

Form ES-201-1, "Examination Preparation Checklist"

Form ES-201-2, "Examination Outline Quality Checklist," along with the *written examination and operating test outline(s)*

Facility: BraidwoodDate of Examination: 10/23-27/00 and 10/30-11/1/00Examinations Developed by: ☒ Facility / ☐ NRC (circle one)

| Target Date* | Task Description / Reference | Chief Examiner's Initials |
|--------------|---|---------------------------|
| -180 | 1. Examination administration date confirmed (C.1.a; C.2.a & b) | MEB |
| -120 | 2. NRC examiners and facility contact assigned (C.1.d; C.2.e) | MEB |
| -120 | 3. Facility contact briefed on security & other requirements (C.2.c) | MEB |
| -120 | 4. Corporate notification letter sent (C.2.d) | MEB |
| [-90] | [5. Reference material due (C.1.e; C.3.c)] | N/A |
| -75 | 6. Integrated examination outline(s) due (C.1.e & f; C.3.d) | MEB |
| -70 | 7. Examination outline(s) reviewed by NRC and feedback provided to facility licensee (C.2.h; C.3.e) | MEB |
| -45 | 8. Proposed examinations, supporting documentation, and reference materials due (C.1.e, f, g & h; C.3.d) | MEB |
| -30 | 9. Preliminary license applications due (C.1.i; C.2.g; ES-202) | MEB |
| -14 | 10. Final license applications due and assignment sheet prepared (C.1.i; C.2.g; ES-202) | MEB |
| -14 | 11. Examination approved by NRC supervisor for facility licensee review (C.2.h; C.3.f) | MEB |
| -14 | 12. Examinations reviewed with facility licensee (C.1.j; C.2.f & h; C.3.g) | MEB |
| -7 | 13. Written examinations and operating tests approved by NRC supervisor (C.2.i; C.3.h) | MEB |
| -7 | 14. Final applications reviewed; assignment sheet updated; waiver letters sent (C.2.g, ES-204) | MEB |
| -7 | 15. Proctoring/written exam administration guidelines reviewed with facility licensee and authorization granted to give written exams (if applicable) (C.3.k) | MEB |
| -7 | 16. Approved scenarios, job performance measures, and questions distributed to NRC examiners (C.3.i) | MEB |

* Target dates are keyed to the examination date identified in the corporate notification letter. They are for planning purposes and may be adjusted on a case-by-case basis in coordination with the facility licensee.

[] Applies only to examinations prepared by the NRC.

INITIAL SUBMITTAL OF OUTLINES

FOR THE BRAIDWOOD INITIAL EXAMINATION - OCTOBER 2000

Commonwealth Edison Company
Braidwood Generating Station
Route #1, Box 84
Braceville, IL 60407-9619
Tel 815-458-2801



April 19, 2000
BW000047

Michael E. Bielby
Lead Examiner
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. 50-456 and 50-457

Subject: Submittal of Integrated Initial License Training Examination Outline

In accordance with NUREG 1021, Revision 8, "Operating Licensing Examination Standards for Power Reactors," Braidwood Station is submitting the integrated initial licensing training examination outline. This submittal supports the initial license examination scheduled to take place during the week of October 23, 2000.

As required by NUREG 1021, please ensure that the enclosed materials are withheld from public disclosure until after the examination is complete.

If you have any questions concerning this letter, please contact Mr. Terry Simpkin at (815) 458-2801, extension 2980.

A handwritten signature in black ink, appearing to read "T. Tulon", is written over the typed name.

Timothy J. Tulon
Site Vice President
Braidwood Station

Enclosures: ES-D-1, Scenario Outlines
ES-201-2, Examination Outline Quality Checklist
ES-201-3, Examination Security Agreements
ES-301-1, Administrative Topics Outline
ES-301-2, Control Room Systems and Facility Walk-Through Test Outline
ES-301-5, Transient and Event Checklist
ES-301-6, Competencies Checklist
ES-401-3, PWR SRO Examination Outline
ES-401-4, PWR RO Examination Outline

cc: Regional Administrator - NRC Region III (without enclosures)
Chief, NRC Operator Licensing Branch (without enclosures)
NRC Senior Resident – Braidwood Station (without enclosures)

Commonwealth Edison Company
Braidwood Generating Station
Route #1, Box 84
Braceville, IL 60407-9619
Tel 815-458-2801



April 19, 2000
BW000047

Michael E. Bielby
Lead Examiner
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. 50-456 and 50-457

Subject: Submittal of Integrated Initial License Training Examination Outline

In accordance with NUREG 1021, Revision 8, "Operating Licensing Examination Standards for Power Reactors," Braidwood Station is submitting the integrated initial licensing training examination outline. This submittal supports the initial license examination scheduled to take place during the week of October 23, 2000.

As required by NUREG 1021, please ensure that the enclosed materials are withheld from public disclosure until after the examination is complete.

If you have any questions concerning this letter, please contact Mr. Terry Simpkin at (815) 458-2801, extension 2980.

A handwritten signature in dark ink, appearing to read "T. Tulon", is written over the printed name of Timothy J. Tulon.

Timothy J. Tulon
Site Vice President
Braidwood Station

Enclosures: ES-D-1, Scenario Outlines
ES-201-2, Examination Outline Quality Checklist
ES-201-3, Examination Security Agreements
ES-301-1, Administrative Topics Outline
ES-301-2, Control Room Systems and Facility Walk-Through Test Outline
ES-301-5, Transient and Event Checklist
ES-301-6, Competencies Checklist
ES-401-3, PWR SRO Examination Outline
ES-401-4, PWR RO Examination Outline

cc: Regional Administrator - NRC Region III (without enclosures)
Chief, NRC Operator Licensing Branch (without enclosures)
NRC Senior Resident - Braidwood Station (without enclosures)

APR 21 2000

Facility: Braidwood Units 1 and 2

Form ES-401-4

Exam Date: 10/20/2000**Exam Level:** RO

| Tier | Group | K/A Category Points | | | | | | | | | | | Point Total |
|--|-------------|---------------------|----|----|-------|----|-------|----|-------|----|-------|---|-------------|
| | | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | |
| 1. Emergency & Abnormal Plant Evolutions | 1 | 4 | 4 | 2 | | | | 3 | 2 | | | 1 | 16 |
| | 2 | 3 | 3 | 5 | | | | 4 | 1 | | | 1 | 17 |
| | 3 | 1 | 1 | 0 | | | | 1 | 0 | | | 0 | 3 |
| | Totals Tier | 8 | 8 | 7 | | | | 8 | 3 | | | 2 | 36 |
| 2. Plant Systems | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 23 |
| | 2 | 2 | 2 | 2 | 4 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 20 |
| | 3 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 8 |
| | Tier Totals | 4 | 5 | 6 | 8 | 4 | 4 | 4 | 5 | 5 | 3 | 3 | 51 |
| 3. Generic Knowledge And Abilities | | | | | Cat 1 | | Cat 2 | | Cat 3 | | Cat 4 | | |
| | | | | | 3 | | 3 | | 3 | | 4 | | 13 |

- 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).
 2. Actual point totals must match those specified in the table.
 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 RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-4

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|--|----|----|----|----|----|---|--|------|--------|
| 005 | Inoperable/Stuck Control Rod / 1 | | X | | | | | AK2.02 - Breakers, relays, disconnects, and control room switches | 2.5 | 1 |
| 015 | Reactor Coolant Pump (RCP) Malfunctions / 4 | | | | | | X | 2.1.20 - Ability to execute procedure steps. | 4.3 | 1 |
| 024 | Emergency Boration / 1 | | X | | | | | AK2.01 - Valves | 2.7 | 1 |
| 024 | Emergency Boration / 1 | | | | | X | | AA2.06 - When boron dilution is taking place | 3.6 | 1 |
| 027 | Pressurizer Pressure Control (PZR PCS) Malfunction / 3 | | | | X | | | AA1.01 - PZR heaters, sprays, and PORVs | 4.0 | 1 |
| 051 | Loss of Condenser Vacuum / 4 | | | | X | | | AA1.04 - Rod position | 2.5* | 1 |
| 069 | Loss of Containment Integrity / 5 | X | | | | | | AK1.01 - Effect of pressure on leak rate | 2.6 | 1 |
| 069 | Loss of Containment Integrity / 5 | | | X | | | | AK3.01 - Guidance contained in EOP for loss of containment integrity | 3.8* | 1 |
| 074 | Inadequate Core Cooling / 4 | X | | | | | | EK1.01 - Methods of calculating subcooling margin | 4.3 | 1 |
| 074 | Inadequate Core Cooling / 4 | | | | X | | | EA1.13 - Subcooling margin indicators | 4.3 | 1 |

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ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-4

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|--|----|----|----|----|----|---|---|------|--------|
| E06 | Degraded Core Cooling / 4 | | X | | | | | EK2.2 - Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility | 3.8 | 1 |
| E09 | Natural Circulation Operations / 4 | X | | | | | | EK1.2 - Normal, abnormal and emergency operating procedures associated with Natural Circulation Operations | 3.3 | 1 |
| E09 | Natural Circulation Operations / 4 | | X | | | | | EK2.2 - Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility | 3.6 | 1 |
| E10 | Natural Circulation with Steam Void in Vessel with/without RVLIS / 4 | X | | | | | | EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the Natural Circulation with Steam Void in Vessel with/without RVLIS | 3.3 | 1 |
| E10 | Natural Circulation with Steam Void in Vessel with/without RVLIS / 4 | | | X | | | | EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations | 3.4 | 1 |
| E14 | High Containment Pressure / 5 | | | | | X | | EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments | 3.3 | 1 |

K/A Category Totals: 4 4 2 3 2 1

Group Point Total: 16

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-4

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|--|----|----|----|----|----|---|--|------|--------|
| 007 | Reactor Trip / 1 | | | X | | | | EK3.01 - Actions contained in EOP for reactor trip | 4.0 | 1 |
| 007 | Reactor Trip / 1 | | | | | X | | EA2.05 - Reactor trip first-out indication | 3.4 | 1 |
| 008 | Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) / 3 | | X | | | | | AK2.02 - Sensors and detectors | 2.7* | 1 |
| 029 | Anticipated Transient Without Scram (ATWS) / 1 | | | X | | | | EK3.07 - Using local turbine trip lever | 3.1* | 1 |
| 038 | Steam Generator Tube Rupture (SGTR) / 3 | X | | | | | | EK1.01 - Use of steam tables | 3.1 | 1 |
| 054 | Loss of Main Feedwater (MFW) / 4 | X | | | | | | AK1.01 - MFW line break depressurizes the S/G (similar to a steam line break) | 4.1 | 1 |
| 054 | Loss of Main Feedwater (MFW) / 4 | | | | X | | | AA1.03 - AFW auxiliaries, including oil cooling water supply | 3.5 | 1 |
| 059 | Accidental Liquid Radwaste Release / 9 | | | X | | | | AK3.01 - Termination of a release of radioactive liquid | 3.5 | 1 |
| 060 | Accidental Gaseous Radwaste Release / 9 | | X | | | | | AK2.01 - ARM system, including the normal radiation-level indications and the operability status | 2.6 | 1 |
| 060 | Accidental Gaseous Radwaste Release / 9 | | | | X | | | AA1.01 - Area radiation monitors | 2.8 | 1 |

PWR RO Examination Outline

Printed: 04/17/2000

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ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-4

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|---|----|----|----|----|----|---|---|------|--------|
| E01 | Rediagnosis / 3 | | | | X | | | EA1.2 - Operating behavior characteristics of the facility | 3.3 | 1 |
| E03 | LOCA Cooldown and Depressurization / 4 | | | X | | | | EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations | 3.9 | 1 |
| E03 | LOCA Cooldown and Depressurization / 4 | | | | | | X | 2.1.20 - Ability to execute procedure steps. | 4.3 | 1 |
| E04 | LOCA Outside Containment / 3 | X | | | | | | EK1.1 - Components, capacity, and function of emergency systems | 3.5 | 1 |
| E04 | LOCA Outside Containment / 3 | | | | X | | | EA1.2 - Operating behavior characteristics of the facility | 3.6 | 1 |
| E05 | Loss of Secondary Heat Sink / 4 | | X | | | | | EK2.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features | 3.7 | 1 |
| E11 | Loss of Emergency Coolant Recirculation / 4 | | | X | | | | EK3.2 - Normal, abnormal and emergency operating procedures associated with Loss of Emergency Coolant Recirculation | 3.5 | 1 |

K/A Category Totals: 3 3 5 4 1 1

Group Point Total: 17

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 3

Form ES-401-4

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|------------------------------|----|----|----|----|----|---|---|------|--------|
| 036 | Fuel Handling Incidents / 8 | X | | | | | | AK1.02 - SDM | 3.4 | 1 |
| 036 | Fuel Handling Incidents / 8 | | X | | | | | AK2.01 - Fuel handling equipment | 2.9 | 1 |
| E15 | Containment Flooding / 5 | | | | X | | | EA1.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features | 2.9 | 1 |

K/A Category Totals: 1 1 0 1 0 0

Group Point Total: 3

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

| ES - 401 | | Plant Systems - Tier 2 / Group 1 | | | | | | | | | | | | Form ES-401-4 | |
|----------|---|----------------------------------|----|----|----|----|----|----|----|----|----|---|---|---------------|--------|
| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
| 001 | Control Rod Drive System / 1 | | | | | X | | | | | | | K5.54 - Definition and units of reactivity | 2.8 | 1 |
| 001 | Control Rod Drive System / 1 | | | | | | X | | | | | | K6.09 - Purpose and operation of neutron flux recorder at high speed concentration | 2.9* | 1 |
| 003 | Reactor Coolant Pump System (RCPS) / 4 | | X | | | | | | | | | | K2.02 - CCW pumps | 2.5* | 1 |
| 003 | Reactor Coolant Pump System (RCPS) / 4 | | | X | | | | | | | | | K3.01 - RCS | 3.7 | 1 |
| 004 | Chemical and Volume Control System (CVCS) / 1 | X | | | | | | | | | | | K1.29 - Effect and detection of leaking PORV or relief on PZR level and pressure, including VCT makeup activity in automatic mode | 3.4 | 1 |
| 004 | Chemical and Volume Control System (CVCS) / 1 | | | | | | X | | | | | | K6.04 - Pumps | 2.8 | 1 |
| 013 | Engineered Safety Features Actuation System (ESFAS) / 2 | | | | X | | | | | | | | K4.03 - Main Steam Isolation System | 3.9 | 1 |
| 013 | Engineered Safety Features Actuation System (ESFAS) / 2 | | | | | | | | | | X | | A4.01 - ESFAS-initiated equipment which fails to actuate | 4.5 | 1 |
| 015 | Nuclear Instrumentation System / 7 | | | | X | | | | | | | | K4.05 - Reactor trip | 4.3 | 1 |
| 015 | Nuclear Instrumentation System / 7 | | | | | | | X | | | | | A1.01 - NIS calibration by heat balance | 3.5 | 1 |
| 017 | In-Core Temperature Monitor (ITM) System / 7 | | | | | | | | X | | | | A2.01 - Thermocouple open and short circuits | 3.1 | 1 |

PWR RO Examination Outline

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Facility: Braidwood

| ES - 401 | | Plant Systems - Tier 2 / Group 1 | | | | | | | | | | | Form ES-401-4 | | |
|----------|--|----------------------------------|----|----|----|----|----|----|----|----|----|---|---|------|--------|
| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
| 017 | In-Core Temperature Monitor (ITM) System / 7 | | | | | | | | | | X | | A4.01 - Actual in-core temperatures | 3.8 | 1 |
| 022 | Containment Cooling System (CCS) / 5 | | | | X | | | | | | | | K4.02 - Correlation of fan speed and flowpath changes with containment pressure | 3.1* | 1 |
| 022 | Containment Cooling System (CCS) / 5 | | X | | | | | | | | | | K2.01 - Containment cooling fans | 3.0* | 1 |
| 056 | Condensate System / 4 | X | | | | | | | | | | | K1.03 - MFW | 2.6* | 1 |
| 059 | Main Feedwater (MFW) System / 4 | | | | | | | | | | | X | 2.1.12 - Ability to apply technical specifications for a system. | 2.9 | 1 |
| 059 | Main Feedwater (MFW) System / 4 | | | X | | | | | | | | | K3.03 - S/Gs | 3.5 | 1 |
| 061 | Auxiliary / Emergency Feedwater (AFW) System / 4 | | | | | | | | | X | | | A3.04 - Automatic AFW isolation | 4.1 | 1 |
| 061 | Auxiliary / Emergency Feedwater (AFW) System / 4 | | | | | | | | | X | | | A3.02 - RCS cooldown during AFW operations | 4.0 | 1 |
| 068 | Liquid Radwaste System (LRS) / 9 | | | | | | | | X | | | | A2.04 - Failure of automatic isolation | 3.3 | 1 |
| 071 | Waste Gas Disposal System (WGDS) / 9 | | | | | | | | | | | X | 2.1.28 - Knowledge of the purpose and function of major system components and controls. | 3.2 | 1 |
| 071 | Waste Gas Disposal System (WGDS) / 9 | | | | | | | X | | | | | A1.06 - Ventilation system | 2.5 | 1 |

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Plant Systems - Tier 2 / Group 1

Form ES-401-4

| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
|----------|--|----|----|----|----|----|----|----|----|----|----|---|--|-----|--------|
| 072 | Area Radiation Monitoring (ARM) System / 7 | | | | | X | | | | | | | K5.01 - Radiation theory, including sources, types, units, and effects | 2.7 | 1 |

K/A Category Totals: 2 2 2 3 2 2 2 2 2 2 2 2

Group Point Total: 23

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Plant Systems - Tier 2 / Group 2

Form ES-401-4

| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
|----------|---|----|----|----|----|----|----|----|----|----|----|---|---|------|--------|
| 002 | Reactor Coolant System (RCS) / 2 | | | | | | | X | | | | | A1.09 - RCS T-ave | 3.7 | 1 |
| 002 | Reactor Coolant System (RCS) / 2 | | | | | | | | | | X | | A4.03 - Indications and controls necessary to recognize and correct saturation conditions | 4.3 | 1 |
| 010 | Pressurizer Pressure Control System (PZR PCS) / 3 | | | | | | | | | | | X | 2.1.10 - Knowledge of conditions and limitations in the facility license. | 2.7 | 1 |
| 010 | Pressurizer Pressure Control System (PZR PCS) / 3 | | | | | | X | | | | | | K6.01 - Pressure detection systems | 2.7 | 1 |
| 012 | Reactor Protection System / 7 | | | | | X | | | | | | | K5.01 - DNB | 3.3* | 1 |
| 014 | Rod Position Indication System (RPIS) / 1 | | | | X | | | | | | | | K4.04 - Zone reference lights | 2.6* | 1 |
| 026 | Containment Spray System (CSS) / 5 | | | | | | | | X | | | | A2.09 - Radiation hazard potential of BWST | 2.5* | 1 |
| 033 | Spent Fuel Pool Cooling System (SFPCS) / 8 | | | | | | | | | X | | | A3.01 - Temperature control valves | 2.5* | 1 |
| 035 | Steam Generator System (S/GS) / 4 | | | | X | | | | | | | | K4.01 - S/G level control | 3.6 | 1 |
| 039 | Main and Reheat Steam System (MRSS) / 4 | | | X | | | | | | | | | K3.04 - MFW pumps | 2.5* | 1 |
| 039 | Main and Reheat Steam System (MRSS) / 4 | | | | | | | | | X | | | A3.02 - Isolation of the MRSS | 3.1 | 1 |

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Plant Systems - Tier 2 / Group 2

Form ES-401-4

| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
|----------|---|----|----|----|----|----|----|----|----|----|----|---|---------------------------------------|------|--------|
| 055 | Condenser Air Removal System (CARS) / 4 | | | X | | | | | | | | | K3.01 - Main condenser | 2.5 | 1 |
| 062 | A.C. Electrical Distribution System / 6 | X | | | | | | | | | | | K1.04 - Off-site power sources | 3.7 | 1 |
| 063 | D.C. Electrical Distribution System / 6 | | X | | | | | | | | | | K2.01 - Major DC loads | 2.9* | 1 |
| 063 | D.C. Electrical Distribution System / 6 | | | | X | | | | | | | | K4.04 - Trips | 2.6? | 1 |
| 064 | Emergency Diesel Generator (ED/G) System / 6 | X | | | | | | | | | | | K1.05 - Starting air system | 3.4 | 1 |
| 064 | Emergency Diesel Generator (ED/G) System / 6 | | | | | | X | | | | | | K6.08 - Fuel oil storage tanks | 3.2 | 1 |
| 073 | Process Radiation Monitoring (PRM) System / 7 | | | | | | | X | | | | | A1.01 - Radiation levels | 3.2 | 1 |
| 075 | Circulating Water System / 8 | | X | | | | | | | | | | K2.03 - Emergency/essential SWS pumps | 2.6* | 1 |
| 079 | Station Air System (SAS) / 8 | | | | X | | | | | | | | K4.01 - Cross-connect with IAS | 2.9 | 1 |

K/A Category Totals: 2 2 2 4 1 2 2 1 2 1 1

Group Point Total: 20

PWR RO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Plant Systems - Tier 2 / Group 3

Form ES-401-4

| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
|----------|---|----|----|----|----|----|----|----|----|----|----|---|---|------|--------|
| 005 | Residual Heat Removal System (RHRS) / 4 | | X | | | | | | | | | | K2.01 - RHR pumps | 3.0 | 1 |
| 027 | Containment Iodine Removal System (CIRS) / 5 | | | | | | | | X | | | | A2.01 - High temperature in the filter system | 3.0* | 1 |
| 028 | Hydrogen Recombiner and Purge Control System (HRPS) / 5 | | | X | | | | | | | | | K3.01 - Hydrogen concentration in containment | 3.3 | 1 |
| 041 | Steam Dump System (SDS) and Turbine Bypass Control / 4 | | | | | X | | | | | | | K5.06 - Effect of power change on fuel cladding | 2.5 | 1 |
| 076 | Service Water System (SWS) / 4 | | | X | | | | | | | | | K3.03 - Reactor building closed cooling water | 3.5* | 1 |
| 076 | Service Water System (SWS) / 4 | | | | | | | | X | | | | A2.01 - Loss of SWS | 3.5* | 1 |
| 078 | Instrument Air System (IAS) / 8 | | | | | | | | | X | | | A3.01 - Air pressure | 3.1 | 1 |
| 103 | Containment System / 5 | | | | X | | | | | | | | K4.04 - Personnel access hatch and emergency access hatch | 2.5 | 1 |

K/A Category Totals: 0 1 2 1 1 0 0 2 1 0 0

Group Point Total: 8

Generic Knowledge and Abilities Outline (Tier 3)

Printed: 04/17/2000

PWR RO Examination Outline

Form ES-401-5

Facility: Braidwood

| Generic Category | KA | KA Topic | Imp. | Points |
|----------------------------------|--------|--|------|-----------|
| Conduct of Operations | 2.1.9 | Ability to direct personnel activities inside the control room. | 2.5 | 1 |
| | 2.1.22 | Ability to determine Mode of Operation. | 2.8 | 1 |
| | 2.1.8 | Ability to coordinate personnel activities outside the control room. | 3.8 | 1 |
| Category Total: | | | | 3 |
| Equipment Control | 2.2.30 | Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation. | 3.5 | 1 |
| | 2.2.13 | Knowledge of tagging and clearance procedures. | 3.6 | 1 |
| | 2.2.33 | Knowledge of control rod programming. | 2.5 | 1 |
| Category Total: | | | | 3 |
| Radiation Control | 2.3.11 | Ability to control radiation releases. | 2.7 | 1 |
| | 2.3.4 | Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. | 2.5 | 1 |
| | 2.3.1 | Knowledge of 10 CFR: 20 and related facility radiation control requirements. | 2.6 | 1 |
| Category Total: | | | | 3 |
| Emergency Procedures/Plan | 2.4.13 | Knowledge of crew roles and responsibilities during EOP flowchart use. | 3.3 | 1 |
| | 2.4.17 | Knowledge of EOP terms and definitions. | 3.1 | 1 |
| | 2.4.26 | Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage. | 2.9 | 1 |
| | 2.4.19 | Knowledge of EOP layout, symbols, and icons. | 2.7 | 1 |
| Category Total: | | | | 4 |
| Generic Total: | | | | 13 |

Facility: Braidwood Units 1 and 2

Form ES-401-3

Exam Date: 10/20/2000

Exam Level: SRO

| Tier | Group | K/A Category Points | | | | | | | | | | | Point Total |
|--|-------------|---------------------|----|----|-------|----|-------|----|-------|----|-------|---|-------------|
| | | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | |
| 1. Emergency & Abnormal Plant Evolutions | 1 | 4 | 4 | 4 | | | | 4 | 6 | | | 2 | 24 |
| | 2 | 2 | 3 | 3 | | | | 3 | 3 | | | 2 | 16 |
| | 3 | 0 | 1 | 0 | | | | 0 | 1 | | | 1 | 3 |
| | Tier Totals | 6 | 8 | 7 | | | | 7 | 10 | | | 5 | 43 |
| 2. Plant Systems | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 19 |
| | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 17 |
| | 3 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 4 |
| | Tier Totals | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 5 | 40 |
| 3. Generic Knowledge And Abilities | | | | | Cat 1 | | Cat 2 | | Cat 3 | | Cat 4 | | |
| | | | | | 4 | | 4 | | 4 | | 5 | | 17 |

- 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).
2. Actual point totals must match those specified in the table.
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 RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-3

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|---|----|----|----|----|----|---|--|------|--------|
| 005 | Inoperable/Stuck Control Rod / 1 | | X | | | | | AK2.02 - Breakers, relays, disconnects, and control room switches | 2.6 | 1 |
| 017 | Reactor Coolant Pump (RCP) Malfunctions (Loss of RC Flow) / 4 | | | | | X | | AA2.07 - Calculation of expected values of flow in the loop with RCP secured | 2.9 | 1 |
| 024 | Emergency Boration / 1 | | X | | | | | AK2.01 - Valves | 2.7 | 1 |
| 024 | Emergency Boration / 1 | | | | | X | | AA2.06 - When boron dilution is taking place | 3.7 | 1 |
| 029 | Anticipated Transient Without Scram (ATWS) / 1 | | | X | | | | EK3.07 - Using local turbine trip lever | 3.4* | 1 |
| 051 | Loss of Condenser Vacuum / 4 | | | | X | | | AA1.04 - Rod position | 2.5* | 1 |
| 059 | Accidental Liquid Radwaste Release / 9 | | | X | | | | AK3.01 - Termination of a release of radioactive liquid | 3.9 | 1 |
| 067 | Plant Fire on Site / 9 | | | | | X | | AA2.13 - Need for emergency plant shutdown | 4.4 | 1 |
| 069 | Loss of Containment Integrity / 5 | X | | | | | | AK1.01 - Effect of pressure on leak rate | 3.1 | 1 |
| 069 | Loss of Containment Integrity / 5 | | | X | | | | AK3.01 - Guidance contained in EOP for loss of containment integrity | 4.2 | 1 |

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-3

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|------------------------------|----|----|----|----|----|---|---|------|--------|
| 074 | Inadequate Core Cooling / 4 | X | | | | | | EK1.01 - Methods of calculating subcooling margin | 4.7 | 1 |
| 074 | Inadequate Core Cooling / 4 | | | | X | | | EA1.13 - Subcooling margin indicators | 4.6 | 1 |
| E01 | Rediagnosis / 3 | | | | X | | | EA1.2 - Operating behavior characteristics of the facility | 3.6 | 1 |
| E01 | Rediagnosis / 3 | | | | | | X | 2.4.1 - Knowledge of EOP entry conditions and immediate action steps. | 4.6 | 1 |
| E02 | SI Termination / 3 | | | | | X | | EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations | 4.2 | 1 |
| E04 | LOCA Outside Containment / 3 | | | | X | | | EA1.2 - Operating behavior characteristics of the facility | 3.8 | 1 |
| E06 | Degraded Core Cooling / 4 | | X | | | | | EK2.2 - Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility | 4.1 | 1 |
| E07 | Saturated Core Cooling / 4 | | | | | X | | EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments | 3.9 | 1 |
| E07 | Saturated Core Cooling / 4 | | | | | | X | 2.1.20 - Ability to execute procedure steps. | 4.2 | 1 |

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 1

Form ES-401-3

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|--|----|----|----|----|----|---|---|------|--------|
| E09 | Natural Circulation Operations / 4 | X | | | | | | EK1.2 - Normal, abnormal and emergency operating procedures associated with Natural Circulation Operations | 3.7 | 1 |
| E09 | Natural Circulation Operations / 4 | | X | | | | | EK2.2 - Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility | 3.9 | 1 |
| E10 | Natural Circulation with Steam Void in Vessel with/without RVLIS / 4 | X | | | | | | EK1.3 - Annunciators and conditions indicating signals, and remedial actions associated with the Natural Circulation with Steam Void in Vessel with/without RVLIS | 3.6 | 1 |
| E10 | Natural Circulation with Steam Void in Vessel with/without RVLIS / 4 | | | X | | | | EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations | 3.6 | 1 |
| E14 | High Containment Pressure / 5 | | | | | X | | EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments | 3.8 | 1 |

K/A Category Totals: 4 4 4 4 6 2

Group Point Total: 24

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-3

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|--|----|----|----|----|----|---|---|------|--------|
| 007 | Reactor Trip / 1 | | | X | | | | EK3.01 - Actions contained in EOP for reactor trip | 4.6 | 1 |
| 007 | Reactor Trip / 1 | | | | | X | | EA2.05 - Reactor trip first-out indication | 3.9 | 1 |
| 008 | Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) / 3 | | X | | | | | AK2.02 - Sensors and detectors | 2.7 | 1 |
| 008 | Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) / 3 | | | | | | X | 2.1.20 - Ability to execute procedure steps. | 4.2 | 1 |
| 022 | Loss of Reactor Coolant Makeup / 2 | | | | | X | | AA2.04 - How long PZR level can be maintained within limits | 3.8 | 1 |
| 027 | Pressurizer Pressure Control (PZR PCS) Malfunction / 3 | | | | X | | | AA1.01 - PZR heaters, sprays, and PORVs | 3.9 | 1 |
| 038 | Steam Generator Tube Rupture (SGTR) / 3 | X | | | | | | EK1.01 - Use of steam tables | 3.4 | 1 |
| 054 | Loss of Main Feedwater (MFW) / 4 | X | | | | | | AK1.01 - MFW line break depressurizes the S/G (similar to a steam line break) | 4.3 | 1 |
| 054 | Loss of Main Feedwater (MFW) / 4 | | | | X | | | AA1.03 - AFW auxiliaries, including oil cooling water supply | 3.7 | 1 |
| 058 | Loss of DC Power / 6 | | | | | X | | AA2.01 - That a loss of dc power has occurred; verification that substitute power sources have come on line | 4.1 | 1 |

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 2

Form ES-401-3

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|---|----|----|----|----|----|---|---|------|--------|
| 060 | Accidental Gaseous Radwaste Release / 9 | | X | | | | | AK2.01 - ARM system, including the normal radiation-level indications and the operability status | 2.9* | 1 |
| 060 | Accidental Gaseous Radwaste Release / 9 | | | | X | | | AA1.01 - Area radiation monitors | 3.0 | 1 |
| E03 | LOCA Cooldown and Depressurization / 4 | | | X | | | | EK3.3 - Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations | 3.9 | 1 |
| E03 | LOCA Cooldown and Depressurization / 4 | | | | | | X | 2.1.20 - Ability to execute procedure steps. | 4.2 | 1 |
| E05 | Loss of Secondary Heat Sink / 4 | | X | | | | | EK2.1 - Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features | 3.9 | 1 |
| E11 | Loss of Emergency Coolant Recirculation / 4 | | | X | | | | EK3.2 - Normal, abnormal and emergency operating procedures associated with Loss of Emergency Coolant Recirculation | 4.0 | 1 |

K/A Category Totals: 2 3 3 3 3 2

Group Point Total: 16

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Emergency and Abnormal Plant Evolutions - Tier 1 / Group 3

Form ES-401-3

| E/APE # | E/APE Name / Safety Function | K1 | K2 | K3 | A1 | A2 | G | KA Topic | Imp. | Points |
|---------|---|----|----|----|----|----|---|---|------|--------|
| 028 | Pressurizer (PZR) Level Control Malfunction / 2 | | | | | X | | AA2.12 - Cause for PZR level deviation alarm: controller malfunction or other instrumentation malfunction | 3.5 | 1 |
| 028 | Pressurizer (PZR) Level Control Malfunction / 2 | | | | | | X | 2.1.20 - Ability to execute procedure steps. | 4.2 | 1 |
| 036 | Fuel Handling Incidents / 8 | | X | | | | | AK2.01 - Fuel handling equipment | 3.5 | 1 |

K/A Category Totals: 0 1 0 0 1 1

Group Point Total: 3

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Plant Systems - Tier 2 / Group 1

Form ES-401-3

| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
|----------|---|----|----|----|----|----|----|----|----|----|----|---|---|------|--------|
| 001 | Control Rod Drive System / 1 | | | | | X | | | | | | | K5.54 - Definition and units of reactivity | 3.1 | 1 |
| 001 | Control Rod Drive System / 1 | | | | | | X | | | | | | K6.09 - Purpose and operation of neutron flux recorder at high speed concentration | 2.9* | 1 |
| 003 | Reactor Coolant Pump System (RCPS) / 4 | | | X | | | | | | | | | K3.01 - RCS | 4.0 | 1 |
| 004 | Chemical and Volume Control System (CVCS) / 1 | X | | | | | | | | | | | K1.29 - Effect and detection of leaking PORV or relief on PZR level and pressure, including VCT makeup activity in automatic mode | 4.0 | 1 |
| 004 | Chemical and Volume Control System (CVCS) / 1 | | | | | | X | | | | | | K6.04 - Pumps | 3.1 | 1 |
| 013 | Engineered Safety Features Actuation System (ESFAS) / 2 | | | | | | | | | | X | | A4.01 - ESFAS-initiated equipment which fails to actuate | 4.8 | 1 |
| 014 | Rod Position Indication System (RPIS) / 1 | | | | X | | | | | | | | K4.04 - Zone reference lights | 2.9* | 1 |
| 015 | Nuclear Instrumentation System / 7 | | | | | | | | | | | X | 2.1.12 - Ability to apply technical specifications for a system. | 4.0 | 1 |
| 015 | Nuclear Instrumentation System / 7 | | | | | | | X | | | | | A1.01 - NIS calibration by heat balance | 3.8 | 1 |
| 017 | In-Core Temperature Monitor (ITM) System / 7 | | | | | | | | | | X | | A4.01 - Actual in-core temperatures | 4.1 | 1 |
| 022 | Containment Cooling System (CCS) / 5 | | | | | | | | | | | X | 2.1.10 - Knowledge of conditions and limitations in the facility license. | 3.9 | 1 |

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Plant Systems - Tier 2 / Group 1

Form ES-401-3

| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
|----------|--|----|----|----|----|----|----|----|----|----|----|---|--|------|--------|
| 022 | Containment Cooling System (CCS) / 5 | | X | | | | | | | | | | K2.01 - Containment cooling fans | 3.1 | 1 |
| 026 | Containment Spray System (CSS) / 5 | | | | | | | | X | | | | A2.09 - Radiation hazard potential of BWST | 2.9* | 1 |
| 056 | Condensate System / 4 | X | | | | | | | | | | | K1.03 - MFW | 2.6 | 1 |
| 059 | Main Feedwater (MFW) System / 4 | | | X | | | | | | | | | K3.03 - S/Gs | 3.7 | 1 |
| 061 | Auxiliary / Emergency Feedwater (AFW) System / 4 | | | | | | | | | X | | | A3.02 - RCS cooldown during AFW operations | 4.0 | 1 |
| 063 | D.C. Electrical Distribution System / 6 | | X | | | | | | | | | | K2.01 - Major DC loads | 3.1* | 1 |
| 063 | D.C. Electrical Distribution System / 6 | | | | X | | | | | | | | K4.04 - Trips | 2.9? | 1 |
| 071 | Waste Gas Disposal System (WGDS) / 9 | | | | | | | X | | | | | A1.06 - Ventilation system | 2.8 | 1 |

K/A Category Totals: 2 2 2 2 1 2 2 1 1 2 2

Group Point Total: 19

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Plant Systems - Tier 2 / Group 2

Form ES-401-3

| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
|----------|---|----|----|----|----|----|----|----|----|----|----|---|---|------|--------|
| 002 | Reactor Coolant System (RCS) / 2 | | | | | | | X | | | | | A1.09 - RCS T-ave | 3.8 | 1 |
| 002 | Reactor Coolant System (RCS) / 2 | | | | | | | | | | X | | A4.03 - Indications and controls necessary to recognize and correct saturation conditions | 4.4 | 1 |
| 010 | Pressurizer Pressure Control System (PZR PCS) / 3 | | | | | | X | | | | | | K6.01 - Pressure detection systems | 3.1 | 1 |
| 011 | Pressurizer Level Control System (PZR LCS) / 2 | | | | | | | | | | | X | 2.1.12 - Ability to apply technical specifications for a system. | 4.0 | 1 |
| 012 | Reactor Protection System / 7 | | | | | X | | | | | | | K5.01 - DNB | 3.8 | 1 |
| 027 | Containment Iodine Removal System (CIRS) / 5 | | | | | | | | X | | | | A2.01 - High temperature in the filter system | 3.3* | 1 |
| 028 | Hydrogen Recombiner and Purge Control System (HRPS) / 5 | | | X | | | | | | | | | K3.01 - Hydrogen concentration in containment | 4.0 | 1 |
| 029 | Containment Purge System (CPS) / 8 | | | | | | | | | | | X | 2.1.10 - Knowledge of conditions and limitations in the facility license. | 3.9 | 1 |
| 033 | Spent Fuel Pool Cooling System (SFPCS) / 8 | | | | | | | | | X | | | A3.01 - Temperature control valves | 2.7* | 1 |
| 035 | Steam Generator System (S/GS) / 4 | | | | X | | | | | | | | K4.01 - S/G level control | 3.8 | 1 |

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

| ES - 401 | | Plant Systems - Tier 2 / Group 2 | | | | | | | | | | | | Form ES-401-3 | |
|----------|---|----------------------------------|----|----|----|----|----|----|----|----|----|---|---------------------------------------|---------------|--------|
| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
| 039 | Main and Reheat Steam System (MRSS) / 4 | | | | | | | | | X | | | A3.02 - Isolation of the MRSS | 3.5* | 1 |
| 062 | A.C. Electrical Distribution System / 6 | X | | | | | | | | | | | K1.04 - Off-site power sources | 4.2 | 1 |
| 064 | Emergency Diesel Generator (ED/G) System / 6 | X | | | | | | | | | | | K1.05 - Starting air system | 3.9 | 1 |
| 064 | Emergency Diesel Generator (ED/G) System / 6 | | | | | | X | | | | | | K6.08 - Fuel oil storage tanks | 3.3 | 1 |
| 073 | Process Radiation Monitoring (PRM) System / 7 | | | | | | | X | | | | | A1.01 - Radiation levels | 3.5 | 1 |
| 075 | Circulating Water System / 8 | | X | | | | | | | | | | K2.03 - Emergency/essential SWS pumps | 2.7* | 1 |
| 079 | Station Air System (SAS) / 8 | | | | X | | | | | | | | K4.01 - Cross-connect with IAS | 3.2 | 1 |

K/A Category Totals: 2 1 1 2 1 2 2 1 2 1 2

Group Point Total: 17

PWR SRO Examination Outline

Printed: 04/17/2000

Facility: Braidwood

ES - 401

Plant Systems - Tier 2 / Group 3

Form ES-401-3

| Sys/Ev # | System / Evolution Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | KA Topic | Imp | Points |
|----------|--|----|----|----|----|----|----|----|----|----|----|---|--|------|--------|
| 008 | Component Cooling Water System (CCWS) / 8 | | | | | | | | | | | X | 2.1.12 - Ability to apply technical specifications for a system. | 4.0 | 1 |
| 041 | Steam Dump System (SDS) and Turbine Bypass Control / 4 | | | | | X | | | | | | | K5.06 - Effect of power change on fuel cladding | 2.8* | 1 |
| 076 | Service Water System (SWS) / 4 | | | X | | | | | | | | | K3.03 - Reactor building closed cooling water | 3.9* | 1 |
| 076 | Service Water System (SWS) / 4 | | | | | | | | X | | | | A2.01 - Loss of SWS | 3.7* | 1 |

K/A Category Totals: 0 0 1 0 1 0 0 1 0 0 1

Group Point Total: 4

PWR SRO Examination Outline

Form ES-401-5

Facility: Braidwood

| Generic Category | KA | KA Topic | Imp. | Points |
|------------------------------|--------|---|------|----------|
| Conduct of Operations | 2.1.22 | Ability to determine Mode of Operation. | 3.3 | 1 |
| | 2.1.8 | Ability to coordinate personnel activities outside the control room. | 3.6 | 1 |
| | 2.1.13 | Knowledge of facility requirements for controlling vital / controlled access. | 2.9 | 1 |
| | 2.1.34 | Ability to maintain primary and secondary plant chemistry within allowable limits. | 2.9 | 1 |
| Category Total: | | | | 4 |
| Equipment Control | 2.2.33 | Knowledge of control rod programming. | 2.9 | 1 |
| | 2.2.11 | Knowledge of the process for controlling temporary changes. | 3.4* | 1 |
| | 2.2.20 | Knowledge of the process for managing troubleshooting activities. | 3.3 | 1 |
| | 2.2.23 | Ability to track limiting conditions for operations. | 3.8 | 1 |
| Category Total: | | | | 4 |
| Radiation Control | 2.3.1 | Knowledge of 10 CFR: 20 and related facility radiation control requirements. | 3.0 | 1 |
| | 2.3.4 | Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized. | 3.1 | 1 |
| | 2.3.10 | Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure. | 3.3 | 1 |
| | 2.3.2 | Knowledge of facility ALARA program. | 2.9 | 1 |
| Category Total: | | | | 4 |

Generic Knowledge and Abilities Outline (Tier 3)

Printed: 04/17/2000

PWR SRO Examination Outline

Form ES-401-5

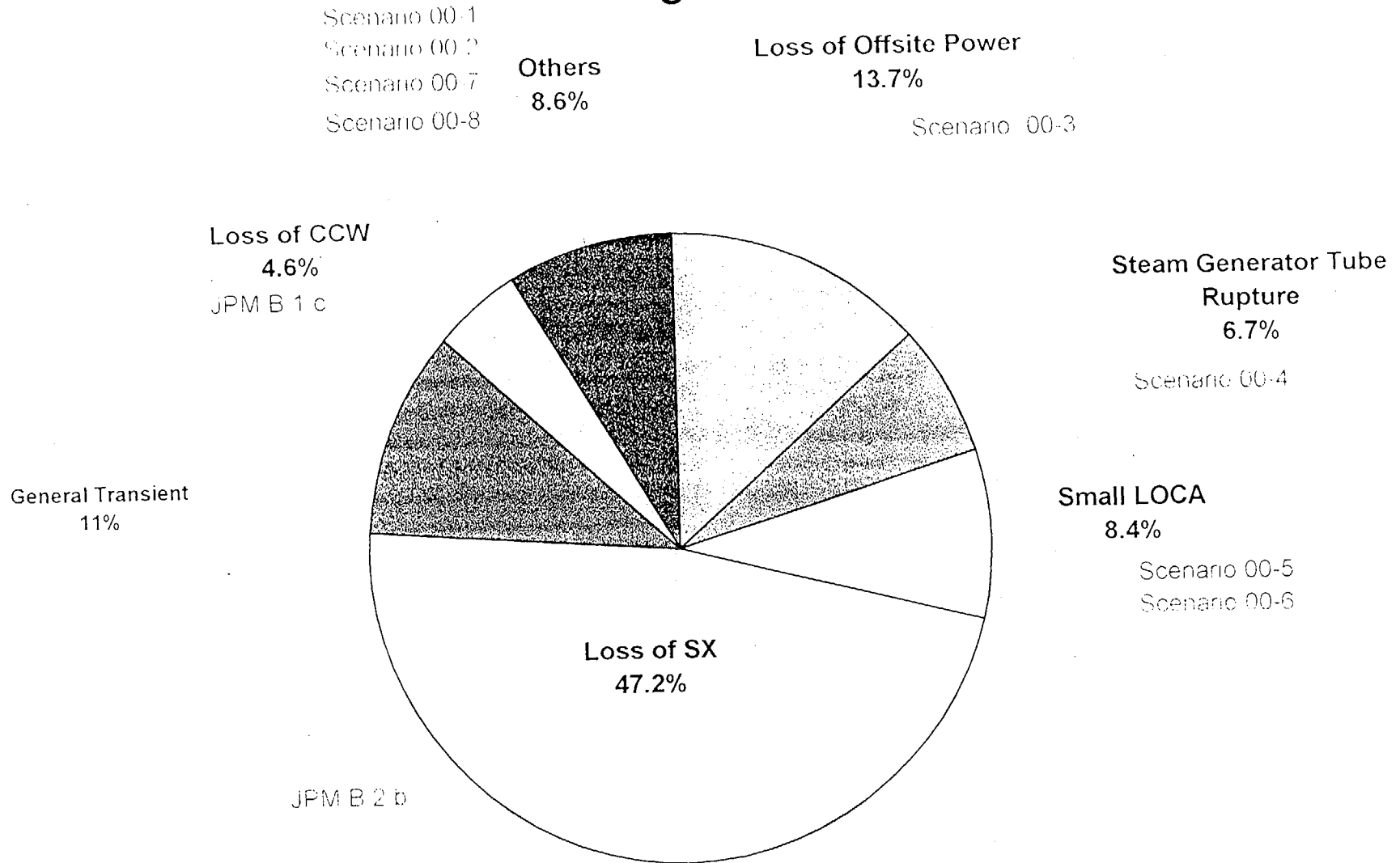
Facility: Braidwood

| Generic Category | KA | KA Topic | Imp. | Points |
|---------------------------|--------|--|------|--------|
| Emergency Procedures/Plan | 2.4.19 | Knowledge of EOP layout, symbols, and icons. | 3.7 | 1 |
| | 2.4.26 | Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage. | 3.3 | 1 |
| | 2.4.22 | Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations. | 4.0 | 1 |
| | 2.4.29 | Knowledge of the emergency plan. | 4.0 | 1 |
| | 2.4.7 | Knowledge of event based EOP mitigation strategies. | 3.8 | 1 |

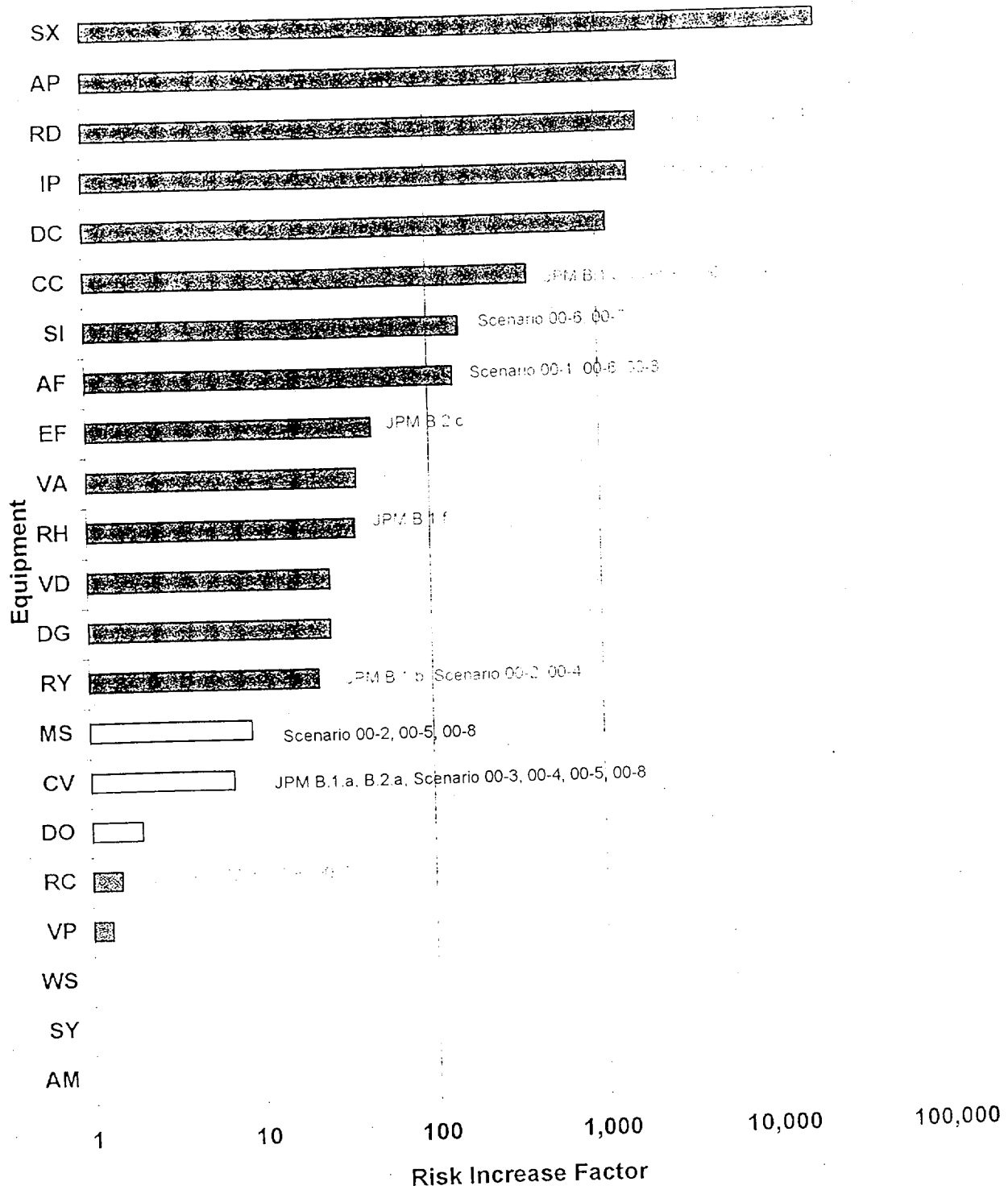
Category Total: 5

Generic Total: 17

Inititiating Events



Potential Risk Increase Factor* for Key Equipment



Braidwood Suppressed KAs

| KA | Sytem/EPE/Generic | KA Statement |
|--------|-------------------|---|
| AK1.13 | 000003 | Interaction of ICS control stations as well as purpose, function, and modes of operation of ICS |
| AK3.01 | 000003 | When ICS logic has failed on a dropped rod, the load must be reduced until flux is within specified target bank |
| AA1.03 | 000005 | Metroscope |
| AK2.03 | 000005 | Metroscope |
| AA1.02 | 000008 | HPI pump to control PZR level/pressure |
| AA1.05 | 000008 | LPI System |
| EA1.03 | 000009 | Low-pressure SWS activity monitor |
| EA1.18 | 000009 | Balancing of HPI loop flows |
| EA2.09 | 000009 | Low-pressure SWS activity monitor |
| EA2.34 | 000009 | Conditions for throttling or stopping HPI |
| EA2.35 | 000009 | Conditions for throttling or stopping reflux boiling spray |
| EK3.27 | 000009 | Manual depressurization or HPI recirculation for sustained high pressure |
| EA1.09 | 000011 | Core flood tank initiation |
| EA1.16 | 000011 | Balancing of HPI loop flows |
| EA2.11 | 000011 | Conditions for throttling or stopping HPI |
| EA2.12 | 000011 | Conditions for throttling or stopping reflux boiling spray |
| AA1.19 | 000015 | Power transfer confirm lamp |
| AA1.19 | 000017 | Power transfer confirm lamp |
| AA1.03 | 000025 | LPI pumps |
| AA1.09 | 000025 | LPI pump switches, ammeter, discharge pressure gauge, flow meter, and indicators |
| AA1.10 | 000025 | LPI pump suction valve and discharge valve indicators |
| AA1.18 | 000025 | LPI header cross-connect valve controller and indicators |
| AA1.20 | 000025 | HPI pump control switch, indicators, ammeter running lights, and flow meter |
| AA1.22 | 000025 | Obtaining of water from BWST for LPI system |
| AA2.05 | 000025 | Limitations on LPI flow and temperature rates of change |
| AK2.04 | 000025 | Raw water or sea water pumps |
| AA1.04 | 000026 | CRDM high-temperature alarm system |
| EA1.04 | 000029 | BIT inlet valve switches |
| EA1.05 | 000029 | BIT outlet valve switches |
| EA2.10 | 000029 | Positive displacement charging pumps |
| EK3.03 | 000029 | Opening BIT inlet and outlet valves |
| AA2.05 | 000033 | Nature of abnormality, from rapid survey of control room data |
| AA1.20 | 000056 | Speed switch room ventilation fan |
| AA2.02 | 000057 | Core flood tank pressure and level indicators |
| AA1.04 | 000062 | CRDM high-temperature alarm system |
| AA1.20 | 000068 | Indicators for operation of startup transformer |
| AA2.04 | 000068 | S/G pressure |
| EA1.03 | 000074 | The alternate control station for turbine bypass valve operation |
| EA1.08 | 000074 | HPI System |
| EA1.10 | 000074 | Core flood system |
| EA1.28 | 000074 | Core flood tank isolation valve controls and indicators |
| EK2.04 | 000074 | HPI pumps |
| EK2.05 | 000074 | LPI pumps |
| EK3.05 | 000074 | Activating the HPI system |

Braidwood Suppressed KAs

| KA | Sytem/EPE/Generic | KA Statement |
|--------|-------------------|--|
| EK3.09 | 000074 | Opening the cross-connect valve from the LPI to the HPI suction |
| EK3.10 | 000074 | Isolating core flood tanks to prevent inadvertent discharge |
| A1.13 | 001000 | "Prepower dependent insertion limit" and power dependent insertion limit, determined with metroscope |
| A2.05 | 001000 | Fractured split pins |
| A2.08 | 001000 | Loss of CCW to CRDS |
| A4.01 | 001000 | Controls for CCWS |
| A4.04 | 001000 | Part-length rod position |
| A4.07 | 001000 | Power source transfer check |
| A4.09 | 001000 | CCWS |
| K1.01 | 001000 | CCW |
| K1.06 | 001000 | WGDS |
| K1.07 | 001000 | Quench tank |
| K1.09 | 001000 | CCWS must be cut in before energizing CRDS |
| K3.03 | 001000 | CCW |
| A4.04 | 002000 | The filling/drainage of LPI pumps during refueling |
| A4.05 | 002000 | The HPI system when it is used to refill the refueling cavity |
| A4.22 | 004000 | Boronometer chart recorder |
| K1.09 | 004000 | Relationship between CVCS and RPIS |
| K1.25 | 004000 | Interface between HPI flow path and excess letdown flow path |
| K5.33 | 004000 | Use of a boronometer |
| K5.40 | 004000 | Response of PRT during bubble formation in PZR: increase in quench tank pressure when cycling PORV shows that complete steam bubble does not exist, that significant noncondensable gas is still present |
| K6.21 | 004000 | Design and purpose of charging pump desurger |
| K6.23 | 004000 | Capacity of boron recovery tanks: plan not to exceed by inefficient boron movement; interface with boron recovery system |
| K6.28 | 004000 | Interface between high-activity waste tank and letdown filter drain |
| K6.33 | 004000 | Principles of boronometer |
| K4.19 | 006000 | Interlocks to storage tank makeup valve |
| K4.22 | 006000 | Interlocks between RCP seal flow rate and standby HPI pump |
| A3.09 | 008000 | Normal CRDM temperatures |
| K3.02 | 008000 | CRDS |
| K1.05 | 011000 | Reactor regulating system |
| K6.07 | 012000 | Core protection calculator |
| K6.08 | 012000 | COLSS |
| K6.09 | 012000 | CEAC |
| K4.14 | 013000 | Upper head injection accumulator isolation |
| A1.01 | 014000 | Metroscope reed switch display |
| A2.06 | 014000 | Loss of LVDT |
| A2.07 | 014000 | Loss of reed switch |
| K2.01 | 014000 | Reed switches |
| K2.02 | 014000 | Metroscope |
| K6.03 | 014000 | Metroscope |
| K1.05 | 015000 | ICS |
| K1.06 | 015000 | Reactor regulating system |
| K3.04 | 015000 | ICS |
| K3.06 | 015000 | Reactor regulating system |

Braidwood Suppressed KAs

| KA | Sytem/EPE/Generic | KA Statement |
|-------|-------------------|--|
| K4.04 | 015000 | Slow response time of SPNDs |
| K1.03 | 022000 | Auxiliary steam |
| A1.01 | 025000 | Temperature chart recorders |
| A1.02 | 025000 | Glycol expansion tank level |
| A1.03 | 025000 | Glycol flow to ice condenser air handling units |
| A2.01 | 025000 | Trip of glycol circulation pumps |
| A2.02 | 025000 | High/low floor cooling temperature |
| A2.03 | 025000 | Opening of ice condenser doors |
| A2.04 | 025000 | Containment isolation |
| A2.05 | 025000 | Abnormal glycol expansion tank level |
| A2.06 | 025000 | Decreasing ice condenser temperature |
| A3.01 | 025000 | Refrigerant system |
| A3.02 | 025000 | Isolation valves |
| A4.01 | 025000 | Ice condenser isolation valves |
| A4.02 | 025000 | Containment vent fans |
| A4.03 | 025000 | Glycol circulation pumps |
| K1.01 | 025000 | Containment ventilation |
| K1.02 | 025000 | Refrigerant systems |
| K1.03 | 025000 | Containment sump system |
| K2.01 | 025000 | Containment ventilation fans and dampers |
| K2.02 | 025000 | Refrigerant systems |
| K2.03 | 025000 | Isolation valves |
| K3.01 | 025000 | Containment |
| K4.01 | 025000 | Glycol expansion tank levels and ice condenser system containment isolation valves |
| K4.02 | 025000 | System control |
| K5.01 | 025000 | Relationships between pressure and temperature |
| K5.02 | 025000 | Heat transfer |
| K5.03 | 025000 | Gas laws |
| K6.01 | 025000 | Upper and lower doors of the ice condenser |
| A3.02 | 035000 | MAD valves |
| A4.01 | 041000 | ICS voltage inverter |
| A4.07 | 041000 | Remote gagging of stuck open-relief valves |
| K2.01 | 041000 | ICS, normal and alternate power supply |
| K2.02 | 041000 | ICS inverter breakers |
| K4.01 | 041000 | RRG/ICS system |
| K4.15 | 041000 | "Measured variable" readings on ICS hand-automatic stations and required action if reading is out of the acceptable band |
| K4.08 | 045000 | The reactor bailey station and reactor diamond station in integrated control circuitry |
| A3.08 | 056000 | Flow through stator coolant and hydrogen coolers |
| A4.05 | 056000 | Valve between upper surge tank and hotwell |
| K1.11 | 056000 | Stator cooling |
| K5.14 | 056000 | Purpose of valve between upper surge tank and hotwell |
| A3.07 | 059000 | ICS |
| A4.10 | 059000 | ICS |
| K1.06 | 068000 | Boron recovery equipment |
| A2.04 | 075000 | Effects of extremes in ambient temperature on cooling tower operation |

Braidwood Suppressed KAs

| KA | Sytem/EPE/Generic | KA Statement |
|-------|-------------------|--|
| A4.13 | 075000 | Cooling tower operations |
| A4.14 | 075000 | Lube oil pumps for circulating water pump |
| K1.06 | 075000 | Cooling towers |
| K4.04 | 075000 | Automatic pickup of backup lube oil pumps (ac and dc) |
| K5.05 | 075000 | Principle of operation of the cooling towers |
| K5.06 | 075000 | Principle of cooling by evaporation |
| K1.03 | 076000 | Relationship of SWS to raw water filtration (RWF) system and location of SWS supply pump to RWF system |
| K2.07 | 076000 | Cooling tower fans |
| K6.08 | 076000 | Cooling towers |
| A1.02 | 086000 | Fire water storage tank level |
| A4.04 | 086000 | Fire water storage tank makeup pumps |
| K1.02 | 086000 | Raw service water |
| A4.05 | 103000 | PDP speed controller |
| K1.03 | 103000 | Shield building vent system |

4-10-00 Training

4-10-00 Operations
Unit Supervisor

| | | |
|--|--|--|
| Facility: <u>Braidwood Unit 1 and 2</u> | | Date of Examination: <u>10/23/00</u> |
| Examination Level (circle one): SRO | | Operating Test Number: <u>1</u> |
| Administrative Topic/Subject Description | | Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions |
| A.1 | Conduct of Operations / Verification of Valve Lineup | JPM (N-143 New) KA 2.1.29 3.4/3.3 Utilizing Mock-up |
| | | |
| | Conduct of Operations / Manual Entry of a Late Log Entry | JPM (N-142) KA 2.1.18 2.9/3.0 |
| | | |
| A.2 | Equipment Control / Perform a QPTR Surveillance | JPM (N-102 Modified) – KA 2.2.12 3.0/3.4 |
| | | |
| A.3 | Radiation Control / Entry and Exit from a RCA | JPM (N-144) KA 2.3.1 2.6/3.0 Evaluated while performing JPM B.2.a |
| | | |
| A.4 | Emergency Plan / GSEP Classification | JPM (New) – KA 2.4.41 2.3/4.1 |
| | | |

| Facility: <u>Braidwood Unit 1 and 2</u> | | Date of Examination: <u>10/23/00</u> |
|--|--|--|
| Examination Level (circle one): RO | | Operating Test Number: <u>1</u> |
| Administrative Topic/Subject Description | | Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions |
| A.1 | Conduct of Operations / Verification of Valve Lineup | JPM (N-143 New) KA 2.1.29 3.4/3.3 Utilizing Mock-up |
| | | |
| | Conduct of Operations / Manual Entry of a Late Log Entry | JPM (N-142) KA 2.1.18 2.9/3.0 |
| | | |
| A.2 | Equipment Control / Perform a QPTR Surveillance | JPM (N-102 Modified) – KA 2.2.12 3.0/3.4 |
| | | |
| A.3 | Radiation Control / Entry and Exit from a RCA | JPM (N-144) KA 2.3.1 2.6/3.0 Evaluated while performing JPM B.2.a |
| | | |
| A.4 | Emergency Plan / Emergency Plan Directions | 2. a. K/A 2.4.39 3.3/3.1 Emergency Exposures |
| | | 2. b. K/A 2.4.29 2.6/4.0 Emergency facilities |

| Facility: <u>Braidwood Unit 1 and 2</u> | | Date of Examination: <u>10/23/00</u> |
|--|------------|--------------------------------------|
| Exam Level (circle one): RO / SRO(I) | | Operating Test No.: <u>1</u> |
| B.1 Control Room Systems | | |
| System / JPM Title | Type Code* | Safety Function |
| a. CVCS / Place Excess L/D in Service with Failure of Cooling to 1A L/D Hx. (N-11) KA 004A4.05 | M A S | 2 |
| b. Pressurizer Relief Tank / Drain PRT with failure of 1B RCDT pump. (N-119) KA 007A1.01 | M A S | 5 |
| c. Component Cooling Water System / Swap CC pumps with high current on started pump. (N-140) KA 008A3.01 | N A S | 8 |
| d. Liquid Radwaste System / Perform a Radwaste Liquid Release Radiation Monitor Valve interlock check. (N-32) KA 068A4.02 | D S | 9 |
| e. A.C. Electrical Distribution / Respond to Loss of 4KV ESF Bus. (N-99) KA 062A2.12 | D S | 6 |
| f. Residual Heat Removal System / Place RH in recirculation for sampling. (N-139) KA 005K5.09 | N S L | 4 |
| g. Nuclear Instrumentation System / Source Range Instrument failure in Mode 4. (N-141) KA 015A2.01) | N S L A | 7 |
| B.2 Facility Walk-Through | | |
| a. CVCS / Local Emergency Boration with Emergency Boration Valve failed closed. (N-89) Unit 2 (KA APE068AA1.08) | M A R | 1 |
| b. Service Water System / Emergency Control of 2A SX Pump. (N-67) High PRA (47.2%) Unit 2 (KA 013A4.01) | D | 4 |
| c. Reactor Protection System / Local Rest of SI. (N-85) Unit 2 (KA E02EA1.1) | D | 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 | | |

OPERATING TEST NO.: 1

| Applicant Type | Evolution Type | Minimum Number | Scenario Number | | | |
|----------------|----------------|----------------|-----------------|-------------|---------|---------|
| | | | 00-1 | 00-2 | 00-3 | Spare |
| | | | 1 | 2 | 3 | 4 |
| RO | Reactivity | 1 | 1/ | 1/ | 1,4/ | 1/ |
| | Normal | 1 | 1/ | 1/ | 1/ | 1/ |
| | Instrument | 2 | 3/2 | 2/3 | 3/2 | 2/3 |
| | Component | 2 | 4/4 | 4,5,6,8/4,6 | 5/5 | 4,7/8 |
| | Major | 1 | 5,6/5,6 | 7/7 | 5,6/5,6 | 5,6/5,6 |
| As RO | Reactivity | 1 | 1 | 1 | 1,4 | 1 |
| | Normal | 0 | | | | |
| | Instrument | 1 | 3 | 2 | 3 | 2 |
| | Component | 1 | 4 | 4,5,6,8 | 5 | 4,7 |
| | Major | 1 | 5,6 | 7 | 5,6 | 5,6 |
| SRO-I | Reactivity | 0 | | | | |
| | Normal | 1 | 1 | 1 | 1 | 1 |
| | Instrument | 1 | 2,3 | 3 | 3 | 2,3 |
| | Component | 1 | 4 | 4,5,6,8 | 5 | 4,7,8 |
| | Major | 1 | 5,6 | 7 | 5,6 | 5,6 |
| As SRO | Reactivity | 0 | N/A | N/A | N/A | N/A |
| | Normal | 1 | N/A | N/A | N/A | N/A |
| | Instrument | 1 | N/A | N/A | N/A | N/A |
| | Component | 1 | N/A | N/A | N/A | N/A |
| | Major | 1 | N/A | N/A | N/A | N/A |
| SRO-U | Reactivity | 0 | N/A | N/A | N/A | N/A |
| | Normal | 1 | N/A | N/A | N/A | N/A |
| | Instrument | 1 | N/A | N/A | N/A | N/A |
| | Component | 1 | N/A | N/A | N/A | N/A |
| | Major | 1 | N/A | N/A | N/A | N/A |

- Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
- (2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO" applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: _____

Chief Examiner: _____


Operating Test: 1

| Competencies | Applicant #1 RO/SRO-I/SRO-U | | | | Applicant #2 RO/SRO-I/SRO-U | | | | Applicant #3 RO(BOP)/SRO-I/SRO-U | | | |
|--|--------------------------------|-----|-----|-----|--------------------------------|-----|-----|-----------|-------------------------------------|-----------|---------|---------|
| | SCENARIO | | | | SCENARIO | | | | SCENARIO | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Understand and Interpret Annunciators and Alarms | 2-6 | 2-8 | 2-6 | 2-8 | 3-6 | 2-8 | 3-6 | 2,4,5,6,7 | 2,4,5,6 | 3,4,6,7 | 4-6 | 3,5,6,8 |
| Diagnose Events and Conditions | 2-6 | 2-8 | 2-6 | 2-8 | 1,3-6 | 2-8 | 3-6 | 2-7 | 1,2,4,5,6 | 1,3,4,6,7 | 2,4-6 | 3,5,6,8 |
| Understand Plant and System Response | 1-6 | 1-8 | 1-6 | 1-8 | 1,3-6 | 1-8 | 1-6 | 1-8 | 1,2,4,5,6 | 1,3,4,6,7 | 1-6 | 1-8 |
| Comply With and Use Procedures (1) | 1-6 | 1-8 | 1-6 | 1-8 | 1,3-6 | 1-8 | 1-6 | 1,2,4-8 | 1,2,4,5,6 | 1,3,4,6,7 | 1-6 | 3-8 |
| Operate Control Boards (2) | 1-6 | 1-8 | 1-6 | 1-8 | 1,3-6 | 1-8 | 1-6 | 1,2,4-8 | 1,2,4,5,6 | 1-8 | 1,2,5,6 | 3-8 |
| Communicate and Interact With the Crew | 1-6 | 1-8 | 1-6 | 1-8 | 1-6 | 1-8 | 1-6 | 1-8 | 1-6 | 1-8 | 1-6 | 1-8 |
| Demonstrate Supervisory Ability (3) | 1-6 | 1-8 | 1-6 | 1-8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Comply With and Use Tech. Specs. (3) | 2,3 | 4 | 3 | 2,4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs. | | | | | | | | | | | | |

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: **OPERATING TEST NO.: 1.** Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author: 
 Chief Examiner: _____

| | | | |
|--------------------------------------|--|---------------------------|------------------------------|
| Simulation Facility <u>Braidwood</u> | | Scenario No.: <u>00-1</u> | Operating Test No.: <u>1</u> |
| Examiners: _____ | Applicant: _____ | | <u>SRO</u> |
| _____ | _____ | | <u>RO</u> |
| _____ | _____ | | <u>BOP</u> |
| Objectives: | To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a 1A Steam Generator level transmitter failure, a 1D Thot RTD failure requiring rod control to be placed in manual, a Main Feedwater Pump trip coincident with a failure of the main turbine to runback, an ATWS event followed by a loss of heat sink requiring a bleed and feed. | | |
| Initial Conditions: | IC-21; 100% power BOL, Equil. Xenon | | |
| Turnover: | The Unit is at 100% power. The 1B AFW pump is OOS to repair a pump motor bearing oil leak. The pump is expected back in approximately 3 to 4 hours. Currently in LCO 3.7.5 Condition A with 12 hours left on the Completion Time. | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|------------------|--|----------------------|--|
| Preload (NOTE 1) | PTL & OOS | | 1B AFW Pump OOS for oil leak repair |
| Preload (NOTE 1) | RP01 RP02A RP02B | | ATWS Event |
| Preload (NOTE 1) | FW43 FW01 | | 1A AFW Pump fail to start 1A MFW Pump fail to start |
| Preload (NOTE 1) | TC04 TC03 IOR ZDI1HSRUNBK OFF IOR ZLO1HSRUNBK OFF IOR ZDI1HSMANUAL OFF IOR ZDI1HSTG010 NORM | | Prevent Main Turbine from Runback Prevent Main Turbine Auto Trip |
| 1 | | R RO N BOP SRO | Perform Load Decrease to 90% at 5MW/min |
| 2 | RX06A, 100 | I BOP SRO | 1A SG Narrow Range Level Transmitter failure high (NOTE 2) |
| 3 | RX18H, 650 | I RO SRO | RCS Loop 1D Thot RTD failure high. (NOTE 3) |
| 4 | IOR ZDI1HSDEHENTR OFF FW02A | C BOP RO SRO | 1B MFW Pump Trip (complicated with failure of Main Turbine to runback) |
| 5 | Preloaded | M BOP RO SRO | ATWS |
| 6 | Preloaded | M BOP RO SRO | Loss of Heat Sink |
| | | | |

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

NOTE 1: Run BATCH FILE for all Preload **BAT RUNBACK**

NOTE 2: RF RP23 (Open/Close) RF RX047 (Trip) RF RX048 (Trip)

NOTE 3: RF RP23 (Open/Close) RF RX026 (Trip) RF RX142 (Trip) RF RX025 (Trip) RF RX141 (Trip)
RF RX028 (Trip) RF RX027 (Trip)

SCENARIO 00-1 OVERVIEW

Unit 1 is at 100% power, BOL. The 1B Auxiliary Feedwater Pump is OOS to repair a pump motor bearing oil leak. The pump is expected back in 3 to 4 hours. Currently in LCO 3.7.5 Condition A with 12 hours left on the Completion Time.

Shortly after the crew takes the shift, Electric Generation will call the control room and request Unit 1 reduce load to 90% at 5MW/min.

Following clearly observable plant response from the reactivity changes the 1A steam generator level transmitter LT-517 will fail high. This is not the controlling channel therefore the crew should not take the FRV to manual. The crew will enter BwOA INST-2 Attachment E and trip the required bistables. Technical Specifications will be addressed for bistable tripping.

After the actions of BwOA INST-2 are complete, the 1D Thot RTD will fail high. This will require the crew to re-enter BwOA INST-2 to address the failure. Control rods will have to be placed in manual. The crew will again have to trip bistables and reference Technical Specifications. Control rods may be placed back into Auto after the failed channel is defeated.

Once the crew determines that the bistables can be tripped, the 1B MFW pump will trip. The crew should attempt to ramp down the main turbine by performing a turbine runback (unsuccessful) while attempting to fast start the 1A Main Feedwater pump. The crew will determine that the Main Turbine will not run back and that a reactor trip is required due to lowering SG water levels.

When the crew attempts to trip the reactor, an ATWS event will initiate. The crew will enter BwFR-S.1. The turbine will fail to trip and the crew will shut the MSIVs by initiating a Main Steamline Isolation signal. When the 1A Auxiliary Feedwater Pump receives a start signal, it will immediately trip. This is an entry condition into BwFR-H.1 but the crew will have to complete FR-S.1 first.

Once the crew is complete with BwFR-S.1, the crew will transition to BwFR-H.1 due to the loss of heat sink. The crew will secure RCPs and initiate an RCS bleed and feed. Once the bleed and feed is initiated, the 1A AFW pump will be returned to operation. The crew must remain in BwFR-H.1 due to bleed and feed initiated.

Critical Tasks

1. FR-S.1--A: Isolate the main turbine from the SGs within 1 minute of the Reactor Trip signal.
2. FR-S.1--C: Insert negative reactivity into the core by at least one of the following methods before completing the immediate action steps of FR-S.1:
 - De-energize the control rod drive MG sets
 - Insert RCCAs
 - Establish emergency boration flow to the RCS
3. FR-H.1--B Establish RCS bleed and feed before PORVs open automatically.

Simulation Facility BraidwoodScenario No.: 00-2Operating Test No.: 1Examiners: _____

_____Applicant: _____ SRO
_____ RO
_____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a VCT level channel failure, a failure of a radiation monitor, letdown system leak to the Component Cooling water system, uncontrolled outward rod motion requiring a manual reactor trip, an instrument air leak inside containment, a steam break inside containment with a failure to auto isolate the faulted steam generator and a failed open PORV requiring manual isolation.

Initial Conditions: IC-16; 48% power MOL, Steady State, Equil. Xe

Turnover: The unit is at 48% power. Currently in BwGP 100-3 step 58. The crew will continue ramping the unit up in power after turnover.

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|-----------------------------------|----------------------|--|
| Preload | FW13D, 100 | | 1D Feedwater Isolation Valve failed open |
| 1 | | N BOP SRO R RO | Ramp the unit up in power at 5MW/min |
| 2 | CV16, 0 | I RO SRO | VCT Level Channel (LT-112) failure |
| 3 | RM01T, 5 | I BOP SRO | Drumming Station Radiation Alarm failure high (Delete malfunction in 5 minutes) |
| 4 | CV23A, 50 | C BOP RO SRO | Letdown Heat Exchanger leak to the Component Cooling Water System |
| 5 | BAT rodsout | C RO SRO | Uncontrolled Rod Withdrawal requiring a Reactor Trip |
| 6 | IA03, 1000 Ramp over 8 minutes | C BOP RO SRO | Instrument Air Leak inside containment |
| 7 | BAT PORVFAIL | M BOP RO SRO | Steam line break inside containment on the 1D Main Steam Line with a failed open Feedwater Isolation valve |
| 8 | BAT PORVFAIL | C RO SRO | PORV 455C fail open |

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

SCENARIO 00-2 OVERVIEW

Initially Unit 1 is at 48% power in BwGP 100-3 step 58 holding for turnover. The crew will continue with the ramp up in power after the turnover. After the crew has taken the shift, the crew will continue with the ramp up in power.

Following clearly observable plant response from the reactivity changes, VCT level transmitter LT-112 will fail low. The crew should respond to the alarm, reference the annunciator response and secure auto makeup.

After the actions for the failed VCT transmitter are complete, the Drumming Station Radiation Alarm will fail high. The crew should reference BwAR 4-OAR059J to determine automatic and subsequent operator actions for the failed radiation monitor.

After the actions are complete for the failed radiation monitor, a letdown heat exchanger to Component Cooling Water System leak will occur. The crew should enter BwOA PRI-6 to isolate letdown, determine the location of the leak and place the standby letdown heat exchanger in service.

Once the crew has placed the standby letdown heat exchanger in service, an uncontrolled rod motion casualty will occur. The crew will attempt to stop the rod motion by placing the rods in manual. When the crew notes that this does not stop the withdrawal, the crew will trip the reactor and enter BwEP E-0.

From E-0, the crew will transition to BwEP ES-0.1. While in ES-0.1, an instrument air leak will occur inside of containment. The crew should enter BwOA SEC-4 to address the failure. When Instrument Air is isolated to containment, the leak will be isolated. NOTE: Instrument Air to containment may auto isolate.

After Instrument Air is isolated to containment, a steam break will occur inside containment on the 1D Main Steam Line. The crew will initiate a Safety Injection and transition back to BwEP E-0. From BwEP E-0, the crew will transition to BwEP E-2. The crew should note that the 1D FW isolation MOV did not automatically close and take actions to close the valve.

From BwEP E-2, the crew will transition to BwEP E-1 and then to BwEP ES-1.1 to terminate SI. After the 1D SG has completely blown down, RCS pressure will rapidly increase to the PORV setpoint. When PORV 455C opens it will fail open requiring the crew to manually isolate the PORV.

Critical Tasks

1. E-2 --A: Isolate the faulted SG before transition out of E-2.
2. E-0--M: Close the block MOV upstream of the stuck-open Pzr PORV by completion of the first step in the ERG network that directs the crew to close the block MOV.

| | | |
|--------------------------------------|--|------------------------------|
| Simulation Facility <u>Braidwood</u> | Scenario No.: <u>00-3</u> | Operating Test No.: <u>1</u> |
| Examiners: _____ | Applicant: _____ | <u>SRO</u> |
| _____ | _____ | <u>RO</u> |
| _____ | _____ | <u>BOP</u> |
| Objectives: | To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a PT-508 high failure, a Power Range NI failure, an inadvertent dilution, a reactor trip due to a failed open RTB, and a Loss of All AC. | |
| Initial Conditions: | IC-21; 100% power BOL, Equilibrium Xenon | |
| Turnover: | Unit 1 is at 100% power. Unit 2 is in MODE 5. The 1A DG is OOS to replace a leaking fuel injection line on the 2R cylinder. The 1A DG is expected back in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the Completion Time. | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|---|----------------------|--|
| Preload | MRF EG03 MAINT 0 IOR ZDI1HSAP079 NAT | | Place the 1A DG & output breaker in PTL and tag OOS Prevents ESF Bus 142 cross tie to U-2 |
| Preload | MRF FW160 STOP | C BOP RO SRO | Prevent the 1B AFW pump from starting |
| Preload | CAE! 1BDGAUTO Link MRF EG09 REMOTE to TRG 6 | C BOP SRO | Failure of the 1B DG to Auto Start |
| 1 | | N BOP SRO R RO | Ramp the unit down in power to 90% at 5Mw/min |
| 2 | FW16, 1500 | I BOP SRO | PT-508 (Feedwater Header Pressure Transmitter) fails high |
| 3 | NI08A, 500 | I RO SRO | NI-41 Power Range Upper Detector Failure High (NOTE 1) |
| 4 | MRF CV13, 100 | R RO SRO | Inadvertent Dilution Event |
| 5 | MRF RP01 TRIP | M BOP RO SRO | Reactor Trip (NOTE 2) |
| 6 | ED04A EG09B | M BOP RO SRO | Loss of All AC DG 1B Seizure (insert after crew manually starts) |
| | | | |
| | | | |
| | | | |

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

NOTE 1: RP20 (Open/Close) RX013 (Trip) RX135 (Trip)

NOTE 2: If the crew trips the reactor due to the inadvertent dilution, this event does not need to be initiated.

NOTE 3: When directed as local operator to attempt to start the 1B AFW pump **MRF FW160 START**

SCENARIO 00-3 OVERVIEW

Unit 1 is at 100% power, BOL. Unit 2 is in MODE 5. The 1A Diesel Generator is OOS to replace a leaking fuel injection line on the 2R cylinder. Currently in LCO 3.8.1 Condition B with 12 hours left on the Completion Time.

After the crew takes the shift, Electric Generation will request the Unit be reduced to 90% power at 5Mw/min.

Following clearly observable plant response from the reactivity changes, feedwater header pressure instrument, PT-508 will fail high. The operator is expected to recognize this condition, take manual control of the Master FW Pumps Speed Controller and restore FW discharge pressure to within its normal band.

After the actions for the failed PT-508 instrument are complete, N-41 Power Range Upper Detector will fail high. The crew will enter BwOA INST-1 Attachment A and take actions to stabilize the plant. After the crew has defeated the failed N-41, the crew will place rods back into Auto and trip bistables associated with the failed Power Range NI.

After the actions of BwOA INST-1 are complete, an inadvertent dilution will occur. The crew should enter BwOA PRI-12 to attempt to determine and correct the cause of the inadvertent dilution. The crew may enter BwOA PRI-2 to commence emergency boration. The crew may trip the reactor due to the inadvertent dilution. If the crew does not trip the reactor, an inadvertent reactor trip will occur due to the opening of the 1A reactor trip breaker.

Once the immediate actions of BwEP E-0 are complete a Loss of All AC will occur. The 1B DG will not auto-start. When the crew attempts to manually start the 1B DG, it will seize and trip. Re-powering the ESF Buses from U-2 will also be unsuccessful. The crew will transition from E-0 to BwCA-0.0 and then transition to BWCA-0.1. While in ECA-0.0 the 1A DG will become available to restore power to Bus 141.

NOTE: The crew may transition to BwCA-0.2 based on Pzr level if they performed a large SG depressurization.

During the crews actions in BwCA-0.0 the crew will recognize the failure of the 1B AFW pump to auto start. The crew will have to manually start (locally) the 1B AFW pump to restore AFW to the steam generators.

Critical Tasks

1. ECA-0.0--B: Establish the minimum required AFW flow rate (500 gpm) to the SGs before dryout occurs.
2. ECA-0.0--H: Isolate RCP seal injection before a charging pump starts or is started.

Simulation Facility BraidwoodScenario No.: Spare
 Examiners: _____

 Operators: _____ SRO
 _____ RO
 _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a normal power increase, a pressurizer level channel failure, HDT level controller failure, a leak in the letdown heat exchanger, a leak in the main turbine EHC system and a Large LOCA with failure of RH pumps to start and failure of automatic transfer to sump suction for operating train of RH.

Initial Conditions: IC-16. Unit at 49% power

Turnover: 1CC9437A OOS for MOV surveillance. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time.

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|------------------------|--------------------|---|
| Preload | RH01A | C RO SRO | 1A RH Pump fails to start/trip |
| Preload | MRF RP85 open RP15F | C RO SRO | 1B RH Pump fails to start on SI with manual start available |
| Preload | RH04B | C BOP SRO | Failure of 1SI8811B (RH CNMT Sump) auto transfer |
| 1 | | N BOP SRO | Ramp up turbine power to 75% at 5 MW/min |
| | | R RO | Raise reactor power using rods and/or dilution |
| 2 | RX13A, 0, 10 | I RO SRO | Pressurizer level channel fails low (LT-459) (NOTE 1) |
| 3 | FW17, 0 | I BOP SRO | Heater Drain Tank level controller fails low |
| 4 | CV23A, 100 | C RO SRO | Letdown Heat Exchanger tube leak |
| 5 | TC15, 34 | M BOP RO SRO | EHC System leak of 34 gpm results in turbine trip (NOTE 2) |
| 6 | TH06A, 450000 | M BOP RO SRO | Large Break LOCA upon reactor trip |
| 7 | Preload | C RO SRO | 1A and 1B RH Pump fail to start with 1B RH pump manual start capable. |
| 8 | Preload | C BOP SRO | Failure of Auto transfer to cold leg recirc for "B" Train |

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

NOTE 1: MRF RP20 OPEN/CLOSE
MRF RX029 TRIP

NOTE 2: If asked as local operator, the EH fluid leak is greater than makeup capacity and leak is located at combined discharge of EH pumps.

SCENARIO Spare OVERVIEW

Unit 1 is at 50% power. Following turnover power increase is initiated to 75% power.

Following clearly observable plant response from the reactivity changes, the controlling pressurizer level channel will fail low. Pressurizer level will be placed in manual, an operable channel selected and level returned to normal. The SRO should contact I&C to assist in repair and the tripping of bistables. Technical Specifications should be consulted for applicability.

After the bistables for pressurizer level have been tripped, Heater Drain Tank level controller will fail causing heater drain tank level to rise. The overflow valve will open and level alarms will actuate. The operator is expected to take manual control of the level controller and reopen the valve.

After HDT tank level is restored to normal band, a leak will develop in the letdown heat exchanger. The operator should notice VCT level changing, and radiation levels in the CCW system increasing. Operators should troubleshoot and identify the failed letdown HX. The crew should establish letdown using the 1B HX.

After the 1B Letdown HX is in service, an EHC leak will develop on the EHC reservoir. EHC level will drop bringing in several alarms. When level is sufficiently low to result in a trip of the EHC pumps, the main turbine also gets a trip signal. E-0 will be entered when the reactor trips.

At the time of the reactor trip, a large break LOCA occurs on the RCS. Both RH pumps fail to start. The 1A RH pump trips if a manual start is attempted, but the 1B RH pump will start on a manual start. When RWST level drops to the LO-2 level for automatic transfer to the CNMT sump suction, the "B" Train valve SI8811B will fail to automatically open. Operator action is required to stop the RH and CS pumps and manually open the sump suction valves. The scenario is terminated following completion of the alignment of ECCS for cold leg recirculation.

Critical Tasks

1. E-0 — H: Manually start at least one low-head ECCS pump before transition out of E-0.
2. ES-1.3 — A: Transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the plant-specific LOCA analysis.

OPERATING TEST NO.: 2

| Applicant Type | Evolution Type | Minimum Number | Scenario Number | | | |
|----------------|----------------|----------------|-----------------|---------|---------|---------|
| | | | 00-4 | 00-5 | 00-6 | Spare |
| | | | 1 | 2 | 3 | 4 |
| RO | Reactivity | 1 | 1/ | 1,3/ | 1/ | 1/ |
| | Normal | 1 | /1 | /1,3 | /1 | /1 |
| | Instrument | 2 | 3/4 | 5/4 | 3/4 | 2/3 |
| | Component | 2 | 2,8/5 | 2,6/6 | 2,5,9/8 | 4,7/8 |
| | Major | 1 | 6/6,7 | 7,8/7,8 | 6,7/6,7 | 5,6/5,6 |
| As RO | Reactivity | 1 | 1 | 1,3 | 1 | 1 |
| | Normal | 0 | | | | |
| | Instrument | 1 | 3 | 5 | 3 | 2 |
| | Component | 1 | 2,8 | 2,6 | 2,5,9 | 4,7 |
| | Major | 1 | 6 | 7,8 | 6,7 | 5,6 |
| SRO-I | Reactivity | 0 | | | | |
| | Normal | 1 | 1 | 1,3 | 1 | 1 |
| | Instrument | 1 | 3,4 | 4,5 | 3,4 | 2,3 |
| | Component | 1 | 2,5,8 | 2,6 | 2,5,8,9 | 4,7,8 |
| | Major | 1 | 6,7 | 7,8 | 6,7 | 5,6 |
| As SRO | Reactivity | 0 | | | | |
| | Normal | 1 | 1 | 1,3 | 1 | 1 |
| | Instrument | 1 | 3,4 | 4,5 | 3,4 | 2,3 |
| | Component | 1 | 2,5,8 | 2,6 | 2,5,8,9 | 4,7,8 |
| | Major | 1 | 6,7 | 7,8 | 6,7 | 5,6 |
| SRO-U | Reactivity | 0 | N/A | N/A | N/A | N/A |
| | Normal | 1 | N/A | N/A | N/A | N/A |
| | Instrument | 1 | N/A | N/A | N/A | N/A |
| | Component | 1 | N/A | N/A | N/A | N/A |
| | Major | 1 | N/A | N/A | N/A | N/A |

- Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
- (2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO" applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: 

Chief Examiner: _____

Operating Test: 2

| Competencies | Applicant #1 RO/SRO-I/SRO-U | | | | Applicant #2 RO/SRO-I/SRO-U | | | | Applicant #3 RO(BOP)/SRO-I/SRO-U | | | |
|--|--------------------------------|-------|-------|-----|--------------------------------|---------------------|-----------------------|---------------|-------------------------------------|---------------------|---------------|-------------|
| | SCENARIO | | | | SCENARIO | | | | SCENARIO | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Understand and Interpret Annunciators and Alarms | 2-8 | 2-8 | 2-9 | 2-8 | 2-8 | 2,4,5 ,6,7, 8 | 2-9 | 2,4,5 ,6,7 | 2-8 | 2,4,5 ,6,7, 8 | 2-9 | 3,5,6 ,8 |
| Diagnose Events and Conditions | 2-8 | 2-8 | 2-9 | 2-8 | 2,3,6 ,8 | 2,5,6 ,7,8 | 2,3,5 ,6,7, 9 | 2-7 | 4-7 | 4,6,7 ,8 | 4,6,7 ,8 | 3,5,6 ,8 |
| Understand Plant and System Response | 1-8 | 1-8 | 1-9 | 1-8 | 1,2,3 ,6,8 | 1-3, 4-8 | 1,2,3 ,5,6, 7,9 | 1-8 | 1,4-7 | 1,3,4 ,6-8 | 1,4,6 ,7,8 | 1-8 |
| Comply With and Use Procedures (1) | 1-8 | 1-8 | 1-9 | 1-8 | 1,2,3 ,6,8 | 1-3, 4-8 | 1,2,3 ,5,6, 7,9 | 1,2,4 -8 | 1,4-7 | 1,3,4 ,6-8 | 1,4,6 ,7,8 | 3-8 |
| Operate Control Boards (2) | 1-8 | 1-8 | 1-9 | 1-8 | 1,2,3 ,6,8 | 1-3, 4-8 | 1,2,3 ,5,6, 7,9 | 1,2,4 -8 | 1,4-7 | 1,3,4 ,6-8 | 1,4,6 ,7,8 | 3-8 |
| Communicate and Interact With the Crew | 1-8 | 1-8 | 1-9 | 1-8 | 1-8 | 1-8 | 1-9 | 1-8 | 1-8 | 1-8 | 1-9 | 1-8 |
| Demonstrate Supervisory Ability (3) | 1-8 | 1-8 | 1-9 | 1-8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Comply With and Use Tech. Specs. (3) | 1,4,5 | 2,4,5 | 3,4,5 | 2,4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Notes:

- (1) Includes Technical Specification compliance for an RO.
 (2) Optional for an SRO-U.
 (3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: **OPERATING TEST NO.: 2.** Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author: _____
 Chief Examiner: _____

| | | | |
|---------------------|---|--------------------|-----------------------|
| Simulation Facility | <u>Braidwood</u> | Scenario No.: 00-4 | Operating Test No.: 2 |
| Examiners: | _____ | Operators: | <u>SRO</u> |
| | _____ | | <u>RO</u> |
| | _____ | | <u>BOP</u> |
| Objectives: | To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to pre-loaded SGTL, a power decrease, an auto rod speed controller failure, a VCT level transmitter failure, a SG level transmitter failure, actuation of deluge to the in service Control Room Vent Charcoal Filter, a SGTR with a pressurizer safety valve failing open. | | |
| Initial Conditions: | IC-16, 49% power. Xenon is increasing | | |
| Turnover: | Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time. Chemistry has just confirmed the 1B SG has a tube leak of 15 gpm. | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|---|------------------|--|
| Preload | TH03B, 15 | RO SRO | SG B Tube leak – 15 gpm small enough to give alarms. Large enough to cause a power reduction |
| Preload | 1B DG in PTL 1423 in PTL MRF EG09 MAINT_0 | | 1B DG OOS |
| 1 | | N BOP SRO | Ramp down turbine power at directed MW/min |
| | | R RO | Lower reactor power using rods and/or boration |
| 2 | RD09, 72 | C RO SRO | Auto Rod Speed controller failure – 72 steps/min when rod motion is initiated |
| 3 | CV17, 100 | I RO SRO | VCT level transmitter LT-185 fails high on a 180 sec ramp. |
| 4 | RX06G, 0 | I BOP SRO | SG B level transmitter (controlling) fails low on a 180 sec ramp (LT-529) (NOTE 1) |
| 5 | FP01D | C BOP SRO | Inadvertent deluge of MCR VC Charcoal filter(trips running supply & exhaust fans) |
| 6 | TC02 | BOP RO SRO | Turbine trip on sensed low load |
| 7 | TH03B, 900 | BOP SRO | SG B tube rupture – (100% 300 sec ramp) |
| 8 | TH12A, 95 | C RO SRO | Pressurizer safety valve fails partially open |

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

NOTE 1 RP20 (OPEN/CLOSE) RX057 (TRIP) RX058 (TRIP)

SCENARIO 00-4 OVERVIEW

Unit 1 is at 50% power. It will be discussed in the turnover that the SGTL has been discovered. Power decrease should be directed following turnover.

Following clearly observable plant response from the reactivity changes, an auto rod speed failure will cause rods to insert at 72 steps/min when demanded. It is expected that the RO will recognize improper rod motion for this condition and place rod control in manual. BwOA ROD-1 may be entered, but is NOT required, in response to the rod control problem. I&C will not be able to repair the rod speed problem and manual rod control will be the only way to move control rods at proper speed.

After actions for the rod failure are complete, a VCT level transmitter LT-185 will fail high. VCT level will have to be controlled manually to allow letdown flow to the VCT or divert as necessary. LT-112 indication will be available.

After control of VCT level is regained, a SG level channel will fail low. SG level control will be placed in manual and normal level restored. Entry is made into BwOA INST-2 (Attachment E); the level control is transferred to an operable channel and the FRV control returned to auto. The SRO will address ITS for applicability and actions for the failed SG level instrument. The SRO will contact I&C for assistance in repair and the tripping of bistables.

After the SG level channel bistables have been tripped, the deluge valve to the Control Room Vent Charcoal Filter opens when inadvertently kicked by a painter. The actuation of the deluge results in trip of the running "B" Train Control Room Ventilation Supply and Return fans and the "B" Train Chiller. The operator will be required to start the "A" Train equipment and direct local actions to isolate the deluge.

After Control Room Ventilation is restored, the main turbine will trip 60 seconds following failure of the load sensor. Coincident with the turbine trip the SGTR will occur on SG B, and a pressurizer safety valve will fail 95% open. E-0 will be entered with procedures E-3 and CA-3.1 utilized. The scenario terminates after determination that no additional cooldown is required at step 10 of ECA-3.1.

Critical Tasks

- E-3--A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.
- E-3--B: Establish/maintain RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions:
- Too high to maintain minimum required subcooling (per ICONICS or Att. A)
- OR
- Below the RCS temperature that causes an extreme or severe challenge to the subcriticality and/or the integrity CSF (240°F).
- E-3--C: Depressurize RCS to meet SI termination criteria before water enters the steamlines.

| | | | | |
|---------------------|---|--------------------|---------------------|------------|
| Simulation Facility | <u>Braidwood</u> | Scenario No.: 00-5 | Operating Test No.: | 2 |
| Examiners: | _____ | Operators: | _____ | <u>SRO</u> |
| | _____ | | _____ | <u>RO</u> |
| | _____ | | _____ | <u>BOP</u> |
| Objectives: | To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a power maneuver, RCP seal failure, 1C Steam Generator feed flow transmitter failure, Pzr pressure channel failure, loss of an ESF bus, reactor trip with component failures. | | | |
| Initial Conditions: | IC-31 90% power. All systems are in automatic and operating properly. | | | |
| Turnover: | Unit 1 is currently at 90% power. All systems are in automatic and operating properly. Electrical Generation has requested a load increase to full power as soon as possible. | | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|-------------------|--------------------|---|
| Preload | RP01 | M RO BOP SRO | Failure of automatic reactor trip |
| Preload | RP15B | C RO BOP SRO | Failure of the 1B Charging pump to Auto Start |
| Preload | RP15R | C RO BOP SRO | Failure of the 1B SX pump to Auto Start |
| 1 | | N BOP SRO | Ramp up turbine power to 100% at 5 MW/min |
| | | R RO | Raise reactor power using rods and/or dilution |
| 2 | CV27A, 3.1 | C RO SRO | 1A RCP #1 seal failure. (3.1 gpm at 240 sec.) |
| 3 | | N BOP SRO | Ramp down turbine power at directed MW/min due to shutdown requirements |
| | | R RO | Lower reactor power using rods and/or boration |
| 4 | RX04E, 0 | I BOP SRO | SG C feed flow (controlling) fails low. 180 sec ramp. |
| 5 | RX21B, 2500 | I RO SRO | Pressurizer Pressure channel PT-456 fails high. (NOTE 1) |
| 6 | ED07A | C RO BOP SRO | Loss of 4KV ESF Bus 141 |
| 7 | RF RP61 IN (RP01) | M RO BOP SRO | Closure of all MSIVs with failure of reactor to auto trip |
| 8 | TH06A, 2500 | M RO BOP SRO | LOCA 2500 gpm. 5 minute ramp |

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

NOTE 1: MRF RP21 (OPEN/CLOSE) MRF RX036 (TRIP) MRF RX038 (TRIP) MRF RX039 (TRIP)
MRF RX037 (TRIP) MRF RX017 (TRIP) MRF RX137 (TRIP)

SCENARIO 00-5 OVERVIEW

Unit 1 is at 90% power. Electric Generation has requested load increase to full power as soon as possible due to expected electrical loads.

Following clearly observable plant response from the reactivity changes, a 1A RCP #1 seal will fail and leak at the rate of 3.1 gpm over a 240-sec. period. The seal should be isolated. The procedure will direct the removal of the RCP from service. A ramp down in power should be started.

[NOTE to Simulator Operator: When asked, report 1A RCP # 2 seal leakoff flow reads 0.3 gpm]

Following the decision to ramp down power, a SG feed flow channel will fail low. The operator should place the associated FWRV in manual and restore SG level. Entry is made into BwOA INST-2 (Attachment G) and the feedwater flow control is transferred to an operable channel and the FRV control returned to auto. The SRO should call I&C for assistance in repair of the failed channel.

After I&C has been notified of the feed flow channel failure, a pressurizer pressure channel will fail high. A PORV will go open. The operator must diagnose the failed channel, close the PORV. Entry is made into BwOA Inst-2 (Attachment B) and an operable pressurizer pressure channel selected. Pressurizer pressure is verified restoring to normal. The SRO will review ITS for applicability and actions. The SRO will notify I&C of the failure, request assistance in repair and the tripping of bistables.

When the bistables have been tripped, power will be lost to the 4KV ESF Bus 141. Just following the loss of power to the bus, all MSIVs will close resulting in a primary transient that will generate a reactor trip (OTΔT). The reactor will fail to trip requiring the crew to recognize failure and initiate a manual trip. Following entry into E-0, a LOCA will occur on the 1A Cold Leg requiring a SI. The crew should manually initiate a SI. The crew will recognize the DG 1A started but does NOT tie to bus due to the fault. Repairs are required for Bus 141. Transition will be made to E-1. The crew will be required to manually start the 1B SX Pump to provide cooling to various plant components. Manual start of the 1B CV Pump is also required.

Critical Tasks

E-0--A: Manually trip the reactor from the control room when safety limits are exceeded (failure of auto trip)

E-0--L: Manually start at least one ESW pump in an operating safeguards train (1B) before cooled components overheat.

| | | | |
|---------------------|--|--------------------|-----------------------|
| Simulation Facility | Braidwood | Scenario No.: 00-6 | Operating Test No.: 2 |
| Examiners: | _____ | Operators: | _____ <u>SRO</u> |
| | _____ | | _____ <u>RO</u> |
| | _____ | | _____ <u>BOP</u> |
| Objectives: | To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to normal power reduction, a plugged boric acid filter, a Tcold RTD failing high, a steam flow detector failure, a RCP thermal barrier leak, a steam break causing a reactor trip, a RCS Small Break LOCA with a failure of automatic start of both Auxiliary Feedwater (AF) pump but manual start available for the 1A AF Pump, and failure of the High Head SI discharge valves to auto open. | | |
| Initial Conditions: | IC-54; 100% power BOL. Equilibrium. Xenon | | |
| Turnover: | Unit is at 100% power. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time. | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|------------------|--|--------------------|---|
| Preload (NOTE 1) | FW44 MRF EG09 MAINT_O | C BOP SRO | 1B AF Pump fails to start 1B DG OOS |
| Preload (NOTE 1) | IMF RP15B MRF RP90 OPEN RF RP91 TEST IORs SE:PN0470 OFF SE:PN0468 OFF | C BOP SRO | 1A AF Pump fails to auto start |
| Preload (NOTE 1) | MRF RP75 OUT IOR ZDI1SI8801A CLS | C RO SRO | SI8801A fails close and SI8801B fails to auto open |
| 1 | | N BOP SRO | Ramp down turbine power to 60% at 5 MW/min |
| | | R RO | Lower reactor power using rods and/or boration |
| 2 | RF CV33, 0 | C RO SRO | Boric Acid filter plugged. (Insert after boration has started) (NOTE 2) |
| 3 | RX18D, 630 | I RO SRO | Loop D Tcold fails high (NOTE 3) |
| 4 | RX03E, 0 | I BOP SRO | Steam Flow C (control) detector fails low. (360 sec ramp) FT-532A |
| 5 | CC07C, 25 | C RO SRO | Loop C RCP thermal barrier leak. (25 gpm) |
| 6 | MS08 | M BOP RO SRO | Main Steam Line Break Outside Containment (Results in reactor trip) |
| 7 | TH06C, 200 -900 | M BOP RO SRO | RCS leak on Loop C at 200 gpm (increase to 900 gpm after 5 min.) |
| 8 | Preload | C BOP SRO | AF pumps fail to auto start with 1A manual start capable |
| 9 | Preload | C RO SRO | High Head SI discharge valves to RCS fail to open automatically with 1SI8801A |

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

NOTE 1: Run BATCH FILE for all Preload **BAT ES1.2**

NOTE 2: MRF CV34, 100 when directed to bypass filter.

NOTE 3: MRF RP23 (OPEN/CLOSE) MRF RX026 (TRIP) MRF RX142 (TRIP) MRF RX025 (TRIP)
MRF RX141 (TRIP) MRF RX028 (TRIP) MRF RX027 (TRIP)

SCENARIO 00-6 OVERVIEW

Unit 1 is at 100 % power BOL. Following turnover, the crew is to maintain power steady for flux mapping.

The system operator will call the control room and request a reduction of reactor power to 75%.

Following clearly observable plant response from the reactivity changes, the boric acid filter will become plugged causing a complete loss of boric acid flow. The operators will troubleshoot the lack of boric acid flow and will eventually open the filter bypass valve.

After the boric acid filter bypass is opened, Loop D Tcold RTD will fail high. BwOA INST-2 (Attachment A) will be entered to address the failed Tcold RTD. The SRO will address ITS for actions for the failed Tcold instrument.

When I&C has tripped the bistables, a steam flow detector will fail low. This will cause the BOP to go to manual on the FWRV and control the feed pump speed manually. Entry into BwOA INST-2 (Attachment H) is required. The failed channel will be selected out and after control of SG level is attained, control will be switched back to auto. The turbine ramp should be slowed or stopped during troubleshooting and plant stabilized.

Two minutes following return of the SG level control to auto, a RCP will develop a thermal barrier leak. Automatic isolation of the leak is not desired. Entry into BwOA PRI-1 may occur and entry into PRI-6 will occur. The operators must diagnose the leak and expected radiation alarms, and manually isolate the leak.

After the RCP thermal barrier leak is isolated, a main steam break outside of containment will occur. This will result in a reactor trip and main steam isolation. The crew will enter BwEP E-0 and transition to BwEP ES-0.1. While the crew is in ES-0.1, an RCS leak of 200 gpm occurs. This leak will increase to 900 gpm after approx. 5 min. The crew will transition back to BwEP-E-0. Upon AFW actuation, the 1A motor driven AF pump and the 1B diesel driven AF pump will fail to start. The operator will manually start the 1A AF pump (the 1B AFW pump will not be able to be started). The high head SI discharge valve SI8801A & B will fail to open with the SI8801B capable of being manually open. The operator will manually open SI8801B for high head injection flow. Transition is made to E-1 based on RCS and containment conditions. Cooldown will be required and transition is made to ES-1.2. The scenario is terminated when at step 6 when determination of cooldown is required.

Critical Tasks

E-0--F: Establish the minimum required AFW flow rate to the SGs before transition out of E-0.

E-0--I: Establish flow from at least one high-head ECCS pump before transition out of E-0.

Simulation Facility BraidwoodScenario No.: SpareExaminers: _____

_____Operators: _____ SRO
_____ RO
_____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a normal power increase, a pressurizer level channel failure, HDT level controller failure, a leak in the letdown heat exchanger, a leak in the main turbine EHC system and a Large LOCA with failure of RH pumps to start and failure of automatic transfer to sump suction for operating train of RH.

Initial Conditions: IC-16. Unit at 49% power

Turnover: 1CC9437A OOS for MOV surveillance. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time.

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|------------------------|--------------------|---|
| Preload | RH01A | C RO SRO | 1A RH Pump fails to start/trip |
| Preload | MRF RP85 open RP15F | C RO SRO | 1B RH Pump fails to start on SI with manual start available |
| Preload | RH04B | C BOP SRO | Failure of 1SI8811B (RH CNMT Sump) auto transfer |
| 1 | | N BOP SRO | Ramp up turbine power to 75% at 5 MW/min |
| | | R RO | Raise reactor power using rods and/or dilution |
| 2 | RX13A, 0, 10 | I RO SRO | Pressurizer level channel fails low (LT-459) (NOTE 1) |
| 3 | FW17, 0 | I BOP SRO | Heater Drain Tank level controller fails low |
| 4 | CV23A, 100 | C RO SRO | Letdown Heat Exchanger tube leak |
| 5 | TC15, 34 | M BOP RO SRO | EHC System leak of 34 gpm results in turbine trip (NOTE 2) |
| 6 | TH06A, 450000 | M BOP RO SRO | Large Break LOCA upon reactor trip |
| 7 | Preload | C RO SRO | 1A and 1B RH Pump fail to start with 1B RH pump manual start capable. |
| 8 | Preload | C BOP SRO | Failure of Auto transfer to cold leg recirc for "B" Train |

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

NOTE 1: MRF RP20 OPEN/CLOSE MRF RX029 TRIP

NOTE 2: If asked as local operator, the EH fluid leak is greater than makeup capacity and leak is located at combined discharge of EH pumps.

SCENARIO Spare OVERVIEW

Unit 1 is at 50% power. Following turnover power increase is initiated to 75% power.

Following clearly observable plant response from the reactivity changes, the controlling pressurizer level channel will fail low. Pressurizer level will be placed in manual, an operable channel selected and level returned to normal. The SRO should contact I&C to assist in repair and the tripping of bistables. Technical Specifications should be consulted for applicability.

After the bistables for pressurizer level have been tripped, Heater Drain Tank level controller will fail causing heater drain tank level to rise. The overflow valve will open and level alarms will actuate. The operator is expected to take manual control of the level controller and reopen the valve.

After HDT tank level is restored to normal band, a leak will develop in the letdown heat exchanger. The operator should notice VCT level changing, and radiation levels in the CCW system increasing. Operators should troubleshoot and identify the failed letdown HX. The crew should establish letdown using the 1B HX.

After the 1B Letdown HX is in service, an EHC leak will develop on the EHC reservoir. EHC level will drop bringing in several alarms. When level is sufficiently low to result in a trip of the EHC pumps, the main turbine also gets a trip signal. E-0 will be entered when the reactor trips.

At the time of the reactor trip, a large break LOCA occurs on the RCS. Both RH pumps fail to start. The 1A RH pump trips if a manual start is attempted, but the 1B RH pump will start on a manual start. When RWST level drops to the LO-2 level for automatic transfer to the CNMT sump suction, the "B" Train valve SI8811B will fail to automatically open. Operator action is required to stop the RH and CS pumps and manually open the sump suction valves. The scenario is terminated following completion of the alignment of ECCS for cold leg recirculation.

Critical Tasks

1. E-0 — H: Manually start at least one low-head ECCS pump before transition out of E-0.
2. ES-1.3 — A: Transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the plant-specific LOCA analysis.

OPERATING TEST NO.: 3

| Applicant Type | Evolution Type | Minimum Number | Scenario Number | | | |
|----------------|----------------|----------------|-----------------|-----------|-----------|-----------|
| | | | 00-7 | 00-8 | 00-9 | Spare |
| | | | 1 | 2 | 3 | 4 |
| RO | Reactivity | 1 | 4 / | 1 / | 1 / | 1 / |
| | Normal | 1 | / 4 | / 1 | / 1 | / 1 |
| | Instrument | 2 | 1,2 / 1 | 3 / 4 | 4 / 2,3 | 2 / 3 |
| | Component | 2 | 3,5 / 5 | 2,5 / 5 | 5,7 / 5,7 | 4,7 / 8 |
| | Major | 1 | 6 / 6 | 6,7 / 6,7 | 6,8 / 6,8 | 5,6 / 5,6 |
| As RO | Reactivity | 1 | 4 | 1 | 1 | 1 |
| | Normal | 0 | | | | |
| | Instrument | 1 | 1,2 | 3 | 4 | 2 |
| | Component | 1 | 3,5 | 2,5 | 5,7 | 4,7 |
| | Major | 1 | 6 | 6,7 | 6,8 | 5,6 |
| SRO-I | | | | | | |
| | Reactivity | 0 | | | | |
| | Normal | 1 | 4 | 1 | 1 | 1 |
| | Instrument | 1 | 1,2 | 3,4 | 2,3,4 | 2,3 |
| | Component | 1 | 3,5 | 2,5 | 5,7 | 4,7,8 |
| As SRO | Major | 1 | 6 | 6,7 | 6,8 | 5,6 |
| | | | | | | |
| | Reactivity | 0 | N/A | N/A | N/A | N/A |
| | Normal | 1 | N/A | N/A | N/A | N/A |
| | Instrument | 1 | N/A | N/A | N/A | N/A |
| SRO-U | Component | 1 | N/A | N/A | N/A | N/A |
| | Major | 1 | N/A | N/A | N/A | N/A |
| | | | | | | |
| | Reactivity | 0 | N/A | N/A | N/A | N/A |
| | Normal | 1 | N/A | N/A | N/A | N/A |
| | Instrument | 1 | N/A | N/A | N/A | N/A |
| | Component | 1 | N/A | N/A | N/A | N/A |
| | Major | 1 | N/A | N/A | N/A | N/A |

- Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
- (2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO" applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: _____

Chief Examiner: _____

Operating Test: 3

| Competencies | Applicant #1 RO/SRO-I/SRO-U | | | | Applicant #2 RO/SRO-I/SRO-U | | | | Applicant #3 RO(BOP)/SRO-I/SRO-U | | | |
|--|--------------------------------|-------|-------|-----|--------------------------------|---------------------|-------|---------------|-------------------------------------|---------------|-----------------------|-------------|
| | SCENARIO | | | | SCENARIO | | | | SCENARIO | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Understand and Interpret Annunciators and Alarms | 1,2,3 ,5,6 | 2-7 | 2-8 | 2-8 | 1,2,3 ,5,6 | 2,3,5 ,6,7 | 4-8 | 2,4,5 ,6,7 | 1,5,6 | 4,5,6 ,7 | 2,3,5 ,6,7, 8 | 3,5,6 ,8 |
| Diagnose Events and Conditions | 1,2,3 ,5,6 | 2-7 | 2-8 | 2-8 | 1,2,3 ,5,6 | 2,3,5 ,6,7 | 4-8 | 2-7 | 1,5,6 | 4,5,6 ,7 | 2,3,5 ,6,7, 8 | 3,5,6 ,8 |
| Understand Plant and System Response | 1-6 | 1-7 | 1-8 | 1-8 | 1-6 | 1,2,3 ,5,6, 7 | 1,4-8 | 1-8 | 1,4,5 ,6 | 1,4,5 ,6,7 | 1,2,3 ,5,6, 7,8 | 1-8 |
| Comply With and Use Procedures (1) | 1-6 | 1-7 | 1-8 | 1-8 | 1-6 | 1,2,3 ,5,6, 7 | 1,4-8 | 1,2,4 -8 | 1,4,5 ,6 | 1,4,5 ,6,7 | 1,2,3 ,5,6, 7,8 | 3-8 |
| Operate Control Boards (2) | 1-6 | 1-7 | 1-8 | 1-8 | 1-6 | 1,2,3 ,5,6, 7 | 1,4-8 | 1,2,4 -8 | 1,4,5 ,6 | 1,4,5 ,6,7 | 1,2,3 ,5,6, 7,8 | 3-8 |
| Communicate and Interact With the Crew | 1-6 | 1-7 | 1-8 | 1-8 | 1-6 | 1-7 | 1-8 | 1-8 | 1-6 | 1-7 | 1-8 | 1-8 |
| Demonstrate Supervisory Ability (3) | 1-6 | 1-7 | 1-8 | 1-8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Comply With and Use Tech. Specs. (3) | 1,3 | 2,3,4 | 3,4,5 | 2,4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs. | | | | | | | | | | | | |

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: **OPERATING TEST NO.: 2.** Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author: _____

Chief Examiner: _____

| | | | |
|---------------------|--|--------------------|-----------------------|
| Simulation Facility | <u>Braidwood</u> | Scenario No.: 00-7 | Operating Test No.: 3 |
| Examiners: | _____ | Operators: | <u>SRO</u> |
| | _____ | | <u>RO</u> |
| | _____ | | <u>BOP</u> |
| Objectives: | To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to an impulse pressure transmitter failure, Pzr Master Controller failing low, 1C RCP #1 seal failing open requiring a unit S/D, loss of ESF Bus, RCP shaft seizure resulting in a LOCA with various components failing to align (start/open) during the Reactor Trip and Safety Injection. | | |
| Initial Conditions: | IC- 21, 100% power, Steady State operations. All equipment in automatic and operating properly. | | |
| Turnover: | 100% power, Steady State operations. All equipment in automatic and operating properly. | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|------------------|--|--------------------|---|
| Preload (NOTE 1) | RP01 IOR ZDIRT2 NORMAL | C BOP RO SRO | Automatic reactor trip failure. Failure of the reactor trip switch from the RO panel. |
| Preload (NOTE 1) | RP02A | C RO SRO | Failure of the "A" RTB to open. |
| Preload (NOTE 1) | RP15C MRF FW160 STOP MRF RP90 OPPEN IMF RP155 | C BOP RO SRO | Failure of the 1A SI Pump to Auto start. Failure of the 1B AFW Pump to Auto start. Failure of the 1A AFW Pump to Auto Start |
| 1 | RX10A, 0 | I BOP RO SRO | PT-505 failure low (NOTE 2) |
| 2 | RX15, 2355 | I RO SRO | Failure of the Pzr Master Pressure Controller |
| 3 | CV27C, 4 | C RO SRO | Failure of the 1C RCP #1 seal |
| 4 | | N BOP SRO | Ramp down turbine power at directed MW/min due to RCP seal failure |
| | | R RO | Lower reactor power using rods and/or boration due to RCP seal failure |
| 5 | ED07B | C BOP RO SRO | Loss of ESF Bus 142 (overcurrent) |
| 6 | TH17C TH06C, 2000 IOR ZDI1HSAP041 | M BOP RO SRO | 1C RCP shaft seizure 1C RCS cold leg LOCA (1 minute delay) Trip Bkr 1412 after E-0 to manually start the 1A SI Pump |

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

NOTE 1: Run BATCH FILE for all Preload **BAT 1AFWPMP**

NOTE 2: RP20 (OPEN/CLOSE) RX143 (Trip)

SCENARIO 00-7 OVERVIEW

The scenario starts with the Unit 1 at 100% steady state power. There are no Out of Services and all equipment is operating properly.

After the crew has taken the shift, PT-505, Main Turbine First Stage Impulse Pressure Channel will fail low causing the crew to perform the actions of BwOA INST-2 Attachment D. These actions include manual rod control, going to the steam pressure mode on the steam dumps, defeating the failed channel, tripping bistables and referencing Tech Specs.

After the actions of BwOA INST-2 Attachment D are complete, the Pressurizer Master Pressure Controller will fail high. The crew should take manual control of the controller and restore RCS pressure to normal. The crew may reference BwOA INST-2 Attachment B for guidance.

Once Pzr Pressure has been restored to normal, the 1C RCP #1 seal will fail open resulting in the Unit required to be shutdown and the 1C RCP secured within 8 hours. The crew should enter BwOA RCP-1 to address the seal failure. The crew will commence a unit shutdown per BwGP 100-4 ensuring that the 1C RCP will be secured in 8 hours. Tech. Specs should also be referenced to determine if the RCS leak rate is acceptable.

Following clearly observable plant response from the reactivity changes resulting from the unit shutdown, an overcurrent condition will occur on Bus 142 resulting in the loss of Bus 142. The crew should enter BwOA ELEC-3 to take actions for the loss of Bus 142. The crew should also determine that Attachment D of BwOA ELEC-3 is not applicable due to the fire being in Bus 142. The crew will reference tech Specs.

After the actions for the loss of Bus 142 are complete, the 1C RCP shaft will seize resulting in a RCS Cold Leg LOCA. The crew will have to manually trip the reactor from the safeguards panel due to both an automatic reactor trip failure and the failure of the manual reactor trip switch from the RO panel. The crew will perform the actions of BwEP E-0. During the Immediate Actions of E-0, the crew should recognize that the "A" reactor trip breaker failed open and dispatch a local operator to open it. The crew will have to manually start the 1A SI pump due to an auto start failure. Auxiliary Feedwater will also have to be manually initiated due to the Loss of Bus 142 (1A AFW pump) and the failure of the 1B AFW pump to auto start.

From BwEP E-0 the crew will transition to BwEP E-1 and then to BwEP ES-1.2 to cooldown the primary plant.

Critical Tasks

- E-0--A: Manually trip the reactor from the control room to prevent a transition to BWFR-S.1.
- E-0--F: Establish the minimum required AFW flow rate to the SGs before transition out of E-0.
- E-0--J: Establish flow from at least one intermediate-head ECCS pump before transition out of E-0.

| | | | |
|---------------------|---|--------------------|-----------------------|
| Simulation Facility | <u>Braidwood</u> | Scenario No.: 00-8 | Operating Test No.: 3 |
| Examiners: | _____ | Operators: | <u>SRO</u> |
| | _____ | | <u>RO</u> |
| | _____ | | <u>BOP</u> |
| Objectives: | To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a | | |
| Initial Conditions: | IC-31, 90% power, Steady State, 1A Charging pump and 1B AFW pump OOS. | | |
| Turnover: | Unit 1 is currently at 90% power. 1A Charging pump is OOS for pump bearing replacement and is expected back next shift. Currently in Tech Spec 3.5.2 Condition A. There are 5 days left on the Completion Time. The 1B AFW Pump is OOS for a modification to the starting circuit and is expected back in 3 to 4 hours. Currently in Tech Spec 3.7.5 Condition A. There are 60 hours left on the Completion Time. Electrical Generation has requested a load increase to full power as soon as possible at 5Mw/min. Unit 2 is in a Refueling outage and they are making preps to lift the head. | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|------------------|--|--------------------|--|
| Preload (NOTE 1) | RP01 RP02A RP02B | M BOP RO SRO | Failure of the reactor to trip (Auto and Manual) |
| Preload (NOTE 1) | RD09, 18 | C RO SRO | Auto rod speed failure at 18 steps/min. |
| Preload (NOTE 1) | MS03A 100 Trg 3 MS03B 100 Trg 3 MS03C 100 Trg 3 MS03D 100 Trg 3 | C BOP RO SRO | SG Safety failure (4 SGs) |
| Preload (NOTE 1) | 1A CV Pump PTL & OOS 1B AFW Pump PTL & OOS | | 1A CV Pump OOS 1B AFW Pump OOS |
| Preload (NOTE 1) | Imbedded Batch File | C BOP RO SRO | 1A AFW pump fail to Auto start |
| 1 | | N BOP SRO | Ramp up turbine power to 100% at 5 MW/min |
| | | R RO | Raise reactor power using rods and/or dilution |
| 2 | CV01B | C RO SRO | 1B Charging Pump trip |
| 3 | RX18E, 650 | I RO SRO | A Loop Hot Leg RTD failure high (NOTE 2) |
| 4 | RX03A, 4.8mlbm/hr | I BOP SRO | 1B SG Steam Flow Channel Failure (controlling channel) |
| 5 | EG05A | C BOP RO SRO | 1E Main Power Transformer Failure |
| 6 | Preloaded | M BOP RO SRO | ATWS |
| 7 | TRG! 3 | M BOP RO SRO | 4 Faulted SGs |

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

NOTE 1: Run BATCH FILE for all Preload BAT ATWS

NOTE 1: RP20 (OPEN/CLOSE) RX014 (Trip) RX136 (Trip) RX013 (Trip) RX135 (Trip) RX016 (Trip)
RX015 (Trip)

SCENARIO 00-8 OVERVIEW

Unit 1 is at 90% power. Electric Generation has requested load increase to full power as soon as possible. The 1A Charging Pump is OOS for bearing replacement and the 1B AFW Pump is OOS for a modification installation. Unit 2 is in a refueling outage and they are making preps to lift the head.

Once the crew starts the power increase, a failed auto rod speed failure may become evident. If this is the case, the crew will put the Control Rods into manual.

Following clearly observable plant response from the reactivity changes due to the power increase, the 1B Charging pump will trip for no apparent reason. The crew should isolate letdown and reference the applicable Annunciator Response manuals and dispatch a local operator to investigate. The crew should also reference Tech Specs due to no charging pumps available. The local operator will report back that a maintenance worker hit the breaker trip with a bar that he was using to erect scaffolding. There is nothing wrong with the breaker or the pump. The crew should re-start the pump and re-establish letdown.

Once letdown is restored, the "A" Loop Hot Leg RTD will fail high. This will require the crew to enter BwOA INST-2 Attachment A and take the appropriate actions which include placing control rods in manual, defeating the failed channel, tripping bistables and referencing Tech Specs.

After the actions of BwOA INST-2 are complete, the controlling steam flow channel for the 1B SG will fail low. This will require the crew to take manual control of the 1B SG FRV and enter BwOA INST-2 Attachment H. The crew will select an operable channel for the 1B SG steam flow and return the FRV back to automatic control.

Shortly after the crew gains control of the 1B SG level, a catastrophic failure of the 1E Main Power Transformer will occur resulting in a trip of the Main Generator. The reactor will fail to trip resulting in the crew transitioning to BwFR-S.1. Compounding the problem, Auto rod speed will fail to 18 steps/min (rods may be in manual due to rod speed failure previously detected) requiring the crew to take manual control of rods. As steam generator pressure increases due to the ATWS, a safety valve on each of the SGs will fail open resulting in an uncontrolled depressurization of all SGs. The crew will transition from BwFR-S.1 to E-0. From E-0 the crew will transition to E-2 and then to BwCA-2.1

Critical Tasks

FR-S.1--B: Start AFW pumps within 60 seconds of the ATWS condition.

FR-S.1--C: Insert negative reactivity into the core by at least one of the following methods before completing the immediate-action steps of FR-S.1:

- De-energize the control rod drive MG sets
- Insert RCCAs
- Establish emergency boration flow to the RCS

| | | | |
|---------------------|--|--------------------|-----------------------|
| Simulation Facility | <u>Braidwood</u> | Scenario No.: 00-9 | Operating Test No.: 3 |
| Examiners: | _____ | Operators: | <u>SRO</u> |
| | _____ | | <u>RO</u> |
| | _____ | | <u>BOP</u> |
| Objectives: | To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a request to raise power, radiation monitor failure, SG Narrow range level failure, Pzr level failure, a SG tube leak which degrades to a SGTR, and a main steam line break. | | |
| Initial Conditions: | IC-31; 90% Power, Equilibrium. Xenon, Steady State. 1A AFW pump OOS | | |
| Turnover: | Unit 1 is at 90% power, Steady State. The 1A AFW pump is OOS for motor bearing replacement. Currently in Tech Spec 3.7.5 Condition A. The pump is expected back in 3 to 4 hours. There are 60 hours left on the Completion Time. | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|--------------------------|--------------------|---|
| Preload | 1A AFW Pump in PTL & OOS | | 1A AFW pump OOS |
| 1 | | N BOP SRO | Raise turbine power to 100% at 5 MW/min |
| | | R RO | Raise reactor power using rods and/or boration |
| 2 | RM01AU | I BOP SRO | 1D Main Steam Line radiation monitor failure |
| 3 | RX06C, 0 | I BOP SRO | 1A SG Narrow Range level channel failure (LT-519) (NOTE 1) |
| 4 | RX13A, 0 | I RO SRO | Pressurizer Level Channel LT-460 fail low (NOTE 2) |
| 5 | TH03D, 20 | C BOP RO SRO | 1D SG Tube Leak |
| 6 | TH03D, 450 | M BOP RO SRO | 1D SGTR (after crew determines shutdown required) |
| 7 | MS04D, 100 | C BOP RO SRO | 1D SG atmospheric relief fail open |
| 8 | MS07A, .5 | M BOP RO SRO | 1A Main Steam Line steam break (once C/D commenced in E-3) |

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

NOTE 1: RP21 (OPEN/CLOSE) RX051 (Trip) RX052 (Trip)

NOTE 2: RP21 (OPEN/CLOSE) RX030 (Trip)

SCENARIO 00-9 OVERVIEW

Unit 1 is at 90% power, Steady State. The 1A AFW pump is OOS for motor bearing replacement. Currently in Tech Spec 3.7.5 Condition A. The pump is expected back in 3 to 4 hours. There are 60 hours left on the Completion Time. Electric Generation has requested an increase in power to 100% at 5MW/min.

Following clearly observable plant response from the reactivity changes, the 1D Main Steam Line radiation monitor will fail. The crew will enter the RM-11 annunciator responses and determine that the Rad Monitor has failed.

After the crew has taken the actions for the failed rad monitor, the 1A SG Narrow Range Level Channel (LT-519) will fail low. The crew will enter BwOA INST-2 Attachment E. The crew will take manual control of the 1A FRV, restore SG level, trip applicable bistables and reference Tech Specs. The crew will also switch controlling channels and return the 1A SG FRV to Auto.

Once the actions for the failed SG level channel are complete, Pzr level channel 460 will fail low. The crew will enter BwOA INST-2 Attachment C to select an operable channel, restore Pzr level to normal and restore letdown. The crew will also trip bistables and reference Tech Specs.

When the crew determines that the tripping of the Pzr level bistables will not generate a reactor trip or SI, the 1D Steam Generator will develop a 20 gpm leak. The crew will enter BwOA SEC-8 and determine that a unit S/D is required. The crew will initiate a S/D to MODE 3 within 6 hours and reference Tech Specs.

After the crew determines that a Unit shutdown is required per SEC-8, the SGTL on the 1D SG will increase to 450 gpm. At the same time, the 1D SG atmospheric relief valve will fail open. The crew will trip the reactor, manually initiate a Safety Injection and transition to BwEP E-0.

From E-0 the crew will transition to BwEP E-3. After the crew has commenced a cooldown in E-3, the 1B main steam line will develop a large steam break. The crew will transition to BwEP E-2 per the foldout page. When the crew completes BwEP E-2 and transitions back to E-3 the scenario will be complete.

Critical Tasks

E-2--A: Isolate the faulted SG before transition out of E-2.

E-3--A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

Simulation Facility BraidwoodScenario No.: SpareExaminers: _____

_____Operators: _____ SRO
_____ RO
_____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a normal power increase, a pressurizer level channel failure, HDT level controller failure, a leak in the letdown heat exchanger, a leak in the main turbine EHC system and a Large LOCA with failure of RH pumps to start and failure of automatic transfer to sump suction for operating train of RH.

Initial Conditions: IC-16. Unit at 49% power

Turnover: ICC9437A OOS for MOV surveillance. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time.

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|------------------------|--------------------|---|
| Preload | RH01A | C RO SRO | 1A RH Pump fails to start/trip |
| Preload | MRF RP85 open RP15F | C RO SRO | 1B RH Pump fails to start on SI with manual start available |
| Preload | RH04B | C BOP SRO | Failure of 1SI8811B (RH CNMT Sump) auto transfer |
| 1 | | N BOP SRO | Ramp up turbine power to 75% at 5 MW/min |
| | | R RO | Raise reactor power using rods and/or dilution |
| 2 | RX13A, 0, 10 | I RO SRO | Pressurizer level channel fails low (LT-459) (NOTE 1) |
| 3 | FW17, 0 | I BOP SRO | Heater Drain Tank level controller fails low |
| 4 | CV23A, 100 | C RO SRO | Letdown Heat Exchanger tube leak |
| 5 | TC15, 34 | M BOP RO SRO | EHC System leak of 34 gpm results in turbine trip (NOTE 2) |
| 6 | TH06A, 450000 | M BOP RO SRO | Large Break LOCA upon reactor trip |
| 7 | Preload | C RO SRO | 1A and 1B RH Pump fail to start with 1B RH pump manual start capable. |
| 8 | Preload | C BOP SRO | Failure of Auto transfer to cold leg recirc for "B" Train |

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

NOTE 1: MRF RP20 OPEN/CLOSE
MRF RX029 TRIP

NOTE 2: If asked as local operator, the EH fluid leak is greater than makeup capacity and leak is located at combined discharge of EH pumps.

SCENARIO Spare OVERVIEW

Unit 1 is at 50% power. Following turnover power increase is initiated to 75% power.

Following clearly observable plant response from the reactivity changes, the controlling pressurizer level channel will fail low. Pressurizer level will be placed in manual, an operable channel selected and level returned to normal. The SRO should contact I&C to assist in repair and the tripping of bistables. Technical Specifications should be consulted for applicability.

After the bistables for pressurizer level have been tripped, Heater Drain Tank level controller will fail causing heater drain tank level to rise. The overflow valve will open and level alarms will actuate. The operator is expected to take manual control of the level controller and reopen the valve.

After HDT tank level is restored to normal band, a leak will develop in the letdown heat exchanger. The operator should notice VCT level changing, and radiation levels in the CCW system increasing. Operators should troubleshoot and identify the failed letdown HX. The crew should establish letdown using the 1B HX.

After the 1B Letdown HX is in service, an EHC leak will develop on the EHC reservoir. EHC level will drop bringing in several alarms. When level is sufficiently low to result in a trip of the EHC pumps, the main turbine also gets a trip signal. E-0 will be entered when the reactor trips.

At the time of the reactor trip, a large break LOCA occurs on the RCS. Both RH pumps fail to start. The 1A RH pump trips if a manual start is attempted, but the 1B RH pump will start on a manual start. When RWST level drops to the LO-2 level for automatic transfer to the CNMT sump suction, the "B" Train valve SI8811B will fail to automatically open. Operator action is required to stop the RH and CS pumps and manually open the sump suction valves. The scenario is terminated following completion of the alignment of ECCS for cold leg recirculation.

Critical Tasks

1. E-0 — H: Manually start at least one low-head ECCS pump before transition out of E-0.
2. ES-1.3 — A: Transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the plant-specific LOCA analysis.