

|                    |   |                        |          |
|--------------------|---|------------------------|----------|
| Facility:          | Limerick - NRC  | Date of Examination:   | 12/18/17 |
| Examination Level: | RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/> | Operating Test Number: | 1        |

  

| Administrative Topic (see Note) | Type Code* | Describe activity to be performed  |
|---------------------------------|------------|--|
| Conduct of Operations           | R, D       | G 2.1.5 (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>Evaluate Overtime Work Request (RO)</u> (LOJPM6704)  |
| Conduct of Operations           | R, D       | G 2.1.7 (Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13) IMPORTANCE RO 4.4 SRO 4.7) <u>Administrative Actions on a Thermal Limit Violation.</u> (LOJPM6714) |
| Equipment Control               | R, D       | G 2.2.12 (Knowledge of surveillance procedures. (CFR: 41.10 / 45.13) IMPORTANCE RO 3.7 SRO 4.1) <u>Review Drywell Floor Drain Sump/Equipment Drain Tank Logs and Determine Compliance with TS 3.4.3.2</u> (LOJPM6708)  |
| Radiation Control               | R, N       | G 2.3.15 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>Determination of actions for ARM downscale condition</u> (LOJPM6718)          |
| Emergency 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 and Criteria: (C)ontrol room, (S)imulator, or Class(R)oom  
 (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs and RO retakes)  
 (N)ew or (M)odified from bank (≥ 1)  
 (P)revious 2 exams (≤ 1, randomly selected)

|  |                                      |
|--|--------------------------------------|
| Facility: <u>Limerick - NRC</u>  | Date of Examination: <u>12/18/17</u> |
| Examination Level: RO <input type="checkbox"/> SRO <input checked="" type="checkbox"/> | Operating Test Number: <u>1</u>      |

  

| Administrative Topic (see Note) | Type Code* | Describe activity to be performed  |
|---------------------------------|------------|--|
| Conduct of Operations           | R, D       | G 2.1.5 (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> (LOJPM6725)  |
| Conduct of Operations           | R, D       | G2.1.37 (Knowledge of procedures, guidelines or limitations associated with reactivity management. (CFR: 41.1 / 43.6 / 45.6) IMPORTANCE RO 4.3 SRO 4.6) <u>Review and Approve RMSI</u> (LOJPM6727)   |
| Equipment Control               | R, D       | G2.2.12 (Knowledge of surveillance procedures. (CFR: 41.10 / 45.13) IMPORTANCE RO 3.7 SRO 4.1) <u>Review Drywell Floor Drain Sump/Equipment Drain Tank Logs and Determine Compliance with TS 3.4.3.2</u> (LOJPM6708)   |
| 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>Determination of actions for ARM downscale condition</u> (LOJPM6718) |
| Emergency 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> (LOJPM3101)  |

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

|             |  |                        |          |
|-------------|--|------------------------|----------|
| Facility:   | Limerick - NRC   | Date of Examination:   | 12/18/17 |
| Exam Level: | RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/> | Operating Test Number: | 1        |

  

| Control Room Systems: 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U  |            |                              |
|--|------------|------------------------------|
| System/JPM Title   | Type Code* | Safety Function              |
| a. <u>Resetting a 42% Recirculation System Runback</u> (System 202002 – Recirculation Flow Control System, A4.07; 3.3 / 3.2)(LOJPM3119)                              | A, N, S    | 1 – Reactivity Control       |
| b. <u>Start a Condensate Pump</u> (System 256000 – Reactor Condensate System, A4.03; 3.2 / 3.1)(LOJPM3530)   | A, N, S    | 2 – Reactor Water Inventory  |
| c. <u>EHC Pump Operability Test</u> (System 241000 – Reactor / Turbine Pressure Regulating System, A4.19; 3.5/3.4) (LOJPM3140)                                       | A, N, S    | 3 – Reactor Pressure Control |
| d. <u>Secure Unit 1 HPCI Following Full Flow Functional Test</u> (System 20600 – High Pressure Coolant Injection, A4.04 3.7/3.7) (LOJPM3020)                         | D, EN, S   | 4 – Heat Removal From Core   |
| e. <u>Perform a Group III NSSSS Isolation Reset</u> (System 223002 – Primary Containment Isolation System / NSSSS; A4.03, 3.6/3.5)(LOJPM3037)                        | D, EN, S   | 5 – Containment Integrity    |
| f. <u>Supplying power to a 480 VAC Non-Safeguard Load Center From its Alternate Source</u> (System 262001 – A. C. Electrical Distribution A4.05; 3.3/3.3)(LOJPM3525) | A, D, S    | 6 – Electrical               |
| g. <u>Placing Alternate RECW Pump in Service</u> (System 400000 – Component Cooling Water; A2.01; 3.3/3.4) (LOJPM3129)   | A, D, S    | 8 – Plant service Systems    |
| h. <u>Standby Gas Treatment System Train Swap</u> (System 261000 – Standby Gas Treatment System; A4.03; 3.0/3.0) (LOJPM3514)   | EN, N, S   | 9 – Radioactivity Release    |

  

|   |            |                                     |
|---|------------|-------------------------------------|
| In-Plant Systems: 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U   |            |                                     |
| i. <u>Alternate Injection From the Fire System</u> (295031 – EPE Reactor Low Water Level, EA1.08; 3.8/3.9) (LOJPM2260) (Unit 2) | D, E, L, R | 2 – Reactor Water Inventory Control |
| j. <u>Inadvertent Opening of a Relief Valve</u> (239002 – Safety Relief Valves, A2.03; 4.1/4.1) (LOJPM2204)                     | D, E, R    | 3 – Reactor Pressure Control        |
| k. <u>Manual Isolation and Vent of the Scram Air Header</u> (212000 – Reactor Protection System, A4.17; 4.1/4.1)(LOJPM2210)     | D, E, R    | 7 – Instrumentation                 |

  

\* 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, and in-plant systems and functions may overlap those tested in the control room.

| * Type Codes                                 | Criteria for R /SRO-I/SRO-U         |
|--|-------------------------------------|
| (A)lternate path                             | 4–6/4–6 /2–3 5                      |
| (C)ontrol room                               |                                     |
| (D)irect from bank                           | ≤ 9/≤ 8/≤ 4 7                       |
| (E)mergency or abnormal in-plant             | ≥ 1/≥ 1/≥ 1 3                       |
| (EN)gineered safety feature                  | ≥ 1/≥ 1/≥ 1 (control room system) 3 |
| (L)ow-Power/Shutdown                         | ≥ 1/≥ 1/≥ 1 1                       |
| (N)ew or (M)odified from bank including 1(A) | ≥ 2/≥ 2/≥ 1 4                       |
| (P)revious 2 exams                           | ≤ 3/≤ 3/≤ 2 (randomly selected) 0   |
| (R)CA  | ≥ 1/≥ 1/≥ 1 3                       |
| (S)imulator                                  |                                     |

|   |   |                                |                              |
|---|---|--------------------------------|------------------------------|
| Facility: _____                         | Limerick - NRC                            | Date of Examination: _____     | 12/18/17                     |
| Exam Level: RO <input type="checkbox"/> | SRO-I <input checked="" type="checkbox"/> | SRO-U <input type="checkbox"/> | Operating Test Number: _____ |
| 1                                       |   |                                |                              |

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

| System/JPM Title   | Type Code* | Safety Function              |
|--|------------|------------------------------|
| a. <u>Resetting a 42% Recirculation System Runback</u> (System 202002 – Recirculation Flow Control System, A4.07; 3.3 / 3.2)(LOJPM3119)                              | A, N, S    | 1 – Reactivity Control       |
| b. <u>Start a Condensate Pump</u> (System 256000 – Reactor Condensate System, A4.03; 3.2 / 3.1)(LOJPM3530)   | A, N, S    | 2 – Reactor Water Inventory  |
| c. <u>EHC Pump Operability Test</u> (System 241000 – Reactor / Turbine Pressure Regulating System, A4.19; 3.5/3.4) (LOJPM3139)                                       | A, N, S    | 3 – Reactor Pressure Control |
|  |            |                              |
| e. <u>Perform a Group III NSSSS Isolation Reset</u> (System 223002 – Primary Containment Isolation System / NSSSS; A4.03, 3.6/3.5)(LOJPM3037)                        | D, EN, S   | 5 – Containment Integrity    |
| f. <u>Supplying power to a 480 VAC Non-Safeguard Load Center From its Alternate Source</u> (System 262001 – A. C. Electrical Distribution A4.05; 3.3/3.3)(LOJPM3525) | A, D, S    | 6 - Electrical               |
| g. <u>Placing Alternate RECW Pump in Service</u> (System 400000 – Component Cooling Water; A2.01; 3.3/3.4) (LOJPM3129)   | A, D, S    | 8 – Plant service Systems    |
| h. <u>Standby Gas Treatment System Train Swap</u> (System 261000 – Standby Gas Treatment System; A4.03; 3.0/3.0) (LOJPM3514)   | EN, N, S   | 9 – Radioactivity Release    |

In-Plant Systems: 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U

|   |            |                                     |
|---|------------|-------------------------------------|
| i. <u>Alternate Injection From the Fire System</u> (295031 – EPE Reactor Low Water Level, EA1.08; 3.8/3.9) (LOJPM2260) (Unit 2) | D, E, L, R | 2 – Reactor Water Inventory Control |
| j. <u>Inadvertent Opening of a Relief Valve</u> (239002 – Safety Relief Valves, A2.03; 4.1/4.1) (LOJPM2204)                     | D, E, R    | 3 – Reactor Pressure Control        |
| k. <u>Manual Isolation and Vent of the Scram Air Header</u> (212000 – Reactor Protection System, A4.17; 4.1/4.1)(LOJPM2210)     | D, E, R    | 7 – Instrumentation                 |

\* 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, and in-plant systems and functions may overlap those tested in the control room.

| * Type Codes                                 | Criteria for R /SRO-I/SRO-U         |
|--|-------------------------------------|
| (A)lternate path                             | 4–6/4–6 /2–3 5                      |
| (C)ontrol room                               |                                     |
| (D)irect from bank                           | ≤ 9/≤ 8/≤ 4 6                       |
| (E)mergency or abnormal in-plant             | ≥ 1/≥ 1/≥ 1 3                       |
| (EN)gineered safety feature                  | ≥ 1/≥ 1/≥ 1 (control room system) 2 |
| (L)ow-Power/Shutdown                         | ≥ 1/≥ 1/≥ 1 1                       |
| (N)ew or (M)odified from bank including 1(A) | ≥ 2/≥ 2/≥ 1 4                       |
| (P)revious 2 exams                           | ≤ 3/≤ 3/≤ 2 (randomly selected) 0   |
| (R)CA  | ≥ 1/≥ 1/≥ 1 3                       |
| (S)imulator                                  |                                     |

|             |  |                        |          |
|-------------|--|------------------------|----------|
| Facility:   | Limerick - NRC   | Date of Examination:   | 12/18/17 |
| Exam Level: | RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/> | Operating Test Number: | 1        |

  

| Control Room Systems: 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U  |                                   |                                     |
|--|-----------------------------------|-------------------------------------|
| System/JPM Title   | Type Code*                        | Safety Function                     |
| a. <u>Resetting a 42% Recirculation System Runback</u> (System 202002 – Recirculation Flow Control System, A4.07; 3.3 / 3.2)(LOJPM3119)  | A, N, S                           | 1 – Reactivity Control              |
|  |                                   |                                     |
| c. <u>EHC Pump Operability Test</u> (System 241000 – Reactor / Turbine Pressure Regulating System, A4.19; 3.5/3.4) (LOJPM3139)   | A, N, S                           | 3 – Reactor Pressure Control        |
|  |                                   |                                     |
|  |                                   |                                     |
|  |                                   |                                     |
| h. <u>Standby Gas Treatment System Train Swap</u> (System 261000 – Standby Gas Treatment System; A4.03; 3.0/3.0) (LOJPM3514)   | EN, N, S                          | 9 – Radioactivity Release           |
| In-Plant Systems: 3 for RO, for SRO-I, and 3 or 2 for SRO-U  |                                   |                                     |
| i. <u>Alternate Injection From the Fire System</u> (295031 – EPE Reactor Low Water Level, EA1.08; 3.8/3.9) (LOJPM2260) (Unit 2)  | D, E, L, R                        | 2 – Reactor Water Inventory Control |
|  |                                   |                                     |
| k. <u>Manual Isolation and Vent of the Scram Air Header</u> (212000 – Reactor Protection System, A4.17; 4.1/4.1)(LOJPM2210)  | D, E, R                           | 7 – Instrumentation                 |
| <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, and in-plant systems and functions may overlap those tested in the control room.</p> |                                   |                                     |
| * Type Codes   | Criteria for R /SRO-I/SRO-U       |                                     |
| (A)lternate path   | 4–6/4–6 /2–3                      | 2                                   |
| (C)ontrol room   |                                   |                                     |
| (D)irect from bank   | ≤ 9/≤ 8/≤ 4                       | 2                                   |
| (E)mergency or abnormal in-plant   | ≥ 1/≥ 1/≥ 1                       | 2                                   |
| (EN)gineered safety feature  | ≥ 1/≥ 1/≥ 1 (control room system) | 1                                   |
| (L)ow-Power/Shutdown   | ≥ 1/≥ 1/≥ 1                       | 1                                   |
| (N)ew or (M)odified from bank including 1(A)   | ≥ 2/≥ 2/≥ 1                       | 3(2)                                |
| (P)revious 2 exams   | ≤ 3/≤ 3/≤ 2 (randomly selected)   | 0                                   |
| (R)CA  | ≥ 1/≥ 1/≥ 1                       | 2                                   |
| (S)imulator  |                                   |                                     |

**Appendix D**
**Scenario Outline**
**Form ES-D-1**

Facility: Limerick 1 & 2    Scenario No.: SEG-2159E    Rev 0    Op-Test No.: 1

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

**Initial Conditions:**

Unit 1 Reactor Power is 100%  
Unit 2 Reactor Power is 100%

**Turnover:**

Perform ST-6-077-310-1, Drywell Unit Cooler Hydrogen Mixing System Operability Test Run

**Critical Tasks:**

1. Trip and isolate Recirc Pump
2. Manually Scram the Reactor
3. Spray the Drywell
4. Perform Emergency Blowdown per T-112

| Event No.   | Malfunction Number               | Event Type*             | Event Description  |
|---|----------------------------------|-------------------------|--|
| 1   | None                             | N-PRO                   | Perform Drywell Unit Cooler Hydrogen Mixing System Operability Test Run  |
| 2   | MFW246A<br>MFW552C               | C-RO<br>C-PRO           | Trip of '1C' RFP with discharge check valve stuck open   |
| 3   | MCR547<br>MRD016C                | C-RO<br>TS-SRO          | Running CRD Pump Trip HCU accumulator Trouble for HCU 18-47  |
| 4   | MRR433B<br>MRR434B               | C-PRO<br>R-RO<br>TS-SRO | Sequential failures of '1B' Recirc Pump Seals  |
| 5   | MMS067                           | M-All                   | Steam leak in the Drywell  |
| 6   | MRP029C                          | C-RO                    | RPS 'A' fails to scram (ARI successful)  |
| 7   | MPC476                           | C-PRO                   | Downcomer break results in Suppression Pool pressure equalizing with Drywell pressure requiring blowdown on Pressure Suppression Curve |
| 8   | HS-51-F016A<br>or<br>HS-51-F016B | C-PRO                   | First Drywell spray method selected will be un-successful requiring use of other train   |
| *      (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-3005E      Rev 1      Op-Test No.: 1Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_**Initial Conditions:**Unit 1 is at 5.0 % power. Unit 2 is at 100% power.**Turnover:**D12 D/G is running parallel to 201 Safeguard Bus following maintenance. D12 D/G has been running loaded for 11/2 hours of the required 2 hours per S92.2.N step 4.6.4.**Planned Evolutions :**When the 2 hour loaded run is complete, secure D12 D/G per S92.2.N beginning with step 4.6.4.**Critical Tasks:**

1. Manually Insert Control Rods
2. Direct performance of T-290 to personnel outside the control room
3. Perform Emergency Blowdown per T-112

| Event No.  | Malfunction Number                         | Event Type*     | Event Description   |
|--|--|-----------------|---|
| 1  | MESW600B                                   | C-PRO<br>TS-SRO | '0B' ESW Pump trip  |
| 2  | MCU002A<br>MCU002B<br>MCU193<br>HS44-1F004 | C-PRO<br>TS-SRO | RWCU Isolation failure on differential flow   |
| 3  | MED280A                                    | C-RO<br>C-PRO   | Trip of 1AY160, RPS/UPS Distribution Panel  |
| 4  | MRD016G                                    | C-RO            | Failure of 3 (three) Control Rods to scram.   |
| 5  | MFW251B<br>HS06-108A                       | C-RO            | S/U Level Control Valve and HV-06-108A fail closed  |
| 6  | MHP445                                     | M-ALL           | T-103 Steam Leak in HPCI  |
| 7  | MHP446A<br>MHP446B                         | C-PRO           | HPCI Steam Isolation Valves fail to close   |
| 8  | MFW245B<br>MRC460                          | C-PRO           | '1B' Reactor Feedpump Loss of HP steam supply<br>RCIC injection valve fails to open Automatically |
| (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- 4158E    Rev 0    Op-Test No.: \_\_\_\_

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

**Initial Conditions:**

Unit 1 Reactor Power is 100%  
Unit 2 Reactor Power is 100%

**Turnover:**

Maintain 100% power

**Critical Tasks:**

1. Inhibit Automatic ADS
2. Perform actions to maintain/restore RPV water level above Top of Active Fuel (TAF)
3. Spray the Drywell

| Event No.   | Malfunction Number                      | Event Type*             | Event Description  |
|---|---|-------------------------|--|
| 1   | Ann. 118-I5                             | C-PRO<br>C-RO           | Loss of Iso-Phase Bus Cooling  |
| 2   | MHP450                                  | R-RO<br>C-PRO<br>TS-SRO | Inadvertent HPCI Start Up  |
| 3   | MNS161B<br>MNS001                       | I-PRO<br>TS-SRO         | Inadvertent NSSSS ISOLATION<br>Failure of PCIG to Isolate  |
| 4   | MCN604B<br>MRR507A                      | C-RO                    | Trip of '1B' Condensate Pump with Failure of the '1A' Reactor Recirc Pump to automatically run back. |
| 5   | MED262A                                 | M-ALL                   | Loss of the 11 BUS / Loss of All Condensate & Feed   |
| 6   | MRR440A<br>MHP447B<br>MRC457B<br>MRC466 | C-PRO                   | LOCA, HPCI Aux Oil Pump Failure, RCIC Overspeed trip.  |
| 7   | MDG420D<br>MED014<br>MED015H            | C-PRO                   | D14 Bus fails to auto swap on Dead Bus Transfer, and failure of D14 EDG to auto start.               |
| *      (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-6217E    Rev 0    Op-Test No.: 1

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

**Initial Conditions:**

Unit 1 Reactor Power is 75%  
Unit 2 Reactor Power is 100%

**Turnover:**

Restore Unit 1 power to 100% using by withdrawing Control Rods and raising Core Flow

**Critical Tasks:**

1. Inhibit Auto ADS
2. Terminate and prevent injection into the RPV (second lowering)
3. Direct performance of control rod insertion via T-217 to personnel located outside the MCR

| Event No.   | Malfunction Number | Event Type*     | Event Description  |
|---|--------------------|-----------------|--|
| 1   | None               | R-RO            | Continue raising reactor power                             |
| 2   | MRD016D            | C-RO            | Control Rod (38-39) fails stuck                            |
| 3   | MPC257             | C-PRO<br>TS-SRO | '1D' RHR Pump suction leak                                 |
| 4   | MED282B            | C-PRO<br>TS-SRO | Loss of Div 2 DC   |
| 5   | MVI232B<br>MRP029A | C-RO<br>TS-SRO  | Reactor Level Transmitter Failure / Failure to Half Scram. |
| 6   | MRR441             | C-PRO           | Small coolant leak into Drywell                            |
| 7   | MSL559<br>MRD556   | M-ALL           | Hydraulic ATWS with failure of Standby Liquid Control      |
| 8   | MRD024             | C-RO            | RDACS Inoperative  |
| 9   | MAD145E            | C-PRO           | '1J' SRV Fails Open Mechanically                           |
| *      (N)ormal,      (R)eactivity,      (I)nstrument,      (C)omponent,      (M)ajor |                    |                 |  |

| Facility:                                      |                | LGS ILT NRC Dec 2017   |        |        |        |        |        |        |        |        |        | Date of Exam: |                 | 12/18/17 |    |       |  |
|--|----------------|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------|-----------------|----------|----|-------|--|
| Tier   | Group          | RO K/A Category Points |        |        |        |        |        |        |        |        |        |               | SRO-Only Points |          |    |       |  |
|  |                | K<br>1                 | K<br>2 | K<br>3 | K<br>4 | K<br>5 | K<br>6 | A<br>1 | A<br>2 | A<br>3 | A<br>4 | G<br>*        | Total           | A2       | G* | Total |  |
| 1.<br>Emergency<br>&<br>Plant<br>Evolutions    | 1              | 3                      | 4      | 3      |        |        |        | 4      | 3      |        |        | 3             | 20              | 3        | 4  | 7     |  |
|  | 2              | 2                      | 1      | 1      |        |        |        | 1      | 1      |        |        | 1             | 7               | 2        | 1  | 3     |  |
|  | Tier<br>Totals | 5                      | 5      | 4      |        |        |        | 5      | 4      |        |        | 4             | 27              | 5        | 5  | 10    |  |
| 2.<br>Plant<br>Systems                         | 1              | 2                      | 2      | 2      | 3      | 2      | 3      | 2      | 3      | 3      | 2      | 2             | 26              | 2        | 3  | 5     |  |
|  | 2              | 1                      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 2      | 1      | 1             | 12              | 0        | 1  | 3     |  |
|  | Tier<br>Totals | 3                      | 3      | 3      | 4      | 3      | 4      | 3      | 4      | 5      | 3      | 3             | 38              | 3        | 5  | 8     |  |
| 3. Generic Knowledge & Abilities<br>Categories |                |                        |        | 1      |        | 2      |        | 3      |        | 4      |        | 10            | 1               | 2        | 3  | 4     |  |
|  |                |                        |        | 3      |        | 2      |        | 2      |        | 3      |        |               | 1               | 2        | 2  | 2     |  |

Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)

2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by  $\pm 1$  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.

**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  |   | AA2.01 - Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING : Reactor water heatup/cool-down rate                            | 3.6  | 76 |
| 295024 High Drywell Pressure / 5  |    |    |    |    | X  |   | EA2.06 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE: Suppression pool temperature                                       | 4.1  | 77 |
| 700000 Generator Voltage and Electric Grid Disturbances                               |    |    |    |    | X  |   | AA2.05 - Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Operational status of offsite circuit.  | 3.8  | 78 |
| 295018 Partial or Total Loss of CCW / 8   |    |    |    |    |    | X | 2.2.37 - Equipment Control: Ability to determine operability and / or availability of safety related equipment.   | 4.6  | 79 |
| 295025 High Reactor Pressure / 3  |    |    |    |    |    | X | 2.4.3 - Emergency Procedures / Plan: Ability to identify post-accident instrumentation.   | 3.9  | 80 |
| 295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1 |    |    |    |    |    | X | 2.4.2 - Emergency Procedures / Plan: Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.                             | 4.6  | 81 |
| 295031 Reactor Low Water Level / 2  |    |    |    |    |    | X | 2.2.22 - Knowledge of limiting conditions for operations and safety limits.   | 4.7  | 82 |
| 295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4               | X  |    |    |    |    |   | AK1.03 - Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : Thermal limits | 3.6  | 39 |
| 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  | 40 |
| 295038 High Off-site Release Rate / 9   | X  |    |    |    |    |   | 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             | 4.2  | 41 |
| 295004 Partial or Total Loss of DC Pwr / 6  |    | X  |    |    |    |   | AK2.01 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF D.C. POWER and the following: Battery charger  | 3.1  | 42 |
| 600000 Plant Fire On-site / 8   |    | X  |    |    |    |   | AK2.03 - Knowledge of the interrelations between PLANT FIRE ON SITE and the following: Motors   | 2.5  | 43 |
| 295018 Partial or Total Loss of CCW / 8   |    | X  |    |    |    |   | AK2.02 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER and the following: Plant operations                                | 3.4  | 44 |
| 295021 Loss of Shutdown Cooling / 4   |    |    | X  |    |    |   | AK3.02 - Knowledge of the reasons for the following responses as they apply to LOSS OF SHUTDOWN COOLING : Feeding and bleeding reactor vessel                           | 3.3  | 45 |
| 295003 Partial or Complete Loss of AC / 6   |    |    | X  |    |    |   | AK3.06 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : Containment isolation                           | 3.7  | 46 |
| 295019 Partial or Total Loss of Inst. Air / 8   |    |    | X  |    |    |   | AK3.01 - Knowledge of the reasons for the following responses as they apply to  | 3.3  | 47 |

**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# |
|---|----|----|----|----|-----|-----|--|------|----|
|   |    |    |    |    |     |     | PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR : Backup air system supply: Plant-Specific  |      |    |
| 700000 Generator Voltage and Electric Grid Disturbances                               |    |    |    | X  |     |     | AA1.01 - Ability to operate and/or monitor the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Grid frequency and voltage.                                | 3.6  | 48 |
| 295024 High Drywell Pressure / 5  |    |    |    | X  |     |     | EA1.04 - Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: RHR/LPCI  | 4.1  | 49 |
| 295005 Main Turbine Generator Trip / 3  |    |    |    | X  |     |     | AA1.03 - Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP : Reactor manual control/Rod control and information system                      | 2.7  | 50 |
| 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  | 3.9  | 51 |
| 295028 High Drywell Temperature / 5   |    |    |    |    | X   |     | EA2.03 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE : Reactor water level   | 3.7  | 52 |
| 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 | 4.0  | 53 |
| 295006 SCRAM / 1  |    |    |    |    |     | X   | 2.2.38 - Equipment Control: Knowledge of conditions and limitations in the facility license.   | 3.6  | 54 |
| 295023 Refueling Acc Cooling Mode / 8   |    |    |    |    |     | X   | 2.4.46 - Emergency Procedures / Plan: Ability to verify that the alarms are consistent with the plant conditions.  | 4.2  | 55 |
| 295030 Low Suppression Pool Water Level / 5   |    |    |    |    |     | X   | 2.4.31 - Emergency Procedures / Plan: Knowledge of annunciator alarms, indications, or response procedures.  | 4.2  | 56 |
| 295025 High Reactor Pressure / 3  |    | X  |    |    |     |     | EK2.09 - Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following: Reactor power  | 3.9  | 57 |
| 295016 Control Room Abandonment / 7   |    |    |    | X  |     |     | AA1.04 - Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT : A.C. electrical distribution  | 3.1  | 58 |
| K/A Category Totals:  | 3  | 4  | 3  | 4  | 3/3 | 3/4 | Group Point Total:   | 20/7 |    |

**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# |
|---|----|----|----|----|-----|-----|--|------|----|
| 295022 Loss of CRD Pumps / 1                                |    |    |    |    | X   |     | AA2.01 - Ability to determine and/or interpret the following as they apply to LOSS OF CRD PUMPS : Accumulator Pressure   | 3.6  | 83 |
| 295032 High Secondary Containment Area Temperature / 5      |    |    |    |    |     | 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  | 84 |
| 295012 High Drywell Temperature / 5                         |    |    |    |    | X   |     | AA2.02 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE : Drywell pressure  | 4.1  | 85 |
| 295032 High Secondary Containment Area Temperature / 5      | X  |    |    |    |     |     | EK1.03 - Knowledge of the operational implications of the following concepts as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Secondary containment leakage detection: Plant-Specific | 3.5  | 59 |
| 295036 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  | 60 |
| 295009 Low Reactor Water Level / 2                          |    |    | X  |    |     |     | AK3.01 - Knowledge of the reasons for the following responses as they apply to LOW REACTOR WATER LEVEL : Recirculation pump run back: Plant-Specific   | 3.2  | 61 |
| 295002 Loss of Main Condenser Vac / 3                       |    |    |    | X  |     |     | AA1.07 - Ability to operate and/or monitor the following as they apply to LOSS OF MAIN CONDENSER VACUUM : Condenser circulating water system   | 3.1  | 62 |
| 295008 High Reactor Water Level / 2                         |    |    |    |    | X   |     | AA2.01 - Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL : Reactor water level   | 3.9  | 63 |
| 295014 Inadvertent Reactivity Addition / 1                  |    |    |    |    |     | 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  | 64 |
| 295020 Inadvertent Cont. Isolation / 5 & 7                  | X  |    |    |    |     |     | AK1.01 - Knowledge of the operational implications of the following concepts as they apply to INADVERTENT CONTAINMENT ISOLATION : Loss of normal heat sink   | 3.7  | 65 |
| K/A Category Totals:  | 2  | 1  | 1  | 1  | 1/2 | 1/1 | Group Point Total:   | 7/3  |    |

Written Examination Outline  
Plant Systems – Tier 2 Group 1

| System # / Name | K<br>1 | K<br>2 | K<br>3 | K<br>4 | K<br>5 | K<br>6 | A<br>1 | A2 | A<br>3 | A<br>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  | 3.2 | 86 |
| 264000 EDGs             |   |   |   |  |  |  |  | X |  |   | A2.05 - 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: Synchronization of the emergency generator with other electrical supplies | 3.6 | 87 |
| 205000 Shutdown Cooling |   |   |   |  |  |  |  |   |  | X | 2.2.42 - Equipment Control:: Ability to recognize system parameters that are entry-level conditions for Technical Specifications.   | 4.6 | 88 |
| 206000 HPCI             |   |   |   |  |  |  |  |   |  | X | 2.4.6 - Emergency Procedures / Plan: Knowledge of EOP mitigation strategies.  | 4.7 | 89 |
| 215005 APRM / LPRM      |   |   |   |  |  |  |  |   |  | 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 |
| 239002 SRVs             | X |   |   |  |  |  |  |   |  |   | K1.04 - Knowledge of the physical connections and/or cause- effect relationships between RELIEF/SAFETY VALVES and the following: Main steam   | 3.6 | 1  |
| 215005 APRM / LPRM      | X |   |   |  |  |  |  |   |  |   | K1.07 - Knowledge of the physical connections and/or cause- effect relationships between AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM and the following: Process computer, performance monitoring system  | 2.6 | 2  |
| 217000 RCIC             |   | X |   |  |  |  |  |   |  |   | K2.01 - Knowledge of electrical power supplies to the following: Motor operated valves  | 2.8 | 3  |
| 206000 HPCI             |   | X |   |  |  |  |  |   |  |   | K2.04 - Knowledge of electrical power supplies to the following: Turbine control circuits: BWR-2,3,4  | 2.5 | 4  |
| 205000 Shutdown Cooling |   |   | X |  |  |  |  |   |  |   | K3.01 - Knowledge of the effect that a loss or malfunction of the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) will have on following: Reactor pressure  | 3.3 | 5  |

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# |
|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|--|-----|----|
| 209001 LPCS                        |     |     | X   |     |     |     |     |     |     |     |   | K3.03 - Knowledge of the effect that a loss or malfunction of the LOW PRESSURE CORE SPRAY SYSTEM will have on following: Emergency generators  | 2.9 | 6  |
| 259002 Reactor Water Level Control |     |     |     | X   |     |     |     |     |     |     |   | K4.01 - Knowledge of REACTOR WATER LEVEL CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: Ensuring adequate NPSH for recirculation pumps: Plant-Specific                                    | 3.0 | 7  |
| 215003 IRM                         |     |     |     | X   |     |     |     |     |     |     |   | K4.01 - Knowledge of INTERMEDIATE RANGE MONITOR (IRM) SYSTEM design feature(s) and/or interlocks which provide for the following: Rod withdrawal blocks  | 3.7 | 8  |
| 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 | 9  |
| 215004 Source Range Monitor        |     |     |     |     | X   |     |     |     |     |     |   | K5.01 - Knowledge of the operational implications of the following concepts as they apply to SOURCE RANGE MONITOR (SRM) SYSTEM: Detector operation   | 2.6 | 10 |
| 262001 AC Electrical Distribution  |     |     |     |     |     | X   |     |     |     |     |   | K6.03 - Knowledge of the effect that a loss or malfunction of the following will have on the A.C. ELECTRICAL DISTRIBUTION: Generator trip  | 3.5 | 11 |
| 261000 SGTS                        |     |     |     |     |     | X   |     |     |     |     |   | K6.04 - Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY GAS TREATMENT SYSTEM: Process radiation monitoring  | 2.9 | 12 |
| 264000 EDGs                        |     |     |     |     |     |     | X   |     |     |     |   | A1.09 - Ability to predict and/or monitor changes in parameters associated with operating the EMERGENCY GENERATORS (DIESEL/JET) controls including: Maintaining minimum load on emergency generator (to prevent reverse power) | 3.0 | 13 |
| 218000 ADS                         |     |     |     |     |     |     | X   |     |     |     |   | A1.01 - Ability to predict and/or monitor changes in parameters associated with operating the AUTOMATIC DEPRESSURIZATION SYSTEM controls including: ADS valve tail pipe temperatures   | 3.4 | 14 |

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# |
|--|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|---|--|-----|----|
| 400000 Component Cooling Water           |     |     |     |     |     |     |     | X  |     |     |   | A2.03 - 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: High/low CCW temperature   | 2.9 | 15 |
| 223002 PCIS/Nuclear Steam Supply Shutoff |     |     |     |     |     |     |     | X  |     |     |   | A2.01 - Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A.C. electrical distribution failures | 3.2 | 16 |
| 203000 RHR/LPCI: Injection Mode          |     |     |     |     |     |     |     |    | X   |     |   | A3.07 - Ability to monitor automatic operations of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) including: Loop selection: Plant-Specific   | 4.2 | 17 |
| 211000 SLC                               |     |     |     |     |     |     |     |    | X   |     |   | A3.02 - Ability to monitor automatic operations of the STANDBY LIQUID CONTROL SYSTEM including: Tank level: Plant-Specific   | 3.9 | 18 |
| 212000 RPS                               |     |     |     |     |     |     |     |    |     | X   |   | A4.05 - Ability to manually operate and/or monitor in the control room: Reactor power  | 4.3 | 19 |
| 300000 Instrument Air                    |     |     |     |     |     |     |     |    |     | X   |   | A4.01 - Ability to manually operate and/or monitor in the control room: Pressure gauges  | 2.6 | 20 |
| 262002 UPS (AC/DC)                       |     |     |     |     |     |     |     |    |     |     | X | 2.1.20 - Conduct of Operations: Ability to interpret and execute procedure steps.  | 4.6 | 21 |
| 261000 SGTS                              |     |     |     |     |     |     |     |    |     |     | X | 2.4.1 - Emergency Procedures / Plan: Knowledge of EOP entry conditions and immediate action steps.   | 4.6 | 22 |
| 209001 LPCS                              |     |     |     |     |     |     |     | X  |     |     |   | A2.03 - Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A.C. failures   | 3.4 | 23 |
| 218000 ADS                               |     |     |     |     |     |     |     |    | X   |     |   | A3.08 - Ability to monitor automatic operations of the AUTOMATIC DEPRESSURIZATION SYSTEM including: Reactor pressure   | 4.2 | 24 |



Written Examination Outline  
Plant Systems – Tier 2 Group 1

| System # / Name      | K<br>1 | K<br>2 | K<br>3 | K<br>4 | K<br>5 | K<br>6 | A<br>1 | A2  | A<br>3 | A<br>4 | G   |  | Imp  | Q# |
|----------------------|--------|--------|--------|--------|--------|--------|--------|-----|--------|--------|-----|--|------|----|
| 262002 UPS (AC/DC)   |        |        |        | X      |        |        |        |     |        |        |     | K4.01 - Knowledge of UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) design feature(s) and/or interlocks which provide for the following: Transfer from preferred power to alternate power supplies | 3.1  | 25 |
| 215005 APRM / LPRM   |        |        |        |        |        | X      |        |     |        |        |     | K6.01 - 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 : RPS                              | 3.7  | 26 |
| K/A Category Totals: | 2      | 2      | 2      | 3      | 2      | 3      | 2      | 3/2 | 3      | 2      | 2/3 | Group Point Total:   | 26/5 |    |

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 | A 2 | A 3 | A 4 | G |  | Imp. | Q # |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|--|------|-----|
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|--|------|-----|

|  |   |   |   |   |   |   |   |   |  |  |   |  |     |    |
|--|---|---|---|---|---|---|---|---|--|--|---|--|-----|----|
| 272000 Radiation Monitoring              |   |   |   |   |   |   |   | X |  |  |   | A2.07 - Ability to predict the impacts of the following on the RADIATION MONITORING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Hydrogen injection operation: Plant-Specific | 2.8 | 91 |
| 202002 Recirculation Flow Control        |   |   |   |   |   |   |   |   |  |  | 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 | 92 |
| 239001 Main and Reheat Steam             |   |   |   |   |   |   |   |   |  |  | X | 2.2.38 - Equipment Control: Knowledge of conditions and limitations in the facility license.   | 4.5 | 93 |
| 216000 Nuclear Boiler Inst.              | X |   |   |   |   |   |   |   |  |  |   | K1.22 - Knowledge of the physical connections and/or cause- effect relationships between NUCLEAR BOILER INSTRUMENTATION and the following: Reactor vessel  | 3.6 | 27 |
| 215002 RBM                               |   | X |   |   |   |   |   |   |  |  |   | K2.03 - Knowledge of electrical power supplies to the following: APRM channels: BWR-3,4,5  | 2.8 | 28 |
| 219000 RHR/LPCI: Torus/Pool Cooling Mode |   |   | X |   |   |   |   |   |  |  |   | K3.01 - Knowledge of the effect that a loss or malfunction of the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE will have on following: Suppression pool temperature control   | 3.9 | 29 |
| 256000 Reactor Condensate                |   |   |   | X |   |   |   |   |  |  |   | K4.03 - Knowledge of REACTOR CONDENSATE SYSTEM design feature(s) and/or interlocks which provide for the following: Condensate and/or booster pump protection  | 2.8 | 30 |
| 202002 Recirculation Flow Control        |   |   |   |   | X |   |   |   |  |  |   | K5.02 - Knowledge of the operational implications of the following concepts as they apply to RECIRCULATION FLOW CONTROL SYSTEM : Feedback signals  | 2.6 | 31 |
| 245000 Main Turbine Gen. / Aux.          |   |   |   |   |   | X |   |   |  |  |   | K6.03 - Knowledge of the effect that a loss or malfunction of the following will have on the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS : Hydrogen seal oil  | 2.8 | 32 |
| 223001 Primary CTMT and Aux.             |   |   |   |   |   |   | X |   |  |  |   | A1.07 - Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES controls including: Drywell/suppression chamber differential pressure (drywell to containment building): Plant-Specific                           | 3.2 | 33 |

Written Examination Outline  
Plant Systems – Tier 2 Group 2

| System # / Name                        | K<br>1 | K<br>2 | K<br>3 | K<br>4 | K<br>5 | K<br>6 | A<br>1 | A2  | A<br>3 | A<br>4 | G   |   | Imp. | Q<br># |
|--|--------|--------|--------|--------|--------|--------|--------|-----|--------|--------|-----|---|------|--------|
| 290002 Reactor Vessel Internals        |        |        |        |        |        |        |        | X   |        |        |     | A2.05 - 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: Exceeding thermal limits | 3.7  | 34     |
| 230000 RHR/LPCI: Torus/Pool Spray Mode |        |        |        |        |        |        |        |     | X      |        |     | A3.01 - Ability to monitor automatic operations of the RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE including: Valve operation   | 3.4  | 35     |
| 268000 Radwaste                        |        |        |        |        |        |        |        |     |        | X      |     | A4.01 - Ability to manually operate and/or monitor in the control room: Sump integrators  | 3.4  | 36     |
| 201006 RWM                             |        |        |        |        |        |        |        |     |        |        | X   | 2.2.40 - Equipment Control: Ability to apply technical specifications for a system.   | 3.4  | 37     |
| 226001 RHR/LPCI: CTMT Spray Mode       |        |        |        |        |        |        |        |     | X      |        |     | A3.07 - Ability to monitor automatic operations of the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE including: Pump start  | 3.5  | 38     |
| K/A Category Totals:                   | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1/1 | 2      | 1      | 1/2 | Group Point Total:  | 12/3 |        |

| Facility: LGS                  |          | Date: 12/18/17  |     |    |          |     |
|--------------------------------|----------|---|-----|----|----------|-----|
| Category                       | K/A #    | Topic   | RO  |    | SRO-Only |     |
|                                |          |   | IR  | Q# | IR       | Q#  |
| 1.<br>Conduct<br>of Operations | 2.1.32   | Ability to explain and apply all system limits and precautions.   |     |    | 4.0      | 94  |
|                                |          |   |     |    |          |     |
|                                |          |   |     |    |          |     |
|                                | 2.1.3    | Knowledge of shift or short-term relief turnover practices.   | 3.7 | 66 |          |     |
|                                | 2.1.40   | Knowledge of refueling administrative requirements  | 2.8 | 67 |          |     |
|                                | 2.1.19   | Ability to use plant computers to evaluate system or component status.  | 3.9 | 74 |          |     |
|                                |          |   |     |    |          |     |
|                                | Subtotal |   |     | 3  |          | 1   |
| 2.<br>Equipment<br>Control     | 2.2.43   | Knowledge of the process used to track inoperable alarms.   |     |    | 3.3      | 95  |
|                                | 2.2.7    | Knowledge of the process for conducting special or infrequent tests.  |     |    | 3.6      | 100 |
|                                |          |   |     |    |          |     |
|                                |          |   |     |    |          |     |
|                                | 2.2.3    | (multi-unit license) Knowledge of the design, procedural, and operational differences between units.  | 3.8 | 68 |          |     |
|                                | 2.2.14   | Knowledge of the process for controlling equipment configuration or status.   | 3.9 | 69 |          |     |
|                                |          |   |     |    |          |     |
|                                | Subtotal |   |     | 2  |          | 2   |
| 3.<br>Radiation<br>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      | 96  |
|                                | 2.3.14   | Knowledge of radiation or containment hazards that may arise during normal, abnormal, or emergency conditions or activities.                                |     |    | 3.8      | 98  |
|                                |          |   |     |    |          |     |
|                                |          |   |     |    |          |     |
|                                | 2.3.7    | Ability to comply with radiation work permit requirements during normal or abnormal conditions.   | 3.5 | 70 |          |     |
|                                | 2.3.11   | Ability to control radiation releases.  | 3.8 | 71 |          |     |
|                                |          |   |     |    |          |     |
|                                | Subtotal |   |     | 2  |          | 2   |

|   |        |   |     |    |     |    |
|---|--------|---|-----|----|-----|----|
| 4.<br>Emergency<br>Procedures /<br>Plan | 2.4.8  | Knowledge of how abnormal operating procedures are used in conjunction with EOP's.  |     |    | 4.5 | 97 |
|   | 2.4.27 | Knowledge of "fire in the plant" procedures.  |     |    | 3.9 | 99 |
|   |        |   |     |    |     |    |
|   |        |   |     |    |     |    |
|   | 2.4.23 | Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.   | 3.4 | 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 |     |    |
|   | 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. | 3.8 | 75 |     |    |
|   |        |   |     |    |     |    |
| Subtotal                                |        |   |     | 3  |     | 2  |
| Tier 3 Point Total                      |        |   |     | 10 |     | 7  |

