

Facility: <u>LIMERICK</u>		Date of Examination: <u>1/18/16</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: <u>1</u>

  

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, R	G.2.1.20 (Ability to interpret and execute procedure steps) Evaluate Valve Stroke Data ST-6-107-200-0 (0764)
Conduct of Operations	N, R	G. 2.1.8 (Ability to coordinate personnel activities outside the control room) – Fire Alarm In Inverter Room JPM (0715)
Equipment Control	D, R	G.2.2.12 (knowledge of surveillance procedures) Review ST-6-047-370-1, Pre Control Rod withdrawal Check (0752)
Radiation Control	N, R	G.2.3.14 (knowledge of radiation and contamination hazards that may arise during normal, abnormal, and emergency conditions) Radioactive Spill Response (3122)
Emergency Plan		N/A

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

\* Type Codes & Criteria:

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

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Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, R	G.2.1.8 (Coordinate Personnel Activities Outside of the Control Room) Reactivate SRO License (6710)
Conduct of Operations	D, R	2.1.25 (Ability to interpret reference material such as graphs, curves, tables, etc.) Evaluate valve data -JPM (6766)
Equipment Control	D, R	G.2.2.12 ( Knowledge of surveillance procedures) Review ST-6-047-370-1, Pre Control Rod withdrawal Check (0753)
Radiation Control	N, R	G2.3.14 (knowledge of radiation and contamination hazards that may arise during normal, abnormal, and emergency conditions) Radiation Transportation Accident assessment (Time Critical) (3123)
Emergency Plan	D, R	G.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.  ERP Classification and Reporting (Time Critical) (3124)

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

Facility: LIMERICK Date of Examination: 1/18/16  
 Examination Level: RO ☒ SRO ☐ Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, R	G.2.1.20 (Ability to interpret and execute procedure steps) Evaluate Valve Stroke Data ST-6-107-200-0 (6764)
Conduct of Operations	N, R	G. 2.1.8 (Ability to coordinate personnel activities outside the control room) – Fire Alarm In Inverter Room JPM (3715)
Equipment Control	D, R	G.2.2.12 (knowledge of surveillance procedures) Review ST-6-047-370-1, Pre Control Rod withdrawal Check (6752)
Radiation Control	N, R	G.2.3.14 (knowledge of radiation and contamination hazards that may arise during normal, abnormal, and emergency conditions) Radioactive Spill Response (3122)
Emergency Plan		N/A

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

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Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, R	G.2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.) Reactivate SRO License (6710)
Conduct of Operations	D, R	2.1.25 (Ability to interpret reference material such as graphs, curves, tables, etc.) Evaluate valve data -JPM (6766)
Equipment Control	D, R	G.2.2.12 ( Knowledge of surveillance procedures) Review ST-6-047-370-1, Pre Control Rod withdrawal Check (6753)
Radiation Control	N, R	G2.3.14 (knowledge of radiation and contamination hazards that may arise during normal, abnormal, and emergency conditions) Radiation Transportation Accident assessment (Time Critical) (3123)
Emergency Plan	D, R	G.2.4.41 Knowledge of the emergency action level thresholds and classifications.  ERP Classification and Reporting (Time Critical) (3124)

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

Facility: LIMERICKDate of Examination: 1/18/2016Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test No.: 1

Control Room Systems: 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
a. Response to EHC Leaks (3109) 241000 A4.08 3.5	N, S	3
b. RCIC Manual Slow Start (3022) 217000 A2.08 3.0	D, A, S, EN	2
c. Shutdown D11 Diesel Generator (3027) 264000 A4.04 3.7	D, S	6
d. Reset Group 2A NSSSS Isolation (3071) 223002 A4.03 3.6	D, S, L	5
e. Resetting ASD Speed Hold (3529) 202001 A1.01 3.6	D, A, S	4
f. Alternate Cooling of RECW (3052) 400000 A2.01 3.3	D, S, L	8
g. SBT Manual Start with Charcoal Encl Hi Temp (3528) 2012 NRC 261000 A4.02 3.31	D,P,A,S,EN	9
h. Control Rod Exercise Test (3034) 201003 A2.01 3.4	N, A, S	1

In-Plant Systems (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

i. D11 Diesel Local Start (2236) 264000 A2.09 3.7	N,A,E,EN	6
j. Placing Alternate CRD Flow Cont in service (2200) 201001 A1.03 2.9	D, R	1
k. Bypassing Rx HVAC Isolation (3214) 288000 A2.01 3.3	D, R, E, EN	9

\* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; 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 (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ $\geq 1 / \geq 1 / \geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$

## Control Room/In-Plant Systems Outline

Form ES-301-2

Facility: <u>LIMERICK</u>		Date of Examination: <u>1/18/2016</u>	
Exam Level: RO <input type="checkbox"/> SRO-I <input checked="" type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>1</u>	
Control Room Systems: 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U			
System / JPM Title	Type Code*	Safety Function	
a. Response to EHC Leaks (3109) 241000 A4.08 3.5	N, S	3	
b. RCIC Manual Slow Start (3022) 217000 A2.08 3.0	D, A, S	2	
c.			
d. Reset Group 2A NSSSS Isolation (3071) 223002 A4.03 3.6	D, S, L	5	
e. Resetting ASD Speed Hold (3529) 202001 A1.01 3.6	D, A, S	4	
f. Alternate Cooling of RECW (3052) 400000 A2.01 3.3	D, S, L	8	
g. SBTG Manual Start with Charcoal Encl Hi Temp (3528) 2012NRC 261000 A4.02 3.31	D, P, A, S, EN	9	
h. Control Rod Exercise Test (3107) 201003 A2.01 3.4	N, A, S	1	
In-Plant Systems (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
i. D11 Diesel Local Start (2236) 264000 A2.09 3.7	N,A,E,EN	6	
j. Placing Alternate CRD Flow Cont in service (0200) 201001 A1.03 2.9	D, R	1	
k. Bypassing Rx HVAC Isolation (3214) 288000 A2.01 3.3	D, R, E, EN	9	
<p>* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>			
* Type Codes	Criteria for RO / SRO-I / SRO-U		
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	<p>4-6 / 4-6 / 2-3</p> <p>≤ 9 / ≤ 8 / ≤ 4</p> <p>≥ 1 / ≥ 1 / ≥ 1</p> <p>≥ 1 / ≥ 1 / ≥ 1 (control room system)</p> <p>≥ 1 / ≥ 1 / ≥ 1</p> <p>≥ 2 / ≥ 2 / ≥ 1</p> <p>≤ 3 / ≤ 3 / ≤ 2 (randomly selected)</p> <p>≥ 1 / ≥ 1 / ≥ 1</p>		

Facility: <u>LIMERICK</u>		Date of Examination: <u>1/18/2016</u>	
Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>		Operating Test No.: <u>1</u>	

  

Control Room Systems: 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U			
System / JPM Title	Type Code*	Safety Function	
a. Response to EHC Leaks (3109)      241000 A4.08 3.5	N, S	3	
b. RCIC Manual Slow Start (3022)      217000 A2.08 3.	D, A, S, EN	2	
c.			
d. Reset Group 2A NSSSS Isolation (3071)      223002 A4.03 3.6	D, S, L	5	
e.			
f.			
g.			
h.			
In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
i. D11 Diesel Local Start (2236)      264000 A2.09 3.7	N,A,E,EN	6	
j. Placing Alternate CRD Flow Cont in service (0200) 201001 A1.03 2.9	D, R	1	
K			
* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; 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 (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3  ≤ 9 / ≤ 8 / ≤ 4 ≥ 1 / ≥ 1 / ≥ 1 ≥ 1 / ≥ 1 / ≥ 1 (control room system) ≥ 1 / ≥ 1 / ≥ 1 ≥ 2 / ≥ 2 / ≥ 1 ≤ 3 / ≤ 3 / ≤ 2 (randomly selected) ≥ 1 / ≥ 1 / ≥ 1		

Facility: Limerick 1 & 2      Scenario No.: SEG-4055E      Rev 1      Op-Test No.: 1

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

Initial Conditions:

Unit 1 is at 100 % power. Unit 2 is at 100% power.

Turnover:

RCIC is running per S49.1.D for oil sampling. S49.1.D is complete up to and including step 4.3.7. RCIC will be shutdown when sampling is complete.

Event No.	Malfunction Number	Event Type*	Event Description
1	E51-S37 E51-S37-PB	I-PRO R-RO TS-SRO	Inadvertent RCIC Startup and injection ( <b>Abnormal</b> )
2	MED015E MDG420C	C-PRO TS-SRO	D13 Dead Bus Transfer to 101 / D13 D/G fails to start ( <b>Malfunction</b> )
3	VIC108B MCN604B	C-RO C-PRO	'1B' Condensate Pump Vibration requiring shutdown ( <b>Abnormal</b> )
4	MRR441	C-ALL	Leak in the Drywell ( <b>Abnormal</b> )
5	MHP447A E41-S20 MRR440A MED262A MSL196A MSL196B MSL196C MRC466	M-ALL	LOCA with Loss of High Pressure Injection Sources
6	MCR547	C-RO	Loss of CRD system due to clogged suction filter ( <b>Abnormal</b> )
7	MCS183A	C-PRO	'1A' Core Spray Pump fails to auto start ( <b>Malfunction</b> )
*      (N)ormal,      (R)eactivity,      (I)nstrument,      (C)omponent,      (M)ajor			



Facility: Limerick 1 & 2 Scenario No.: SEG-4056E Rev 1 Op-Test No.: 1

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

**Initial Conditions:** Unit 1 is at 6% power with a startup in progress. Unit 2 is at 100% power.

**Turnover:** Startup is in progress per GP-2 with steps complete to step \_\_\_\_\_. Crew is to continue withdrawing control rods IAW rod move sheet until 4 Bypass Valves are open in preparation to enter OPCON 1.

Event No.	Malfunction Number	Event Type*	Event Description
1	N/A	R-RO	Withdraw control rods to raise power
2	MRD016F (18-19)	C-RO TS-SRO	Control Rod (18-19 ) scrams ( <b>Abnormal</b> )
3	E51-S37-PB E51-S37	I-PRO R-RO TS-SRO	Inadvertent RCIC system start ( <b>Abnormal</b> )
4	MPC482A	C-PRO	'1A' Drywell Chiller trip ( <b>Abnormal</b> )
5	MED279A	C-PRO TS-SRO	Loss of 10-Y201 safeguard electrical panel ( <b>Abnormal</b> )
6	MRD016F (34-23) (58-35)	C-RO	2 <sup>nd</sup> and 3 <sup>rd</sup> Control Rod (34-23) and (58-35) scram ( <b>Malfunction</b> )
7	MED261 MED263D	M-All C-PRO	Grid Instability Resulting in Loss of Offsite Power Fault on D14 SFGD BUS
8	MHP447B MDG420C	C-PRO	HPCI system failure on initiation ( <b>Malfunction</b> ) D13 Diesel Auto Start Failure (Recoverable)
9	MRR440A MDG418D	M-All	Small Break LOCA (1.5% ramped over 5 minutes) with D14 Diesel Trip on Bus Lockout
10	MRC466	C-PRO	RCIC Turbine trip on overspeed ( <b>Malfunction</b> ) (Recoverable after RPV Level reaches -150")

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

Facility: Limerick 1 & 2      Scenario No.: SEG-6213E      Rev 1      Op-Test No.: 1Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Initial Conditions:

Unit 1 is at 100% power. Unit 2 is at 100% power.

## Turnover:

Crew is required to cross-tie 114A LC to 124A LC per S93.7.A to remove 114A Reactor Area Load Center Transformer Supply Breaker for Maintenance. LC Transformer to service when maintenance is complete.

Event No.	Malfunction Number	Event Type*	Event Description
1	N/A	N-PRO	Cross tie 114A to 124A Load Center
2	MEH101C	C-PRO R-RO TS-SRO	# 3 Turbine Stop Valve fail closed ( <b>Abnormal</b> )
3	MRP406A	C-RO TS-SRO	Loss of power to Div I RRCS
4	MED263A	C-PRO TS-SRO	D11 Bus Lockout ( <b>Abnormal</b> )
5	MSL001B	C-RO	'1B' SLC Pump spuriously starts and injects ( <b>Abnormal</b> )
6	MRP029B MSL559 C22-S1B	M-ALL	ATWS, SLC failure (ARI successful on low level)
7	C11A-S16	C-RO	Control Rod Continuous Insert pushbutton fails
8	MRC465 MRC464A	M-ALL	RCIC steam leak with failure to auto isolate results in MSO exceeded in 2 areas
9	MAD148D	C-PRO	'1M' SRV fails closed
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: Limerick 1 & 2 Scenario No.: SEG-6214E Rev 1 Op-Test No.: 1

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

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

**Initial Conditions:**

Unit 1 is at 100% power. Unit 2 is at 100% power.

**Turnover:**

No equipment is known to be inoperable.

Event No.	Malfunction Number	Event Type*	Event Description
1	118 I-5	C-PRO R-RO	Loss of Iso-Phase Bus Cooling ( <b>Abnormal</b> )
2	MRP029A MV1232B	I-RO TS-SRO	RPS Level Instrument Failure
3	MCR412A MCR547 MRD016C (10-11) (34-35) (42-23)	C-RO C-PRO TS-SRO	CRD Pump Failure CRD System Failure ( <b>Abnormal</b> ) HCU Accumulator(s) Trouble
4	MRD557 MSL559 MMT002	M-ALL C-RO	ATWS (Scram Air Header fails to depressurize) with Turbine Trip
5	MAD148C	C-PRO	'1M' SRV fails open (electrical)
6	MRC457B	C-PRO	RCIC fails in automatic

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

Facility:		2016 NRC											Date of Exam:					
Tier	Group	RO K/A Category Points											SRO-Only Points					
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Plant Evolutions	1	4	3	3				3	4			3	20	4	3	7		
	2	1	1	1				2	1			1	7	2	1	3		
	Tier Totals	5	4	4				5	5			4	27	6	4	10		
2. Plant Systems	1	3	3	2	2	2	3	2	2	2	2	3	26	2	3	5		
	2	1	1	1	1	1	1	1	1	1	2	1	12	0	1	3		
	Tier Totals	4	4	3	3	3	4	3	3	3	4	4	38	3	5	8		
3. Generic Knowledge & Abilities Categories				1		2		3		4		10	1	2	3	4	7	
				3		2		3		2			2	2	1	2		
<p>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 outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category.)</p> <p>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 <math>\pm 1</math> 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.</p> <p>3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted 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.</p> <p>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.</p> <p>5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>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.</p> <p>8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in 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.</p> <p>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.</p>																		
G*		Generic K/As																

2016 NRC  
Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
295024 High Drywell Pressure / 5					X		EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE: Drywell temperature	4.0	76
295016 Control Room Abandonment / 7					X		AA2.07 - Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT : Suppression chamber pressure	3.4	77
295003 Partial or Complete Loss of AC / 6					X		AA2.02 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : Reactor power, pressure, and level	4.3	78
295031 Reactor Low Water Level / 2						X	2.4.47 - Emergency Procedures / Plan: Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	4.2	79
295038 High Off-site Release Rate / 9						X	2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.	4.0	80
295018 Partial or Total Loss of CCW / 8						X	2.4.11 - Emergency Procedures / Plan: Knowledge of abnormal condition procedures.	4.2	81
295026 Suppression Pool High Water Temp. / 5					X		EA2.03 - Ability to determine and/or interpret the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Reactor pressure	4.0	82
295026 Suppression Pool High Water Temp. / 5	X						EK1.01 - Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE : Pump NPSH	3.0	39
295024 High Drywell Pressure / 5	X						EK1.01 - Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE : Drywell integrity: Plant-Specific	4.1	40
600000 Plant Fire On-site / 8	X						AK1.02 - Knowledge of the operation applications of the following concepts as they apply to Plant Fire On Site: Fire Fighting	2.9	41
295030 Low Suppression Pool Water Level / 5		X					EK2.03 - Knowledge of the interrelations between LOW SUPPRESSION POOL WATER LEVEL and the following: LPCS	3.8	42
295038 High Off-site Release Rate / 9		X					EK2.01 - Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: Radwaste	3.1	43
295021 Loss of Shutdown Cooling / 4		X					AK2.03 - Knowledge of the interrelations between LOSS OF SHUTDOWN COOLING and the following: RHR/shutdown cooling	3.6	44
295018 Partial or Total Loss of CCW / 8			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Isolation of non-essential heat loads: Plant-Specific	2.9	45
295003 Partial or Complete Loss of AC / 6			X				AK3.02 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF	2.9	46

2016 NRC  
Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
							A.C. POWER : Selective tripping		
295005 Main Turbine Generator Trip / 3			X				AK3.03 - Knowledge of the reasons for the following responses as they apply to MAIN TURBINE GENERATOR TRIP: Feedwater temperature decrease	2.8	47
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4				X			AA1.03 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : RMCS: Plant-Specific	2.6	48
295025 High Reactor Pressure / 3				X			EA1.04 - Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE: HPCI: Plant-Specific	3.8	49
295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1				X			EA1.10 - Ability to operate and/or monitor the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN : Alternate boron injection methods: Plant-Specific	3.7	50
295028 High Drywell Temperature / 5					X		EA2.05 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE : Torus/suppression chamber pressure: Plant-Specific	3.6	51
700000 Generator Voltage and Electric Grid Disturbances					X		AA2.07 - Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Operational status of engineered safety features.	3.6	52
295006 SCRAM / 1					X		AA2.06 - Ability to determine and/or interpret the following as they apply to SCRAM : Cause of reactor SCRAM	3.5	53
295004 Partial or Total Loss of DC Pwr / 6						X	2.1.20 - Conduct of Operations: Ability to interpret and execute procedure steps.	4.6	54
295019 Partial or Total Loss of Inst. Air / 8						X	2.1.27 - Conduct of Operations: Knowledge of system purpose and / or function.	3.9	55
295016 Control Room Abandonment / 7						X	2.2.3 - Equipment Control: (multi-unit license) Knowledge of the design, procedural, and operational differences between units.	3.8	56
295031 Reactor Low Water Level / 2	X						EK1.01 - Knowledge of the operational implications of the following concepts as they apply to REACTOR LOW WATER LEVEL : Adequate core cooling	4.6	57
295023 Refueling Acc Cooling Mode / 8					X		AA2.01 - Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS : Area radiation levels	3.6	58
K/A Category Totals:	4	3	3	3	4/4	3/3	Group Point Total:	20/7	

2016 NRC  
Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

EAPE # / Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
500000 High CTMT Hydrogen Conc. / 5					X		EA2.01 - Ability to determine and / or interpret the following as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: Hydrogen monitoring system availability	3.5	83
295007 High Reactor Pressure / 3						X	2.1.7 - Conduct of Operations: Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	84
295022 Loss of CRD Pumps / 1					X		AA2.02 - Ability to determine and/or interpret the following as they apply to LOSS OF CRD PUMPS : CRD system status	3.4	85
295022 Loss of CRD Pumps / 1	X						AK1.02 - Knowledge of the operational implications of the following concepts as they apply to LOSS OF CRD PUMPS: Reactivity control	3.6	59
295012 High Drywell Temperature / 5		X					AK2.02 - Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following: Drywell cooling	3.6	60
295002 Loss of Main Condenser Vac / 3			X				AK3.02 - Knowledge of the reasons for the following responses as they apply to LOSS OF MAIN CONDENSER VACUUM : Turbine trip	3.4	61
295008 High Reactor Water Level / 2				X			AA1.09 - Ability to operate and/or monitor the following as they apply to HIGH REACTOR WATER LEVEL : Ability to drain: Plant-Specific	3.3	62
295034 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	3.8	63
295017 High Off-site Release Rate / 9						X	2.4.47 - Emergency Procedures / Plan: Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.	4.2	64
295033 High Secondary Containment Area Radiation Levels / 9				X			EA1.05 - Ability to operate and/or monitor the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : Affected systems so as to isolate damaged portions	3.9	65
K/A Category Totals:	1	1	1	2	1/2	1/1	Group Point Total:	7/3	

2016 NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp	Q#
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264000 EDGs								X				A2.10 - Ability to (a) predict the impacts of the following on the EMERGENCY GENERATORS (DIESEL/JET) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: LOCA	4.2	86
215005 APRM / LPRM								X				A2.02 - Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions Upscale or downscale trips	3.7	87
212000 RPS											X	2.2.42 - Equipment Control:: Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	4.6	88
400000 Component Cooling Water											X	2.2.4 - Equipment Control: (multi-unit license) Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility.	3.6	89
203000 RHR/LPCI: Injection Mode											X	2.1.31 - Conduct of Operations: Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup.	4.3	90
206000 HPCI	X											K1.04 - Knowledge of the physical connections and/or cause- effect relationships between HIGH PRESSURE COOLANT INJECTION SYSTEM and the following: Reactor feedwater system: BWR-2,3,4	3.6	1
262002 UPS (AC/DC)	X											K1.17 - Knowledge of the physical connections and/or cause- effect relationships between UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) and the following: Scram solenoid valves: Plant-Specific	3.1	2
262001 AC Electrical Distribution		X										K2.01 - Knowledge of electrical power supplies to the following: Off-site sources of power	3.3	3
211000 SLC		X										K2.02 - Knowledge of electrical power supplies to the following: Explosive valves	3.1	4



2016 NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp	Q#
218000 ADS			X									K3.02 - Knowledge of the effect that a loss or malfunction of the AUTOMATIC DEPRESSURIZATION SYSTEM will have on following: Ability to rapidly depressurize the reactor	4.5	5
215004 Source Range Monitor			X									K3.04 - Knowledge of the effect that a loss or malfunction of the SOURCE RANGE MONITOR (SRM) SYSTEM will have on following: Reactor power and indication	3.7	6
215005 APRM / LPRM				X								K4.02 - Knowledge of AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM design feature(s) and/or interlocks which provide for the following: Reactor SCRAM signals	4.1	7
259002 Reactor Water Level Control				X								K4.17 - Knowledge of REACTOR WATER LEVEL CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: Simultaneous Manual and Auto operation of the system (i.e. 1 FP in Auto, 1 FP in Manual)	3.1	8
209001 LPCS					X							K5.01 - Knowledge of the operational implications of the following concepts as they apply to LOW PRESSURE CORE SPRAY SYSTEM : Indications of pump cavitation	2.6	9
205000 Shutdown Cooling					X							K5.02 - Knowledge of the operational implications of the following concepts as they apply to SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) : Valve operation	2.8	10
400000 Component Cooling Water						X						K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the CCWS: Valves	2.7	11
203000 RHR/LPCI: Injection Mode							X					K6.04 - Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) : Keep fill system	3.3	12
212000 RPS							X					A1.05 - Ability to predict and/or monitor changes in parameters associated with operating the REACTOR PROTECTION SYSTEM controls including: RPS bus frequency: Plant-Specific	2.6	13

2016 NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp	Q#
261000 SGTS							X					A1.03 - Ability to predict and/or monitor changes in parameters associated with operating the STANDBY GAS TREATMENT SYSTEM controls including: Off-site release levels	3.2	14
215003 IRM								X				A2.05 - Ability to (a) predict the impacts of the following on the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Faulty or erratic operation of detectors/system	3.3	15
264000 EDGs								X				A2.08 - Ability to (a) predict the impacts of the following on the EMERGENCY GENERATORS (DIESEL/JET) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Initiation of emergency generator room fire protection system	3.3	16
239002 SRVs									X			A3.02 - Ability to monitor automatic operations of the RELIEF/SAFETY VALVES including: SRV operation on high reactor pressure	4.3	17
263000 DC Electrical Distribution									X			A3.01 - Ability to monitor automatic operations of the D.C. ELECTRICAL DISTRIBUTION including: Meters, dials, recorders, alarms, and indicating lights	3.2	18
300000 Instrument Air										X		A4.01 - Ability to manually operate and/or monitor in the control room: Pressure gauges	2.6	19
217000 RCIC										X		A4.05 - Ability to manually operate and/or monitor in the control room: Reactor water level	4.1	20
223002 PCIS/Nuclear Steam Supply Shutoff											X	2.4.9 - Emergency Procedures / Plan: Knowledge of low power / shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	3.8	21
218000 ADS											X	2.4.20 - Emergency Procedures / Plan: Knowledge of operational implications of EOP warnings, cautions, and notes.	3.8	22
215004 Source Range Monitor											X	2.1.30 - Conduct of Operations: Ability to locate and operate components, including local controls.	4.4	23

2016 NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 1

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp .	Q#
223002 PCIS/Nuclear Steam Supply Shutoff						X						K6.05 - Knowledge of the effect that a loss or malfunction of the following will have on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF : Containment instrumentation	3.0	24
203000 RHR/LPCI: Injection Mode	X											K1.17 - Knowledge of the physical connections and/or cause- effect relationships between RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) and the following: Reactor pressure	4.0	25
205000 Shutdown Cooling		X										K2.02 - Knowledge of electrical power supplies to the following: Motor operated valves	2.5	26
K/A Category Totals:	3	3	2	2	2	3	2	2/2	2	2	3/3	Group Point Total:	26/5	

2016 NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 2

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp.	Q #
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290002 Reactor Vessel Internals								X				A2.01 - Ability to (a) predict the impacts of the following on the REACTOR VESSEL INTERNALS ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: LOCA	4.0	91
286000 Fire Protection											X	2.2.25 - Equipment Control: Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	4.2	92
214000 RPIS											X	2.4.34 - Emergency Procedures / Plan: Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.	4.1	93
201002 RMCS	X											K1.01 - Knowledge of the physical connections and/or cause- effect relationships between REACTOR MANUAL CONTROL SYSTEM and the following: Control rod drive hydraulic system	3.2	27
223001 Primary CTMT and Aux.		X										K2.09 - Knowledge of electrical power supplies to the following: Drywell cooling fans: Plant-Specific	2.7	28
288000 Plant Ventilation			X									K3.02 - Knowledge of the effect that a loss or malfunction of the PLANT VENTILATION SYSTEMS will have on following: Reactor building temperature: Plant-Specific	2.9	29
290002 Reactor Vessel Internals				X								K4.05 - Knowledge of REACTOR VESSEL INTERNALS design feature(s) and/or interlocks which provide for the following: Natural circulation	3.3	30
271000 Off-gas					X							K5.09 - Knowledge of the operational implications of the following concepts as they apply to OFFGAS SYSTEM : Hydrogen and oxygen recombination	2.6	31
241000 Reactor/Turbine Pressure Regulator						X						K6.06 - Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR/TURBINE PRESSURE REGULATING SYSTEM : Reactor pressure	3.8	32
239001 Main and Reheat Steam							X					A1.10 - Ability to predict and/or monitor changes in parameters associated with operating the MAIN AND REHEAT STEAM SYSTEM controls including: Reactor power	3.8	33

2016 NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 2

System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A2	A 3	A 4	G		Imp.	Q #
256000 Reactor Condensate								X				A2.12 - Ability to (a) predict the impacts of the following on the REACTOR CONDENSATE SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of equipment component cooling water systems	3.1	34
201003 Control Rod and Drive Mechanism									X			A3.01 - Ability to monitor automatic operations of the CONTROL ROD AND DRIVE MECHANISM including: Control rod position	3.7	35
214000 RPIS										X		A4.01 - Ability to manually operate and/or monitor in the control room: RCIS rod action control bypass switches	3.2	36
214000 RPIS											X	2.4.2 - Emergency Procedures / Plan: Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	37
233000 Fuel Pool Cooling/Cleanup										X		A4.10 - Ability to manually operate and/or monitor in the control room: Tank levels	2.5	38
K/A Category Totals:	1	1	1	1	1	1	1	1/1	1	2	1/2	Group Point Total:	12/3	

Facility:		2016 NRC		Date:		
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.42	Knowledge of new and spent fuel movement procedures.			3.4	94
	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.			3.9	98
	2.1.9	Ability to direct personnel activities inside the control room.	2.9	66		
	2.1.26	Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).	3.4	67		
	2.1.6	Ability to manage the control room crew during plant transients.	3.8	75		
	Subtotal			3		2
2. Equipment Control	2.2.35	Ability to determine Technical Specification Mode of Operation.			4.5	95
	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.			4.4	100
	2.2.4	(multi-unit license) Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility.	3.6	68		
	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 effect plant and system conditions.	4.2	69		
	Subtotal			2		2
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.			3.1	96
	2.3.11	Ability to control radiation releases.	3.8	70		

	2.3.15	Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.	2.9	71		
	2.3.12	Knowledge of Radiological Safety Principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.2	74		
	Subtotal			3		1
4. Emergency Procedures / Plan	2.4.38	Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required.			4.4	97
	2.4.11	Knowledge of abnormal condition procedures.			4.2	99
	2.4.17	Knowledge of EOP terms and definitions.	3.9	72		
	2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	73		
Subtotal				2		2
Tier 3 Point Total				10		7

