



Appendix D

Scenario Outline

Form ES-D-1

Facility: Limerick 1 & 2 Scenario No.: SEG-2007E Rev 2 Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:

Unit 1 is at 90% power. Unit 2 is at 100% power.

Turnover:

Withdraw Control Rods per ReMA and raise Recirc flow to return to 100% Reactor power

'1B' EHC Pump is blocked for pump replacement. Repairs are scheduled to be complete in two (2) hours. Maintain 100% power and support PMT of '1B' EHC pump when it is returned to operations.

Event No.	Malfunction Number	Event Type*	Event Description
1.	None	R-RO	Raise Power with Control Rods
2.	MRD016E (46-15)	C-RO TS-SRO	Control Rod (46-15) uncoupled (Abnormal)
3.	MAD149E	C-RO C-PRO	'1N' SRV fails open / closes when Rx power lowered to <90 % (Abnormal)
4.	MV1231D MRH172D	C-RO C-PRO TS-SRO	Inadvertent Div 4 LOCA Signal (Abnormal) '1D' RHR Pump fails to auto start
5.	MRR441	C-PRO	Small leak in Drywell (Abnormal)
6.	MMS067	M-ALL	Large Steam Leak in Drywell
7.	MRH600B	C-PRO	'1B' RHR Pump Trips (Malfunction)
8.	MRH573A	C-PRO	HV-51-1F024A Thermal Overload condition (Malfunction)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Appendix D
Scenario Outline
Form ES-D-1

Facility: Limerick 1 & 2 Scenario No.: SEG-5006E Rev 0 Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:

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

Turnover:

Maintain 100% Reactor power
Place '1C' SLC Pump in Automatic Injection Mode per S48.1.A, Standby Liquid Control
System Set-Up For Normal Operation, step 4.7 in preparation of a 1B SLC System Outage
Window.

Event No.	Malfunction Number	Event Type*	Event Description
1.	MSL198B C41-S1C	N-PRO TS-SRO	Align '1C' SLC Pump for automatic operation
2.	MPR020C	C-RO	#3 APRM fails upscale (Malfunction)
3.	MRR430A	R-RO C-PRO TS-SRO	'1A' Reactor Recirc Pump shaft seizure resulting in Recirc Pump trip (Abnormal)
4.	MFH563C	C-PRO	Low Pressure FWH Level Transient (Abnormal)
5.	MPR003A	C-RO	Core Power Oscillations
6.	MFW252A MRR440A	M-ALL	LOCA Inside Containment (T-111)
7.	MRC457B	C-PRO	RCIC controller in AUTO failure (Malfunction)
8.	MAD148D	C-PRO	'1M' SRV fails to open (Malfunction)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			



Appendix D

Scenario Outline

Form ES-D-1

Facility: Limerick 1 & 2 Scenario No.: SEG-7016E Rev 002 Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions:Unit 1 is at 100% power. Unit 2 is at 100% power.**Turnover:**

- Maintain 100%.

Event No.	Malfunction Number	Event Type*	Event Description
1.	MFW001	R-RO C-PRO TS-SRO	HWC System Failure (Abnormal)
2.	VIC104C8 MFW250A MFW246A	C-RO C-PRO	'1C' RFP Min Flow Valve fails open, resulting in RFP Hi Pump Vibration (Abnormal)
3.	MCW481A MCW486B	C-PRO	'1A' TECW Pump trip '1B' TECW fails to auto start (Abnormal)
4.	MVI234C	C-RO TS- SRO	Reactor High Pressure Transmitter Failure (Abnormal)
5.	MRP029D MSL559 MRP407C	M-ALL	ATWS The ATWS is mitigated by the insertion of control rods via T-215. (Major)
6.	MRD024	C-RO	RDCS Inoperative after reactor shutdown (Malfunction)
7.	MMT002 MEH108	C-PRO C-RO	Turbine Trip / Bypass Valves Fail Closed (Malfunction)
8.	MRSW600A MRSW600C	C-PRO	'0A' or '0C' RHRSW Pump Trips (Malfunction)

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

Facility: <u>Limerick</u>		Date of Examination: <u>01/17/17</u>
Examination Level: RO X SRO		Operating Test Number: <u>1</u>
Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, D	2.1.19 (Ability to use plant computers to evaluate system or component status. (CFR: 41.10 / 45.12) IMPORTANCE RO 3.9 SRO 3.8 <u>Evaluate Jet Pump Operability</u> (LOJPM6717)
Conduct of Operations	R, N	G2.1.25 (Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12) IMPORTANCE RO 3.9 SRO 4.2) <u>Determine Maximum Generator VARS</u> (LOJPM6719)
Equipment Control	R, D	G2.2.6 Knowledge of the process for making changes to procedures. (CFR: 41.10 / 43.3 / 45.13) IMPORTANCE RO 3.0 SRO 3.6 <u>Prepare a Partial Procedure</u> (LOJPM6777)
Radiation Control	R, N	G2.3.15 (Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 43.4 / 45.9) IMPORTANCE RO 2.9 SRO 3.1) <u>Actions Required for Spiking ARM</u> (LOJPM6728)
Emergency Procedures/Plan		
NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items)		
* Type Codes & 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)		

Facility: <u>Limerick</u>		Date of Examination: <u>01/17/17</u>
Examination Level: RO SRO X		Operating Test Number: <u>1</u>
Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, D	G2.1.5 (Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (CFR: 41.10 / 43.5 / 45.12) IMPORTANCE RO 2.9* SRO 3.9) <u>Determination of Adequate Shift Staffing</u> (LOJPM6712)
Conduct of Operations	R, N	G2.1.40 (Knowledge of refueling administrative requirements. (CFR: 41.10 / 43.5 / 45.13) IMPORTANCE RO 2.8 SRO 3.9) <u>Determine Acceptability of Installing Fuel Pool Gates</u> (LOJPM6763)
Equipment Control	R, D	G2.2.40 (Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3) IMPORTANCE RO 3.4 SRO 4.7) <u>Evaluate Jet Pump Operability</u> (LOJPM6717)
Radiation Control	R, M	G2.3.11 (Ability to control radiation releases. (CFR: 41.11 / 43.4 / 45.10) IMPORTANCE RO 3.8 SRO 4.3) <u>Calculate the Average Offgas Pre-Treatment Radioactivity Release Rate</u> (LOJPM6720)
Emergency Procedures/Plan	S, D	G2.4.41 (Knowledge of the emergency action level thresholds and classifications. (CFR: 41.10 / 43.5 / 45.11) IMPORTANCE RO 2.9 SRO 4.6) <u>ERP Classification and Reporting</u> (LOJPM3097)
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)		

Facility: <u>LIMERICK</u>		Date of Examination: <u>1/17/2017</u>
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input 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. <u>Start a Reactor Recirculation Pump</u> (System 202001 – Recirculation System; A3.02; 3.1/3.0) (LOJPM3121)	A, N, S	1 – Reactivity Control
b. <u>RCIC Manual Slow Start Using FIC-49-1R600</u> (System 217000 – RCIC; A4.04; 3.6/3.6) (LOJPM3015)	D, S, P	2 – Rx Water Inventory Ctrl.
c. <u>Main Turbine Bypass Valve Exercising</u> (System 241000 – Rx/Turb Pressure Regulating System; A4.06; 3.9/3.9) (LOJPM3083)	N, S	3 – Reactor Pressure Control
d. <u>Shutdown Cooling Flow Adjustments</u> (System 205000 – Shutdown Cooling; A4.04; 3.4/3.3) (LOJPM3515)	A, D, EN, L, S	4 – Heat removal from core
e. <u>Placing Safeguard Piping Fill System in Service</u> (System 223001- Primary Containment System and Auxiliaries; A2.01; 4.3/4.4) (LOJPM3118)	EN, L, N, S	5 – Containment Integrity
f. <u>Diesel Generator Fast Start From the MCR</u> (System - 264000 – Emergency Diesel Generator; A4.04; 3.7/3.7) (LOJPM3130)	A, D, EN, S	6 - Electrical
g. <u>Supply RECW to the Drywell Coolers</u> (System 400000 – Component Cooling Water (CCWS); A2.01; 3.3/3.4) (LOJPM3028)	D, L, S	8 – Plant service systems
h. <u>Manually Initiate a Control Room Radiation Isolation</u> (System 290003 – Control Room HVAC; A4.01; 3.2/3.2) (LOJPM3024)	D, EN, S	9 – Radioactivity Release

In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. <u>Bypassing a Control Rod From RMCS</u> (System 201002 – Reactor Manual Control; A2.04; 3.2/3.1) (LOJPM2226)	D, R	1 – Reactivity Control
j. <u>T-239 Defeating High RPV Level Interlocks</u> (EPE295031 - Reactor Low Water Level; EA1.02; 4.5/4.5) (LOJPM2273)	E, N, R	2 – Reactor Water Inventory
k. <u>Start ESW Pump Per SE-1</u> (APE295016 – Control Room Abandonment; AA1.04; 3.1/3.2) (LOJPM2258) (Unit 2)	A, D, E, L, R	8- Plant service systems

* 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	4-6 / 4-6 / 2-3 4
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4 7
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1 2
(EN)gineered safety feature	≥ 1 / ≥ 1 / ≥ 1 (control room system) 4
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1 4
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1 4
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected) 1
(R)CA	≥ 1 / ≥ 1 / ≥ 1 3
(S)imulator	

Facility: <u>LIMERICK</u>	Date of Examination: <u>1/17/2017</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. <u>Start a Reactor Recirculation Pump</u> (System 202001 – Recirculation System; A3.02; 3.1/3.0) (LOJPM3121)	A, N, S	1 – Reactivity Control
b. <u>RCIC Manual Slow Start Using FIC-49-1R600</u> (System 217000 – RCIC; A4.04; 3.6/3.6) (LOJPM3015)	D, S, P	2 – Rx Water Inventory Ctrl.
c.		
d. <u>Shutdown Cooling Flow Adjustments</u> (System 205000 – Shutdown Cooling; A4.04; 3.4/3.3) (LOJPM3515)	A, D, EN, L, S	4 – Heat removal from core
e. <u>Placing Safeguard Piping Fill System in Service</u> (System 223001- Primary Containment System and Auxiliaries; A2.01; 4.3/4.4) (LOJPM3118)	EN, L, N, S	5 – Containment Integrity
f. <u>Diesel Generator Fast Start From the MCR</u> (System - 264000 – Emergency Diesel Generator; A4.04; 3.7/3.7) (LOJPM3130)	A, D, EN, S	6 – Electrical
g. <u>Supply RECW to the Drywell Coolers</u> (System 400000 – Component Cooling Water (CCWS); A2.01; 3.3/3.4) (LOJPM3028)	D, L, S	8 – Plant service systems
h. <u>Manually Initiate a Control Room Radiation Isolation</u> (System 290003 – Control Room HVAC; A4.01; 3.2/3.2) (LOJPM3024)	D, EN, S	9 – Radioactivity Release

In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. <u>Bypassing a Control Rod From RMCS</u> (System 201002 – Reactor Manual Control; A2.04; 3.2/3.1) (LOJPM2226)	D, R	1 – Reactivity Control
j. <u>T-239 Defeating High RPV Level Interlocks</u> (EPE295031 - Reactor Low Water Level; EA1.02; 4.5/4.5) (LOJPM2273)	E, N, R	2 – Reactor Water Inventory
k. <u>Start ESW Pump Per SE-1</u> (APE295016 – Control Room Abandonment; AA1.04; 3.1/3.2) (LOJPM2258) (Unit 2)	A, D, E, L, R	8- Plant service systems

* 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	4-6 / 4-6 / 2-3 4
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4 7
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1 2
(EN)gineered safety feature	≥ 1 / ≥ 1 / ≥ 1 (control room system) 4
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1 4
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1 3
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected) 1
(R)CA	≥ 1 / ≥ 1 / ≥ 1 3
(S)imulator	

Facility: <u>LIMERICK</u>		Date of Examination: <u>1/17/2017</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. <u>Start a Reactor Recirculation Pump</u> (System 202001 – Recirculation System; A3.02; 3.1/3.0) (LOJPM3121)	A, N, S	1 – Reactivity Control
f. <u>Diesel Generator Fast Start From the MCR</u> (System - 264000 – Emergency Diesel Generator; A4.04; 3.7/3.7) (LOJPM3130)	A, D, EN, S	6 – Electrical
h. <u>Manually Initiate a Control Room Radiation Isolation</u> (System 290003 – Control Room HVAC; A4.01; 3.2/3.2) (LOJPM3024)	D, EN, S	9 – Radioactivity Release
In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
j. <u>T-239 Defeating High RPV Level Interlocks</u> (EPE295031 – Reactor Low Water Level; EA1.02; 4.5/4.5) (LOJPM2273)	E, N, R	2 – Reactor Water Inventory
k. <u>Start ESW Pump Per SE-1</u> (APE295016 – Control Room Abandonment; AA1.04; 3.1/3.2) (LOJPM2258) (Unit 2)	A, D, E, L, R	8- Plant service systems
<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	4-6 / 4-6 / 2-3	3
(C)ontrol room	≤ 9 / ≤ 8 / ≤ 4	3
(D)irect from bank	≥ 1 / ≥ 1 / ≥ 1	2
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1 (control room system)	2
(EN)gineered safety feature	≥ 1 / ≥ 1 / ≥ 1	1
(L)ow-Power / Shutdown	≥ 2 / ≥ 2 / ≥ 1	2
(N)ew or (M)odified from bank including 1(A)	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	0
(P)revious 2 exams	≥ 1 / ≥ 1 / ≥ 1	2
(R)CA		
(S)imulator		

Facility:		Limerick January 2017 ILT NRC Exam										Date of Exam: 1/17/17					
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	2	4	4				3	3				4	20	4	3	7
	2	1	1	1				1	2				1	7	2	1	3
	Tier Totals	3	5	5				4	5				5	27	6	4	10
2. Plant Systems	1	2	2	3	2	3	1	3	2	3	3	2	26	3	2		5
	2	1	1	1	2	1	1	1	1	1	1	1	12	0	2	1	3
	Tier Totals	3	3	4	4	4	2	4	3	4	4	3	38	5	3		8
3. Generic Knowledge & Abilities Categories					1		2		3		4		10	1	2	3	4
					3		3		2		2			2	2	2	1
<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 ± 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</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/A's</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>																	
G*		Generic K/As															

Limerick January 2017 ILT NRC Exam
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#
295018 Partial or Total Loss of CCW / 8					X		AA2.01 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Component temperatures	3.4	76
295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1					X		EA2.04 - Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN : Suppression Pool Temperature	4.1	77
600000 Plant Fire On-site / 8					X		AA2.17 - Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Systems that may be affected by the fire	3.6	78
295019 Partial or Total Loss of Inst. Air / 8						X	2.2.36 - Equipment Control: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	4.2	79
295005 Main Turbine Generator Trip / 3						X	2.4.6 - Emergency Procedures / Plan: Knowledge of EOP mitigation strategies.	4.7	80
295026 Suppression Pool High Water Temp. / 5						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	81
700000 Generator Voltage and Electric Grid Disturbances					X		AA2.10 - Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Generator overheating and the required actions.	3.8	82
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : Natural circulation	3.5	39
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	40
295038 High Off-site Release Rate / 9		X					EK2.04 - Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: Stack-gas monitoring system: Plant-Specific	4.2	41
295031 Reactor Low Water Level / 2		X					EK2.03 - Knowledge of the interrelations between REACTOR LOW WATER LEVEL and the following: Low pressure core spray	4.2	42
600000 Plant Fire On-site / 8		X					AK2.04 - Knowledge of the interrelations between PLANT FIRE ON SITE and the following: Breakers, relays, and disconnects	2.5	43
295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1		X					EK2.11 - Knowledge of the interrelations between SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN and the following: RMCS: Plant-Specific	3.8	44
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	45

Limerick January 2017 ILT NRC Exam
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#
295021 Loss of Shutdown Cooling / 4			X				AK3.05 - Knowledge of the reasons for the following responses as they apply to LOSS OF SHUTDOWN COOLING : Establishing alternate heat removal flow paths	3.6	46
295016 Control Room Abandonment / 7			X				AK3.02 - Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT : Turbine trip	3.7	47
295003 Partial or Complete Loss of AC / 6				X			AA1.04 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : D.C. electrical distribution system	3.6	48
295018 Partial or Total Loss of CCW / 8				X			AA1.02 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : System loads	3.3	49
700000 Generator Voltage and Electric Grid Disturbances				X			AA1.05 - Ability to operate and/or monitor the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Engineered safety features.	3.9	50
295023 Refueling Acc Cooling Mode / 8					X		AA2.04 - Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS : Occurrence of fuel handling accident	3.4	51
295028 High Drywell Temperature / 5					X		EA2.01 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE : Drywell temperature	4.0	52
295005 Main Turbine Generator Trip / 3					X		AA2.03 - Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP : Turbine valve position	3.1	53
295025 High Reactor Pressure / 3						X	2.4.18 - Emergency Procedures / Plan: Knowledge of the specific bases for EOPs.	3.3	54
295030 Low Suppression Pool Water Level / 5						X	2.4.4 - Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	55
295006 SCRAM / 1						X	2.4.46 - Emergency Procedures / Plan: Ability to verify that the alarms are consistent with the plant conditions.	4.2	56
295004 Partial or Total Loss of DC Pwr / 6						X	2.4.49 - Emergency Procedures / Plan: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.6	57
295019 Partial or Total Loss of Inst. Air / 8			X				AK3.01 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR : Backup air system supply: Plant-Specific	3.3	58
K/A Category Totals:	2	4	4	3	3/4	4/3	Group Point Total:	20/7	

Limerick January 2017 ILT NRC Exam
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#
295010 High Drywell Pressure / 5					X		AA2.03 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE : Drywell radiation levels	3.6	83
295002 Loss of Main Condenser Vac / 3						X	2.4.49 - Emergency Procedures / Plan: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.4	84
295017 High Off-site Release Rate / 9					X		AA2.04 - Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE : Source of off-site release	4.3	85
295012 High Drywell Temperature / 5	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE : Pressure/temperature relationship	3.3	59
295014 Inadvertent Reactivity Addition / 1		X					AK2.04 - Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following: Void concentration	3.2	60
295017 High Off-site Release Rate / 9			X				AK3.02 - Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE : Plant ventilation	3.3	61
295008 High Reactor Water Level / 2				X			AA1.08 - Ability to operate and/or monitor the following as they apply to HIGH REACTOR WATER LEVEL : Feedwater system	3.5	62
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	3.3	63
295002 Loss of Main Condenser Vac / 3						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.	4.6	64
295010 High Drywell Pressure / 5					X		AA2.02 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE : Drywell pressure	3.8	65
K/A Category Totals:	1	1	1	1	2/2	1/1	Group Point Total:	7/3	

Limerick January 2017 ILT NRC Exam
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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400000 Component Cooling Water								X				A2.04 - 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: Radiation monitoring system alarm	3.0	86
215005 APRM / LPRM								X				A2.01 - 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 Power supply degraded	3.1	87
263000 DC Electrical Distribution											X	2.1.27 - Conduct of Operations: Knowledge of system purpose and / or function.	4.0	88
215003 IRM											X	2.2.40 - Equipment Control: Ability to apply technical specifications for a system.	4.7	89
239002 SRVs								X				A2.06 - Ability to (a) predict the impacts of the following on the RELIEF/SAFETY VALVES ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor high pressure	4.3	90
215003 IRM					X							K5.01 - Knowledge of the operational implications of the following concepts as they apply to INTERMEDIATE RANGE MONITOR (IRM) SYSTEM : Detector operation	2.6	1
217000 RCIC	X											K1.07 - Knowledge of the physical connections and/or cause- effect relationships between REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) and the following: Leak detection	3.1	2
205000 Shutdown Cooling		X										K2.02 - Knowledge of electrical power supplies to the following: Motor operated valves	2.5	3
206000 HPCI		X										K2.04 - Knowledge of electrical power supplies to the following: Turbine control circuits: BWR-2,3,4	2.5	4
300000 Instrument Air			X									K3.02 - Knowledge of the effect that a loss or malfunction of the (INSTRUMENT AIR SYSTEM) will have on the following: Systems having pneumatic valves and controls	3.3	5

Limerick January 2017 ILT NRC Exam
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	A 2	A 3	A 4	G		Imp	Q#
259002 Reactor Water Level Control			X									K3.02 - Knowledge of the effect that a loss or malfunction of the REACTOR WATER LEVEL CONTROL SYSTEM will have on following: Reactor feedwater system	3.7	6
262001 AC Electrical Distribution				X								K4.04 - Knowledge of A.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the following: Protective relaying	2.8	7
218000 ADS				X								K4.01 - Knowledge of AUTOMATIC DEPRESSURIZATION SYSTEM design feature(s) and/or interlocks which provide for the following: Prevent inadvertent initiator of ADS logic	3.7	8
209001 LPCS					X							K5.04 - Knowledge of the operational implications of the following concepts as they apply to LOW PRESSURE CORE SPRAY SYSTEM : Heat removal (transfer) mechanisms	2.8	9
263000 DC Electrical Distribution	X											K1.02 - Knowledge of the physical connections and/or cause- effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following: Battery charger and battery	3.2	10
264000 EDGs						X						K6.07 - Knowledge of the effect that a loss or malfunction of the following will have on the EMERGENCY GENERATORS (DIESEL/JET) : Cooling water system	3.8	11
400000 Component Cooling Water			X									K3.01 - Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: Loads cooled by CCWS	2.9	12
203000 RHR/LPCI: Injection Mode							X					A1.09 - Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) controls including: Component cooling water systems	2.9	13
223002 PCIS/Nuclear Steam Supply Shutoff							X					A1.03 - Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF controls including: SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.5	14

Limerick January 2017 ILT NRC Exam
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#
239002 SRVs								X				A2.02 - Ability to (a) predict the impacts of the following on the RELIEF/SAFETY VALVES ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Leaky SRV	3.1	15
215004 Source Range Monitor								X				A2.05 - 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: Faulty or erratic operation of detectors/system	3.3	16
262002 UPS (AC/DC)									X			A3.01 - Ability to monitor automatic operations of the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) including: Transfer from preferred to alternate source	2.8	17
212000 RPS									X			A3.07 - Ability to monitor automatic operations of the REACTOR PROTECTION SYSTEM including: SCRAM air header pressure	3.6	18
215005 APRM / LPRM										X		A4.06- Ability to manually operate and/or monitor in the control room: Verification of proper functioning/ operability	3.2	19
211000 SLC										X		A4.06 - Ability to manually operate and/or monitor in the control room: RWCU system isolation	3.9	20
261000 SGTS											X	2.1.27 - Conduct of Operations: Knowledge of system purpose and / or function.	3.9	21
211000 SLC											X	2.2.36 - Equipment Control: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	3.1	22
261000 SGTS										X		A4.05 - Ability to manually operate and/or monitor in the control room: Drywell to suppression chamber/torus differential pressure: Mark-I,II	2.9	23
263000 DC Electrical Distribution					X							K5.01 - Knowledge of the operational implications of the following concepts as they apply to D.C. ELECTRICAL DISTRIBUTION : Hydrogen generation during battery charging.	2.6	24

Limerick January 2017 ILT NRC Exam
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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206000 HPCI							X					A1.06 - Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE COOLANT INJECTION SYSTEM controls including: System flow: BWR-2,3,4	3.8	25
203000 RHR/LPCI: Injection Mode									X			A3.02 - Ability to monitor automatic operations of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) including: Pump start	4.0	26
K/A Category Totals:	2	2	3	2	3	1	3	2/3	3	3	2/2	Group Point Total:	26/5	

Limerick January 2017 ILT NRC Exam
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 #
202002 Recirculation Flow Control								X				A2.04 - Ability to (a) predict the impacts of the following on the RECIRCULATION FLOW CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Recirculation pump speed mismatch between loops: Plant-Specific	3.2	91
226001 RHR/LPCI: CTMT Spray Mode											X	2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.	4.0	92
290001 Secondary CTMT								X				A2.03 - Ability to (a) predict the impacts of the following on the SECONDARY CONTAINMENT ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High area radiation	3.6	93
245000 Main Turbine Gen. / Aux.	X											K1.09 - Knowledge of the physical connections and/or cause- effect relationships between MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS and the following: D. C . electrical distribution	2.7	27
202001 Recirculation		X										K2.01 - Knowledge of electrical power supplies to the following: Recirculation pumps: Plant-Specific	3.2	28
290001 Secondary CTMT			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	29
271000 Off-gas				X								K4.06 - Knowledge of OFFGAS SYSTEM design feature(s) and/or interlocks which provide for the following: Decay of fission product gases to particulate daughters	2.7	30
256000 Reactor Condensate					X							K5.08 - Knowledge of the operational implications of the following concepts as they apply to REACTOR CONDENSATE SYSTEM: Heat removal (transfer) mechanisms	2.6	31
286000 Fire Protection						X						K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the FIRE PROTECTION SYSTEM A.C. electrical distribution: Plant-Specific	3.1	32

Limerick January 2017 ILT NRC Exam
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 #
219000 RHR/LPCI: Torus/Pool Cooling Mode							X					A1.01 - Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE controls including: Suppression pool temperature	4.0	33
214000 RPIS								X				A2.03 - Ability to (a) predict the impacts of the following on the ROD POSITION INFORMATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Overtravel/in-out	3.6	34
288000 Plant Ventilation									X			A3.01 - Ability to monitor automatic operations of the PLANT VENTILATION SYSTEMS including: Isolation/initiation signals	3.8	35
230000 RHR/LPCI: Torus/Pool Spray Mode										X		A4.13 - Ability to manually operate and/or monitor in the control room: Suppression chamber pressure	4.0	36
201001 CRD Hydraulic											X	2.2.44 - Equipment Control: 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	37
223001 Primary CTMT and Aux.				X								K4.04 - Knowledge of PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES design feature(s) and/or interlocks which provide for the following: Prevents hydrogen from reaching an explosive mixture	3.5	38
K/A Category Totals:	1	1	1	2	1	1	1	1/2	1	1	1/1	Group Point Total:	12/3	

Facility:		Limerick January 2017 ILT NRC Exam		Date:		
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.13	Knowledge of facility requirements for controlling vital / controlled access.			3.2	94
	2.1.36	Knowledge of procedures and limitations involved in core alterations.			4.1	99
	2.1.8	Ability to coordinate personnel activities outside the control room.	3.4	66		
	2.1.32	Ability to explain and apply all system limits and precautions.	3.8	67		
	2.1.25	Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	75		
	Subtotal			3		2
2. Equipment Control	2.2.20	Knowledge of the process for managing troubleshooting activities.			3.8	95
	2.2.43	Knowledge of the process used to track inoperable alarms.			3.3	98
	2.2.21	Knowledge of pre- and post-maintenance operability requirements.	2.9	68		
	2.2.36	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	3.1	69		
	2.2.39	Knowledge of less than one hour technical specification action statements for systems.	3.9	74		
	Subtotal			3		2
3. Radiation Control						
	2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personell monitoring equipment, etc.			2.9	100
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal or emergency conditions or activities			3.8	96
	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	70		

	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	71		
	Subtotal			2		2
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.	4.0	72		
	2.4.35	Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.	3.8	73		
	Subtotal			2		1
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
2/1 Q#1	263000 K1.03	K1.03 - Knowledge of the physical connections and/or cause- effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following: Battery ventilation There are no DC components, all fans are MCC level 480 volt power (ac control power) all solenoids dampers are ac powered. This leaves the cause and effect which would lead to duplication/overlap with Q 24 263000 K5.01 Hydrogen generation during battery charging. K1.03 removed random number generator used to select from remaining KA's K1.02 selected Battery charger and battery
1/1 Q# 46	295021 AK3.03	AK3.03 Knowledge of the reasons for the following responses as they apply to LOSS OF SHUTDOWN COOLING: Increasing drywell cooling There is no procedural direction at LGS to increase Drywell cooling on a loss of Shutdown cooling, also the difficulty of any question for this would be low and 4 plausible distractors would not be possible AK3.03 removed from 295021 AK3's random number generator used to reselect AK3.05 selected
1/1 Q51	295023 Refueling Acc Cooling Mode / 8	AA2.05 - Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS : Entry conditions of emergency plan Unable to write an RO level question to AA2.05 AA2.05 removed random number generator used to select from the remaining 4 AA2.01-2.04 AA2.04 Occurrence of fuel handling accident selected
1/1 Q55	295030 Low Suppression Pool Water Level / 5	2.4.41 - Emergency Procedures / Plan: Knowledge of the emergency action level thresholds and classifications. Unable to write an RO question to this K/A Reselected with random number generator from generic 2.4 not already used in RO exam 2.4.4 selected
1/1 Q41	295038 High Off-site Release Rate / 9	EK1.02 - Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE : Protection of the general public KA deselected due to inability to write question with required LOD due to overlap with other questions in this exam or cert exam. Unable to write questions with sufficient LOD for the remaining 2 EK1 KAs Used random number generator to select EK2.04
2/1 Q19	215005 Average Power Range Monitor/Local Power Range Monitor Sys	A4.01 IRM/APRM recorder. unable to write a question with required LOD. used random number generator and reselected A4.06 Verification of proper functioning/ operability
3 Q96	2.3.6 Ability to approve release permits.	Unable to write a sufficiently difficult SRO question. Randomly selected 2.3.14 from remaining generic 2.3
1/1 Q77	295037 EA2.0.5	Unable to write a sufficiently difficult SRO question. Reselected EA2.0.4
2/1 Q12	400000 Component Cooling Water	Knowledge of the effect that a loss or malfunction of the CCWS will have on the following:K6.06 HTX and condenser reselected K3.01 : Loads cooled by CCWS