<table>
<tr><td colspan="17">Facility: Pilgrim NRC Exam Date of Exam: 01/21/11</td></tr>
<tr><td rowspan="2">Tier</td><td rowspan="2">Group</td><td colspan="12">RO K/A Category Points</td><td colspan="4">SRO-Only Points</td></tr>
<tr><td>K 1</td><td>K 2</td><td>K 3</td><td>K 4</td><td>K 5</td><td>K 6</td><td>A 1</td><td>A 2</td><td>A 3</td><td>A 4</td><td>G *</td><td>Total</td><td colspan="2">A2</td><td>G*</td><td>Total</td></tr>
<tr><td rowspan="3">1. Emergency & Plant Evaluations</td><td>1</td><td>4</td><td>3</td><td>4</td><td></td><td></td><td></td><td>3</td><td>3</td><td></td><td></td><td>3</td><td>20</td><td colspan="2">3</td><td>4</td><td>7</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td></td><td>1</td><td>2</td><td></td><td></td><td>1</td><td>7</td><td colspan="2">1</td><td>2</td><td>3</td></tr>
<tr><td>Tier Totals</td><td>5</td><td>4</td><td>5</td><td></td><td></td><td></td><td>4</td><td>5</td><td></td><td></td><td>4</td><td>27</td><td colspan="2">4</td><td>6</td><td>10</td></tr>
<tr><td rowspan="3">2. Plant Systems</td><td>1</td><td>2</td><td>2</td><td>4</td><td>2</td><td>1</td><td>3</td><td>3</td><td>2</td><td>3</td><td>2</td><td>2</td><td>26</td><td colspan="2">2</td><td>3</td><td>5</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1</td><td>2</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>12</td><td>0</td><td>2</td><td>1</td><td>3</td></tr>
<tr><td>Tier Totals</td><td>3</td><td>3</td><td>5</td><td>4</td><td>2</td><td>4</td><td>4</td><td>3</td><td>4</td><td>3</td><td>3</td><td>38</td><td colspan="2">4</td><td>4</td><td>8</td></tr>
<tr><td colspan="5" rowspan="2">3. Generic Knowledge & Abilities</td><td colspan="2">1</td><td colspan="2">2</td><td colspan="2">3</td><td colspan="2">4</td><td rowspan="2">10</td><td>1</td><td>2</td><td>3 | 4</td><td rowspan="2">7</td></tr>
<tr><td colspan="2">3</td><td colspan="2">2</td><td colspan="2">2</td><td colspan="2">3</td><td>1</td><td>2</td><td>2 | 2</td></tr>
</table>

Note

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the Tier Totals in each K/A category shall not be less than two).

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 associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to section D.1.b of ES-401, for guidance regarding 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 KAs 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/A's

8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) 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 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 10CFR55.43

Pilgrim Nuclear Power Station
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# |
|---|---|---|---|---|---|---|---|---|---|
| 295031 Reactor Low Water Level / 2 | | | | | X | | EA2.01 - Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Reactor water level | 4.6 | 76 |
| 295004 Partial or Total Loss of DC Pwr / 6 | | | | | X | | AA2.03 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Battery voltage | 2.9 | 77 |
| 295003 Partial or Complete Loss of AC / 6 | | | | | X | | AA2.04 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER: System lineups | 3.7 | 78 |
| 600000 Plant Fire On-site / 8 | | | | | | X | 2.4.41 - Emergency Procedures / Plan: Knowledge of the emergency action level thresholds and classifications. | 4.6 | 79 |
| 295026 Suppression Pool High Water Temp. / 5 | | | | | | X | 2.4.47 - Emergency Procedures / Plan: Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. | 4.2 | 80 |
| 295019 Partial or Total Loss of Inst. Air / 8 | | | | | | X | 2.4.4 - Emergency Procedures / Plan: Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. | 4.7 | 81 |

Pilgrim Nuclear Power Station
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# |
|---|---|---|---|---|---|---|---|---|---|
| 700000 Generator Voltage and Electric Grid Disturbances | | | | | | X | 2.4.30 - Emergency Procedures / Plan; Knowledge of events related to system operation / status that must be reported to internal organizations or external agencies, such as the state, the NRC, or the transmission system operator. | 4.1 | 82 |
| 295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1 | X | | | | | | EK1.03 - Knowledge of the operational implications of the following concepts as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Boron effects on reactor power (SBLC) | 4.2 | 39 |
| 295005 Main Turbine Generator Trip / 3 | X | | | | | | AK1.03 - Knowledge of the operational implications of the following concepts as they apply to MAIN TURBINE GENERATOR TRIP: Pressure effects on reactor level | 3.5 | 40 |
| 295018 Partial or Total Loss of CCW / 8 | X | | | | | | AK1.01 - Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Effects on component/system operations | 3.5 | 41 |
| 295006 SCRAM / 1 | | X | | | | | AK2.06 - Knowledge of the interrelations between SCRAM and the following: Reactor Power | 4.2 | 42 |
| 295016 Control Room Abandonment / 7 | | X | | | | | AK2.02 - Knowledge of the interrelations between CONTROL ROOM ABANDONMENT and the following: Local control stations: Plant-Specific | 4.0 | 43 |

Pilgrim Nuclear Power Station
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# |
|---|---|---|---|---|---|---|---|---|---|
| 295028 High Drywell Temperature / 5 | | X | | | | | EK2.02 - Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following: Components internal to the drywell | 3.2 | 44 |
| 700000 Generator Voltage and Electric Grid Disturbances | | | X | | | | AK3.02 - Knowledge of the reasons for the following responses as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Actions contained in abnormal operating procedure for voltage and grid disturbances. | 3.6 | 45 |
| 295026 Suppression Pool High Water Temp. / 5 | | | X | | | | EK3.05 - Knowledge of the reasons for the following responses as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Reactor SCRAM | 3.9 | 46 |
| 295024 High Drywell Pressure / 5 | | | X | | | | EK3.07 - Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE: Drywell venting | 3.5 | 47 |
| 295023 Refueling Accidents / 8 | | | | X | | | AA1.04 - Ability to operate and/or monitor the following as they apply to REFUELING ACCIDENTS: Radiation monitoring equipment. | 3.4 | 48 |
| 600000 Plant Fire On-site / 8 | | | | X | | | AA1.06 - Ability to operate and / or monitor the following as they apply to PLANT FIRE ON SITE: Fire alarm | 3.0 | 49 |
| 295003 Partial or Complete Loss of AC / 6 | | | | X | | | AA1.03 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : Systems necessary to assure safe plant shutdown | 4.4 | 50 |

Pilgrim Nuclear Power Station
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# |
|---|---|---|---|---|---|---|---|---|---|
| 295038 High Off-site Release Rate / 9 | | | | | X | | EA2.04 - Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE : Source of off-site release | 4.1 | 51 |
| 295019 Partial or Total Loss of Inst. Air / 8 | | | | | X | | AA2.02 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR : Status of safety-related instrument air system loads (see AK2.1 - AK2.19) | 3.6 | 52 |
| 295031 Reactor Low Water Level / 2 | | | | | X | | EA2.04 - Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Adequate core cooling | 4.6 | 53 |
| 295025 High Reactor Pressure / 3 | | | | | | X | 2.4.18 - Emergency Procedures / Plan: Knowledge of the specific bases for EOPs. | 3.3 | 54 |
| 295021 Loss of Shutdown Cooling / 4 | | | | | | X | 2.1.7 - Conduct of Operations: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. | 4.4 | 55 |
| 295004 Partial or Total Loss of DC Pwr / 6 | | | X | | | | AK3.03 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Reactor scram | 3.1 | 56 |
| 295030 Low Suppression Pool Water Level / 5 | X | | | | | | EK1.01 - Knowledge of the operational implications of the following concepts as they apply to LOW SUPPRESSION POOL WATER LEVEL: Steam condensation. | 3.8 | 57 |

# Pilgrim Nuclear Power Station
## 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# |
|---|---|---|---|---|---|---|---|---|---|
| 295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4 | | | | | | X | 2.2.37 – Equipment Control: Ability to determine operability and/or availability of safety related \| equipment. | 3.6 | 58 |
| K/A CategoryTotals | 4 | 3 | 4 | 3 | [illegible] | [illegible] | Group Point Total: | | 20/7 |

Pilgrim Nuclear Power Station
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# |
|---|---|---|---|---|---|---|---|---|---|
| 295032 High Secondary Containment Area Temperature / 5 | | | | | X | | EA2.02 - Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE : Equipment operability | 3.5 | 83 |
| 500000 High CTMT Hydrogen Conc. / 5 | | | | | | X | 2.4.6 – Emergency Procedures/Plan: Knowledge of EOP mitigation strategies | 4.7 | 84 |
| 295015 Incomplete SCRAM / 1 | | | | | | X | 2.4.18 - Emergency Procedures / Plan: Knowledge of the specific bases for EOPs. | 4.0 | 85 |
| 295029 High Suppression Pool Water Level / 5 | X | | | | | | EK1.01 - Knowledge of the operational implications of the following concepts as they apply to HIGH SUPPRESSION POOL WATER LEVEL : Containment integrity | 3.4 | 59 |
| 295032 High Secondary Containment Area Temperature / 5 | | X | | | | | EK2.01 - Knowledge of the interrelations between HIGH SECONDARY CONTAINMENT AREA TEMPERATURE and the following: Area/room coolers | 3.5 | 60 |
| 295015 Incomplete SCRAM / 1 | | | X | | | | AK3.01 - Knowledge of the reasons for the following responses as they apply to INCOMPLETE SCRAM : Bypassing rod insertion blocks | 3.4 | 61 |
| 295033 High Secondary Containment Area Radiation Levels / 9 | | | | X | | | EA1.08 - Ability to operate and/or monitor the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : Control Room ventilation | 3.6 | 62 |

# Pilgrim Nuclear Power Station
## 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# |
|---|---|---|---|---|---|---|---|---|---|
| 295013 High Suppression Pool Temperature / 5 | | | | | X | | AA2.01 Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE :Suppression pool temperature | 3.8 | 63 |
| 295009 Low Reactor Water Level / 2 | | | | | | X | 2.1.20 - Conduct of Operations: Ability to interpret and execute procedure steps. | 4.6 | 64 |
| 295022 Loss of CRD Pumps / 1 | | | | | X | | AA2.02 - Ability to determine and/or interpret the following as they apply to LOSS OF CRD PUMPS: CRD system status | 3.3 | 65 |
| K/A CategoryTotals | 1 | 1 | 1 | 1 | [illegible] | [illegible] | Group Point Total: | | 7/3 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 1

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 223002 PCIS/Nuclear Steam Supply Shutoff | | | | | | | | X | | | | A2.08 - 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: Surveillance testing | 3.1 | 86 |
| 215005 APRM / LPRM | | | | | | | | X | | | | A2.02 - Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Upscale or downscale trips | 3.7 | 87 |
| 203000 RHR/LPCI: Injection Mode | | | | | | | | | | | X | 2.2.42 - Equipment Control: Ability to recognize system parameters that are entry-level conditions for Technical Specifications. | 4.6 | 88 |
| 262002 UPS (AC/DC) | | | | | | | | | | | X | 2.1.20 - Conduct of Operations: Ability to interpret and execute procedure steps. | 4.6 | 89 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 1

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 259002 Reactor Water Level Control System | | | | | | | | | | | X | 2.1.19, Ability to use plant computers to evaluate system or component status. | 3.8 | 90 |
| 239002 SRVs | X | | | | | | | | | | | K1.03 - Knowledge of the physical connections and/or cause- effect relationships between RELIEF/SAFETY VALVES and the following: Nuclear boiler instrument system | 3.5 | 1 |
| 215003 IRM | X | | | | | | | | | | | K1.06 - Knowledge of the physical connections and/or cause- effect relationships between INTERMEDIATE RANGE MONITOR (IRM) SYSTEM and the following: APRM SCRAM signals: Plant-Specific | 3.9 | 2 |
| 215005 APRM / LPRM | | X | | | | | | | | | | K2.02 - Knowledge of electrical power supplies to the following: APRM channels | 2.6 | 3 |
| 215004 Source Range Monitor | | X | | | | | | | | | | K2.01 - Knowledge of electrical power supplies to the following: SRM channels/detectors | 2.6 | 4 |
| 206000 HPCI | | | X | | | | | | | | | K3.02 - Knowledge of the effect that a loss or malfunction of the HIGH PRESSURE COOLANT INJECTION SYSTEM will have on following: Reactor pressure control: BWR-2,3,4 | 3.8 | 5 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 1

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 6 |
| 217000 RCIC | | | | X | | | | | | | | K4.06 - Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following: Manual initiation | 3.5 | 7 |
| 300000 Instrument Air | | | | X | | | | | | | | K4.03 - Knowledge of (INSTRUMENT AIR SYSTEM) design feature(s) and or interlocks which provide for the following: Securing of IAS upon loss of cooling water | 2.8 | 8 |
| 211000 SLC | | | | | X | | | | | | | K5.06 - Knowledge of the operational implications of the following concepts as they apply to STANDBY LIQUID CONTROL SYSTEM: Tank level measurement | 3.0 | 9 |
| 263000 DC Electrical Distribution | | | X | | | | | | | | | K3.02 - Knowledge of the effect that a loss or malfunction of the D.C. ELECTRICAL DISTRIBUTION will have on the following: Components using DC control power (i.e. breakers) | 3.5 | 10 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 1

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 261000 SGTS | | | | | | X | | | | | | K6.08 - Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY GAS TREATMENT SYSTEM: Reactor vessel level: Plant-Specific | 3.1 | 11 |
| 223002 PCIS/Nuclear Steam Supply Shutoff | | | | | | X | | | | | | K6.08 - Knowledge of the effect that a loss or malfunction of the following will have on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF: Reactor protection system | 3.5 | 12 |
| 203000 RHR/LPCI: Injection Mode | | | | | | | X | | | | | A1.08 - Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) controls including: Emergency generator loading | 3.7 | 13 |
| 209001 LPCS | | | | | | | X | | | | | A1.04 - Ability to predict and/or monitor changes in parameters associated with operating the LOW PRESSURE CORE SPRAY SYSTEM controls including: Reactor pressure | 3.7 | 14 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 1

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 218000 ADS | | | | | | | | X | | | | A2.01 - Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Small steam line break L0CA | 4.1 | 15 |
| 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 | 16 |
| 262001 AC Electrical Distribution | | | | | | | | | X | | | A3.03 - Ability to monitor automatic operations of the A.C. ELECTRICAL DISTRIBUTION including: Load shedding | 3.4 | 17 |
| 264000 EDGs | | | | | | | | | X | | | A3.03 - Ability to monitor automatic operations of the EMERGENCY GENERATORS (DIESEL/JET) including: Indicating lights, meters, and recorders | 3.4 | 18 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 1

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 262002 UPS (AC/DC) | | | | | | | | | | X | | A4.01 - Ability to manually operate and/or monitor in the control room: Transfer from alternative source to preferred source | 2.8 | 19 |
| 259002 Reactor Water Level Control | | | | | | | | | | X | | A4.04 - Ability to manually operate and/or monitor in the control room: FWRV lockout reset controls | 3.7 | 20 |
| 212000 RPS | | | | | | | | | | | X | 2.4.31 - Emergency Procedures / Plan: Knowledge of annunciator alarms, indications, or response procedures. | 4.2 | 21 |
| 206000 HPCI | | | | | | | | | | | X | 2.2.40 - Equipment Control: Ability to apply technical specifications for a system. | 3.4 | 22 |
| 212000 RPS | | | | | | | X | | | | | A1.08 - Ability to predict and/or monitor changes in parameters associated with operating the REACTOR PROTECTION SYSTEM controls including: Valve position | 3.4 | 23 |
| 209001 LPCS | | | | | | | | | X | | | A3.02 - Ability to monitor automatic operations of the LOW PRESSURE CORE SPRAY SYSTEM including: Pump start | 3.8 | 24 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 1

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 218000 ADS | | | X | | | | | | | | | K3.01 - Knowledge of the effect that a loss or malfunction of the AUTOMATIC DEPRESSURIZATION SYSTEM will have on following: Restoration of reactor water level after a break that does not depressurize the reactor when required | 4.4 | 25 |
| 217000 RCIC | | | | | | X | | | | | | K6.01 - Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC): Electrical power | 3.4 | 26 |
| K/A Category Totals | 2 | 2 | 4 | 2 | 1 | 3 | 3 | [illegible] | 3 | 2 | 2/3 | Group Point Total: | | 26/5 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 2

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 214000 RPIS | | | | | | | | X | | | | A2.02 - Ability to (a) predict the impacts of the following on the ROD POSITION INFORMATION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Reactor SCRAM | 3.7 | 91 |
| 233000 Fuel Pool Cooling/Cleanup | | | | | | | | | | | 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. | 4.2 | 92 |
| 234000 Fuel Handling Equipment | | | | | | | | X | | | | A2.01 - Ability to (a) predict the impacts of the following on the FUEL HANDLING EQUIPMENT; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Interlock failure | 3.7 | 93 |
| 215002 RBM | X | | | | | | | | | | | K1.03 - Knowledge of the physical connections and/or cause- effect relationships between ROD BLOCK MONITOR SYSTEM and the following: Reactor manual control: BWR-3,4,5 | 3.2 | 27 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 2

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 202002 Recirculation Flow Control | | | | | | | | | X | | | A3.03, Ability to monitor automatic operations of the RECIRCULATION FLOW CONTROL SYSTEM including: Scoop tube operation: BWR-2,3,4 | 3.1 | 28 |
| 259001 Reactor Feedwater | | | X | | | | | | | | | K3.06 - Knowledge of the effect that a loss or malfunction of the REACTOR FEEDWATER SYSTEM will have on following: Core inlet subcooling | 3.1 | 29 |
| 216000 Nuclear Boiler Inst. | | | | X | | | | | | | | K4.09 - Knowledge of NUCLEAR BOILER INSTRUMENTATION design feature(s) and/or interlocks which provide for the following: Protection against filling the main steam lines from the feed system | 3.3 | 30 |
| 201006 RWM | | | | | X | | | | | | | K5.10 - Knowledge of ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following: Withdraw error: P-Spec(Not-BWR6) | 3.2 | 31 |
| 204000 RWCU | | | | | | X | | | | | | K6.08 - Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR WATER CLEANUP SYSTEM: PCIS/NSSSS | 3.5 | 32 |

Pilgrim Nuclear Power Station
Written Examination Outline
Plant Systems - Tier 2 Group 2

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 272000 Radiation Monitoring | | | | | | | X | | | | | A1.01 - Ability to predict and/or monitor changes in parameters associated with operating the RADIATION MONITORING SYSTEM controls including: Lights, alarms, and indications associated with normal operations | 3.2 | 33 |
| 288000 Plant Ventilation | | | | | | | | X | | | | A2.04 - Ability to (a) predict the impacts of the following on the PLANT VENTILATION SYSTEMS ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High radiation: Plant-Specific | 3.7 | 34 |
| 239001 Main and Reheat Steam | | X | | | | | | | | | | K2.01, Knowledge of electrical power supplies to the following: Main steam isolation valve solenoids | 3.2 | 35 |
| 245000 Main Turbine Gen. / Aux. | | | | | | | | | | X | | A4.02 - Ability to manually operate and/or monitor in the control room: Generator controls | 3.1 | 36 |
| 201001 CRD Hydraulic | | | | | | | | | | | X | 2.2.25 - Equipment Control: Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. | 3.2 | 37 |
| 290003 Control Room HVAC | | | | X | | | | | | | | K4.01 - Knowledge of CONTROL ROOM HVAC design feature(s) and/or interlocks which provide for the following: System initiations/reconfiguration : Plant-Specific | 3.1 | 38 |

# Pilgrim Nuclear Power Station
## Written Examination Outline
## Plant Systems - Tier 2 Group 2

| System #/Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | Imp. | Q# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| K/A Category Totals | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1/2 | 1 | 1 | 1/1 | Group Point Total: | | 12/3 |

| Facility: Pilgrim 7 | | Date: | | | | |
|---|---|---|---|---|---|---|
| Category | KA # | Topic | RO | | SRO-Only | |
| | | | IR | Q# | IR | Q# |
| 1. Conduct of Operations | 2.1.2 | Knowledge of operator responsibilities during all modes of plant operation. | 4.1 | 66 | | |
| | 2.1.3 | Knowledge of shift or short-term relief turnover practices. | 3.7 | 67 | | |
| | 2.1.28 | Knowledge of the purpose and function of major system components and controls. | 4.1 | 70 | | |
| | | | | | | |
| | 2.1.23 | Ability to perform specific system and integrated plant procedures during all modes of plant operation. | | | 4.4 | 94 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | Subtotal | | | 3 | | 1 |
| 2. Equipment Control | 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. | 4.2 | 68 | | |
| | 2.2.12 | Knowledge of surveillance procedures. | 3.7 | 69 | | |
| | | | | | | |
| | | | | | | |
| | 2.2.19 | Knowledge of maintenance work order requirements. | | | 3.4 | 95 |
| | 2.2.1 | Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity. | | | 4.4 | 99 |
| | | | | | | |
| | | | | | | |
| | Subtotal | | | 2 | | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. Radiation Control | 2.3.11 | Ability to control radiation releases. | 3.8 | 71 | | |
| | 2.3.12 | Knowledge of Radiological Safety Principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. | 3.2 | 74 | | |
| | | | | | | |
| | 2.3.6 | Ability to approve release permits. | | | 3.8 | 96 |
| | 2.3.5 | Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. | | | 2.9 | 98 |
| | | | | | | |
| | | | | | | |
| | Subtotal | | | 2 | | 2 |
| 4. Emergency Procedures / Plan | 2.4.1 | Knowledge of EOP entry conditions and immediate action steps. | 4.6 | 72 | | |
| | 2.4.29 | Knowledge of the emergency plan. | 3.1 | 73 | | |
| | 2.4.49 | Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. | 4.6 | 75 | | |
| | | | | | | |
| | 2.4.11 | Knowledge of abnormal condition procedures. | | | 4.2 | 97 |
| | 2.4.49 | Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. | | | 4.4 | 100 |
| | | | | | | |
| | | | | | | |
| | Subtotal | | | 3 | | 2 |
| Tier 3 Point Total: | | | | 10 | | 7 |

| Tier / Group | Randomly Selected KA | Reason for Rejection |
|---|---|---|
| 1 / 1 | 295031 / EA2.03 replaced by 295031 / EA2.01 | SRO (#76) - Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Reactor pressure. Originally proposed K/A would present a double jeopardy situation for an SRO with RO question #53 (same K/A).<br><br>Randomly selected EA2.01, Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Reactor water level |
| 1 / 1 | 295006 / AK2.02 replaced by 295006 / AK2.06 | (RO #42) - AK2.02 - Knowledge of the interrelations between SCRAM and the following: Reactor water level control system. Similar concept to #40<br><br>Randomly selected AK2.06 – Reactor power |
| 1 / 1 | 295016 / AK2.03 replaced by 295016 / AK2.02 | RO (#43) - Knowledge of the interrelations between CONTROL ROOM ABANDONMENT and the following: Control room HVAC. There are currently six HVAC questions on the NRC written, this one is difficult to find a procedural reference for writing a question.<br><br>Randomly selected AK2.02, Knowledge of the interrelations between CONTROL ROOM ABANDONMENT and the following: Local control stations: Plant-Specific |
| 1 / 1 | 295026 / EK3.03 replaced by 295026 / EK3.05 | RO (#46) - Knowledge of the reasons for the following responses as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Suppression pool spray: Plant-Specific. Pilgrim's mitigation strategy for high suppression pool temperature does not use suppression chamber spray nor is it impacted by suppression chamber sprays.<br><br>Randomly selected EK3.05, Knowledge of the reasons for the following responses as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Reactor SCRAM |
| 1 / 1 | 295023 / AA1.05 replaced by 295023 / AA1.04 | RO (#48) - Ability to operate and/or monitor the following as they apply to REFUELING ACCIDENTS: Fuel transfer system: Plant-Specific. Pilgrim design does not include a Fuel Transfer System.<br><br>Randomly selected AA1.04, Ability to operate and/or monitor the following as they apply to REFUELING ACCIDENTS: Radiation monitoring equipment. |
| 1 / 1 | 600000 / AA1.01 replaced by 600000 / AA1.06 | RO (#49) - Ability to operate and / or monitor the following as they apply to PLANT FIRE ON SITE: Respirator air pack. At Pilgrim, the ability to operate or monitor an air pack would not discriminate as this ability is first obtained as a non licensed operator.<br><br>Randomly selected AA1.06, Ability to operate and / or monitor the following as they apply to PLANT FIRE ON SITE: Fire alarm |

| | | |
|---|---|---|
| 1 / 1 | 295004 / 2.2.36 replaced by 295004 / AK3.03 | (RO #56) - Equipment Control: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. Assessing maintenance activities is an SRO function at Pilgrim.<br><br>Randomly selected AK3.03 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Reactor scram |
| 1 / 1 | 295001 / 2.1.31 replaced by 295001 /2.2.37 | (RO #58) - Conduct of Operations: Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. This is being tested in the operating test portion of the exam.<br><br>Randomly selected 2.2.37 – Equipment Control: Ability to determine operability and/or availability of safety related equipment. |
| 1 / 2 | 295033 / EA1.07 replaced by 295033 / EA1.08 | (RO #62) - EA1.07 - Ability to operate and/or monitor the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : Personnel dosimetry. GET level topic, not discriminatory for a license exam.<br><br>Randomly selected EA1.08 – Control Room ventilation |
| 1 / 2 | 295034 / EA2.02 replaced by 295013 / AA2.01 | (RO #63) - EA2.02 - Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION: Cause of high radiation levels. Similar in concept to #51 and randomly resampled #62. Also #34 was similar<br><br>Randomly selected 295013 AA2.01- Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE :Suppression pool temperature |
| 1 / 2 | 500000 / 2.4.8 replaced by 500000 / 2.4.6 | (SRO #84) - 2.4.8 - Emergency Procedures / Plan: Knowledge of how abnormal operating procedures are used in conjunction with EOP's. There are no abnormal procedures for this EAPE at Pilgrim<br><br>Randomly selected 2.4.6 – Emergency Procedures/Plan: Knowledge of EOP mitigation strategies |
| 2 / 1 | 215005 / A2.01 replaced by 215005 / A2.02 | SRO (#87) - Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions Power supply degraded. Originally proposed K/A would present a double jeopardy situation for an SRO with RO question #3 (same system, same topic).<br><br>Randomly selected A2.01, Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Upscale or downscale trips |

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|---|---|---|
| 2 / 1 | 261000 / 2.1.27 replaced by 259002 / 2.1.19 | SRO (#90) 2.1.27 - Conduct of Operations: Knowledge of system purpose and / or function. Difficult to write an operationally valid SRO question on the purpose and/or function of SGTS.<br><br>Randomly replaced with 259002, Reactor Water Level Control System, 2.1.19, Ability to use plant computers to evaluate system or component status. |
| 2 / 1 | 263000 / K5.01 replaced by 263000 / | RO (#10) K5.01 - Knowledge of the operational implications of the following concepts as they apply to D.C. ELECTRICAL DISTRIBUTION: Hydrogen generation during battery charging. Could not find a suitable reference for this topic.<br><br>Randomly replaced with K3.02, Knowledge of the effect that a loss or malfunction of the D.C. ELECTRICAL DISTRIBUTION will have on the following: Components using DC control power (i.e. breakers) |
| 2 / 1 | 259002 / A4.10 replaced by 259002 / A4.04 | RO (#20) - Ability to manually operate and/or monitor in the control room: Setpoint setdown reset controls: Plant-Specific. Pilgrim's Reactor Water Level Control System does not include a Setpoint Setdown feature.<br><br>Randomly selected A4.04, Ability to manually operate and/or monitor in the control room: FWRV lockup reset controls |
| 2 / 2 | 290003 / A2.02 replaced by 234000 / A2.01 | SRO (#93) A2.02 - Ability to (a) predict the impacts of the following on the CONTROL ROOM HVAC; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Extreme environmental conditions. There are two tier 2, group 2 questions on CONTROL ROOM HVAC, (93 and 38, and another plant ventilation question #34). Procedure No. 2.1.42, OPERATION DURING SEVERE WEATHER has very little on ventilation during severe weather. Deleting this K/A for better coverage and a more appropriate SRO question.<br><br>Randomly replaced with A2.01 - Ability to (a) predict the impacts of the following on the FUEL HANDLING EQUIPMENT; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Interlock failure. |
| 2 / 2 | 215002 / K1.04 replaced by 215002 / K1.03 | RO (#27) - Knowledge of the physical connections and/or cause-effect relationships between ROD BLOCK MONITOR SYSTEM and the following: Recirculation system: BWR-3,4,5. Following system modification there is no longer a cause - effect relationship between the ROD BLOCK MONITOR SYSTEM and the Recirculation system.<br><br>Randomly selected K1.03, Knowledge of the physical connections and/or cause- effect relationships between ROD BLOCK MONITOR SYSTEM and the following: Reactor manual control: BWR-3,4,5 |

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|---|---|---|
| 2 / 2 | 202002 / K2.02 replaced by 202002 / A3.03 | RO (#28) - Knowledge of electrical power supplies to the following: Hydraulic power unit: Plant-Specific. Pilgrim does not utilize hydraulic power units as part of its Recirc Flow Control System.<br><br>Randomly selected A3.03, Ability to monitor automatic operations of the RECIRCULATION FLOW CONTROL SYSTEM including: Scoop tube operation: BWR-2,3,4 |
| 2 / 2 | 239001 / A3.02 replaced by 239001 / K2.01 | RO (#35) - Ability to monitor automatic operations of the MAIN AND REHEAT STEAM SYSTEM including: Opening and closing of drain valves as turbine load changes: Plant-Specific. Drain Valves associated with Pilgrim's Main Steam System do not automatically respond to changes in Turbine Load.<br><br>Randomly selected K2.01, Knowledge of electrical power supplies to the following: Main steam isolation valve solenoids |
| Tier 3 | G1 / 2.1.6 replaced by 2.1.3 | RO (# 67) - Ability to manage the control room crew during plant transients. This is an SRO function at Pilgrim.<br><br>Randomly selected 2.1.3 - Knowledge of shift or short-term relief turnover practices. |
| Tier 3 | G2.3.7 replaced by 2.1.28 | RO (#70) - Ability to comply with radiation work permit requirements during normal or abnormal conditions. This is being tested on the admin JPM portion of the exam.<br><br>Randomly selected 2.1.28 - Knowledge of the purpose and function of major system components and controls. |
| Tier 3 | G2.4.2 replaced by 2.4.49 | RO (#75) - Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. Same concept as #72.<br><br>Randomly selected 2.4.49 - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. |
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|---|---|---|---|
| Facility: PNPS NRC | | Date of Examination: | 1/2011 |
| Examination Level (circle one): | **RO** / SRO | Operating Test Number: | |

| Administrative Topic (see Note) | Type Code* | Describe activity to be performed |
|---|---|---|
| Conduct of Operations 1 | N | Obtain and Evaluate Plant Cooldown Parameters following a Scram<br><br>The candidate will obtain required plant cooldown data and evaluate against requirements IAW PNPS 2.1.7 – OPER-07<br><br>K/A: 2.1.25 (3.9)<br>Ability to interpret reference materials, such as graphs, curves, tables, etc. |
| Conduct of Operations 2 | N | Verification of License Requirements<br><br>Given information related to maintenance of active license status for three operators, the candidate will determine which operator(s), if any, is(are) qualified to relieve the watch.<br><br>(the candidate will be given the status of 3 operators in regard to last medical exam, hours worked in last quarter, SCBA fit test latest date etc. AND given the procedure that describes the requirements, determine if anyone meets eligibility requirements)<br><br>K/A: 2.1.4 (3.3)<br>Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc. |
| Equipment Control – | N | Identify the isolations required to tagout "E" RBCCW pump for the shaft seal replacement.<br><br>The candidate will determine blocking points, tag types, and component position for a tagout on the "E" RBCCW pump.<br><br>K/A: 2.2.13 (4.1)<br>Knowledge of tagging and clearance procedures |

| | | |
|---|---|---|
| Radiation Control – | M | Determine personnel available to perform a High Rad Task<br><br>Given a list of operators, their dose history and task conditions, determine who is available to perform a task in a high rad area and the expected total dose for those performing the work.<br><br>K/A 2.3.4 (3.2)<br>Knowledge of radiation exposure limits under normal or emergency conditions. |
| Emergency Plan | N/A | |

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

*Type Codes & Criteria:

(C)ontrol room
(D)irect from bank (≤ 3 for ROs; ≤ for SROs & RO retakes)
(N)ew or (M)odified from bank (> 1)
(P)revious 2 exams (≤ 1; randomly selected)
(S)imulator

| | | | |
|---|---|---|---|
| Facility: PNPS NRC | | Date of Examination: | 1/2011 |
| Examination Level (circle one): | RO / **SRO** | Operating Test Number: | |

| Administrative Topic (see Note) | Type Code* | Describe activity to be performed |
|---|---|---|
| Conduct of Operations | P | Perform & Review a Short Form Heat Balance Comparison<br><br>The candidate will perform a short form heat balance and determine any appropriate actions IAW PNPS 2.1.10<br><br>K/A: 2.1.7 (4.4)<br>Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior and instrument interpretation |
| Conduct of Operations | N | Review a portion of the Control Room Daily Logs<br><br>The candidate will review a completed portion of the control room logs and identify OOS items and TS implications<br><br>K/A: 2.1.18 (3.8)<br>Ability to make accurate, clear, and concise logs, records, status boards, and reports. |
| Equipment Control | N | Analyze a Solomon case from 3D Monicore and determine the appropriate action.<br><br>Following a dual Recirculation Pump runback the candidate will review a Solomon Case and determines that the Hot Channel Decay Ratio is unsat, then determine power must be lowered using the RPR array instruction sheet.<br><br>K/A: 2.2.38 (4.5)<br>Knowledge of conditions and limitations in the facility license. |

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|---|---|---|
| Radiation Control | D | Determine the actions required when both channels of the Reactor Building Effluent Monitoring System become inoperable the ODCM<br><br>With Reactor Building Effluent Monitoring System "A" RM-1705-32A out of service the control room will must determine the ODCM requirements when the "B" monitor becomes inoperable. This includes that grab samples are taken, that auxiliary sampling equipment is operable and flow rates are estimated.<br><br>K/A: 2.3.11 (4.3)<br>Ability to control radiation releases. |
| Emergency Plan | N | Emergency Classification<br><br>The candidate will classify the event following performance in Scenario #1 OR #2<br><br>K/A: 2.4.29 (4.4)<br>Knowledge of the emergency plan |

NOTE: All items (5 total are required for SROs). RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

*Type Codes & Criteria:

(C)ontrol room
(D)irect from bank (≤ 3 for ROs; ≤ for SROs & RO retakes)
(N)ew or (M)odified from bank (> 1)
(P)revious 2 exams (≤ 1; randomly selected)
(S)imulator

| Facility: | PILGRIM | NRC | Date of Examination: | 1 / 2011 |
|---|---|---|---|---|
| Exam Level (circle one): | RO / SRO(I) / SRO (U) | | Operating Test No: | 1 |

Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)

| | System / JPM Title | Type Code* | Safety Function |
|---|---|---|---|
| S-2 | <u>HPCI Swap-Over from Pressure Control to Injection</u><br><br>HPCI is operating in pressure control mode and must be swapped to injection mode. When HPCI is placed in injection mode and the candidate attempts to raise injection flow the HPCI Flow Controller FIC-2340-1 fails high, the operator must place the controller in manual to raise flow.<br><br>PNPS 2.2.21.5, Attachments 1 and 2<br>K/A 206000 A4.02 4.0/3.8 | M, L, A, EN, S | 2<br>Reactor Water Inventory Control |
| S-7 | <u>Reset Control Room Instrumentation and RPS Following Manual Transfer of RPS "A" to the Alternate power Supply.</u><br><br>The operator is required to coordinate the transfer of RPS "A" to its alternate power supply. Following the transfer RPS will not reset due to APRM "C" failing upscale when re-energized. The operator will be required to diagnose the failure, bypass the APRM and continue on with resetting the RPS and other control room instrumentation affected by the transfer.<br><br>K/A 212000 A4.14 3.8/3.8 | N, A, EN, S | 7<br>Instrumentation |
| S-8 | <u>Isolate a Condenser Waterbox during Chloride intrusion</u><br><br>The operator will isolate Water Box 1-3 due to chloride intrusion IAW PNPS 2.4.33 Att.3.<br><br>K/A 256000 A2.15, 2.8/3.1 | D, S | 8<br>Plant Service Systems |
| | | | |

| In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U) | | | |
|---|---|---|---|
| P-1 | Depressurize Scram Volume Pressure Header<br><br>With the reactor having received a reactor SCRAM all rods did not insert due to an electrical malfunction in the RPS circuit. The control room has given the order to depressurize the SPVAH in the field per 5.3.23. (preferred method will not work due to stuck valve.)<br><br>K/A 295037 2.1.30 4.4/4.0 | D, E, A, R | 1 Reactivity Control |
| P-3 | Lineup Alternate Power to RHR Valves<br><br>During a refueling outage with shutdown cooling in service a loss of 480 Volt bus B20 has occurred, resulting in a loss of power to selected RHR valves. The operator will align alternate power to those RHR valves fed from B20 and which have failed as is.)<br><br>K/A 295003 AA1.01 3.7.3.8 | D, L, R | 6 Electrical |
| | | | |

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

| * Type Codes | Criteria for RO / SRO-I / SRO-U |
|---|---|
| (A)lternate path | 4-6 / 4-6 / 2-3 |
| (C)ontrol room | |
| (D)irect from bank | ≤ 9 / ≤ 8 / ≤ 4 |
| (E)mergency or abnormal in-plant | ≥ 1 / ≥ 1 / ≥ 1 |
| (EN)gineering Safeguards Feature | - / - / ≥ 1 (control room) |
| (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 | |

| | | | |
|---|---|---|---|
| Mark10 Facility: | PILGRIM | NRC | Date of Examination: 1 / 2011 |
| Exam Level (circle one): | RO / SRO(I) / SRO (U) | | Operating Test No: 1 |

Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)

| | System / JPM Title | Type Code* | Safety Function |
|---|---|---|---|
| S-1 | Control Rod Exercising IAW 8.3.2<br>The reactor is at power. The weekly control rod exercising in accordance with procedure 8.3.2 is required. When a coupling check is performed on a rod being withdrawn, the rod will go into an overtravel condition. The operator is expected to recouple the rod per off-normal procedure 2.4.11. The JPM will end when the rod is recoupled.<br>PNPS 8.3.2, 2.4.11<br>K/A 201002 A3.03 3.2/3.2 | M, A, S | 1<br>Reactivity Control |
| S-2 | HPCI Swap-Over from Pressure Control to Injection<br>HPCI is operating in pressure control mode and must be swapped to injection mode. When HPCI is placed in injection mode and the candidate attempts to raise injection flow the HPCI Flow Controller FIC-2340-1 fails high, the operator must place the controller in manual to raise flow.<br>PNPS 2.2.21.5, Attachments 1 and 2<br>K/A 206000 A4.02 4.0/3.8 | M, L, A, EN, S | 2<br>Reactor Water Inventory Control |
| S-3 | Re-Open MSIV's Following Closure<br>The operator is required to reopen the outboard and inboard "D" MSIVs following MSIV closure IAW PNPS 2.2.92.<br>K/A 239001 A2.03 4.0/4.2 | D, L, S | 3<br>Reactor Pressure Control |

| | | | |
|---|---|---|---|
| S-5 | <u>Manually Start SBGT and Vent the Torus</u><br><br>The operator will align standby gas to vent the torus. After establishing the lineup, a reactor coolant pressure boundary leak develops in the drywell. The operator will secure the standby gas vent alignment IAW Section 7.10 of 2.2.70.<br><br>K/A 261000 A4.09 2.7/2.7 | D, A, S | 9<br>Radioactivity Release |
| S-6 | <u>Bypass Diesel Generator Load Shed for placing a CRD Pump in Service</u><br><br>A Reactor Scram has occurred due to a loss of offsite power and a small leak in containment has led to diesel load shed. A Reactor low level condition requires placing two CRD pumps in emergency makeup. The candidate must assess Emergency Diesel Generator loading and then defeat the CRD Load shed logic.<br><br>K/A 264000 K4.05 3.2/3.5 | D, EN, S | 6<br>Electrical |
| S-7 | <u>Reset Control Room Instrumentation and RPS Following Manual Transfer of RPS "A" to the Alternate power Supply.</u><br><br>The operator is required to coordinate the transfer of RPS "A" to its alternate power supply. Following the transfer RPS will not reset due to APRM "C" failing upscale when re-energized. The operator will be required to diagnose the failure, bypass the APRM and continue on with resetting the RPS and other control room instrumentation affected by the transfer.<br><br>K/A 212000 A4.14 3.8/3.8 | N, A, EN, S | 7<br>Instrumentation |
| S-8 | <u>Isolate a Condenser Waterbox during Chloride intrusion</u><br><br>The operator will isolate Water Box 1-3 due to chloride intrusion IAW PNPS 2.4.33 Att.3.<br><br>K/A 256000 A2.15, 2.8/3.1 | D, S | 8<br>Plant Service Systems |
| | | | |

| In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U) | | | |
|---|---|---|---|
| P-1 | <u>Depressurize Scram Volume Pressure Header</u><br><br>With the reactor having received a reactor SCRAM all rods did not insert due to an electrical malfunction in the RPS circuit. The control room has given the order to depressurize the SPVAH in the field per 5.3.23. (preferred method will not work due to stuck valve.)<br><br>K/A 295037 2.1.30 4.4/4.0 | D, E, A, R | 1<br>Reactivity Control |
| P-2 | <u>Install Backup N2 for Extended SRV Operation</u><br><br>Following a seismic event with a subsequent loss of N2/air supply to the drywell, the Emergency Director requires backup N2 supplied to 'B' and 'C' SRVs for continued reactor pressure control.<br><br>K/A 218000 A2.03 3.4/3.6 | D, L, R | 3<br>Reactor Pressure Control |
| P-3 | <u>Lineup Alternate Power to RHR Valves</u><br><br>During a refueling outage with shutdown cooling in service a loss of 480 Volt bus B20 has occurred, resulting in a loss of power to selected RHR valves. The operator will align alternate power to those RHR valves fed from B20 and which have failed as is.)<br><br>K/A 295003 AA1.01 3.7.3.8 | D, L, R | 6<br>Electrical |
| | | | |

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

| * Type Codes | Criteria for RO / SRO-I / SRO-U |
|---|---|
| (A)lternate path | 4-6 / 4-6 / 2-3 |
| (C)ontrol room | |
| (D)irect from bank | ≤ 9 / ≤ 8 / ≤ 4 |
| (E)mergency or abnormal in-plant | ≥ 1 / ≥ 1 / ≥ 1 |
| (EN)gineering Safeguards Feature | - / - / ≥ 1 (control room) |
| (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: | PILGRIM NRC | Date of Examination: | 1 / 2011 |
|---|---|---|---|
| Exam Level (circle one): | RO / SRO(I) / SRO (U) | Operating Test No: | 1 |

Control Room Systems@ (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)

| | System / JPM Title | Type Code* | Safety Function |
|---|---|---|---|
| S-1 | Control Rod Exercising IAW 8.3.2<br><br>The reactor is at power. The weekly control rod exercising in accordance with procedure 8.3.2 is required. When a coupling check is performed on a rod being withdrawn, the rod will go into an overtravel condition. The operator is expected to recouple the rod per off-normal procedure 2.4.11. The JPM will end when the rod is recoupled.<br><br>PNPS 8.3.2, 2.4.11<br>K/A 201002 A3.03 3.2/3.2 | M, A, S | 1<br>Reactivity Control |
| S-2 | HPCI Swap-Over from Pressure Control to Injection<br><br>HPCI is operating in pressure control mode and must be swapped to injection mode. When HPCI is placed in injection mode and the candidate attempts to raise injection flow the HPCI Flow Controller FIC-2340-1 fails high, the operator must place the controller in manual to raise flow.<br><br>PNPS 2.2.21.5, Attachments 1 and 2<br>K/A 206000 A4.02 4.0/3.8 | M, L, A, EN, S | 2<br>Reactor Water Inventory Control |
| S-3 | Re-Open MSIV's Following Closure<br><br>The operator is required to reopen the outboard and inboard "D" MSIVs following MSIV closure IAW PNPS 2.2.92.<br><br>K/A 239001 A2.03 4.0/4.2 | D, L, S | 3<br>Reactor Pressure Control |
| S-4 | Synchronize Main TG to Grid<br><br>A plant startup is progress. The Turbine Generator is ready to be synchronized to the grid. The TG will be synched to the grid, the Turbine Bypass Valves closed.<br><br>K/A 245000 A4.09 3.1/2.9 | D, S | 4<br>Heat Removal From the Core |

| | | | |
|---|---|---|---|
| S-5 | Manually Start SBGT and Vent the Torus<br><br>The operator will align standby gas to vent the torus. After establishing the lineup, a reactor coolant pressure boundary leak develops in the drywell. The operator will secure the standby gas vent alignment IAW Section 7.10 of 2.2.70.<br><br>K/A 261000 A4.09 2.7/2.7 | D, A, S | 9<br>Radioactivity Release |
| S-6 | Bypass Diesel Generator Load Shed for placing a CRD Pump in Service<br><br>A Reactor Scram has occurred due to a loss of offsite power and a small leak in containment has led to diesel load shed. A Reactor low level condition requires placing two CRD pumps in emergency makeup. The candidate must assess Emergency Diesel Generator loading and then defeat the CRD Load shed logic.<br><br>K/A 264000 K4.05 3.2/3.5 | D, EN, S | 6<br>Electrical |
| S-7 | Reset Control Room Instrumentation and RPS Following Manual Transfer of RPS "A" to the Alternate power Supply.<br><br>The operator is required to coordinate the transfer of RPS "A" to its alternate power supply. Following the transfer RPS will not reset due to APRM "C" failing upscale when re-energized. The operator will be required to diagnose the failure, bypass the APRM and continue on with resetting the RPS and other control room instrumentation affected by the transfer.<br><br>K/A 212000 A4.14 3.8/3.8 | N, A, EN, S | 7<br>Instrumentation |
| S-8 | Isolate a Condenser Waterbox during Chloride intrusion<br><br>The operator will isolate Water Box 1-3 due to chloride intrusion IAW PNPS 2.4.33 Att.3.<br><br>K/A 256000 A2.15, 2.8/3.1 | D, S | 8<br>Plant Service Systems |
| | | | |

| In-Plant Systems@ (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U) | | | |
|---|---|---|---|
| P-1 | Depressurize Scram Volume Pressure Header<br><br>With the reactor having received a reactor SCRAM all rods did not insert due to an electrical malfunction in the RPS circuit. The control room has given the order to depressurize the SPVAH in the field per 5.3.23. (preferred method will not work due to stuck valve.)<br><br>K/A 295037 2.1.30 4.4/4.0 | D, E, A, R | 1<br>Reactivity Control |
| P-2 | Install Backup N2 for Extended SRV Operation<br><br>Following a seismic event with a subsequent loss of N2/air supply to the drywell, the Emergency Director requires backup N2 supplied to 'B' and 'C' SRVs for continued reactor pressure control.<br><br>K/A 218000 A2.03 3.4/3.6 | D, L, R | 3<br>Reactor Pressure Control |
| P-3 | Lineup Alternate Power to RHR Valves<br><br>During a refueling outage with shutdown cooling in service a loss of 480 Volt bus B20 has occurred, resulting in a loss of power to selected RHR valves. The operator will align alternate power to those RHR valves fed from B20 and which have failed as is.)<br><br>K/A 295003 AA1.01 3.7.3.8 | D, L, R | 6<br>Electrical |
| | | | |

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

| * Type Codes | Criteria for RO / SRO-I / SRO-U |
|---|---|
| (A)lternate path | 4-6 / 4-6 / 2-3 |
| (C)ontrol room | |
| (D)irect from bank | ≤ 9 / ≤ 8 / ≤ 4 |
| (E)mergency or abnormal in-plant | ≥ 1 / ≥ 1 / ≥ 1 |
| (EN)gineering Safeguards Feature | - / - / ≥ 1 (control room) |
| (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: | PILGRIM | Scenario No.: | 2 | Op Test No.: | 2011 NRC |
| Examiners: | | Operators: | SRO - | | |
| | | | RO - | | |
| | | | BOP - | | |

Initial Conditions:

- Reactor Power: 90%
- Plant Status: Reactor power was reduced to 90% last shift for rod pattern adjustments.
- Core flow is 49 Mlbm/hr
- Current Rod Position: Sequence A1, Step 87, rod 18-43
- RHR Loop "A" was placed in torus cooling mode to support a HPCI surveillance last shift.
- Equipment Out of Service: "A" APRM has a faulty power supply and is OOS and bypassed. Tracking LCO initiated. All other APRMs are operable.
- "D" RBCCW pump is OOS. All other RBCCW pumps are operable. Tracking LCO initiated.

Turnover:

- Secure torus cooling and restore power to 100% IAW PNPS 2.1.14, Station Power Changes.

Critical Tasks:

1. During failure to scram conditions terminate and prevent injection from all sources (except CRD, RCIC, and SBLC) and lower level to prevent oscillations.
2. Inject SBLC before torus water temperature exceeds the BIIT or in response to core oscillations.
3. During failure to scram conditions, insert control rods using one or more methods contained within 5.3.23 and / or EOP-02 to achieve Rx. Shutdown under all conditions

| Event No. | Malf. No. | Event Type* | Event Description |
|---|---|---|---|
| 1. | N/A | N-BOP<br>N-BOP | Secure Torus Cooling |
| 2. | RD08 | TS-SRO | A control rod accumulator Trouble alarm is received. Local efforts to recharge the accumulator are ineffective. The SRO is expected to declare the accumulator inoperable and determine that the associated Control Rod should be declared "slow" or inoperable within 8 hours. TS 3.3.D.A.1 |
| 3. | CW06 | C-BOP<br>C-SRO<br>TS-SRO | "F" RBCCW pump trip. Loop "B" RBCCW becomes inoperable. TS 3.5.B.3 |
| 4. | RR13 &<br>RR14. | C-All | "B" Recirc Seal Failures (Both). Requires tripping and isolation of pump per PNPS 2.4.22 and 2.4.17 |

| | | | |
|---|---|---|---|
| 5. | N/A | R-RO<br>R-SRO | Inserts control rods to exit the Unanalyzed and Exclusion Regions of the Power/Flow Map following the tripping of "B" Recirc Pump - PNPS 2.1.14 Section 7.9 |
| 6. | RR07 | C-RO<br>C-SRO | Second Recirc Pump Trip – Manual Reactor Scram Required. |
| 7. | RR27 and RD29 at 99% | M – All | ATWS requiring SBLC. RPV injection will be terminated and prevented and RPV level lowered to below the feedwater spargers. |
| 8. | TC09 | C-BOP<br>C-SRO | All turbine bypass valves fail closed. BOP is required to take manual control of pressure with SRVs |
| 9. | LP01 | C-RO<br>C-SRO | Standby Liquid Control pump fails to start. RO must recognize failure and start other system. |
| * (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor | | | |

**Pilgrim 2011 NRC Scenario #2**

The plant is operating at 90% power following a rod pattern adjustment the previous shift. Torus cooling is in service following a HPCI surveillance also conducted last shift. Equipment out of service consists of APRM "A" and RBCCW Pump "D". Tracking LCOs have been initiated for both components. Directions to the shift are to secure Torus Cooling and then restore power to 100%.

After assuming the watch, the BOP operator will secure Torus Cooling and return RHR to a normal standby lineup IAW PNPS 2.2.19, RHR. After Torus Cooling is secured, an Accumulator Trouble Alarm will be received on a withdrawn control rod. The field operator will report that the accumulator cannot be recharged above 800 psig. The SRO is expected to declare the Accumulator inoperable and determine that the associated Rod is to be declared "slow" (or inoperable) within 8 hours IAW TS 3.3.D.A.1.

Next the "F" RBCCW pump will trip and the standby RBCCW pump will fail to auto start but can be started manually. All RBCCW flow will be lost in the "B" RBCCW loop until the BOP starts the one remaining pump. The loss of "F" RBCCW in conjunction with the inoperable "D" RBCCW will render the "B" loop inoperable and a 7 day LCO should be declared IAW Technical Specification 3.5.B.3.

The brief disruption in cooling flow to the "B" Recirc Pump seal cooler will result in a failure of the inboard seal followed by a subsequent failure of the outboard seal. Drywell pressure and temperature will begin to rise. The BOP operator is expected to trip and isolate the pump IAW PNPS 2.4.22, Recirc Pump Seal Failure. The crew is also expected to execute PNPS 2.4.17, Recirc Pump Trip following the manual pump trip.

The reduction in core flow will result in the plant entering the Unanalyzed Region of the power to flow map. The RO is expected to insert steps of the RPR array to reduce power to exit both the Unanalyzed and Exclusion Regions.

After the crew has stabilized the plant in single loop, the "A" Recirc Pump will trip placing the plant on natural circulation. The RO is expected to insert a manual scram IAW the immediate actions of PNPS 2.4.17, Recirc Pump Trip. Due to a hydraulic lock most of the control rods will fail to insert. The crew is expected to enter EOP02, Failure to Scram in response to the event. Due to the high power, low flow condition, core-wide oscillations will occur. Expected EOP actions include injecting Standby Liquid (**Critical Task**), terminating injection and lowering level in order to mitigate core oscillations (**Critical Task**), and defeating the MSIV low level isolation. The RO is expected to use the Reactor Manual Control System and repeated manual scrams to achieve a rod pattern that will ensure the reactor will remain shutdown under all conditions (**Critical Task**). A failure of all main turbine bypass valves will require the crew to establish alternate means of pressure control. Additionally Standby Liquid will initially fail to inject due to a pump trip. The RO is expected to recognize the failure and start the redundant train.

The scenario may be terminated when EOP02 is exited and EOP01, RPV Control, is entered to restore RPV level and commence a plant cooldown.

Emergency Classification: Site Area Emergency

EAL: 2.3.1.3, Reactor power > 3% and boron injection into the RPV intentionally initiated.

| | | | |
|---|---|---|---|
| Facility: PILGRIM | Scenario No.: 3 | Op Test No.: 2011 NRC | |
| Examiners: | Operators: | SRO - | |
| | | RO - | |
| | | BOP - | |

Initial Conditions:

- Reactor Power: 90%
- Plant Status: Tech Spec required shutdown in progress following a catastrophic failure of MO-1001-23A, RHR Loop A, Upper Drywell Spray Valve #1, which cannot be repaired within the specified LCO time due unavailability of replacement parts.
- Currently on step [3] (b) of PNPS 2.1.5 Section F, Controlled Shutdown Without Manual Scram.
- Core flow: 57 Mlbm/hr
- Current rod position: Step 85, rod 18-43
- Equipment Out of Service: "A" APRM has a faulty power supply and is OOS and bypassed. Tracking LCO initiated. All other APRMs are operable.
- "D" RBCCW pump is OOS. All other RBCCW pumps are operable. Tracking LCO initiated.
- "A" Containment Spray Loop Inoperable. Day 6 of 7 day LCO 3.5.B.2

Turnover:

- Continue the plant shutdown IAW PNPS 2.1.5, Section F. Step [3] is in progress.

Critical Tasks:

1. Scram the reactor before torus water temperature exceeds 110 degrees following SOSRV.
2. Initiate drywell sprays when torus bottom pressure exceeds 16 psig
3. Emergency Depressurize the RPV when torus bottom pressure cannot be maintained below the Pressure Suppression Pressure.

| Event No. | Malf. No. | Event Type* | Event Description |
|---|---|---|---|
| 1. | | R-RO<br>R-SRO | Reduces core flow to 43 Mlbm/hr and inserts rods as necessary to achieve 75%. PNPS 2.1.5 Section F, steps [3] (b) and (d). |
| 2. | | N-BOP<br>N-SRO | Plant shutdown actions for 75% power: Adjust Speed Load Changer and secure a Reactor Feed Pump. PNPS 2.1.5 Section F, steps [3] (c) and (e). |
| 3. | Crywolf Annunciat or C3L-B1 | TS-SRO | DC control power fuse blows for EDG "A" generating alarm C3L-B1, "GENERATOR BKR TRIP/INOP". Tech Spec 3.5.F.1 requires upgrading to a 24 hour cold shutdown LCO. |
| 4. | CU02 | C-BOP<br>C-SRO | RWCU Pump Trip. The BOP is expected to shutdown the RWCU system IAW PNPS 2.4.27, REACTOR WATER CLEANUP SYSTEM MALFUNCTIONS. |

| | | | |
|---|---|---|---|
| 5. | RR20, Recirc Flow Controller Fails Upscale. | C-RO<br>C-SRO<br>TS-SRO | Recirc Pump "A" speed controller fails upscale. Requires Manual Scoop Tube Lock. PNPS 2.4.20, REACTOR RECIRCULATION SYSTEM SPEED OR FLOW CONTROL SYSTEM MALFUNCTION. SRO will be required to evaluate Recirc Speed mismatch per Tech Spec 3.6.F.1. |
| 6. | MS13(B) and MS14(B) | C-All | Following the power rise, SRV 3B begins to leak then fails open. When the SRV cannot be closed, a manual scram is required. PNPS 2.4.29, STUCK OPEN SAFETY RELIEF VALVE |
| 7. | ED13, 4KV bus A-1 fails to Auto Transfer. | C-BOP<br>C-SRO | 4KV Bus A-1 fails to auto transfer following main turbine trip. BOP operator required to manually re-energize. |
| 8. | PC22 (B) Ramped to 100% over 5 minutes | M - All | SRV 3B Tail Pipe Leak causing direct pressurization of Torus Air Space. Drywell sprays will be required and Emergency Depress required when torus bottom pressure cannot be maintained below the PSP curve. Reactor mode switch failure will result in MSIVs closing when pressure lowers to < 810 psig. |
| * (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor | | | |

**Pilgrim 2011 NRC Scenario #3**

The plant is operating at 90% power with a Tech Spec required shutdown in progress due to an inoperable containment cooling subsystem. APRM "A" and "D" RBCCW pump are also OOS. The directions to the crew are to continue the plant shutdown IAW PNPS 2.1.5, Reactor Plant Shutdown.

The crew will lower reactor power to ~ 75% at which point they will perform procedurally directed actions to adjust the MHC Speed Load Changer and remove a Reactor Feed Pump (RFP) from service. After the RFP is secured, a fuse will blow in the control power circuit for the "A" EDG output breaker. The SRO is expected to declare a 24 hr cold S/D LCO based on TS 3.5.F.1 due to the "A" EDG being inoperable along with an "A" side containment cooling subsystem. Next the RWCU pump will trip following a loss of seal cooling. The BOP is expected to shutdown the RWCU system IAW PNPS 2.4.27, REACTOR WATER CLEANUP SYSTEM MALFUNCTIONS.

Next, the "A" Recirc Flow Controller output will fail upscale causing an increase in "A" Recirc Pump speed and reactor power. The RO is expected to diagnose the failure and insert a manual scoop tube lock IAW PNPS 2.4.20 Reactor Recirculation System Speed or Flow Control System Malfunction. The malfunction will result in a mismatch between recirc pump speeds. The SRO is expected to evaluate the mismatch IAW with Tech Spec 3.6.F. The crew may direct local control of the "A" recirc MG set be established and lower the speed of the "A" recirc pump to reduce the mismatch.

The RPV pressure and power rise will result in SRV 3B beginning to leak and eventually fail open. The crew is expected to respond IAW PNPS 2.4.29, Stuck Open SRV. When efforts to close the valve are unsuccessful and before torus water temperature reaches 110 degrees the crew is expected to insert a manual scram **(Critical Task).** When the main turbine trips, 4KV bus A-1 will fail to fast transfer, causing a partial loss of feed and condensate. The BOP is expected to diagnose the failure and manually re-energize the bus. Additionally, switch contacts within the Reactor Mode Switch will fail resulting in MSIV closure when RPV pressure lowers to 810 psig via the stuck open SRV.

Following the scram the tail pipe of the stuck open SRV will fail, resulting in direct steam pressurization of the torus air space. Containment pressure and temperature will rise rapidly. Drywell sprays will be required when torus bottom pressure exceeds 16 psig **(Critical Task).** Only one loop will be available due to the inoperable containment cooling loop. Drywell sprays will be insufficient to maintain containment pressure. When pressure cannot be maintained below the Pressure Suppression Pressure of EOP-03, Primary Containment Control, an Emergency RPV Depressurization will be required **(Critical Task)**.

The scenario can be terminated when the RPV is depressurized, RPV level is stable and containment pressure is lowering.

Emergency Classification: Site Area Emergency
EAL 3.4.1.3: Torus bottom pressure cannot be maintained below the "Pressure Suppression Pressure" (PSP) EOP Figure 6.

| | | | | | |
|---|---|---|---|---|---|
| Facility: | PILGRIM | Scenario No.: | 5 | Op Test No.: | 2011 NRC |
| Examiners: | | Operators: | | SRO - | |
| | | | | RO - | |
| | | | | BOP - | |

Initial Conditions:

- Reactor Power: ~ 89%.
- Plant Status: Reactor power at 90% following control rod exercising
- HPCI is isolated due to I&C error during surveillance last shift and is currently INOP
- Core flow is 57 Mlbm/hr
- Current rod position: Sequence A-1, Step 85, Rod 18-43
- Equipment Out of Service: "A" APRM has a faulty power supply and is OOS and bypassed. Tracking LCO initiated. All other APRMs are operable.
- "D" RBCCW pump is OOS. All other RBCCW pumps are operable. Tracking LCO initiated.

Turnover:

- Un-isolate HPCI IAW 2.2.125.1, RESET OF PRIMARY AND SECONDARY CONTAINMENT ISOLATIONS
- Restore power to 100%.

Critical Tasks:

1. Initiate drywell sprays when torus bottom pressure exceeds 16 psig
2. Emergency Depressurize the RPV when RPV level cannot be restored and maintained above -150 inches.

| Event No. | Malf. No. | Event Type* | Event Description |
|---|---|---|---|
| 1. | | N-BOP<br>N-SRO | HPCI will be un-isolated and placed in Standby line up. |
| 2. | RX 18 | TS-SRO | Rx Level Transmitter LT-263-120D Fails Upscale. SRO refers to Tech Spec 3.2.G and associated Table 3.2.G and determines that ATWS /ARI Division Two is inoperable and that a 14 day Hot Shutdown LCO is required. |
| 3. | MSIV Test PB Override. | C-BOP<br>C-SRO | MSIV closure requires a power reduction to < 75% IAW PNPS 2.4.30, MSIV Closure and the BOP aligning the Main Steam System per 2.2.92, Main Steam Line Isolation and Turbine Bypass Valves," for continued operation with a MSIV closed. |
| 4. | | R-RO<br>R-SRO | Power reduction to less than 75% following an MSIV closure. |
| 5. | RD01 | C-RO<br>C-SRO | CRD Flow Control Valve Fails Open. RO will shift to the standby FCV IAW PNPS 2.4.11.1, CRD System Malfunctions. |

| | | | |
|---|---|---|---|
| 6. | ED07 | C-ALL<br>TS-SRO | Loss of 4 KV Emergency Bus A5. The crew will be required to cross connect RBCCW, respond to a Recirc Pump Trip and address the loss of multiple safety – related components. Multiple Tech Spec 24 hr cold shutdown requirements will exist. |
| 7. | FW34 "A" Ramped to 40%<br>PC01, Ramped to 2000 GPM | M-All | Feedwater line break inside the drywell. Reactor Scram and Entry conditions to EOP-01, RPV Control and EOP-03, Primary Containment Control. Location of leak will render RCIC and the feed system ineffective as injection sources. Level will initially be maintained by HPCI. Drywell Sprays will be required. |
| 8. | HP02 | C-ALL | HPCI turbine trip. ADS will be inhibited as level drops and MSIVs will close. Both RO and BOP are expected to align alternate injection sources (CRD, Standby Liquid Control). When RPV level cannot be maintained above -150 inches, an Emergency Depressurization will be performed IAW EOP-17. |
| 9. | RH04 | C-BOP<br>C-SRO | LPCI Injection Valve fails to Open. When pressure lowers to < 400 psig, LPCI injection valve, MO-29B will fail to open. The BOP operator is expected to recognize the failure and manually open the valve. |
| * (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor | | | |

**Pilgrim 2011 NRC Scenario #5**

The plant is operating at 90% following control rod exercising the previous shift. HPCI is currently isolated due to an I&C error during surveillance testing last shift and is currently inoperable. "A" APRM and "D" RBCCW pump are also out of service. All other APRMs and RBCCW pumps are operable. Directions to the shift are to un-isolate HPCI, place in a standby lineup and then restore power to 100%.

After the crew assumes the watch the BOP will un-isolate HPCI IAW 2.2.125.1, RESET OF PRIMARY AND SECONDARY CONTAINMENT ISOLATIONS and verify the system has been restored to a standby lineup IAW PNPS 2.2.21, HPCI System. After HPCI is restored, Rx Level Transmitter LT-263-120D fails upscale. This transmitter is one of two level transmitters inputting into Division Two of the ATWS system. The SRO is expected to determine the impact of the failure, refer to Tech Spec 3.2.G and associated Table 3.2.G, determine that Division Two is inoperable and that a 14 day Hot Shutdown LCO is required.

Following the Tech Spec assessment, the outboard "B" MSIV will close. The crew is expected to respond IAW PNPS 2.4.30, MSIV Closure and reduce power to < 75%. The BOP is expected to align the main steam system per 2.2.92, Main Steam Line Isolation and Turbine Bypass Valves, for continued operation with a MSIV closed. Next, the in service CRD Flow Control Valve (FCV) fails open. The RO is expected to diagnose the failure and shift to the standby FCV IAW PNPS 2.4.11.1, CRD System Malfunctions.

Next a loss of 4 KV safety related bus A5 will occur. The crew is expected to respond IAW PNPS 2.4.A.5, LOSS OF ELECTRICAL BUS A5, and will be required to cross connect RBCCW, respond to a Recirc Pump Trip and address the loss of multiple safety– related components. The trip of the Recirc pump will place the reactor in the Exclusion region of the power to flow map. The RO will be required to insert the RPR array to exit the region. Multiple Tech Spec 24 hr cold shutdown requirements will exist due to the loss of safety related equipment.

The scenario ending event commences with an "A" Feedline break inside the drywell. Rising drywell pressure will result in a scram if not previously scrammed and entry conditions to EOP-01, RPV Control and EOP-03, Primary Containment Control. Initially the feed system will be able to maintain level but as the size of the leak progresses, it will become ineffective in controlling level. The location of leak will render RCIC ineffective as well. HPCI will be required for level control. Containment parameters will require the use of Drywell Sprays (**Critical Task**).

Finally, the HPCI turbine will trip. ADS will be inhibited as level drops and the MSIVs will close. Both the RO and the BOP are expected to align alternate injection sources (CRD, Standby Liquid Control). When RPV level cannot be maintained above -150 inches, an Emergency Depressurization will be performed IAW EOP-17 (**Critical Task**). When pressure lowers to < 400 psig, LPCI injection valve, MO-29B will fail to open. The BOP operator is expected to recognize the failure and manually open the valve. The scenario will be terminated at the discretion of the Lead Examiner OR when the RPV has been depressurized, RPV level stabilized and containment parameters are lowering.

Emergency Classification: Alert
EAL 3.4.1.2: Primary containment pressure cannot be maintained < 2.2 psig