

| Facility: FENOC BVPS Unit 2 | | Date of Exam: 12/2002 | | Exam Level: SRO | | | | | | | | | | |
|---|--------------------|------------------------------|-----|------------------------|-----|--------------|-----|--------------|-----|--------------|-----|--------------|-------------|-----------|
| Tier | Group | K/A Category Point | | | | | | | | | | | Point Total | |
| | | K 1 | K 2 | K 3 | K 4 | K 5 | K 6 | A 1 | A 2 | A 3 | A 4 | G * | | |
| 1. Emergency & Abnormal Plant Evolutions | 1 | 2 | 2 | 5 | | | | 5 | 7 | | | 3 | 24 | |
| | 2 | 0 | 0 | 0 | | | | 7 | 6 | | | 3 | 16 | |
| | 3 | 1 | 0 | 0 | | | | 0 | 1 | | | 1 | 3 | |
| | Tier Totals | 3 | 2 | 5 | | | | 12 | 14 | | | 7 | 43 | |
| 2. Plant Systems | 1 | 1 | 1 | 1 | 4 | 3 | 1 | 0 | 2 | 3 | 1 | 2 | 19 | |
| | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 0 | 1 | 2 | 3 | 1 | 17 | |
| | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 4 | |
| | Tier Totals | 3 | 3 | 3 | 5 | 4 | 3 | 2 | 3 | 6 | 4 | 4 | 40 | |
| 3. Generic Knowledge and Abilities | | | | | | Cat 1 | | Cat 2 | | Cat 3 | | Cat 4 | | 17 |
| | | | | | | 5 | | 5 | | 4 | | 3 | | |
| <p>Note:</p> <ol style="list-style-type: none"> 1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., 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 exam must total 100 points. 3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities. 4. Systems/evolutions within each group are identified on the associated outline. 5. The shaded areas are not applicable to the category/tier. 6.* The generic 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. 7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/A's below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above. | | | | | | | | | | | | | | |

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BEAVER VALLEY UNIT 2
PWR SRO Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1/Group 1

Form ES-401-3

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|---|----|----|----|----|----|---|--------|--|------|--------|
| 000001 / Continuous Rod Withdrawal / 1 | | | | | | X | 2.4.49 | Emergency Procedures / Plan: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. | 4 | 1 |
| 000003 / Dropped Control Rod / 1 | | | | | | | | | | |
| 000005 / Inoperable/Stuck Control Rod / 1 | | | X | | | | AK3.03 | Knowledge of the reasons for the following responses as they apply to the Inoperable / Stuck Control Rod: Tech-Spec limits for rod mismatch. | 4.1 | 1 |
| 000011 / Large Break LOCA / 3 | | | | | X | | EA2.10 | Ability to determine or interpret the following as they apply to a Large Break LOCA: Verification of adequate core cooling. | 4.7 | 1 |
| W/E04 / LOCA Outside Containment / 3 | | | | X | | | EA1.2 | Ability to operate and/or monitor the following as they apply to the (LOCA Outside Containment): Operating behavior characteristics of the facility. | 3.8 | 1 |
| W/E01 & E02 / Rediagnosis & SI Termination / 3 | | X | | | | | EK2.2 | Knowledge of the interrelations between the (SI Termination) and the following: 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. | 3.9 | 1 |
| 000015 / 17 RCP Malfunctions / 4 | | | | | X | | AA2.02 | Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Abnormalities in RCP air vent flow paths and/or oil cooling system. | 3 | 1 |
| BW/E09; CE/A13; W/E09 & E10 / Natural Circ. / 4 | | | X | | | | EK3.4 | Knowledge of the reasons for the following responses as they apply to the (Natural Circulation Operations): 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 | 1 |
| BW/E09; CE/A13; W/E09 & E10 / Natural Circ. / 4 | | | | X | | | EA1.2 | Ability to operate and/or monitor the following as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS): Operating behavior characteristics of the facility. | 3.8 | 1 |
| 000024 / Emergency Boration / 1 | | | | | | | | | | |
| 000026 / Loss of Component Cooling Water / 8 | | | | X | | | AA1.06 | Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: Control of flow rates to components cooled by the CCWS. | 2.9 | 1 |
| 000026 / Loss of Component Cooling Water / 8 | | | X | | | | AK3.02 | Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS/Nuclear Service Water system resulting from the actuation of ESFAS. | 3.9 | 1 |
| 000029 / Anticipated Transient w/o Scram / 1 | | | X | | | | EK3.10 | Knowledge of the reasons for the following responses as they apply to the ATWS: Manual rod insertion. | 4.1 | 1 |

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Emergency and Abnormal Plant Evolutions – Tier 1/Group 1

Form ES-401-3

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|---|----|----|----|----|----|---|--------|---|------|--------|
| 000040 (BW/E05; CE/E05; W/E12) / Steam Line Rupture – Excessive Heat Transfer / 4 | | | | | X | | AA2.05 | Ability to determine and interpret the following as they apply to the Steam Line Rupture: When ESFAS systems may be secured. | 4.5 | 1 |
| 000040 (BW/E05; CE/E05; W/E12) / Steam Line Rupture – Excessive Heat Transfer / 4 | X | | | | | | EK1.1 | Knowledge of the operational implications of the following concepts as they apply to the (Uncontrolled Depressurization of all Steam Generators): Components: capacity, and function of emergency systems. | 3.8 | 1 |
| CE/A11; W/E08 / RCS Overcooling – PTS / 4 | X | | | | | | EK1.2 | Knowledge of the operational implications of the following concepts as they apply to the (Pressurized Thermal Shock): Normal, abnormal and emergency operating procedures associated with (Pressurized Thermal Shock). | 4 | 1 |
| 000051 / Loss of Condenser Vacuum / 4 | | | | X | | | AA1.04 | Ability to operate and / or monitor the following as they apply to the Loss of Condenser Vacuum: Rod position. | 2.5 | 1 |
| 000055 / Station Blackout / 6 | | | | | | | | | | |
| 000057 / Loss of Vital AC Elec. Inst. Bus / 6 | | | | | X | | AA2.06 | Ability to determine and interpret the following as they apply to the Loss of Vital Ac Instrument Bus: AC instrument bus alarms for the inverter and alternate power source. | 3.7 | 1 |
| 000059 / Accidental Liquid Radwaste Rel. / 9 | | | | | | | | | | |
| 000062 / Loss of Nuclear Service Water / 4 | | | | | | X | 2.4.6 | Emergency Procedures/Plan: Knowledge of symptom based EOP mitigation strategies. | 4.0 | 1 |
| 000067 / Plant Fire On-site / 9 | | | | | X | | AA2.13 | Ability to determine and interpret the following as they apply to the Plant Fire on Site: Need for emergency plant shutdown. | 4.4 | 1 |
| 000068 (BW/A06) / Control Room Evac. / 8 | | | | X | | | AA1.31 | Ability to operate and / or monitor the following as they apply to the Control Room evacuation: EDG. | 4.0 | 1 |
| 000069 (W/E14) / Loss of CTMT Integrity / 5 | | | | | X | | AA2.02 | Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Verification of automatic and manual means of restoring integrity. | 4.4 | 1 |
| 000069 (W/E14) / Loss of CTMT Integrity / 5 | | | | | | X | 2.1.32 | Conduct of Operations: Ability to explain and apply all system limits and precautions. | 3.8 | 1 |
| 000074 (W/E06 & E07) / Inad. Core Cooling / 4 | | X | | | | | EK2.1 | Knowledge of the interrelations between the (Degraded Core Cooling) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. | 3.8 | 1 |
| 000074 (W/E06 & E07) / Inad. Core Cooling / 4 | | | | | X | | EA2.2 | Ability to determine and interpret the following as they apply to the (Saturated Core Cooling): Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments. | 3.9 | 1 |
| BW/E03 / Inadequate Subcooling Margin / 4 | | | | | | | | | | |
| 000076 / High Reactor Coolant Activity / 9 | | | X | | | | AK3.05 | Knowledge of the reasons for the following responses as they apply to the High Reactor Coolant Activity: Corrective actions as a result of high fission-product radioactivity level in the RCS. | 3.6 | 1 |

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Emergency and Abnormal Plant Evolutions – Tier 1/Group 1

Form ES-401-3

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|------------------------------------|----|----|----|----|----|---|--------|--------------------|------|--------|
| BW/A02 & A03 / Loss of NNI-X/Y / 7 | | | | | | | | | | |
| K/A Category Point Totals: | 2 | 2 | 5 | 5 | 7 | 3 | | Group Point Total: | | 24 |

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Emergency and Abnormal Plant Evolutions – Tier 1/Group 2

Form ES-401-3

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|---|----|----|----|----|----|---|--------|--|------|--------|
| 000007 (BW/E02 & E10; CE/E02) / Reactor Trip – Stabilization – Recovery / 1 | | | | | | | | | | |
| BW/A01 / Plant Runback / 1 | | | | | | | | | | |
| BW/A04 / Turbine Trip / 4 | | | | | | | | | | |
| 000008 / Pressurizer Vapor Space Accident / 3 | | | | X | | | AA1.07 | Ability to operate and/or monitor the following as they apply to the Pressurizer Vapor Space Accident: Reseating of code safety and PORV. | 4.2 | 1 |
| 000008 / Pressurizer Vapor Space Accident / 3 | | | | | X | | AA2.19 | Ability to determine or interpret the following as they apply to a pressurizer vapor space accident: Pressurizer Spray Valve failure, using plant parameters. | 3.6 | 1 |
| 000009 / Small Break LOCA / 3 | | | | | | | | | | |
| BW/E08; W/E03 / LOCA Cooldown – Depress. / 4 | | | | X | | | EA1.2 | Ability to operate and / or monitor the following as they apply to the Post LOCA Cooldown and Depressurization: Operating behavior characteristics of the facility. | 3.9 | 1 |
| W/E11 / Loss of Emergency Coolant Recirc. / 4 | | | | | | X | 2.1.23 | Conduct of Operations: Ability to perform specific system and integrated plant procedures during all modes of plant operation. | 4 | 1 |
| 000022 / Loss of Reactor Coolant Makeup / 2 | | | | | X | | AA2.03 | Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Pump Makeup: Failures of flow control valve or controller. | 3.6 | 1 |
| 000025 / Loss of RHR System / 4 | | | | X | | | AA1.02 | Ability to operate and/or monitor the following as they apply to the Loss of Residual Heat Removal System: RCS inventory. | 3.9 | 1 |
| 000027 / Pressurizer Pressure Control System Malfunction / 3 | | | | | | X | 2.1.30 | Conduct of Operations: Ability to locate and operate components, including local controls. | 3.4 | 1 |
| 000032 / Loss of Source Range NI / 7 | | | | | X | | AA2.05 | Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: Nature of abnormality, from rapid survey of control room data. | 3.2 | 1 |
| 000033 / Loss of Intermediate Range NI / 7 | | | | X | | | AA1.03 | Ability to operate and/or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Manual restoration of power. | 3.2 | 1 |
| 000033 / Loss of Intermediate Range NI / 7 | | | | | X | | AA2.03 | Ability to determine and interpret the following as they apply to Loss of Intermediate Range NI: Indication of blown fuse. | 3.1 | 1 |
| 000037 / Steam Generator Tube Leak / 3 | | | | | | X | 2.2.22 | Equipment Control: Knowledge of limiting conditions for operations and safety limits. | 4.1 | 1 |
| 000038 / Steam Generator Tube Rupture / 3 | | | | X | | | EA1.02 | Ability to operate and monitor the following as they apply to a SGTR: Steam and feedwater flow, for mismatched condition. | 4.1 | 1 |
| 000054 (CE/E06) / Loss of Main Feedwater / 4 | | | | X | | | AA1.04 | Ability to operate and/or monitor the following as they apply to the Loss of Main Feedwater (MFW): HPI, under total feedwater loss conditions. | 4.5 | 1 |

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Emergency and Abnormal Plant Evolutions – Tier 1/Group 2

Form ES-401-3

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|--|----|----|----|----|----|---|--------|---|------|--------|
| BW/E04; W/E05 / Inadequate Heat Transfer – Loss of Secondary Heat Sink / 4 | | | | X | | | EA1.1 | Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink): Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. | 4.0 | 1 |
| 000058 / Loss of DC Power / 8 | | | | | X | | AA2.02 | Ability to determine and interpret the following as they apply to Loss of DC power: 125 VDC bus voltage, low/critical low voltage alarm. | 3.6 | 1 |
| 000060 / Accidental Gaseous Radwaste Rel. / 9 | | | | | | | | | | |
| 000061 / ARM System Alarms / 7 | | | | | | | | | | |
| W/E16 / High Containment Radiation / 9 | | | | | | | | | | |
| 000065 / Loss of Instrument Air / 8 | | | | | X | | AA2.05 | Ability to determine and interpret the following as they apply to loss of instrument air: When to commence plant shutdown if Instrument Air pressure is decreasing. | 4.1 | 1 |
| CE / E09 / Functional Recovery | | | | | | | | | | |
| K/A Category Point Totals: | 0 | 0 | 0 | 7 | 6 | 3 | | Group Point Total: | | 16 |

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BEAVER VALLEY UNIT 2
PWR SRO Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1/Group 3

Form ES-401-3

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|--|----|----|----|----|----|---|--------|---|------|--------|
| 000028 / Pressurizer Level Malfunction / 2 | | | | | | | | | | |
| 000036 (BW/A08) / Fuel Handling Accident / 8 | X | | | | | | AK1.03 | Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents: Indications of approaching criticality. | 4.3 | 1 |
| 000056 / Loss of Off-site Power / 6 | | | | | X | | AA2.53 | Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Status of emergency bus under voltage relays. | 3.2 | 1 |
| BW/E13 & E14 / EOP Rules and Enclosures | | | | | | | | | | |
| BW/A05 / Emergency Diesel Actuation / 6 | | | | | | | | | | |
| CE/A16 / Excess RCS Leakage / 2 | | | | | | | | | | |
| W/E13 / Steam Generator Over-pressure / 4 | | | | | | | | | | |
| W/E15 / Containment Flooding / 5 | | | | | | X | 2.1.27 | Conduct of Operations: Knowledge of system purpose and or function. | 2.9 | 1 |
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| K/A Category Point Totals: | 1 | 0 | 0 | 0 | 1 | 1 | | Group Point Total: | | 3 |

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BEAVER VALLEY UNIT 2
PWR SRO Examination Outline
Plant Systems – Tier 2/Group 1

Form ES-401-3

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|--|----|----|----|----|----|----|----|----|----|----|---|--------|--|------|--------|
| 001 Control Rod Drive | | | | | X | | | | | | | K5.09 | Knowledge of the operational implications as they apply to the CRDS: Relationships between reactivity due to boron and reactivity due to control rod. | 3.7 | 1 |
| 003 Reactor Coolant Pump | | | | | | | | | X | | | A3.05 | Ability to monitor automatic operation of the RCPs, including: RCP lube oil and bearing lift pumps. | 2.6 | 1 |
| 003 Reactor Coolant Pump | | | | | X | | | | | | | K5.02 | Knowledge of the operational implications of the following concepts as they apply to the RCPs: Effects of RCP coastdown on RCS parameters. | 3.2 | 1 |
| 004 Chemical and Volume Control | | | | X | | | | | | | | K4.08 | Knowledge of CVCS design feature(s) and/or interlock(s), which provide for the following: Hydrogen control in RCS. | 3.2 | 1 |
| 013 Engineered Safety Features Actuation | | | | | | X | | | | | | K6.01 | Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: Sensors and detectors. | 3.1 | 1 |
| 013 Engineered Safety Features Actuation | | | | X | | | | | | | | K4.10 | Knowledge of ESFAS design feature(s) and/or interlock(s), which provide for the following: Safeguards equipment control reset. | 3.7 | 1 |
| 014 Rod Position Indication | | | | | | | | | | X | | A4.01 | Ability to manually operate and/or monitor in the Control Room: Rod selection control. | 3.1 | 1 |
| 015 Nuclear Instrumentation | | | X | | | | | | | | | K3.01 | Knowledge of the effect that a loss or malfunction of the NIS will have on the following: RPS. | 4.3 | 1 |
| 015 Nuclear Instrumentation | | X | | | | | | | | | | K2.01 | Knowledge of bus power supplies to the following: NIC channels, components, and interconnections. | 3.7 | 1 |
| 017 In-Core Temperature Monitor | | | | | | | | | X | | | A3.02 | Ability to monitor automatic operation of the ITM system including: Measurement of in-core thermocouple temperatures at panel outside Control Room. | 3.1 | 1 |
| 022 Containment Cooling | | | | | | | | X | | | | A2.06 | Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of CCS pump. | 3.2 | 1 |
| 025 Ice Condenser | | | | | | | | | | | | | | | |

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PWR SRO Examination Outline
Plant Systems – Tier 2/Group 1

Form ES-401-3

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|-------------------------------------|----|----|----|----|----|----|----|----|----|----|---|--------------------|--|------|--------|
| 026 Containment Spray | | | | | | | | | X | | | A3.02 | Ability to monitor automatic operation of the CSS, including: Verification that cooling water is supplied to the containment spray heat exchanger. | 4.2 | 1 |
| 056 Condensate | X | | | | | | | | | | | K1.03 | Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: MFW. | 2.6 | 1 |
| 059 Main Feedwater | | | | X | | | | | | | | K4.16 | Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following: Automatic trips for MFW pumps. | 3.2 | 1 |
| 061 Auxiliary / Emergency Feedwater | | | | | | | | | | | X | 2.2.25 | Equipment Control: Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. | 3.7 | 1 |
| 063 DC Electrical Distribution | | | | X | | | | | | | | K4.02 | Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for the following: Breaker interlocks, permissives, bypasses and cross-ties. | 3.2 | 1 |
| 063 DC Electrical Distribution | | | | | | | | | | | X | 2.1.33 | Conduct of Operations: Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications. | 4 | 1 |
| 068 Liquid Radwaste | | | | | | | | X | | | | A2.04 | Ability to (a) predict the impacts of the following malfunctions or operations on the Liquid Radwaste System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunction or operations: Failure of automatic isolation. | 3.3 | 1 |
| 071 Waste Gas Disposal | | | | | X | | | | | | | K5.04 | Knowledge of the operational implication of the following concepts as they apply to the Waste Gas Disposal System: Relationship of hydrogen/oxygen concentrations to flammability. | 3.1 | 1 |
| 072 Area Radiation Monitoring | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| K/A Category Point Totals: | 1 | 1 | 1 | 4 | 3 | 1 | 0 | 2 | 3 | 1 | 2 | Group Point Total: | | | 19 |

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BEAVER VALLEY UNIT 2
PWR SRO Examination Outline
Plant Systems – Tier 2/Group 2

Form ES-401-3

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|---|----|----|----|----|----|----|----|----|----|----|---|--------|---|------|--------|
| 002 Reactor Coolant | | | | | | | | | | | | | | | |
| 006 Emergency Core Cooling | | X | | | | | | | | | | K2.04 | Knowledge of bus power supplies to the following: ESFAS-operated valves. | 3.8 | 1 |
| 010 Pressurizer Pressure Control | | | | | | | | | | | | | | | |
| 012 Reactor Protection | | X | | | | | | | | | | K2.01 | Knowledge of bus power supplies to the following: RPS channels, components, and interconnections. | 3.7 | 1 |
| 016 Non-nuclear Instrumentation | | | | | | | | | | | | | | | |
| 027 Containment Iodine Removal | | | | | | | | | | X | | A4.01 | Ability to manually operate and/or monitor in the Control Room: CIRS controls. | 3.3 | 1 |
| 028 Hydrogen Recombiner and Purge Control | | | | | X | | | | | | | K5.03 | Knowledge of the operational implication of the following concepts as they apply to the Hydrogen Recombiner and Purge control system: Sources of hydrogen within containment. | 3.6 | 1 |
| 029 Containment Purge | | | | | | | | X | | | | A2.03 | Ability to (a) predict the impacts of the following malfunctions or operations on the Containment Purge System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Startup operations and the associated required valve lineups. | 3.1 | 1 |
| 033 Spent Fuel Pool Cooling | | | | | | | | | X | | | A3.01 | Ability to monitor automatic operation of the Spent Fuel Pool Cooling System including: Temperature control valves. | 2.7 | 1 |
| 034 Fuel Handling Equipment | | | | | | | | | | X | | A4.02 | Ability to manually operate and/or monitor in the Control Room: Neutron levels. | 3.9 | 1 |
| 035 Steam Generator | | | | | | X | | | | | | K6.01 | Knowledge of the effect of a loss or malfunction on the following will have on the S/Gs: MSIVs. | 3.6 | 1 |
| 039 Main and Reheat Steam | X | | | | | | | | | | | K1.05 | Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: T/G. | 2.6 | 1 |
| 039 Main and Reheat Steam | | | X | | | | | | | | | K3.05 | Knowledge of the effect that a loss or malfunction of the Main and Reheat Steam System will have on the following: RCS. | 3.7 | 1 |
| 055 Condenser Air Removal | | | | | | | | | X | | | A3.03 | Ability to monitor automatic operation of the CARS, including: Automatic diversion of CARS exhaust. | 2.7 | 1 |

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Plant Systems – Tier 2/Group 2

Form ES-401-3

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|----------------------------------|----|----|----|----|----|----|----|----|----|----|---|--------------------|--|------|--------|
| 062 AC Electrical Distribution | | | | X | | | | | | | | K4.10 | Knowledge of AC distribution system design feature(s) and/or interlock(s) which provide for the following: Uninterruptable AC power sources. | 3.5 | 1 |
| 062 AC Electrical Distribution | | | | | | | | | | | | | | | 1 |
| 064 Emergency Diesel Generator | | | X | | | | | | | | | K3.02 | Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: ESFAS controlled or actuated systems. | 4.4 | 1 |
| 073 Process Radiation Monitoring | | | | | | | | | | | | | | | |
| 075 Circulating Water | | | | | | | | | | | | | | | |
| 079 Station Air | | | | | | | | | | X | | A4.01 | Ability to manually operate and/or monitor in the Control Room: Cross-tie valves with IAS. | 2.7 | 1 |
| 086 Fire Protection | | | | | | | | | | | X | 2.1.2 | Conduct of Operations: Knowledge of operator responsibilities during all modes of plant operation. | 4 | 1 |
| 103 Containment | X | | | | | | | | | | | K1.01 | Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: CCS. | 3.9 | 1 |
| | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | |
| K/A Category Point Totals: | 2 | 2 | 2 | 1 | 1 | 2 | 0 | 1 | 2 | 3 | 1 | Group Point Total: | | | 17 |

ES-401

BEAVER VALLEY UNIT 2
PWR SRO Examination Outline
Plant Systems – Tier 2/Group 3

Form ES-401-3

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|---------------------------------------|----|----|----|----|----|----|----|----|----|----|---|--------------------|--|------|--------|
| 005 Residual Heat Removal | | | | | | | | | | | | | | | |
| 007 Pressurizer Relief / Quench Tank | | | | | | | X | | | | | A1.02 | Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank pressure. | 2.9 | 1 |
| 008 Component Cooling Water | | | | | | | | | | | X | 2.4.6 | Emergency Procedures/Plan: Knowledge symptom based EOP mitigation strategies. | 4 | 1 |
| 041 Steam Dump/Turbine Bypass Control | | | | | | | X | | | | | A1.01 | Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: T-ave, verification above low/low setpoint. | 2.9 | 1 |
| 045 Main Turbine Generator | | | | | | | | | | | | | | | |
| 076 Service Water | | | | | | | | | X | | | A3.02 | Ability to monitor automatic operation of the SWS, including: Emergency Heat Loads. | 3.7 | 1 |
| 078 Instrument Air | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| K/A Category Point Totals: | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | Group Point Total: | | | 4 |

| Facility: FENOC BVPS Unit 2 | | Date of Exam: 12/2000 | Exam Level: SRO | |
|-----------------------------|-------|--|-----------------|--------|
| Category | K/A # | Topic | Imp. | Points |
| Conduct of Operations | 1.8 | Ability to coordinate personnel activities outside the Control Room. | 3.6 | 1 |
| | 1.17 | Ability to make accurate, clear and concise verbal reports. | 3.6 | 1 |
| | 1.19 | Ability to use plant computer to obtain and evaluate parametric information on system or component status. | 3 | 1 |
| | 1.27 | Knowledge of system purpose and or function. | 2.9 | 1 |
| | 1.31 | Ability to locate Control Room switches, controls and indications and to determine that they are correctly reflecting the desired plant lineup. | 3.9 | 1 |
| | Total | | | 5 |
| Equipment Control | 2.17 | Knowledge of the process for managing maintenance activities during power operations. | 3.5 | 1 |
| | 2.31 | Knowledge of procedures and limitations involved in initial core loading. | 2.9 | 1 |
| | 2.28 | Knowledge of new and spent fuel movement procedures. | 3.5 | 1 |
| | 2.25 | Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. | 3.7 | 1 |
| | 2.1 | Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity. | 3.6 | 1 |
| | Total | | | 5 |
| Radiation Control | 3.11 | Ability to control radiation releases. | 3.2 | 1 |
| | 3.10 | Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure. | 3.3 | 1 |
| | 3.3 | Knowledge of SRO responsibilities for auxiliary systems that are outside the Control Room (e.g., waste disposal and handling systems). | 2.9 | 1 |
| | 3.4 | Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. | 3.1 | 1 |
| | Total | | | 4 |
| Emergency Procedures / Plan | 4.39 | Knowledge of the RO's responsibilities in emergency plan implementation. | 3.1 | 1 |
| | 4.26 | Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage. | 3.3 | 1 |
| | 4.15 | Knowledge of communications procedures associated with EOP implementation. | 3.5 | 1 |
| | Total | | | 3 |
| Tier 3 Point Total (SRO) | | | | 17 |

| Facility: FENOC BVPS Unit 2 | | Date of Exam: 12/2002 | | Exam Level: RO | | | | | | | | | |
|--|--------------------|------------------------------|-----|-----------------------|-----|--------------|-----|--------------|-----|--------------|-----|-----------|-------------|
| Tier | Group | K/A Category Point | | | | | | | | | | | Point Total |
| | | K 1 | K 2 | K 3 | K 4 | K 5 | K 6 | A 1 | A 2 | A 3 | A 4 | G * | |
| 1. Emergency & Abnormal Plant Evolutions | 1 | 2 | 1 | 4 | | | | 4 | 3 | | | 2 | 16 |
| | 2 | 0 | 2 | 1 | | | | 9 | 5 | | | 0 | 17 |
| | 3 | 1 | 0 | 0 | | | | 0 | 1 | | | 1 | 3 |
| | Tier Totals | 3 | 3 | 5 | | | | 13 | 9 | | | 3 | 36 |
| 2. Plant Systems | 1 | 2 | 1 | 2 | 4 | 3 | 2 | 0 | 1 | 4 | 3 | 1 | 23 |
| | 2 | 1 | 2 | 4 | 4 | 0 | 1 | 1 | 2 | 3 | 2 | 0 | 20 |
| | 3 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 2 | 1 | 8 |
| | Tier Totals | 4 | 3 | 6 | 8 | 4 | 3 | 3 | 3 | 8 | 7 | 2 | 51 |
| 3. Generic Knowledge and Abilities | | | | Cat 1 | | Cat 2 | | Cat 3 | | Cat 4 | | 13 | |
| | | | | 6 | | 2 | | 2 | | 3 | | | |
| <p>Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).</p> <p>2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ± 1 from that specified in the table based on NRC revisions. The final exam must total 100 points.</p> <p>3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.</p> <p>4. Systems/evolutions within each group are identified on the associated outline.</p> <p>5. The shaded areas are not applicable to the category/tier.</p> <p>6.* The generic 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.</p> <p>7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/A's below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.</p> | | | | | | | | | | | | | |

ES-401

BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1/Group 1

Form ES-401-4

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|---|----|----|----|----|----|---|--------|--|------|--------|
| 00005 Inoperable/Stuck Control Rod / 1 | | | X | | | | AK3.03 | Knowledge of the reasons for the following responses as they apply to the Inoperable/Stuck control Rod: Tech-Spec limits for rod mismatch. | 3.6 | 1 |
| 000015/17 RCP Malfunctions / 4 | | | | | X | | AA2.02 | Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Abnormalities in RCP air vent flow paths and/or oil cooling system. | 2.8 | 1 |
| BW/E09; CE/A13; W/E09 & 10 Natural Circ./ 4 | | | X | | | | EK3.4 | Knowledge of the reasons for the following responses as they apply to the (Natural Circulation Operations): RO or SRO function as a member of 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. | 3.4 | 1 |
| BW/E09; CE/A13; W/E09 & 10 Natural Circ./ 4 | | | | X | | | EA1.2 | Ability to operate and / or monitor the following as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS): Operating behavior characteristics of the facility. | 3.6 | 1 |
| 000024 Emergency Boration / 1 | | | | | | | | | | |
| 000026 / Loss of Component Cooling Water / 8 | | | | X | | | AA1.06 | Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: Control of flow rates to components cooled by the CCWS. | 2.9 | 1 |
| 000026 / Loss of Component Cooling Water / 8 | | | X | | | | AK3.02 | Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS/Nuclear Service Water system resulting from the actuation of ESFAS | 3.6 | 1 |
| 000027 / Pressurizer Pressure Control System Malfunction / 3 | | | | | | | | | | |
| 000040 (BW/E05; CE/E05; W/E12) / Steam Line Rupture – Excessive Heat Transfer / 4 | X | | | | | | EK1.1 | Knowledge of the operational implications of the following concepts as they apply to the (Uncontrolled Depressurization of all Steam Generators): Components: capacity, and function of emergency systems. | 3.4 | 1 |
| CE/A11; W/E08 / RCS Overcooling – PTS / 4 | X | | | | | | EK1.2 | Knowledge of the operational implications of the following concepts as they apply to the (Pressurized Thermal Shock): Normal, abnormal and emergency operating procedures associated with (Pressurized Thermal Shock). | 3.4 | 1 |
| 000051 / Loss of Condenser Vacuum / 4 | | | | X | | | AA1.04 | Ability to operate and / or monitor the following as they apply to the Loss of Condenser Vacuum: Rod position. | 2.5 | 1 |
| 000055 / Station Blackout / 6 | | | | | | | | | | |
| 000057 / Loss of Vital AC Elec. Inst. Bus / 6 | | | | | X | | AA2.06 | Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: AC instrument bus alarms for the inverter and alternate power source. | 3.2 | 1 |
| 000062 / Loss of Nuclear Service Water / 4 | | | | | | X | 2.4.6 | Emergency Procedures/Plan: Knowledge of symptom based EOP mitigation strategies | 3.1 | 1 |

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BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1/Group 1

Form ES-401-4

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|---|----|----|----|----|----|---|--------|---|------|--------|
| 000067 / Plant Fire On-site / 9 | | | | | X | | AA2.13 | Ability to determine and interpret the following as they apply to the Plant Fire on Site: Need for emergency plant shutdown. | 3.3 | 1 |
| 000068 (BW/A06) / Control Room Evac. / 8 | | | | X | | | AA1.31 | Ability to operate and / or monitor the following as they apply to the Control Room evacuation: EDG | 3.9 | 1 |
| 000069 (W/E14) / Loss of CTMT Integrity / 5 | | | | | | X | 2.1.32 | Conduct of Operations: Ability to explain and apply all system limits and precautions. | 3.4 | 1 |
| 000074 (W/E06 & E07) / Inad. Core Cooling / 4 | | X | | | | | EK2.1 | Knowledge of the interrelations between the (Degraded Core Cooling) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. | 3.6 | 1 |
| BW/E03 / Inadequate Subcooling Margin / 4 | | | | | | | | | | |
| 000076 / High Reactor Coolant Activity / 9 | | | X | | | | AK3.05 | Knowledge of the reasons for the following responses as they apply to the High Reactor Coolant Activity: Corrective actions as a result of high fission-product radioactivity level in the RCS. | 2.9 | 1 |
| BW/A02 & A03 / Loss of NNI-X/Y / 7 | | | | | | | | | | |
| K/A Category Point Totals: | 2 | 1 | 4 | 4 | 3 | 2 | | Group Point Total: | | 16 |

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BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1/Group 2

Form ES-401-4

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|---|----|----|----|----|----|---|--------|---|------|--------|
| 000001 / Continuous Rod Withdrawal / 1 | | | | | | | | | | |
| 000003 / Dropped Control Rod / 1 | | | | | | | | | | |
| 000007 (BW/E02 & E10; CE/E02) / Reactor Trip – Stabilization – Recovery / 1 | | | | X | | | EA1.07 | Ability to operate and / or monitor the following as they apply to the Reactor Trip: MT/G trip; verification that the MT/G has been tripped. | 4.3 | 1 |
| BW/A01 / Plant Runback / 1 | | | | | | | | | | |
| BW/A04 / Turbine Trip / 4 | | | | | | | | | | |
| 000008 / Pressurizer Vapor Space Accident / 3 | | | | X | | | AA1.07 | Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident: Reseating of code safety and PORV. | 4 | 1 |
| 000008 / Pressurizer Vapor Space Accident / 3 | | | | | X | | AA2.19 | Ability to determine or interpret the following as they apply to a pressurizer vapor space accident: Pressurizer Spray Valve failure, using plant parameters. | 3.4 | 1 |
| 000009 / Small Break LOCA / 3 | | | | | | | | | | |
| 000011 / Large Break LOCA / 3 | | | | | X | | EA2.10 | Ability to determine or interpret the following as they apply to a Large Break LOCA: Verification of adequate core cooling. | 4.5 | 1 |
| W/E04 / LOCA Outside Containment / 3 | | | | X | | | EA1.2 | Ability to operate and / or monitor the following as they apply to the (LOCA Outside Containment): Operating behavior characteristics of the facility. | 3.6 | 1 |
| BW/E08; W/E03 / LOCA Cutdown / Depress. / 4 | | | | X | | | EA1.2 | Ability to operate and / or monitor the following as they apply to the Post LOCA Cutdown and Depressurization: Operating behavior characteristics of the facility. | 3.7 | 1 |
| W/E11 / Loss of Emergency Coolant Recirc. / 4 | | X | | | | | EK2.2 | Knowledge of the interrelations between the (Loss of Emergency Coolant Recirculation) and the following: 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. | 3.9 | 1 |
| WE/01 & 02 / Rediagnosis & SI Termination / 3 | | X | | | | | EK2.2 | Knowledge of the interrelations between the (SI Termination) and the following: 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. | 3.5 | 1 |
| 000022 / Loss of Reactor Coolant Makeup / 2 | | | | | | | | | | |
| 000025 / Loss of RHR System / 4 | | | | X | | | AA1.02 | Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: RCS inventory. | 3.8 | 1 |
| 000029 / Anticipated Transient w/o Scram / 1 | | | X | | | | EK3.10 | Knowledge of the reasons for the following responses as they apply to the ATWS: Manual rod insertion. | 4.1 | 1 |
| 000032 / Loss of Source Range NI / 7 | | | | | X | | AA2.05 | Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: Nature of abnormality, from rapid survey of control room data. | 2.9 | 1 |

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BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1/Group 2

Form ES-401-4

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|--|----|----|----|----|----|---|--------|---|------|--------|
| 000033 / Loss of Intermediate Range NI / 7 | | | | X | | | AA1.03 | Ability to operate and / or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Manual restoration of power. | 3.0 | 1 |
| 000033 / Loss of Intermediate Range NI / 7 | | | | | X | | AA2.03 | Ability to determine and interpret the following as they apply to Loss of Intermediate Range NI: Indication of blown fuse. | 2.8 | 1 |
| 000037 / Steam Generator Tube Leak / 3 | | | | | | | | | | |
| 000038 / Steam Generator Tube Rupture / 3 | | | | X | | | EA1.02 | Ability to operate and monitor the following as they apply to a SGTR: Steam and feedwater flow, for mismatched condition. | 4.2 | 1 |
| 000054 (CE/E06) / Loss of Main Feedwater / 4 | | | | X | | | AA1.04 | Ability to operate and / or monitor the following as they apply to the Loss of Main Feedwater (MFW): HPI, under total feedwater loss conditions. | 4.4 | 1 |
| BW/E04; W/E05 / Inadequate Heat Transfer – Loss of Secondary Heat Sink / 4 | | | | X | | | EA1.1 | Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink): Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features. | 4.1 | 1 |
| 000058 / Loss of DC Power / 8 | | | | | X | | AA2.02 | Ability to determine and interpret the following as they apply to Loss of DC power: 125 VDC bus voltage, low/critical low voltage alarm. | 3.3 | 1 |
| 000059 / Accidental Liquid Radwaste Rel. / 9 | | | | | | | | | | |
| 000060 / Accidental Gaseous Radwaste Rel. / 9 | | | | | | | | | | |
| 000061 / ARM System Alarms / 7 | | | | | | | | | | |
| W/E16 / High Containment Radiation / 9 | | | | | | | | | | |
| CE/E09 / Functional Recovery | | | | | | | | | | |
| K/A Category Point Totals: | 0 | 2 | 1 | 9 | 5 | 0 | | Group Point Total: | | 17 |

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BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions – Tier 1/Group 3

Form ES-401-4

| E/APE # / Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | Number | K/A Topic(s) | Imp. | Points |
|--|----|----|----|----|----|---|--------|---|------|--------|
| 000028 / Pressurizer Level Malfunction / 2 | | | | | | | | | | |
| 000036 (BW/A08) / Fuel Handling Accident / 8 | X | | | | | | AK1.03 | Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents: Indications of approaching criticality. | 4 | 1 |
| 000056 / Loss of Off-site Power / 6 | | | | | X | | AA2.53 | Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Status of emergency bus under voltage relays. | 2.9 | 1 |
| 000065 / Loss of Instrument Air / 8 | | | | | | | | | | |
| BW/E13 & E14 / EOP Rules and Enclosures | | | | | | | | | | |
| BW/A07 / Flooding / 8 | | | | | | | | | | |
| CE/A16 / Excess RCS Leakage / 2 | | | | | | | | | | |
| W/E13 / Steam Generator Over-pressure / 4 | | | | | | | | | | |
| W/E15 / Containment Flooding / 5 | | | | | | X | 2.1.27 | Conduct of Operations: Knowledge of system purpose and or function. | 3.4 | 1 |
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| K/A Category Point Totals: | 1 | 0 | 0 | 0 | 1 | 1 | | Group Point Total: | | 3 |

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BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Plant Systems – Tier 2/Group 1

Form ES-401-4

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|--|----|----|----|----|----|----|----|----|----|----|---|--------|---|------|--------|
| 001 Control Rod Drive | | | | | X | | | | | | | K5.09 | Knowledge of the following operational implications as they apply to the CRDS: Relationships between reactivity due to boron and reactivity due to control rod. | 3.5 | 1 |
| 003 Reactor Coolant Pump | | | | | X | | | | | | | K5.02 | Knowledge of the operational implications of the following concepts as they apply to the RCPS: Effects of RCP coastdown on RCS parameters. | 2.8 | 1 |
| 003 Reactor Coolant Pump | | | | | | | | | X | | | A3.05 | Ability to monitor automatic operation of the RCPS, including: RCP lube oil and bearing lift pumps. | 2.7 | 1 |
| 004 Chemical and Volume Control | | | | X | | | | | | | | K4.08 | Knowledge of CVCS design feature(s) and/or interlock(s), which provide for the following: Hydrogen control in RCS. | 2.8 | 1 |
| 004 Chemical and Volume Control | | | | | | | | | | | X | 2.1.27 | Conduct of operations: Knowledge of system purpose and/or function. | 2.8 | 1 |
| 013 Engineered Safety Features Actuation | | | | | | X | | | | | | K6.01 | Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: Sensors and detectors. | 2.7 | 1 |
| 013 Engineered Safety Features Actuation | | | | | | | | | | X | | A4.02 | Ability to manually operate and / or monitor in the control room: Reset of ESFAS channels. | 4.3 | 1 |
| 013 Engineered Safety Features Actuation | | | | X | | | | | | | | K4.10 | Knowledge of ESFAS design feature(s) and/or interlock(s), which provide for the following: Safeguards equipment control reset. | 3.3 | 1 |
| 015 Nuclear Instrumentation | | | X | | | | | | | | | K3.01 | Knowledge of the effect that a loss or malfunction of the NIS will have on the following: RPS. | 3.9 | 1 |
| 015 Nuclear Instrumentation | | X | | | | | | | | | | K2.01 | Knowledge of bus power supplies to the following: NIS channels, components, and interconnections. | 3.3 | 1 |
| 017 In-Core Temperature Monitor | | | | | | | | | X | | | A3.02 | Ability to monitor automatic operation of the ITM system including: Measurement of in-core thermocouple temperatures at panel outside control room. | 3.4 | 1 |
| 017 In-Core Temperature Monitor | | | | | | | | | X | | | A3.02 | Ability to monitor automatic operation of the ITM system including: Measurement of in-core thermocouple temperatures at panel outside control room. | 3.4 | 1 |

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BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Plant Systems – Tier 2/Group 1

Form ES-401-4

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|-------------------------------------|----|----|----|----|----|----|----|----|----|----|---|--------|--|------|--------|
| 022 Containment Cooling | | | | | | | | | X | | | A3.01 | Ability to monitor automatic operation of the CCS, including: Initiation of safeguards mode of operation. | 4.1 | 1 |
| 025 Ice Condenser | | | | | | | | | | | | | | | |
| 056 Condensate | X | | | | | | | | | | | K1.03 | Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: MFW. | 2.6 | 1 |
| 056 Condensate | | | | | | | | X | | | | A2.04 | Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of condensate pumps. | 2.6 | 1 |
| 059 Main Feedwater | | | | | | | | | | X | | A4.01 | Ability to manually operate and monitor in the control room: MFW turbine trip indication. | 3.1 | 1 |
| 059 Main Feedwater | | | | X | | | | | | | | K4.16 | Knowledge of MFW design feature(s) and / or interlock(s), which provide for the following: Automatic trips for MFW pumps. | 3.1 | 1 |
| 061 Auxiliary / Emergency Feedwater | | | | X | | | | | | | | K4.03 | Knowledge of AFW design feature(s) and / or interlock(s) which provide for the following: Automatic blowdown / sample isolation. | 2.7 | 1 |
| 068 Liquid Radwaste | | | | | | X | | | | | | K6.10 | Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwaste System: Radiation monitors. | 2.5 | 1 |
| 068 Liquid Radwaste | X | | | | | | | | | | | K1.02 | Knowledge of the physical connections and / or cause effect relationships between the Liquid Radwaste System and the following systems: Waste gas vent header. | 2.5 | 1 |
| 071 Waste Gas Disposal | | | | | | | | | | X | | A4.20 | Ability to manually operate and / or monitor in the control room: Placing WGDS gas compressors in automatic operation. | 2.5 | 1 |
| 071 Waste Gas Disposal | | | | | X | | | | | | | K5.04 | Knowledge of the operational implication of the following concepts as they apply to the Waste Gas Disposal System: Relationship of hydrogen/oxygen concentrations to flammability. | 2.5 | 1 |

ES-401

BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Plant Systems – Tier 2/Group 1

Form ES-401-4

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|-------------------------------|----|----|----|----|----|----|----|----|----|----|---|--------------------|---|------|--------|
| 072 Area Radiation Monitoring | | | X | | | | | | | | | K3.01 | Knowledge of the effect that a loss or malfunction of the ARM system will have on the following: Containment ventilation isolation. | 3.2 | 1 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| K/A Category Point Totals: | 2 | 1 | 2 | 4 | 3 | 2 | 0 | 1 | 4 | 3 | 1 | Group Point Total: | | | 23 |

ES-401

BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Plant Systems – Tier 2/Group 2

Form ES-401-4

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|----------------------------------|----|----|----|----|----|----|----|----|----|----|---|--------|---|------|--------|
| 002 Reactor Coolant | | | | | | | X | | | | | A1.08 | Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCS controls including: RCS average temperature. | 3.7 | 1 |
| 006 Emergency Core Cooling | | X | | | | | | | | | | K2.04 | Knowledge of bus power supplies to the following: ESFAS-operated valves. | 3.6 | 1 |
| 010 Pressurizer Pressure Control | | | | | | | | | | | | | | | |
| 011 Pressurizer Level Control | | | | | | | | X | | | | A2.03 | Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of Loss of PZR level. | 3.8 | 1 |
| 012 Reactor Protection | | X | | | | | | | | | | K2.01 | Knowledge of bus power supplies to the following: RPS channels, components, and interconnections. | 3.3 | 1 |
| 012 Reactor Protection | | | X | | | | | | | | | K3.01 | Knowledge of the effect that a loss or malfunction of the RPS will have on the following: CRDS. | 3.9 | 1 |
| 014 Rod Position Indication | | | | | | | | | | X | | A4.01 | Ability to manually operate and/or monitor in the Control Room: Rod selection control. | 3.3 | 1 |
| 016 Non-nuclear Instrumentation | | | X | | | | | | | | | K3.06 | Knowledge of the effect that a loss or malfunction of the NNIS will have on the following: AFW system. | 3.5 | 1 |
| 026 Containment Spray | | | | | | | | | X | | | A3.02 | Ability to monitor automatic operation of the CSS, including: Verification that cooling water is supplied to the containment spray heat exchanger. | 3.9 | 1 |
| 029 Containment Purge | | | | | | | | | | | | | | | |
| 033 Spent Fuel Pool Cooling | | | | | | | | | X | | | A3.01 | Ability to monitor automatic operation of the Spent Fuel Pool Cooling System including: Temperature control valves. | 2.5 | 1 |
| 035 Steam Generator | | | | | | X | | | | | | K6.01 | Knowledge of the effect of a loss or malfunction on the following will have on the S/GS: MSIVs. | 3.2 | 1 |
| 039 Main and Reheat Steam | X | | | | | | | | | | | K1.05 | Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: T/G. | 2.5 | 1 |
| 039 Main and Reheat Steam | | | X | | | | | | | | | K3.05 | Knowledge of the effect that a loss or malfunction of the Main and Reheat Steam System will have on the following: RCS. | 3.6 | 1 |

ES-401

BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Plant Systems – Tier 2/Group 2

Form ES-401-4

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|----------------------------------|----|----|----|----|----|----|----|----|----|----|---|--------------------|--|------|--------|
| 055 Condenser Air Removal | | | | | | | | | X | | | A3.03 | Ability to monitor automatic operation of the CARS, including: Automatic diversion of CARS exhaust. | 2.5 | 1 |
| 062 AC Electrical Distribution | | | | X | | | | | | | | K4.10 | Knowledge of AC Distribution System design feature(s) and/or interlock(s) which provide for the following: Uninterruptable AC power sources. | 3.1 | 1 |
| 063 DC Electrical Distribution | | | | X | | | | | | | | K4.02 | Knowledge of DC Electrical System design feature(s) and/or interlock(s) which provide for the following: Breaker interlocks, permissives, bypasses and cross-ties. | 2.9 | 1 |
| 064 Emergency Diesel Generator | | | X | | | | | | | | | K3.02 | Knowledge of the effect that a loss or malfunction of the ED/G System will have on the following: ESFAS controlled or actuated systems. | 4.2 | 1 |
| 073 Process Radiation Monitoring | | | | X | | | | | | | | K4.01 | Knowledge of PRM system design feature(s) and/or interlocks which provide for the following: Release termination when radiation exceeds setpoint. | 4.0 | 1 |
| 075 Circulating Water | | | | | | | | X | | | | A2.02 | Ability to (a) predict the impacts of the following malfunctions or operations on the Circulating Water System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of Circulating Water pumps. | 2.5 | 1 |
| 079 Station Air | | | | | | | | | | X | | A4.01 | Ability to manually operate and/or monitor in the Control Room: Cross-tie valves with IAS. | 2.7 | 1 |
| 086 Fire Protection | | | | X | | | | | | | | K4.06 | Knowledge of design feature(s) and/or interlock(s) which provide for the following: CO2. | 3.0 | 1 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| K/A Category Point Totals: | 1 | 2 | 4 | 4 | 0 | 1 | 1 | 2 | 3 | 2 | 0 | Group Point Total: | | | 20 |

ES-401

BEAVER VALLEY UNIT 2
PWR RO Examination Outline
Plant Systems – Tier 2/Group 3

Form ES-401-4

| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | Number | K/A Topic(s) | Imp. | Points |
|---|----|----|----|----|----|----|----|----|----|----|---|--------------------|--|------|--------|
| 005 Residual Heat Removal | | | | | | | | | | | | | | | |
| 007 Pressurizer Relief/Quench Tank | | | | | | | X | | | | | A1.02 | Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank pressure. | 2.7 | 1 |
| 008 Component Cooling Water | | | | | | | | | | | X | 2.4.6 | Emergency Procedures / Plan: Knowledge symptom based EOP mitigation strategies. | 2.7 | 1 |
| 027 Containment Iodine Removal | | | | | | | | | | X | | A4.01 | Ability to manually operate and/or monitor in the Control Room: CIRS controls. | 3.3 | 1 |
| 028 Hydrogen Recombiner and Purge Control | | | | | X | | | | | | | K5.03 | Knowledge of the operational implication of the following concepts as they apply to the Hydrogen Recombiner and Purge Control System: Sources of hydrogen within containment. | 2.9 | 1 |
| 034 Fuel Handling Equipment | | | | | | | | | | X | | A4.02 | Ability to manually operate and/or monitor in the Control Room: Neutron levels. | 3.5 | 1 |
| 041 Steam Dump/Turbine Bypass Control | | | | | | | X | | | | | A1.01 | Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: T-ave, verification above low/low setpoint. | 2.9 | 1 |
| 045 Main Turbine Generator | | | | | | | | | | | | | | | |
| 076 Service Water | | | | | | | | | X | | | A3.02 | Ability to monitor automatic operation of the SWS, including: Emergency Heat Loads. | 3.7 | 1 |
| 078 Instrument Air | | | | | | | | | | | | | | | |
| 103 Containment | X | | | | | | | | | | | K1.01 | Knowledge of the physical connections and/or cause-effect relationships between the containment system and the following systems: CCS. | 3.6 | 1 |
| K/A Category Point Totals: | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 2 | 1 | Group Point Total: | | | 8 |

| Facility: BVPS-2 | | Date of Exam: 12/2000 | Exam Level: RO | |
|------------------------------|-------|--|----------------|--------|
| Category | K/A # | Topic | Imp. | Points |
| Conduct of Operations | 1.28 | Knowledge of the purpose and function of major system components and controls. | 3.2 | 1 |
| | 1.31 | Ability to locate Control Room switches, controls and indications and to determine that they are correctly reflecting the desired plant lineup. | 3.0 | 1 |
| | 1.17 | Ability to make accurate, clear and concise verbal reports. | 3.5 | 1 |
| | 1.19 | Ability to use plant computer to obtain and evaluate parametric information on system or component status. | 3.0 | 1 |
| | 1.27 | Knowledge of system purpose and or function. | 3.0 | 1 |
| | 1.18 | Ability to make accurate, clear and concise logs, records, status boards, and reports. | 2.9 | 1 |
| | Total | | | 6 |
| Equipment Control | 2.26 | Knowledge of refueling administrative requirements. | 2.5 | 1 |
| | 2.1 | Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity. | 3.7 | 1 |
| | Total | | | 2 |
| Radiation Control | 3.1 | Knowledge of 10CFR: 20 and related facility radiation control requirements. | 2.6 | 1 |
| | 3.4 | Knowledge of radiation exposure limits and containment control, including permissible levels in excess of those authorized. | 2.5 | 1 |
| | Total | | | 2 |
| Emergency Procedures / Plans | 4.2 | Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. | 3.9 | 1 |
| | 4.15 | Knowledge of communications procedures associated with EOP implementation. | 3.0 | 1 |
| | 4.16 | Knowledge of EOP implementation hierarchy and coordination with other support procedures. | 3.0 | 1 |
| Total | | | | 3 |
| Tier 3 Point Total (RO) | | | | 13 |

| | | | |
|---|------------------------|--|---|
| Facility: FENOC BVPS Unit 2 | | Date of Examination: 12/2002 | |
| Examination Level: SRO | | Operating Test Number: 2002-02 | |
| Administrative Topic/Subject Description | | Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions | |
| A.1 | Conduct of Operations | 2.1.7 (4.4) | Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. JPM: Review a QPTR Calculation and Determine Tech. Specs. |
| | Conduct of Operations | 2.1.18 (3.0) | Ability to make accurate, clear, and concise logs, records, status boards, and reports. JPM: Review Operating Logs |
| A.2 | Equipment Control | 2.2.12 (3.4) | Knowledge of surveillance procedures. JPM: Review AC Sources Alignment Verification and Determine Tech. Specs. |
| A.3 | Radiation Control | 2.3.1 (3.0) | Knowledge of 10CFR20 and related facility radiation control requirements. JPM: Authorize extending facility dose limits |
| A.4 | Emergency Preparedness | 2.4.44 (4.0) | Knowledge of emergency plan protective action recommendations. JPM: Classify an EPP event |

| | | | |
|--|------------------------|--|---|
| Facility: FENOC BVPS Unit 2 | | Date of Examination: 12/2002 | |
| Examination Level: RO | | Operating Test Number: 2002-02 | |
| Administrative Topic/Subject Description | | Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions | |
| A.1 | Conduct of Operations | 2.4.7 (4.4) | Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. JPM: Perform a QPTR Manual Calculation |
| | Conduct of Operations | 2.1.18 (2.9) | Ability to make accurate, clear, and concise logs, records, status boards, and reports. JPM: Perform Operating Logs |
| A.2 | Equipment Control | 2.2.12 (3.0) | Knowledge of surveillance procedures. JPM: Perform AC Sources Alignment Verification |
| A.3 | Radiation Control | 2.3.10 (2.9) | Ability to perform procedures to reduce excessive levels of radiation and guard against personal exposure. QUESTION: Give a set of conditions, specify actions when high dose rate is encountered |
| | Radiation Control | 2.3.1 (2.6) | Knowledge of 10CFR20 and related facility radiation control requirements. QUESTION: Give plant conditions and a personal exposure history, calculate stay time |
| A.4 | Emergency Preparedness | 2.4.29 (2.6) | Knowledge of the emergency plan. QUESTION: List ERO facilities activated |
| | Emergency Preparedness | 2.4.39 (3.3) | Knowledge of RO's responsibilities during emergency plan implementation. QUESTION: Responsibilities during search and rescue operations |

| | | | | |
|--|--------------------------|--|-------------------|------------------------|
| Facility: | FENOC BVPS Unit 2 | Date of Examination: | 12/2002 | |
| Exam Level: | SRO (U) | Operating Test No.: | 2002-02 | |
| B.1: Control Room Systems | | | | |
| | System | JPM Description | Type Code* | Safety Function |
| S2 | 013 ESF Actuation | Respond to Shutdown LOCA. | M, A, S, L | 2 |
| S5 | 026 Containment Spray | Manual Initiation of Quench Spray | D, A,S, E | 5 |
| S7 | 015 NI | Respond To Failed Power Range Channel N-44 (Repeat) | D, S | 7 |
| B.2 Facility Walk-Through | | | | |
| P1 | 033 SFP Cooling | Respond to SFP Low Level Alarm | N, R | 8 |
| P2 | 061 AFW | Reset the Terry Turbine Trip Throttle Valve | D, E | 4 |
| * Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol Room, (S)imulator, (L)ow-Power, RCA, (E)OP/AB | | | | |

NOTES

| Facility: | FENOC BVPS Unit 2 | Date of Examination: | 12/2002 | |
|---|--------------------------|---|-------------------|------------------------|
| Exam Level: | RO / SRO (I) | Operating Test No.: | 2002-02 | |
| B.1: Control Room Systems | | | | |
| | System | JPM Description | Type Code* | Safety Function |
| S1 | 001 Rod Control | Realign Mispositioned Control Rod | D, S | 1 |
| S2 | 013 ESF Actuation | Respond to Shutdown LOCA | M, A, S, L | 2 |
| S3 | 068 Liquid Radwaste | Respond to Radiation Monitor Alarm - Leak Collection Tank <i>(Repeat)</i> | D, A, S | 9 |
| S4 | 002 RCS | Initiate a Natural Circulation Cooldown per ES-0.2 <i>(Repeat)</i> | D, A, S, E | 4 |
| S5 | 026 Containment Spray | Manual Initiation of Quench Spray | D, A, S, E | 5 |
| S6 | 064 EDG | Shutdown No. 1 Diesel Generator | N, S | 6 |
| S7 | 015 NI | Respond To Failed Power Range Channel N-44 <i>(Repeat)</i> | D, S | 7 |
| B.2 Facility Walk-Through | | | | |
| P1 | 033 SFP Cooling | Respond to SFP Low Level Alarm | N, R | 8 |
| P2 | 061 AFW | Reset the Terry Turbine Trip Throttle Valve | D, E | 4 |
| P3 | 012 RPS | Place SSPS Train in Service | D, L | 7 |
| * Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol Room, (S)imulator, (L)ow-Power, (R)CA, (E)OP/AB | | | | |

NOTES

| | | | | | |
|----------------------------|---|---------------|----------|--------------|----------------|
| Facility: | FENOC BVPS Unit 2 | Scenario No.: | <u>1</u> | Op Test No.: | <u>2002-02</u> |
| Examiners: | _____ | Candidates: | _____ | CRS | |
| | _____ | | _____ | RO | |
| | _____ | | _____ | PO | |
| <u>Objectives:</u> | In accordance with plant procedures: | | | | |
| <u>Initial Conditions:</u> | 100% power. | | | | |
| <u>Turnover:</u> | AFW Pump "2B" OOS. Perform a normal power reduction to remove Main Feed Pump "2A" from service. | | | | |
| <u>Critical Tasks:</u> | FR-S.1.C, Insert RCCAs E-0.I, Establish flow from HHSI pump E-1.C, Stop RCPs | | | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|------------------|----------------------------|---|
| 1 | | N (US) N (PO) R (RO) | Normal power reduction |
| 2 | CNH CFW12 | C (PO) C (US) | "B" SG FWRV sticks in position during power reduction (Manual operation available) |
| 3 | BKR HIV01 | C (PO) | Loss of 4160V bus "2AE" |
| | BKR HIV11 | C (US) | EDG No. 1 breaker fails to close; manual closure is available |
| 4 | PMP CHS01 | C (RO) C (US) | 2CHS*P21A fails to auto start on EDG sequencer (Manual start of 2CHS*P21B available) |
| 5 | CNH PCS10A | I (RO) I (US) | Pressurizer Pressure Master Controller fails high |
| 6 | IOR XB1I035C | M (ALL) | PORV fails open. Block valve leaks after being closed leading to reactor trip |
| 7 | RCS10A PPL01A | C (RO) | ATWS |
| 8 | PPL01B | C (US) | |
| | BKR SWD02C | C (PO) | System Station Service Transformer "2B" trips |
| | BKR HIV13 | C (US) | EDG No. 2 output breaker fails to close automatically |

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

| | | | | | |
|----------------------------|---|---------------|----------|--------------|----------------|
| Facility: | FENOC BVPS Unit 2 | Scenario No.: | <u>2</u> | Op Test No.: | <u>2002-02</u> |
| Examiners: | _____ | Candidates: | _____ | CRS | |
| | _____ | | _____ | RO | |
| | _____ | | _____ | PO | |
| <u>Objectives:</u> | In accordance with plant procedures: | | | | |
| <u>Initial Conditions:</u> | 8% power. | | | | |
| <u>Turnover:</u> | Continue plant startup. | | | | |
| <u>Critical Tasks:</u> | E-0.I, Manually start HHSI pump. E-3.A, Isolate SG. E-3.C, Depressurize RCS. | | | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|-----------------------------------|----------------------------|--|
| 1 | | R (RO) N (PO) N (US) | Continue plant startup. |
| 2 | NIS07B | C (RO) C (US) | Intermediate Range instrument power fuse blows. |
| 3 | XMT MSS044A | I (PO) I (US) | PT-464 fails low causing condenser steam dumps to close |
| 4 | CNH MSS03B | C (PO) C (US) | SG "B" atmospheric dump valve fails open as condenser steam dumps are manually opened |
| 5 | RCP06B RCP01B | C (RO) C (US) | "2B" RCP high vibration with rising seal leakoff flow |
| 6 7 | RCS04B PMP CHS002 PLP07A | M (ALL) C (RO) | "B" SG Tube Rupture Running HHSI pump trips Standby HHSI pump fails to auto start (manual start available) |

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

Facility: **FENOC BVPS Unit 2** Scenario No.: **3** Op Test No.: **2002-02**
 Examiners: _____ Candidates: _____ CRS
 _____ RO
 _____ PO

Objectives: In accordance with plant procedures:

Initial Conditions: 100% power.

Turnover: AFW Pump "2B" OOS.

Critical Tasks: **E-0.A, Manually trip reactor.**

ECA-0.0.B, Establish feedwater flow to at least one SG.

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|-------------|----------------------------|---|
| 1 | | R (RO) N (PO) N (US) | Normal power reduction |
| 2 | CNH-PCS09B | I (RO) I (US) | Pressurizer level controller fails high |
| 3 | XMT-CFW055A | I (PO) I (US) | Selected feedwater flow transmitter fails high |
| 4 | EHC06 | C (All) | Main turbine valve position limiter failure (Load rejection) |
| 5 | HIV01D | M (All) | Loss of 4KV bus "2D" (condensate pump and feed pump trip) |
| | FLEXCFW07 | | Pipe rupture in condensate header |
| 6 | PPL01A | | Automatic reactor trip fails (manual trip available) |
| | PPL01B | | |
| 7 | LOA AFW001 | | Turbine driven AFW pump (2FWE*P22) fails to start |
| 8 | LOA AFW013 | | |
| | DSG01B | | EDG No. 2 trips immediately after powering 4KV bus "2DF" |
| 9 | BKR HIV01 | C (PO) | Loss of 4160V bus "2AE" after entering ES-0.1 |
| | LOA DSG01 | C (US) | EDG No. 1 fails to auto start (manual start available in ECA-0.0) |

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

| | | | | | |
|----------------------------|---|----------------------|----------|---------------------|----------------|
| Facility: | FENOC BVPS Unit 2 | Scenario No.: | <u>4</u> | Op Test No.: | <u>2002-02</u> |
| Examiners: | _____ | Candidates: | _____ | | CRS |
| | _____ | | _____ | | RO |
| | _____ | | _____ | | PO |
| Objectives: | In accordance with plant procedures: | | | | |
| Initial Conditions: | 80% power. | | | | |
| Turnover: | AFW Pump "2B" OOS. Perform a normal power reduction to remove "2A" Main Feed Pump from service. | | | | |
| Critical Tasks: | E-0.H, Start LHSI pump E-0.O, Manually initiate CIB | | | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|--|----------------------------|--|
| 1 | | N (US) N (PO) R (RO) | Normal power reduction |
| 2 | PMP FW4 PMP CFW008 | C (All) | 2FWS*P21A trips at approximately 75% power 2FWS*P24 trips 3 minutes after being started |
| 3 | PMP CCP01 PPL07B | C (PO) C (US) | Running CCP pump trips Manually start standby CCP pump |
| 4 | FLEXCCP34 | C (RO) C (US) | CCP supply leak to 2RCS*P21B (10 minute ramp to 450 GPM) (leads to reactor trip) |
| 5 | RCS03B | M (All) | Large break LOCA |
| 6 | PPL07A PPL07B | C (RO) C (US) | Both low head SI pumps fail to auto start (manual start available) |
| 7 | BST-PCS048 BST-PCS049 BST-PCS052 | C (RO) C (US) | Auto CIB failure (manual available) |

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