

Facility: **James A. Fitzpatrick**Scenario No.: **NRC-1**Op-Test No.: **17-2**Examiners: _____

_____Operators: _____

Initial Conditions: The plant is operating at approximately 80% power. IAC C is out of service.

Turnover: Start Service Water pump A, then secure Service Water pump B per OP-42 section G.1. Then, raise Reactor power to 85% with Recirculation flow.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Swap Service Water Pumps OP-42
2	N/A	R – ATC, SRO	Raise Reactor Power with Recirculation Flow OP-27
3	MC11	C – All	Intake Structure Blockage AOP-56
4	Overrides SW18:B	C – BOP, SRO	EDG D Spuriously Starts; ESW B Fails to Start AOP-77, Technical Specifications
5	RD12	C – ATC, SRO	Control Rod Drift In AOP-27, Technical Specifications
6	AD06:C AD08:C MS16:C	M – All	SRV C Fails Open; SRV C Tailpipe Break in Torus Airspace AOP-36, AOP-1, EOP-2, EOP-4
7	RH01 Remote Override	C – All	RHR Pumps B and D Trip; RHR Loop A Suction Valve Drifts Closed and Delayed Pump Trips; RHRSW to RHR Crosstie Valves Fail Closed EOP-4, EOP-2
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: **James A. Fitzpatrick**Scenario No.: **NRC-2**Op-Test No.: **17-2**

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at approximately 85% power. Feedwater is in single element control. IAC C is out of service.

Turnover: Swap Feedwater to three element control per OP-2A section G.32.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Swap Feedwater to Three Element Control OP-2A
2	N/A	R – ATC, SRO	Withdraw Control Rods OP-65, OP-26
3	RW01	I – ATC, SRO	Rod Worth Minimizer Fails ARP 09-5-2-1
4	RD11	C – ATC, SRO	Uncoupled Control Rod OP-26, AOP-25
5	SW09:B SW17:C	C – BOP, SRO	RBCLC Pump B Trips; RBCLC Pump C Fails to Automatically Start AOP-11
6	RC06	C – BOP, SRO	RCIC Inadvertent Start AOP-77, Technical Specifications
7	ED43:A	C – SRO	Loss of Line 3 AOP-72, Technical Specifications
8	Report	M – All	Code Red AOP-70, AOP-1, EOP-2
9	DG10 DG11	I – BOP, SRO	EDGs Fail to Automatically Start AOP-70
10	ED43:B	C – All	Loss of Offsite Power AOP-72, AOP-1

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

Facility: **James A. Fitzpatrick**Scenario No.: **NRC-3**Op-Test No.: **17-2**Examiners: _____

_____Operators: _____

Initial Conditions: The plant is operating at approximately 5% power during a startup. HPCI is out of service and ready to be restored to a standby lineup. IAC C is out of service. Standby Gas Treatment fan B is operating for Containment inerting.

Turnover: Restore HPCI to a standby lineup per OP-15. Then, continue power ascension by withdrawing control rods. Complete the current rod group, then hold for Reactor Engineering.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Restore HPCI to a Standby Lineup OP-15
2	N/A	R – ATC, SRO	Withdraw Control Rods OP-65, OP-26
3	NM08:E	I – ATC, SRO	IRM Fails Inop ARPs, OP-16, Technical Specifications
4	PC04:B	C – BOP, SRO	Standby Gas Treatment Fan B Trips ARP 09-75-2-24(32), OP-20, Technical Specifications
5	EP02 Remote ED23	I – BOP, SRO	Seismic Event, LPCI Inverter Trips AOP-14, ARP 09-8-3-2, Technical Specifications
6	OG03	C – All	Explosion in Air Ejector Discharge ARP 09-6-1-7(15), AOP-4, AOP-1, EOP-2
7	EP01 RH10 Overrides	M – All	Second Seismic Event; RHR Suction Piping Leak; RHR Suction Fails to Isolate EOP-2, EOP-4
8	Overrides	C – ATC, SRO	Feedwater Low Flow Control Valve Fails Closed EOP-2
9	RP03	I – All	MSIVs Spuriously Isolate EOP-2

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

Facility: **James A. Fitzpatrick**Scenario No.: **NRC-4**Op-Test No.: **17-2**Examiners: _____

_____Operators: _____

Initial Conditions: The plant is operating at approximately 100% power. IAC C is out of service.

Turnover: Perform Core Spray full flow testing per ST-3PA, starting at step 8.7.6.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Perform Core Spray Full Flow Test ST-3PA
2	Override	C – BOP, SRO	Core Spray Pump Overload ARP 09-3-1-31, Technical Specifications
3	TU04	R – ATC, SRO C – BOP	Main Turbine Bearing High Vibration AOP-66
4	ED19:D	C – All	Electrical Fault on 10400 Bus AOP-17, AOP-8, AOP-60, Technical Specifications
5	TU04	C – ATC, SRO	Main Turbine Bearing High Vibration AOP-66, AOP-1
6	RP01AA RP01BA RP09 RD10	M – All	Failure of RPS and ARI to Actuate; Multiple Control Rods Stuck EOP-2, EOP-3
7	SL02 RR13	C – ATC, SRO	First SLC Squib Valve Fails to Fire, Recirculation Pump A Fails to Automatically Trip EOP-3
8	FW19	C – All	Trip of Condensate Pump A, HPCI, and CRD Pump A; RCIC Flow Controller Fails Low AOP-41, EOP-3, EOP-3A
9	RR15:A	C – All	Coolant Leak in Drywell EOP-3, EOP-3A

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

Facility: **James A. Fitzpatrick**Scenario No.: **NRC-5**Op-Test No.: **17-2**

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at approximately 80% power. L-34 is aligned to the alternate supply following breaker maintenance. Reactor Building ventilation is isolated for maintenance and Standby Gas Treatment fan B is operating.

Turnover: Restore L-34 to the normal supply per OP-46A section G.12.3. The procedure is in progress up to step G.12.3.d. Then, raise Reactor power with Recirculation flow.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO	Restore L-34 to Normal Power Source OP-46A
2	N/A	R – ATC, SRO	Raise Reactor Power with Recirculation Flow OP-27
3	RD06:A RD09	C – ATC, SRO	Control Rod Drive Pump Trip, One Control Rod Drive Accumulator Low Pressure AOP-69, ARP-09-5-1-43, Technical Specifications
4	ED21:A Override	C – BOP, SRO	Loss of L15, Drywell Cooling Fan Fails to Automatically Start AOP-18A, Technical Specifications
5	Override	C – BOP, SRO	Loss of Steam Packing Exhauster A ARP 09-7-3-43, OP-24D
6	CU07 CU10 CU11 CU12	M – All	RWCU Steam Leak into Reactor Building; RWCU Fails to Isolate Automatically and Manually EOP-5, EOP-2, AOP-1
7	RP01BB RP01AA	I – ATC, SRO	RPS Fails to Scram, ARI Works AOP-1
8	Override	C – All	Bypass Opening Jack Fails to Open Beyond 5% AOP-1, EOP-2

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

Facility: J.A. FitzPatrick		Date of Exam: 1/14/2019																
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	4	3	4	N/A			3	3	N/A			3	20	3	4	7	
	2	1	2	1	N/A			1	1	N/A			1	7	1	2	3	
	Tier Totals	5	5	5	N/A			4	4	N/A			4	27	4	6	10	
2. Plant Systems	1	3	1	3	2	2	3	3	3	2	2	2	26	2	3	5		
	2	1	1	1	2	1	1	1	1	1	1	1	12	0	1	2	3	
	Tier Totals	4	2	4	4	3	4	4	4	3	3	3	38	3	5	8		
3. Generic Knowledge and Abilities Categories				1		2		3		4		10		1	2	3	4	7
				3		3		2		2				2	2	2	1	

- 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	#
295003 (APE 3) Partial or Complete Loss of AC Power / 6						X	G2.4.21 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.	4.6	76
295016 (APE 16) Control Room Abandonment / 7					X		AA2.06 Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT: Cooldown rate	3.5	77
295018 (APE 18) Partial or Complete Loss of CCW / 8					X		AA2.04 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: System flow	2.9	78
295021 (APE 21) Loss of Shutdown Cooling / 4						X	G2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	79
295023 (APE 23) Refueling Accidents / 8					X		AA2.04 Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS: Occurrence of fuel handling accident	4.1	80
295025 (EPE 2) High Reactor Pressure / 3						X	G2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.3	81
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1						X	G2.4.6 Knowledge of EOP mitigation strategies.	4.7	82
295001 (APE 1) Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4				X			AA1.06 Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Neutron monitoring system	3.3	1
295003 (APE 3) Partial or Complete Loss of AC Power / 6					X		AA2.01 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: Cause of partial or complete loss of A.C. power	3.4	2
295004 (APE 4) Partial or Complete Loss of DC Power / 6						X	G2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	3
295005 (APE 5) Main Turbine Generator Trip / 3	X						AK1.01 Knowledge of the operational implications of the following concepts as they apply to MAIN TURBINE GENERATOR TRIP: Pressure effects on reactor power	4.0	4
295006 (APE 6) Scram / 1	X						AK1.03 Knowledge of the operational implications of the following concepts as they apply to SCRAM: Reactivity control	3.7	5
295016 (APE 16) Control Room Abandonment / 7			X				AK3.03 Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT: Disabling control room controls	3.5	6

295018 (APE 18) Partial or Complete Loss of CCW / 8					X	G2.4.8 Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8	7
295019 (APE 19) Partial or Complete Loss of Instrument Air / 8	X					AK2.14 Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR and the following: Plant air systems	3.2	8
295021 (APE 21) Loss of Shutdown Cooling / 4					X	G2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	3.8	9
295023 (APE 23) Refueling Accidents / 8			X			AK3.02 Knowledge of the reasons for the following responses as they apply to REFUELING ACCIDENTS: Interlocks associated with fuel handling equipment	3.4	10
295024 High Drywell Pressure / 5			X			EK3.04 Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE: Emergency depressurization	3.7	11
295025 (EPE 2) High Reactor Pressure / 3	X					EK1.06 Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE: Pressure effects on reactor water level	3.5	12
295026 (EPE 3) Suppression Pool High Water Temperature / 5			X			EA1.03 Ability to operate and/or monitor the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Temperature monitoring	3.9	13
295028 (EPE 5) High Drywell Temperature (Mark I and Mark II only) / 5	X					EK2.01 Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following: Drywell spray: Mark-I&II	3.7	14
295030 (EPE 7) Low Suppression Pool Water Level / 5			X			EA1.01 Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: ECCS systems (NPSH considerations): Plant-Specific	3.6	15
295031 (EPE 8) Reactor Low Water Level / 2				X		EA2.01 Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Reactor water level	4.6	16
295037 (EPE 14) Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1				X		EA2.01 Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Reactor power	4.2	17
295038 (EPE 15) High Offsite Radioactivity Release Rate / 9			X			EK3.04 Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: Emergency depressurization	3.6	18
600000 (APE 24) Plant Fire On Site / 8	X					AK1.01 Knowledge of the operational implications of the following concepts as they apply to Plant Fire On Site: Fire Classifications by type	2.5	19
700000 (APE 25) Generator Voltage and Electric Grid Disturbances / 6		X				AK2.03 Knowledge of the interrelations between GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES and the following: Sensors, detectors, indicators	3.0	20
K/A Category Totals:	4	3	4	3	3/3	3/4	Group Point Total: 20/7	

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)						Form ES-401-1	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
295015 (APE 15) Incomplete Scram / 1						X	G2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	83
295032 (EPE 9) High Secondary Containment Area Temperature / 5						X	G2.4.41 Knowledge of the emergency action level thresholds and classifications.	4.6	84
295034 (EPE 11) Secondary Containment Ventilation High Radiation / 9					X		EA2.01 Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION : Ventilation radiation levels	4.2	85
295009 (APE 9) Low Reactor Water Level / 2						X	G2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.2	21
295017 (APE 17) High Offsite Release Rate / 9			X				AK3.01 Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: System isolations	3.6	22
295020 (APE 20) Inadvertent Containment Isolation / 5 & 7					X		AA2.04 Ability to determine and/or interpret the following as they apply to INADVERTENT CONTAINMENT ISOLATION: Reactor pressure	3.9	23
295032 (EPE 9) High Secondary Containment Area Temperature / 5	X						EK1.02 Knowledge of the operational implications of the following concepts as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Radiation releases	3.6	24
295033 (EPE 10) High Secondary Containment Area Radiation Levels / 9		X					EK2.02 Knowledge of the interrelations between HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS and the following: Process radiation monitoring system	3.8	25
295010 High Drywell Pressure				X			AA1.03 Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: Nitrogen makeup: Plant-Specific	2.6	26
295036 (EPE 13) Secondary Containment High Sump/Area Water Level / 5		X					EK2.01 Knowledge of the interrelations between SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL and the following: Secondary containment equipment and floor drain system	3.1	27
K/A Category Point Totals:	1	2	1	1	1/1	1/2	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				A2.02 Ability to (a) predict the impacts of the following on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Pump trips	3.5	86
215004 (SF7 SRMS) Source Range Monitor								X				A2.04 Ability to (a) predict the impacts of the following on the SOURCE RANGE MONITOR (SRM) SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Up scale and downscale trips	3.7	87
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor											X	G2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	88
218000 (SF3 ADS) Automatic Depressurization											X	G2.2.37 Ability to determine operability and/or availability of safety related equipment.	4.6	89
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff											X	G2.2.40 Ability to apply Technical Specifications for a system.	4.7	90
203000 (SF2, SF4 RHR/LPCI) RHR/LPCI: Injection Mode									X			A3.09 Ability to monitor automatic operations of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) including: Emergency generator load sequencing	3.6	28
205000 (SF4 SCS) Shutdown Cooling				X								K4.05 Knowledge of SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) design feature(s) and/or interlocks which provide for the following: Reactor cooldown rate	3.6	29
206000 (SF2, SF4 HPCIS) High-Pressure Coolant Injection					X							K5.01 Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM: Turbine operation: BWR-2,3,4	3.3	30
209001 (SF2, SF4 LPCS) Low-Pressure Core Spray		X										K2.01 Knowledge of electrical power supplies to the following: Pump power	3.0	31
211000 (SF1 SLCS) Standby Liquid Control								X				A2.07 Ability to (a) predict the impacts of the following on the STANDBY LIQUID CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Valve closures	2.9	32
211000 (SF1 SLCS) Standby Liquid Control					X							K5.06 Knowledge of the operational implications of the following concepts as they apply to STANDBY LIQUID CONTROL SYSTEM: Tank level measurement	3.0	33
212000 (SF7 RPS) Reactor Protection						X						K6.03 Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR PROTECTION SYSTEM: Nuclear boiler instrumentation	3.5	34

215003 (SF7 IRM) Intermediate-Range Monitor							X											A1.01 Ability to predict and/or monitor changes in parameters associated with operating the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM controls including: Detector position	3.4	35	
215004 (SF7 SRMS) Source-Range Monitor								X											A2.02 Ability to (a) predict the impacts of the following on the SOURCE RANGE MONITOR (SRM) SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: SRM inop condition	3.4	36
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor							X												A1.04 Ability to predict and/or monitor changes in parameters associated with operating the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM controls including: SCRAM and rod block trip setpoints	4.1	37
215005 (SF7 PRMS) Average Power Range Monitor/Local Power Range Monitor							X												K6.07 Knowledge of the effect that a loss or malfunction of the following will have on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM: Flow converter/comparator network: Plant-Specific	3.2	38
217000 (SF2, SF4 RCIC) Reactor Core Isolation Cooling			X																K3.01 Knowledge of the effect that a loss or malfunction of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) will have on following: Reactor water level	3.7	39
218000 (SF3 ADS) Automatic Depressurization								X											A2.06 Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: ADS initiation signals present	4.2	40
223002 (SF5 PCIS) Primary Containment Isolation/Nuclear Steam Supply Shutoff			X																K3.14 Knowledge of the effect that a loss or malfunction of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF will have on following: Recirculation system: Plant-Specific	3.0	41
239002 (SF3 SRV) Safety Relief Valves																	X		G2.2.43 Knowledge of the process used to track inoperable alarms.	3.0	42
259002 (SF2 RWLCS) Reactor Water Level Control	X																		K1.02 Knowledge of the physical connections and/or cause-effect relationships between REACTOR WATER LEVEL CONTROL SYSTEM and the following: Main steam flow	3.2	43
261000 (SF9 SGTS) Standby Gas Treatment				X															K4.03 Knowledge of STANDBY GAS TREATMENT SYSTEM design feature(s) and/or interlocks which provide for the following: Moisture removal	2.5	44
262001 (SF6 AC) AC Electrical Distribution																	X		A4.01 Ability to manually operate and/or monitor in the control room: All breakers and disconnects (including available switch yard): Plant-Specific	3.4	45
262001 (SF6 AC) AC Electrical Distribution			X																K3.05 Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: Off-site power system	3.2	46

262002 (SF6 UPS) Uninterruptable Power Supply (AC/DC)	X																	K1.03 Knowledge of the physical connections and/or cause-effect relationships between UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) and the following: Rod position information: Plant-Specific	2.7	47
263000 (SF6 DC) DC Electrical Distribution																	X	A4.03 Ability to manually operate and/or monitor in the control room: Battery discharge rate: Plant-Specific	2.7	48
264000 (SF6 EGE) Emergency Generators (Diesel/Jet) EDG																	X	A3.01 Ability to monitor automatic operations of the EMERGENCY GENERATORS (DIESEL/JET) including: Automatic starting of compressor and emergency generator	3.0	49
300000 (SF8 IA) Instrument Air	X																	K1.03 Knowledge of the connections and / or cause effect relationships between INSTRUMENT AIR SYSTEM and the following: Containment air	2.8	50
300000 (SF8 IA) Instrument Air													X					K6.13 Knowledge of the effect that a loss or malfunction of the following will have on the INSTRUMENT AIR SYSTEM: Filters	2.8	51
400000 (SF8 CCS) Component Cooling Water													X					A1.01 Ability to predict and / or monitor changes in parameters associated with operating the CCWS controls including: CCW flow rate	2.8	52
400000 (SF8 CCS) Component Cooling Water																	X	G2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.4	53
K/A Category Point Totals:	3	1	3	2	2	3	3	3/2	2	2	2/3							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	#	
201006 (SF7 RWMS) Rod Worth Minimizer												X	G2.2.42 Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	4.6	91
215001 (SF7 TIP) Traversing In Core Probe								X					A2.02 Ability to (a) predict the impacts of the following on the TRAVERSING IN-CORE PROBE; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High primary containment pressure: Mark-I&II	3.0	92
286000 (SF8 FPS) Fire Protection												X	G2.2.38 Knowledge of conditions and limitations in the facility license.	4.5	93
202002 (SF1 RSCTL) Recirculation Flow Control									X				A3.03 Ability to monitor automatic operations of the RECIRCULATION FLOW CONTROL SYSTEM including: Scoop tube operation: BWR-2,3,4	3.1	54
230000 RHR/LPCI: Torus/Suppression Pool Spray Mode				X									K4.07 Knowledge of RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE design feature(s) and/or interlocks which provide for the following: Prevention of water hammer	3.1	55
215002 (SF7 RBMS) Rod Block Monitor								X					A2.03 Ability to (a) predict the impacts of the following on the ROD BLOCK MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of associated reference APRM channel: BWR-3,4,5	3.1	56
223001 (SF5 PCS) Primary Containment and Auxiliaries										X			A4.09 Ability to manually operate and/or monitor in the control room: SPDS/CRIDS/ERIS/GDS: Plant-Specific	2.5	57
234000 (SF8 FH) Fuel-Handling Equipment						X							K6.02 Knowledge of the effect that a loss or malfunction of the following will have on the FUEL HANDLING EQUIPMENT: Reactor manual control system: Plant-Specific	2.8	58
245000 (SF4 MTGEN) Main Turbine Generator/Auxiliary	X												K1.06 Knowledge of the physical connections and/or cause-effect relationships between MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS and the following: Component cooling water systems	2.6	59
259001 (SF2 FWS) Feedwater		X											K2.01 Knowledge of electrical power supplies to the following: Reactor feedwater pump(s): Motor-Driven-Only	3.3	60
268000 (SF9 RW) Radwaste							X						A1.01 Ability to predict and/or monitor changes in parameters associated with operating the RADWASTE controls including: Radiation level	2.7	61
272000 (SF7, SF9 RMS) Radiation Monitoring												X	G2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.6	62
286000 (SF8 FPS) Fire Protection				X									K4.02 Knowledge of FIRE PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic system initiation	3.3	63

288000 (SF9 PVS) Plant Ventilation					X										K5.01 Knowledge of the operational implications of the following concepts as they apply to PLANT VENTILATION SYSTEMS: Airborne contamination control	3.1	64
290001 (SF5 SC) Secondary Containment			X												K3.01 Knowledge of the effect that a loss or malfunction of the SECONDARY CONTAINMENT will have on following: Off-site radioactive release rates	4.0	65
K/A Category Point Totals:	1	1	1	2	1	1	1	1/1	1	1	1/2	Group Point Total:				12/3	

Facility: J. A. FitzPatrick		Date of Exam: 1/14/2019				
Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements	3.8			66
	2.1.19	Ability to use the plant computer to evaluate system or component status	3.9			67
	2.1.23	Ability to perform specific system and integrated plant procedures during all modes of plant operation	4.3			68
	2.1.27	Knowledge of system purpose and/or function			4.0	94
	2.1.32	Ability to explain and apply all system limits and precautions			4.0	95
	Subtotal				3	
2. Equipment Control	2.2.1	Ability to perform pre-startup procedures for the facility, including those controls associated with plant equipment that could affect reactivity	4.5			69
	2.2.6	Knowledge of the process for making changes to procedures	3.0			70
	2.2.7	Knowledge of the process for conducting special or infrequent tests	2.9			71
	2.2.36	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions of operations			4.2	96
	2.2.37	Ability to determine operability and/or availability of safety related equipment			4.6	97
	Subtotal				3	
3. Radiation Control	2.3.15	Knowledge of radiation monitoring systems , such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9			72
	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions	3.5			73
	2.3.4	Knowledge of radiation exposure limits under normal and emergency conditions			3.7	98
	2.3.6	Ability to approve release permits			3.8	99
	Subtotal				2	
4. Emergency Procedures/Plan	2.4.11	Knowledge of abnormal condition procedures	4.0			74
	2.4.26	Knowledge of facility protection requirements including fire brigade and portable firefighting equipment usage	3.1			75
	2.4.14	Knowledge of general guidelines for EOP usage.			4.5	100
	2.4.					
	2.4.					
	2.4.					
Subtotal				2		1
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
The following topics / K/As were excluded from the systematic and random sampling process:		
1 / 1	295027 High Containment Temperature	This topic applies to plants with Mark III containments only. The facility has a Mark I containment.
1 / 2	295011 High Containment Temperature	This topic applies to plants with Mark III containments only. The facility has a Mark I containment.
2 / 1	207000 Isolation (Emergency) Condenser	This system is not installed at the facility.
2 / 1	209002 HPCS	This system is not installed at the facility.
2 / 2	201004 RSCS	This system is no longer installed at the facility.
2 / 2	201005 RCIS	This system is not installed at the facility.
G	2.2.3 Knowledge of the design, procedural, and operational differences between units.	This K/A applies to multi-unit facilities only.
G	2.2.4 Ability to explain the variations in control board/control room layouts, systems, instrumentation, and procedural actions between units at a facility.	This K/A applies to multi-unit facilities only.

The following K/As were rejected following the systematic and random sampling process:		
1 / 1	<p>Question 3</p> <p>295004 Partial or Complete Loss of DC Power</p> <p>2.4.11 - Knowledge of abnormal condition procedures.</p>	<p>Due to a change in NUREG 1021 Revision 11, K/A 2.4.11 is no longer allowed to be used in Tier 1.</p> <p>Randomly resampled K/A 295004 Partial or Complete Loss of DC Power 2.4.49 - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.</p>
1 / 1	<p>Question 18</p> <p>295038 High Offsite Radioactivity Release Rate</p> <p>EK3.01 - Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: Implementation of site emergency plan</p>	<p>An acceptable question could not be developed for the randomly sampled K/A at a high enough LOD without testing SRO Knowledge.</p> <p>Randomly resampled K/A 295038 High Offsite Radioactivity Release Rate EK3.04 - Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: Emergency depressurization.</p>
1 / 2	<p>Question 21</p> <p>295009 Low Reactor Water Level</p> <p>2.4.30 - Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator</p>	<p>An acceptable question could not be developed for the randomly sampled K/A at a high enough LOD without testing SRO Knowledge.</p> <p>Randomly resampled K/A 295009 Low Reactor Water Level 2.4.34 - Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.</p>

1 / 2	<p>Question 26 295034 Secondary Containment Ventilation High Radiation</p> <p>EA1.03 - Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: Secondary containment ventilation</p>	<p>An acceptable question could not be developed for the randomly sampled K/A without over-emphasizing Secondary Containment concepts on the exam.</p> <p>Randomly resampled K/A 295010 High Drywell Pressure AA1.03 - Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: Nitrogen makeup: Plant-Specific.</p>
2 / 1	<p>Question 30 206000 High Pressure Coolant Injection</p> <p>K5.07 - Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM: System venting: BWR-2,3,4</p>	<p>An acceptable question could not be developed for the randomly sampled K/A due to lack of operationally important, system specific information about system venting.</p> <p>Randomly resampled K/A 206000 High Pressure Coolant Injection K5.01 - Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM: Turbine operation: BWR-2,3,4.</p>
2 / 1	<p>Question 47 262002 Uninterruptable Power Supply (AC/DC)</p> <p>K1.14 - Knowledge of the physical connections and/or cause-effect relationships between UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) and the following: Main steam line radiation monitors: Plant-Specific</p>	<p>An acceptable question could not be developed for the randomly sampled K/A due to lack of interrelationship between UPS and Main Steam line radiation monitors at the facility.</p> <p>Randomly resampled K/A 262002 Uninterruptable Power Supply (AC/DC) K1.03 - Knowledge of the physical connections and/or cause-effect relationships between UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) and the following: Rod position information: Plant-Specific.</p>
2 / 1	<p>Question 51 300000 Instrument Air</p> <p>K6.04 - Knowledge of the effect that a loss or malfunction of the following will have on the INSTRUMENT AIR SYSTEM: Service air refusal valve</p>	<p>An acceptable question could not be developed for the randomly sampled K/A without overlapping concepts tested in Question 8.</p> <p>Randomly resampled K/A 300000 Instrument Air K6.13 - Knowledge of the effect that a loss or malfunction of the following will have on the INSTRUMENT AIR SYSTEM: Filters.</p>

2 / 2	<p>Question 55 215001 Traversing In Core Probe</p> <p>K4.01 - Knowledge of TRAVERSING IN-CORE PROBE design feature(s) and/or interlocks which provide for the following: Primary containment isolation: Mark-I&II</p>	<p>An acceptable question could not be developed for the randomly sampled K/A without overlapping concepts tested in Question 92.</p> <p>Randomly resampled K/A 230000 RHR/LPCI: Torus/Suppression Pool Spray Mode K4.07 - Knowledge of RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE design feature(s) and/or interlocks which provide for the following: Prevention of water hammer.</p>
2 / 2	<p>Question 56 215002 RBM</p> <p>A2.02 - Ability to (a) predict the impacts of the following on the ROD BLOCK MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss or reduction in recirculation system flow (flow comparator): BWR-3,4,5</p>	<p>An acceptable question could not be developed for the randomly sampled K/A</p> <p>Randomly resampled K/A 215002 RBM A2.03 - Ability to (a) predict the impacts of the following on the ROD BLOCK MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of associated reference APRM channel: BWR-3,4,5.</p>
2 / 2	<p>Question 62 272000 Radiation Monitoring</p> <p>2.2.40 - Ability to apply Technical Specifications for a system.</p>	<p>An acceptable question could not be developed for the randomly sampled K/A due to lack of appropriate Technical Specification requirements to be tested on an RO exam related to Radiation Monitoring.</p> <p>Randomly resampled K/A 272000 Radiation Monitoring 2.1.31 - Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.</p>

1 / 1	<p>Question 76 295003 Partial or Complete Loss of A.C. Power</p> <p>2.4.18 - Knowledge of the specific bases for EOPs.</p>	<p>An acceptable question could not be developed for the randomly sampled K/A due to lack of specific EOP bases related to A.C. power.</p> <p>Randomly resampled K/A 295003 Partial or Complete Loss of A.C. Power 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.</p>
1 / 1	<p>Question 79 205000 Loss of Shutdown Cooling</p> <p>2.1.30 - Ability to locate and operate components, including local controls.</p>	<p>An acceptable question could not be developed for the randomly sampled K/A due to lack of SRO level material to test related to locating and operating components.</p> <p>Randomly resampled K/A 205000 Loss of Shutdown Cooling 2.1.7 - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.</p>
1 / 1	<p>Question 82 295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown</p> <p>2.2.37 - Ability to determine operability and/or availability of safety related equipment.</p>	<p>An acceptable question could not be developed for the randomly sampled K/A due to the mismatch between an EOP related evolution and a Technical Specification related generic.</p> <p>Randomly resampled K/A 295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown 2.4.6 - Knowledge of EOP mitigation strategies.</p>
1 / 2	<p>Question 83 295015 Incomplete SCRAM</p> <p>2.2.36 - Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.</p>	<p>An acceptable question could not be developed for the randomly sampled K/A due to the mismatch between an EOP related evolution and a Technical Specification related generic.</p> <p>Randomly resampled K/A 295015 Incomplete SCRAM 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.</p>

<p>2 / 1</p>	<p>Question 89 218000 Automatic Depressurization System 2.4.2 - Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.</p>	<p>An acceptable question could not be developed for the randomly sampled K/A at the SRO level. Randomly resampled K/A 218000 Automatic Depressurization System 2.2.37 - Ability to determine operability and/or availability of safety related equipment.</p>
<p>2 / 1</p>	<p>Question 90 223002 Primary Containment Isolation System/Nuclear Steam Supply Shut-Off 2.4.49 - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.</p>	<p>An acceptable question could not be developed for the randomly sampled K/A at the SRO level. Randomly resampled K/A 223002 Primary Containment Isolation System/Nuclear Steam Supply Shut-Off 2.2.40 - Ability to apply Technical Specifications for a system.</p>
<p>3</p>	<p>Question 100 2.4.13 - Knowledge of crew roles and responsibilities during EOP usage.</p>	<p>An acceptable question could not be developed for the randomly sampled K/A at an appropriate LOD. Additionally, the randomly sampled generic K/A is tested extensively on the operating exam. Randomly resampled K/A 2.4.14 - Knowledge of general guidelines for EOP usage.</p>