Facility: Surry Date of Examination: 10/30/2017

Examination Level: RO ☐ SRO ☐ Operating Test Number: SR 2017 301

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,D	Perform a QPTR
Conduct of Operations	R,D	Determine Final pressure for a WGDT
Equipment Control		
Radiation Control	R,D	Calculate Dose and Best Method
Emergency Plan	S,N	Complete Notification to State & Local

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes and Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs and RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1, randomly selected)

Facility: Surry Date of Examination: 10/30/2017

Examination Level: RO ☐ SRO ■ Operating Test Number: SR 2017 301

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,D	Perform a QPTR
Conduct of Operations	R,D	Determine Final pressure for a WGDT
Equipment Control	R, M	Perform Review of OPT-FW-006
Radiation Control	R,D	Calculate Dose and Best Method
Emergency Plan	R,N	Approve Notification to State & Local

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes and Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs and RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1, randomly selected)

Facility: Surry Date of Examination: 10/30/2017

Exam Level: RO ■ SRO-I ☐ SRO-U ☐ Operating Test No.: SR 2017 301

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U

System/JPM Title	Type Code*	Safety Function
a. Isolate/Vent SI Accumulator [006A1.13 3.5/3.7]	D,A,S,L,EN	3
b. Respond to a Loss of Semi Vital bus [062A2.04 3.1/3.4]	N,S	6
c. Perform 1-FR-H.1 [APE054.AA1.01 4.5/4.4]	N,A,S,L	4S
d. Perform E-0 Immediate Actions following RPS Auto trip failure [EPE007EA2.02 4.3/4.6]	N,A,S	1
e. Start RHR Pump per 1-OP-RH-001 [APE025AA1.09 3.2/3.1]	N,S,L	4P
f. Venting the PRT to Process Vent per 1-OP-RC-011 [007A2.02 2.6/3.2]	N,S,A	5
g. Remove SR NIs from service during Rx. Startup [015A4.03 3.8/3.9]	D,S,L	7
h. Perform AP-16.00 Actions for Rx. Leak [EPE009EA2.13 3.4/3.6]	N,S	2
In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. Locally establish Charging Pump Cross Tie (U1 to U2) [EPE11EA1.1]	D,E,L,R	2
j. Manually actuation of Underground FOPH CO_2 [086A2.04 3.3/3.9]	D,A,E	8
k. Swap N-16 and MGPI Rad. Mon. PS [073K1.01 3.6/3.9]	D,L	6

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

* Type Codes	Criteria for R /SRO-I/SRO-U
(A)lternate path	5 (4–6)
(C)ontrol room	
(D)irect from bank	5 (≤ 9)
(E)mergency or abnormal in-plant	2 (≥ 1)
(EN)gineered safety feature	1 (≥ 1 control room system)
(L)ow-Power/Shutdown	6 (≥ 1)
(N)ew or (M)odified from bank including 1(A)	6 (≥ 2)
(P)revious 2 exams	0 (≤ 3) (randomly selected)
(R)CA	1 (≥ 1)
(S)imulator	

Facility: Surry Date of Examination: 10/30/2017

Exam Level: RO ☐ SRO-I ■ SRO-U ☐ Operating Test No.: SR 2017 301

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U		
System/JPM Title	Type Code*	Safety Function
a. Isolate/Vent SI Accumulator [006A1.13 3.5/3.7]	D,A,S,L,EN	3
b. Respond to a Loss of Semi Vital bus [062A2.05 2.9/3.3]	N,S	6
c. Perform 1-FR-H.1 [APE054.AA1.01 4.5/4.4]	N,A,S,L	4S
d. Perform E-0 Immediate Actions following RPS Auto trip failure [EPE007EA2.02 4.3/4.6]	N,A,S	1
e. Start RHR Pump per 1-OP-RH-001 [APE025AA1.09 3.2/3.1]	N,S,L	4P
f. Venting the PRT to Process Vent per 1-OP-RC-011 [007A2.02 2.6/3.2]	N,S,A	5
g. Remove SR NIs from service during Rx. Startup [015A4.03 3.8/3.9]	D,S,L	7
h.		
In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
i. Locally establish Charging Pump Cross Tie (U1 to U2) [EPE11EA1.1]	D,E,L,R	2
j. Manually actuation of Underground FOPH CO_2 [086A2.04 3.3/3.9]	D,A,E	8
k. Swap N-16 and MGPI Rad. Mon. PS [073K1.01 3.6/3.9]	D,L	6

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

* Type Codes	Criteria for R /SRO-I/SRO-U
(A)lternate path	5 (4–6)
(C)ontrol room	
(D)irect from bank	5 (≤ 8)
(E)mergency or abnormal in-plant	2 (≥ 1)
(EN)gineered safety feature	1 (≥ 1 control room system)
(L)ow-Power/Shutdown	6 (≥ 1)
(N)ew or (M)odified from bank including 1(A)	5 (≥ 2)
(P)revious 2 exams	0 (≤ 3) (randomly selected)
(R)CA	1 (≥ 1)
(S)imulator	

Facility: Surry	Date of Examination: 10/30/2017
Exam Level: RO ☐ SRO-I ☐ SRO-U ■	Operating Test No.: SR 2017 301

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U

System/JPM Title	Type Code*	Safety Function
a. Isolate/Vent SI Accumulator [006A1.13 3.5/3.7]	D,A,S,L,EN	3
b. Respond to a Loss of Semi Vital bus [062A2.05 2.9/3.3]	N,S	6
c. Perform 1-FR-H.1 [APE054.AA1.01 4.5/4.4]	N,A,S,L	4S
d.		
e.		
f.		
g.		
h.		

In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U

i. Locally establish Charging Pump Cross Tie (U1 to U2) [EPE11EA1.1]	D,E,L,R	2
j. Manually actuation of Underground FOPH CO_2 [086A2.04 3.3/3.9]	D,A,E	8
k.		

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

* Type Codes	Criteria for R /SRO-I/SRO-U
(A)lternate path	3 (2–3)
(C)ontrol room	
(D)irect from bank	3 (≤ 4)
(E)mergency or abnormal in-plant	2 (≥ 1)
(EN)gineered safety feature	1 (≥ 1 control room system)
(L)ow-Power/Shutdown	3 (≥ 1)
(N)ew or (M)odified from bank including 1(A)	2 (≥ 2)
(P)revious 2 exams	0 (≤ 2) (randomly selected)
(R)CA	1 (≥ 1)
(S)imulator	

ES-301 **Operating Test Review Worksheet** **Form ES-301-7**

Facility: Surry										**Exam Date:** Week of October 30, 2017			
Admin JPMs	1 ADMIN Topic and K/A	2 LOD (1-5)	3 Attributes I/C Focus	Cues	Critical Steps	Scope (N/B)	Overlap	Perf. Std.	Key	4 Job Content Minutia	Job Link	5 U/E/S	6 Explanation
L (RO/SRO)	COO G.2.1.7	3						X	X			E	Minor editorial and formatting changes.
M (RO/SRO)	COO G2.1.7	4										E	Several minor editorial changes.
N (RO/SRO)	Rad G2.3.4	3										E	Several changes made for operational validity:
RWPs weren't signed and dated. Survey maps had travel times noted; that wouldn't be on a survey map. Travel times were unrealistically long. Started off with zero dose YTD, not likely.													
O (RO)	EP G2.4.39	3							X			S	A small change to the Key:
Item 6, Update Schedule: "60 minutes (recommended)" block is checked, but EPIP-2.01 has you do this during the phone call at Step 6.k, so it should not be checked yet.													
P (SRO)	EC G2.2.12	2										S	Some minor editorial changes.
Q (SRO)	EP 2.4.39	3										S	Some minor editorial changes.
Simulator/In-Plant JPMs	1 Safety Function and K/A												
A (All)	3			X								E	After controlled venting of an SI accumulator was started by the applicant, the JPM guide had the booth operator insert a malfunction for nitrogen leakage, "to assist in venting." This was: 1) not necessary, and 2) negative training. Removed.
B (All)	6											S	
C (All)	4S											S	
D (RO/SROI)	1					B	X					E	
Too broad: task was essentially to perform E-0 Immediate Actions (alternate path), but it started with a dropped control rod, then another, forcing entry into an Abnormal Procedure, where the reactor would be tripped, and <u>then</u> to E-0. All this performed by one person. Simplified to the initiator being a spurious turbine trip. Overlap: during Prep Week, identified that the Main Generator Breakers had failed to trip during one of the scenarios, so this failure was removed. Failure of reactor to automatically trip was added to compensate.													
E (RO/SROI)	4P											S	
F (RO/SROI)	5										X	E	Initial value of hydrogen concentration made it almost
impossible to select an incorrect value for the depressurization rate. Changed to a value that requires you to apply a Note and then select between two values.													
G (RO/SROI)	7										X	E	Instead of expecting an RO determine which Abnormal Procedure to implement (Entry Conditions weren't clearly met), added in the Cue that they were to "perform AP-4.00."

H (RO)	2						X					U	Identified during prep week that one of the scenarios had the crew performing this stabilization and leak-rate determination. Replaced JPM with a task to re-establish letdown following SI.
Generic simulator JPM comment: Surry has a practice of having an instructor run the scenario from a computer on the far right side of the simulated Unit 1 control room (just beyond where the Unit 2 SRO would sit in the actual control room). When the students come in for a JPM, they ask the instructor to silence and acknowledge all alarms (from there). This is not realistic. During Prep Week we allowed them to have an instructor as a second operator "on the floor", who was allowed to acknowledge/silence alarms *from the normal control panel locations*, but only if the applicant **asked** them to acknowledge a specific alarm. This is better because: 1) it prevents an alarm from being silenced that the applicant might not be aware of, and 2) it prevents the surrogate operator from "leading" the applicant by letting an alarm annunciate that he might otherwise have acknowledged. This was a change in practice for the 3 licensed individuals who assisted with validation, and likely will be for the applicants, so the class lead was instructed to train the applicants on this in the 3 remaining weeks before the op-test.													
I (All)	2											S	Minor editorial corrections.
J (All)	8											S	Some very minor changes to encompass improper actions the applicants might take.
K (RO/SROI)	6											S	Minor editorial corrections.

Instructions for Completing This Table:

Check or mark any item(s) requiring a comment and explain the issue in the space provided using the guide below.

1. Check each JPM for appropriate administrative topic requirements (COO, EC, Rad, and EP) or safety function requirements and corresponding K/A. Mark in column 1. (ES-301, D.3 and D.4)

2. Determine the level of difficulty (LOD) using an established 1–5 rating scale. Levels 1 and 5 represent an inappropriate (low or high) discriminatory level for the license that is being tested. Mark in column 2 (Appendix D, C.1.f)

3. In column 3, "Attributes," check the appropriate box when an attribute is **not met**:
   - ☐ The initial conditions and/or initiating cue is clear to ensure the operator understands the task and how to begin. (Appendix C, B.4)
   - ☐ The JPM contains appropriate cues that clearly indicate when they should be provided to the examinee. Cues are objective and not leading. (Appendix C, D.1)
   - ☐ All critical steps (elements) are properly identified.
   - ☐ The scope of the task is not too narrow (N) or too broad (B).
   - ☐ Excessive overlap does not occur with other parts of the operating test or written examination. (ES-301, D.1.a, and ES-301, D.2.a)
   - ☐ The task performance standard clearly describes the expected outcome (i.e., end state). Each performance step identifies a standard for successful completion of the step.
   - ☐ A valid marked up key was provided (e.g., graph interpretation, initialed steps for handouts).

4. For column 4, "Job Content," check the appropriate box if the job content flaw **does not meet** the following elements:
   - ☐ Topics are linked to the job content (e.g., not a disguised task, task required in real job).
   - ☐ The JPM has meaningful performance requirements that will provide a legitimate basis for evaluating the applicant's understanding and ability to safely operate the plant. (ES-301, D.2.c)

5. Based on the reviewer's judgment, is the JPM as written (U)nacceptable (requiring repair or replacement), in need of (E)nhancement, or (S)atisfactory? Mark the answer in column 5.

6. In column 6, provide a brief description of any (U)nacceptable or (E)nhancement rating from column 5.

Save initial review comments and detail subsequent comment resolution so that each exam-bound JPM is marked by a (S)atisfactory resolution on this form.

Facility: Surry **Scenario: 1** **Exam Date:** October 2017

1 Event	2 Realism/ Credibility	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scenario Overlap	9 U/E/S	10 Explanation
1					✓			S	
2					✓			E	Minor discrepancy between “fails low” in one place, and “fails to 34%” in another place.
3						✓		S	
4								S	
5						✓		S	
6						✓ ✓		S	
7								S	
8								S	
8	0	0	0		2	4	4	E	

Facility: Surry **Scenario:** 2 **Exam Date:** October 2017

1 Event	2 Realism/ Credibility	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scenario Overlap	9 U/E/S	10 Explanation
1								E	Minor discrepancy about which Feedwater pump was to be started.
2								E	Minor discrepancy about which way the Charging Flow Controller fails.
3					✓	✓		S	
4						✓		S	
5					✓	✓		S	
6						✓✓		S	
7								S	
8								S	
8	0	0	0		2	5	5	E	

Facility: Surry						**Scenario:** 3			**Exam Date:** October 2017
1 Event	2 Realism/ Credibility	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scenario Overlap	9 U/E/S	10 Explanation
1								S	
2					✓	✓		S	
3								S	
4								S	
5					✓	✓		S	
6						✓		S	
7						✓		S	
8								E	Guide didn't have the crew performing E-0 Attachment 4.
8	0	0	0		2	4	7	E	

Facility: Surry **Scenario:** 4 **Exam Date:** October 2017

1 Event	2 Realism/ Credibility	3 Required Actions	4 Verifiable actions	5 LOD	6 TS	7 CTs	8 Scenario Overlap	9 U/E/S	10 Explanation
1								S	
2					✓			S	
3								S	
4					✓	✓		S	
5						✓		S	
6						✓✓		S	
6					2	4	6	S	

Instructions for Completing This Table:

Use this table for each scenario for evaluation.

2 Check this box if the events are not related (e.g., seismic event followed by a pipe rupture) **OR** if the events do not obey the laws of physics and thermodynamics.

3, 4 In columns 3 and 4, check the box if there is **no** verifiable or required action, as applicable. Examples of required actions are as follows: (ES-301, D.5f)

- opening, closing, and throttling valves
- starting and stopping equipment
- raising and lowering level, flow, and pressure
- making decisions and giving directions
- acknowledging or verifying key alarms and automatic actions (Uncomplicated events that require no operator action beyond this should **not** be included on the operating test unless they are necessary to set the stage for subsequent events. (Appendix D, B.3).)

5 Check this box if the level of difficulty is **not** appropriate.

6 Check this box if the event has a TS.

7 Check this box if the event has a critical task (CT). If the same CT covers more than one event, check the event where the CT started **only.**

8 Check this box if the event overlaps with another event on any of the last two NRC examinations. (Appendix D, C.1.f)

9 Based on the reviewer's judgment, is the event as written (U)nacceptable (requiring repair or replacement), in need of (E)nhancement, or (S)atisfactory? Mark the answer in column 9.

10 Record any explanations of the events here.

In the shaded boxes, sum the number of check marks in each column.

- In column 1, sum the number of events.
- In columns 2–4, record the total number of check marks for each column.
- In column 5, based on the reviewer's judgement, place a checkmark only if the scenario's LOD is not appropriate.
- In column 6, TS are required to be ≥ 2 for each scenario. (ES-301, D.5.d)
- In column 7, preidentified CTs should be ≥ 2 for each scenario. (Appendix D; ES-301, D.5.d; ES-301-4)
- In column 8, record the number of events not used on the two previous NRC initial licensing exams. A scenario is considered unsatisfactory if there is < 2 new events. (ES-301, D.5.b; Appendix D, C.1.f)
- In column 9, record whether the scenario as written (U)nacceptable, in need of (E)nhancement, or (S)atisfactory from column 11 of the simulator scenario table.

Facility:					Exam Date:				
Scenario	1 Event Totals	2 Events Unsat.	3 TS Total	4 TS Unsat.	5 CT Total	6 CT Unsat.	7 % Unsat. Scenario Elements	8 U/E/S	11 Explanation
1	8	0	2	0	4	0	0	S	
2	8	0	2	0	5	0	0	S	
3	8	0	2	0	4	0	0	S	
4	6	0	2	0	4	0	0	S	

Instructions for Completing This Table:

Check or mark any item(s) requiring comment and explain the issue in the space provided.

1, 3, 5 For each simulator scenario, enter the **total** number of events (column 1), TS entries/actions (column 3), and CTs (column 5). This number should match the respective scenario from the event-based scenario tables (the sum from columns 1, 6, and 7, respectively).

2, 4, 6 For each simulator scenario, evaluate each event, TS, and CT as (S)atisfactory, (E)nhance, or (U)nsatisfactory based on the following criteria:

a. Events. Each event is described on a Form ES-D-2, including all switch manipulations, pertinent alarms, and verifiable actions. Event actions are balanced between at-the-controls and balance-of-plant applicants during the scenario. All event-related attributes on Form ES-301-4 are met. Enter the total number of unsatisfactory events in column 2.

b. TS. A scenario includes at least two TS entries/actions across at least two different events. TS entries and actions are detailed on Form ES-D-2. Enter the total number of unsatisfactory TS entries/actions in column 4. (ES-301, D.5d)

c. CT. Check that a scenario includes at least two preidentified CTs. This criterion is a target quantitative attribute, not an absolute minimum requirement. Check that each CT is explicitly bounded on Form ES-D-2 with measurable performance standards (see Appendix D). Enter the total number of unsatisfactory CTs in column 6.

7 In column 7, calculate the percentage of unsatisfactory scenario elements: $\left(\frac{2+4+6}{1+3+5}\right)100\%$

8 If the value in column 7 is > 20%, mark the scenario as (U)nsatisfactory in column 8. If column 7 is ≤ 20%, annotate with (E)nhancement or (S)atisfactory.

9 In column 9, explain each unsatisfactory event, TS, and CT. Editorial comments can also be added here.

Save initial review comments and detail subsequent comment resolution so that each exam-bound scenario is marked by a (S)atisfactory resolution on this form.

Site name: **Exam Date:**

OPERATING TEST TOTALS

	Total	Total Unsat.	Total Edits	Total Sat.	% Unsat.	Explanation
Admin. JPMs	6	0	2	4		
Sim./In-Plant JPMs	11	1	4	6		
Scenarios	4	0	4	0		
Op. Test Totals:	21	1	10	10	4.8	

Instructions for Completing This Table:

Update data for this table from quality reviews and totals in the previous tables and then calculate the percentage of total items that are unsatisfactory and give an explanation in the space provided.

1. Enter the total number of items submitted for the operating test in the "Total" column. For example, if nine administrative JPMs were submitted, enter "9" in the "Total" items column for administrative JPMs. For scenarios, enter the total number of simulator scenarios.

2. Enter the total number of (U)nsatisfactory JPMs and scenarios from the two JPMs column 5 and simulator scenarios column 8 in the previous tables. Provide an explanation in the space provided.

3. Enter totals for (E)nhancements needed and (S)atisfactory JPMs and scenarios from the previous tables. This task is for tracking only.

4. Total each column and enter the amounts in the "Op. Test Totals" row.

5. Calculate the percentage of the operating test that is (U)nsatisfactory (Op. Test Total Unsat.)/(Op. Test Total) and place this value in the bolded "% Unsat." cell.

   Refer to ES-501, E.3.a, to rate the overall operating test as follows:
   - satisfactory, if the "Op. Test Total" "% Unsat." is ≤ 20%
   - unsatisfactory, if "Op. Test Total" "% Unsat." is > 20%

6. Update this table and the tables above with post-exam changes if the "as-administered" operating test required content changes, including the following:
   - The JPM performance standards were incorrect.
   - The administrative JPM tasks/keys were incorrect.
   - CTs were incorrect in the scenarios (not including postscenario critical tasks defined in Appendix D).
   - The EOP strategy was incorrect in a scenario(s).
   - TS entries/actions were determined to be incorrect in a scenario(s).

Facility: Date of Exam:

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	A2		G*		Total
1. Emergency & Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	3		3		6
	2	2	1	1				2	1			2	9	2		2		4
	Tier Totals	5	4	4				5	4			5	27	5		5		10
2. Plant Systems	1	3	3	2	2	3	2	3	3	2	3	2	28	2		3		5
	2	1	0	1	1	1	1	1	1	1	1	1	10	0	2	1		3
	Tier Totals	4	3	3	3	4	3	4	4	3	4	3	38	4		4		8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	2	2	1	2	7

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 Radiation Control K/A is allowed if the K/A is replaced by a K/A from another Tier 3 Category).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted with justification; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in a category other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

G* Generic K/As

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / SRO)							Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1	X						007EK1.02 Knowledge of the operational implications of the following concepts as they apply to the reactor trip: Shutdown Margin	3.4 3.8	1
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3						X	009EG2.1.28 Knowledge of the purpose and function of major system - components and controls.	4.1 4.1	2
000011 Large Break LOCA / 3				X			011EA1.14 Ability to operate and monitor the following as they apply to a Large Break LOCA: Subcooling margin monitors.	3.9 4.1	3
						X	011EG2.4.8 Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	3.8 4.5	76
000015/17 RCP Malfunctions / 4			X				015AK3.04 Knowledge of the reasons for the following responses as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow) : Reduction of power to below the steady state power to flow limits.	3.1 3.2	4
000022 Loss of Rx Coolant Makeup / 2									
000025 Loss of RHR System / 4	X						025AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Residual Heat Removal System: Loss of RHRS during all modes of operation.	3.9 4.3	5
						X	025AG2.2.40 Ability to apply technical specifications for a system.	3.4 3.7	77
000026 Loss of Component Cooling Water / 8					X		026AA2.01 Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: Location of a leak in the CCWS.	2.9 3.5	6
					X		026AA2.03 Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The valve lineups necessary to restart the CCWS while bypassing the portion of the system causing the abnormal condition.	2.6 2.9	78
000027 Pressurizer Pressure Control System Malfunction / 3		X					027AK2.03 Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: Controllers and Positioners.	2.6 2.8	7
000029 ATWS / 1									
000038 Steam Gen. Tube Rupture / 3			X				038EK3.01 Knowledge of the reasons for the following responses as the apply to the SGTR: Equalizing pressure on primary and secondary sides of ruptured S/G.	4.1 4.3	8
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4		X					WE12EK2.1 Knowledge of the interrelations between the (Uncontrolled Depressurization of all Steam Generators) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.4 3.7	18
000054 (CE/E06) Loss of Main Feedwater / 4									
000055 Station Blackout / 6				X			055EA1.07 Ability to operate and monitor the following as they apply to a Station Blackout: Restoration of power from offsite.	4.3 4.5	9

000056 Loss of Off-site Power / 6			X				056AK3.02 Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Actions contained in EOP for loss of offsite power. 056AA2.47 Ability to determine and interpret the following as they apply to the Loss of Offsite Power: Proper operation of the ED/G load sequencer	4.4 4.7 3.8 3.9	10 79
000057 Loss of Vital AC Inst. Bus / 6					X		057AA2.06 Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: AC instrument bus alarms for the inverter and alternate power source.	3.2 3.7	11
000058 Loss of DC Power / 6						X	058AG2.4.20 Knowledge of operational implications of EOP warnings, cautions and notes.	3.8 4.3	12
000062 Loss of Nuclear Svc Water / 4				X			062AA1.05 Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water (SWS): The CCWS surge tank, including level control and level alarms, and radiation alarm.	3.1 3.1	13
000065 Loss of Instrument Air / 8						X X	065AG2.4.20 Knowledge of operational implications of EOP warnings, cautions and notes. 065AG2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	3.8 4.3 4.0 4.6	14 80
W/E04 LOCA Outside Containment / 3	X						WE04EK1.2 Knowledge of the operational implications of the following concepts as they apply to the (LOCA Outside Containment): Normal, abnormal and emergency operating procedures associated with (LOCA Outside Containment). WE04EA2.1 Ability to determine and interpret the following as they apply to the (LOCA Outside Containment): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.5 4.2 3.4 4.3	16 81
W/E11 Loss of Emergency Coolant Recirc. / 4		X					WE11EK2.2 Knowledge of the interrelations between the (Loss of Emergency Coolant Recirculation) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.9 4.3	17
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000077 Generator Voltage and Electric Grid Disturbances / 6					X		077AA2.08 Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Criteria to trip the turbine or reactor.	4.3 4.4	15
K/A Category Totals:	3	3	3	3	3 3	3 3	Group Point Total:		18/6

ES-401	PWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / SRO)						Form ES-401-2	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	#
000001 Continuous Rod Withdrawal / 1					X		001AA2.03 Ability to determine and interpret the following as they apply to the Continuous Rod Withdrawal : Proper actions to be taken if automatic safety functions have not taken place	4.5 4.8	19
000003 Dropped Control Rod / 1					X		003AA2.03 Ability to determine and interpret the following as they apply to the Dropped Control Rod: Dropped rod, using in-core/ex-core instrumentation, in-core or loop temperature measurements	3.6 3.8	82
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1									
000028 Pressurizer Level Malfunction / 2					X		028AA2.03 Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Charging subsystem flow indicator and controller	2.8 3.3	83
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7									
000036 (BW/A08) Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3						X	037AG2.4.1 Knowledge of EOP entry conditions and immediate action steps.	4.6 4.8	20
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid Radwaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9				X			060AA1.01 Ability to operate and / or monitor the following as they apply to the Accidental Gaseous Radwaste: Area radiation monitors	2.8 3.0	21
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8									
000068 (BW/A06) Control Room Evac. / 8		X					068AK2.01 Knowledge of the interrelations between the Control Room Evacuation and the following: Auxiliary shutdown panel layout	3.9 4.0	22
						X	068AG2.4.31 Knowledge of annunciators alarms, indications or response procedures	4.2 4.1	84
000069 (W/E14) Loss of CTMT Integrity / 5					X		069AA2.02: Loss of Containment Integrity /5, Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Ability to determine and interpret verification of automatic and manual means of restoring integrity.	3.9 4.4	24
000074 (W/E06&E07) Inad. Core Cooling / 4				X			074EA1.10 Ability to operate and monitor the following as they apply to a Inadequate Core Cooling: Core Flood system	4.0 4.1	23
000076 High Reactor Coolant Activity / 9									
W/EO1 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5			X				WE15EK3.1 Knowledge of the reasons for the following responses as they apply to the (Containment Flooding): Facility operating characteristics during transient conditions, including coolant chemistry and the effects of temperature, pressure, and reactivity changes and operating limitations and reasons for these operating characteristics.	2.7 2.9	27

W/E16 High Containment Radiation / 9									
BW/A01 Plant Runback / 1									
BW/A02&A03 Loss of NNI-X/Y / 7									
BW/A04 Turbine Trip / 4									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
BW/E03 Inadequate Subcooling Margin / 4									
BW/E08; W/E03 LOCA Cooldown - Depress. / 4	X						WE03EK1.2 Knowledge of the operational implications of the following concepts as they apply to the (LOCA Cooldown and Depressurization): Normal, abnormal and emergency operating procedures associated with (LOCA Cooldown and Depressurization).	3.6 4.1	25
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4						X	WE09EG2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3 4.4	85
BW/E13&E14 EOP Rules and Enclosures									
CE/A11; W/E08 RCS Overcooling - PTS / 4	X						WE08EK1.2 Knowledge of the operational implications of the following concepts as they apply to the (Pressurized Thermal Shock): Normal, abnormal and emergency operating procedures associated with (Pressurized Thermal Shock). RCS Overcooling/FR-P.1	3.4 4.0	26
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	2	1	1	2	2 2	1 2	Group Point Total:		9/4

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / SRO)												Form ES-401-2	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
003 Reactor Coolant Pump					X							003K5.03 Knowledge of the operational implications of the following concepts as they apply to the RCPS: Effects of RCP shutdown on T-ave., including the reason for the unreliability of T-ave. in the shutdown loop.	3.1 3.5	28
								X				003A2.04 Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Effects of fluctuation of VCT pressure on RCP seal injection flow	2.4 2.8	86
004 Chemical and Volume Control							X					004A1.07 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CVCS controls including: Maximum specified letdown flow.	2.7 3.1	29
										X		004A4.21 Ability to manually operate and/or monitor in the control room: Letdown demineralizer flow divert valve control switch	2.6 2.3	30
005 Residual Heat Removal								X				005A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Pressure transient protection during cold shutdown	3.5 3.7	31
006 Emergency Core Cooling									X			006A3.08 Ability to monitor automatic operation of the ECCS, including: Automatic transfer of ECCS flowpaths	4.2 4.3	32
007 Pressurizer Relief/Quench Tank									X			007A3.01 Ability to monitor automatic operation of the ECCS, including: Automatic transfer of ECCS flowpaths	2.7 2.9	33
008 Component Cooling Water	X											008K1.01 Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: SWS	3.1 3.1	34
010 Pressurizer Pressure Control						X						010K6.03 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PZR sprays and heaters	3.2 3.6	36
								X				010A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Heater failures.	3.3 3.6	35

012 Reactor Protection		X						X				012K2.01 Knowledge of bus power supplies to the following: RPS channels, components, and interconnections 012A2.06 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: Failure of RPS signal to trip the reactor	3.3 3.7 4.4 4.7	37 87
013 Engineered Safety Features Actuation						X						013K6.01 Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: Sensors and Detectors.	2.7 3.1	38
022 Containment Cooling											X X	022G2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects. 022G2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.	4.2 4.1 4.1 4.3	39 40
025 Ice Condenser														
026 Containment Spray		X										026K2.01 Knowledge of bus power supplies to the following: Containment spray pumps	3.4 3.6	41
039 Main and Reheat Steam			X								X	039K3.05 Knowledge of the effect that a loss or malfunction of the MRSS will have on the following: RCS 039G2.4.9 Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.	3.6 3.7 3.8 4.2	42 88
059 Main Feedwater	X									X		059K1.02 Knowledge of the physical connections and/or cause-effect relationships between the MFW and the following systems: AFW system 059A4.12 Ability to manually operate and monitor in the control room: Initiation of automatic feedwater isolation	3.4 3.4 3.4 3.5	44 43
061 Auxiliary/Emergency Feedwater					X X							061K5.03 Knowledge of the operational implications of the following concepts as the apply to the AFW: Pump head effects when control valve is shut. 061K5.05 Knowledge of the operational implications of the following concepts as the apply to the AFW: Feed line voiding and water hammer	2.6 2.9 2.7 3.2	45 46
062 AC Electrical Distribution										X		062A4.04 Ability to manually operate and/or monitor in the control room: Local operation of breakers	2.6 2.7	47
063 DC Electrical Distribution	X			 X								063K1.03 Knowledge of the physical connections and/or cause effect relationships between the DC electrical system and the following systems: Battery charger and battery. 063K4.04 Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for the following: Trip.	2.9 3.5 2.6 2.9	48 49

064 Emergency Diesel Generator				X							064K4.04 Knowledge of ED/G system design feature(s) and/or interlock(s) which provide for the following: Overload ratings	3.1 3.7	50
073 Process Radiation Monitoring			X								073K3.01 Knowledge of the effect that a loss or malfunction of the PRM system will have on the following: Radioactive effluent releases	3.6 4.2	51
076 Service Water						X					076A1.02 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: Reactor and turbine building closed cooling water temperatures.	2.6 2.6	52
							X				076A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Service water header pressure.	2.7 3.1	53
										X	076G2.4.41 Knowledge of the emergency action level thresholds and classifications	2.9 4.6	89
078 Instrument Air		X									078K2.01 Knowledge of bus power supplies to the following: Instrument air compressor	2.7 2.9	54
103 Containment						X					103A1.01 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: Containment pressure, temperature, and humidity	3.7 4.1	55
										X	103G2.1.32 Ability to explain and apply all system limits and precautions.	3.8 4.0	90
K/A Category Point Totals:	3	3	2	2	3	2	3	3 2	2	3	2 3	Group Point Total:	28/5

ES-401	PWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-2		
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	#
001 Control Rod Drive										X		001A4.03 Ability to manually operate and/or monitor in the control room: CRDS mode control.	4.0 3.7	56
								X				001A2.19 Ability to (a) predict the impacts of the following malfunction or operations on the CRDS- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Axial flux distribution	3.6 3.4	91
002 Reactor Coolant														
011 Pressurizer Level Control								X				011A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of PZR level	3.8 3.6	57
014 Rod Position Indication														
015 Nuclear Instrumentation				X								015K4.01 Knowledge of NIS design feature(s) and/or interlock(s) provide for the following: Source-range detector power shutoff at high powers.	3.1 3.3	58
016 Non-Nuclear Instrumentation														
017 In-Core Temperature Monitor														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control						X						028K6.01 Knowledge of the effect of a loss or malfunction on the following will have on the HRPS: Hydrogen recombiners	2.6 3.1	59
029 Containment Purge														
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment														
035 Steam Generator														
041 Steam Dump/Turbine Bypass Control							X					041A1.02 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: Steam pressure	3.1 3.2	60
045 Main Turbine Generator					X							045K5.17 Knowledge of the operational implications of the following concepts as they apply to the MT/B System: Relationship between moderator temperature coefficient and boron concentration in RCS as T/G load increases.	2.5 2.7	61
055 Condenser Air Removal											X	055G2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5 4.7	62
056 Condensate	X											056K1.03 Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems: MFW.	2.6 2.6	63

068 Liquid Radwaste										X	068G2.2.38 Knowledge of conditions and limitations in the facility license.	3.6 4.5	92
071 Waste Gas Disposal								X			071A2.05 Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Power failure to the ARM and PRM Systems	2.5 2.6	93
072 Area Radiation Monitoring									X		072A3.01 Ability to monitor automatic operation of the ARM system, including: Changes in ventilation alignment.	2.9 3.1	64
075 Circulating Water			X								075K3.07 Knowledge of the effect that a loss or malfunctions of the circulating water system will have on the following: ESFAS.	3.4 3.5	65
079 Station Air													
086 Fire Protection													
K/A Category Point Totals:	1	0	1	1	1	1	1	1 2	1	1	1 1	Group Point Total:	10/3

Facility:		Date of Exam:				
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.18	Ability to make accurate, clear and concise logs, records, status boards and reports.	3.6	66	3.8	
	2.1.30	Ability to locate and operate components, including local controls.	4.4	68	4.0	
	2.1.37	Knowledge of procedures, guidelines or limitations associated with reactivity management.	4.3	67	4.6	
	2.1.42	Knowledge of new and spent fuel movement procedures.	2.5		3.4	95
	2.1.28	Knowledge of the purpose and function of major system components and controls.	4.1		4.1	94
	2.1.					
	Subtotal		3		2	
2. Equipment Control	2.2.12	Knowledge of surveillance procedure.	3.7	69	4.1	
	2.2.38	Knowledge of conditions and limitations in the facility license.	3.6	70	4.5	
	2.2.41	Ability to obtain and interpret station electrical and mechanical drawings.	3.5	71	3.9	
	2.2.1	Ability to perform pre-startup procedures for the facility, - including operating those controls associated with plant equipment that could affect reactivity.	4.5		4.4	96
	2.2.39	Knowledge of less than one hour technical specification action statements for systems.	3.9		4.5	97
	2.2.					
	Subtotal		3		2	
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal and emergency conditions.	3.2	72	3.7	
	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions	3.9		4.5	98
	2.3.					
	2.3.					
	2.3.					
	2.3.					
	Subtotal		1		1	
4. Emergency Procedures / Plan	2.4.5	Knowledge of the organization of the operating procedures network for normal, abnormal and emergency evolutions.	3.7	74	4.3	
	2.4.6	Knowledge of EOP mitigation strategies.	3.7	75	4.7	
	2.4.12	Knowledge of general operating crew responsibilities during emergency operations.	4.0	73	4.3	
	2.4.35	Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.	3.8		4.0	99
	2.4.37	Knowledge of the lines of authority during implementation of an emergency plan.	3.0		4.1	100
	2.4.					
	Subtotal		3		2	
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
RO T2/G2	001A4.04	Surry doesn't have Part-Length Control Rods. **New K/A** 001A4.03 – Control Rod Drive System – Ability to manually operate and/or monitor in the control room: CRDS mode control.
RO T3	G2.1.9	ROs don't typically direct people *inside* the control room. **New K/A** G2.1.30 – Ability to locate and operate components, including local controls.
RO T1G2	069AA2.02	Replace K/A 076AG2.2.4 High Reactor Coolant Activity, inability to write question to match K/A – Per Chief 3/29/17
SRO T3	G2.1.21	"Ability to verify the controlled procedure copy," would be difficult to write a discriminating SRO question to because it's RO knowledge, so replace with another topic from G2.1, Conduct of Operations: **New K/A** G2.1.28 Knowledge of the purpose and function of major system components and controls.
RO T1/G1	038EK3.07	Knowledge of the reasons for the following responses as they apply to the SGTR: RCS Loop Stops. **New K/A:** 038EK3.01: **Equalizing pressure on primary and secondary sides of ruptured S/G Changed per Chief 4-11-17**

ES-401 **Written Examination Quality Checklist** Form ES-401-6

Facility: Surry Date of Exam: 10-30-17 Exam Level: RO ☐ SRO ☐

	Item Description	Initial a	Initial b*	Initial c*#
1.	Questions and answers are technically accurate and applicable to the facility.	M	RP	MD
2.	a. NRC K/As are referenced for all questions. b. Facility learning objectives are referenced as available. c. Correct answer explanation and distractor analysis provided (ES-401, D.2.g)	M	RP	MD
3.	SRO questions are appropriate in accordance with Section D.2.d of ES-401	M	RP	MD
4	The sampling process was random and systematic. (If more than four RO or two SRO questions were repeated from the last two NRC licensing exams, consult the NRR/NRO OL program office).	M	RP	MD
5.	Question duplication from the licensee screening/audit exam was controlled as indicated below (check the item that applies) and appears appropriate. __ The audit exam was systematically and randomly developed, or __ the audit exam was completed before the license exam was started, or X the examinations were developed independently, or __ the licensee certifies that there is no duplication, or __ other (explain).	M	RP	MD
6.	Bank use meets limits (no more than 75% from the bank, at least 10% new, and the rest new or modified); enter the actual RO/SRO-only question distribution(s) at right.	Bank: 20/8 Modified: 17/20 New: 63/72	M	RP	MD
7.	Between 38 and 45 questions of the questions on the RO exam and at least 13 questions of the questions on the SRO-only portion of the exam are written at the comprehension/analysis level (see ES-401, D.2.c); enter the actual RO/SRO-only question distribution(s) at right.	Memory: 32/8 C/A: 43/17	M	RP	MD
8.	References/handouts provided do not give away answers or aid in the elimination of distractors.	M	RP	MD
9.	Question content conforms to specific K/A statements in the previously approved examination outline and is appropriate for the tier to which they are assigned; deviations are justified.	M	RP	MD
10.	Question psychometric quality and format meet the guidelines in Appendix B.	M	RP	MD
11.	The exam contains the required number of one-point, multiple-choice items; the total is correct and agrees with the value on the cover sheet.	M	RP	MD

	Printed Name/Signature	Date
a. Author	Michael R Meyer / Michael R Meyer	10/18/2017
b. Facility Reviewer (*)	Rich Philpot / Richard Philpot	10/18/2017
c. NRC Chief Examiner (#)	Michael G. Jonithan / Michael G. Jonithan	10/20/17
d. NRC Regional Supervisor	Gerald J. McCoy / Gerald J. McCoy	10/27/17

Note: * The facility reviewer's initials or signature are not applicable for NRC-developed examinations.
Independent NRC reviewer initials items in Column "c"; chief examiner concurrence is required.

Refer to Section D of ES-401 and Appendix B for additional information regarding each of the following concepts:

1. Enter the level of knowledge (LOK) of each question as either (F)undamental or (H)igher cognitive level.
2. Enter the level of difficulty (LOD) of each question a 1 (easy) to 5 (difficult); questions with a difficulty between 2 and 4 are acceptable.
3. Check the appropriate box if a psychometric flaw is identified:
   - "Stem Focus": The stem lacks sufficient focus to elicit the correct answer (e.g., unclear intent, more information is needed, or too much needless information).
   - "Cues": The stem or distractors contain cues (e.g., clues, specific determiners, phrasing, length).
   - "T/F": The answer choices are a collection of unrelated true/false statements.
   - "Cred. Dist.": The distractors are not credible; single implausible distractors should be repaired, and more than one is unacceptable.
   - "Partial": One or more distractors are partially correct (e.g., if the applicant can make unstated assumptions that are not contradicted by the stem).
4. Check the appropriate box if a job content flaw is identified:
   - "Job Link": The question is not linked to the job requirements (i.e., the question has a valid K/A but, as written, is not operational in content).
   - "Minutia": The question requires the recall of knowledge that is too specific for the closed-reference test mode (i.e., it is not required to be known from memory).
   - "#/Units": The question contains data with an unrealistic level of accuracy or inconsistent units (e.g., panel meter in percent with question in gallons).
   - "Backward": The question requires reverse logic or application compared to the job requirements.
5. Check questions that are sampled for conformance with the approved K/A and those K/As that are designated "SRO-only." (K/A and license-level mismatches are unacceptable.)
6. Enter question's source: (B)ank, (M)odified, or (N)ew. Verify that (M)odified questions meet the criteria of Form ES-401, Section D.2.f.
7. Based on the reviewer's judgment, is the question, as written, (U)nsatisfactory (requiring repair or replacement), in need of (E)ditorial enhancement, or (S)atisfactory?
8. At a minimum, explain any "U" status ratings (e.g., how the Appendix B psychometric attributes are not being met).

Generic/global comments

"D/A" in the following comments = Distractor Analysis.

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6. Source B/M/N	7. Status U/E/S	8. Explanation
			Stem Focus	Cues	T/F	Cred Dist	Partial	Job-Link	Minutia	# / Units	Back ward	Q – K/A	SRO Only			
1P	H	3												M	S	**007EK1.02** Reactor Trip - Knowledge of operational implications of SDM for Rx trip.
	Calling this LOD 2 based on 1st-half LOD 3 and 2nd-half LOD 1 averaging to 2. Only one rod is not fully-inserted (and it almost is, at 18 steps), and "everyone knows" that the most-reactive rod is assumed to not trip, so of course you don't need to emergency borate. Putting that rod at 200+ inches would make it somewhat harder, and/or *adding another rod between 0 and 10 inches*. D/A B: "rod is stuck near the top of the core", but 18 steps is near the bottom of the core. Changed rod H14 to 218 steps. This should increase LOD. D/A B now correct. Raised LOD to 3. mgd, 3/13 **Q is SAT**															
2	H	2												M	S	**009EG2.1.28** Small Break LOCA - Knowledge of the purpose and function of major system components and controls.
	Are there Bases for Surry AOPs and EOPs? I want to check the basis for the RCP/spray thing, and the reason for minimizing the # of RCPs running (I know it's to minimize heat input, but I don't get that from ES-1.2). Included Basis for minimizing RCPs and reason for securing in References. I'm having trouble understanding why 'C' RCP with its associated spray valve is okay, but just 'A' RCP with its associated spray valve is not okay. 'C' RCS loop is desirable because Pressurizer Surge line is located on this loop. ES-1.2 Basis for RCP Note states that if RCP with Pzr Surge line can be started it should be. If that RCP is unavailable then "it will likely be necessary to start more than one RCP." Understand. mgd, 9/15 And speaking of airtight, a couple things: the Bank Q this came from had "one RCP" being the correct answer, without specifying *which* RCP. But the modified Q is specifying *which* RCP is preferred, but "the basis for this configuration" doesn't really match WHY that particular RCP is preferred. Yes, it's to minimize unnecessary heat input, but the real reason the Q wants you to pick 'C' RCP is to have effective spray, and that's not one of the 2nd-part answer choices. Modified part 2 to explicitly ask why RCPs are tripped to better clarify the question intent and separate the two parts. In part 1 we ask for the optimum RCP combination to test the knowledge of which RCP is preferable for Pressurizer spray. In part 2 we ask for the reason for stopping RCPs to test the "big picture" knowledge. Looks good. mgd, 9/15															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
	The more I look at it, the more I think the Bank Q and this Q may have a fatal flaw. We say that "RCS C/D has been *initiated*." That's Step 11. You can't get past Step 12 until you've cooled down enough to have subcooling >30F [85F]. (Wouldn't you most likely on a SBLOCA initially NOT have that much SCM, so you'd RNO to Step 25, which eventually loops you back to Step 7 at Step 37?) So we have to have a certain amount of C/D before we even get to **go** to Step 14, "Depressurize RCS to Refill PZR." And note that this step just says to "Use normal PRZR spray," and the procedure hasn't told us yet what that entails. It's not until the NEXT Step, 15, that the procedure starts to care which RCP is running. But we can't even get there until we've stopped the depressurization at 35% level in the PZR. This is all a convoluted way of saying that, yes, ES-1.2 has some legitimate reasons for wanting us to have a certain number of RCPs running, but the Q doesn't put the applicant at the point where that's relevant yet. You are correct, the question as originally written did not "put the operator in the right place". Modified the stem to clarify that cooldown and depressurization has already taken place and all RCPs are running. This will avoid confusion, because during depressurization all RCPs are running. It is only after the pressurizer is full that the EOP provides guidance for starting/stopping RCPs. Also bounded the question by stating "IAW ES-1.2..." Looks good. mgd, 9/15 **Q is SAT**															
3P	H	3												B	S	**011EA1.14** Large Break LOCA - Ability to operate and monitor SCM monitors.
	It's highly unlikely that both trains of ICCM will show the exact same values at any given time, so to avoid confusion and/or questions, let's present the data as being from Train A, with the addition of something like "Train B shows similar values." Changed stem to reflect that table shows Train A (Train B shows similar values). Perfect. mgd, 3/13 Stem Focus: At Time 3, is there supposed to be a negative sign in front "32.7°F"? Added negative sign at time 3. There is a positive value that will occur for a brief time due to SI Accumulator dump but believe this (+) may be confusing to candidate. Agree, would be confusing, and I don't think it changes the analysis. mgd, 3/13 Q Source: Not much Modification here: the Catawba Q asks exactly the same 2 things, and the answer is the same. You've added CETC indications to the stem, but they're irrelevant. You've changed the first 3 subcooling numbers, but the trend is the same. And you changed "40 ACC qualified CETs" to "25 compensated CETs" to "match the Surry design", but they're probably the same idea; and that piece doesn't affect the answer choice. I'm calling it a Bank. Changed to Bank question. Thanks. mgd, 3/13 **Q is SAT**															
4P	H	3												B	S	**015AK3.04** – RCP Malfunctions - Knowledge of the reasons for reduction of power to below the steady state power-to-flow limit.
	I like the Source Q better because it asks the same things but 1) avoids the 2x2 construction that some people have an issue with, and 2) avoids these issues in the 2nd part: • The WOOTF asks, "*The* trip is required to ____," so if you decided trip was NOT required in the 1st part (which it's not), then *what* trip are we talking about? To address that I was going to suggest changing to: "The purpose of the loss of flow trip (RCP trip) is _____" or similar. (Those words are from the Explanation section.) • It could unfairly lead someone to an incorrect answer because "no auto trip" AND'ed with "the trip is required to…" doesn't make sense. Having said all that, I don't think the source Q got it right concerning a manual trip being required (at least to protect the fuel "right now"). It used the words "*must be* manually tripped to maintain DNBR or kW/ft." Would Surry be *required* to trip in that situation? **Yes**. Probably so, from Tech Specs and/or Conduct of Ops, but conditions in the core probably don't require it. Perhaps change to something like: "The Rx *should be* tripped to avoid challenging the DNBR / kW/ft limits." Changed question to Bank, and incorporated other comments. Nice catch that a trip will occur shortly on S/G levels; I hadn't thought of that. At first I didn't like the removal of the "automatic" trip, but I think "immediately" works. mgd, 3/13 **Q is SAT**															
5	H	3												B	S	**025AK1.01** Loss of RHR - Knowledge of the operational implications of the loss of RHR during all modes of operation.
	Giving the picture of PC-145 is probably cueing, because of the "Reverse Acting" label on the controller, as well as the legend at the top that shows which way is Open and which way is Closed. Certainly makes it MUCH easier. Note that the Source Q didn't have the picture. Removed picture of controller – PK 7/18. "Question Source" says it was "modified to Unit 2", but Q looks like U1. Add unit # to the stem, and change to U2 if desired, or leave as-is but take out "modified to U2." 1st bullet: break out these facts into bullets. Revised Initial conditions to reflect Unit 2 mark numbers; revised initial conditions to bulleted items; added "2-CH-FCV-2122 in Manual." – PK 7/18 Thanks. mgd, 9/18. Doesn't P initially lower due to loss of pump head? And then rise because you're solid and no longer removing heat? Note that the source Q had "eventually". When loss of RHR pump run on Classroom Simulator, loss of RHR pump discharge pressure on upstream side of 2-CH-PCV-2145 causes the valve to close immediately. With No Letdown flow and Charging flow in Manual, RCS pressure begins to rise immediately. – PK 7/18. Guess I can't argue with that, thanks for running it. mgd 9/18 **Q is SAT**															
6	H/F	3												B	S	**026AA2.01** Loss of CCW - Ability to determine and interpret location of a leak.
	What physically causes the RM-Q5, CC/SW HX B ALERT/FAILURE alarm? What's the sensor? If the detector senses "too high" of a radiation field, or if there is some internal failure the detector may have these indications. Previous OE at Surry indicates that that alarm could come in also due to a transient. The alarm was used to aid in plausibility for CC HX distractor since if SW side of CC HX is drained, this alarm may actuate. Thanks. mgd, 9/18															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
	What is RI-107B telling us with "EEEEE" displayed? When the radiation field is too high to be measured, the indicator will read "EEEE" and the range alarm will be lit. Thanks. Makeup isn't postulated to keep up with this CC leak? (Which is probably a single tube failure?) ("M/U in progress, level lowering.") Makeup can be either "low level" or high level". Given a large break it is possible for high level makeup, which can come from the Bearing Cooling system or Condensate system to feed SFP and CC. Thanks. mgd, 9/18 **Q is SAT**															
7	H	3												N	S	**027AK2.03** Pressurizer Pressure Control - Knowledge of the interrelations between PZR PCS malfunctions and controllers and positioners.
	Do we need to say that the individual spray valve controllers and the Master Pressure Controller are in Auto? Or something like, "normal system alignment"? Added bullet; "All Pressurizer pressure controllers are in AUTO." Thanks. mgd, 9/18 "Explanation": "spray valves and 1455C will open (once pressure on PT-1444 gets a little higher)." If they're not all 3 open now, then how can 445 be "lowering due to the response of the spray and PORV opening" in the last sentence? But see if I have this right: PT-1444 thinks it's at 2300# (maybe 2290). It should've told both spray valves to start opening at 2255#, but they won't be full-open till 2305#, so they're modulated mostly open. But 1444 doesn't tell PORV 1455C to open until 2335#. If I have that correct, then the answer choices need to be very clear that they're asking about this point in time, or at some time in the future. The answer might then become something like: "Both PZR spray valves are at least partially open, and 1455C can be expected to open." Or add to the stem: "If these trends continue, then:" "B. Both spray valves and 1455C *will* open." But that's kind of hokey because the spray valves are already (partially) open. So maybe: "will be open." Added to the stem of the question, "Assuming these trends continue…" Modified choice A and B to "Both PRZR spray valve are currently open and 1-RC-PCV 1456 (1455C) will open. That looks good. mgd, 9/18 **Q is SAT**															
8	F	3												N	S	**038EK3.07** SGTR - Knowledge of the reasons for RCS loop isolation valves.
	I see this one as F, since you only have to "know" 2 things, and there's no real analysis. Changed to Memory or Fundamental Knowledge. PK 7/18 Thanks. mgd, 9/18 **Q is SAT**															
9	F	4												N	S	**055EA1.07** Station Blackout - Ability to operate and monitor restoration of power from offsite.
	Calling this F, because you just have to know 2 facts. Changed to Memory or Fundamental Knowledge. – PK 7/18 Thanks. mgd, 9/18 Are we sure that holding for just 5s won't work? Because if it does then it's a subset issue. The procedure may say 15s, but if it actually closes in 5s then this won't work. Is there a reference like a CWD that shows it's more than 5s? Transfer bus supply breakers 15D1/15E1/15F1 have an originally installed UV device to trip the breaker open on Transfer Bus UV; this UV interlock is overridden by holding the switch in close to energize the bus; the UV device can take up to 15 seconds to reset when the transfer bus is energized and the UV signal clears. If the switch is not held in close long enough for the UV device to reset, the breaker will open when the control switch is returned to Auto – PK 7/18. I don't have a warm fuzzy about this, because you didn't quite answer my question. "Can take up to 15s" doesn't rule out 5s. Again, I'm not concerned with what a procedure Note says, but what the UV interlock actually does. Is there a drawing or calibration sheet that shows exactly how this thing acts? mgd 9/18 Added Relay time testing from Electrical procedure to question reference section, discussed per telecon – PK 9/20. That covers it, thanks. mgd, 9/28 **Q is SAT**															
10	H	3												N	S	**056AK3.02** LOOP - Knowledge of the reasons for actions contained in EOP.
	Question 1) - Suggest: "The # of running CRDM fans should be ____." (Or turn around to: "_(1)_ CRDM fans should be running" or "Should be available." Someone could argue that "are running" is indeterminate, that maybe one or both didn't start. Normally at-power all 3 fan units are running, right? So on the LOOP all 3 lose power, and 60A & 60F get power back from the diesel supplying the 1H1 Bus? **Do they auto-start?** I.E. are they a Blackout load? I can't find that in the lesson plans. If they DON'T auto-start, we may have to put them past Step 5 of ES-0.2. The switch position for CRDM fans 60B/60E is B/OFF/E; when the switch is in position E the 60E fan runs, in OFF both fans are off; the fan will run with the switch in the fan position and power is available on the MCC that supplies the fan; on loss of power the fan will "ride the bus." PK 7/18. Partial: 25°F is correct early in ES0.2. Step 5 tells you to start 3 fans; you can't, so you start 2. 6.a then tells you to maintain C/D <25F/hr, and then maybe you're stuck in a loop till you get <550 at Step 7. At 11.c you're still maintaining <25F/hr. It's not until Step 16 that the procedure asks again about CRDM fans, and this is where we get our answer from. But you can see that all the way up to that point, 25F/hr was the right answer. You may've included the "RCS at 500°F" bullet to try to put them at or past this step, but I'd argue that you could theoretically be at 500F well before this step. We may need to ask this Q a different way. Revised Part 2) for purpose of RCS CDR limit (purpose of ES-0.2/ES-0.3) relating to void formation in vessel head. PK 7/18 I like the change. Lowered LOD to 3 based on getting away from specific CDRs. mgd, 9/18 **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
11	H	3												N	S	**057AA2.06** Loss of Instrument Bus - Ability to determine and interpret alarms for the inverter and alternate power source.
	Choice A: is "I/IA" standard usage? Maybe: "Busses I and IA"? And capitalize "bus" there, whichever way you go. Changed to Vital Bus 1 and IA – PK 7/18. Credible Distractors: Choice D isn't very plausible. With everything given, I'd be awfully naïve to think there was "no effect," so I'm going to rule that out. Revised question to ask if Vital Bus I and/or IA are energized/de-energized – PK 7/18. That's a good change. mgd, 9/18 **Q is SAT**															
12	F	3												N	S	**058AG2.4.20** Loss of DC - Knowledge of the operational implications of EOP warnings, cautions, and notes.
	Question 1): what do you think about changing "as soon as" to "when"? "When" would better match the Note in ECA-0.0, and how would one define "as soon as"? Is it when voltage reaches 105.0? Or 105.00? Or maybe 105.49 and you round down? Or 105.99 and you truncate? Agreed, "when" matches knowledge we are testing much better. Thanks. mgd, 9/18 **Q is SAT**															
13	H	2												N	S	~~**062AA1.05** Loss of Nuclear SW - Ability to operate and/or monitor the CCWS surge tank, including level control and level alarms, and radiation alarm.~~ **062AA1.04** Loss of Nuclear Service Water - Ability to operate and/or monitor the CRDM high-temperature alarm system as it applies to the Loss of Nuclear SW.
	The K/A isn't matched, because we don't have a "Loss of Nuclear Svc Water," which is the main idea of APE 062. The K/A is asking for the effect of loss of SW on CCW, and we're kind of going the other way. Look at it from that perspective and see if you can come up with a question. Or else I can swap out the K/A. Revised question based upon phone discussion with Chief on 7/31. Question focus changed to CC Surge Tank High level alarm setpoint and whether Tank vent closes on high level. – PK 8/1 I like the new Q, but have a few questions: Are we saying in CC1 that SW to BOTH units' CCW HXs has been cut off? SW to all CC HXs comes through 1-SW-MOV-102A&B PK 9/20. Is that realistically possible? If so, let's modify CC1 to say "both" or "all", and not just "the". Changed "the" to "all" - PK 9/20. Thanks. mgd, 9/28 I'm not keen on the plausibility of 73% from the Hotwell high level alarm. I'd be okay with 70%, playing off your idea that the Low is 20% lower than normal. Changed to 70% - PK 9/20. Thanks. mgd, 9/28 WOOTF 2: we should probably add: "Vent Valve ___ automatically close." mgd, 9/18 Added Automatically. – PK 9/20/17. Thanks. mgd, 9/28 **Q is SAT**															
14	F	2												N	S	**065AG2.4.20** Loss of IA - Knowledge of the operational implications of EOP warnings, cautions, and notes.
	Minor editorial comments addressed. mgd, 9/18 **Q is SAT**															
15	H	3												N	S	**077AA2.08** Generator Voltage and Electric Grid Disturbances - Ability to determine and interpret criteria to trip the turbine or reactor.
	Probably cleaner to have one unit S/D, rather than say "Unit 2 parameters are comparable." Agreed, removed (Note Unit 2…) Thanks. mgd, 9/18 If you give me this question, I'm expecting to see the Generator Capability Curve so I can plot the operating point. But we're not giving it. So: 1) they're going to ask for it, and 2) when we don't give it they'll go back and key in on the frequency, and then get to RCP trip criteria. Especially because we ask if the reactor is required to be tripped. It's kind of cueing. (I first thought that was a mistake, that it must mean the turbine/generator, and of course then the reactor would trip on the turbine trip. Or trip the reactor and then the turbine.) What if we gave them the curve, which currently requires generator trip, but change the end state conditions so generator trip is NOT required. Then it becomes much harder, because it would be easy to jump on that and forget RCP UF. Not that I'm trying to make it harder per se, but right now the only thing I can evaluate from memory is the RCP UF trip, so I'll eventually get there. Added Generator Capability curve, and changed conditions (MW, MVAR) so that Generator will be close, but will not exceed Gen limits for Hydrogen pressure of 75 psig. Thanks. mgd, 9/18 And the second part is really easy: "Would you find the Generator Capability **curve** in the **Curve** Book, or ONLY in this AP?" [Granted, it could be in both, and I'm actually used to it also being in the Grid Instability AOP, but as a test taker I can rule out "AP-10.18 only" (which is implied) because I [should] know that this is a generic curve, not just AOP-applicable.] The RCP UF setpoint, is there a time component? "58Hz for 60 seconds" or something like that? If so, we need to make sure it's had time to time out. In the table: hz.→Hz and Kv→kV. No time delay for UF trip. Changed P2 to ask "Which of the emergency buses are most affected by the conditions given above." Added bullet to Current Conditions stem to indicate that the 500 KV system is most affected and is below its emergency voltage limit. Based on this, RSST A and B are most affected and they supply emergency buses 1J and 2H. Good revisions to the Q, raised LOD to 3. mgd, 9/18 **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
16	F	3												B	S	**WE04EK1.2** LOCA Outside Containment - Knowledge of the operational implications of normal, abnormal and emergency operating procedures
	Is it RO knowledge to ask, "what procedure would be entered next"? The LO says they're responsible for "the transition criteria for … exiting ECA-1.2", but knowing when and why to exit isn't the same as knowing, from memory for an RO, where to exit to. We agree, we propose a new but similar question that was written for the 2010 Surry exam. This question is a straight forward memory question. We're still within the limits required by ES-401-6; Bank is now 16% of RO, and we have 31 Low cog questions. Agree. mgd, 9/18 The fact that there would have to be "*several* failed check valves" kind of worries me. Is it realistic? Can we add a drawing showing where the postulated leak is? Yes this type of scenario is trained on, and was one of the scenarios on the last NRC exam. Drawing added. Thanks. mgd, 9/18 Comments on new (bank) Q: I like it and think it hits the K/A; lowered LOD to 3, and changed to Low Cog. I'd only ask that the answer choices be scrambled so that the correct answer is no longer C. mgd, 9/18 Changed to answer D. MM 9/20 Thanks. mgd, 9/28 **Q is SAT**															
17	H	2												N	S	**WE11EK2.2** Loss of Emergency Coolant Recirculation - Knowledge of the interrelations between loss of recirculation and the facility's heat removal systems, including primary coolant, emergency coolant, decay heat removal systems, and relations between proper operation of these systems to the operation of the facility.
	Is the ability to use the curve RO knowledge? The LO doesn't exactly cover it. Are the ROs normally the ones who would implement it, or do they back up the SRO? ROs may back up the SRO, or vice versa. ROs are required to and would normally implement this attachment to ensure they have enough SI flow. As conditions change they are required to also monitor to ensure they stay within the curve. Thanks. mgd, 9/18 0905: what caused the reactor trips, just automatic? Added "Auto" Thanks. mgd, 9/18 0910: should specify Unit 1 here, since that's what we go on to talk about. Added "Unit 1". Thanks. mgd, 9/18 Should we state that the LHSI pumps can't be restarted? What would it take to start them, after they tripped on overcurrent? The overcurrent trip would "lockout" the 'A' LHSI pump. Electrical maintenance would need to check out the pump before it was restarted. The question doesn't indicate to the operator that he/she would get either LHSI pump back any time soon. Okay. mgd, 9/18 **Q is SAT**															
18	H	4												H	S	**WE12EK2.1** Uncontrolled Depressurization of all Steam Generators - Knowledge of the interrelations between that and components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, & automatic & manual features.
	Current Condition 3: do we need to state that AFW has already been throttled some? Does it change the flow of the question either way? Removed Bullet for AFW throttled to 120 gpm. Thanks. mgd, 9/18 **We need to be careful with the "transition to H.1" part of the question.** Your procedure is set up exactly like I was trained, that yes, you go there ("transition"), but then you read the first Caution/Note and it says "if you're here because of operator action (like the all-faulted AOP sent you here) then don't do anything, and exit." So, have you ***transitioned*** to H.1? I think you have, but at minimum **we need to fix the Distractor Analyses** for A & B 2nd Parts, at the end where it says, "**no transition is required**." Because in C & D we say "**transition** is required." Distractor Analyses revised. Thanks. mgd, 9/18 I think we're on solid ground for RO knowledge on this because the 60gpm is in a Caution, and not just detailed step knowledge of Step 2. mgd, 9/18 **Q is SAT**															
19	H	2												M	S	**001AA2.03** Continuous Rod Withdrawal - Ability to determine and interpret proper actions to be taken if automatic safety functions have not taken place.
	Calling it Modified, not New. Changed to Modified – PK 7/19 Thanks. mgd, 9/18 We need to state that rods are in Auto; someone could assume they're in Manual for the ramp (which they probably would be), then tripping the Rx would be the correct answer. Added "Rod Control in Auto" to initial conditions – PK 7/19 Thanks. mgd, 9/18 The Explanation doesn't "explain" why the answer is correct. How recently was auto-withdrawal disabled? Modification installed Unit 1 fall 2016, Unit 2 in spring 2017 – PK 7/19 Looks good now, thanks. mgd, 9/18 **Q is SAT**															
20	H	4												N	S	**037AG2.4.1** SGTL - Knowledge of EOP entry conditions and immediate action steps.
	I'd like to say that "Letdown ~~is~~ has been isolated," just to make it clearer that AP-16 probably did it (which it did/would've). Changed as noted. Thanks. mgd, 9/18 Very sneaky on the 45 gpm, you would've gotten me on it. That's part of the reason I'm calling this LOD 4. But since we don't give them seal injection and leakoff flows (which would give it away), I want to make sure it's airtight. So, what's the normal range of your seal injection, maybe 8 to 13 gpm? Log spec for Seal Injection flow is 6 – 13 gpm, normally at 2235 psig (NOP) it runs right around 9 gpm. And can it sometimes be expanded to something like 6 to 20? I don't believe we would expand the range beyond our log															

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	spec. I suppose (with engineering) anything is possible. What I'm getting at is: how low could seal injection be before you had to stop RCPs? Actually, per 1-AP-9.00, RCP Abnormal, step 1, we can run without normal seal injection as long as we have Thermal barrier CC flow, and we take action to place Alternate Seal Injection in service. And on the goes-out side, what's the acceptable range for seal leakoff? Seal Leakoff Log spec is 1.5 – 3 gpm. Normally we run at about 2.5 gpm per pump.I want to make sure that ([seal injection] – [seal leakoff]) x 3 will always be greater than the 5gpm we need to get to 50gpm "total" makeup flow. I'm sure it will be, I just don't know your numbers. Even with absolute minimum numbers (6, 1.5) , we would have 4.5gpm/pump x 3 pumps = 13.5 gpm net. 45 gpm + 13.5 gpm = 58.5 gpm. Therefore even with absolute minimum numbers you will still exceed threshold of 50 gpm. Great, thanks. mgd, 9/18 **Q is SAT**															
21	H	3												M	S	**060AA1.01** Accidental Gaseous Radwaste Release - Ability to operate and/or monitor area radiation monitors.
	Is there a technical reason that RI-104 is not correct, other than that a procedure tells you to monitor 131? Two things here: 1) The Explanation says that Step 3 of AP-22 directs 131 to be monitored, but it doesn't; the Entry Conditions sort of tell you to monitor it, but keywords "131" or "MGPI" don't show up anywhere else in AP-22. Changed description to refer to 0-RM-D3, 1-RM-RI-153 High ARP, Step 3; and added ARP to Technical Reference Section – PK 7/19. 2) In the drawing on the last page, what's circled in red at the top right doesn't seem to include 131. Would RM-104 "see" the release? I.e., are dampers 112A&B and 113 normally open, and some of the release could/would go out Vent Stack 1? Changed the picture showing where the individual RMs tap off and added a text box describing that 1-VG-RI-131 A/B/C sample just prior to ventilation release into Vent Stack #2. The picture shows that the 112 A/B Dampers are normally closed, 1-VG-RM-104 would not see the release – PK 7/19. Thanks. mgd, 9/19 **Q is SAT**															
22	F	3												N	S	**068AK2.01** Control Room Evacuation - Knowledge of the interrelations between Control Room Evacuation and the auxiliary shutdown panel layout.
	I'd like to change the question setup a little, specifically to take out the phrase, "and to transfer control to the Aux Shutdown Panel." Maybe I got it right for the wrong reason, but when I read that, and then the question asks about charging flow, I thought, "Well that's something I ought to be able to control (and not just monitor), so let me pick "Aux Shutdown Panel" and NOT "Remote Monitoring Panel"." So that took it down to a 50/50 proposition, which I then nuked out that neutron flux is something you're mostly just going to monitor and not control (granted, you could affect it by borating), so I picked the Remote Monitoring Panel. I think we can do without saying anything about transferring control, because that's Step 16 of FCA-1.00, while Step 15 is what sends people to do FCA-11.00, Remote Monitoring. That seems to me a logical place to essentially ask, "What're you going to see when you get there?" Thoughts? I agree, took out the phrase "and to xfer control." And we should probably state that "MCR Evacuation is in progress IAW 0-FCA-1.00, Limiting MCR Fire," just to make it absolutely clear what procedure they're in. Changed as noted. Thanks. mgd, 9/19 **Q is SAT**															
23	H	3												N	S	**074EA1.10** Inadequate Core Cooling - Ability to operate and monitor the core flood system.
	Seems like a tough question for an RO. You'd almost have to know C.1 from memory, wouldn't you? Technically, the FIRST C.1 action to restore core cooling is to align SI valves and start pumps (Step 2), so we may need to ask that differently. Is Step 7 going to be a problem: wouldn't CETCs be <700F? Saturation temp for 1130# is around 560F, and that should be about the hottest part of the RCS, so probably you'd exit C.1 there? And thus never get to the answer. Here's why I finally called the Q Unsat: **you can't get to RVLIS>63% (at Step 20) until you've first gotten through *two* steps that ask about 2 hot leg temps:** - You can't get past Step 14 until SGs are <200# **and** 2 hot legs <395F. Then you stop depressurizing to do some stuff. - At Step 18 you start dumping steam again. - At Step 19 you check for SI flow. **If you have it**, then you get to go to Step 20, where the answer is. If you don't, you loop back, so that in itself is a problem. - At Step 20 you have to have at least 2 hot legs <350F **before you even get asked** about RVLIS. - So you have to have **both** 2 hot leg temps **and** the RVLIS indication to exit C.1. It's not an either/or, so we can't really ask, "Which one of these tells you that core cooling is restored?" Does all that make sense? After writing this I checked Minutia also, because for an RO I think it is minutia to ask if you need one or two hot leg temps, or do you need just RVLIS, or some combination. Rewrote Question to focus on how secondary is depressurized (Steam Dump or SG PORVs), and purpose for depressurizing the secondary. PK 7/25. I like the new Q, but distractors A2 & D2 are very weak: RCS is at 1130#, and S/Gs are probably at 1035#, riding on the PORVs. So already, "secondary to primary D/P" is 95# the wrong way, and lowering S/G pressure is only going to make it worse. Can we start with RCS pressure much, much lower to help plausibility, without invalidating the question? Ideally RCS P would be 200#, making that choice seem really plausible, but even four or five hundred pounds would help make it believable. mgd, 9/19 Changed initial RCS pressure to 650 psig per telecom - PK 9/20. Thanks. mgd, 9/28 **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
24	F	3												N	S	**076AG2.2.4** High Reactor Coolant Activity - Ability to explain variations in control board / control room layouts, systems, instrumentation, and procedural actions between units.
	Stem, 2nd bullet: does it matter if the SI was Automatic and Manual? No – PK 8/8 Do the exact same things happen? Yes, the same actions occur – PK 8/8. Calling it Fundamental and not Higher Cog, seems to be just knowing two things from memory. Is there something I'm missing? Changed to Memory or Fundamental Knowledge – PK 8/8. Thanks. mgd, 9/19 **Q is SAT**															
25	H	3												N	S	**WE03EK1.2** LOCA Cooldown and Depressurization - Knowledge of the operational implications of normal, abnormal and emergency operating procedures.
	Cuing discussion for Part 1: since the choices in ES-1.2 Step 14.a are normal spray and one PORV, are we kind of steering them to the correct answer by offering the incorrect choice of aux spray? They probably know you almost never want to use aux spray (because of the thermal shock issue), besides the issue of having to stop SI flow, not something you want to do right now. So: with the given conditions, can we say with certainty that the RCPs would be off? If so, I'd say let's give them the choice of normal spray or PORV, and let them rule out spray because there's no RCP to drive it. . Added Bullet with RCS subcooling 20 °F and lowering at Step 6 of E-0; revised CTMT pressure to 19 PSIA and slowly rising; Candidate must assess that RCP Trip Criteria would be met – RCPS secured. Changed Part 1) response to "normal PRZR spray / one PRZR PORV" – PK 8/8. I like it, thanks. mgd, 9/19 Minutia discussion for Part 2: I'm struggling with how fair it is for an RO to know from memory whether the number is 35% or 63%. Can you speak to how an RO is expected to answer this part? The LO doesn't support it. (One could make a case that Part 1 is similar, that you'd need detailed step knowledge to know which one to pick, but you can actually use systems knowledge to rule out normal spray, so it's not quite the same.) Revised Part 2) to test Candidate knowledge of the basic purpose for this initial RCS depressurization and parameter used to determine whether depressurization can be stopped. Plausible that the Candidate could confuse the purpose of Step 14 with the purpose for depressurizing the RCS in Step 23. – PK 8/8. Looks good, thanks. mgd, 9/19 **Q is SAT**															
26	H	3												B	S	**WE08EK1.2** Pressurized Thermal Shock - Knowledge of the operational implications of normal, abnormal and emergency operating procedures.
	D/A A: would you agree that rising T_H with constant pressure would (instead of could) lower subcooling? D/A B: PRZR~~P~~ Good question. Changed as annotated. Thanks. mgd, 9/19 **Q is SAT**															
27	F	3												M	S	**WE15EK3.1** Containment Flooding - Knowledge of facility operating characteristics during transient conditions, including coolant chemistry and effects of temperature, pressure, and reactivity changes and operating limitations and reasons.
	"Boron" in C.1 & D.1 is very easy to rule out, especially when the question is, "What are you sampling for before you move this water?", and "activity" is the other choice. But then I saw the included lesson plan reference, and I'd argue that "boron" is also a correct answer. Granted, we know what we're asking, and you don't need to know the boron concentration before you move the water out of containment into storage, but the fact is that you're probably going to sample for boron and pH *before the water is released*. Not because that's why you sample for boron and pH, just that it would probably happen before that. What if we used the distractor from the Source Q, shutdown margin? I think it's kind of hokey, but I like it better than boron. (What unborated water are they talking about, spray?) You could then change the 1st-part Q to: "Containment sump is sampled to ___", then: "determine the level of activity…" or "ensure SDM is…". Or for another distractor, they could be sampling for dissolved "stuff" that could lead to sump strainer blockage. That's from Generic Safety Issue (GSI)-191, Assessment of Debris Accumulation on PWR Sump Performance, from 2006. I think most people don't realize that that wasn't so much about floating "stuff" (insulation, debris) that mats up on the screens, but rather the dissolved "stuff" (aluminum compounds, calcium phosphate, etc) that can precipitate out and form a kind of gel on that fibrous mat and block off flow entirely. Changed Distractors C1, and D1 to "Total Dissolved Solids". Updated Explanation. I like it. mgd, 9/19 **Q is SAT**															
28	H	3												N	S	**003K5.03** RCPs - Knowledge of the operational implications of the effects of RCP shutdown on T_{ave}, including the reason for the unreliability of T_{ave} in the shutdown loop.
	I don't know why I had Q29 comments here, but you picked up on that, so I moved them down to Q29. I did have a couple of very minor comments on this one: WOOTF 1): Consider changing "Tave Loop A" to "Loop 'A' Tave," to match how it is in 2). I think this is clearly High Cog, so change that on your copy. mgd, 9/19 **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6. Source B/M/N	7. Status U/E/S	8. Explanation
			Stem Focus	Cues	T/F	Cred Dist	Partial	Job-Link	Minutia	# / Units	Back ward	Q – K/A	SRO Only			
29	F	3												N	S	**004A1.07** CVCS - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating CVCS controls, including: maximum specified letdown flow.
	In the very first sentence I think it would be better if we stated that letdown flow orifices are being swapped around, however you guys say that. Something like, "U1 is at 100%. Letdown flow orifice configuration is being changed, when the following occurs:" Added "Letdown flow orifice configuration is being changed" to Stem – PK 8/8 Thanks. mgd, 9/19 Are we sure that the alarm doesn't come in until 130gpm, but resin damage can occur at 120? Doesn't seem like a good design (but makes for a great test question) By procedural requirements letdown flowrate is limited to 120 gpm to prevent resin channeling; the ARP for the alarm for High Flow Rate setpoint is 130 gpm – PK 8/8. Okay then, that's the way it is. mgd, 9/19 **Q is SAT**															
30	F	3												N	S	**004A4.21** CVCS - Ability to manually operate and/or monitor in the control room: letdown demineralizer flow divert valve control switch.
	No comments. **Q is SAT**															
31	H	4												N	S	**005A2.02** RHR - Ability to (a) predict the impacts of a pressure transient protection during cold shutdown, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.
	K/A Match: We're not really hitting the (a) part of the K/A because we tell them that pressure increases and a PORV is going to open. So we've taken all the "predict the impacts" away. But I'm not sure how to fix it. We could ask which PORV would open first, but that's not terribly better, and I'd like to get away from even stating or implying that pressure will increase. Is it plausible at all that pressure would decrease? I can't think of a mechanism for that. Revised Stem and Part 1) and Part 2) responses to query effect of Loss of Instrument Air on RCS pressure while solid on RHR, and which procedure used to address the effect on RHR and the RCS due to the Loss of Instrument Air. – PK 8/9. This new Q squarely hits the K/A, and seems to be good in every other aspect also. mgd, 9/19 **Q is SAT**															
32	F	3												N	S	**006A3.08** ECCS - Ability to monitor automatic operation of the ECCS, including automatic transfer of ECCS flowpaths.
	Do we need to tell them they're at Step 4, does it add anything? You can't get past Step 5 RNO b) until RWST <13% anyway. Agree, step 4 adds no value to question, good comment, removed "step 4." 2nd bullet: should we add "and lowering slowly", since that's what we normally do? Changed as annotated. Thanks. mgd, 9/19 **Q is SAT**															
33	F	3												N	S	**007A3.01** PRT - Ability to monitor automatic operation of the PRT, including components which discharge to it.
	No comments. **Q is SAT**															
34	F	3												N	S	**008K1.01** CCW - Knowledge of the physical connections and/or cause-effect relationships between CCW and SW.
	Credible Distractors: I guessed the 2nd part (may be reopened) by using the "Well since you're asking…" method, combined with the "after 5 minutes" piece. I don't feel strongly enough about it to call the Q Unsat, but it's pretty easy. What if we asked something like: "The valves can be reopened from the MCR (after the alarm condition clears / after a time delay)." The Explanation would still mostly work for that, and it tests if they recall the difference between the Low Canal Level and Hi-Hi CLS logics. . Changed part 2) Question to "The valves(s) can be reopened from the MCR ___(2)____." As recommended. Revised Part 1) to read "Close on a HI-HI CLs in coincidence with a loss of RSST ___(1)___. Choices for part 1) test the Candidate's ability to correlate the RSSTs that are lost to the Blackout signal development for Unit 1 (since these are Unit 1 valves) with the Unit 2 signal. PK 8/9 I like the changes, especially the plausibility of 2 minutes. mgd, 9/19 **Q is SAT**															
35	H	3												M	S	**010A2.01** PZR Pressure Control - Ability to (a) predict impacts of heater failures; and (b) based on those predictions, use procedures to correct, control, or mitigate consequences.
	K/A Match: this is another A.2 where we don't ask them to "predict the impacts", we tell them what's going to happen ("Pressure is 2000# and lowering slowly"). "). Modified Farley, 2013, Question 12 to meet the K/A. – PK 8/29. I like the new Q. Agree with High Cog, no other comments. mgd, 9/19 **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
36	H	2												N	S	**010K6.03** PZR Pressure Control - Knowledge of the effect of a loss or malfunction of PZR sprays and heaters.
	I'm struggling with the plausibility of B & C. I like A because it's at least internally consistent: those 3 things would happen together, but of course only if 1444J had failed HIGH. But in B, a PORV *opens* (suggesting pressure is high), but spray valves *close* (suggesting pressure is low), and heaters turn on (again suggesting low pressure). We've got 3 things that happen when pressure is High/Low/Low, so it's not internally plausible. I can't think of a scenario where that would be the case, so I'd rule out that distractor. (And the DA doesn't even mention the PORV, probably because you can't justify it: "plausible because spray valves close, and heaters energize." Yes, but why would a PORV open? C is even more straightforward: spray valves *open*, but heaters turn *on*? Again, these are opposites and wouldn't occur together from the same failure. And I get the DA, that a "Spray Controller failed would cause these indications to occur," but the heaters energizing would be *caused by* the spray valves opening, and not be an immediate (from the stem) response. I didn't feel so strongly about two distractors being implausible so I didn't call the Q unsat, but we need to fix it. A & B are very similar, so what if we made B look exactly like A, just with 1456 instead of 1455C? As an operator I always struggled to remember which PORV was driven by 444J, and it still gets me sometimes. So both would be wrong because none of that stuff would happen on a Low failure, and B would be doubly wrong because 1444J doesn't drive 1456. What do you think of that? Agree, changed distractor B as noted. The only difference between A and B is the PORV. Updated DA. Thanks. mgd, 9/19 For C, what if we changed heaters to "deenergize," so it's at least internally consistent, is that plausible enough? It's a "this would happen on a High failure" outcome, so it's at least as plausible as A. What do you think of that, or do you have other ideas? Agree, changed distractor C as noted. Distractor C now is based on misconception that controller has failed "a little" high, but not high enough to cause PORV opening. Updated DA. Thanks. mgd, 9/19 **Q is SAT**																
37	F	3												B	S	**012K2.01** RPS - Knowledge of bus power supplies to RPS channels, components, and interconnections.
	No comments on this Bank question. **Q is SAT**															
38	H	3												N	S	**013K6.01** ESFAS - Knowledge of the effect of a loss or malfunction of sensors & detectors.
	Stem 2nd bullet: are the words "and has been declared inoperable" necessary? Less wordiness is generally better. Removed the phrase. Thanks. mgd, 9/19 **Q is SAT**															
39	H	4												N	S	**022G2.4.34** Containment Cooling - Knowledge of RO tasks performed outside the control room during an emergency and the resultant operational effects.
	DA: What are we saying here, that the breaker is in the Normal Swgr Room, but the control switch is somewhere else? Yes, located on the Turbine Bldg Mezz, on a cabinet next to the Chiller. – PK 9/22 If so, could the breaker itself be opened locally without using the c/s? The breaker could be opened at the breaker using a mechanical trip pushbutton – PK 9/22 Or is there *anything* on the breaker that could be construed as a switch? The switch on the breaker face, by design, can only be used to open/close the breaker when the breaker is racked to "Test" – 9/22 You see where I'm going here: the goal is to get the breaker opened; if I can do that *from the breaker*, then who cares where the switch is? Plus it could be argued as Minutia. Not saying it is, but if I can trip the breaker *at the breaker*, and I'm in an AOP, then it is. My thought is, the Step directs the Chiller breaker to be opened from the Chiller Control Panel; the RO/BOP would direct the watchstander to secure the chiller using the Step guidance; if the watchstander reported back that the chiller did not secure using the Control switch, I would expect direction from the RO/BOP to attempt opening the breaker using the mechanical trip pushbutton at the breaker itself; Part 2) of the question essentially takes into account that the mechanical trip was tried but failed; so to remove this load from the RSSTs (which supply the Station Service buses and the Emergency buses when both Units are shutdown) the bus would be tripped to secure this load to ensure adequate voltage to supply the Emergency and remaining Station Service buses. – PK 9/22 Can you trip the breaker at the breaker? mgd, 9/19 As stated above the mechanical trip pushbutton can be used to trip the breaker at the breaker at any time. The breaker switch can be used when breaker is in "Test". In this case the breaker is "jammed closed." Okay, I'm good with it. I think I was conflating the breaker for the Chiller in Part 1 with the breaker for the Bus in Part 2: but since you're asking about the Chiller's breaker, *which is jammed closed and you're not going to get it open*, then it doesn't matter if I can normally trip if from the breaker. Raised LOD to 4. mgd, 9/26 **Q is SAT**																

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6. Source B/M/N	7. Status U/E/S	8. Explanation
			Stem Focus	Cues	T/F	Cred Dist	Partial	Job-Link	Minutia	# / Units	Back ward	Q – K/A	SRO Only			
40	H	3												N	S	**022G2.4.45** Containment Cooling, Ability to prioritize and interpret the significance of each annunciator or alarm.
	I like the question, but it's not really hitting the words of the K/A. I agree that it hits the intent, but there are no "annunciators or alarms" here *related to Containment Cooling*. Are there no alarms associated with the CRDM fans we could list? Airflow, temperature, failed-to-auto-start? If not, at least massage the K/A Match statement to include 1K-G7 (if that's what tells you you've lost power to 60A & F.) Modified K/A Match statement by including 1K-G7 as the key alarm that needs to be interpreted. Thanks. mgd, 9/19 **Q is SAT**															
41	H	3												N	S	**026K2.01** Containment Spray - Knowledge of power supplies to containment spray pumps.
	Minor editorial comments addressed. mgd, 9/19 **Q is SAT**															
42	H	4												N	S	**039K3.05** Main and Reheat Steam - Knowledge of the effect that a loss or malfunction will have on the RCS.
	Stem, 3rd bullet: What do you think about ordering the information this way: **Rx. Pwr Delta T Tave Tref Gen MWe** That puts the two powers together (which you normally compare), the two temperatures you always compare, and then MW. I like it! Changed as annotated. Thanks, the table format looks good too. WOOTF: to get away from the possibility of arguing about timing (5 minutes), what if we asked, "WOOTF parameters would be higher *when steady-state conditions are reached*?" Changed as annotated. Thanks. mgd, 9/19 Simulator snapshots: this is very nitpicky and I apologize, but it's been bugging me. The Initial Conditions aren't *quite* the same as the stem of the question. Is there a reason for that, or that you didn't make the Q conditions match this? Simulator snapshot used was closest to original conditions chosen for the question. I know for the trends we're looking for it doesn't matter, but just in case someone tries to appeal on that. So I'd feel better if would could make the Initial Conditions be 89% power and Tave and Tref 569.7F. Do you see any reason not to? No not really, the only question is for Reactor Power. If the operator uses "board" indications and NIs then he wouldn't be able to discern between 89 and 89.1 due to scale readability. However Rx Thermal Power is a PCS generated number and would read out in tenths. All other parameters can be read as to the tenth position as these are all recorder indicators that would read out in tenths. Changed question IC to match Simulator snapshot. Looks good. mgd, 10/10 **Q is SAT**															
43P	F	3												N	S	**059A4.12** Main Feedwater - Ability to manually operate and monitor in the control room initiation of automatic feedwater isolation.
	Cred. Dist.: I like this question, but there isn't a strong case for the "generator output breakers" being plausible. Not saying they're not, but the discussion in D/As A & B isn't robust, and there's no technical reference supporting it. Stem Focus: It occurred to me while writing the above that someone might argue B is correct like this: generator output breakers open, so turbine trips, so Rx trip breakers open, so MFRVs close once <554F. I know that's a stretch, but we should probably add the concept of "directly" somehow. Modified D/A per recommendation. Suggest changing the stem to something like: "The P-4 signal is generated by a direct input from the ____ breakers being open, and the MFRVs will close when ____." Should go back to 100% IC and just beef up the distractor analysis discussion of generator output breakers. mgd, 3/13. Changed question Stem to match recommended wording. Added to Distractor Analysis for Part 1 of A/B to enhance plausibility. Looks good. mgd, 3/15. **Q is SAT**															
44	H	3												B	S	**059K1.02** MFW - Knowledge of the physical connections and/or cause-effect relationships between MFW and the AFW system.
	Stem Focus: there's a little bit of wiggle room for the "0800" answer choice because at the moment the MFW Pump recirc valve fails to open, the MDAFWPs don't instantly start. As noted in the Explanation, there's a 15s delay before the MFP even trips, and THAT'S what sends a signal to start the MDAFWPs, right? And there's probably no built-in time-delay on that, is there? Just whatever time it takes for the electrons to do their thing. So we can't really say, "At 0800 this happens, and at (exactly) 0800 this happens in response." We have to allow for the 15s. To fix it I first thought, let's put "*shortly after* 0800", but my "shortly after" might be 30s, while someone else's is 5 minutes. So the best I've come up with is: "at 080**1** (these pumps) will ***be running***." Can you think of a better way? Changed part 1 to 0801 and altered question slightly as follows: "…at 0801 ____ pump(s) will be running, and at 0805 ____ pump(s) will be running". Removed word pump(s) from each distractor. Believe this question should still remain a "Bank" question. What do you think? I like the change, and agree it should remain Bank. mgd, 9/20 **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
45	H	3												N	S	**061K5.03** AFW - Knowledge of the operational implications of pump head effects when control valve is shut.
	Stem ICs, 3rd bullet: should we say that this was done IAW ES-0.1? It probably doesn't matter, but just for completeness. mgd, 9/20: I see you added it, thanks. mgd, 9/22 Stem Current Conditions, 2nd bullet is somewhat cueing: "Hey, notice that they've been lowering flow, so since levels are rising, maybe **you** should keep lowering flow." Which points you to "discharge pressure rises" in the 2nd part. Although you do have a good argument in the DA with Heat Sink, 22%, and 540gpm; but even supposing the applicant thought that way, how would he reconcile the crew lowering flow from 200 gpm/SG to 175? He couldn't, so he'd probably reevaluate and dismiss the 540gpm idea. So all that said, **is there any relevant reason for that bullet to be included?** Removed CC second bullet. Thanks. mgd, 9/20 **Q is SAT**															
46	F	3												**B***	S	**061K5.05** AFW - Knowledge of the operational implications of feed line voiding and water hammer. ***Q46 on 2015 NRC Exam**
	Explanation: Do you know why AP-21.01 directs FW-P-2 to be cooled first? Is it because it has a larger pumping capacity than the MDAFWPs, or that it doesn't need electric power to run? I just want there to be some documented technical reason for it, and not find out on appeal that it was just a whim of the procedure writer. No specific documentation could be found, assumed that both reasons listed above for preference of TDAFW pump cooled first is reasonable. – PK 8/22. Well that's interesting. I can let it go, because it's a Note in AP-21.01, and the WOOTF asks "IAW AP-21.01". But after looking at that Note again, I'd like to have the Part 2 question directly mimic it: "If ALL AFW Pumps are vapor bound, ___ AFW Pump(s) should be cooled **FIRST**." mgd, 9/20 Changed Part 2) to read as above. – PK 9/22. Thanks. mgd, 9/27 **Q is SAT**															
47	F	2												M	S	**062A4.04** AC Electrical Distribution - Ability to manually operate and/or monitor in the control room: local operation of breakers.
	Is there really a DC breaker that just feeds that one breaker, and not the whole bus? No, general configuration is that a 125 VDC breaker would power multiple bus loads. And the Part 1 Explanation talks about Control Power fuses blowing, which doesn't match the stem of the Q. Sorry for confusion, intent of question was to lose all control power to breaker. Explanation has been updated. Thanks. mgd, 9/20 Both Parts of the Q are pretty easy, such that the combination is really easy, hence the 1.5 for LOD. But also the X* for Credible Distractors. Part 1: the line voltage through this breaker is 4Kv, right? Yes, this is a 4160 V breaker. Is it really plausible I'm going to think that 4kV is supplying some little light bulbs? Light indication comes from 125 VDC through Trip/Ind fuses. So it is plausible for candidate to think he has power if he believes that trip/ind power comes from separate DC, or he believes that just closing power is affected. He must understand how control power affects breaker and therefore how he can operate the breaker. Sure, it *could* be done with a stepdown transformer, but you've already told me in the Stem that there's DC control power supplied to this breaker, so if I don't know, I'm going to choose that. There are three combinations for losing control power; 1) just lose closing power, 2) just lose trip/ind power, or 3) lose all control power. Okay, I can buy that. mgd, 9/20 Part 2: if I'd forgotten about the charging springs and their motor, I'm told that too in the Stem. So: "Oh yeah, I can close it once, but after that we're going to have to do something about those charging springs." Two scenarios there: 1) I forget about the motor and think the springs "will have to be manually charged," or 2) I know about the motor, but again, would you put DC through it, or 4kV AC? I'd rather ask if the breaker can be closed locally at all: "If the pump were stopped by tripping the breaker locally, then it could/could not be restarted by closing the breaker locally." Something like that, what do you think? Changed as annotated. Thanks, raised LOD to 2. mgd, 9/20 **Q is SAT**															
48	H	3												M	S	**063K1.03** DC Electrical Distribution - Knowledge of the physical connections and/or cause-effect relationships between DC electrical and: battery charger and battery.
	No comments. **Q is SAT**															
49	H	4												N	S	**063K4.04** DC Electrical Distribution - Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for: trips.
	Minor editorial comments addressed. mgd, 9/20 **Q is SAT**															
50	H	4												N	S	**064K4.04** EDG - Knowledge of design feature(s) and/or interlock(s) which provide for: overload ratings.
	Minor editorial comment addressed. mgd, 9/20 **Q is SAT**															
51	H	2												N	S	**073K3.01** Process Radiation Monitoring - Knowledge of the effect that a loss or malfunction of the PRM system will have on radioactive effluent releases.
	No comments. **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6. Source B/M/N	7. Status U/E/S	8. Explanation
			Stem Focus	Cues	T/F	Cred Dist	Partial	Job-Link	Minutia	# / Units	Back ward	Q – K/A	SRO Only			
52	H	3												B	S	**076A1.02** Service Water - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating SWS controls including: reactor and turbine building closed cooling water temperatures.
	Minor editorial comments addressed. mgd, 9/20 **Q is SAT**															
53	H	3												N	S	**076A2.02** Service Water - Ability to (a) predict the impacts of Service water header pressure on SW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.
	Initial Conditions: With the 'A' pump running in Hand, could the 'B' pump also be running in Auto? Like maybe it was running in Auto and then you manually started 'A'? Because Current Conditions has 'B' in Auto and Off, but did it fail to auto start, as the Explanation says, or was it running and then tripped, causing the low pressure? There'd probably be an alarm for that, but the point is, ***if we need to***, we should say in the ICs whether it's running or not. Changed as annotated. Thanks. mgd, 9/20 **Q is SAT**															
54	F	2												M	S	**078K2.01** IA - Knowledge of bus power supplies to: instrument air compressor.
	Minor editorial comments addressed. mgd, 9/20 **Q is SAT**															
55	H	4												N	S	**103A1.01** Containment - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the containment system controls including: containment pressure, temperature, and humidity.
	Could RCS pressure really be 0 psig 1 minute after a LBLOCA? Changed to 10 psig and lowering. With 45 psia in Containment, and with the RCS now communicating with Containment, wouldn't the RCS sensors "see" that pressure? And are you sure that Containment pressure would be lowering already? Changed to 45 psia and slowly rising. Thanks. mgd, 9/20 **Q is SAT**															
56	H	3												N	S	**001A4.03** Control Rod Drive System - Ability to manually operate and/or monitor in the control room: CRDS mode control.
	Do we have to tell them that Power Cabinet 1BD is normal? Is this leading? You can tell them that ALL OTHER Power Cabinets are normal, and even throw in the Logic Cabinets if you want, but not just this specific one. Changed as annotated. Thanks. mgd, 9/20 **Q is SAT**															
57	H	3												N	S	**011A2.03** PZR Level Control - Ability to (a) predict the impacts of loss of PZR level; and (b) based on those predictions, use procedures to correct, control, or mitigate consequences.
	What happens if you pull the input fuses? Essentially, it is the same as de-energizing the detector system, the low level signal would be locked in and the letdown valves could not be opened. Would the low-level interlock be defeated as it is when the output fuses are pulled? No, by pulling the output fuses, the letdown LCVs can be opened from the MCR. If so, there's a subset issue, and at the very least we'd need to add "IAW 1-ECA-3.3". Added "In accordance with" to question Stem. But even if not, I'm thinking this is minutia. ECA-3.3 is a very seldom-used procedure, the step reads "pull Letdown LCV fuses," it's not until you get into the Attachment that you see it's the output fuses, and this is an RO question. Can you argue that it's NOT minutia? The "RK" associated with this Step of ECA-3.3 is covered during Classroom Training on the procedure; the restoration of letdown to regain PRZR pressure control (ECA-3.3) is trained during Simulator Training; SRO Directs have an In-Plant JPM (LC-77.02) that is required to be trained and evaluated during In-Plant Training, ROs would have been trained and evaluated on this Task during NLO training (failure criteria for this JPM is removing the Input vice Output fuses). Since specific fuses to be operated to restore letdown would be briefed by an RO or SRO when an operator is dispatched to perform this task, it is reasonable to assume this knowledge item is not minutia. Wow, VERY thorough explanation, I withdraw the comment! (And lowered LOD to 3.) mgd, 9/20 **Q is SAT**															
58	H	3												N	S	**015K4.01** Nuclear Instrumentation - Knowledge of NIS design feature(s) and/or interlock(s) which provide for: source-range detector power shutoff at high powers.
	C2 & D2 are backwards from how they are in A2 & B2 and I'd like to swap them if it doesn't mess up your answer distribution too much. It goes "one, two" with the 1st part distractor, then "two, one" with the 1st part answer, and normally we do "one, two" "one, two" for both. I just don't want to trip anyone up. Changed. Thanks. mgd, 9/20 **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
59	F	3												N	S	**028K6.01** Hydrogen Recombiner and Purge Control - Knowledge of the effect of a loss or malfunction hydrogen recombiners.
	2 or 3 implausible distractors. I answered this by picking the one safety-related AC bus. A 2nd Chief did the same. We both discounted the two DC choices (though I did like your analogy with the Emerg. Oil Pump), because you're not going to run a Recombiner on DC, and especially not the "A" DC Bus. The other Chief discounted the "A" Station Service Bus because it's not safety-related; I'm on the fence about that one. But regardless, two implausible distractors means it's Unsat. I was leaning toward calling it Unsat on K/A Match, but the other Chief thought that was actually okay. Not great, but okay. He also said you could just directly ask what the power supply is, without all the words that try to tie it to the K/A. Rewrote question to establish scenario with only 1 recombiner available, and ask minimum value of H2 concentration in CTMT where the recombiner can be placed in service. Also changed to Analysis or Comprehension due to requirements of Part 1); determination of plant status and bus power available to power "B" recombiner – PK 8/25. I like the new Q, and it's a better hit on the K/A. Did you mean for the Part 1 distractor to be 4% and not 5? (Because 4% is in the D/A.) And the D/A talks about a 6-8% flammability limit for hydrogen, but I was remembering 4%. So I found a Wikipedia article and another source that said the LFL is 4%, so would you change it to that please? That's a beautiful distractor btw. Raised LOD to 3. Intended part 1) distractor to be 5 so it is similar to correct Minimum H2 concentration but could be chosen if the Candidate fails to note minimum and the factor of ten difference in the numbers. – PK 9/22 I think 5% is a much weaker distractor than 4%. Also I think you originally intended for it to be 4%, as evidenced by the Explanation and Distractor Analyses are still talking about 4%. Combine that with the Lower Flammability Limit of 4% I quoted above, and you have a great distractor. I'd like you to change the A.2 & B.2 distractors to 4%. mgd, 9/27 Changed A2 and B2 to 4%. MM 9/27 Perfect. mgd, 9/28 **Q is SAT**															
60	H	3												N	S	**041A1.02** Steam Dump/Turbine Bypass Control - Ability to predict and/or monitor changes in steam pressure (to prevent exceeding design limits) associated with operating controls.
	Explanation: 4th line talks about the "10°F trip open signal," but DA's B & D have 9°F. Should they be the same? Yes, Corrected – PK 8/24. DA 'B' still has 9%. mgd, 9/20 Clarified Explanation and D/A. Changed Choice D to 32% to make more plausible. MM 9/27/17. Changes look good. mgd, 9/28 **Q is SAT**															
61P	H	3												M	S	**045K5.17** Main Turbine Generator - Knowledge of the operational implications of the relationship between MTC and boron concentration in RCS as T/G load increases.
	Could you raise turbine load from 90 to 100% WITHOUT diluting, letting Tave drag, and still stay in your temperature band? No, rods are near the top so there isn't enough reactivity to reach 100% by themselves. If increased load without diluting Tave would go way outside its band (normal band ± 4-5°F). Thanks. mgd, 3/13 The SimView screenshots are a nice touch, and it's great that you went to the effort to validate the Q. But I note that they're for 9**0**% and 100%, while the Q asks from 9**2**% to 100%. The cleanest thing would be to change the Q to 90-100, to match your data. Because while I think the 20.7# change in pressure and 30ppm change in boron are operationally valid, going to an 8% power change may be on the small side of readability for the P, and repeatability for the sample. If you re-ran the sim data for 8% we might have to talk about significance/observability of the plant effects. Changed Q to 90 to 100%. Perfect. mgd, 3/13 **Q is SAT**															
62	F	3												N	S	**055G2.4.4** Condenser Air Removal - Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal OPs.
	No comments, good Q. **Q is SAT**															
63	H	3												M	S	**056K1.03** Condensate - Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and MFW.
	Editorial comment addressed. mgd, 9/21 **Q is SAT**															
64	H	3												N	S	**072A3.01** Area Radiation Monitoring - Ability to monitor automatic operation of the ARM system, including changes in ventilation alignment.
	The excerpt from ND-93.5-LP-1 is for High alarms; is there a page for Low alarms, which is what the Q is about? Excerpt added to list auto actions that occur, to go with the NOTE: If a monitor fails, the automatic actions associated with that monitor must be verified or performed. – PK 8/24. Thanks. mgd, 9/27 **Q is SAT**															
65	F	2												N	S	**075K3.07** Circulating Water - Knowledge of the effect that a loss or malfunctions of 1circ water system will have on ESFAS.
	I'm struggling a bit with not giving them the alarms for the individual LO LVL Channels (1F-H7, 1F-H8, 2F-H7, 2F-H8), because at least 3 of those would be in, right? I suspect you left them out for the same reason I'm thinking, that if you gave them then you almost give away the 3-of-4 concept. I'm just afraid that someone will make an assumption that it's a spurious alarm and get it wrong. They should ask a question of course, but some won't. And if/when we get asked the question, how do we answer it? Can you noodle on															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
	that? I think the best course of action would be to give them all the alarms that would come in which includes Unit 1 and Unit 2. The operator must still account for the P-7 interlock for Unit 1. I added the additional alarms/Changed IC 1st bullet to include Unit 2 at 100%/Modified P1 by asking for Unit 1 Reactor is/is not tripped. That's a good solution, agree with all your changes. I lowered the LOD to 2 though. mgd, 9/21 **Q is SAT**															
66	F	3												N	S	**G2.1.18** Ability to make accurate, clear, and concise logs, records, status boards, and reports.
	Answer Choices A1 & D1: "Ch Pump bearing temps **is** monitored each hour." I'd rule those out just on syntax. Changed Stem to is/are to avoid syntax conflict. – PK 8/24. Is there any reason not to spell out "Charging" there? Spelled out Charging and Temperatures – PK 8/24. Thanks, I missed "temps". mgd, 9/21 It's pretty easy to pick Delta Flux over Charging Pumps as something you'd monitor hourly, but the Part 2 distractor is very juicy, so I'm saying they cancel each other out. **BUT**, why is that not also a correct answer? From the Explanation: "since this procedure has a mechanism for performing manual calorimetric." I may be erring on the technical side, but with the PCS out of service, the computer calculation for 30 minute average power is lost (this is what is monitored to ensure we are operating at or below Licensed Power level) so the monitoring of reactor power would be performed using PR NI control board indications and trend recorders and recorded on OP-RX-007; OPT-RX-004 would be used as a daily power calculation and the NIs adjusted based upon the result – NIs would be the indication being *monitored*. – PK 8/24 I defer to your judgment. mgd, 9/21 LO doesn't neatly bound the question how I like. Charging Pump bearing temps and Delta Flux I'd say are both Major Actions and fit the LO (or they're part of a single Major Action, "Monitor stuff"), but then we're asking them to choose based on their periodicity, and that concept isn't in the LO. Is there another one that would help? ? I have looked and that is he only objective we have that deals with this topic. – PK 8/24. Okay, thanks for looking. mgd, 9/21 **Q is SAT**															
67	H	4												B	S	**G2.1.37** Knowledge of procedures, guidelines, or limitations associated with reactivity management.
	No comments on this bank question. **Q is SAT**															
68	F	3												B	S	**G2.1.30** Ability to locate and operate components, including local controls.
	Convince me that the usage of 0-AP-12.00 Step 5 RNO isn't appealable. Step 5 RNO is referring to restoration of Ch Pump SW. By the question phrase the student is to understand that restoration of Ch Pump SW is unlikely. As far as the opposite unit unaffected… This is referring to the opposite unit's Ch Pump SW system status, and not the general state of the entire Unit. The fact that the U2 Turbine building is evacuated does not equate to a total loss of all system and capability, only personnel access. It's in the question package as support for both the answer and the distractor, but how do you get past the IF statement: "IF restoration unlikely AND opposite unit unaffected, THEN locally crosstie SW." We don't know anything about the likelihood of restoration, but if we did, it would have to be "unlikely" to get past the AND. • This is a common procedure, but we're running it for Unit 1, yes? So the "opposite unit" would be U2, but it's affected by the steam break, isn't it? So I can't answer Yes to even pair with restoration unlikely and therefore get directed to open SW-443. Am I misunderstanding something? Propose making the following changes: 1) Bullet 1; "Unit 2 has tripped due to a FW Heater Break." (FW htrs located in TB Basement). Bullet no. 2; "Unit 2 TB basement has been evacuated and quarantined for personnel safety." (Limits area that is isolated). Bullet 3: Unit 1 has lost both Ch Pump SW pumps due to elect failure and restoration is unlikely". These changes should not affect integrity of question and K/A that is being tested. As the essential question is what valve do you operate and where is it located? That looks like it should do it, thanks. I like the "quarantined" idea, and adding "restoration is unlikely" addresses my main concern. The K/A is very broad, so it's still hit. mgd, 9/21 **Q is SAT**															
69	F	2												B	S	**G2.2.12** Knowledge of surveillance procedures.
	Plausible Distractors: I can't buy 100**kW/min** plausibility coming from a 100**kVAR** lower limit. Yes, they're both one-hundreds, but you might just as well use 100% full on the Day Tank or some other concept you could think of; the units aren't the same, and the concept of rate isn't the same. 120V isn't supported by the 0-EPT-EG-001 P&Ls included with the question. From the Explanation, that's in Step 6.2.12, but that's not in the package, so please add it. Is the 500kW/min loading rate for #3 EDG the same as for 1 & 2, or is it an oolie for that diesel? This question's already plenty hard, having to recall from memory some pretty abstract numbers that would be in the procedure for you, so if the loading rate for 1 & 2 is different (but the same #), I'd rather use that. And if it's a different rate for every diesel then let's throw the question out.															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
	The 60V distractor, are you sure you can say that's a "typical value" when the button is released too soon? In the recent operator error, did the CR capture that value? Because if you let it go too soon then doesn't the field not flash and voltage pretty quickly decays back to zero? So is there some other basis for the 60? It's not by chance the first tick on the gauge, is it? Or the first numbered one? Propose a new question. Bank question Seabrook 2010 question # 69 (coincidental that is the same #). This question deals with RCS leakage, which is a surveillance that they should be more familiar with. I like it, and of course it still hits the K/A. Do you think we should name the surveillance procedure(s) in the Stem, like the source Q did? Could name both or just one, whichever you thought was a better fit. Changed Stem to "According to surveillance procedure 1-OPT-10.00, Reactor Coolant Leakage-Computer Calculated.." MM 9/25 Perfect. mgd, 9/27 Technical References field currently has just the 10.01 procedure listed. Added 1-OPT-10.00 reference. The LO isn't a very good fit; nothing better available? Added ND-88.1-LP-9 Tech Specs, Objective H. This is where the specific Tech Spec is taught. It is really the combination of the two objectives that match this question: 1) Knowledge of Pressurizer/PRT, and 2) knowledge of Tech Specs. Thanks. mgd, 9/27 K/A Match statement is from the old question. mgd, 9/21 Changed K/A to match question. Looks good, thanks. mgd, 9/27 **Q is SAT**															
70	F	3												N	S	**G2.2.38** Knowledge of conditions and limitations in the facility license.
	Minor editorial comments addressed. mgd, 9/21 **Q is SAT**															
71	H	2												N	S	**G2.2.41** Ability to obtain and interpret station electrical and mechanical drawings.
	I pondered a bit over plausibility of distractors, but what you've got for DA is all true. It's just that I was able to answer the Q by doing a "real-world" analysis: "Closed" for the pump breaker means the pump is running, so would you want to close the suction valve of a running pump? No. Similarly for the valve's switch: is it a throttle valve? No, so why would you have to hold the switch? And the candidates probably know all (or most) of the switches you have to hold. All that said, I called it LOD 2. Minor editorial comments addressed. mgd, 9/25 **Q is SAT**															
72	F	3												M	S	**G2.3.4** Knowledge of radiation exposure limits under normal or emergency conditions.
	Minor editorial comments were addressed. mgd, 9/25 **Q is SAT**															
73	F	3												M	S	**G2.4.12** Knowledge of general operating crew responsibilities during emergency operations.
	WOOTF 1): "The location you will report to…" doesn't really fit with "remain on station." What about something like: "1) Your response to the Site Evacuation Alarm." **Changed as annotated. MM 9/14** Thanks. mgd, 9/25 **Q is SAT**															
74	F	2												N	S	**G2.4.5** Knowledge of the organization of the procedure network for normal, abnormal, and emergency evolutions.
	No comments. **Q is SAT**															
75	H	4												B	S	**G2.4.6** Knowledge of EOP mitigation strategies.
	No comments. **Q is SAT**															
76	H	4												N	S	**011EG2.4.8** Large Break LOCA - Knowledge of how abnormal operating procedures are used in conjunction with EOPs.
	ICs: past-tense and present-tense are mixed. Since it's now 5m later, they should probably be all past tense. "#2 EDG start**ed** and load**ed**", ""#1 & #3 EDGs tripp**ed**", "Crew enter**ed**…" **Changed as annotated. MM 9/14** Thanks. mgd, 10/10 Current Conditions: 1) Should state "Unit 1 RCS pressure". And do we need the leak to be so big that RC S P is already 900# and lowering rapidly? **Changed to "Unit 1", and changed to 1600 psig and lowering slowly.** Thanks. mgd, 10/10															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
	3) Is there a rad monitor in the safeguards area that might be in alarm? I don't want to give them EVERY alarm of course, but if there's a rad monitor that would likely be in alarm we should give them that. **Agree, added "0-RMA-D6, VENT STACK #2 PART ALERT/ HI is Lit." MM 9/14** Thanks. mgd, 10/10 **Q is SAT**															
77**P**	F	3												N	S	**025AG2.2.40** Loss of RHR System – Ability to apply technical specifications for a system.
	This was a pre-look Q and is SAT. **Q is SAT**															
78	H	3												M	S	**026AA2.03** Loss of CCW - Ability to determine and interpret the valve lineups necessary to restart CCW while bypassing the portion of the system causing the abnormal condition.
	Stem Focus: The ICs could better define plant conditions (I realize that the Source Q didn't either). From GOP-2.5 you would come into CSD (<200F, GP-2.6) above 300# (300-325, Step 5.2.9) with a bubble in the PZR. In GP-2.6 you cool down and go solid, at the end being <25#. So by just saying "U1 is in CSD", it could be anywhere from 300# to 0#, and with a bubble or solid. I think it matters because: **Changed stem to clarify RCS pressure and make P1 distractor more plausible. Changed bullet 1 to "Unit 1 is in Refueling Shutdown" with the "B" RHR HX and "B" RHR pump in service. Added new bullet "Refueling Cavity level is 26 feet and stable."** Ok. mgd, 10/10 To rule out the RHR pump seal cooler, don't we have to diagnose that CCW would leak *into* it? And what's CCW header pressure, about 100# maybe? So that's not going to leak into a 300# system, but it would leak into a <25# system. (And btw, say RCS was at 0psig and the leak was in the RHR pump seal cooler: do you think you'd be able to see increased CCW and RHR flows on the meters? On computer points, *maybe*. Do the seal coolers happen to have any flow-restricting orifices or throttle valves?) And could you be draining something to the PRT (see GP 2.6 Step 5.2.29.a) and *that* could be the reason the PDTT pump is running continuously? **By adding Refueling cavity level 26' and stable, we add a new parameter that would change if the RHR pump seal cooler developed a leak. The CC Surge tank contains approximately 2800 gal., and Refueling cavity level would change approximately 750 gal/inch.** ICs: 6th bullet: is the PD Xfer Pump switch in the MCR, or would they need to be told it's running continuously? 7th bullet: "dropping" is a little slangy, please change to "lowering". **Changed as annotated.** 8th bullet: 1K-E7 is entered because it's lit, is that the idea? If so, I'd put it in bullet 3 with the other annunciator, which is where the Source Q had it. Then delete this bullet, because it's covered by the lead-in to CCs. **Changed as annotated.** CCs, 3rd bullet: "continues to ~~drop~~ lower" **Changed as annotated.** D/As A1 & D1: "…Candidate can fail to diagnose indications that…" [or similar] **Changed as annotated.** **Q is SAT**															
79	H	3												N	S	**056AA2.47** LOOP - Ability to determine and interpret proper operation of the EDG load sequencer.
	Stem Focus: If I'm understanding this Q properly, U2 had no AC power from 0702 until 0710, when it got Bus 2J back. **That is correct, U1 and U2 lost offsite power at 0702. EDG 3 supplied 1J because of the SI. U2 had no power to its 2J bus (EDG 3 supplying 1J), and damage in 2H bus supply breaker.** And since the timeline has no later times, "time now" must be 0710. **That is correct.** You won't technically absolutely be "in" SU1 until 0717. And similar for SA1, though I don't know what you'd call it's time-zero. 0702? Or 0710, when you got one bus back? **The clock for SU1 starts at 0702, and ends at 0717. The clock starts for SA1 at 0710 (U2), and ends at 0725. At this time U2 only has one power source.** I know you're wanting to use the "Control Ops report" that restoration will be in 1 to 2 hours to say that you should go ahead and declare SA1, ***but is that absolutely required, in writing?*** Because right now you haven't actually met any of the criteria. How to fix? I didn't like the Control Ops report just 6 minutes after the tornado, so I was going to suggest making it later. Yeah, *maybe* there was a lineman in or near the swyd and he didn't get killed, but he's still recovering from shock a few minutes later, *then* assessing the damage, *then* calling it in. So what if the report from Control Ops came in at or shortly after 15 minutes? SU1 would then clearly apply for both units because you've lost offsite power for >15min, but it's not the correct answer because SA1 now also applies. Thoughts? **Propose that the report from Control Ops comes in at 0717, which is exactly 15 minutes after the tornado. Also propose that Control Ops reports extensive damage to Transformers #1, #2, and 24.5 kv switchyard. This ensures that there is no doubt that power from off-site is not coming back any time soon. This keeps SU1 as plausible but the SRO now must consider that there is extensive damage to the offsite supply to 2J. Unit 2 only has EDG 3 supplying 2J. If that supply is lost then a blackout occurs on U2. Note 3 of the EAL states that the SRO should not wait until the applicable time has elapsed, but make the determination as soon as he has information that states the time limit will be exceeded. Therefore the SRO must declare an SA1. MM 9/14.** WOOTF: "consider both units" is leading. Isn't there always just one SM for both units, and isn't he always responsible for classifications on both units? I'd like to see that taken out. To help the candidate not have a "U1 mindset" you could make the EAL call the first answer choice, and the AFW pump 2nd. Because with the steam-driven AFW pump, as															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
	SM my first priority is the classification, and not how many seconds it's going to take a MDAFWP to start when power is restored (which is the real driver for my AFW concerns anyway). **Changed so that the EAL call is P1 and AFW is P2.** Stem: "Units 1&2 **are** operating at 100% when the following occurr**ed**." Verb tenses are mixed; I'd prefer "were operating when the following occurred" because we're looking back in time at a sequence of events, but you could do "are" and "occurs". **Changed as annotated.** If you go with past tense, then change the time bullets to "SI caused", "tornado touched down", etc. (Is there a reason to capitalize 'tornado' there?) But whichever way you go with, the 0703 bullet needs work: either, "2K-H2 annunciated and an NLO was sent to investigate", or, "2K-H2 annunciates and an NLO is sent". **Changed as annotated.** 0709, 2nd bullet: is "heavy smoke" indicative of a fire? If a candidate called it a fire could it lead to a different Alert classification? If you want to report "no fire" that's okay with me. **Changed as annotated.** K/A Match, the SRO piece: I agree that this is an SRO-only Q, and you show that in the "Part 55 Content" field, but the K/A match last sentence has it being "at the SRO level" because you have to "determine how the Emerg 4160V busses for both units will operate," and that seems to be RO knowledge. It's an SRO question because of the EAL classification, so please put that in there. **Changed as annotated.** Is "CLS" different from "HI-HI CLS"? **Yes, CLS actuates when Containment pressure > 17.7 psia, HI-HI CLS occurs at 23.0 psia. A CLS will initiate the SI sequence. A HI-HI CLS starts Containment Spray pumps.** Because the plausibility of 140 seconds is based on HI-HI CLS, but on p. 3 of the question package, the two excerpts from LP-7, it says "Same as for CLS condition", then goes on to talk about the 10 seconds. If all that's good just say so, you don't have to explain it. **The chart following that reference sums it up best. SI with LOOP: AFW start after 10 sec. delay. Hi-Hi CLS with LOOP: AFW start after 140 sec. delay.** Thanks. mgd, 10/11 **Q is SAT**															
80	H	3													S	**065AG2.4.21** Loss of IA - Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc
	Partial / 2 Correct Answers / No Correct Answer: There may not be a problem, I just want to be sure the Q is tight. When do you start officially monitoring Safety Function Status Trees? I don't see it called out in E-0 Step 4 RNO where you transition to ES-01, or at the beginning of ES-0 (I'm used to seeing it in one of those 2 places). It's probably covered in OP-AP-104, EOPs & AOPs, but I don't seem to have that. I ask because of the timing, and the Q asks what the FIRST FRP is, something the Source Q didn't have. Added Excerpt from OP-AP-104 and ND-95.3-LP-26, CSFSTs, to show that the Candidates are trained that CSFSTs are monitored upon transition from E-0, or when directed by E-0 unless a procedure suspends CSFST monitoring. – PK 9/14. Thanks. mgd, 10/11 So in this scenario the FRVs close and the Rx trips on S/G Lo Level with flow mismatch. You get through E-0 (in what, a minute or less?) Essentially, the SRO monitors E-0 actions, checks off the E-0 IA Steps in E-0, and then announces transition to ES-0.1 and begins a brief, which could take about 2 minutes and go to ES-0.1. Are you monitoring CSFSTs now? Yes, OP-AP-104 has a NOTE that states that the Crew (Team) is responsible for monitoring the CSFSTs if the STA is not present. At the start of the H.3 flowchart you're either > or < 12% S/G levels, doesn't really matter because AFW pumps should be running so you'd meet the TOTAL FW FLOW block. Correct. Pressures are probably <1135psig, and NR levels <75%, so now you're in the "PRESSURE <1085#?" block, the NO output of which is H.4, one of the distractors, *but will probably become a correct answer later*. The YES output takes you to "NR LEVEL IN ALL >12%?" If NO, then you get to H.5, the correct answer, but if YES, then the CSF is satisfied and there's *no correct answer*. So: ***assuming AFW flow*, would you have H.5 entry conditions when you start monitoring Status Trees? ?** Added Screenshots from Classroom Simulator to show that SG NR levels are all offscale low 2 minutes after the reactor trip. – PK 9/14 Fair enough, thanks. mgd, 10/11 Q Source: calling this Modified based on the scope of changes made to the Watts Bar source Q (you even say Modified in the Q Source field). Changed to Modified – PK 9/14. Thanks. mgd, 10/11 **Q is SAT**															
81	H	3												M	S	**WE04EA2.1** LOCA Outside Containment - Ability to determine and interpret facility conditions & selection of appropriate procedures during abnormal & emergency operations.
	K/A Match: "Candidate must assess unit conditions ~~given in stem~~ after a LOCA outside containment and…" Modified as described. - PK 9/14. Thanks. mgd, 10/11 **Q is SAT**															
82P	H	3												N	S	**003AA2.03** Dropped Control Rod - Ability to determine and interpret using in-core/ex-core instrumentations, in-core or loop temperature measurements.
	Good Q, you got me on the aspect that we're not doing the 1-hour action to reduce power <75% first, because we're already there. So I think that makes picking the correct answer a bit harder, because if you don't reduce power, then why go on and reduce the trip setpoint? But you still have to, right? **Yes, Per TS 3.12.C.3.c; power shall be reduced to < 75% and Hi Neutron flux setpoint shall be reduced to ≤ 85% within 4 hours.** Good. mgd, 3/13															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
	I'm sure you've validated that D4 affects mostly just NI-43 as shown? I.E., if you dropped D4 in the sim (starting at what, about 65% power?) would the NIs look like this? mgd, 3/13 A copy of simulator data was added as a question reference. mgd, 3/16 Explanation: Describe how you can rule out it being a failed CERPI. If it were just a CERPI failure, would you have the "Any Rod On Bottom" light, or the "Rod-to-Rod Deviation"? D/As A.1 & B.1: Make more specific as to what you'd have to miss to diagnose it incorrectly. Tie it into what you add to the Explanation. mgd, 3/13 **A failed CERPI would not cause a deflection in N-43 as indicated in the question. A failed CERPI would not cause any NI change. Changed Explanation, A1, and B1 to reason why dropped rod is correct (N-43 drop). Modified D/A so that everything from Q that would appear for both Rod Drop and CERPI failure is written. MM 3/14.** Thanks. mgd, 3/15 **Q is SAT**															
83	H	3												N	S	**028AA2.03** Pressurizer Level Control Malfunction - Ability to determine and interpret charging subsystem flow indicator and controller.
	K/A Match / SRO Only: The 2nd-part question doesn't match the K/A, and since that's the SRO piece, the Q is unsat. The K/A is about PZR level malfunction and its effect on the charging flow controller. Yes, level affects the heaters by turning them off (or on), but that has nothing to do with their emergency power supply and basis. 2 Implausible Distractors: "to ensure RCS not solid when criticality is achieved" is easily dismissed. The fact that 125kW of heaters is covered in TS tells you it's safety-related, and going critical for commercial operation is not a safety function, and if Surry is like most, then the heaters are on non-E busses normally and you have to go through some gyrations to get 125kW on an E bus. If a candidate remembers either of those two things they can rule out this distractor. **Per phone call (9/14), propose changing Part 2 to a question pertaining to a TS parameter that is affected by this Pressurizer Level Malfunction – Pressurizer pressure. Changed Part 2 to asking how long Pressurizer pressure can stay below its limit.** The change fixes the SRO-only part of the question. mgd, 10/11 **Q is SAT**															
84	H	3												N	S	**068AG2.4.31** Control Room Evacuation - knowledge of annunciator alarms, indications, or response procedures.
	Q History, Last 2 NRC Exam: "~~YES /~~ NO". For New questions you could even leave that field blank if you wanted. **I understand, for now prefer to leave field as written since we've answered that question for entire exam. For future exams, we understand that we can leave the field blank.** Okay. mgd, 10/11 **Q is SAT**															
85	H	3												M	S	**WE09EG2.1.23** Natural Circulation Operations - Ability to perform specific system and integrated plant procedures during all modes of plant operation.
	No comments.															
86	H	3												N	S	**003A2.04** Reactor Coolant Pump System - Ability to (a) predict the impacts of fluctuation of VCT pressure on RCP seal injection flow, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.
	0810: Why would all charging pumps be running? Some kind of auto-start? Because it would be prudent to stop and preserve 1 or 2 until a suction source was reestablished. **Charging pumps will auto start if: Low charging header pressure - < 1176 psig, SI, UV, and all other charging pump breakers open. So in this scenario VCT ruptured causing discharge header pressure to degrade (along with other parameters).** Thanks for the explanation. mgd, 10/11 0845: What TS? Could you put it in the Explanation? Is it 3.0.3 for no operable high-head SI pumps that drives the 8-hour notification? **Our version of TS 3.0.3 is TS 3.0.1, and yes, that is basically the case. TS 3.2.C, and TS 3.3.B cannot be met with operator action. And at our plant that would be a 6-hour clock.** Thanks. mgd, 10/11 WOOTF 1): I think we should tighten this up because of AP-9 Caution 1 about seal or bearing temps reaching operating limits in 1 to 2 hours. So I'd like to put a time element into it, maybe something like, "Immediately after E-0 Immediate Operator Actions are complete, AP-9 (does/does not) **require** RCPs to be stopped." I'd also like to emphasize "require" (bold or underline or both) so they don't miss it and think, "Well, it would be a good *idea* to stop them." **Changed as annotated.** Looks good. mgd, 10/11 And more likely you'd do a controlled shutdown rather than trip, wouldn't you? I'm just afraid that the trip muddies the water, so what if we said, "The crew has commenced a S/D to comply with TS", would that change anything? The Part 2 distractor would still be viable, and then you're clearly just in AP-9 and nothing else, but the NRC notification piece still works. What do you think? **We agree, changed 0845 entry to "The Crew initiates a plant shutdown to comply with Technical Specifications."** You did exactly what I asked, but did that introduce some possible confusion? At 0845 we have the crew initiating a shutdown, and the next thing is WOOTF 1), "Immediately after E-0 IAs are complete…" I think I can make it work in my head (you do a General Procedure shutdown up to the point where it trips the reactor, then you do E-0, is that how it would work?), but will we confuse people? Is there a better way to handle that? mgd, 10/11															
87	H	3												N	S	**012A2.06** RPS - Ability to (a) predict the impacts of failure of RPS signal to trip the reactor, and (b) based on those predictions, use procedures to correct, control, or mitigate.

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	Is 40# realistic for one faulted S/G? I know you have to get to Adverse Containment to make the question work, is that 20#? If 40# is realistic, then leave it. But if not, reduce to something closer to 20. Added screenshot to show that CTMT pressure is close to 40# when SG blows down and AFW isolated. – PK 9/14. Thanks. I keep forgetting that you guys do containment pressure in psia, so that's really only about 25 psig. mgd, 10/11 D/A's A2 & B2: Could you flesh those out to include how someone could confuse the criteria, what mistake they might make? Modified D/As, candidate could assume that emergency boration and control rod insertion that eventually cause reactor power to lower < 5% meet the intent of the alert block. PK 9/14. Good, thanks. mgd, 10/11 **Q is SAT**															
88	H	3												N	S	**039G2.4.9** Main and Reheat Steam System - Knowledge of low power/shutdown implications in accident (e.g., LOCA or loss of heat removal) mitigation strategies.
	You smashed this K/A. IC2: should we give the instrument number/name? Added A/E RM Mark Number – PK 9/14. Thanks. mgd, 10/11 Stem Focus: in the Current Conditions we should probably give trends for those 3 parameters. Especially RCS pressure, so you could answer E-3 Step 22.c correctly to get the answer. The table of S/G parameters has trends, so it kind of stands out that these don't. Added "and lowering to RCS parameters – PK 9/14. Thanks. mgd, 10/11 Proposed Answer: delete verbiage after "A". Deleted – PK 9/14. **Q is SAT**															
89	H	3												N	S	**076G2.4.41** Service Water - Knowledge of the emergency action level thresholds and classifications.
	IC3: Is this "Secondary tagout" important to the question? Changed to Main Steam tagout. Will they know what it means? Candidate must assess whether tag-out can be removed to allow RCS temperature control by steaming to the condenser; steam via the SG PORVs would maintain RCS temperature at ~250 °F. – PK 9/14 How does flooding in the U1 Turbine building and closing two U1 SW valves affect U**2** RHR? ? Unit 1 SW valves supply the CCHXs which are common to both Units, CC is providing the heat sink for the Unit 2 RHR system – PK 9/14 A picture would help better explain that. Added the picture to question references – PK 9/14 And add to the Explanation. I guess I didn't think of this before, but should we give the noun names for SW-102A&B? mgd, 10/11 Proposed answer: delete words after "A". Corrected – PK 9/14. ✓															
90	F	3												M	S	**103G2.1.32** Containment - Ability to explain and apply system limits and precautions.
	Stem, 3rd bullet: make "Temperature" lower case. ("pressure" right below it is lower case.) **Changed as annotated.** A2 & C2: please add an "s" to the end of "leak rate". Reads better, and that's how it is in the Bases. **Changed as annotated.** Question Source: the Part 2 distractor was changed also, so might as well take credit for it. **Changed as annotated.** Thanks for all. mgd, 10/11 **Q is SAT**															
91	H	4												N	S	**001A2.19** Control Rod Drive - Ability to (a) predict the impacts of axial flux distribution, and (b) based on those predictions, use procedures to correct, control, or mitigate.
	IC2: "rods 168 steps" and "H14 122 steps" both read kind of funny. Consider adding "are/is at" or similar. Corrected to read "rods at 168 steps, rod at 122 steps" – PK 9/14. ✓ CC2: "Control rod H14" CC3: make "Rod" lower case. – Corrected PK 9/14. ✓ Stem: to avoid going into the next day and making the math needlessly harder, what if we backed up the "begin recovery" time so that the end time is on the same calendar day? 0600 or earlier would work. And I'd go ahead and just make it a round hour like that, just to make it a bit simpler. Changed to 0500 and modified times to 2200/1600 – PK 9/14. Thanks. mgd, 10/11 Part 1 Answer: 17 hours + *30 minutes*, I guess I'm not seeing that. I agree that 17 hours gets you 34 steps out. And 122 + 34 = 156, which is exactly 12 steps away from 168. So why the extra step (and extra 30m "to have H14 in the 12 step band"? If the TS said a *band* of ± 12, then I could see that, but it reads "within ± 12 steps ***of***" the group. Part 1 Distractor: same argument. I agree with 11 hours if using ± 24 steps, but not the extra step/30m. Changed the times to match the movement of rods to be = 12 or 24 steps – PK 9/14. Thanks. mgd, 10/11 K/A Match: "Candidate must ~~select~~ assess…" Corrected and also corrected D/A Table time for Operable Rod – PK 9/14. Thanks. mgd, 10/11 **Q is SAT**															
92	F	3												N	S	**068G2.3.38** Liquid Radwaste - Knowledge of conditions and limitations in facility license.
	Good creative question, no comments. **Q is SAT**															

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
93P	H	3												N	S	**071A2.05** WGD - Ability to (a) predict the impacts of power failure to ARM & PRM on WGD; and (b) based on those predictions, use procedures to correct, control, or mitigate.
	Not SRO-only, because there's no "procedure selection": 1) you just stay in the current ARP to be successful (which might be OK for some questions), but 2) ROs are expected to know AOP entry conditions, so an RO could rule out the 0-AP-5.21 answer choice. And the 1st-part question is systems knowledge, so the question is not at the SRO level. **Changed Part 2 to Tech Spec Basis for Waste Gas Storage as an understanding of the limits and what they are based on provides mitigation of an uncontrolled release of this tank. Added TS basis to references.** Good change, and definitely makes it SRO. You added a markup of TS 3.11 Basis to the question's reference documents, but also need to add it to the "Technical Reference" field. mgd, 3/14. **Added Tech Spec to Tech References field.** Perfect, thanks. mgd, 3/15 **Q is SAT**															
94	F	3												N	S	**G2.1.28** Knowledge of the purpose and function of major system components and controls.
	Stem: do we need the U1 information? No, removed it. Also changed all Unit references to Unit 1 in the question (i.e., 1-FW-P-2). – PK 9/14. Thanks. mgd, 10/11 WOOTF 1: Which "Feed Pressure" light you were talking about was confusing to me at least, so I wouldn't mind if you put the picture of the switch from p. 4 of the package there. And then in the Q refer to it by its label, "FEED PRESS". If you don't want to put the picture, then still I'd refer to it as "the FEED PRESS red light above the switch," and I'd change it to something like "should light" or "should be lit when". (Is that all it takes, that one switch, to light off the TDAFWP? Added picture to question stem and changes stem to read FEED PRESS, and added "should be LIT" – PK 9/14. Much better, thanks. mgd, 10/11 And in the Q: "…is started the ~~feed pressure~~ Feed Pressure light…" Fixed – PK 9/14. WOOTF 2: is **1**-CN-TK-1 correct? Yes Proposed Answer: delete words after "D". Corrected – PK 9/14 D/A C.1 has those 2 sentences repeated. Should look like the A.1 block. Corrected – PK 9/14. Thanks for all. mgd, 10/11 **Q is SAT**															
95	F	3												N	S	**G2.1.42** Knowledge of new and spent fuel movement procedures.
	Explanation: please add at the end, "will be established within 45 minutes IAW AP-22.01." **Changed as annotated. MM 9-21** Thanks. mgd, 10/11 **Q is SAT**															
96P	F	4												N	S	**045K5.17** Main Turbine Generator - Knowledge of the operational implications of the relationship between MTC and boron concentration in RCS as T/G load increases.
	You nailed the K/A, but it's almost minutia, this requirement from a very seldom-used Operating Procedure that's more restrictive than Tech Specs. I've never had to deal with loop stops, but I picked "1 SRNI" because it seemed to be appropriate, and indeed it is by TS. The second part is pretty easy, because as I rationalized, you never know how long a fill evolution like that is going to go, so if it went >2 hours you'd be stuck. And is the 2 SRNIs thing true for any loop, and not just an oolie for "A"? **Yes, both SRNI channels must be operable for fill of any loop.** OK. mgd, 3/14 Explanation: I'd like to see these two additions: "IAW 1-OP-RC-16, both SR channel N31 & N32 are required…," and: "TS-3.17 requires only "A Channel" of SR…" Just to make it absolutely clear that the OP requires 2 and TS only 1. You've got "IAW the OP" in the stem, so it's a fair enough question. **Made the annotated changes to the explanation to clarify that 1-OP-RC-16 requires both SR channels to be operable, while TS 3.17 only requires one channel to be operable.** Thanks, looks good. mgd, 3/15 **Q is SAT**															
97	F	3												M	S	**G2.2.39** Knowledge of less than or equal to one hour TS action statements for systems.
	I don't care for the "modification" of this question: you've essentially cut the 2014 Q in half, only asking its 2nd part, and then splitting the original answer and distractor from their bases and making a 2x2 of those 4 pieces of information. Which leads us to: Credible Distractors: The interplay of the two parts of Choice B isn't plausible, because Delta Flux has no effect on or tie to SDM. The interplay in C is actually not bad, so I can't make a case for 2 implausible, but with B dead we can't have a 2x2 with these 4 bits of information. If you want to use the 2014 question that's okay with me (but I haven't evaluated the number of Bank Qs yet.) It would still hit the K/A. In fact, you could take the Bases stuff out of the answer choices because it's the same in each pair, and isn't needed for the K/A. **We agree. Changed to Bank Question as written from 2014 exam, and took out Bases portion of Part 2. This changed the Bank questions used on the SRO exam from 8% to 12% which is well within the limit of 75%. Will re-submit ES-401-6 with updated numbers.** Thanks. In Current Conditions, last bullet, "thermalled" is somewhat slangy. Would it be accurate to say that the MOV's *breaker tripped on thermal overload*? And should we give the noun names for CH-1113A & 228? mgd, 10/11															
98P	H	4												M	S	**G2.3.7** Radiation Control - Ability to comply with RWP requirements during normal or abnormal conditions.

Q	1. LOK F/H	2. LOD (1-5)	3. Psychometric Flaws: Stem Focus	Cues	T/F	Cred Dist	Partial	4. Job Content Flaws: Job-Link	Minutia	# / Units	Back ward	5. Other: Q – K/A	SRO Only	6. Source B/M/N	7. Status U/E/S	8. Explanation
	WOOTF 2): Because the phrase "Manager RP and Chemistry" is in all 4 answer choices, we should move it to the stem. Essentially we're asking if the Site VP needs to sign or not, so what if we rephrased to: "In addition to the Department Manager and the Manager, Radiological Protection and Chemistry, must the Site Vice President approve the dose upgrade?" Or: "…Site VP is/is not required to approve the upgrade." **Changed part 2 as annotated.** Looks good. mgd, 3/14 Question Source: Listed as New, but also says it came from Catawba, so is it really a Bank question? (Or maybe Modified, but sounds like not.). **Changed to Modified Bank as the stem, part 1, and part 2 was modified. It bears a "resemblance" to Catawba but asks different questions entirely.** Agree it's Modified. I didn't have the Source Q before, but see you've added it. mgd, 3/14 If I missed this Q, this would be the basis of my appeal: VPAP-2101 says I can get up to 2R at my home site and 3R from all licensees before needing any kind of extension or upgrade. Worker 1 had 1163mR, some from North Anna, and some from Surry. Let's say 1000 of that was from Surry. Now when he gets an additional 1225 for this job he's gone over 2R *dose at Surry*. Are we absolutely certain he doesn't need an upgrade for exceeding 85% of the 2R Surry limit? Are you positive that once he gets some dose from another site that his new Admin limit becomes 3R, *and the 2R Surry limit essentially goes away?* If not, a way to bound that would be to state in the stem that his Surry dose is, for example, 400mR, and his North Anna dose is 763 (those add up to the original 1163mR). Then when he gets 1225mR on this job he doesn't exceed 85% of the 2R Surry limit (1700mR), so no one could argue that. Thoughts? **To bound this question, changed the dose such that worker #2 will start out with 800mr which will result in him exceeding 2000mr, the VPAP-2101 limit (6.3.3), also greater than the 85% Admin limit of 1700mr. Left Worker #1 dose the same but split it between Surry (400), and North Anna (763). Worker #1 doesn't exceed the Surry limit (1700/2000mr) or the All Sites limit (2550/3000mr).** Changes all look good. That was a good catch on Worker 2, because it's not so much that he needs an upgrade to exceed 85% of 2R, but that he really needs an upgrade to exceed 2R. I'd missed that nuance before. mgd, 3/14 **Q is SAT**															
99	H	3												N	S	**G2.4.35** Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.
	K/A Match: The Q is in the EOPs, and there's a local action *about to take place*, but there's no "resultant operational effect." The AO doesn't **do** anything, so I don't think it meets the K/A. Stem Focus* and Partial*: There's no clean place to put this, but I'm not sure the correct answer is correct. **Can** you use 0-FCA-15.00? I note that its Entry Conditions are "Transition from … FCA-1 and/or FCA-17", yet no fire was given in the stem. Sure, an SRO could *decide* to use it for guidance (using whatever site process that entails), but I don't think it's fair (or correct) to use on a test question. Anyway, it would probably just be Skill-of-the-Craft, wouldn't it? "Hey Joe, we need you to go press the "Close" button on the 'B' LHSI Pump breaker." Because isn't that all he's doing, pushing a button? Not charging springs or racking in or anything? So does he really need "guidance"? IC 2: "At step 4 of 1-E-0 the RO reports…" And isn't the expectation that he attempt to start 'A' when he recognizes it didn't auto-start? So why 10m later are we finally starting it? Maybe he attempted to start it but it wasn't successful, and they think trying at the breaker might work? CC1: Would annunciator K-A-7, Battery System 1A Trouble, be in? CC2: Is AP-10.06 designated Concurrent Use with the EOPs? (It was at Robinson.) **Submitted new question. Changed Question as follows: P1 "Preferred method for local operation of SG Porvs. P2 reason for stopping depressurization at 300 psig. See separate Q 99 comments.** Concur with the new question. A few editorial comments marked up in the Q and sent back. mgd, 10/11															
100	F	2												N	S	**G2.4.27** Knowledge of the lines of authority during implementation of the emergency plan.
	Explanation: "…at Step 8 ~~or~~ of EPIP-1.01." Corrected – PK 9/14. Technical Reference: E-Plan is at least Rev. 63. Corrected – PK 9/14. Thanks. mgd, 10/11 **Q is SAT**															