Administrative Documents

VOGTLE EXAM 2002-301
50-424 AND 50-425

NOVEMBER 26, &
DECEMBER 2 - 13, 2002

FINAL RO/SRO WRITTEN EXAM OUTLINES

Facility: Vogtle Date of Examination: 11/26/02, 12/02 - 13/02

Examinations Developed by: Facility (Operating) / NRC (Written)

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

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

[ ] Applies only to examinations prepared by the NRC.

Facility: Vogtle Date of Examination: 11/26/02, 12/02-13/02

Item	Task Description	Initials a	Initials b*	Initials c#
1. WRITTEN	a. Verify that the outline(s) fit(s) the appropriate model per ES-401.	K O'D		
	b. Assess whether the outline was systematically and randomly prepared in accordance with Section D.1 of ES-401 and whether all K/A categories are appropriately sampled.	K O'D		
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	K O'D		
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.	K O'D		
2. SIM	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, and major transients.			KO'D
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity; ensure each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s)*, and scenarios will not be repeated over successive days.			KO'D
	c. To the extent possible, assess whether the outline(s) conform(s) with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D.			KO'D
3. W/T	a. Verify that: (1) the outline(s) contain(s) the required number of control room and in-plant tasks, (2) no more than 30% of the test material is repeated from the last NRC examination, (3)* no tasks are duplicated from the applicants' audit test(s), and (4) no more than 80% of any operating test is taken directly from the licensee's exam banks.			KO'D
	b. Verify that: (1) the tasks are distributed among the safety function groupings as specified in ES-301, (2) one task is conducted in a low-power or shutdown condition, (3) 40% of the tasks require the applicant to implement an alternate path procedure, (4) one in-plant task tests the applicant's response to an emergency or abnormal condition, and (5) the in-plant walk-through requires the applicant to enter the RCA.			KO'D
	c. Verify that the required administrative topics are covered, with emphasis on performance-based activities.			KO'D
	d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on successive days.			KO'D
4. GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.			KO'D
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.			KO'D
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.			KO'D
	d. Check for duplication and overlap among exam sections.			KO'D
	e. Check the entire exam for balance of coverage.			KO'D
	f. Assess whether the exam fits the appropriate job level (RO or SRO).			KO'D

	Printed Name / Signature	Date
a. Author	(Written) Kathleen O'Donohue / Kathleen O'Donohue	11/20/02
Author	(Operating) Al Sweat / Al Sweat	12-1-02
b. Facility Reviewer (*)	(Operating) Dan Scukanec / Dan Scukanec	12-1-02
c. NRC Chief Examiner (#)	(Written) George Hopper / George Hopper	11/22/02
NRC Chief Examiner (#)	(Operating) Kathleen O'Donohue / Kathleen O'Donohue	11/22/02
d. NRC Supervisor	Michael Ernstes/ Michael E. Ernstes	11/22/02

Note: * Not applicable for NRC-developed examinations.
Independent NRC reviewer initial items in Column "c;" chief examiner concurrence required.

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of 12/2/02 (11/25/02 12/9/02) as of the date of my signature. I agree that I will not knowingly divulge any information about these examinations to any persons who have not been authorized by the NRC chief examiner. I understand that I am not to instruct, evaluate, or provide performance feedback to those applicants scheduled to be administered these licensing examinations from this date until completion of examination administration, except as specifically noted below and authorized by the NRC.Furthermore, I am aware of the physical security measures and requirements (as documented in the facility licensee's procedures) and understand that violation of the conditions of this agreement may result in cancellation of the examinations and/or an enforcement action against me or the facility licensee. I will immediately report to facility management or the NRC chief examiner any indications or suggestions that examination security may have been compromised.

2. Post-Examination

To the best of my knowledge, I did not divulge to any unauthorized persons any information concerning the NRC licensing examinations administered during the week(s) of 12/9/02 (11/25/02 12/2/02). From the date that I entered into this security agreement until the completion of examination administration, I did not instruct, evaluate, or provide performance feedback to those applicants who were administered these licensing examinations, except as specifically noted below and authorized by the NRC.

	PRINTED NAME	JOB TITLE / RESPONSIBILITY	SIGNATURE (1)	DATE	SIGNATURE (2)	DATENOTE
1.	D. SCUKANEC	SR. OPS INSTRUCTOR		10-18-02		12-12-02
2.	M. Gibson	Simulator Coordinator		10-22-02		12-12-02
3.	AC Sweat	Instructor / HL-12		10-22-02		12-12-02
4.	Thad N. Thompson	Instructor - LORQ		11-8-02		12-11-02
5.	Lewis P. Vannier	Instructor - /HL-12, NLO		11-11-02		12-12-02
6.	TOM E. TYNAN	OPS MGR -		11-22-02		12-12-02
7.	John M. Randolph	Sr Plant Eng.		12/2/02		12-12-02
8.	Kay S. Smith	Sr. Secretary		12/2/02		12/12/02
9.	Timothy L. Harris	Instructor / HL-12		12-9-02		12-12-02
10.	Mick Youmans	Simulator Engineer		12-9-02		12-13-02
11.	Charlton Salter	Instructor		12/9/02		12-12-02
12.						
13.						
14.						
15.						

NOTES:

Facility: Vogtle Date of Examination: 12/02/02
Examination Level (circle one): ISRO/ USRO Operating Test Number: _____

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	CONDUCT OF OPERATIONS	Shift Manning Requirements K/A: G2.1.1, G2.1.4
	CONDUCT OF OPERATIONS	Calculate Boron Addition Following Reator Trip with 3 Stuck Control Rods K/A: G2.1.23
A.2	EQUIPMENT CONTROL	Review Clearance for Containment Spray Pump "A" K/A: G2.2.13
A.3	RADIATION CONTROL	Question Topic - License Requirements for Conducting a Waste Release with Inoperable Instrumentation and Administrative Controls Ensuring Requirements Met. K/A: G2.3.6
		Question Topic - Selection Process for Individuals Performing Emergency Entries into Radiation Fields Resulting in Exceeding Permissible Exposure Limits. K/A: G2.3.4
A.4	EMERGENCY PLAN	Perform an Emergency Action Level Classification and Recommend Protective Actions K/A: G2.4.41, G2.4.44

Facility: Vogtle Date of Examination: 12/02/02

Examination Level (circle one): RO Operating Test Number: _____

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	CONDUCT OF OPERATIONS	Shift Manning Requirement K/A: G2.1.1, G2.1.4
	CONDUCT OF OPERATIONS	Calculate Boron Addition Following Reactor Trip with 3 stuck Control Rods K/A: G2.1.23
A.2	EQUIPMENT CONTROL	Review Clearance for Containment Spray Pump, Train "A" K/A: G2.2.13
A.3	RADIATION CONTROL	Calculate Worker Dose Using Survey Maps K/A: G2.3.4
A.4	EMERGENCY PLAN	Make Emergency Notifications with Failure of the ENN K/A: G2.4.43

Facility: Vogtle Date of Examination: 12/02/02
Exam Level (circle one): USRO Operating Test No.: _____

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a.		
b. Manually Initiate Containment Spray K/A: 026A2.03, 069AA2.02	A, S, M	5
c.		
d. Spurious CIA Response K/A: 002A2.12	S, N	2
e.		
f. Bypass Containment Hi-1 Following a Loss of Heat Sink K/A: 012A4.04	CR,L, D	7
g.		

B.2 Facility Walk-Through

a. Control Pzr Pressure and S/G Level from Shutdown Panel K/A:, 068AA1.03, 068AA1.28	A,N	8
b.		
c Locally Isolate RCP Seals K/A: 003A4.01	D, R	4P

* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA

Facility: Vogtle Date of Examination: 12/02/02
Exam Level (circle one): RO / SRO(I) Operating Test No.: _____

B.1 Control Room Systems

	System / JPM Title	Type Code*	Safety Function
a.	D/G 1A Parallel Operating with Failure of LubeOil K/A: 064A2.01, 064A2.03,	A, S, N, L	6
b.	Manually Initiate Containment Spray K/A: 026A2.03, 069AA2.02	A, S, M	5
c.	Start a Reactor Coolant Pump K/A: 002A1.05	A, S, M, L	4P
d.	Spurious CIA Response K/A: 004A2.12	S, N	2
e.	Initiate RCS Boration using BTRS K/A:004A4.07	D, S	1
f.	Bypass Containment Hi-1 Following a Loss of Heat Sink K/A: 012A4.04	CR, L, D	7
g.	Reduce Containment pressure following a CVI K/A: 029A1.03	CR, S	8

B.2 Facility Walk-Through

a.	Control Pzr Pressure and S/G Level from Shutdown Panel K/A:, 068AA1.03, 068AA1.28	A,N	8
b.	TDAFW Local Manual Control w/o DC power K/A: 061A2.03, 061A2.04	D	4S
c	Locally Isolate RCP Seals K/A: 003A4.01	D, R	4P

* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA

ES-301 Operating Test Quality Checklist Form ES-301-3 (R8, S1)

Facility: VEGP Date of Examination: DEC 2002 Operating Test Number:

	1. GENERAL CRITERIA ①	Initials a	b*	c#
a.	The operating test conforms with the previously approved outline; changes are consistent with sampling requirements (e.g., 10 CFR 55.45, operational importance, safety function distribution).	AS		
b.	There is no day-to-day repetition between this and other operating tests to be administered during this examination.	AS		
c.	The operating test shall not duplicate items from the applicants' audit test(s)(see Section D.1.a).	AS		
d.	Overlap with the written examination and between operating test categories is within acceptable limits.	AS		
e.	It appears that the operating test will differentiate between competent and less-than-competent applicants at the designated license level.	AS		
	2. WALK-THROUGH (CATEGORY A & B) CRITERIA	--	--	--
a.	Each JPM includes the following, as applicable: • initial conditions • initiating cues • references and tools, including associated procedures • reasonable and validated time limits (average time allowed for completion) and specific designation if deemed to be time critical by the facility licensee • specific performance criteria that include: - detailed expected actions with exact criteria and nomenclature - system response and other examiner cues - statements describing important observations to be made by the applicant - criteria for successful completion of the task - identification of critical steps and their associated performance standards - restrictions on the sequence of steps, if applicable	AS		
b.	The prescripted questions in Category A are predominantly open reference and meet the criteria in Attachment 1 of ES-301.	AS		
c.	Repetition from operating tests used during the previous licensing examination is within acceptable limits (30% for the walk-through) and do not compromise test integrity.	AS		
d.	At least 20 percent of the JPMs on each test are new or significantly modified.	AS		
	3. SIMULATOR (CATEGORY C) CRITERIA	--	--	--
a.	The associated simulator operating tests (scenario sets) have been reviewed in accordance with Form ES-301-4 and a copy is attached.	AS		

	Printed Name / Signature	Date
a. Author	Al Sweat / Al Sweat	11-21-02
b. Facility Reviewer(*)	DANIEL SCHKANEC / Daniel Schkanec	11-22-02
c. NRC Chief Examiner (#)	Kathleen O'Donohue / Kathleen O'Donohue	11/22/02
d. NRC Supervisor	Mike Scott / Mike Scott	11/22/02

NOTE: * The facility signature is not applicable for NRC-developed tests.
Independent NRC reviewer initial items in Column "c;" chief examiner concurrence required.

① operating test outline developed by NRC

ES-301 Simulator Scenario Quality Checklist Form ES-301-4 (R8, S1)

Facility: VEGP Date of Exam: DEC 2002 Scenario Numbers: 1, 2, 3 / / Operating Test No.:

QUALITATIVE ATTRIBUTES		Initials a	b*	c#
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	AJ		
2.	The scenarios consist mostly of related events.	AJ		
3.	Each event description consists of • the point in the scenario when it is to be initiated • the malfunction(s) that are entered to initiate the event • the symptoms/cues that will be visible to the crew • the expected operator actions (by shift position) • the event termination point (if applicable)	AJ		
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	AJ		
5.	The events are valid with regard to physics and thermodynamics.	AJ		
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	AJ		
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	AJ		
8.	The simulator modeling is not altered.	AJ		
9.	The scenarios have been validated. Any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.	AJ		
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.4 of ES-301.	AJ		
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	AJ		
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).	AJ		
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	AJ		

TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4.D)		Actual Attributes	--	--	--
1.	Total malfunctions (5-8)	6, 6, 5	AJ		
2.	Malfunctions after EOP entry (1-2)	2, 2, 2	AJ		
3.	Abnormal events (2-4)	4, 5, 4	AJ		
4.	Major transients (1-2)	1, 1, 1	AJ		
5.	EOPs entered/requiring substantive actions (1-2)	2, 2, 2	AJ		
6.	EOP contingencies requiring substantive actions (0-2)	2, 1, 1	AJ		
7.	Critical tasks (2-3)	2, 2, 2	AJ		

ES-301 Simulator Scenario Quality Checklist Form ES-301-4 (R8, S1)

Facility: VEGP Date of Exam: DEC 2002 Scenario Numbers: 4 / / Operating Test No.:

QUALITATIVE ATTRIBUTES		Initials a	b*	c#
		AF		
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	M	AF	(V)
2.	The scenarios consist mostly of related events.	M	AF	(V)
3.	Each event description consists of • the point in the scenario when it is to be initiated • the malfunction(s) that are entered to initiate the event • the symptoms/cues that will be visible to the crew • the expected operator actions (by shift position) • the event termination point (if applicable)	A'	AF	(V)
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	M	AF	(V)
5.	The events are valid with regard to physics and thermodynamics.	M	AF	(V)
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	A'	AF	(V)
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	M	AF	(V)
8.	The simulator modeling is not altered.	M	AF	(V)
9.	The scenarios have been validated. Any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.	M	AF	(V)
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.4 of ES-301.	M	AF	(V)
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	M	AF	(V)
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).	M	AF	(V)
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	M	AF	(V)

TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4.D)		Actual Attributes	--	--	--
1.	Total malfunctions (5-8)	6 / N/A / N/A	M	AF	(V)
2.	Malfunctions after EOP entry (1-2)	2 / /	M	AF	(V)
3.	Abnormal events (2-4)	4 / /	M	AF	(V)
4.	Major transients (1-2)	1 / /	M	AF	(V)
5.	EOPs entered/requiring substantive actions (1-2)	2 / /	M	AF	(V)
6.	EOP contingencies requiring substantive actions (0-2)	1 / /	M	AF	(V)
7.	Critical tasks (2-3)	2 / /	M	AF	(V)

OPERATING TEST NO Scenerio 1, Crew 1, Crew 2, Crew 5.

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1 BOP		RO2 BOP		RO3 BOP		RO4 BO	
RO1	Reactivity	1	1	0						
	Normal	1	1	0						
	Instrument / Component	4	2	2						
	Major	1	1	1						
As RO	Reactivity	1	1	0						
	Normal	0	1	0						
	Instrument / Component	2	2	2						
	Major	1	1	1						
SRO-I 1										
As SRO	Reactivity	0	0							
	Normal	1	1							
	Instrument / Component	2	2							
	Major	1	1							
SRO-U1	Reactivity	0								
	Normal	1								
	Instrument / Component	2								
	Major	1								

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

OPERATING TEST NO Scenario 2, Crew 3

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1 BOP		RO2 BOP		RO3 BOP		RO4 BO	
RO1	Reactivity	1			1					
	Normal	1			1					
	Instrument / Component	4			2					
	Major	1			1					
As RO	Reactivity	1								
	Normal	0								
	Instrument / Component	2								
	Major	1								
SRO-I 1										
As SRO	Reactivity	0			0					
	Normal	1			1					
	Instrument / Component	2			2					
	Major	1			1					
SRO-U1	Reactivity	0				0				
	Normal	1				0				
	Instrument / Component	2				2				
	Major	1				1				

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

OPERATING TEST Scenario 2, Crew 1, Crew 2

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1 BOP		RO2 BOP		RO3 BOP		RO4 BO	
RO1	Reactivity	1				0				
	Normal	1				0				
	Instrument / Component	4				2				
	Major	1				1				
As RO	Reactivity	1			1					
	Normal	0			1					
	Instrument / Component	2			2					
	Major	1			1					
SRO-I 1										
As SRO	Reactivity	0			1					
	Normal	1			1					
	Instrument / Component	2			2					
	Major	1			1					
SRO-U1	Reactivity	0								
	Normal	1								
	Instrument / Component	2								
	Major	1								

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

OPERATING TEST Scenario 3 Crew 4.:

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1 BOP		RO2 BOP		RO3 BOP		RO4 BOP	
RO1	Reactivity	1					1	0		
	Normal	1					1	0		
	Instrument / Component	4					2	2		
	Major	1					1	1		
As RO	Reactivity	1								
	Normal	0								
	Instrument / Component	2								
	Major	1								
SRO-I 1										
As SRO	Reactivity	0								
	Normal	1								
	Instrument / Component	2								
	Major	1								
SRO-U1	Reactivity	0					0			
	Normal	1					1			
	Instrument / Component	2					2			
	Major	1					1			

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

OPERATING TEST Scenario 3 Crew 2

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1 BOP		RO2 BOP		RO3 BOP		RO4 BO	
RO1	Reactivity	1						0		
	Normal	1						0		
	Instrument / Component	4						2		
	Major	1						1		
As RO	Reactivity	1					1			
	Normal	0					1			
	Instrument / Component	2					2			
	Major	1					1			
SRO-I 1										
As SRO	Reactivity	0					0			
	Normal	1					1			
	Instrument / Component	2					2			
	Major	1					1			
SRO-U1	Reactivity	0								
	Normal	1								
	Instrument / Component	2								
	Major	1								

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

OPERATING TEST Scenario 3 Crew3

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1BOP		RO2BOP		RO3BOP		RO4BOP	
RO1	Reactivity	1						0		
	Normal	1						0		
	Instrument / Component	4						2		
	Major	1						1		
As RO	Reactivity	1					1			
	Normal	0					1			
	Instrument / Component	2					2			
	Major	1					1			
SRO-I 1										
As SRO	Reactivity	0								
	Normal	1								
	Instrument / Component	2								
	Major	1								
SRO-U1	Reactivity	0					0			
	Normal	1					1			
	Instrument / Component	2					2			
	Major	1					1			

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

OPERATING TEST Scenario 4 Crew 5

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1 BOP		RO2 BOP		RO3 BOP		RO4 BOP	
RO1	Reactivity	1							1	
	Normal	1							1	
	Instrument / Component	4							2	
	Major	1							1	
As RO	Reactivity	1								
	Normal	0								
	Instrument / Component	2								
	Major	1								
SRO-I 1										
As SRO	Reactivity	0							0	
	Normal	1							1	
	Instrument / Component	2							2	
	Major	1							1	
SRO-U1	Reactivity	0								
	Normal	1								
	Instrument / Component	2								
	Major	1								

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

OPERATING TEST Scenario 4 Crew 1

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1 BOP		RO2 BOP		RO3 BOP		RO4 BOP	
RO1	Reactivity	1								0
	Normal	1								0
	Instrument / Component	4								2
	Major	1								1
As RO	Reactivity	1							1	
	Normal	0							1	
	Instrument / Component	2							2	
	Major	1							1	
SRO-I 1										
As SRO	Reactivity	0							0	
	Normal	1							1	
	Instrument / Component	2							2	
	Major	1							1	
SRO-U1	Reactivity	0								
	Normal	1								
	Instrument / Component	2								
	Major	1								

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

OPERATING TEST Scenario 4, Crew 4

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			RO1 BOP		RO2 BOP		RO3 BOP		RO4 BO	
RO1	Reactivity	1							1	0
	Normal	1							1	0
	Instrument / Component	4							2	2
	Major	1							1	1
As RO	Reactivity	1								
	Normal	0								
	Instrument / Component	2								
	Major	1								
SRO-I 1										
As SRO	Reactivity	0								
	Normal	1								
	Instrument / Component	2								
	Major	1								
SRO-U1	Reactivity	0							0	
	Normal	1							1	
	Instrument / Component	2							2	
	Major	1							1	

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _Dan Scukanec _____

NRC Reviewer: _Kathleen O'Donohue_____

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

Notes:

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

Instructions:

Circle the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author: rfa (Tabulation) Dan Scukanec

NRC Reviewer: Kathleen O'Donohue

Facility: Vogtle Electric Generating Plant | Date of Exam: 11/26/02 | Exam Level: RO

Item Description					Initial a	Initial b*	Initial c#
1.	Questions and answers technically accurate and applicable to facility				(R)	N/A	RR
2.	a. NRC K/As referenced for all questions b. Facility learning objectives referenced as available				(C)	N/A	RR
3.	RO/SRO overlap is no more than 75 percent, and SRO questions are appropriate per Section D.2.d of ES-401				(C)	N/A	RR
1.	Question selection and duplication from the last two NRC licensing exams appears consistent with a systematic sampling process						RR
5.	Question duplication from the license screening/audit exam was controlled as indicated below (check the item that applies) and appears appropriate: X the audit exam was systematically and randomly developed; or __ the audit exam was completed before the license exam was started; or __ the examinations were developed independently; or __ the licensee certifies that there is no duplication; or __ other (explain)				(C)	N/A	RR
6.	Bank use meets limits (no more than 75 percent from the bank at least 10 percent new, and the rest modified); enter the actual question distribution at right	Bank: ~~49~~ (C) 48	Modified: 13	New: ~~28~~ (R) 39	(C)	N/A	RR
7.	Between 50 and 60 percent of the questions on the exam (including 10 new questions) are written at the comprehension/analysis level; enter the actual question distribution at right	Memory: 48	C/A: 52		(C)	N/A	RR
8.	References/handouts provided do not give away answers				(C)	N/A	RR
9.	Question content conforms with specific K/A statements in the previously approved examination outline and is appropriate for the Tier to which they are assigned; deviations are justified				(C)	N/A	RR
10.	Question psychometric quality and format meet ES, Appendix B, guidelines				(C)	N/A	RR
11.	The exam contains 100, one-point, multiple choice items; the total is correct and agrees with value on cover sheet				(C)	N/A	RR

	Printed Name / Signature	Date
a. Author	Kathleen O'Donohue / Kathleen O'Donohue	10/29/02
b. Facility Reviewer (*)	N/A	
c. NRC Chief Examiner (#)	George Hopper / George Hopper	11/18/02
d. NRC Regional Supervisor	Michael Ernstes / Mike Ernstes	11/21/02

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

Facility: Vogtle Electric Generating Plant | Date of Exam: 11/26/02 | Exam Level: SRO

Item Description					Initial a	Initial b*	Initial c#
1.	Questions and answers technically accurate and applicable to facility				(R)	N/A	RR
2.	a. NRC K/As referenced for all questions b. Facility learning objectives referenced as available				(R)	N/A	RR
3.	RO/SRO overlap is no more than 75 percent, and SRO questions are appropriate per Section D.2.d of ES-401				(R)	N/A	RR
1.	Question selection and duplication from the last two NRC licensing exams appears consistent with a systematic sampling process						RR
5.	Question duplication from the license screening/audit exam was controlled as indicated below (check the item that applies) and appears appropriate: X the audit exam was systematically and randomly developed; or __ the audit exam was completed before the license exam was started; or __ the examinations were developed independently; or __ the licensee certifies that there is no duplication; or __ other (explain)				(R)	N/A	RR
6.	Bank use meets limits (no more than 75 percent from the bank at least 10 percent new, and the rest modified); enter the actual question distribution at right	Bank: ~~46~~ 47	Modified: 13	New: ~~39~~ 40	(R)	N/A	RR
7.	Between 50 and 60 percent of the questions on the exam (including 10 new questions) are written at the comprehension/analysis level; enter the actual question distribution at right	Memory: 44	C/A: 56		(R)	N/A	RR
8.	References/handouts provided do not give away answers				(R)	N/A	RR
9.	Question content conforms with specific K/A statements in the previously approved examination outline and is appropriate for the Tier to which they are assigned; deviations are justified				(R)	N/A	RR
10.	Question psychometric quality and format meet ES, Appendix B, guidelines				(R)	N/A	RR
11.	The exam contains 100, one-point, multiple choice items; the total is correct and agrees with value on cover sheet				(R)	N/A	RR

	Printed Name / Signature	Date
a. Author	Kathleen O'Donohue/ Kathleen O'Donohue	10/29/02
b. Facility Reviewer (*)	N/A	
c. NRC Chief Examiner (#)	RR George Hopper / George F. Hopper	11/18/02
d. NRC Regional Supervisor	MET Michael Ernstes/ Michael E. Ernstes	11/21/02

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

Facility:	Date of Exam:	Exam Level: RO/SRO		
		Initials		
	Item Description	a	b	c
1.	Clean answer sheets copied before grading	KO	N/A	MA
2.	Answer key changes and question deletions justified and documented	KO N/A		MA
3.	Applicants' scores checked for addition errors (reviewers spot check > 25% of examinations)	KO		MA
4.	Grading for all borderline cases (80% +/- 2%) reviewed in detail	KO		MA
5.	All other failing examinations checked to ensure that grades are justified	KO N/A		N/A
6.	Performance on missed questions checked for training deficiencies and wording problems; evaluate validity of questions missed by half or more of the applicants	KO	↓	MA

	Printed Name / Signature	Date
a. Grader	Kathleen O'Donohue / Kathleen O'Donohue	12/16/02
b. Facility Reviewer(*)	N/A	
c. NRC Chief Examiner (*)	George T. Hopper / George T. Hopper	12/16/02
d. NRC Supervisor (*)	MICHAEL E. ERNSTES / Michael E. Ernstes	12/16/02

(*) The facility reviewer's signature is not applicable for examinations graded by the NRC; two independent NRC reviews are required.

VOGTLE

	Task Description	Date Complete
1.	Facility written exam comments or graded exams received and verified complete	12/12/02
2.	Facility written exam comments reviewed and incorporated and NRC grading completed, if necessary	NO COMMENTS 12/16/02 N/A (KO)
3.	Operating tests graded by NRC examiners	12/9/02
4.	NRC Chief examiner review of written exam and operating test grading completed	12/19/02
5.	Responsible supervisor review completed	12/26/02
6.	Management (licensing official) review completed	12/26/02
7.	License and denial letters mailed	1/6/03
8.	Facility notified of results	12/20/02
9.	Examination report issued (refer to NRC MC 0610)	1/10/03
10.	Reference material returned after final resolution of any appeals	N/A (KO)

Facility: Vogtle Date of Exam: Exam Level: RO

Tier	Group	K/A Category Points											Point Total	
		K 1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G *		
1. Emergency & Abnormal Plant Evolutions	1	2	3	4				0	5			2	16	16
	2	4	3	1				5	1			3	17	17
	3	1	0	1				1	0			0	3	3
	Tier Totals	7	6	6	0	0	0	6	6	0	0	5	36	36
2. Plant Systems	1	3	1	2	3	3	3	2	2	0	2	2	23	23
	2	3	1	3	1	1	1	3	1	2	2	2	20	20
	3	1	1	1	1	1	0	0	1	1	0	1	8	8
	Tier Totals	7	3	6	5	5	4	5	4	3	4	46	51	51
3. Generic Knowledge and Abilities		Cat 1			Cat 2			Cat 3			Cat 4		13	13
		3			3			3			4			

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-4	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1		1					AK2.02 Knowledge of interrelationship between stuck rods and breakers, relays, disconnects, and control room switches (CFR 41.7, 45.7)	2.5/2.6	R
000015/17 RCP Malfunctions / 4	1						AK1.02 - Consequences of an RCPS failure(CFR 41.8 / 41.10 / 45.3)	3.7/4.1	B
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					1		EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments. (CFR: 43.5 / 45.13)	3.4/3.8	B
000024 Emergency Boration / 1		1					AK2.01 - Valves - (CFR 41.7 / 45.7)	2.7/2.7	B
000026 Loss of Component Cooling Water / 8			1				AK3.01 - Knowledge of the reasons for the following responses as they apply to the Loss of CCW: The conditions that will initiate the automatic opening and closing of the SWS isolation valves to the CCWS collers (CFR 41.5,41.10 / 45.6 / 45.13)	3.2/3.5	B
000027 Pressurizer Pressure Control System Malfunction / 3			1				AK3.03 - Actions contained in EOP for PZR PCS malfunction (CFR 41.5,41.10 / 45.6 / 45.13)	3.7/4.1	B
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4						1	AG2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry level conditions for EOPs and AOPs (CFR 41.10, 43.2, 45.6	4.0/4.3	B
CE/A11; W/E08 RCS Overcooling - PTS / 4					1		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	3.4/4.2	R
000051 Loss of Condenser Vacuum / 4					1		AA2.02 - Conditions requiring reactor and/or turbine trip (CFR: 43.5 / 45.13)	3.9/4.1	R
000055 Station Blackout / 6			1				EK3.02 - Actions contained in EOP for loss of offsite and onsite power (CFR 41.5 / 41.10 / 45.6 / 45.13)	4.3/4.6	B
000057 Loss of Vital AC Elec. Inst. Bus / 6					1		AA2.18 - Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: The indicator, valve, breaker, or damper position which will occur on a loss of power (CFR: 43.5 / 45.13)	3.1/3.1	R
000062 Loss of Nuclear Service Water / 4						1	AG2.4.24 - Knowledge of loss of cooling water procedures. (CFR: 41.10 / 45.13)	3.3/3.7	B
000067 Plant Fire On-site / 9	1						AK1.02 - Fire fighting (CFR 41.8 / 41.10 / 45.3)	3.1/3.9	B
000068 (BW/A06) Control Room Evac. / 8			1				AK3.18 - Knowledge of the reasons for the following responses as they apply to the Control Room Evacuation: Actions contained in EOP for control room evacuation emergency task. (CFR 41.5,41.10 / 45.6 / 45.13)	4.2/4.5	B
000069 (W/E14) Loss of CTMT Integrity / 5		1					AK2.03 - Personnel access hatch and emergency access hatch (CFR 41.7 / 45.7)	2.8/2.9	B
000074 (W/E06&E07) Inad. Core Cooling / 4					1		EA2.2 - Ability to determine and interpret the following as they apply to the (Saturated Core Cooling) Adherence to appropriate procedures and operations within the limitations in the facility's license and amendments. (CFR 43.5 / 45.13)	3.3/3.9	R
BW/E03 Inadequate Subcooling Margin / 4									
000076 High Reactor Coolant Activity / 9									

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1								Form ES-401-4
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:	2	3	4	0	5	2	Group Point Total: 16		16

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-4	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1	1						AK1.05 - Knowledge of the operational implications of the following concepts as they apply to Continuos Rod Withdrawal: Effects of turbine-reactor power mismatch on rod control (CFR: 41.8 / 41.10 / 45.3)	3.5/3.8	B
000003 Dropped Control Rod / 1						1	G2.4.49 - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)	4.0/4.0	B
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1									
BW/A01 Plant Runback / 1									
BW/A04 Turbine Trip / 4									
000008 Pressurizer Vapor Space Accident / 3	1						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: Thermodynamics and flow characteristics of open or leaking valves (CFR 41.8 / 41.10 / 45.3)	3.2/3.7	B
000009 Small Break LOCA / 3					1		EA2.39 - Ability to determine or interpret the following as they apply to a small break LOCA: Adequate core cooling. (CFR 43.5 / 45.13)	4.3/4.7	R
000011 Large Break LOCA / 3		1					EK2.02 Knowledge of the inter-relationship LB LOCA and pumps	2.6/2.7	B
W/E04 LOCA Outside Containment / 3									
BW/E08; W/E03 LOCA Cooldown/Depress. / 4		1					EK2.2 - Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility. (CFR: 41.7 / 45.7)	3.7/ 4.0	B
W/E11 Loss of Emergency Coolant Recirc. / 4				1			EA1.3 - Desired operating results during abnormal and emergency situations. (CFR: 41.7 / 45.5 / 45.6)	3.7/4.2	B
W/EO1 & E02 Rediagnosis & SI Termination / 3	1						EK1.2 - Normal, abnormal and emergency operating procedures associated with (Reactor Trip or Safety Injection / Rediagnosis). (CFR: 41.8 / 41.10 / 45.3)	3.4/4.0	R
000022 Loss of Reactor Coolant Makeup / 2						1	AG2.1.32 - Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	3.4/3.8	B
000025 Loss of RHR System / 4		1					AK2.02 - LPI or Decay Heat Removal/RHR pumps (CFR 41.7 / 45.7)	3.2/3.2	B
000029 Anticipated Transient w/o Scram / 1				1			EA1.13 - Manual trip of main turbine (41.8/41.10/45.3)	4.1/3.9	B
000032 Loss of Source Range NI / 7	1						AK1.01 - Effects of voltage changes on performance (CFR 41.8 / 41.10 / 45.3)	2.5/3.1	B
000033 Loss of Intermediate Range NI / 7									
000037 Steam Generator Tube Leak / 3			1				AK3.07 - Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: Actions contained in EOP for S/G tube leak (CFR 41.5, 41.10 / 45.6 / 45.13)	4.2/4.4	B
000038 Steam Generator Tube Rupture / 3									
000054 (CE/E06) Loss of Main Feedwater / 4						1	EG2.4.48 - Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions. (CFR: 43.5 / 45.12)	3.5/ 3.8	B

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-4	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4				1			EA1.3 - Desired operating results during abnormal and emergency situations. (CFR: 41.7 / 45.5 / 45.6)	3.8/4.2	B
000058 Loss of DC Power / 6									
000059 Accidental Liquid Radwaste Rel. / 9				1			AA1.01 - Radioactive-liquid monitor (CFR 41.7 / 45.5 / 45.6)	3.5/3.5	B
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7				1			AA1.01 - Ability to operate and / or monitor the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Automatic actuation (CFR 41.7 / 45.5 / 45.6)	3.6/3.6	R
W/E16 High Containment Radiation / 9									
CE/E09 Functional Recovery									
K/A Category Point Totals:	4	3	1	5	1	3	Group Point Total: 17		17

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3							Form ES-401-4	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2									
000036 (BW/A08) Fuel Handling Accident / 8									
000056 Loss of Off-site Power / 6	1						AK1.01 - Principle of cooling by natural convection CFR 41.8 / 41.10 / 45.3)	3.7/4.2	R
000065 Loss of Instrument Air / 8				1			AA1.03 - Restoration of systems served by instrument air when pressure is regained (CFR 41.7 / 45.5 / 45.6)	2.9/3.1	B
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2									
W/E13 Steam Generator Over-pressure / 4			1				EK3.2 - Normal, abnormal and emergency operating procedures associated with (Steam Generator Over pressure). (CFR: 41.5 / 41.10, 45.6, 45.13)	2.9/3.3	R
W/E15 Containment Flooding / 5									
K/A Category Point Totals:	1	0	1	1	0	0	Group Point Total: 3		3

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 1											Form ES-401-4		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive	1											K1.05 Knowledge of the physical connections and/or cause-effect relationship between the CRDS and the following systems: NIS and RPS (CFR 41.2 to 41.9 / 45.7 to 45.8)	4.5/4.4	B
003 Reactor Coolant Pump								1				A2.02 Conditions which exist for an abnormal shutdown of an RCP in comparison to a normal shutdown of an RCP (CFR: 41.5 / 43.5/ 45.3 / 45/13)	3.7/3.9	R
004 Chemical and Volume Control				1								K4.04 Knowledge of CVCS design features and interlocks that provide for manual/automatic transfers of controls (CFR 41.7)	3.2/3.1	R
004 Chemical and Volume Control					1							K5.04 Knowledge of the operational implications of the following concepts as they apply to the CVCS: Reason for hydrogen cover gas in VCT (oxygen scavenge) (CFR: 41.5/ 45.7)	2.8/3.2	R
004 Chemical and Volume Control								1				A2.12 Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedure to correct, control, or mitigate the consequences of those malfunctions or operations: CIAS, SIAS (CFR: 41.5 / 43.5 / 45.3 / 45.5)	4.1/4.3	B
004 Chemical and Volume Control										1		A4.07Ability to manually operate and/or monitor in the control room: Boration/dilution. (CFR: 41.7 / 45.5 to 45.8)	3.9/3.7	B
013 Engineered Safety Features Actuation						1						K6.01 Knowledge of the effect of a loss or malfunction on the sensors and detectors will have on the ESFAS (CFR 41.7, 45.5 to 8)	2.7/3.1	R
013 Engineered Safety Features Actuation		1										K2.01 ESFAS/safeguards equipment control (CFR: 41.7)	3.6/3.8	B
015 Nuclear Instrumentation											1	G2.2.12 Knowledge of surveillance procedures (CFR 41.10, 45.13)	3.0/3.4	R
015 Nuclear Instrumentation				1								K4.06 Reactor trip bypasses (CFR: 41.7)	3.9/4.2	B
015 Nuclear Instrumentation					1							K5.04 Knowledge of the operational implication of the following concepts as they apply to the NIS: Factors affecting accuracy and reliability of calorimetric calibrations. (CFR: 41.5 / 45.7)	2.6/3.1	B
017 In-core Temperature Monitor			1									K3.01 Natural circulation indications (CFR: 41.7 / 45.6)	3.5/3.7	B
022 Containment Cooling														
025 Ice Condenser														

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 1												Form ES-401-4	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
025 Ice Condenser														
056 Condensate	1											K1.03 - MFW (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.6/2.6	B
059 Main Feedwater						1						K6.09 Effect of loss of MFW pump and flow regulating valves	2.4/2.6	B
059 Main Feedwater				1								K4.19 Knowledge of MFW design Features and / or interlocks that provide for automatic feedwater isolation of MFW (CFR 41.7)	3.2/3.4	R
059 Main Feedwater										1		A4.11 - Recovery from automatic feedwater isolation (CFR: 41.7 / 45.5 to 45.8)	3.1/3.3	B
061 Auxiliary/Emergency Feedwater					1							K5.01 Knowledge of the operational implications of the relationship between AFW flow and RCS heat transfer (41.5, 45.7)	3.6/3.9	R
061 Auxiliary/Emergency Feedwater							1					A1.04 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: AFW source tank level. (CFR: 41.5 / 45.5)	3.9/3.9	B
068 Liquid Radwaste	1											K1.07 - Sources of liquid wastes for LRS (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.7/2.9	B
068 Liquid Radwaste						1						K6.10 Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwaste System: Radiation monitors. (CFR: 41.7 / 45.7)	2.5/2.9	R
071 Waste Gas Disposal			1									K3.05 Knowledge of the effect that a loss of the waste gas disposal will have on ARM and PRM (CFR 41.7, 45.6)	3.2/3.2	B
072 Area Radiation Monitoring							1					A1.01 Predict/monitor changes in radiation levels to prevent exceeding design limits (CFR 41.5, 45.5)	3.4/3.6	B
072 Area Radiation Monitoring											1	G2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR41.7)	3.2/3.3	B
	3	1	2	3	3	3	2	2	0	2	2	Group Point Total: 23		23

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 2												Form ES-401-4
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant					1							K5.10 Operational implications of relationship between reactor power and RCS differential temperature (CFR 41.5, 45.7)	3.6/4.1	B
006 Emergency Core Cooling	1											K1.07 Knowledge of the physical connections and/or cause-effect relationship between the ECCS and the following systems: MFW system. (CFR 41.2 to 41.9 / 45.7 to 45.8)	2.9/3.3	B
006 Emergency Core Cooling							1					A1.11 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: Boron concentration. (CFR 41.5 / 45.5)	3.1/3.4	B
010 Pressurizer Pressure Control			1									K3.01 Knowledge of the loss of PZR PCS on RPS (CFR 41.7, 45.6)	3.8/3.9	B
011 Pressurizer Level Control									1			A3.03 Ability to monitor automatic operation of PZR LCS including: Charging and letdown (CFR 41.7 / 45.5)	3.2/3.3	B
012 Reactor Protection						1						K6.10 Effect of loss of permissive circuits on RPS (CFR 41.7, 45.5)	3.3/3.5	B
014 Rod Position Indication										1		A4.01 Rod selection control (CFR: 41.7 / 45.5 to 45.8)	3.3/3.1	B
016 Non-nuclear Instrumentation			1									K3.02 Knowledge of the effect that a loss or malfunction of the NNIS has on PZR LCS	3.4/3.5	R
026 Containment Spray							1					A1.01 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Containment pressure (CFR: 41.5 / 45.5)	3.9/4.2	B
029-Containment Purge	1											K1.02 Knowledge of the physical connections and/or cause-effect relationship between the Containment Purge System and the following systems: Containment radiation monitor	3.6/3.8	R
033 Spent Fuel Pool Cooling											1	G2.4.18 Knowledge of the specific bases for EOPs (CFR 41.10 / 45.13)	2.7/3.6	R
035 Steam Generator	1											K1.09 Cause / effect between S/G and RCS (CFR 41.2 - 9, 45.7 - 8)	3.8/4.0	B
039 Main and Reheat Steam							1					A1.03 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MRSS controls including: Primary system temperature indications, and required valves, during main steam system warm-up. (CFR 41.5 / 45.5)	2.6/2.7	B
055 Condenser Air Removal			1									K3.01 Knowledge of the effect that a loss or malfunction of the CARS will have on the following: Main condenser. (CFR 41.7 / 45.6)	2.5/2.7	R

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 2												Form ES-401-4	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
062 AC Electrical Distribution									1			A3.05 Ability to monitor automatic operation of the ac distribution system, including: Safety related indicators and controls. (41.7 / 45.5)	3.5/3.6	B
063 DC Electrical Distribution														
064 Emergency Diesel Generator		1										K2.03 Knowledge control power power supplies (CFR41.7)	3.6/3.9	B
073 Process Radiation Monitoring								1				A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedure to correct, control, or mitigate the consequences of those malfunctions or operations: Erratic or failed power supply. (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.5/2.9	R
075 Circulating Water										1		A4.01 Ability to operate/monitor emergency / essential SWS pumps (CFR41.7, 45.5 - 8)	3.2/3.2	B
079 Station Air				1								K4.01 Knowledge of SAS design feature and cross-connection with !AS (CFR41.7)	2.9/3.2	B
086 Fire Protection											1	G2.4.25 Knowledge of fire protection procedures (CFR 41.10 / 45.13)	2.9/3.4	B
K/A Category Point Totals:	3	1	3	1	1	1	3	1	2	2	2	Group Point Total: 20		20

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 3												Form ES-401-4	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal					1							K5.03 Operational effects of reactivity effects of RHR fill water (CFR41.5, 45.7)	2.9/3.1	R
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water	1											K1.02 Knowledge of the physical connections and/or cause-effect relationship between the CCWS and the following systems: Loads cooled by CCWS. (CFR: 41.2 to 41.9 / 45.7 to 45.9)	3.3/3.4	R
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
034 Fuel Handling Equipment				1								K4.01 Design features and interlocks which provide fuel protection from binding and dropping (CFR41.7)	2.6/3.4	B
041 Steam Dump/Turbine Bypass Control			1									K3.04 Effect of a malfunction of the SDS has on reactor power (CFR41.7, 45.6)	3.5/3.4	B
045 Main Turbine Generator									1			A3.05 Ability to monitor auto operation of the MT/G system, including: Electrohydraulic control. (CFR 41.7 / 45.5)	2.6/2.9	B
076 Service Water		1										K2.08 Power supplies to ESF-actuated MOV (CFR 41.7)	3.1/3.3	B
078 Instrument Air											1	G2.4.11 Knowledge of abnormal conditions procedures (CFR 41.10, 43.5, 45.13)	3.4/3.6	R
103 Containment								1				A2.03 Predict impact and use procedures to address malfunction of phase A and B isolation (CFR 41.5, 43.5, 45.3, 45.13)	3.5/3.8	R
K/A Category Point Totals:	1	1	1	1	1	0	0	1	1	0	1	Group Point Total: 8		8

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility:	Date of Exam:			Exam Level: RO
Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.3	Knowledge of shift turnover practices	3.0/3.4	B
	2.1.2	Knowledge of operator responsibility during all modes of operation	3.0/4.0	B
	2.1.32	Ability to explain and apply all system limits and precautions	3.4/3.8	B
	2.1.			
	2.1.			
	Total			3
Equipment Control	2.2.3	Knowledge of the design, procedural and operational differences between Units	3.1/3.3	B
	2.2.12	Knowledge of surveillance procedures	3.0/3.4	B
	2.2.22	Knowledge of limiting conditions for operations and safety limits	3.4/4.1	B
	Total			3
Radiation Control	2.3.1	Knowledge of 10 CFR 20 and related facility radiation control requirements	2.6/3.0	B
	2.3.4	Knowledge of radiation exposure limits and contamination control including permissible levels in excess of those authorized	2.5/3.1	B
	2.3.9	Knowledge of the process for performing a containment purge	2.5/3.4	B
	Total			3
Emergency Procedures/ Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps	4.3/4.6	B
	2.4.14	Knowledge of general guidelines for EOP flowchart use	3.0/3.9	B
	2.4.8	Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs	3.0/3.7	B
	2.4.11	Knowledge of abnormal condition procedures	3.4/3.6	B
	Total			4
Tier 3 Point Total RO				13

/ Final

Facility: Vogtle Date of Exam: Exam Level: SRO

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

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final exam must total 100 points.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1							Form ES-401-3
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1	1						AK1.05 - Knowledge of the operational implications of the following concepts as they apply to Continuos Rod Withdrawal: Effects of turbine-reactor power mismatch on rod control (CFR: 41.8 / 41.10 / 45.3)	3.5/3.8	B
000003 Dropped Control Rod / 1						1	G2.4.49 - Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)	4.0/4.0	B
000005 Inoperable/Stuck Control Rod / 1			1				AK3.02 Knowledge of the reason for the following responses as they apply to the Dropped Control Rod: Reactor runback with a dropped control rod (CFR 41.5,41.10 / 45.6 / 45.13)	3.3/3.7	S
000011 Large Break LOCA / 3		1					EK2.02 knowledge of the inter-relationship LB LOCA and pumps	2.6/2.7	B
000011 Large Break LOCA / 3				1			EA1.04 - ESF actuation system in manual (CFR 41.7/45.5/45.6)	4.4/4.4	S
W/E04 LOCA Outside Containment / 3					1		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	3.4/4.3	S
W/EO1 & E02 Rediagnosis & SI Termination / 3	1						EK1.2 - Normal, abnormal and emergency operating procedures associated with (Reactor Trip or Safety Injection / Rediagnosis). (CFR: 41.8 / 41.10 / 45.3)	3.4/4.0	S
000015/17 RCP Malfunctions / 4	1						AK1.02 - Consequences of an RCPS failure(CFR 41.8 / 41.10 / 45.3)	3.7/4.1	B
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					1		EA2.2 - Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments. (CFR: 43.5 / 45.13)	3.4/3.8	B
000024 Emergency Boration / 1		1					AK2.01 - Valves - (CFR 41.7 / 45.7)	2.7/2.7	B
000026 Loss of Component Cooling Water / 8			1				AK3.01 - Knowledge of the reasons for the following responses as they apply to the Loss of CCW: The conditions that will initiate the automatic opening and closing of the SWS isolation valves to the CCWS collers (CFR 41.5,41.10 / 45.6 / 45.13)	3.2/3.5	B
000029 Anticipated Transient w/o Scram / 1				1			EA1.13 - Manual trip of main turbine (41.8/41.10/45.3)	4.1/3.9	B
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - E1cessive Heat Transfer / 4						1	AG2.4.4 ability to recognize abnormal indications for system operating parameters which are entry level conditions for EOPs and AOPs (CFR 41.10, 43.2, 45.6	4.0/4.3	B
CE/A11; W/E08 RCS Overcooling - PTS / 4					1		EA2.1 - Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 43.5 / 45.13)	3.4/4.2	S
000051 Loss of Condenser Vacuum / 4					1		AA2.02 - Conditions requiring reactor and/or turbine trip (CFR: 43.5 / 45.13)	3.9/4.1	S
000055 Station Blackout / 6			1				EK3.02 - Actions contained in EOP for loss of offsite and onsite power (CFR 41.5 / 41.10 / 45.6 / 45.13)	4.3/4.6	B
000057 Loss of Vital AC Elec. Inst. Bus / 6					1		AA2.19 - Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: The the plant automatic actions that will occur on a loss of a vital ac electrical instrument bus (CFR: 43.5 / 45.13)	4.0/4.3	S

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1							Form ES-401-3	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000059 Accidental Liquid RadWaste Rel. / 9				1			AA1.01 - Radioactive-liquid monitor (CFR 41.7 / 45.5 / 45.6)	3.5/3.5	B
000062 Loss of Nuclear Service Water / 4						1	AG2.4.24 - Knowledge of loss of cooling water procedures. (CFR: 41.10 / 45.13)	3.3/3.7	B
000067 Plant Fire On-site / 9	1						AK1.02 - Fire fighting (CFR 41.8 / 41.10 / 45.3)	3.1/3.9	B
000068 (BW/A06) Control Room Evac. / 8			1				AK3.18 - Knowledge of the reasons for the following responses as they apply to the Control Room Evacuation: Actions contained in EOP for control room evacuation emergency task. (CFR 41.5,41.10 / 45.6 / 45.13)	4.2/4.5	B
000069 (W/E14) Loss of CTMT Integrity / 5		1					AK2.03 - Personnel access hatch and emergency access hatch (CFR 41.7 / 45.7)	2.8/2.9	B
000074 (W/E06&E07) Inad. Core Cooling / 4					1		EA2.1 - Ability to determine and interpret the following as they apply to the (Saturated Core Cooling) Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR 43.5 / 45.13)	3.2/4.0	S
BW/E03 Inadequate Subcooling Margin / 4									
000076 High Reactor Coolant Activity / 9					1		AA2.02 Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: Corrective actions required for high fission product activity in RCS. (CFR: 43.5 / 45.13)	2.8/3.4	S
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:	4	3	4	3	7	3	Group Point Total: 24		24

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2							Form ES-401-3
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1				1			EA1.03 - RCS pressure and temperature (CFR 41.7 / 45.5 / 45.6)	4.2/4.1	S
BW/A01 Plant Runback / 1									
BW/A04 Turbine Trip / 4									
000008 Pressurizer Vapor Space Accident / 3	1						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: Thermodynamics and flow characteristics of open or leaking valves (CFR 41.8 / 41.10 / 45.3)	3.2/3.7	B
000009 Small Break LOCA / 3					1		EA2.34 - Ability to determine or interpret the following as they apply to a small break LOCA: Conditions for throttling or stopping HPI. (CFR 43.5 / 45.13)	3.6/4.2	S
BW/E08; W/E03 LOCA Cooldown - Depress. / 4		1					EK2.2 - Knowledge of the operational implicationsFacility'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. (CFR: 41.7 / 45.7)	3.7/4.0	B
W/E11 Loss of Emergency Coolant Recirc. / 4				1			EA1.3 - Ability to monitor / operate to obtain the desired operating results during abnormal and emergency situations during a loss of emerg cool recirc. (CFR: 41.7 / 45.5 / 45.6)	3.7/4.2	B
000022 Loss of Reactor Coolant Makeup / 2						1	AG2.1.32 - Ability to explain and apply all system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)	3.4/3.8	B
000025 Loss of RHR System / 4		1					AK2.02 - Knowledge of the interrelationship of the LPI or Decay Heat Removal/RHR pumps during a loss of RHR (CFR 41.7 / 45.7)	3.2/3.2	B
000027 Pressurizer Pressure Control System Malfunction / 3			1				AK3.03 - Knowledge of the actions contained in EOP for PZR PCS malfunction (CFR 41.5,41.10 / 45.6 / 45.13)	3.7/4.1	B
000032 Loss of Source Range NI / 7	1						AK1.01 - Knowledge of the operational implications of the effects of voltage changes on performance during a loss of SR NI (CFR 41.8 / 41.10 / 45.3)	2.5/3.1	B
000033 Loss of Intermediate Range NI / 7									
000037 Steam Generator Tube Leak / 3			1				AK3.07 - Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: Actions contained in EOP for S/G tube leak (CFR 41.5, 41.10 / 45.6 / 45.13)	4.2/4.4	B
000038 Steam Generator Tube Rupture / 3				1			EA1.04 - Ability to operate and monitor the following as they apply to a SGTR: PZR spray, to reduce coolant system pressure. (CFR 41.7 / 45.5 / 45.6)	4.3/4.1	S
000054 (CE/E06) Loss of Main Feedwater / 4						1	EG2.4.48 - Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions. (CFR: 43.5 / 45.12)	3.5/3.8	B
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4				1			EA1.3 - Ability to obtain desired operating results during abnormal and emergency situations. (CFR: 41.7 / 45.5 / 45.6)	3.8/4.2	B
000058 Loss of DC Power / 6									

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2								Form ES-401-3
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000060 Accidental Gaseous Radwaste Rel. / 9					1		AA2.04 - Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste: The effects on the power plant of isolating a given radioactive-gas leak (CFR: 43.5 / 45.13)	2.6/3.4	S
000061 ARM System Alarms / 7									
W/E16 High Containment Radiation / 9						1	2.3.10 - Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure. (CFR: 43.4 / 45.10)	2.9/3.3	S
000065 Loss of Instrument Air / 8				1			AA1.03 - Ability ot conduct restoration of systems served by instrument air when pressure is regained (CFR 41.7 / 45.5 / 45.6)	2.9/3.1	B
CE/E09 Functional Recovery									
K/A Category Point Totals:	2	2	2	5	2	3	Group Point Total:	16	16

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3							Form ES-401-3	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2					1		AA2.12 - Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Cause for PZR level deviation alarm: controller malfunction or other instrument malfunction. (CFR: 43.5 / 45.13)	3.1/3.5	S
000036 (BW/A08) Fuel Handling Accident / 8									
000056 Loss of Off-site Power / 6	1						AK1.01 - knowledge of the operational implications of the Principle of cooling by natural convection as it applies to LOSP (CFR 41.8 / 41.10 / 45.3)	3.7/4.2	S
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2									
W/E13 Steam Generator Over-pressure / 4			1				EK3.2 -Knowledge of the normal, abnormal and emergency operating procedures associated with (Steam Generator Overpressure). (CFR: 41.5 / 41.10, 45.6, 45.13)	2.9/3.3	S
W/E15 Containment Flooding / 5									
K/A Category Point Totals:	1	0	1	0	1	0	Group Point Total:	3	3

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 1											Form ES-401-3	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive	1											K1.05 Knowledge of the physical connections and/or cause-effect relationship between the CRDS and the following systems: NIS and RPS (CFR 41.2 to 41.9 / 45.7 to 45.8)	4.5/4.4	B
003 Reactor Coolant Pump								1				A2.02 Ability to predict the impact of the following malfunction or operation on the RCPS : Conditions which exist for an abnormal shutdown of an RCP in comparison to a normal shutdown of an RCP (CFR: 41.5 / 43.5/ 45.3 / 45/13)	3.7/3.9	S
004 Chemical and Volume Control								1				A2.12 Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedure to correct, control, or mitigate the consequences of those malfunctions or operations: CIAS, SIAS (CFR: 41.5 / 43.5 / 45.3 / 45.5)	4.1/4.3	B
004 Chemical and Volume Control										1		A4.07Ability to manually operate and/or monitor in the control room: Boration/dilution. (CFR: 41.7 / 45.5 to 45.8)	3.9/3.7	B
013 Engineered Safety Features Actuation		1										K2.01 Knowledge of the power supplies of the ESFAS/safeguards equipment control (CFR: 41.7)	3.6/3.8	B
014 Rod Position Indication										1		A4.01 Ability to manually operate or monitor in the CR the rod selection control (CFR: 41.7 / 45.5 to 45.8)	3.3/3.1	B
015 Nuclear Instrumentation				1								K4.06 Knowledge of the NIS design features and interlocks provided for Reactor trip bypasses (CFR: 41.7)	3.9/4.2	B
015 Nuclear Instrumentation					1							K5.04 Knowledge of the operational implication of the following concepts as they apply to the NIS: Factors affecting accuracy and reliability of calorimetric calibrations. (CFR: 41.5 / 45.7)	2.6/3.1	B
017 In-core Temperature Monitor			1									K3.01 Knowledge of the effect of loss of Natural circulation indications (CFR: 41.7 / 45.6)	3.5/3.7	B
022 Containment Cooling											1	G2.1.27 - Knowledge of system purpose and function. (CFR: 41.7)	2.8/ 2.9	B
025 Ice Condenser														
025 Ice Condenser														
026 Containment Spray							1					A1.01 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including: Containment pressure (CFR: 41.5 / 45.5)	3.9/4.2	B

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 1												Form ES-401-3	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
056 Condensate	1											K1.03 -Knowledge of the physical connection or cause-effect relationship between condensate system and the MFW (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.6/2.6	B
059 Main Feedwater						1						K6.09 Knowledge of the effect of loss of MFW pump and flow regulating valves	2.4/2.6	B
059 Main Feedwater										1		A4.11 - Recovery from automatic feedwater isolation (CFR: 41.7 / 45.5 to 45.8)	3.1/3.3	B
061 Auxiliary/Emergency Feedwater							1					A1.04 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: AFW source tank level. (CFR: 41.5 / 45.5)	3.9/3.9	B
063 DC Electrical Distribution														
068 Liquid Radwaste	1											K1.07 - Knowledge of the sources of liquid wastes for LRS (CFR: 41.2 to 41.9 / 45.7 to 45.8)	2.7/2.9	B
071 Waste Gas Disposal			1									K3.05 Knowledge of the effect that a loss of the waste gas disposal will have on ARM and PRM (CFR 41.7, 45.6)	3.2/3.2	B
072 Area Radiation Monitoring							1					A1.01 Predict/monitor changes in radiation levels to prevent exceeding design limits (CFR 41.5, 45.5)	3.4/3.6	B
072 Area Radiation Monitoring											1	G2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR41.7)	3.2/3.3	B
K/A Category Point Totals:	3	1	2	1	1	1	3	2	0	3	2	Group Point Total:	19	19

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 2												Form ES-401-3	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant					1							K5.10 Knowledge of the operational implications of relationship between reactor power and RCS differential temperature (CFR 41.5, 45.7)	3.6/4.1	B

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 2											Form ES-401-3		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
006 Emergency Core Cooling	1											K1.07 Knowledge of the physical connections and/or cause-effect relationship between the ECCS and the following systems: MFW system. (CFR 41.2 to 41.9 / 45.7 to 45.8)	2.9/3.3	B
006 Emergency Core Cooling							1					A1.11 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: Boron concentration. (CFR 41.5 / 45.5)	3.1/3.4	B
010 Pressurizer Pressure Control			1									K3.01 Knowledge of the loss of PZR PCS on RCS (CFR 41.7, 45.6)	3.8/3.9	B
011 Pressurizer Level Control									1			A3.03 Ability to monitor automatic operation of PZR LCS including: Charging and letdown (CFR 41.7 / 45.5)	3.2/3.3	B
012 Reactor Protection						1						K6.10 Knowledge of the effect of loss of permissive circuits on RPS (CFR 41.7, 45.7)	3.3/3.5	B
016 Non-nuclear Instrumentation														
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029- Containment Purge														
033 Spent Fuel Pool Cooling											1	G2.4.18 Knowledge of the specific bases for EOPs (CFR 41.10 / 45.13)	2.7/3.6	S
034 Fuel Handling Equipment				1								K4.01 Knowledge of the design features and interlocks which provide fuel protection from binding and dropping (CFR 41.7)	2.6/3.4	B
035 Steam Generator	1											K1.09 Knowledge of the cause / effect between S/G and RCS (CFR 41.2 - 9, 45.7 - 8)	3.8/4.0	B
039 Main and Reheat Steam							1					A1.03 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MRSS controls including: Primary system temperature indications, and required valves, during main steam system warm-up. (CFR 41.5 / 45.5)	2.6/2.7	B
055 Condenser Air Removal														
062 AC Electrical Distribution									1			A3.05 Ability to monitor automatic operation of the ac distribution system, including: Safety related indicators and controls. (41.7 / 45.5)	3.5/3.6	B
064 Emergency Diesel Generator		1										K2.03 Knowledge control power power supplies (CFR 41.7)	3.2/3.6	B
073 Process Radiation Monitoring								1				A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedure to correct, control, or mitigate the consequences of those malfunctions or operations: Erratic or failed power supply. (CFR: 41.5 / 43.5 / 45.3 / 45.13)	2.5/2.9	S

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 2												Form ES-401-3	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
075 Circulating Water										1		A4.01 Ability to operate/monitor emergency / essential SWS pumps (CFR 41.7, 45.5 - 8)	3.2/3.2	B
079 Station Air				1								K4.01 Knowledge of SAS design feature and cross Connection with iAS (CFR41.7)	2.9/3.2	B
086 Fire Protection											1	2.4.25 Knowledge of fire protection procedures (CFR 41.0, 43.5, 45.5)	2.9/3.4	S
103 Containment								1				A2.03 Ability to predict impact and use procedures to address malfunction of phase A and B isolation (CFR 41.5, 43.5, 45.3, 45.13)	3.5/3.8	S
K/A Category Point Totals:	2	1	1	2	1	1	2	2	2	1	2	Group Point Total: 17		17

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 3	Form ES-401-3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal					1							K5.03 Knowledge of the operational implications of reactivity effects of RHR fill water (CFR 41.5, 45.7)	2.9/3.1	S
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water														
041 Steam Dump/Turbine Bypass Control			1									K3.04 Knowledge of the effect of a malfunction of the SDS has on reactor power (CFR41.7, 45.6)	3.5/3.4	B
045 Main Turbine Generator									1			A3.05 Ability to monitor auto operation of the MT/G system, including: Electrohydraulic control. (CFR 41.7 / 45.5)	2.6/2.9	B
076 Service Water		1										K2.08 Knowledge of the power supplies to ESF-actuated MOV (CFR 41.7)	3.1/3.3	B
078 Instrument Air														
K/A Category Point Totals:	0	1	1	0	1	0	0	0	1	0	0	Group Point Total:	4	4

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility:	Date of Exam:			Exam Level: SRO
Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.3	Knowledge of shift turnover practices	3.0/3.4	B
	2.1.2	Knowledge of operator responsibility during all modes of operation	3.0/4.0	B
	2.1.14	Knowledge of system status criteria which require the notification of plant personnel	2.5/3.3	S
	2.1.32	Ability to explain and apply all system limits and precautions	3.4/3.8	B
	2.1.			
	2.1.			
	Total			4
Equipment Control	2.2.3	Knowledge of the design, procedural and operational differences between Units	3.1/3.3	B
	2.2.8	Knowledge of the process for determining if the proposed change, test, or experiment involves an unreviewed safety question.	1.8/3.3	S
	2.2.12	Knowledge of surveillance procedures	3.0/3.4	B
	2.2.22	Knowledge of limiting conditions for operations and safety limits	3.4/4.1	B
	2.2.29	Knowledge of SRO fuel handling responsibilities	1.6/3.8	S
	2.2.			
	Total			5
Radiation Control	2.3.1	Knowledge of 10 CFR 20 and related facility radiation control requirements	2.6/3.0	B
	2.3.4	Knowledge of radiation exposure limits and contamination control including permissible levels in excess of those authorized	2.5/3.1	B
	2.3.9	Knowledge of the process for performing a containment purge	2.5/3.4	B
	2.3.8	Knowledge of the process for performing a planned gaseous release	2.3/3.2	S
	2.3.			
	2.3.			
	Total			4
Emergency Procedures/ Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps	4.3/4.6	B
	2.4.14	Knowledge of general guidelines for EOP flowchart use	3.0/3.9	B
	2.4.8	Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs	3.0/3.7	B
	2.4.11	Knowledge of abnormal condition procedures	3.4/3.6	B
	2.4.			
	Total			4
Tier 3 Point Total (RO/SRO)				17