 AK1.01 T1 G1 Question is Satisfactory.
54	H	2												M	S	K/A 295028 EK3.05 TI G1 Question is Satisfactory.
55	F	2												N	S	K/A 295034 G2.4.34 T1 G2 Question is Satisfactory.
56	H	2												M	S	K/A 205000 A1.03 T2 G1 Question is Satisfactory
57	H	2												M	S	K/A 217000 K2.02 T2 G1 Question is Satisfactory.
58	F	2												N	S	K/A 223002 G2.1.32 T2 G1 Question is Satisfactory.
59	H	2												B	S	K/A 262002 A1.02 T2 G1 (Used on 2015 NRC exam) Question is Satisfactory.
60	H	2												M	S	K/A 300000 A2.01 T2 G1 Question is Satisfactory.

Browns Ferry 2021-301 Initial Operator License Exam

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6.	7.	8.
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	B/M/N	U/E/S	Explanation
61	F	2												M	S	K/A 400000 A3.01 T2 G1 Question is Satisfactory.
62	H	2												B	E S	K/A 201002 A4.05 T2 G2 (Used on 2017 Nine Mile NRC Exam) I do not agree that this is a high cognitive level question. We can discuss. The question is otherwise Satisfactory. 2/19/21 – Minor changes made to question stem to simplify it. The ES-401-5 was updated to be a memory level question. The question is Satisfactory.
63	H	2												B	S	K/A 290003 A3.01 T2 G2 Question is Satisfactory.
64	F	3												M	S	K/A 290002 K5.07 T2 G2 (Question submitted for preliminary review) We do not normally require RO applicants to know greater than one hour Technical Specification completion times from memory. We need to discuss. 2/19/21 – Discussed with licensee. The licensee stated that this is testing knowledge of safety limit requirements and LCO 3.0.3 knowledge rather than technical specification completion times. This is very well covered in the training program. The question is Satisfactory.
65	H	2												N	S	K/A 259001 A2.06 T2 G2 Question is Satisfactory.
66	F	2												B	S	G2.1.29 T3 (Used on 2015 NRC exam) Question is Satisfactory.
67	F	2												M	S	G2.2.35 T3 Question is Satisfactory.
68	H	2		X		X								M	S	G2.2.41 T3 (Question submitted for preliminary review) Question is Satisfactory.
69	F	3												B	S	G2.2.12 T3 (Used on 2019 NRC exam) Question is Satisfactory.
70	F	2												M	S	G2.3.13 T3 Question is Satisfactory.
71	F	2	X				X							N	E S	G2.3.4 T3 (Question submitted for preliminary review) I believe there is the potential for more than one correct answer. Is SED approval required to exceed 5 rem. Also, are we asking about whole body, lens of the eye, or all other organs. 2/19/21 – Licensee updated the question stem to address the concerns listed above. The question is now Satisfactory.
72	F	2												B	S	G2.3.5 T3 Question is Satisfactory.
73	F	2												B	S	G2.4.27 T3 Question is Satisfactory.
74	F	2												B	S	K/A 600000 AK1.01 T1 G1 (Used on 2018 NRC exam) Question is Satisfactory.
75	H	2												B	S	K/A 263000 A1.01 T2 G1 (Used on 2017 NRC exam) Question is Satisfactory.

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			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	B/M/N	U/E/S	Explanation
76	H	2				X							?	M N	E S	K/A 295001 AA2.03 T1 G1 We normally do not test Technical Specification completion times that are greater than one hour without a reference. The reference is then generally used to lead to the testing of another concept such as the "motherhood" statements so that it is not a direct lookup. Is it operationally valid and fair to test these completion times from memory? Also, can this question be answered solely from RO knowledge of Caution statements in 2-AOI-68-1. It seems that this could easily be changed to a procedure selection question to eliminate these concerns. We need to discuss this question. 2/19/2021 – Licensee submitted a new question. I do not believe that it is credible to give the applicants the information that indicated core flow rises in the question stem and have a distractor that actual core flow rises after failure of a pump. It would be acceptable to ask if indicated flow is greater than, less than, or possibly even equal to indicated flow. 3/29/2021 – Licensee submitted changes to the question that addressed the concerns listed above. The question is now Satisfactory.
77	H	1 2				X								N	U S	K/A 295004 AA2.03 T1 G1 (Question submitted for preliminary review) 1. Choice A is not a credible distractor with the references provided for the following reasons: Condition B is the only CONDITION on the provided references that contains an ACTION to declare the battery inoperable. Conditions B consists of three OR statements. There is no information in the stem of the question or the initial conditions to even evaluate the first two OR statements (no times for completion time evaluation and no average electrolyte temperatures of the representative cells given or temperatures of the referenced cells given). The initial conditions can easily be compared to Category C to determine that no cell parameters are outside Category C values. 2. Since there are only two CONDITIONS in the provided TS and Condition B is not credible, the you must be in Condition A. 3. Let's just leave completion time totally out of this discussion. Based on knowing that we are in Condition A because the only other CONDITION is not credible (Condition B) and that there are three AND statements for REQUIRED ACTIONS in Conditions A, then any credible answer choice should contain three ACTIONS. For this reason, answer choices B and C are also not credible. 4. With three of four answer choices not being credible, this makes the LOD = 1. This is not a discriminating question the way it is written with the references provided. 3/29/2021 – Licensee submitted a new question. The new question is Satisfactory.
78	H	3												M	S	K/A 295006 AA2.01 T1 G1 Question is Satisfactory.
79	H	2												N	S	K/A 295024 G2.2.36 T1 G1 Question is Satisfactory.
80	F	2												B	S	K/A 295026 G2.4.18 T1 G1 Question is Satisfactory.
81	F	2												B	E S	K/A 295028 EA2.01 T1 G1 (Used on 2019 NRC exam) The SRO level justification describes this as a memory level question. I agree with that assessment. The question cognitive level, however, is checked off as comprehension or analysis on the ES-401-5 form. How was this counted for the ES-401-6 form? The question itself is Satisfactory. 2/19/21 – Licensee updated the ES-401-5 information to be counted as a memory level question. The question is Satisfactory.
82	H	2												N	S	K/A 295037 G2.4.9 T1 G1 Question is Satisfactory.

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			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only	B/M/N	U/E/S	Explanation
83	H	2												N	E S	K/A 295010 AA2.01 T1 G2 (Question submitted for preliminary review) This question is not really testing the leak rate portion of the K/A, although it does discuss leak rate. Also, with the specific classifications given, the level of difficulty is very low for the first part question. Need to discuss this question. 2/19/21 – Licensee removed the specific classifications and added leak rate information to test the K/A better. The question is now Satisfactory.
84	H	3												N	S	K/A 295015 AA2.02 T1 G2 Question is Satisfactory.
85	F	2												B	S	K/A 295029 G2.2.22 T1 G2 (Used on 2011 NRC exam) Question is Satisfactory.
86	H	2										X		M	U S	K/A 209001 A2.06 T2 G1 (Question submitted for preliminary review) Question is Unsatisfactory due to not meeting the K/A statement. 2/19/21 – Licensee modified the question stem to meet the K/A statement. The question is now Satisfactory
87	H	2												M	S	K/A 211000 G2.2.40 Question is Satisfactory.
88	H	2												B	S	K/A 217000 A2.07 T2 G1 (Used on 2019 NRC exam) Question is Satisfactory.
89	H	2											X	M	U S	K/A 239002 G2.4.2 T2 G1 (Question submitted for preliminary review) I believe that both parts of this question can be answered with RO knowledge. Question is Unsatisfactory due to not being SRO only. I believe there is a way to easily fix this. 2/19/21 – Licensee addressed the concern listed above. The question is now Satisfactory.
90	H	2												B	S	K/A 261000 A2.12 T2 G1 (Used on 2011 NRC exam) Question is Satisfactory.
91	H	2												M	S	K/A 201003G2.1.7 T2 G2 Question is Satisfactory.
92	H	2												N	S	K/A 226001 A2.08 T2 G2 Question is Satisfactory.
93	H	2												B	S	K/A 239001 A2.12 T2 G2 Question is Satisfactory.
94	F	2										X		N B	E S	K/A G2.1.7 T3 See ES-401 D.2.a. This question seems to be an extension of Tier 2 and does not seem to test a plantwide generic concept. 2/19/21 – Licensee submitted a different question that tests a plantwide generic concept. The new question is Satisfactory. This bank question was used on the 2017 NRC exam.
95	H	2												M	S	K/A G2.1.41 T3 Question is Satisfactory.
96	F	2												B	S	K/A G2.2.14 T3 Question is Satisfactory.
97	F	2	X											N	E S	K/A G2.2.6 T3 Since two members of Plant Management Staff are required for approval, the Operations Superintendent could possibly be one of those people. You could state that the SRO has approved of the change and ask if Shift Manager approval is or is not required. 2/19/21 – Licensee modified question due to recent procedure revision. The revised question is Satisfactory.
98	F	2												B	S	K/A G2.3.11 T3 Question is Satisfactory.

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			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only			
99	F	2				X								B	E S	K/A G2.4.40 T3 (Used on 2014 NRC exam) Choice A does not seem to be a credible distractor when the SM is not the one who normally performs the notifications (Appendix B). Choice B does not seem credible either when the SRO can direct tripping the plant at any time. 2/19/21 – Licensee revised question to include a credible distractor for Choice A. The question is now Satisfactory.
100	F	2				X						X		N	U S	K/A G2.4.43 T3 (Question submitted for preliminary review) Question is Unsatisfactory due to not meeting the K/A statement. 2/19/21 - Licensee submitted a new question. Choices C(1) and D(1) are not credible distractors. How could a 3-minute undulating siren inform anyone that it was Unit 1 main control room that is being evacuated? Would there be a different kind of sirens for Units 2 and 3? Question is Unsatisfactory due to more than one non-credible distractor. 3/29/2021 – Changed the K/A and the licensee submitted a new question. The new question is Satisfactory.

Instructions

[Refer to Section D of ES-401 and Appendix B for additional information regarding each of the following concepts.]

1. Enter the level of knowledge (LOK) of each question as either (F)undamental or (H)igher cognitive level.
2. Enter the level of difficulty (LOD) of each question using a 1 – 5 (easy – difficult) rating scale (questions in the 2 – 4 range are acceptable).
3. Check the appropriate box if a psychometric flaw is identified:
   - The stem lacks sufficient focus to elicit the correct answer (e.g., unclear intent, more information is needed, or too much needless information).
   - The stem or distractors contain cues (i.e., clues, specific determiners, phrasing, length, etc).
   - The answer choices are a collection of unrelated true/false statements.
   - The distractors are not credible; single implausible distractors should be repaired, more than one is unacceptable.
   - One or more distractors is (are) partially correct (e.g., if the applicant can make unstated assumptions that are not contradicted by stem).
4. Check the appropriate box if a job content error is identified:
   - The question is not linked to the job requirements (i.e., the question has a valid K/A but, as written, is not operational in content).
   - The question requires the recall of knowledge that is too specific for the closed reference test mode (i.e., it is not required to be known from memory).
   - The question contains data with an unrealistic level of accuracy or inconsistent units (e.g., panel meter in percent with question in gallons).
   - The question requires reverse logic or application compared to the job requirements.
5. Check questions that are sampled for conformance with the approved K/A and those that are *designated SRO-only* (K/A and license level mismatches are unacceptable).
6. Enter question source: (B)ank, (M)odified, or (N)ew. Check that (M)odified questions meet criteria of ES-401 Section D.2.f.
7. Based on the reviewer's judgment, is the question as written (U)nsatisfactory (requiring repair or replacement), in need of (E)ditorial enhancement, or (S)atisfactory?
8. At a minimum, explain any "U" ratings (e.g., how the Appendix B psychometric attributes are not being met).

Browns Ferry 2021-301 Initial Operator Licensing Exam Outline Submittal Review Comments (Dan Bacon)

A. RO Administrative JPMs
    a. JPM 516 – Determine Control Rod Withdrawal Requirements (K/A 2.1.37)
        i. No comments based on outline review alone.
    b. JPM 745 – Place an RPS Channel in Trip (K/A 2.1.25)
        i. No comments based on outline review alone.
    c. JPM 510 – Evaluate Recombiner Performance (K/A 2.2.44)
        i. No comments based on outline review alone.
    d. JPM 682 – Review a Radiological Work Permit (K/A 2.3.7)
        i. No comments based on outline review alone.

B. SRO Administrative JPMs
    a. JPM 678 – Determine Crew Shift Staffing Requirements (K/A 2.1.5)
        i. No comments based on outline review alone.
    b. JPM 745 – Place an RPS Channel in trip and determine REQUIRED ACTIONS in accordance with Technical Specifications (K/A 2.1.25)
        i. No comments based on outline review alone.
    c. JPM 746 – Review a completed Surveillance (SR) (K/A 2.2.22)
        i. No comments based on outline review alone.
    d. JPM 682 – Review a Radiological Work Permit (K/A 2.3.7)
        i. No comments based on outline review alone (Description on page two states that this has additional SRO component when compared to the RO JPM.)
    e. JPM 738 – Emergency Action Level Classification (k/A 2.4.41)
        i. No comments based on outline review alone.

C. Control Room/In-plant Systems JPMs
    a. JPM 80A – Respond to a Control Rod Drift per AOI-85-5, Rod Drift In
        i. No comments based on outline review alone.
    b. JPM 18A – Inject to the Reactor per EOI Appendix-5C, Injection System Lineup-RCIC **(Upgrades)**
        i. No comments based on outline review alone.
    c. JPM 743A – Alternate Generator Bus Duct Fans per OI-47, Turbine-Generator System
        i. This is listed as Safety Function 4 on the front page of the ES-301-2. The K/A used in the description is Safety Function 6. This system is also listed as SF 6 on the ES-401-1 form.
        ii. 2/19/21 – Licensee changed the K/A to 245000 A4.02 which is a Safety Function 4 K/A that matches the task.
    d. JPM 747 – Purge the Drywell with the Primary Containment Purge Filter Fan per OI-64, Primary Containment System
        i. No comments based on outline review alone.
    e. JPM 631 – Restore Offsite Power to a 4KV Shutdown Board at Panel 9-23 per 0-OI-82, Standby Diesel Generator (EDG) System **(ROs Only)**
        i. If JPM c is also Safety Function 6, one of the two JPMs would have to be changed out for a JPM that meets the overall Safety Function requirements.

ii. 2/19/21 – This potential problem was corrected with the change to the K/A for JPM 743A.

f. JPM 748 – Recover from a loss of RPS per AOI-99-1, Loss of Power to One RPS Bus
    i. No comments based on outline review alone.
g. JPM 602A - Respond to a loss of RBCCW per AOI-70-1, Loss of Reactor Building Closed Cooling Water **(Upgrades)**
    i. No comments based on outline review alone.
h. JPM 55 – Emergency Vent Primary Containment per EOI Appndix-13, Emergency Venting Primary Containment **(Upgrades)**
    i. This is listed as Safety Function 9 on the front page of the ES-301-2. The K/A used in the description is Safety Function 5. This system is also listed as SF 5 on the ES-401-1 form. If both JPM d and JPM h are Safety Function 5, one of them would need to be changed out to meet overall Safety Function Requirements.
    ii. 2/19/21 – Licensee changed the K/A to 28800 A2.01 which is a Safety Function 9 K/A that matches the task.
i. JPM 247 – Perform Field Actions for a Stuck Open Main Steam Relief Valve (MSRV) per AOI-1-1, Relief Valve Stuck Open
    i. No comments based on outline review alone.
j. JPM 733A, Locally Start an EHPM Pump per EOI Appendix-7L, Alternate Injection System Lineup EHPM System **(Upgrades)**
    i. This is listed as Safety Function 4 on the front page of the ES-301-2. This is listed as Safety Function 2 on the ES-401-1. Is there a reason this is being listed as heat removal from the core vice reactor water inventory control?
    ii. 2/19/21 – Licensee changed to Safety Function 2 on ES-301-2. The Upgrade applicants will now perform JPM 743A vice 733A.
k. JPM 306 – Place the Division I ECCS ATU Inverter in Service per 0-OI-57C, 208V / 120V AC Electrical System **(Upgrades)**
    i. No comments based on outline review alone.

D. Scenario #1
    a. Need to discuss how we are sure that the BOP will get credit for Event #9. Is it possible that the OATC will recognize and take the required actions?
    b. 2/19/21 – Licensee provided the following information: At BFN, the BOP normally controls HPCI, as the equipment controls are located on Panel 9-3. The RFPT trip malfunction is only to force the crew to change tactics on Reactor Water Level Control.
E. Scenario #2
    a. No comments based on outline review alone.
F. Scenario #3
    a. No comments based on outline review alone.
G. Scenario #4
    a. No comments based on outline review alone.