

Draft Submittal
(Pink Paper)

CATAWBA APRIL 2003 EXAM
50-413 & 50-414/2003-301

MARCH 31 - APRIL 4 &
APRIL 30, 2003

DRAFT OUTLINES

| Facility: <u>Catawba</u> | | Date of Examination: <u>3/31/03</u> | | |
|--|--|-------------------------------------|-----------------------|----|
| Item | Task Description | Initials | | |
| | | a | b* | c# |
| 1. W R I T T E N | a. Verify that the outline(s) fit(s) the appropriate model per ES-401 <u>REV 9</u> | BEK | JWP | EL |
| | b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all K/A categories are appropriately sampled. | BEK | JWP | EL |
| | c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics. | BEK | JWP | EL |
| | d. Assess whether the justifications for deselected or rejected K/A statements are appropriate. | BEK | JWP | EL |
| 2. S I M | a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, and major transients. | BEK | JWP | EL |
| | b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity; ensure each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s), and scenarios will not be repeated over successive on subsequent days. | BEK | JWP | EL |
| | c. To the extent possible, assess whether the outline(s) conform(s) with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D. | BEK | JWP | |
| 3. W T | a. Verify that: (1) the outline(s) contain(s) the required number of control room and in-plant tasks; (2) no more than 30% of the test material is repeated from the last NRC examination; (3)* no tasks are duplicated from the applicants' audit test(s), and (4) no more than 80% of any operating test is taken directly from the licensee's exam banks. | BEK | JWP | EL |
| | b. Verify that: (1) the tasks are distributed among the safety function groupings as specified in ES-301, (2) one task is conducted in a low-power or shutdown condition, (3) 40% 4 - 6 (2 - 3 for SRO-U) of the tasks require the applicant to implement an alternate path procedure, (4) one in-plant task tests the applicant's response to an emergenc, or abnormal condition, and (5) the in-plant walk-through requires the applicant to enter the RCA | BEK | JWP | EL |
| | c. Verify that the required administrative topics are covered, with emphasis on performance-based activities. | BEK | JWP | EL |
| | d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on successive subsequent days. | BEK | JWP | EL |
| 4. G E N E R A L | a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section. | BEK | JWP | EL |
| | b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate. | BEK | JWP | EL |
| | c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5. | BEK | JWP | EL |
| | d. Check for duplication and overlap among exam sections. | BEK | JWP | EL |
| | e. Check the entire exam for balance of coverage. | BEK | JWP | EL |
| | f. Assess whether the exam fits the appropriate job level (RO or SRO). | BEK | JWP | EL |
| a. Author | BRIAN C. HAAGENSEN / <u>Brian C. Haagensen</u> Printed Name / Signature | | Date <u>2/3/03</u> | |
| b. Facility Reviewer (*) | <u>Reginald E. Kimway</u> / <u>Reginald E. Kimway</u> | | <u>3/16/03</u> | |
| c. NRC Chief Examiner (#) | <u>John W. Pitzer</u> / <u>John W. Pitzer</u> | | <u>2/11/03</u> | |
| d. NRC Supervisor | <u>MICHAEL E. BRONTES</u> / <u>Michael E. Brontes</u> | | <u>2/11/03</u> | |
| Note: * Not applicable for NRC-developed examinations. # Independent NRC reviewer initial items in Column "c;" chief examiner concurrence required. | | | | |

| Facility <u>Catawba</u> | | Date of Examination: <u>3/31/03</u> | | |
|---------------------------------------|---|-------------------------------------|---------|----|
| Item | Task Description | Initials | | |
| | | a | b* | c# |
| 1. W R I T T E N | a. Verify that the outline(s) fit(s) the appropriate model per ES-401. | BOJ | GOJ | ED |
| | b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all K/A categories are appropriately sampled. | BOJ | GOJ | ED |
| | c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics. | BOJ | GOJ | ED |
| | d. Assess whether the justifications for deselected or rejected K/A statements are appropriate. | BOJ | GOJ | ED |
| 2. S I M | a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, and major transients. | REK | GOJ | ED |
| | b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity; ensure each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s), and scenarios will not be repeated ever successive on subsequent days. | REK | GOJ | ED |
| | c. To the extent possible, assess whether the outline(s) conform(s) with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D. | REK | GOJ | ED |
| 3. W / T | a. Verify that: (1) the outline(s) contain(s) the required number of control room and in-plant tasks; (2) no more than 30% of the test material is repeated from the last NRC examination, (3)* no tasks are duplicated from the applicants' audit test(s), and (4) no more than 80% of any operating test is taken directly from the licensee's exam banks. | REK | GOJ | ED |
| | b. Verify that: (1) the tasks are distributed among the safety function groupings as specified in ES-301, (2) one task is conducted in a low-power or shutdown condition, (3) 40% 4 - 6 (2 - 3 for SRO-U) of the tasks require the applicant to implement an alternate path procedure, (4) one in-plant task tests the applicant's response to an emergency or abnormal condition, and (5) the in-plant walk-through requires the applicant to enter the RCA. | REK | GOJ | ED |
| | c. Verify that the required administrative topics are covered, with emphasis on performance-based activities. | REK | GOJ | ED |
| | d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on successive subsequent days. | REK | GOJ | ED |
| 4. G E N E R A L | a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section. | REK | GOJ | ED |
| | b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate. | REK | GOJ | ED |
| | c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5. | REK | GOJ | ED |
| | d. Check for duplication and overlap among exam sections. | REK | GOJ | ED |
| | e. Check the entire exam for balance of coverage. | REK | GOJ | ED |
| | f. Assess whether the exam fits the appropriate job level (RO or SRO). | REK | GOJ | ED |
| a. Author | BRIAN C. HAAGENSEN / <i>[Signature]</i> Printed Name / Signature | | Date | |
| b. Facility Reviewer (*) | <i>Reginald E. Kimrey</i> / <i>Reginald E. Kimrey</i> | | 2/12/03 | |
| c. NRC Chief Examiner (#) | <i>Gary W. Hamilton</i> / <i>Gary W. Hamilton</i> | | 2-12-03 | |
| d. NRC Supervisor | <i>David Lee Jr.</i> / <i>David Lee Jr.</i> | | 3/12/03 | |
| | <i>Michael E. Carter</i> / <i>Michael E. Carter</i> | | 3/12/03 | |
| Note. | * Not applicable for NRC-developed examinations. # Independent NRC reviewer initial items in Column "c;" chief examiner concurrence required. | | | |

| | | | |
|---|---|--|--|
| Facility: Catawba | | Date of Examination: March 31, 2003 - April 18, 2003 | |
| Examination Level: RO | | Operating Test Number: | |
| Administrative Topic (see Note) | Describe activity to be performed | | |
| Conduct of Operations | Perform a Manual Shutdown Margin Calculation | | |
| Conduct of Operations | Monitor Reactor Coolant System leakage during loss of Operator Aid Computer | | |
| Equipment Control | Classify Emergency Diesel Generator start and make required log entries | | |
| Radiation Control | Calculate Low Pressure Service Water Flow for liquid radioactive release | | |
| Emergency Plan | | | |
| <p>NOTE: All items (5 total) are required for SROs. RO applicants require 4 items unless they are retaking only the administrative topics, when 5 are required.</p> | | | |

| Facility: Catawba | | Date of Examination: March 31, 2003 - April 18, 2003 | |
|---|--|--|--|
| Examination Level: SRO | | Operating Test Number: | |
| Administrative Topic (see Note) | Describe activity to be performed | | |
| Conduct of Operations | Perform a Manual Shutdown Margin Calculation | | |
| Conduct of Operations | Evaluate Reactor Coolant System leakage and determine Tech Spec actions during loss of Operator Aid Computer | | |
| Equipment Control | Perform a review of an R&R procedure | | |
| Radiation Control | Calculate Low Pressure Service Water Flow for liquid radioactive release | | |
| Emergency Plan | Upgrade to a higher emergency classification | | |
| <p>NOTE: All items (5 total) are required for SROs. RO applicants require 4 items unless they are retaking only the administrative topics, when 5 are required.</p> | | | |

| Facility: Catawba | | Date of Examination: Mar 31- Apr 18,2003 |
|--|-------------|---|
| Exam Level (circle one): RO / SRO(I) / SRO(U) | | Operating Test No.: |
| Control Room Systems (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U) | | |
| System / JPM Title | Type Code* | Safety Function |
| a. 004/Respond to Inadvertent Dilution While Shutdown (NV-119) | M, A, L, S | 1 |
| b. 026/Align the NS System to Cold Leg Recirculation (NS-104) | M, A, S | 5 |
| c. 015/Take Power Range Drawer Out of Service (ENB-002) | D, C | 7 |
| d. 003/Start Reactor Coolant Pump 1B (NCP-081) | D, A, C | 4 Primary |
| e. 061/Establish Feedwater to a Hot Dry Steam Generator (CSF-005) | D, C | 4 Secondary |
| f. 006/Transfer Emergency Core Cooling System to Hot Leg Recirculation (NI-098) | D, A, S | 3 |
| g. 008/Respond to a Leak in the Component Cooling System | N, A, S | 8 |
| h. 002/ Vent the Reactor Vessel Head Following a Small Break LOCA | M, C | 2 |
| In-Plant Systems (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U) | | |
| i. 013/Transfer HVAC Controls to "Local" Following Control Room Evacuation (RSS-003) | D, R | 2 |
| j. 078/Startup Backup Temporary VI Compressor (VI-002) | D | 8 |
| k. 064/Place SSF Diesel In Operation (AD-003) | D | 6 |
| * 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 | | |

Bolded items are from the 2001 initial exam at Catawba.

| Facility: Catawba | | Date of Examination: Mar 31- Apr 18, 2003 | |
|--|-------------|---|--|
| Exam Level (circle one): RO / SRO(I) / SRO(U) | | Operating Test Ne.: | |
| Control Room Systems (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U) | | | |
| System / JPM Title | Type Code* | Safety Function | |
| a. 004/Respond to Inadvertent Dilution While Shutdown (NV-119) | M, A, L, S | 1 | |
| b. 026/Align the NS System to Cold Leg Recirculation (NS-104) | M, A, S | 5 | |
| c. 015/Take Power Range Drawer Out of Service (ENB-002) | D, C | 7 | |
| d. 003/Start Reactor Coolant Pump 1B (NCP-081) | D, A, C | 4 Primary | |
| e. 061/Establish Feedwater to a Hot Dry Steam Generator (CSF-005) | D, C | 4 Secondary | |
| f. 006/Transfer Emergency Core Cooling System to Hot Leg Recirculation (NI-098) | D, A, S | 3 | |
| g. 008/Respond to a Leak in the Component Cooling System | N, A, S | 8 | |
| h. | | | |
| In-Plant Systems (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U) | | | |
| i. 013/Transfer HVAC Controls to "Local" Following Control Room Evacuation (RSS-003) | D, R | 2 | |
| j. 078/Startup Backup Temporary VI Compressor (VI-002) | D | 8 | |
| k. 064/Place SSF Diesel in Operation (AD-003) | D | 6 | |
| * 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 | | | |

Bolded items are from the 2001 Initial exam at Catawba.

Facility: Catawba

Date of Examination: **Mar 31-Apr 18, 2003**Exam Level (circle one): RO / SRO(I) / **SRO(U)**

Operating Test No. :

Control Room Systems (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)

| System / JPM Title | Type Code* | Safety Function |
|---|------------|-----------------|
| a. 004/Respond to Inadvertent Dilution While Shutdown (NV-119) | M, A, L, S | 1 |
| b. 061/Establish Feedwater to a Hot Dry Steam Generator (CSF-005) | D, C | 4 |
| c. 026/Align the NS System to Cold Recirculation (NS-104) | M, A, S | 5 |
| d. | | |
| e. | | |
| f. | | |
| g. | | |
| h. | | |

In-Plant Systems (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)

| | | |
|---|-------------|----------|
| i. 013/Transfer HVAC Controls to "Local" Following Control Room Evacuation (RSS-003) | D, R | 2 |
| j. 064/Place SSF Diesel in Operation (AD-003) | D | 6 |
| k. | | |

* 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

Bolded items are from the 2001 initial exam at Catawba.

| Facility: <u>Catawba</u> | | Date of Examination: <u>3/31/03</u> | | Operating Test Number | |
|--|---|-------------------------------------|----|-----------------------|--|
| 1. GENERAL CRITERIA | | Initials | | | |
| | | a | b* | c# | |
| a. | The operating test conforms with the previously approved outline; changes are consistent with sampling requirements (e.g., 10 CFR 55.45, operational importance, safety function distribution). | RSK | GW | | |
| b. | There is no day-to-day repetition between this and other operating tests to be administered during this examination. | RSK | GW | GW | |
| c. | The operating test shall not duplicate items from the applicants' audit test(s) (see Section D.1.a). | RSK | GW | | |
| d. | Overlap with the written examination and between different parts of the operating test categories is within acceptable limits. | RSK | GW | GW | |
| e. | It appears that the operating test will differentiate between competent and less-than-competent applicants at the designated license level. | RSK | GW | GW | |
| 2. WALK-THROUGH (CATEGORY A & B) CRITERIA | | -- | -- | -- | |
| a. | Each JPM includes the following, as applicable: <ul style="list-style-type: none"> initial conditions initiating cues references and tools, including associated procedures reasonable and validated time limits (average time allowed for completion) and specific designation if deemed to be time critical by the facility licensee specific performance criteria that include: <ul style="list-style-type: none"> detailed expected actions with exact criteria and nomenclature system response and other examiner cues statements describing important observations to be made by the applicant criteria for successful completion of the task identification of critical steps and their associated performance standards restrictions on the sequence of steps, if applicable | RSK | GW | GW | |
| b. | The prescribed questions in Category A are predominantly open reference and meet the criteria in Attachment I of ES-301. | N/A | | | |
| c. | Repetition from operating tests used during the previous licensing examination is within acceptable limits (30% for the walk-through) and do not compromise test integrity. | RSK | GW | GW | |
| d. | At least 20 percent of the JPMs on each test are new or significantly modified. | RSK | GW | GW | |
| 3. SIMULATOR (CATEGORY G) CRITERIA | | -- | -- | -- | |
| a. | The associated simulator operating tests (scenario sets) have been reviewed in accordance with Form ES-301-4 and a copy is attached. | RSK | GW | GW | |
| Printed Name / Signature | | Date | | | |
| a. Author | <u>Reginald E. Kimroy / Reginald E. Kimroy</u> | <u>2/12/03</u> | | | |
| b. Facility Reviewer(*) | <u>Gary W. Hamilton / Gary W. Hamilton</u> | <u>2-12-03</u> | | | |
| c. NRC Chief Examiner (#) | <u>Edwin L. Cantel / Edwin L. Cantel</u> | <u>3/12/03</u> | | | |
| d. NRC Supervisor | <u>MICHAEL E. ERNSTES / Michael E. Ernstes</u> | <u>3/12/03</u> | | | |
| NOTE: * The facility signature is not applicable for NRC-developed tests. # Independent NRC reviewer initial items in Column "c," chief examiner concurrence required | | | | | |

| Facility: <i>Catawba</i> | | Date of Exam: <i>3/31/03</i> | | Scenario Numbers: <i>1, 2, 3</i> | | Operating Test No.: | | |
|---|---|------------------------------|------------|----------------------------------|------------|---------------------|------------|----|
| QUALITATIVE ATTRIBUTES | | | | | | Initials | | |
| | | | | | | a | b* | c# |
| 1. | The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events. | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | | | | |
| 2. | The scenarios consist mostly of related events. | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | | | | |
| 3. | Each event description consists of the point in the scenario when it is to be initiated the malfunction(s) that are entered to initiate the event the symptoms/cues that will be visible to the crew the expected operator actions (by shift position) the event termination point (if applicable) | <i>REK</i> | <i>GWK</i> | | | | | |
| 4. | No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event. | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | | | | |
| 5. | The events are valid with regard to physics and thermodynamics. | <i>REK</i> | <i>GWK</i> | | | | | |
| 6. | Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives. | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | | | | |
| 7. | If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given. | <i>REK</i> | <i>GWK</i> | | | | | |
| 8. | The simulator modeling is not altered. | <i>REK</i> | <i>GWK</i> | | | | | |
| 9. | The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios. | <i>REK</i> | <i>GWK</i> | | | | | |
| 10. | Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.45 of ES-301. | <i>REK</i> | <i>GWK</i> | | | | | |
| 11. | All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios). | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | | | | |
| 12. | Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios). | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | | | | |
| 13. | The level of difficulty is appropriate to support licensing decisions for each crew position. | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | | | | |
| TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4-D5.d) | | | | | | Actual Attributes | | |
| 1. | Total malfunctions (5-6) | <i>7</i> | <i>8</i> | <i>6</i> | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | |
| 2. | Malfunctions after EOP entry (1-2) | <i>3</i> | <i>2</i> | <i>1</i> | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | |
| 3. | Abnormal events (2-4) | <i>4</i> | <i>4</i> | <i>4</i> | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | |
| 4. | Major transients (1-2) | <i>1</i> | <i>1</i> | <i>1</i> | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | |
| 5. | EOPs entered/requiring substantive actions (1-2) | <i>2</i> | <i>2</i> | <i>1</i> | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | |
| 6. | EOP contingencies requiring substantive actions (0-2) | <i>1</i> | <i>1</i> | <i>0</i> | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | |
| 7. | Critical tasks (2-3) | <i>2</i> | <i>3</i> | <i>2</i> | <i>REK</i> | <i>GWK</i> | <i>LOJ</i> | |

| Facility: <i>Catawba</i> | | Date of Exam: <i>3/31/03</i> | | Scenario Numbers: <i>41</i> | | Operating Test No.: | |
|---|---|------------------------------|-----------|-----------------------------|------------|---------------------|-----------|
| QUALITATIVE ATTRIBUTES | | | Initials | | | | |
| | | | a | b* | c# | | |
| 1. | The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events. | <i>RSK</i> | <i>GH</i> | <i>td</i> | | | |
| 2. | The scenarios consist mostly of related events. | <i>RSK</i> | <i>GH</i> | <i>td</i> | | | |
| 3. | Each event description consists of the point in the scenario when it is to be initiated the malfunction(s) that are entered to initiate the event the symptoms/cues that will be visible to the Crew the expected operator actions (by shift position) the event termination point (if applicable) | <i>RSK</i> | <i>GH</i> | | | | |
| 4. | No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event. | <i>RSK</i> | <i>GH</i> | <i>td</i> | | | |
| 5. | The events are valid with regard to physics and thermodynamics. | <i>RSK</i> | <i>GH</i> | | | | |
| 6. | Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives. | <i>RSK</i> | <i>GH</i> | <i>td</i> | | | |
| 7. | If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given. | <i>RSK</i> | <i>GH</i> | | | | |
| 8. | The simulator modeling is not altered. | <i>RSK</i> | <i>GH</i> | | | | |
| 9. | The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios. | <i>RSK</i> | <i>GH</i> | | | | |
| 10. | Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.45 of ES-301. | <i>RSK</i> | <i>GH</i> | | | | |
| 11. | All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios). | <i>RSK</i> | <i>GH</i> | <i>td</i> | | | |
| 12. | Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios). | <i>RSK</i> | <i>GH</i> | <i>td</i> | | | |
| 13. | The level of difficulty is appropriate to support licensing decisions for each crew position. | <i>RSK</i> | <i>GH</i> | <i>td</i> | | | |
| TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4-B5.d) | | Actual Attributes | | | - | - | - |
| 1. | Total malfunctions (5-8) | <i>7</i> | <i>1</i> | <i>1</i> | <i>RSK</i> | <i>GH</i> | <i>td</i> |
| 2. | Malfunctions after EOP entry (1-2) | <i>2</i> | <i>1</i> | <i>1</i> | <i>RSK</i> | <i>GH</i> | <i>td</i> |
| 3. | Abnormal events (2-4) | <i>4</i> | <i>1</i> | <i>1</i> | <i>RSK</i> | <i>GH</i> | <i>td</i> |
| 4. | Major transients (1-2) | <i>1</i> | <i>1</i> | <i>1</i> | <i>RSK</i> | <i>GH</i> | <i>td</i> |
| 5. | EOPs entered/requiring substantive actions (1-2) | <i>2</i> | <i>1</i> | <i>1</i> | <i>RSK</i> | <i>GH</i> | <i>td</i> |
| 6. | EOP contingencies requiring substantive actions (0-2) | <i>1</i> | <i>1</i> | <i>1</i> | <i>RSK</i> | <i>GH</i> | <i>td</i> |
| 7. | Critical tasks (2-3) | <i>2</i> | <i>1</i> | <i>1</i> | <i>RSK</i> | <i>GH</i> | <i>td</i> |

OPERATING TEST NO.: _____

| Applicant Type | Evolution Type | Minimum Number | Scenario Number | | | | | | | |
|----------------|----------------------|----------------|-----------------|------|------|------|------|------|------|------|
| | | | 1 | | 2 | | 3 | | 4 | |
| | | | RO | BOP | RO | BOP | RO | BOP | RO | BOP |
| RO | Reactivity | 1* | 1 | | 1 | | 1 | | 1 | |
| | Normal | 1* | | 2 | | 2 | | 2 | | 2 |
| | Instrument/Component | 4* | 4, 6 | 3, 5 | 6, 7 | 3, 4 | 3, 6 | 4, 5 | 4, 6 | 3, 5 |
| | Major | 1 | 7 | 7 | 8 | 8 | 7a | 7a | 7 | 7 |

| | | | | | | | | | | |
|-------|----------------------|----|------------|--|------------|--|------------|--|------------|--|
| As RO | Reactivity | 1* | 1 | | 1 | | 1 | | 1 | |
| | Normal | 0 | | | | | | | | |
| | Instrument/Component | 2* | 4, 6 | | 6, 7 | | 3, 6 | | 4, 6 | |
| | Major | 1 | 7 | | 8 | | 7a | | 7 | |
| SRO-i | Reactivity | 0 | 1 | | 1 | | 1 | | 1 | |
| | Normal | 1* | 2 | | 2 | | 2 | | 2 | |
| | Instrument/Component | 2* | 3, 4, 5, 6 | | 3, 4, 6, 7 | | 3, 4, 5, 6 | | 3, 4, 5, 6 | |
| | Major | 1 | 7 | | 8 | | 7a | | 7 | |

| | | | | | | | | | | |
|-------|----------------------|----|------------|--|------------|--|------------|--|------------|--|
| SRO-U | Reactivity | 0 | 1 | | 1 | | 1 | | 1 | |
| | Normal | 1* | 2 | | 2 | | 2 | | 2 | |
| | Instrument/Component | 2* | 3, 4, 5, 6 | | 3, 4, 6, 7 | | 3, 4, 5, 6 | | 3, 4, 5, 6 | |
| | Major | 1 | 7 | | 8 | | 7a | | 7 | |

- Instructions:
- (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
 - (2) Reactivity Manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. * Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
 - (3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author:

Chief Examiner:

Ronald E. Lewis
Edwin Dow, Jr.

| Competencies | SRO | | | | RO | | | | BOP | | | |
|---|----------|--------|-----|-----|----------|---------|-----------|-------------|--------------|-----------|--------------|-------------|
| | SCENARIO | | | | SCENARIO | | | | SCENARIO | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Interpret/ Diagnose Events and Conditions | 3-10 | 3-10 | 3-8 | 3-9 | 4, 6-8 | 6-9 | 3,6, 7a | 4,6, 7,9 | 3,5, 7,9, 10 | 3-5, 8,10 | 4,5, 7a,8 | 3,5, 7,8 |
| Comply With and Use Procedures (1) | 1-10 | 1-10 | 1-8 | 1-7 | 1,4, 6-9 | 1, 6-10 | 1,3, 6,7a | 1,4, 6,7 | 2,3, 5, 7-10 | 2-4, 8-10 | 1-8 | 2,3, 5,7 |
| Operate Control Boards (2) | N/A | N/A | N/A | N/A | 1,4, 6-9 | 1, 6-10 | 1,3, 6,7a | 1,4, 6,7, 9 | 2,3, 5, 7-10 | 2-4, 8-10 | 2,4, 5,7a, 8 | 2,3, 5,7, 8 |
| Communicate and Interact | 1-10 | 1-10 | 1-8 | 1-9 | 1,4, 6-9 | 1, 6-10 | 1,3, 6,7a | 1,4, 6,7, 9 | 2,3, 5, 7-10 | 2-4, 8-10 | 2,4, 5,7a, 8 | 2,3, 5,7, 8 |
| Demonstrate Supervisory Ability (3) | 3-10 | 3-10 | 3-8 | 3-9 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Comply With and Use Tech. Specs. (3) | 3-5 | 3,4, 7 | 3,5 | 5,6 | 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 one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author:

Ronald E. Kinney

Chief Examiner:

Edwin J. Jr.

| Competencies | SRO | | | | RO | | | | BOP | | | |
|---|----------|--------|-----|-----|----------|---------|-----------|-------------|--------------|-----------|--------------|-------------|
| | SCENARIO | | | | SCENARIO | | | | SCENARIO | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Interpret/ Diagnose Events and Conditions | 3-10 | 3-10 | 3-8 | 3-9 | 4, 6-8 | 6-9 | 3,6, 7a | 4,6, 7,9 | 3,5, 7,9, 10 | 3-5, 8,10 | 4,5, 7a,8 | 3,5, 7,8 |
| Comply With and Use Procedures(1) | 1-10 | 1-10 | 1-8 | 1-7 | 1,4, 6-9 | 1, 6-10 | 1,3, 6,7a | 1,4, 6,7 | 2,3, 5, 7-10 | 2-4, 8-10 | 1-8 | 2,3, 5,7 |
| Operate Control Boards (2) | N/A | N/A | N/A | N/A | 1,4, 6-9 | 1, 6-10 | 1,3, 6,7a | 1,4, 6,7, 9 | 2,3, 5, 7-10 | 2-4, 8-10 | 2,4, 5,7a, 8 | 2,3, 5,7, 8 |
| Communicate and Interact | 1-10 | 1-10 | 1-8 | 1-9 | 1,4, 6-9 | 1, 6-10 | 1,3, 6,7a | 1,4, 6,7, 9 | 2,3, 5, 7-10 | 2-4, 8-10 | 2,4, 5,7a, 8 | 2,3, 5,7, 8 |
| Demonstrate Supervisory Ability (3) | 3-10 | 3-10 | 3-8 | 3-9 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Comply With and Use Tech. Specs. (3) | 3-5 | 3,4, 7 | 3,5 | 5,6 | 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 one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author:

Ronald E. Kerriany

Chief Examiner:

Edward Lee, Jr.

| Facility: Catawba | | Date of Exam: 4/18/03 | | | | | | | | | | | | | | | | |
|---|-------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---|---|-----|-----|-------|
| Tier | Group | RO K/A Category Points | | | | | | | | | | | SRO-Only Points | | | | | |
| | | K 1 | K 2 | K 3 | K 4 | K 5 | K 6 | A 1 | A 2 | A 3 | A 4 | G * | Total | K | A | A 2 | G * | Total |
| 1 Emergency & Abnormal Plant Evolutions | 1 | 2 | 2 | 3 | | | | 4 | 4 | | | 3 | 18 | 0 | 0 | 4 | 3 | 7 |
| | 2 | 3 | 1 | 1 | | | | 2 | 2 | | | 0 | 9 | 0 | 0 | 2 | 3 | 5 |
| | Tier Totals | 5 | 3 | 4 | | | | 6 | 6 | | | 3 | 27 | 0 | 0 | 6 | 6 | 12 |
| 2 Plant Systems | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 3 | 4 | 2 | 5 | 3 | 28 | 0 | 0 | 2 | 2 | 4 |
| | 2 | 0 | 1 | 1 | 0 | 1 | 4 | 0 | 1 | 1 | 1 | 0 | 10 | 0 | 0 | 1 | 1 | 2 |
| | Tier Totals | 2 | 3 | 3 | 3 | 2 | 5 | 3 | 5 | 3 | 6 | 3 | 38 | 0 | 0 | 3 | 3 | 6 |
| 3 Generic Knowledge and Abilities Categories | | | | | | | 1 | 2 | 3 | 4 | | | | 1 | 2 | 3 | 4 | |
| | | | | | | | 3 | 2 | 2 | 3 | | | 10 | 1 | 2 | 2 | 2 | 7 |

- Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier of the RO Outline (i.e., the "Tier Totals" in each K/A category shall not be less than two). Refer to Section D.1.c for additional guidance regarding SRO sampling.
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by fllrom that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Select topics from many systems; avoid selecting more than two K/A topics from a 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 (G) KIAs in Tiers 1 and 2 shall be selected from Section 2 of the KIA Catalog, but the topics must be relevant to the applicable evolution or system. The SRO KIAs must also be linked to 10 CFR 55.43 or an SRO-level learning objective.
7. On the following pages, enter the KIA numbers, a brief description of each topic, the topic's importance ratings (IR) for the applicable license level, and the point totals for each system and category. Enter the Group and Tier totals for each category in the Table above; summarize all the SRO-only knowledge and non-A2 ability categories in the columns labeled "K" and "A." Use duplicate pages for RO and SRO-only exams.
8. For Tier 3, enter the KIA numbers, descriptions, Importance ratings, and point totals on Form ES-401-3.
9. Refer to ES-401, Attachment 2, for guidance regarding the elimination of inappropriate K/A statements.

| ES-401 | PWR Examination Outline | | | | | | | | | | ES-401-2 Rev 9 | |
|---|-------------------------|------|------|------|------|------|--|------------|-------|----|----------------|--|
| Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO) | | | | | | | | | | | | |
| E/APE # / Name / Safety Function | K 1 | K 2 | K 3 | A 1 | A 2 | G 2 | K/A Topic(s) | Imp. | # | | | |
| 000007 Reactor Trip - Stabilization - Recovery / 1 | | | 3.01 | | | | Knowledge of the reasons for the following as they apply to a reactor trip: EK3.01 Actions contained in EOP for reactor trip 4.0 4.6 (CFR 41.5 /41.10 / 45.6 / 45.13) | 4.0/4.6 | 987 | | | |
| 000008 Pressurizer Vapor Space Accident / 3 | | | | | | | | | | | | |
| 000009 Small Break LOCA / 3 | | | | | | | | | | | | |
| 000011 Large Break LOCA / 3 | | | | | 2.09 | | Ability to determine or interpret the following as they apply to a Large Break LOCA: AA2.09 Existence of adequate natural circulation (CFR 43.5 / 45.13) | 4.2/ 4.3 | 602.1 | | | |
| 000015/17 RCP Malfunction / 4 | | 2.10 | | | | | Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: AK2.10 RCP indicators and controls 2.8* 2.8(CFR 41.7 / 45.7) | 2.8*/2.8 | 996 | | | |
| 000022 Loss of Reactor Coolant Makeup / 2 | | | | | 2.04 | | Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: AA2.04 How long PZR level can be maintained within limits (CFR: 43.5 / 45.13) | 2.9/ 3.8 | 857.2 | | | |
| 000025 Loss of RHR System / 4 | | | | | | 1.32 | G2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12) | 3.4/ 3.8 | 980 | | | |
| 000026 Loss of Component Cooling Water / 8 | | | 3.03 | | | | Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: AK3.03 Guidance actions contained in EOP for Loss of CCW (CFR 41.5,41.10 / 45.6 / 45.13) | 4.0/4.2 | 997 | | | |
| 000027 Pressurizer Pressure Control System Malfunction / 3 | | | | | 2.08 | | Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: AA2.08 Letdown flow indication (CFR: 43.5 / 45.13) | 3.2/3.2 | 995 | | | |
| 000029 Anticipated Transient w/o Scram / 1 | 1.02 | | | | | | Knowledge of the operational implications of the following concepts as they apply to the ATWS: AA1.05 Definition of reactivity (CFR 41.8 / 41.10 / 45.3) | 2.6/ 2.8 | 865.2 | | | |
| 000038 Steam Generator Tube Rupture / 3 | | | | 1.05 | | | Ability to operate and monitor the following as they apply to a SGTR: EA1.05 Maximum controlled depressurization rate for affected SiG (CFR 41.7 / 45.5 / 45.6) | 4.1/4.5 | 907.1 | | | |
| 000040 Steam Line Rupture - Excessive Heat Transfer / 4 | | 2.01 | | | | | Knowledge of the interrelations between the Steam Line Rupture and the following: AK2.01 Valves 2.6* 2.5 (CFR 41.7 / 45.7) | 2.6*/2.5 | 300.1 | | | |
| 000054 Loss of Main Feedwater / 4 | | | | | | | | | | | | |
| 000055 Station Blackout / 6 | | | | 1.05 | | | Ability to operate and monitor the following as they apply to a Station Blackout: AA1.05 Battery, when approaching fully discharged (CFR 41.7 / 45.5 / 45.6) | 3.3/ 3.6 | 436.1 | | | |
| 000056 Loss of Off-site Power / 6 | 1.04 | | | | | | Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: AK1.04 Definition of saturation conditions, implication for the systems 3.1* 3.2* CFR 41.8 / 41.10 / 45.3) | 3.1*/ 3.2* | 911.1 | | | |
| 000057 Loss of Vital Ac Elec. Inst. Bus. / 6 | | | | 1.08 | | | Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus: AA1.06 Manual control of components for which automatic control is lost (CFR 41.7 / 45.5 / 45.6) | 3.5/ 3.5 | 999 | | | |
| 000058 Loss of DC Power / 6 | | | | | | 4.49 | G2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6) | 4.0/ 4.0 | 974 | | | |
| 000062 Loss of Nuclear Service Water / 4 | | | | 1.02 | | | Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water (SWS): AA1.02 Loads on the SWS in the control room (CFR 41.7,145.5,145.6) | 3.2/ 3.3 | 757 | | | |
| 000065 Loss of Instrument Air / 8 | | | | | | | | | | | | |
| WE04 LOCA Outside Containment / 3 | | | | | 2.1 | | Ability to determine and interpret the following as they apply to the (LOCA Outside Containment): EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13) | 3.4/4.3 | 507 | | | |
| WE11 Loss of Emergency Coolant Recirc / 4 | | | 3.2 | | | | Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation): EA3.2 Normal, abnormal and emergency operating procedures associated with (Loss of Emergency Coolant Recirculation). (CFR: 41.5 / 41.10, 45.6, 45.13) | 3.5/4.0 | 521 | | | |
| WE05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4 | | | | | | 1.32 | G2.1.32 Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12) | 3.4/ 3.8 | 769.1 | | | |
| K/A Category Totals: | 2 | 2 | 3 | 4 | 4 | 3 | Group Point Total: | | 18 | 18 | | |

| ES-401 | | PWR Examination Outline | | | | | | | ES-401-2 Rev 9 | |
|---|--------|-------------------------|--------|--------|--------|--------|--------|--|-------------------|-------|
| Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO) | | | | | | | | | | |
| E/APE # / Name / Safety Function | K 1 | K 2 | K 3 | A 1 | A 2 | A 3 | G 2 | K/A Topic(s) | Imp. | # |
| 000001 Continuous Rod Withdrawal / 1 | | | | | | | | | | |
| 000003 Dropped Control Rod / 1 | | | | | | | | | | |
| 000005 Inoperable/Stuck Control Rod / 1 | 1.03 | | | | | | | Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod: EK1.03 Xenon transient (CFR 41.8 / 41.10 / 45.3) | 3.2/3.6 | 493.1 |
| 000024 Emergency Boration / 1 | | | | | | | | | | |
| 000028 Pressurizer Level Malfunction / 2 | 1.01 | | | | | | | Knowledge of the operational implications of the following concepts as they apply to Pressurizer Level Control Malfunctions: AK1.01 PZR reference leak abnormalities 2.8" 3.1" (CFR 41.8 / 41.10 / 45.3) | 2.8*/3.1* | 399 |
| 000032 Loss of Source Range NI / 7 | | | | | | | 2.01 | Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: AA2.01 Equivalency between source-range, intermediate-range, and power-range channel readings (CFR: 43.5 / 45.13) | 3.0/3.5 | 979 |
| 000033 Loss of Intermediate Range NI / 7 | | | | | | | | | | |
| 000036 Fuel Handling Accident / 8 | | | | | | | | | | |
| 000037 Steam Generator Tube Leak / 3 | | | | | | | | | | |
| 000051 Loss of Condenser Vacuum / 4 | | | | | | | 2.02 | Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: AA2.02 Conditions requiring reactor and/or turbine trip (CFR: 43.5 / 45.13) | 3.9/4.1 | 977 |
| 000059 Accidental Liquid Radwaste Rel. / 9 | | | | | | | | | | |
| 000060 Accidental Gaseous Radwaste Rel. / 9 | | | | | | | | | | |
| 000061 ARM System Alarms / 7 | | | | | | | | | | |
| 000067 Plant Fire On-site / 9 | | | | | | | | | | |
| 000068 Control Room Evac. / 8 | | | | | | | 1.12 | Ability to operate and / or monitor the following as they apply to the Control Room Evacuation: AA1.12 Auxiliary shutdown panel controls and indicators (CFR 41.7 / 45.5 / 45.6) | 4.4/4.4 | 501 |
| 000069 (WE14) Loss of CTMT Integrity / 5 | | | | | | | | | | |
| 000074 (WE06&E07) Inad. Core Cooling / 4 | | | | | | | | | | |
| 000078 High Reactor Coolant Activity / 9 | | | | | | | | | | |
| WE01 & E02 Rediagnosis & SI Termination / 3 | | | | | | | 3.3 | WE01 Knowledge of the reasons for the following responses as they apply to the (SI Termination); EK3.3 Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations. (CFR: 41.5 / 41.10, 45.6, 45.13) | 3.5/3.3 | 508.1 |
| WE 13 Steam Generator Over-pressure / 4 | | | | | | | | | | |
| WE 15 Containment Flooding / 5 | | | | | | | 1.3 | Ability to operate and / or monitor the following as they apply to the (Containment Flooding): EA1.3 Desired operating results during abnormal and emergency situations. (CFR: 41.7 / 45.5 / 45.6) | 2.8/3.0 | 518.1 |
| WE16 High Containment Radiation / 9 | 1.1 | | | | | | | Knowledge of the operational implications of the following concepts as they apply to the (High Containment Radiation): EK1.1 Components, capacity, and function of emergency systems. (CFR: 41.8 / 41.10, 45.3) | 2.7/3.0 | 971 |
| WE03 LOCA Cooledown - Depress. / 4 | | | | | | | 2.2 | Knowledge of the reasons for the following responses as they apply to the (LOCA Cooledown and Depressurization) Normal, abnormal and emergency operating procedures associated with (LOCA Cooledown and Depressurization). 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. IMPORTANCE RO 3.7 SRO 4.0(CFR: 41.5 / 41.10, 45.6 / 45.13) | 3.7/4.0 | 571.1 |
| WE09 & E10 Natural Circ. / 4 | | | | | | | | | | |
| WE08 RCS Overcooling - PTS / 4 | | | | | | | | | | |
| K/A Category Totals: | 3 | 1 | 1 | 2 | 2 | 6 | | Group Point Total: | 9 | 9 |

| PWR Examination Outline | | | | | | | | | | | | | ES-401-2 Rev 9 | | |
|--|----|------|------|------|----|----|------|------|------|------|------|----|--|-----------|-------|
| Plant Systems - Tier 2 Group 1 (RO) | | | | | | | | | | | | | Imp. | # | |
| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | A5 | A6 | K/A Topic(s) | Imp. | # |
| 003 Reactor Coolant Pump | | 2.02 | | | | | | | | | | | Knowledge of bus power supplies to the following: K2.02 COW pumps 2.5" 2.8" (CFR: 41.7) | 2.5"/2.8" | 964 |
| 004 Chemical Volume Control | | | | | | | 1.11 | | | | | | Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CVCS controls including: A1.11 Letdown and charging flows 3.0 3.0 (CFR: 41.5 / 45.5) | 3.0/3.0 | 629 |
| 005 Residual Heat Removal | | 2.01 | | | | | | | | | | | Knowledge of bus power supplies to the following: K2.01 RHR pumps 3.0 3.2 (CFR: 41.7) | 3.0/3.2 | 540.1 |
| 006 Emergency Core Cooling | | | 3.02 | | | | | | | | | | Knowledge of the effect that a loss or malfunction of the ECCS will have on the following: K3.02 Fuel: 4.3 4.4 (CFR: 41.7 / 45.6) | 4.3/4.4 | 731 |
| 007 Pressurizer Relief/Quench Tank | | | | | | | | | | | | | 2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (CFR 41.10 / 43.2 / 45.6) | 4.0/4.3 | 796 |
| 008 Component Cooling Water | | | | | | | | | | | | | 2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits. (CFR: 43.2) | 2.5/3.7 | 986 |
| 010 Pressurizer Pressure Control | | | 3.03 | | | | | | | | | | Knowledge of the effect that a loss or malfunction of the PZR PCS will have on the following: K3.03 ESFAS: 4.0 4.2 (CFR: 41.7 / 45.6) | 4.0/4.2 | 736.1 |
| 012 Reactor Protection | | | | | | | | 2.01 | | | | | Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.01 Faulty bistable operation: 3.1 3.6 (CFR: 41.5 / 43.5 / 45.3 / 45.5) | 3.1/3.6 | 882 |
| 013 Engineered Safety Features Actuation | | | | | | | 5.01 | | | | | | Knowledge of the operational implications of the following concepts as they apply to the ESFAS: K5.01 Definitions of safety train and ESF channel 2.6 3.2 (CFR: 41.5 / 45.7) | 2.6/3.2 | 990 |
| 022 Containment Cooling | | | | | | | | 2.01 | | | | | Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.01 Fan motor over-current: 2.5 2.7 (CFR: 41.5 / 43.5 / 45.3 / 45.13) | 2.5/2.7 | 992 |
| 022 Containment Cooling | | | | | | | | | 3.01 | | | | Ability to monitor automatic operation of the CCS, including: A3.01 In/Inlet of safeguards mode of operation 4.1 4.3 (CFR: 41.7 / 45.5) | 4.1/4.3 | 957.1 |
| 025 Ice Condenser | | | | | | | | | | 4.02 | | | Ability to manually operate and/or monitor in the control room: A4.02 Containment vent fans: 2.7" 2.5" (CFR: 41.7 / 45.5 to 45.6) | 2.7"/2.5" | 965 |
| 026 Containment Spray | | | | | | | | | | | 4.05 | | Ability to manually operate and/or monitor in the control room: A4.05 Containment spray reset switches 3.5 3.5 (CFR: 41.7 / 45.5 to 45.8) | 3.5/3.5 | 985 |
| 026 Containment Spray | | | | | | | | | | | 1.27 | | 2.1.27 Knowledge of system purpose and/or function. (CFR: 41.7) | 2.8/2.9 | 993 |
| 039 Main and Reheat Steam | | | | | | | | | | | 2.03 | | Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.03 Indications and alarms for main steam and area radiation monitors (during SGTR): 3.4 3.7 (CFR: 41.5 / 43.5 / 45.3 / 45.13) | 3.4/3.7 | 605.1 |
| 058 Condensate | | 1.03 | | | | | | | | | | | Knowledge of the physical connections and/or cause-effect relationships between the Condensate System; and the following systems: K1.03 MF/W: 2.6" 2.6" (CFR: 41.2 to 41.9 / 45.7 to 45.8) | 2.6"/2.6" | 531.1 |
| 059 Main Feedwater | | | 1.02 | | | | | | | | | | Knowledge of the physical connections and/or cause-effect relationships between the MF/W and the following systems: K1.02 AFW system: 3.4" 3.4" (CFR: 41.2 to 41.9 / 45.7 to 45.8) | 3.4"/3.4" | 16.2 |
| 059 Main Feedwater | | | | 4.17 | | | | | | | | | Knowledge of MF/W design feature(s) and/or interlock(s) which provide for the following: K4.17 Increased feedwater flow following a reactor trip: 2.5" 2.5" (CFR: 41.7) | 2.5"/2.5" | 970 |
| 061 Auxiliary/Emergency Feedwater | | | | | | | | | | | 2.05 | | Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.05 Automatic control malfunction: 3.1" 3.4" (CFR: 41.5 / 43.5 / 45.3 / 45.13) | 3.1"/3.4" | 882.1 |
| 061 Auxiliary/Emergency Feedwater | | | | | | | | 0.02 | | | | | Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: K6.02 Pumps: 2.6 2.7 (CFR: 41.7 / 45.7) | 2.6/2.7 | 289.2 |
| 062 AC Electrical Distribution | | | | | | | 4.03 | | | | | | Knowledge of ac distribution system design feature(s) and/or interlock(s) which provide for the following: K4.03 Interlocks between automatic bus transfer and breakers: 2.8" 3.1 (CFR: 41.7) | 2.8"/3.1" | 826 |
| 062 AC Electrical Distribution | | | | | | | | | | | 4.01 | | Ability to manually operate and/or monitor in the control room: A4.01 All breakers (including available switchyard): 3.3 3.1 (CFR: 41.7 / 45.5 / 45.8) | 3.3/3.1 | 843.1 |
| 063 DC Electrical | | | | | | | | 1.01 | | | | | Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: A1.01 Battery capacity as it is affected by discharge rate: 2.5 3.3 (CFR: 41.5 / 45.5) | 2.5/3.3 | 906.1 |
| 064 Emergency Diesel Generator | | | | | | | | | | | 3.04 | | Ability to monitor automatic operation of the ED/G system, including: A3.04 Number of starts available with an air compressor: 3.1 3.5 (CFR: 41.7 / 45.5) | 3.1/3.5 | 886 |
| 073 Process Radiation Monitoring | | | | | | | | | 1.01 | | | | Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRM system controls including: A1.01 Radiation levels: 3.2 3.5 (CFR: 41.5 / 45.7) | 3.2/3.5 | 324 |
| 076 Service Water | | | | | | | | | | | 4.01 | | Ability to manually operate and/or monitor in the control room: A4.01 SWS pumps: 2.9 2.9 (CFR: 41.7 / 45.5 to 45.8) | 2.9/2.9 | 994 |
| 078 Instrument Air | | | | | | | | | | | 4.01 | | Ability to manually operate and/or monitor in the control room: A4.01 Pressure gauges: 3.1 3.1 (CFR: 41.7 / 45.5 to 45.8) | 3.1/3.1 | 991 |
| 103 Containment | | | | | | | 4.06 | | | | | | Knowledge of containment system design feature(s) and/or interlock(s) which provide for the following: K4.06 Containment isolation system: 3.1 3.7 (CFR: 41.7) | 3.1/3.7 | 39 |
| K/A Category Totals: | | | | | | | | | | | | | Group Point Total: 28 28 | | |

| ES-401 | PWR Examination Outline | | | | | | | | | | | | | ES-401-2 Rev 9 | |
|---|-------------------------|------|------|----|------|------|----|----|------|----|------|--------------|---|----------------|-------|
| Plant Systems - Tier 2 Group 2 (RO) | | | | | | | | | | | | | | | |
| System # / Name | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | | Imp. | # |
| 001 Control Rod Drive | | | | | | | | | | | 3.03 | | Ability to monitor automatic operation of the CRDS, including: A3.03 Axial imbalance 3.6 3.8 (CFR: 41.7/45.13) | 3.6/ 3.8 | 963 |
| 002 Reactor Coolant | | | | | | 6.03 | | | | | | | Knowledge of the effect or a loss or malfunction on the following RCS components: K6.03 Reactor vessel level indication 3.1 3.6 (CFR: 41.7 / 45.7) | 3.1/3.6 | 978 |
| 011 Pressurizer Level Control | | 2.02 | | | | | | | | | | | Knowledge of bus power supplies to the following: K2.02 PZR heaters 3.1 3.2 (CFR: 41.7) | 3.1/3.2 | 981 |
| 014 Rod Position Indication | | | | | | | | | | | | | | | |
| 015 Nuclear Instrumentation | | | | | | | | | | | | | | | |
| 016 Non-nuclear instrumentation | | | | | | | | | | | | | | | |
| 017 In-core Temperature Monitor | | | | | | 6.01 | | | | | | | Knowledge of the effect of a loss or malfunction of the following ITM system components: K6.01 Sensors and detectors 2.7 3.0 (CFR: 41.7 / 45.7) | 2.7/3.0 | 793 |
| 027 Containment Iodine Removal | | | | | | 5.01 | | | | | | | Knowledge of the operational implications of the following concepts as they apply to the CIRS: K5.01 Purpose of charcoal filters 3.1* 3.4* (CFR: 41.7 / 45.7) | 3.1*/3.4* | 834 |
| 028 Hydrogen Recombiner and Purge Control | | | | | | | | | | | | | | | |
| 029 Containment Purge | | | | | | | | | | | | | | | |
| 033 Spent Fuel Pool Cooling | | | | | | | | | 2.01 | | | | Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: A2.01 Inadequate SDM 3.0 3.5 (CFR: 41.5 / 43.5 / 45.3 / 45.13) | 3.0/3.5 | 489.1 |
| 034 Fuel Handling Equipment | | | | | | 6.02 | | | | | | | Knowledge of the effect of a loss or malfunction on the following will have on the Fuel Handling System : K6.02 Radiation monitoring systems.2.6 3.3 (CFR: 41.7 / 45.7) | 2.6/3.3 | 263 |
| 035 Steam Generator | | | | | | | | | | | | | | | |
| 041 Steam Dump/Turbine Bypass Control | | | 3.02 | | | | | | | | | | Knowledge of the effect that a loss or malfunction of the SDS will have on the following: K3.02 RCS 3.8 3.9 (CFR: 41.7 / 45.6) | 3.8/3.9 | 966 |
| 045 Main Turbine Generator | | | | | | | | | | | | | | | |
| 055 Condenser Air Removal | | | | | | | | | | | | | | | |
| 068 Liquid Rad Waste | | | | | | | | | | | | | | | |
| 071 Waste Gas Disposal | | | | | | | | | | | | | | | |
| 072 Area Radiation Monitoring | | | | | | | | | | | | | | | |
| 075 Circulating Water | | | | | | | | | | | | | | | |
| 079 Station Air | | | | | | | | | | | 4.01 | | Ability to manually operate and/or monitor in the control room: A4.01 Cross-tie valves with IAS 2.7 2.7 (CFR: 41.7 / 45.5 to 45.8) | 2.7/2.7 | 282.1 |
| 086 Fire Protection | | | | | 5.04 | | | | | | | | Knowledge of the operational implication: of the following concepts as they apply to the Fire Protection System: K5.04 Hazards to personnel as a result of fire type and methods of protection 2.9 3.5* (CFR: 41.5 / 45.7) | 2.9/3.5* | 60.1 |
| K/A Category Totals: | 0 | 1 | 1 | 0 | 1 | 4 | 0 | 1 | 1 | 1 | 0 | | Group Point Total | 10 | 10 |

NRC Written Exam Sample Plan Development Method

The sample plan was initially developed in accordance with the methodology recommended by the NRC in NUREG 1021, ES-401 Attachment I Revision 8, as amplified by the recent NRC Operator Licensing web page guidance entitled "K/A Suppression" (<http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/ka-suppression.pdf>). The sample plan was adapted to NUREG 1021, ES-401 Attachment 1 Revision 9 after a determination was made to conduct the examination using revision 9 guidance. The following statements amplify and explain this process.

Random Sampling Method: The sample plan was developed using the random number generation function incorporated into Microsoft's Excel spreadsheet software instead of using tokens as described in NUREG 1021 ES-401 Attachment 1. The random number generation function is programmed to produce an evenly distributed random number between 0 and the number entered into the argument of the function. For example, if the number 20 is entered as the argument, the function produces a resultant between 0 and 20 on an evenly distributed random basis. The result is mathematically equivalent to using the method of selection by tokens but is less time consuming.

RO Exam Sampling: Initially, all K/A E/APEs, System and Generic topics listed in ES-401 are prescreened and those topics that apply only to B&W or CE reactor designs are eliminated. All NRC K/A topics and all Westinghouse (WE) E/APEs are retained for sampling. Using the selection methodology described in Attachment 1 to ES-401, an Excel spreadsheet is used to generate the RO examination. When the K/A is randomly selected, the author enters the corresponding K/A stem statement, the K/A description and importance rating from NUREG 1122.

If a K/A is randomly selected such that the RO importance rating is $d . 5$ but the SRO importance rating is >2.5 , this is retained for an SRO-only question and the RO-only question is selected again.

SRO Exam Sampling: The SKO examination worksheet automatically imports all applicable KO K/As into the corresponding tiers and groups in the SRO sample plan. The final outcome results in 89 K/As that are common to both the RO and the SRO sample plans. There are 7 E/APEs and 4 Generic SRO-only K/As that must then be randomly selected to increase the number of questions to 100. These K/As are restricted to those K/As that are identified as having ties to 10CFR55.43(b) in NUREG 1122 for those K/As in Tiers 1 and 2. For Tier 3 (generic K/As), one additional SRO-only K/A is randomly added to each of the four K/A generic categories.

This produces an exam outline with 100 K/As of which 89 are common to both exam and 11 are unique to the SRO exam. Similarly, there will be 11 system K/As that are used on the KO exam but not used on the SRO exam due to the larger number of RO system K/As in the sample plan. (Note: There *may* be additional SMO-only questions if some of the K/As selected had >2.5 SRO importance rating but <2.5 RO importance rating as explained above.)

During the exam development process, 25 questions will be written that are unique to the SRO exam. The sampling process only identifies 11 of these questions. The exam authors will identify 14 additional SRO-only questions as they become more familiar with the training material and plant procedures. These SKO-only questions will be tied to 10CFR43(b) test items. This process will result in 25 questions that are unique to the RO exam as the 14 additional SRO-only questions are generated to replace the RO questions.

Documentation of K/As on ES-401-10: If a K/A topic (E/APE, system or generic) contains K/As that are less than 2.5 in importance value, these K/As are not eligible for selection unless they are on the plant specific priority list. The random selection process only considers K/As that have importance ratings greater than or equal to 2.5. If the K/A topic contains a small percentage of K/As that are less than 2.5, the total number of K/As within the category (K1-K6, AI-A5 and G for systems) is used for the random selection process. If a K/A of <2.5 is randomly selected, it is replaced without notation in ES-401-10 using another random selection. K/As that are selected randomly that are <2.5 are not documented on the ES-401-10 form but are documented (using the hidden comment feature of Excel) on the ES-401-4 sample plan.

If the K/A category contains no K/As ≤ 2.5 , then the category is randomly reselected. If the K/A category contains a relatively large percentage of K/As < 2.5 (e.g. 21 of 25), then the individual K/As ≥ 2.5 are counted (e.g. 3) and the entering argument for the random number generator is the total number of K/As ≥ 2.5 to efficiently eliminate the need for conducting multiple random reselections of the list of K/As (until a WA ≥ 2.5 is finally selected). The random selection of K/As that are < 2.5 in importance value are not documented in ES-401-10 but are listed using the Excel "comment" feature (comments are hidden) on the worksheet should it be necessary to reconstruct the sampling process.

When sampling generic K/As for tiers 1 and 2, the method used is stated in the recent NRC Operator Licensing web page guidance entitled "K/A Suppression" (<http://www.nrc.gov/reactors/operator-licensing/op-licensing-files/ka-suppression.pdf>). The sixteen former system-wide or A/EPE-wide generics (from Rev 0 of NUREG 1122) are used for tiers 1 and 2. All generic K/As are used for tier 3 sampling.

Sample Plan Category Equalization: Upon completion of the initial random selection process, the tier selection totals are reviewed to ensure that each Tier has at least 2 K/As in each category. If less than 2 K/As have been selected, the category that has the greatest number of K/As is then randomly reselected to identify K/As that should be changed to the category with a deficit. For example, if K1 has only 1 K/A in Tier 2, but K5 has 10 K/As, then the group with the largest number of K5s would be chosen for redistribution of K/As. If there were 7 K5s in this group, the random number generator would select a K/A topic between 1 and 4 at random and the K1s in that topic would then be resampled to increase the number of K1s to the minimum required. This redistribution or rebalancing was documented in ES-401-10.

Adaptation to NUREG 1021 Revision 9:

The sample plan was submitted to the NRC at the 75-thy milestone in the revision 8 format. After submittal, a decision was made to adapt or convert to NUREG 1021 Revision 9 guidance. This conversion was made by taking the randomly sampled K/As from the original revision 8 sample plan and fitting them into the revision 9 sample plan. NKC Region II approved this technique in advance. After all revision 8 K/As were adapted into their respective tiers and groups in the revision 9 sample plan, there were several additional K/As that were required to be added due to the Revision 9 changes in the systems and EAPEs alignments under the groups. These K/As were added using random sampling techniques as described above.

All plant-specific priority K/As that had replaced several randomly selected K/As in Revision 8 were eliminated in accordance with revision 9 guidance. The K/As then reverted back to the original randomly selected K/As.

The SRO sample plan was developed by selecting the 14 §KO-only K/As from revision 8 sampling plan and adding 11 additional K/As by randomly sampling those K/As that were linked to 10CFR43(b).2 in the K/A Catalogue. This included EAPE AA2s and the 16 former plant-wide generics, the systems A2s and 16 former plant-wide generics, and the generics that were cross-referenced to 10CFR43(b).2.

Catawba Sample Plan

| ES-401 | | Generic Knowledge and Abilities Outline (Tier 3) | | ES-401-3 Rev 9 | |
|----------------------------|-----------------|---|-----------|----------------|----------|
| Facility: Catawba | | Date of Exam: 4/18/03 | | Level: RO | |
| Category | K/A # | Topic | Imp. | # | |
| 1 | 2.1.17 | Ability to make accurate, clear and concise verbal reports. (CFR: 45.12 / 45.13) | 3.5/3.2 | 967 | |
| | 2.1.11 | Knowledge of less than one hour technical specification action statements for systems (CFR: 43.2 / 45.13) | 3.0/3.8 | 600 | |
| | 2.1.20 | Ability to execute procedure steps. (CFR: 41.10 / 43.5 / 45.12) | 4.3/4.2 | 331.1 | |
| | Subtotal | | | 3 | 3 |
| 2 | 2.2.13 | Knowledge of tagging and clearance procedures. (CFR: 41.10 / 45.13) | 3.6/3.8 | 482.1 | |
| | 2.2.27 | Knowledge of the refueling process. (CFR: 43.6 / 45.13) | 2.6/3.5 | 363.1 | |
| | Subtotal | | | 2 | 2 |
| | Subtotal | | | 2 | 2 |
| 3 | 2.3.2 | Knowledge of facility ALARA program. (CFR: 41.12 / 43.4 / 45.9 / 45.10) | 2.5/2.9 | 353.3 | |
| | 2.3.9 | Knowledge of the process for performing a containment purge. (CFR: 43.4 / 45.10) | 2.5/3.4 | 968 | |
| | Subtotal | | | 2 | 2 |
| | Subtotal | | | 2 | 2 |
| 4 | 2.4.2 | Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (CFR: 41.7 / 45.7 / 45.8) (Note: The issue of setpoints and automatic safety features is not specifically covered in the systems sections.) | 3.9/4.1 | 594.3 | |
| | 2.4.27 | Knowledge of fire in the plant procedure. (CFR: 41.10 / 43.5 / 45.13) | 3.0/3.5 | 460.2 | |
| | 2.4.21 | Knowledge of the parameters and logic used to assess the status of safety functions including: 1. Reactivity control 2. Core cooling and heat removal 3. Reactor coolant system integrity 4. Containment conditions 5. Radioactivity release control. (CFR: 43.5 / 45.12) | 3.7/4.3 | 511.1 | |
| | Subtotal | | | 3 | 3 |
| Tier 3 Point Total: | | | 10 | 10 | |

Catawba Sample Plan

| ES-401 | | Generic Knowledge and Abilities Outline (Tier 3) | | | ES-401-3 Rev 9 |
|--|---------|--|-----------------|---------------|----------------|
| Facility: | Catawba | | | Date of Exam: | 4/18/03 |
| Category | K/A # | Topic | Imp. | Level: | SRO |
| | | | | # | |
| 1 Conduct of Operations | 1.33 | Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications. (CFR: 43.2 / 43.3 / 45.3) | 3.4/4.0 | 936.1 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | Subtotal | 1 | 1 |
| 1 Equipment Control | 2.27 | Knowledge of the refueling process. (CFR: 43.6 / 45.13) | 2.6/3.5 | 483.1 | |
| | 2.24 | Ability to analyze the affect of maintenance activities on LCO status. (CFR: 43.2 / 45.13) | 2.6/3.8 | 96.1 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | Subtotal | 2 | 2 |
| 3 Radiation Protection | 3.9 | Knowledge of the process for performing a containment purge. (CFR: 43.4 / 45.10) | 2.5/3.4 | 479.3 | |
| | 3.3 | Knowledge of SRO responsibilities for auxiliary systems that are outside the control room (e.g., waste disposal and handling systems). (CFR: 43.4 / 45.10) | 1.8/2.9 | 323.1 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | Subtotal | 2 | 2 |
| 4 Emergency Procedures and Plan | 4.44 | 2.4.44 Knowledge of emergency plan protective action recommendations. (CFR: 43.5 / 45.11) | 21./4.0 | 491.1 | |
| | 4.33 | Knowledge of the process used track inoperable alarms. (CFR: 41.10 / 43.5 / 45.13) | 2.4/2.8 | 969 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | Subtotal | 2 | 2 |
| Tier 3 Point Total | | | 7 | 7 | |