

|  |                                      |
|--|--------------------------------------|
| Facility: <u>Seabrook Station</u>  | Date of Examination: <u>8/3/2020</u> |
| Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/> | Operating Test Number: <u>2020</u>   |

  

| Administrative Topic (see Note) | Type Code* | Describe activity to be performed   |
|---------------------------------|------------|---|
| Conduct of Operations           | R, D       | QPTR Calculation N-42 INOP<br><br>KA: 2.1.7 Ability to evaluate plant performance and make operational judgments based on the operating characteristics, reactor behavior, and instrument interpretation. |
| Conduct of Operations           | R, M       | Calculate Boron Change<br><br>K/A 2.1.37, Knowledge of procedures, guidelines, or limitations associated with reactivity management.  |
| Equipment Control               | R, D       | Shutdown Margin Calculation (MODE 3) Inadvertent Dilution<br><br>KA: 2.2.12 Knowledge of Surveillance Procedures  |
| Radiation Control               | R, D, P    | Initiate a Liquid Effluent Waste Sample Request (form CP 4.1A)<br><br>KA: 2.3.11 Ability to control radiation releases.   |
| 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)

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| Administrative Topic (see Note)   | Type Code* | Describe activity to be performed  |
| Conduct of Operations   | R, N       | Evaluate QPTR Calculation N-42 INOP<br>KA: 2.1.7 Ability to evaluate plant performance and make operational judgments based on the operating characteristics, reactor behavior, and instrument interpretation. |
| Conduct of Operations   | R, N       | Review Boron Concentration Change<br>K/A 2.1.37, Knowledge of procedures, guidelines, or limitations associated with reactivity management.  |
| Equipment Control   | R, N       | Evaluate Shutdown Margin Calculation (MODE 3) Inadvertent Dilution<br>KA: 2.2.12 Knowledge of Surveillance Procedures  |
| Radiation Control   | R, D, P    | Review LEWSR Request<br>K/A 2.3.11, Ability to control radiation releases  |
| Emergency Plan  | S, M       | Post Scenario E Plan Classification and State Notification (Sim Scenario Dependent)<br>K/A 2.4.41, Knowledge of SRO responsibilities in emergency plan implementation  |
| 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:<br>(C)ontrol room, (S)imulator, or Class(R)oom<br>(D)irect from bank ( $\leq 3$ for ROs; $\leq 4$ for SROs and RO retakes)<br>(N)ew or (M)odified from bank ( $\geq 1$ )<br>(P)revious 2 exams ( $\leq 1$ , randomly selected) |            |  |

| Facility: <u>Seabrook Station</u>   | Date of Examination: <u>8/3/2020</u> |                       |
|---|--------------------------------------|-----------------------|
| Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>  | Operating Test Number: <u>2020</u>   |                       |
| 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. Recover A Dropped Rod  | D, S                                 | 1                     |
| b. SI Termination   | A, D, EN, P, S                       | 2                     |
| c. SG Pressure Instrument Failure   | A, N, S                              | 7                     |
| d. Raise SI Accumulator Pressure  | D, S                                 | 3                     |
| e. Transfer To Cold Leg Recirculation (TCA)   | A, D, S                              | 4<br>Primary System   |
| f. Faulted DG Surveillance  | A, D, S                              | 6                     |
| g. Tower Actuation (TCA)  | A, D, S                              | 4<br>Secondary System |
| h. Placing the Containment On-Line Purge (COP) System in Service  | D, P, S                              | 8                     |
| In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U  |                                      |                       |
| i. Local Manual Rapid Boration  | D, E, L, R                           | 1                     |
| j. Feed SG Locally With EFW   | E, M                                 | 4<br>Secondary System |
| k. Reset PCCW Pump High Temperature Trip  | A, D, E                              | 8                     |
| * 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                      |
| (C)ontrol room                               |                                   |
| (D)irect from bank                           | ≤ 9/≤ 8/≤ 4                       |
| (E)mergency or abnormal in-plant             | ≥ 1/≥ 1/≥ 1                       |
| (EN)gineered safety feature                  | ≥ 1/≥ 1/≥ 1 (control room system) |
| (L)ow-Power/Shutdown                         | ≥ 1/≥ 1/≥ 1                       |
| (N)ew or (M)odified from bank including 1(A) | ≥ 2/≥ 2/≥ 1                       |
| (P)revious 2 exams                           | ≤ 3/≤ 3/≤ 2 (randomly selected)   |
| (R)CA  | ≥ 1/≥ 1/≥ 1                       |
| (S)imulator                                  |                                   |

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| 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. -  | -                                    | -                     |
| b. SI Termination   | A, D, EN, P, S                       | 2                     |
| c. SG Pressure Instrument Failure   | A, N, S                              | 7                     |
| d. Raise SI Accumulator Pressure  | D, S                                 | 3                     |
| e. Transfer To Cold Leg Recirculation (TCA)   | A, D, S                              | 4<br>Primary System   |
| f. Faulted DG Surveillance  | A, D, S                              | 6                     |
| g. Tower Actuation (TCA)  | A, D, S                              | 4<br>Secondary System |
| h. Placing the Containment On-Line Purge (COP) System in Service  | D, P, S                              | 8                     |
| In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U  |                                      |                       |
| i. Local Manual Rapid Boration  | D, E, L, R                           | 1                     |
| j. Feed SG Locally With EFW   | E, M                                 | 4<br>Secondary System |
| k. Reset PCCW Pump High Temperature Trip  | A, D, E                              | 8                     |
| * 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                      |
| (C)ontrol room                               |                                   |
| (D)irect from bank                           | ≤ 9/≤ 8/≤ 4                       |
| (E)mergency or abnormal in-plant             | ≥ 1/≥ 1/≥ 1                       |
| (EN)gineered safety feature                  | ≥ 1/≥ 1/≥ 1 (control room system) |
| (L)ow-Power/Shutdown                         | ≥ 1/≥ 1/≥ 1                       |
| (N)ew or (M)odified from bank including 1(A) | ≥ 2/≥ 2/≥ 1                       |
| (P)revious 2 exams                           | ≤ 3/≤ 3/≤ 2 (randomly selected)   |
| (R)CA  | ≥ 1/≥ 1/≥ 1                       |
| (S)imulator                                  |                                   |

| Facility: <u>Seabrook Station</u>   | Date of Examination: <u>8/3/20</u>   |                       |
|---|--|-----------------------|
| Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>  | Operating Test Number: <u>2020</u>   |                       |
| 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.-   | -  | -                     |
| b. SI Termination   | A, D, EN, P, S   | 2                     |
| c. SG Pressure Instrument Failure   | A, N, S  | 7                     |
| d.-   | -  | -                     |
| e.-   | -  | -                     |
| f.-   | -  | -                     |
| g.-   | -  | -                     |
| h.-   | -  | -                     |
| In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U  |  |                       |
| i. Local Manual Rapid Boration  | D, E, L, R   | 1                     |
| j. Feed SG Locally With EFW   | E, M   | 4<br>Secondary System |
| k. Reset PCCW Pump High Temperature Trip  | A, D, E  | 8                     |
| * 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<br>(C)ontrol room<br>(D)irect from bank<br>(E)mergency or abnormal in-plant<br>(EN)gineered safety feature<br>(L)ow-Power/Shutdown<br>(N)ew or (M)odified from bank including 1(A)<br>(P)revious 2 exams<br>(R)CA<br>(S)imulator             | 4-6/4-6 /2-3<br><br>$\leq 9/\leq 8/\leq 4$<br>$\geq 1/\geq 1/\geq 1$<br>$\geq 1/\geq 1/\geq 1$ (control room system)<br>$\geq 1/\geq 1/\geq 1$<br>$\geq 2/\geq 2/\geq 1$<br>$\leq 3/\leq 3/\leq 2$ (randomly selected)<br>$\geq 1/\geq 1/\geq 1$ |                       |

Facility: **Seabrook Station**      Scenario No.: **1**      Op-Test No.: **2020**

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

Initial Conditions: **Intermediate range power equivalent at  $10^{-8}$  Amps, boron concentration is 1653 ppm and CBD at 98 steps.**

Turnover:

- **No equipment out of service**
- **Increase power to 3% power range**

Critical Tasks:

1. **Manually actuate SI before transitioning out of E-0.**
2. **Transfer to Cold Leg Recirculation before receiving the RWST empty alarm.**

| Event No. | Malf. No.                  | Event Type*            | Event Description  |
|-----------|----------------------------|------------------------|--|
| 1         |                            | PSO R<br>BOP N<br>US N | Power increase to 3%   |
| 2         | trRCPR455                  | PSO I<br>US I, TS      | Pressurizer pressure controlling channel RC-PT-455 fails low.          |
| 3         | trFWLT529                  | BOP I<br>US I, TS      | SG 'B' controlling channel (FRBV) FW-LT-529 fails high.                |
| 4         | mfRC048B                   | PSO M<br>BOP M<br>US M | RCS leak leads to large break LOCA in 'B' hot leg.                     |
| 5         | aet SWA<br>SW Pump<br>trip | PSO C<br>US C          | Running 'A' train SW pump trips, standby fails to automatically start. |
| 6         | mfCBS004,<br>005           | PSO C<br>US C          | CBS pumps fail to automatically start.                                 |

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

**Procedure flow path: OS1201.06, ON1235.03, OS1201.02, E-0, FR-Z.1, E-1**



Facility: **Seabrook Station** Scenario No.: **2** Op-Test No.: **2020**

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

Initial Conditions: **75% power. The core is at middle of life with a burnup of 10,000 MWD/MTU. Boron concentration is 1105 ppm and CBD is at 181 steps.**

Turnover: **The plant is at 75% power due to grid limitations. Power has been stable for 12 hours. Maintain current power. Swap 'A' train SW pumps, from SW-P-41C to SW-P-41A.**

Critical Tasks:

1. **Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.**
2. **Establish/maintain an RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions:**  
 Too high to maintain 60F of subcooling  
 OR  
 Too low causing Red or Orange path on the sub criticality and/or the integrity CSF.

| Event No. | Malf. No. | Event Type*            | Event Description  |
|-----------|-----------|------------------------|--|
| 1         |           | BOP N<br>US N          | Swap 'A' train SW pumps.   |
| 2         | mfCC008   | PSO C<br>US C, TS      | CC-P-11A trips and the standby fails to automatically start. PSO must manually start.  |
| 3         | mfSW001   | BOP C<br>US C, TS      | SW-P-41A trips. Standby fails to auto start, trips when manually started. Manual TA is necessary.  |
| 4         | mfSG001B  | PSO C<br>US C, TS      | 30 gpm 'B' SG tube leak  |
| 5         |           | PSO R                  | Down power to <50% within 1 hour.  |
| 6         | mfSG001B  | PSO M<br>BOP M<br>US M | During down power, 'B' SG degrades into a 500 gpm tube rupture requiring start of second charging pump, tripping the reactor and actuating SI. |
| 7         | mfRPS012  | PSO C<br>US C          | Automatic 'T' signal on Train 'B' fails to actuate. PSO must manually actuate train 'B' 'T' signal.  |
| 8         | svMSV88   | BOP C<br>US C          | 'B' MSIV cannot be closed. Other MSIVs must be closed and c/d shifted to ASDVs.  |

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

Procedure flow path: OS1211.04, OS1216.01, OS1227.02, OS1231.04, E-0, E-3

Facility: **Seabrook Station** Scenario No.: **3** Op-Test No.: **2020**

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

Initial Conditions: **100% power, no equipment is out of service. The core is at middle of life with a burnup of 10,000 MWD/MTU. Boron concentration is 1045 ppm and CBD is at 230 steps.**

Turnover: **The plant is in a post-contingency back down to 800 MWeI net. Pre-brief ISO down power before taking the watch.**

Critical Tasks:

1. **Restore power to Bus 6 via SEPS before placing equipment in pull-to-lock in step 6 of ECA-0.0.**
2. **Start the motor driven EFW pump before transitioning to FR-H.1.**

| Event No.  | Malf. No.                     | Event Type*            | Event Description   |
|--|-------------------------------|------------------------|---|
| 1  | trFWLT553                     | BOP I<br>US I, TS      | 'C' SG Level controlling channel FW-LT-553 fails low.   |
| 2  | ctRCPK455A                    | PSO C<br>US C          | Pressurizer Master Pressure Controller set point fails high.  |
| 3  |                               | PSO R<br>BOP N<br>US N | ISO down power to 800 MWeI net in 30 minutes.   |
| 4  |                               | US TS                  | During ISO down power, NSO reports a loss of oil from the 'B' CBS pump.   |
| 5  | mfED038<br>mfED031<br>mfED034 | PSO M<br>BOP M<br>US M | Loss of Offsite Power, 'A' EDG failure to start (auto or manual), 'B' EDG starts then trips on low lube oil pressure.                       |
| 6  | mfCC013                       | PSO C<br>US C          | Once Bus 6 power is restored from SEPs, no PCCW pump will start automatically and must be manually started.                                 |
| 7  | mfFW052                       | BOP C<br>US C          | Turbine driven EFW pump trips. The motor driven EFW pump fails to start automatically and must be manually started once Bus 6 is energized. |
|  |                               |                        |   |
| * (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor |                               |                        |   |

Procedure flow path: OS1231.04, OS1227.02, E-0, ECA-0.0, E-0, ES-0.1

| Facility: Seabrook                                  |             |                        |    |    |     |    |    |    |    |     |    |    |                 | Date of Exam: August 2020 |    |       |    |   |
|---|-------------|------------------------|----|----|-----|----|----|----|----|-----|----|----|-----------------|---------------------------|----|-------|----|---|
| Tier  | Group       | RO K/A Category Points |    |    |     |    |    |    |    |     |    |    | SRO-Only Points |                           |    |       |    |   |
|   |             | K1                     | K2 | K3 | K4  | K5 | K6 | A1 | A2 | A3  | A4 | G* | Total           | A2                        | G* | Total |    |   |
| 1.<br>Emergency and<br>Abnormal Plant<br>Evolutions | 1           | 3                      | 3  | 3  | N/A |    |    | 3  | 3  | N/A |    |    | 3               | 18                        | 3  | 3     | 6  |   |
|   | 2           | 1                      | 2  | 2  | N/A |    |    | 1  | 2  | N/A |    |    | 1               | 9                         | 2  | 2     | 4  |   |
|   | Tier Totals | 4                      | 5  | 5  | N/A |    |    | 4  | 5  | N/A |    |    | 4               | 27                        | 5  | 5     | 10 |   |
| 2.<br>Plant<br>Systems                              | 1           | 2                      | 3  | 2  | 3   | 2  | 2  | 3  | 3  | 2   | 3  | 3  | 28              | 2                         | 3  | 5     |    |   |
|   | 2           | 1                      | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 0   | 1  | 1  | 10              | 0                         | 1  | 2     |    |   |
|   | Tier Totals | 3                      | 4  | 3  | 4   | 3  | 3  | 4  | 4  | 2   | 4  | 4  | 38              | 3                         | 5  | 8     |    |   |
| 3. Generic Knowledge and Abilities<br>Categories    |             |                        |    | 1  |     | 2  |    | 3  |    | 4   |    | 10 |                 | 1                         | 2  | 3     | 4  | 7 |
|   |             |                        |    | 2  |     | 2  |    | 3  |    | 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 ±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 shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
  6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
  7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
  8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' IRs for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel-handling equipment is sampled in a category other than Category A2 or G\* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2. (Note 1 does not apply). Use duplicate pages for RO and SRO-only exams.
  9. For Tier 3, select topics from Section 2 of the K/A catalog and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

G\* Generic K/As

- \* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.
- \*\* These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

| ES-401   |    | PWR Examination Outline |    |    |    |        |  | Form ES-401-2 |    |
|--|----|-------------------------|----|----|----|--------|--|---------------|----|
| Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)              |    |                         |    |    |    |        |  |               |    |
| E/APE # / Name / Safety Function   | K1 | K2                      | K3 | A1 | A2 | G*     | K/A Topic(s)   | IR            | #  |
| 000007 (EPE 7; BW E02&E10; CE E02) Reactor Trip, Stabilization, Recovery / 1 | 5  |                         |    |    |    |        | Decay power as a function of time  | 3.3           | 1  |
| 000009 (EPE 9) Small Break LOCA / 3  |    | 3                       |    |    |    |        | S/Gs   | 3.0           | 2  |
| 000015 (APE 15) Reactor Coolant Pump Malfunctions / 4                        |    |                         |    |    |    | 2.1.25 | Ability to interpret reference materials such as graphs, monographs and tables which contain performance data.   | 3.9           | 3  |
| 000025 (APE 25) Loss of Residual Heat Removal System / 4                     |    |                         |    |    | 1  |        | Proper amperage of running LPI/decay heat removal/RHR pump(s)  | 2.7           | 4  |
| 000026 (APE 26) Loss of Component Cooling Water / 8                          |    |                         |    | 4  |    |        | CRDM high-temperature alarm system   | 2.7           | 5  |
| 000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3          |    |                         |    |    |    | 2.4.50 | Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.   | 4.2           | 6  |
| 000038 (EPE 38) Steam Generator Tube Rupture / 3                             |    |                         |    | 36 |    |        | Cooldown of RCS to specified temperature   | 4.3           | 7  |
| 000054 (CE E06) Loss of Main Feedwater / 4                                   | 1  |                         |    |    |    |        | MFW line break depressurizes the S/G (similar to a steam line break)   | 4.1           | 8  |
| 000055 (EPE 55) Station Blackout / 6   | 2  |                         |    |    |    |        | Natural circulation cooling  | 4.1           | 9  |
| 000056 (APE 56) Loss of Offsite Power / 6                                    |    |                         |    |    |    | 2.4.20 | Knowledge of the operational implications of EOP warnings, cautions, and notes.  | 3.8           | 10 |
| 000057 (APE 57) Loss of Vital AC Instrument Bus / 6                          |    |                         | 1  |    |    |        | Actions contained in EOP for loss of vital ac electrical instrument bus  | 4.1           | 11 |
| 000058 (APE 58) Loss of DC Power / 6   |    |                         |    |    | 1  |        | That a loss of dc power has occurred; verification that substitute power sources have come on line   | 3.7           | 12 |
| 000062 (APE 62) Loss of Nuclear Service Water / 4                            |    |                         |    |    | 3  |        | The valve lineups necessary to restart the SWS while bypassing the portion of the system causing the abnormal condition  | 2.6           | 13 |
| 000065 (APE 65) Loss of Instrument Air / 8                                   |    |                         | 8  |    |    |        | Actions contained in EOP for loss of instrument air  | 3.7           | 14 |
| 000077 (APE 77) Generator Voltage and Electric Grid Disturbances / 6         |    |                         |    | 3  |    |        | Voltage regulator controls   | 3.8           | 15 |
| (W E04) LOCA Outside Containment / 3   |    | 2                       |    |    |    |        | Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems and relations between the proper operation of these systems to the operation of the facility.          | 3.8           | 16 |
| (BW E04; W E05) Inadequate Heat Transfer—Loss of Secondary Heat Sink / 4     |    | 1                       |    |    |    |        | Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes and automatic and manual features.   | 3.7           | 17 |
| (W E11) Loss of Emergency Coolant Recirculation / 4                          |    |                         | 4  |    |    |        | RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated. | 3.6           | 18 |
|  |    |                         |    |    |    |        |  |               |    |
| 000007 (EPE 7; BW E02&E10; CE E02) Reactor Trip, Stabilization, Recovery / 1 |    |                         |    |    | 2  |        | Proper actions to be taken if the automatic safety functions have not taken place  | 4.6           | 76 |
| 000011 (EPE 11) Large Break LOCA / 3   |    |                         |    |    | 7  |        | That equipment necessary for functioning of critical pump water seals is operable  | 3.4           | 77 |
| 000025 (APE 25) Loss of Residual Heat Removal System / 4                     |    |                         |    |    | 5  |        | Limitations on LPI flow and temperature rates of change  | 3.5           | 78 |
| 000026 (APE 26) Loss of Component Cooling Water / 8                          |    |                         |    |    |    | 2.4.47 | Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.   | 4.2           | 79 |

|   |   |   |   |   |     |        |   |     |      |
|---|---|---|---|---|-----|--------|---|-----|------|
| 000056 (APE 56) Loss of Offsite Power / 6 |   |   |   |   |     | 2.4.41 | Knowledge of the emergency action level thresholds and classifications. | 4.6 | 80   |
| (W E04) LOCA Outside Containment / 3      |   |   |   |   |     | 2.4.18 | Knowledge of the specific bases for EOPs.                               | 4.0 | 81   |
| K/A Category Totals:                      | 3 | 3 | 3 | 3 | 3/3 | 3/3    | Group Point Total:  |     | 18/6 |

| ES-401  |    | PWR Examination Outline |    |    |     |        |  | Form ES-401-2 |     |
|---|----|-------------------------|----|----|-----|--------|--|---------------|-----|
| Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO) |    |                         |    |    |     |        |  |               |     |
| E/APE # / Name / Safety Function                                | K1 | K2                      | K3 | A1 | A2  | G*     | K/A Topic(s)   | IR            | #   |
| 000001 (APE 1) Continuous Rod Withdrawal / 1                    |    |                         |    | 4  |     |        | Operating switch for emergency boration motor-operated valve operating switch  | 3.8           | 19  |
| 000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8             |    |                         | 2  |    |     |        | Interlocks associated with fuel handling equipment   | 2.9           | 20  |
| 000037 (APE 37) Steam Generator Tube Leak / 3                   | 2  |                         |    |    |     |        | Leak rate vs. pressure drop  | 3.5           | 21  |
| 000051 (APE 51) Loss of Condenser Vacuum / 4                    |    |                         |    |    | 2   |        | Conditions requiring reactor and/or turbine trip   | 3.9           | 22  |
| 000068 (APE 68; BW A06) Control Room Evacuation / 8             |    |                         |    |    | 10  |        | Source range count rate  | 4.2           | 23  |
| 000076 (APE 76) High Reactor Coolant Activity / 9               |    | 1                       |    |    |     |        | Process radiation monitors   | 2.6           | 24  |
| (BW E08; W E03) LOCA Cooldown—Depressurization / 4              |    | 1                       |    |    |     |        | Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes and automatic and manual features.   | 3.6           | 25  |
| (CE A11**; W E08) RCS Overcooling—Pressurized Thermal Shock / 4 |    |                         | 1  |    |     |        | Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure and reactivity changes and operating limitations and reasons for these operating characteristics. | 3.4           | 26  |
| (W E15) Containment Flooding / 5                                |    |                         |    |    |     | 2.1.23 | Ability to perform specific system and integrated plant procedures during all modes of plant operation.  | 4.3           | 27  |
| 000003 (APE 3) Dropped Control Rod / 1                          |    |                         |    |    | 3   |        | Dropped rod, using in-core/ex-core instrumentation in-core or loop temperature measurements  | 3.8           | 82  |
| 000028 (APE 28) Pressurizer (PZR) Level Control Malfunction / 2 |    |                         |    |    | 1   |        | PZR level indicators and alarms  | 3.6           | 83  |
| 000068 (APE 68; BW A06) Control Room Evacuation / 8             |    |                         |    |    |     | 2.4.3  | Ability to identify post-accident instrumentation.   | 3.9           | 84  |
| (BW E09; CE A13**; W E09 & E10) Natural Circulation/4           |    |                         |    |    |     | 2.2.44 | Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions  | 4.4           | 85  |
| K/A Category Point Totals:                                      | 1  | 2                       | 2  | 1  | 2/2 | 1/2    | Group Point Total:   |               | 9/4 |

| ES-401   |    | PWR Examination Outline<br>Plant Systems—Tier 2/Group 1 (RO/SRO) |    |    |    |    |    |    |    |    |        |  | Form ES-401-2 |    |
|--|----|--|----|----|----|----|----|----|----|----|--------|--|---------------|----|
| System # / Name                                      | K1 | K2   | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G*     | K/A Topic(s)   | IR            | #  |
| 003 (SF4P RCP) Reactor Coolant Pump                  |    | 1  |    |    |    |    |    |    |    |    |        | RCPS   | 3.1           | 28 |
| 004 (SF1; SF2 CVCS) Chemical and Volume Control      |    |  |    | 1  |    |    |    |    |    |    |        | Oxygen control in RCS  | 2.8           | 29 |
| 004 (SF1; SF2 CVCS) Chemical and Volume Control      |    |  |    | 8  |    |    |    |    |    |    |        | Hydrogen control in RCS  | 2.8           | 30 |
| 005 (SF4P RHR) Residual Heat Removal                 |    |  |    |    |    | 3  |    |    |    |    |        | RHR heat exchanger   | 2.5           | 31 |
| 006 (SF2; SF3 ECCS) Emergency Core Cooling           |    |  | 1  |    |    |    |    |    |    |    |        | RCS  | 4.1           | 32 |
| 007 (SF5 PRTS) Pressurizer Relief/Quench Tank        |    |  |    |    |    |    |    | 2  |    |    |        | Abnormal pressure in the PRT   | 2.6           | 33 |
| 007 (SF5 PRTS) Pressurizer Relief/Quench Tank        |    |  |    |    | 2  |    |    |    |    |    |        | Method of forming a steam bubble in the PZR  | 3.1           | 34 |
| 008 (SF8 CCW) Component Cooling Water                |    |  |    | 2  |    |    |    |    |    |    |        | Operation of the surge tank, including the associated valves and controls  | 2.9           | 35 |
| 010 (SF3 PZR PCS) Pressurizer Pressure Control       |    |  |    |    |    |    |    |    |    |    | 2.4.49 | Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. | 4.6           | 36 |
| 010 (SF3 PZR PCS) Pressurizer Pressure Control       |    |  |    |    |    | 1  |    |    |    |    |        | Pressure detection systems   | 2.7           | 37 |
| 012 (SF7 RPS) Reactor Protection                     |    |  |    |    | 1  |    |    |    |    |    |        | DNB  | 3.3           | 38 |
| 013 (SF2 ESFAS) Engineered Safety Features Actuation |    |  |    |    |    |    |    |    |    |    | 2.2.22 | Knowledge of limiting conditions for operations and safety limits.   | 4.0           | 39 |
| 022 (SF5 CCS) Containment Cooling                    | 2  |  |    |    |    |    |    |    |    |    |        | SEC/remote monitoring systems  | 3.7           | 40 |
| 026 (SF5 CSS) Containment Spray                      |    | 1  |    |    |    |    |    |    |    |    |        | Containment spray pumps  | 3.4           | 41 |
| 026 (SF5 CSS) Containment Spray                      |    | 2  |    |    |    |    |    |    |    |    |        | MOVs   | 2.7           | 42 |
| 039 (SF4S MSS) Main and Reheat Steam                 |    |  |    |    |    |    |    |    |    | 4  |        | Emergency feedwater pump turbines  | 3.8           | 43 |
| 039 (SF4S MSS) Main and Reheat Steam                 |    |  | 5  |    |    |    |    |    |    |    |        | RCS  | 3.6           | 44 |
| 059 (SF4S MFW) Main Feedwater                        |    |  |    |    |    |    | 7  |    |    |    |        | Feed Pump speed, including normal control speed for ICS  | 2.5           | 45 |
| 061 (SF4S AFW) Auxiliary/Emergency Feedwater         |    |  |    |    |    |    |    |    |    |    | 2.4.31 | Knowledge of annunciators alarms, indications or response procedures   | 4.2           | 46 |
| 062 (SF6 ED AC) AC Electrical Distribution           |    |  |    |    |    |    | 1  |    |    |    |        | Significance of D/G load limits  | 3.4           | 47 |
| 062 (SF6 ED AC) AC Electrical Distribution           |    |  |    |    |    |    | 3  |    |    |    |        | Effect on instrumentation and controls of switching power supplies   | 2.5           | 48 |
| 063 (SF6 ED DC) DC Electrical Distribution           |    |  |    |    |    |    |    |    |    | 3  |        | Battery discharge rate   | 3.0           | 49 |
| 064 (SF6 EDG) Emergency Diesel Generator             | 1  |  |    |    |    |    |    |    |    |    |        | AC distribution system   | 4.1           | 50 |
| 073 (SF7 PRM) Process Radiation Monitoring           |    |  |    |    |    |    |    | 2  |    |    |        | Detector failure   | 2.7           | 51 |

|  |   |   |   |   |   |   |   |     |   |   |     |  |   |   |        |   |     |      |
|--|---|---|---|---|---|---|---|-----|---|---|-----|--|---|---|--------|---|-----|------|
| 076 (SF4S SW) Service Water                    |   |   |   |   |   |   |   |     |   |   |     |  | 2 |   |        | Emergency heat loads  | 3.7 | 52   |
| 078 (SF8 IAS) Instrument Air                   |   |   |   |   |   |   |   |     |   |   |     |  |   | 1 |        | Pressure gauges   | 3.1 | 53   |
| 103 (SF5 CNT) Containment                      |   |   |   |   |   |   |   |     |   |   |     |  | 5 |   |        | Emergency containment entry   | 2.9 | 54   |
| 103 (SF5 CNT) Containment                      |   |   |   |   |   |   |   |     |   |   |     |  |   | 1 |        | Containment isolation   | 3.9 | 55   |
| 003 (SF4P RCP) Reactor Coolant Pump            |   |   |   |   |   |   |   |     |   |   |     |  | 3 |   |        | Problems associated with RCP motors, including fault motors and current, winding and bearing temperature problems   | 3.1 | 86   |
| 007 (SF5 PRTS) Pressurizer Relief/Quench Tank  |   |   |   |   |   |   |   |     |   |   |     |  |   |   | 2.4.2  | Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.  | 4.6 | 87   |
| 010 (SF3 PZR PCS) Pressurizer Pressure Control |   |   |   |   |   |   |   |     |   |   |     |  | 1 |   |        | Heater failures   | 3.6 | 88   |
| 026 (SF5 CSS) Containment Spray                |   |   |   |   |   |   |   |     |   |   |     |  |   |   | 2.4.9  | Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.  | 4.2 | 89   |
| 073 (SF7 PRM) Process Radiation Monitoring     |   |   |   |   |   |   |   |     |   |   |     |  |   |   | 2.4.21 | Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc. ] | 4.6 | 90   |
| K/A Category Point Totals:                     | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 3/2 | 2 | 3 | 3/3 |  |   |   |        | Group Point Total:  |     | 28/5 |



| ES-401   | PWR Examination Outline |    |    |    |    |    |    |     |    |    |        | Form ES-401-2  |      |    |
|--|-------------------------|----|----|----|----|----|----|-----|----|----|--------|--|------|----|
| Plant Systems—Tier 2/Group 2 (RO/SRO)                |                         |    |    |    |    |    |    |     |    |    |        |  |      |    |
| System # / Name                                      | K1                      | K2 | K3 | K4 | K5 | K6 | A1 | A2  | A3 | A4 | G*     | K/A Topic(s)   | IR   | #  |
| 001 (SF1 CRDS) Control Rod Drive                     |                         |    |    |    | 64 |    |    |     |    |    |        | Reason for withdrawing shutdown group: to provide adequate shutdown margin   | 3.3  | 56 |
| 011 (SF2 PZR LCS) Pressurizer Level Control          |                         |    |    | 6  |    |    |    |     |    |    |        | Letdown isolation  | 3.3  | 57 |
| 028 (SF5 HRPS) Hydrogen Recombiner and Purge Control |                         |    |    |    |    |    | 2  |     |    |    |        | Containment pressure   | 3.4  | 58 |
| 041 (SF4S SDS) Steam Dump/Turbine Bypass Control     |                         |    |    |    |    |    |    |     |    | 2  |        | Cooldown valves  | 2.7  | 59 |
| 045 (SF 4S MTG) Main Turbine Generator               |                         |    |    |    |    |    |    | 12  |    |    |        | Control rod insertion limits exceeded (stabilize secondary)  | 2.5  | 60 |
| 055 (SF4S CARS) Condenser Air Removal                |                         |    | 1  |    |    |    |    |     |    |    |        | Main condenser   | 2.5  | 61 |
| 056 (SF4S CDS) Condensate                            |                         |    |    |    |    |    |    |     |    |    | 2.2.37 | Ability to determine operability and/or availability of safety related equipment   | 3.6  | 62 |
| 072 (SF7 ARM) Area Radiation Monitoring              | 4                       |    |    |    |    |    |    |     |    |    |        | Control room ventilation   | 3.3  | 63 |
| 075 (SF8 CW) Circulating Water                       |                         | 3  |    |    |    |    |    |     |    |    |        | Emergency/essential SWS pumps  | 2.6  | 64 |
| 086 Fire Protection                                  |                         |    |    |    |    | 4  |    |     |    |    |        | Fire, smoke and heat detectors   | 2.6  | 65 |
|  |                         |    |    |    |    |    |    |     |    |    |        |  |      |    |
| 034 (SF8 FHS) Fuel-Handling Equipment                |                         |    |    |    |    |    |    | 1   |    |    |        | Dropped fuel element   | 4.4  | 91 |
| 072 (SF7 ARM) Area Radiation Monitoring              |                         |    |    |    |    |    |    |     |    |    | 2.4.4  | Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. | 4.7  | 92 |
| 079 (SF8 SAS**) Station Air                          |                         |    |    |    |    |    |    |     |    |    | 2.4.6  | Knowledge symptom based EOP mitigation strategies.   | 4.7  | 93 |
| K/A Category Point Totals:                           | 1                       | 1  | 1  | 1  | 1  | 1  | 1  | 1/1 | 0  | 1  | 1/2    | Group Point Total:   | 10/3 |    |

| Facility: Seabrook           |          | Date of Exam: August 2020  |     |    |          |     |
|------------------------------|----------|--|-----|----|----------|-----|
| Category                     | K/A #    | Topic  | RO  |    | SRO-only |     |
|                              |          |  | IR  | #  | IR       | #   |
| 1. Conduct of Operations     | 2.1.15   | Knowledge of administrative requirements for temporary management directives such as standing orders, night orders, Operations memos, etc. | 2.7 | 66 |          |     |
|                              | 2.1.18   | Ability to make accurate, clear and concise logs, records, status boards and reports.  | 3.6 | 67 |          |     |
|                              |          |  |     |    |          |     |
|                              | 2.1.29   | Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.   |     |    | 4.0      | 94  |
|                              | Subtotal |  |     | 2  |          | 1   |
| 2. Equipment Control         | 2.2.42   | Ability to recognize system parameters that are entry-level conditions for Technical Specifications  | 3.9 | 68 |          |     |
|                              | 2.2.35   | Ability to determine Technical Specification Mode of Operation.  | 3.6 | 69 |          |     |
|                              |          |  |     |    |          |     |
|                              | 2.2.17   | Knowledge of the process for managing maintenance activities during power operations.  |     |    | 3.8      | 95  |
|                              | 2.2.39   | Knowledge of less than one hour technical specification action statements for systems.   |     |    | 4.5      | 96  |
| Subtotal                     |          |  | 2   |    | 2        |     |
| 3. Radiation Control         | 2.3.11   | Ability to control radiation releases.   | 3.8 | 70 |          |     |
|                              | 2.3.12   | Knowledge of radiological safety principles pertaining to licensed operator duties   | 3.2 | 71 |          |     |
|                              | 2.3.5    | Ability to use radiation monitoring systems  | 2.9 | 72 |          |     |
|                              |          |  |     |    |          |     |
|                              | 2.3.4    | Knowledge of radiation exposure limits under normal or emergency conditions.   |     |    | 3.7      | 97  |
|                              | 2.3.7    | Ability to comply with radiation work permit requirements during normal or abnormal conditions   |     |    | 3.6      | 98  |
| Subtotal                     |          |  | 3   |    | 2        |     |
| 4. Emergency Procedures/Plan | 2.4.1    | Knowledge of EOP entry conditions and immediate action steps.  | 4.6 | 73 |          |     |
|                              | 2.4.32   | Knowledge of operator response to loss of all annunciators.  | 3.6 | 74 |          |     |
|                              | 2.4.46   | Ability to verify that the alarms are consistent with the plant conditions.  | 4.2 | 75 |          |     |
|                              |          |  |     |    |          |     |
|                              | 2.4.17   | Knowledge of EOP terms and definitions.  |     |    | 4.3      | 99  |
|                              | 2.4.35   | Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects   |     |    | 4.0      | 100 |
| Subtotal                     |          |  | 3   |    | 2        |     |
| Tier 3 Point Total           |          |  |     | 10 |          | 7   |

| Tier / Group | Randomly Selected K/A             | Reason for Rejection   |
|--------------|-----------------------------------|--|
| 1/2          |                                   | Rejected Emergency and Abnormal Plant Evolutions associated with Babcock and Wilcox (BW) and Combustion Engineering (CE) reactors - Seabrook is a Westinghouse design.   |
| 2/1          |                                   | Rejected 025 (SF5 ICE) Ice Condenser - Seabrook does not have an ice condenser installed.  |
| 2/2          |                                   | Rejected 027 (SF5) CIRS Containment Iodine Removal System – system does not exist at Seabrook  |
| 2/2          |                                   | Rejected 016 (SF7) NNI Nonnuclear Instrumentation System – system does not exist at Seabrook   |
| ALL          |                                   | Rejected generics 2.2.3 and 2.2.4 as Seabrook is a single unit site  |
| 1/1          | RO question #5<br>APE 026 A1.04   | K/A is not valid at Seabrook as CRDMs are not cooled by Component Cooling Water. Randomly reselected A1.01.  |
| 1/1          | RO question #18<br>E11 K3.4       | Cannot write a discriminating question of appropriate level of difficulty. Randomly reselected K3.3  |
| 1/2          | RO question #19<br>APE 001 A1.04  | The switches referred to in this K/A are not used in this APE. Cannot write an operationally valid question. Randomly reselected A1.01   |
| 2/1          | RO question #40<br>022 K1.02      | Seabrook uses a closed cooling water system to cool containment. This K/A is not specific and does not resemble systems at Seabrook, so an operationally valid question cannot be written. Randomly reselected K1.01   |
| 2/1          | RO question #54<br>103 A2.05      | Cannot write an operationally valid question regarding emergency containment entry. Randomly reselected A2.03  |
| 2/2          | RO question #58<br>028 A1.02      | Containment pressure monitoring in HRPS does not lend itself to many discriminating questions. Randomly selected A1.01 for more discriminating value.  |
| 2/2          | RO question #62<br>056 Condensate | This system does not contain operability or availability of SR equipment; therefore it is not a match for the generic K/A G2.2.37. Randomly reselected system 014 Rod Position Indication as a replacement for Condensate.   |
| 2/2          | RO question #64<br>075 K2.01      | For K2.01 (knowledge of bus power supplies.), the importance rating for nearly all Tier 2 Group 2 systems is less than 2.5. Cannot write an operationally valid question or the current K/A and system combination. Randomly reselected 033 Spent Fuel Pool Cooling, A3.01 |

|     |   |  |
|-----|---|--|
| 3   | RO question #74<br>G2.4.32                  | Seabrook has no emergency procedure or plan for loss of all annunciators. They address this issue with a procedure for the loss of the power bus. The K/A doesn't lend itself to many discriminating questions of value. Randomly reselected 2.4.11. |
| 1/1 | SRO question #77<br>A2.07                   | Cannot write an operationally valid question for A2.07 in large break LOCA. Randomly reselected A2.08  |
| 1/1 | SRO question #80<br>G2.4.41                 | This generic K/A does not pair well with loss of offsite power. Cannot write a discriminating question. Randomly reselected G2.4.44  |
| 1/2 | SRO question #84<br>G2.4.3                  | This generic K/A discusses PAMS. There are no PAMS instrumentation outside of the control room. Randomly reselected G2.4.27  |
| 2/1 | SRO question #89<br>G2.4.9                  | This generic K/A does not pair well with containment spray. Cannot write a discriminating question. Randomly reselected G2.4.5   |
| 1/2 | RO question #23<br>A2.10                    | CR Evacuation has already been sampled for the SRO exam #84, so this topic is oversampled. Randomly reselected APE 32 Loss of Source Range Nuclear Instrumentation, A2.04  |
| 2/2 | RO question #60<br>A2.12                    | Cannot write a valid, discriminating question. Randomly reselected A2.17   |
| 2/1 | RO question #42<br>026 Containment<br>Spray | This topic is oversampled. Also, cannot write a discriminating question of sufficient difficulty. Randomly reselected 061 Auxiliary/Emergency Feedwater, K2.02   |
| 2/1 | RO question #29<br>K4.01                    | The topic of gas in the RCS is already being tested by question #30. This topic is oversampled. Randomly reselected K4.03  |
|     |   |  |