Facility: Surry Nuclear Station Date of Examination: August 13, 2012

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

Target Date*	Task Description (Reference)	Chief Examiner's Initials
-180	1. Examination administration date confirmed (C.1.a; C.2.a and b)	RSB
-120	2. NRC examiners and facility contact assigned (C.1.d; C.2.e)	RSB
-120	3. Facility contact briefed on security and other requirements (C.2.c)	RSB
-120	4. Corporate notification letter sent (C.2.d)	RSB
[-90]	[5. Reference material due (C.1.e; C.3.c; Attachment 2)]	RSB
{-75}	6. Integrated examination outline(s) due, including Forms ES-201-2, ES-201-3, ES-301-1, ES-301-2, ES-301-5, ES-D-1's, ES-401-1/2, ES-401-3, and ES-401-4, as applicable (C.1.e and f; C.3.d)	RSB
{-70}	{7. Examination outline(s) reviewed by NRC and feedback provided to facility licensee (C.2.h; C.3.e)}	RSB
{-45}	8. Proposed examinations (including written, walk-through JPMs, and scenarios, as applicable), supporting documentation (including Forms ES-301-3, ES-301-4, ES-301-5, ES-301-6, and ES-401-6), and reference materials due (C.1.e, f, g and h; C.3.d)	RSB
-30	9. Preliminary license applications (NRC Form 398's) due (C.1.l; C.2.g; ES-202)	RSB
-14	10. Final license applications due and Form ES-201-4 prepared (C.1.l; C.2.i; ES-202)	RSB
-14	11. Examination approved by NRC supervisor for facility licensee review (C.2.h; C.3.f)	RSB
-14	12. Examinations reviewed with facility licensee (C.1.j; C.2.f and h; C.3.g)	RSB
-7	13. Written examinations and operating tests approved by NRC supervisor (C.2.i; C.3.h)	RSB
-7	14. Final applications reviewed; 1 or 2 (if >10) applications audited to confirm qualifications / eligibility; and examination approval and waiver letters sent (C.2.i; Attachment 4; ES-202, C.2.e; ES-204)	RSB
-7	15. Proctoring/written exam administration guidelines reviewed with facility licensee (C.3.k)	RSB
-7	16. Approved scenarios, job performance measures, and questions distributed to NRC examiners (C.3.i)	RSB

* Target dates are generally based on facility-prepared examinations and 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] {Does not apply} to examinations prepared by the NRC.

FINAL

ES-201 **Examination Outline Quality Checklist** **Form ES-201-2**

Facility: Surry Power Station Date of Examination: 8/2012

Item	Task Description	Initials a	Initials b*	Initials c#
1. WRITTEN	a. Verify that the outline(s) fit(s) the appropriate model, in accordance with ES-401.	N/A	N/A	NA
	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.	↓	↓	↓
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.			
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.			
2. SIMULATOR	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, technical specifications, and major transients.	✓	✓	✓
	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, and ensure that 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 that scenarios will not be repeated on subsequent days.	✓	✓	✓
	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.	✓	✓	✓
3. W / T	a. Verify that the systems walk-through outline meets the criteria specified on Form ES-301-2: (1) the outline(s) contain(s) the required number of control room and in-plant tasks distributed among the safety functions as specified on the form (2) task repetition from the last two NRC examinations is within the limits specified on the form (3) no tasks are duplicated from the applicants' audit test(s) (4) the number of new or modified tasks meets or exceeds the minimums specified on the form (5) the number of alternate path, low-power, emergency, and RCA tasks meet the criteria on the form.	✓	✓	✓
	b. Verify that the administrative outline meets the criteria specified on Form ES-301-1: (1) the tasks are distributed among the topics as specified on the form (2) at least one task is new or significantly modified (3) no more than one task is repeated from the last two NRC licensing examinations	✓	✓	✓
	c. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on subsequent days.	✓	✓	✓
4. GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam sections.	✓ (1)	✓ (1)	✓
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	✓ (1)	✓ (1)	✓
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	✓ (1)	✓ (1)	✓
	d. Check for duplication and overlap among exam sections.	✓ (1)	✓ (1)	✓
	e. Check the entire exam for balance of coverage.	✓ (1)	✓ (1)	✓
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	✓ (1)	✓ (1)	✓

	Printed Name/Signature	Date
a. Author	Paul K. Orrison / Paul K. Orrison	3/31/12
b. Facility Reviewer (*)	Carl F. Irwin III / [illegible]	7/31/12
c. NRC Chief Examiner (#)	Richard S. Baldwin / [illegible]	8/6/2012
d. NRC Supervisor	Malcolm T. Widmann / [illegible]	08/07/12

Note: # Independent NRC reviewer initial items in Column "c"; chief examiner concurrence required.
* Not applicable for NRC-prepared examination outlines

(1) NRC developed written exam

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ES-201 **Examination Outline Quality Checklist** **Form ES-201-2**

Facility: Surry Date of Examination: 8/28/2012

Item	Task Description	Initials a	Initials b*	Initials c#
1. WRITTEN	a. Verify that the outline(s) fit(s) the appropriate model, in accordance with ES-401.		NA	
	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.			
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.			
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.			
2. SIMULATOR	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, technical specifications, and major transients.	NA		NA
	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, and ensure that 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 that scenarios will not be repeated on subsequent days.			
	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.			
3. W/T	a. Verify that the systems walk-through outline meets the criteria specified on Form ES-301-2: (1) the outline(s) contain(s) the required number of control room and in-plant tasks distributed among the safety functions as specified on the form (2) task repetition from the last two NRC examinations is within the limits specified on the form (3) no tasks are duplicated from the applicants' audit test(s) (4) the number of new or modified tasks meets or exceeds the minimums specified on the form (5) the number of alternate path, low-power, emergency, and RCA tasks meet the criteria on the form.			
	b. Verify that the administrative outline meets the criteria specified on Form ES-301-1: (1) the tasks are distributed among the topics as specified on the form (2) at least one task is new or significantly modified (3) no more than one task is repeated from the last two NRC licensing examinations			
	c. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on subsequent days.			
4. GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam sections.			
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.			
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.			
	d. Check for duplication and overlap among exam sections.			
	e. Check the entire exam for balance of coverage.			
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	▼	▼	▼

	Printed Name/Signature	Date
a. Author	Daniel M. Bacon / Daniel M. Bacon	8/8/12
b. Facility Reviewer (*)	N/A / N/A	
c. NRC Chief Examiner (#)	Phillip G. Capehart /	8/8/12
d. NRC Supervisor	MALCOLM T. WIDMANN /	08/28/12

Note: # Independent NRC reviewer initial items in Column "c"; chief examiner concurrence required.

1. Pre-Examination

8/27/12
8/20/12

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of 8/13/12 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 (e.g., acting as a simulator booth operator or communicator is acceptable if the individual does not select the training content or provide direct or indirect feedback). 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 August 2012 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)	DATE NOTE
1.	Carl F. Irwin III	Exam Author		3/12/12		8/29/12
2.	Christopher G. Huth	Software Eng.		3/12/12		8/29/12
3.	Robert W Soderholm	Simulation Support Coordinator		3/12/12		8/29/2012
4.	Phat Tran - Lam	SSG		3/12/12		8/29/2012
5.	Paul K. Graison	Exam Author		3/12/12		8/29/2012
6.	David H Wilson	OPS REP / Observe process		3/12/12		8/29/2012
7.	Brown, Aaron D	SSG Software		14 Mar 12		29 Aug 12
8.	Richard Post	Exam Validator		6/12/12		8/30/12
9.	Jessie Soto	INSTRUCTOR		6/13/12		9/4/12
10.	David K. Sousa	FLT Supervisor		6/20/12		8/29/12
11.	Tim Green	OPS Supv.		6/22/12		8/29/12
12.	Natalie Yonker	Ops Supv.		6/20/12		8/29/12
13.	SCOTT H BITTNER	OPS / RO		6/20/12		8/29/12
14.	SHATEEK R MAJOR	OPS/RO		6/21/12		8/29/12
15.	Adine LaFrance	Eng / Reactor Engineer		6/25/12 ①		8/30/12

NOTES:

① Signed per telecon

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of AUG 2012 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 (e.g., acting as a simulator booth operator or communicator is acceptable if the individual does not select the training content or provide direct or indirect feedback). 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 August 2012 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)	DATE NOTE
1.	Josh. Humphries	Reactor Operator		7.6.12		8.31.12
2.	L.A. Baker	Supv NC Trng (SRO)		7-10-12		8/29/12
3.	T KEATING	SRO/STA		7.11.12		8.29.12
4.	James Burley	Reactor operator		7-11-12		8/29/12
5.	SEAN LOCASCIO	NLO INSTRUCTOR		7/12/12		8/29/12
6.	BILL MARSHALL	AUTHOR		7/19/12	①	8/30/12
7.	JIM SHELL	SRO		7/19/12		8/30/12
8.	Neil Hanlon	RO		8/2/12		8/31/12
9.	Jeff T. Spence	Training Manager		8/3/12		8/29/12
10.	RICH PHILPOT	INSTRUCTOR		8/6/12		8/29/12
11.	Robert Young	Instructor		8/7/12		8/29/12
12.	AMY EPPS	TRAINING ADMIN		8-7-12		8/29/12
13.	Randy Johnson	Mgr Operations		8-9-12		8/29/12
14.	Ken Wagar	Unit Supv. / Check Operator		8-9-12		8-29-12
15.	Kevin Labat	Instructor		8/13/12		8/29/12

NOTES:
① As Per Telcom

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of Aug 2012 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 (e.g., acting as a simulator booth operator or communicator is acceptable if the individual does not select the training content or provide direct or indirect feedback). 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 Aug 2012. 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)	DATE	NOTE
1.	H. Ashley Royal	Director Nuclear Training	H. Ashley Royal	8/13/12	(1) per telecon	8/30/12	
2.	J. Fisher	SNSO		8-20-12		8-30-12	
3.	W. J. Ford	Instructor ILT		8-28-12		8/29/12	
4.	~~SEAN LOCASCIO~~ 7/24/12						
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							

NOTES: (1) Signed per telecon

FINAL

ES-301 **Administrative Topics Outline** **Form ES-301-1**

Facility: **Surry Power Station** Date of Examination: 8/2012
Examination Level: **SRO** Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed **(KA)**
Conduct of Operations	R / M	Perform an At-Power Shutdown Margin with a Partially Dropped Control Rod G2.1.25 Ability to Interpret Reference Materials, Such as Graphs, Curves, Tables, etc. (3.9/4.2)
Conduct of Operations	R / M	Determine Final Pressure for a Waste Gas Decay Tank and determine T.S. time limitations G2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and *instrument interpretation*. (4.4/4.7)
Equipment Control	R / N	Perform a SRO Review of a Surveillance Procedure and Determine Tech Spec Applicability 2.2.12 Knowledge of surveillance procedures (4.1)
Radiation Control	R / M	Calculate Dose and Best Work Method 2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (3.2/3.7)
Emergency Plan	R / M	SRO – Classify SAE SRO- 2.4.41 (Knowledge of the emergency action level thresholds and classifications) (4.6)

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

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

FINAL

ES-301 **Administrative Topics Outline** **Form ES-301-1**

Facility: **Surry Power Station** Date of Examination: 8/2012
Examination Level: **RO** Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed **(KA)**
Conduct of Operations	R / M	Perform an At-Power Shutdown Margin with a Partially Dropped Control Rod G2.1.25 Ability to Interpret Reference Materials, Such as Graphs, Curves, Tables, etc. (3.9/4.2)
Conduct of Operations	R / D	Determine Final Pressure for a Waste Gas Decay Tank G2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and *instrument interpretation.* (4.4/4.7)
Radiation Control	R / M	Calculate Dose and Best Work Method 2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (3.2/3.7)
Emergency Plan	R / D	Complete EPIP-2.01, Attachment 3, Update Message. 2.4.39 (Knowledge of RO responsibilities in emergency plan implementation (3.9)

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank ($\leq$ 3 for ROs; $\leq \infty$ for SROs & RO retakes)
(N)ew or (M)odified from bank ($\geq$ 1)
(P)revious 2 exams ($\leq$ 1; randomly selected)

FINAL

ES-301 **Control Room/In-Plant Systems Outline** **Form ES-301-2**

Facility: Surry Power Station	Date of Examination: 08/2012
Exam Level: RO - X SRO-I SRO-U	Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
a. Manually Align Alternate High Head Safety Injection Flowpath	A/S/D/L/EN	2
b. Isolate a Leaking Recirc Spray Heat Exchanger	S/M/L	9
c. Respond to a Spurious SI <350°F	S/D/L	3
d. Perform AP-3.00 to Emergency Borate the RCS	A/S/N	1
e. Adjust the PRNIs in accordance with 1-OPT-RX-001	A/S/N	7
f. Place the Containment H2 Analyzer in Service	S/D/L	5
g. Perform 1-FR-H.3 for SG High Level	A/S/N/L	4
h. Place the AAC Diesel on the 1J Emergency Bus	S/D/L	6
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. Isolate Flooding in #5 MER	A/D/E	4
j. Align Turbine Building IA to Containment	D/R	8
k. Locally Isolate the Secondary System (E-3, Attachment 1)	E/D	3

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO		
	RO	Actual	Criteria Met?
(A)lternate path	4-6	5	Yes
(D)irect from bank	≤ 9	7	Yes
(E)mergency or abnormal in-plant	≥ 1	2	Yes
(EN)gineered safety feature			
(L)ow-Power / Shutdown	≥ 1	6	Yes
(N)ew or (M)odified from bank including 1(A)	≥ 2	4	Yes
(P)revious 2 exams (randomly selected)	≤ 3	0	Yes
(R)CA	≥ 1	1	Yes
(S)imulator / (C)ontrol room			

FINAL

FINAL

ES-301 **Control Room/In-Plant Systems Outline** **Form ES-301-2**

Facility: Surry Power Station	Date of Examination: 08/2012
Exam Level: RO SRO-I - X SRO-U	Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. Manually Align Alternate High Head Safety Injection Flowpath	A/S/D/L/EN	2
b. Isolate a Leaking Recirc Spray Heat Exchanger	S/M/L	9
c. Respond to a Spurious SI <350°F	S/D/L	3
d. Perform AP-3.00 to Emergency Borate the RCS	A/S/N	1
e. Adjust the PRNIs in accordance with 1-OPT-RX-001	A/S/N	7
f. Place the Containment H2 Analyzer in Service	S/D/L	5
g. Perform 1-FR-H.3 for SG High Level	A/S/N/L	4
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. Isolate Flooding in #5 MER	A/D/E	4
j. Align Turbine Building IA to Containment	D/R	8
k. Locally Isolate the Secondary System (E-3, Attachment 1)	E/D	3

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

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

FINAL

FINAL

ES-301 **Control Room/In-Plant Systems Outline** **Form ES-301-2**

Facility: Surry Power Station	Date of Examination: 08/2012
Exam Level: RO SRO-I SRO-U- X	Operating Test No.: 1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. Manually Align Alternate High Head Safety Injection Flowpath	A/S/D/L/EN	2
b. Isolate a Leaking Recirc Spray Heat Exchanger	S/M/L	9
c. Respond to a Spurious SI <350°F	S/D/L	3
d.		
e.		
f.		
g.		
h.		
In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. Isolate Flooding in #5 MER	A/D/E	4
j. Align Turbine Building IA to Containment	D/R	8
k.		

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

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

FINAL

FINAL

ES-301 **Operating Test Quality Checklist** **Form ES-301-3**

Facility: Surry Power Station Date of Examination: 8/2012 Operating Test Number: 2012-001

	1. General Criteria	Initials a	b*	c#
a.	The operating test conforms with the previously approved outline; changes are consistent with sampling requirements (e.g., 10 CFR 55.45, operational importance, safety function distribution).			
b.	There is no day-to-day repetition between this and other operating tests to be administered during this examination.			
c.	The operating test shall not duplicate items from the applicants' audit test(s). (see Section D.1.a.)			
d.	Overlap with the written examination and between different parts of the operating test is within acceptable limits.			
e.	It appears that the operating test will differentiate between competent and less-than-competent applicants at the designated license level.			
	2. Walk-Through 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 • operationally important 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			
b.	Ensure that any changes from the previously approved systems and administrative walk-through outlines (Forms ES-301-1 and 2) have not caused the test to deviate from any of the acceptance criteria (e.g., item distribution, bank use, repetition from the last 2 NRC examinations) specified on those forms and Form ES-201-2.			
	3. Simulator Criteria	--	--	--
	The associated simulator operating tests (scenario sets) have been reviewed in accordance with Form ES-301-4 and a copy is attached.			

		Printed Name / Signature	Date
a.	Author	Paul K. Garrison / Paul K. Garrison	7/31/12
b.	Facility Reviewer(*)	Carl F. Jannin III / C F J III	7-31-12
c.	NRC Chief Examiner (#)	Richard S. Baldwin / Richard S. Baldwin	8/6/2012
d.	NRC Supervisor	Malcolm T. Widmann / Malcolm T. Widmann	08/07/12

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

FINAL

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ES-301 **Simulator Scenario Quality Checklist** **Form ES-301-4**

Facility: Surry Power Station	Date of Exam: 8/2012	Scenario Numbers: 1/2/3/4	Operating Test No.: 2012-001

QUALITATIVE ATTRIBUTES		Initials a	Initials b*	Initials 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.			
2.	The scenarios consist mostly of related events.			
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)			
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.			
5.	The events are valid with regard to physics and thermodynamics.			
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.			
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.			
8.	The simulator modeling is not altered.			
9.	The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies or deviations from the referenced plant have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.			
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.5 of ES-301.			
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).			
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).			
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.			

	Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes	--	--	--
1.	Total malfunctions (5–8)	7 / 8 / 11 / 8			
2.	Malfunctions after EOP entry (1–2)	4 / 3 / 7 / 2			
3.	Abnormal events (2–4)	4 / 5 / 4 / 5			
4.	Major transients (1–2)	3 / 1 / 3 / 1			
5.	EOPs entered/requiring substantive actions (1–2)	3 / 2 / 2 / 1			
6.	EOP contingencies requiring substantive actions (0–2)	1 / 1 / 1 / 1			
7.	Critical tasks (2–3)	4 / 3 / 2 / 2			

FINAL

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Facility: Surry Power Station		Date of Exam: 8/2012												Operating Test No. 1			
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO	RX		4			5			1			2		**	1		
	NOR													**	1		
	I/C		3,5,6,8			2,6,7			3,4,5,6,7			3,6,7		**	4		
	MAJ		6,7,9			6			6,7,9			7		**	2		
	TS													**	0		
RO (BOP)	RX													**			
	NOR			1,4			3,5			1,3			2	**			
	I/C			2,8			1,4,7			2,8			4,5,8	**			
	MAJ			6,7,9			6			6,7,9			7	**			
	TS																
SROI (US)	RX	4			5			1			2			**		1	
	NOR	1			3			3			2			**		1	
	I/C	2,3,5,6,8			1,2,4,6,7			2,3,4,5,6,7,8			3,4,5 6,7,8			**		4	
	MAJ	6,7,9			6			6,7,9			7			**		2	
	TS	2,3			1,2,4,5			3,4			1,5			**		2	
SROI (RO)	RX		4			5			1			2		**	1		
	NOR													**	1		
	I/C		3,5,6,8			2,6,7			3,4,5,6,7			3,6,7		**	4		
	MAJ		6,7,9			6			6,7,9			7		**	2		
	TS																
SROU (US)	RX	4			5			1			2			**			0
	NOR	1			3			3			2			**			1
	I/C	2,3,5,6,8			1,2,4,6,7			2,3,4,5,6,7,8			3,4,5 6,7,8			**			2
	MAJ	6,7,9			6			6,7,9			7			**			1
	TS	2,3			1,2,4,5			3,4			1,5			**			2

** Scenario Sets verified to meet or exceed minimum event types. All combinations will result in at least 1 reactivity event, 1 normal, 4 instrumentation/control events, 2 major events, and 2 technical specification events.

FINAL

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

FINAL

** Scenario Sets verified to meet or exceed minimum event types. All combinations will result in at least 1 reactivity event, 1 normal, 4 instrumentation/control events, 2 major events, and 2 technical specification events.

FINAL

ES-301 **Competencies Checklist** **Form ES-301-6**

Facility: Surry Power Station Date of Examination: 8/2012 Operating Test No.: 2012-001

Competencies	APPLICANTS															
	RO				SRO-I				SRO-U							
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions	3,5, 6,7, 8,9	2,5, 6,7	3,4, 5,6, 7,9	1,3, 6,7	3,5, 6,7, 8,9	2,5, 6,7	3,4, 5,6, 7,9	1,3, 6,7	3,5, 6,7, 8,9	2,5, 6,7	3,4, 5,6, 7,9	1,3, 6,7				
Comply With and Use Procedures (1)	All	All	All	All	All	All	All	All	All	All	All	All				
Operate Control Boards (2)	3,4, 6,7, 8,9	2,5, 6,7	1,3, 4,5, 6,7, 9	2,3, 6,7	3,4, 6,7, 8,9	2,5, 6,7	1,3, 4,5, 6,7, 9	2,3, 6,7	N/A	N/A	N/A	N/A				
Communicate and Interact	All	All	All	All	All	All	All	All	All	All	All	All				
Demonstrate Supervisory Ability (3)	N/A	N/A	N/A	N/A	All	All	All	All	All	All	All	All				
Comply With and Use Tech. Specs. (3)	N/A	N/A	N/A	N/A	2,3	1,2, 4,5	3,4	1,5	2,3	1,2, 4,5	3,4	1,5				

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

Instructions:

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

FINAL

SURRY NUCLEAR POWER STATION
AUGUST 2012 EXAMINATION

Tier / Group	Randomly Selected K/A	Reason for Rejection
		NO KAs WERE REQUEST BY LICENSEE TO CHANGE

FINAL

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

Facility: Surry Date of Exam: 8/28/2012 Exam Level: (RO)/SRO

	Item Description	Initial a	Initial b*	Initial c#
1.	Questions and answers are technically accurate and applicable to the facility.		N/A	
2.	a. NRC K/As are referenced for all questions. b. Facility learning objectives are referenced as available.			
3.	SRO questions are appropriate in accordance with Section D.2.d of ES-401			
4.	If more than four RO and two SRO questions are repeated from the last two NRC licensing exams, the facility licensee's sampling process was random and systematic.			
5.	Question duplication from the license screening/audit exam was controlled as indicated below (check the item that applies) and appears appropriate: __ the audit exam was systematically and randomly developed __ the audit exam was completed before the license exam was started ✓ the examinations were developed independently __ the licensee certifies that there is no duplication __ other (explain)			
6.	Bank use meets limits (no more than 75 percent from the bank, at least 10 percent new, and the rest new or modified); enter the actual RO / SRO-only question distributions(s) at right.	Bank: 15% / 0% — Modified: 21% / 28% — New: 64% / 72%		
7.	Between 50 and 60 percent of the questions on the RO exam are written at the comprehension/ analysis level; the SRO exam may exceed 60 percent if the randomly selected K/As support the higher cognitive levels; enter the actual RO / SRO question distribution(s) at right.	Memory: 43% / 20% — C/A: 57% / 80%		
8.	References/handouts provided do not give away answers or aid in the elimination of distractors.			
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.			
10.	Question psychometric quality and format meet the guidelines in ES Appendix B.			
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.			

	Printed Name / Signature	Date
a. Author	Daniel M. Bacon / Daniel M. Bacon	8/8/12
b. Facility Reviewer (*)	N/A	
c. NRC Chief Examiner (#)	Phillip G Capehart / P G Capehart	8/8/12
d. NRC Regional Supervisor	MALCOLM T. WIDMANN / Malcolm T. Widmann	08/28/12

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.

FINAL

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6. U/E/S	7. Explanation
			Stem Focus	Cues	T/F			Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only		

SURRY POWER STATION WRITTEN EXAM 2012
WAS DEVELOPED BY THE NRC
- NO COMMENTS -

Instructions

[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 using a 1 – 5 (easy – difficult) rating scale (questions in the 2 – 4 range are acceptable).
3. Check the appropriate box if a psychometric flaw is identified:
   - The stem lacks sufficient focus to elicit the correct answer (e.g., unclear intent, more information is needed, or too much needless information).
   - The stem or distractors contain cues (i.e., clues, specific determiners, phrasing, length, etc).
   - The answer choices are a collection of unrelated true/false statements.
   - The distractors are not credible; single implausible distractors should be repaired, more than one is unacceptable.
   - One or more distractors is (are) partially correct (e.g., if the applicant can make unstated assumptions that are not contradicted by stem).
4. Check the appropriate box if a job content error is identified:
   - 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).
   - 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).
   - The question contains data with an unrealistic level of accuracy or inconsistent units (e.g., panel meter in percent with question in gallons).
   - 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 that are *designated SRO-only* (K/A and license level mismatches are unacceptable).
6. 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?
7. At a minimum, explain any "U" ratings (e.g., how the Appendix B psychometric attributes are not being met).

Q#	1. LOK (F/H)	2. LOD (1-5)	3. Psychometric Flaws					4. Job Content Flaws				5. Other		6. U/E/S	7. Explanation
			Stem Focus	Cues	T/F	Cred. Dist.	Partial	Job-Link	Minutia	#/ units	Back-ward	Q= K/A	SRO Only		
1															

ES-403, Rev. 9 **Written Examination Grading Quality Checklist** **Form ES-403-1**

Facility: Surry 2012 Date of Exam: August 28, 2012			Exam Level: (RO)/SRO
Item Description	Initials		
	a	b	c
1. Clean answer sheets copied before grading	✓	NA	✓
2. Answer key changes and question deletions justified and documented	✓	NA	✓
3. Applicants' scores checked for addition errors (reviewers spot check > 25% of examinations)	✓	NA	✓
4. Grading for all borderline cases (80 ±2% overall and 70 or 80, as applicable, ±4% on the SRO-only) reviewed in detail	✓	NA	✓
5. All other failing examinations checked to ensure that grades are justified	✓	NA	✓
6. Performance on missed questions checked for training deficiencies and wording problems; evaluate validity of questions missed by half or more of the applicants	✓	NA	✓

	Printed Name/Signature	Date
a. Grader	Kenneth D. Schaaf / Kenneth D. Schaaf /	9-25-12
b. Facility Reviewer(*)	N/A	
c. NRC Chief Examiner (*)	Richard S. Baldwin/ Richard S. Baldwin	9/26/2012
d. NRC Supervisor (*)	Mark ~~A.~~ Franke/	9/27/2012

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

Facility: **Surry** Date of Exam: **August 2012**

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	1	2	2				1	2			1	9	2		2		4		
	Tier Totals	4	5	5				4	5			4	27	5		5		10		
2. Plant Systems	1	2	2	2	3	3	3	3	3	3	2	2	28	3		2		5		
	2	1	1	1	0	1	1	1	1	1	1	1	10	1	1	1		3		
	Tier Totals	3	3	3	3	4	4	4	4	4	3	3	38	5		3		8		
3. Generic Knowledge and Abilities Categories		1		2		3		4		10		1	2	3	4	7				
		3		2		2		3				2	2	1	2					

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).
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 and justified; 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 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.

Rev 1

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		R					EK2 Knowledge of the interrelations between a reactor trip and the following: (CFR 41.7 / 45.7) EK2.02 Breakers, relays and disconnects	2.6	1
000008 Pressurizer Vapor Space Accident / 3	R						AK1. Knowledge of the operational implications of the following concepts as they apply to a Pressurizer Vapor Space Accident: (CFR 41.8 / 41.10 / 45.3) AK1.01 Thermodynamics and flow characteristics of open or leaking valves	3.2	2
000009 Small Break LOCA / 3						S	**2.1.19 Ability to use plant computers to evaluate system or component status.** **(CFR: 41.10 / 45.12)**	**3.8**	**76**
000011 Large Break LOCA / 3				R			EA1 Ability to operate and monitor the following as they apply to a Large Break LOCA: (CFR 41.7 / 45.5 / 45.6) EA1.09 Core flood tank initiation	4.3	3
000015/17 RCP Malfunctions / 4					S		**AA2. Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow):** **(CFR: 43.5 / 45.13)** **AA2.08 When to secure RCPs on high bearing temperature**	**3.5**	**77**
000022 Loss of Rx Coolant Makeup / 2					R		AA2. Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: (CFR 43.5/ 45.13) AA2.02 Charging pump problems	3.2	4
000025 Loss of RHR System / 4						R	2.4.31 Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.10 / 45.3)	4.2	5
000026 Loss of Component Cooling Water / 8 AA2.01 Location of a leak in the CCWS.					R		AA2. Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: (CFR: 43.5 / 45.13) ~~AA2.06 The length of time after the loss of CCW flow to a component before that component may be damaged~~	~~2.8~~ 2.9	6
000027 Pressurizer Pressure Control System Malfunction / 3		R				S	AK2. Knowledge of the interrelations between the Pressurizer Pressure Control Malfunctions and the following: (CFR 41.7 / 45.7) AK2.03 Controllers and positioners **2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.**	2.6 **4.4**	7 **78**

000029 ATWS / 1 EA1.03 Ability to op. & monitor the following as they apply to an ATWS: Charging pmp suction vlvs from VCT				R			EA1 Ability to operate and monitor the following as they apply to a ATWS: (CFR 41.7 / 45.5 / 45.6) ~~EA1.07 Operating switch for charging pump recirculation valve~~	~~3.4~~ 3.5	8
000038 Steam Gen. Tube Rupture / 3			R				EK3 Knowledge of the reasons for the following responses as the apply to the SGTR: (CFR 41.5 / 41.10 / 45.6 / 45.13) EK3.01 Equalizing pressure on primary and secondary sides of ruptured S/G	4.1	9
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4		R					WE12 EK2. Knowledge of the interrelations between the (Uncontrolled Depressurization of all Steam Generators) and the following: (CFR: 41.7 / 45.7) WE12 EK2.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.4	10
					S		**WE12 EA2. Ability to determine and interpret the following as they apply to the (Uncontrolled Depressurization of all Steam Generators)** **(CFR: 43.5 / 45.13)** **WE12 EA2.2 Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments.**	**3.9**	**79**
000054 (CE/E06) Loss of Main Feedwater / 4									
000055 Station Blackout / 6	R						EK1 Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : (CFR 41.8 / 41.10 / 45.3) EK1.02 Natural circulation cooling	4.1	11
						S	**2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.** **(CFR: 41.10 / 43.5 / 45.13)**	**4.2**	**80**
000056 Loss of Off-site Power / 6									
000057 Loss of Vital AC Inst. Bus / 6			R				AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.01 Actions contained in EOP for loss of vital ac electrical instrument bus	4.1	12
000058 Loss of DC Power / 6				R			AA1. Ability to operate and / or monitor the following as they apply to the Loss of DC Power: (CFR 41.7 / 45.5 / 45.6) AA1.01 Cross-tie of the affected dc bus with the alternate supply	3.4	13
000062 Loss of Nuclear Svc Water / 4					R		AA2. Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13) AA2.01 Location of a leak in the SWS	2.9	14
000065 Loss of Instrument Air / 8						R	2.1.31 Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. (CFR: 41.10 / 45.12)	4.6	15

W/E04 LOCA Outside Containment / 3						R	2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.1	16
W/E11 Loss of Emergency Coolant Recirc. / 4	R						EK1. Knowledge of the operational implications of the following concepts as they apply to the (Loss of Emergency Coolant Recirculation) (CFR: 41.8 / 41.10 / 45.3) EK1.2 Normal, abnormal and emergency operating procedures associated with (Loss of Emergency Coolant Recirculation).	3.6	17
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4			R				WE05 EK3. Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink) (CFR: 41.5 / 41.10, 45.6, 45.13) WE05 EK3.2 Normal, abnormal and emergency operating procedures associated with (Loss of Secondary Heat Sink).	3.7	18
000077 Generator Voltage and Electric Grid Disturbances / 6					**S**		**AA2. Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: (CFR: 41.5 and 43.5 / 45.5, 45.7, and 45.8)** ~~**AA2.06 Generator frequency limitations**~~ AA2.05 Operational status of offsite circuit	~~**3.5**~~ 3.8	**81**
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									
000003 Dropped Control Rod / 1			R				AK3. Knowledge of the reasons for the following responses as they apply to the Dropped Control Rod: (CFR 41.5,41.10 / 45.6 / 45.13) AK3.07 Tech-Spec limits for T-ave	3.8	19
000005 Inoperable/Stuck Control Rod / 1									
000024 Emergency Boration / 1		R					AK2. Knowledge of the interrelations between Emergency Boration and the following: (CFR 41.7 / 45.7) AK2.03 Controllers and positioners	2.6	20
000028 Pressurizer Level Malfunction / 2		R					AK2. Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: (CFR 41.7 / 45.7) AK2.02 Sensors and detectors	2.6	21
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7	R						AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of Intermediate Range Nuclear Instrumentation: (CFR 41.8 / 41.10 / 45.3) AK1.01 Effects of voltage changes on performance	2.7	22
000036 (BW/A08) Fuel Handling Accident / 8									
000037 Steam Generator Tube Leak / 3									
000051 Loss of Condenser Vacuum / 4									
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9 AA2.05 That the automatic safety actions have occurred as a result of a high ARM system signal					S		**AA2. Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste:** **(CFR: 43.5 / 45.13)** **~~AA2.01 A radiation-level alarm, as to whether the cause was due to a gradual (in time) signal increase or due to a sudden increase (a "spike"), including the use of strip-chart recorders, meter and alarm observations~~**	**~~3.7~~** 4.2	**82**
000061 ARM System Alarms / 7									
000067 Plant Fire On-site / 8						S	**2.4.11 Knowledge of abnormal condition procedures.** **(CFR: 41.10 / 43.5 / 45.13)**	**4.2**	**83**
000068 (BW/A06) Control Room Evac. / 8									

000069 (W/E14) Loss of CTMT Integrity / 5			R				WE14 EK3. Knowledge of the reasons for the following responses as they apply to the (High Containment Pressure) (CFR: 41.5 / 41.10, 45.6, 45.13) WE14 EK3.4 RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.	3.3	23
000074 (W/E06&E07) Inad. Core Cooling / 4									
000076 High Reactor Coolant Activity / 9									
W/EO1 & E02 Rediagnosis & SI Termination / 3									
W/E13 Steam Generator Over-pressure / 4				R			EA1. Ability to operate and / or monitor the following as they apply to the (Steam Generator Overpressure) (CFR: 41.7 / 45.5 / 45.6) EA1.1 Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.	3.1	24
W/E15 Containment Flooding / 5 G2.4.18 Knowledge of the specific bases for EOPs						S	~~2.4.6 Knowledge of EOP mitigation strategies.~~ **(CFR: 41.10 / 43.5 / 45.13)**	~~4.7~~ 4.0	**84**
W/E16 High Containment Radiation / 9					R		EA2. Ability to determine and interpret the following as they apply to the (High Containment Radiation) (CFR: 43.5 / 45.13) EA2.2 Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments.	3.0	25
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						R	2.1.20 Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)	4.6	26
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					S		**WE10 EA2. Ability to determine and interpret the following as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS)** **(CFR: 43.5 / 45.13)** **WE10 EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations.**	**3.9**	**85**
BW/E13&E14 EOP Rules and Enclosures									

CE/A11; W/E08 RCS Overcooling - PTS / 4					R		WE08 EA2. Ability to determine and interpret the following as they apply to the (Pressurized Thermal Shock) (CFR: 43.5 / 45.13) WE08 EA2.2 Adherence to appropriate procedures and operation within the limitations in the Facility's license and amendments.	3.5	27
CE/A16 Excess RCS Leakage / 2									
CE/E09 Functional Recovery									
K/A Category Point Totals:	1	2	2	1	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						R						K6 Knowledge of the effect of a loss or malfunction on the following will have on the RCPS: (CFR: 41.7 / 45/5) K6.02 RCP seals and seal water supply	2.7	28
									R			A3 Ability to monitor automatic operation of the RCPS, including: (CFR: 41.7 / 45.5)A3.03 A3.03 Seal D/P	3.2	29
004 Chemical and Volume Control								**S**				**A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5/ 43/5 / 45/3 / 45/5)** **A2.01 RCS pressure allowed to exceed limits**	**4.2**	**86**
								R				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5/ 43/5 / 45/3 / 45/5) A2.13 Low RWST	3.6	30
											R	2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (CFR: 41.7 / 45.7 / 45.8)	4.5	31
005 Residual Heat Removal					R							K5 Knowledge of the operational implications of the following concepts as they apply the RHRS: (CFR: 41.5 / 45.7) K5.02 Need for adequate subcooling	3.4	32
											R	2.2.42 Ability to recognize system parameters that are entry-level conditions for Technical Specifications. (CFR: 41.7 / 41.10 / 43.2 / 43.3 / 45.3)	3.9	33

006 Emergency Core Cooling								S				**A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 45.5)** **A2.05 Improper amperage to the pump motor**	**3.5**	**87**
										R		A4 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.10 Safety parameter display system	3.8	34
007 Pressurizer Relief/Quench Tank				R								K4 Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.01 Quench tank cooling	2.6	35
									R			A3 Ability to monitor automatic operation of the PRTS, including: (CFR: 41.7 / 45.5) A3.01 Components which discharge to the PRT	2.7	36
008 Component Cooling Water								R				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.04 PRMS alarm	3.3	37
010 Pressurizer Pressure Control		R										K2 Knowledge of bus power supplies to the following: (CFR: 41.7) K2.02 Controller for PZR spray valve	2.5	38
							R					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PZR PCS controls including: (CFR: 41.5 / 45.5) A1.04 Effects of temperature change during solid operation	3.6	39
012 Reactor Protection						R						K6 Knowledge of the effect of a loss or malfunction of the following will have on the RPS: (CFR: 41.7 / 45/7) K6.03 Trip logic circuits	3.1	40
											S	**2.2.38 Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)**	**4.5**	**88**

013 Engineered Safety Features Actuation	R				R							K1 Knowledge of the physical connections and/or cause effect relationships between the ESFAS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.12 ED/G K5 Knowledge of the operational implications of the following concepts as they apply to the ESFAS: (CFR: 41.5 / 45.7) K5.02 Safety system logic and reliability	4.1 2.9	41 42
022 Containment Cooling				R								K4 Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.05 Containment cooling after LOCA destroys ventilation ducts	2.6	43
025 Ice Condenser												Not applicable to Surry		
026 Containment Spray			R									K3 Knowledge of the effect that a loss or malfunction of the CSS will have on the following: (CFR: 41.7 / 45.6) K3.02 Recirculation spray system	4.2	44
039 Main and Reheat Steam									R			A4 Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8) A4.04 Emergency feedwater pump turbines	3.8	45
059 Main Feedwater	R											K1 Knowledge of the physical connections and/or cause-effect relationships between the MFW and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.02 AFW system	3.4	46
061 Auxiliary/Emergency Feedwater		R			R							K2 Knowledge of bus power supplies to the following: (CFR: 41.7) K2.01 AFW system MOVs K5 Knowledge of the operational implications of the following concepts as the apply to the AFW: (CFR: 41.5 / 45.7) K5.02 Decay heat sources and magnitude	3.2 3.2	47 48
~~062 AC Electrical Distribution~~ 078 Instrument Air System			R									~~K3 Knowledge of the effect that a loss or malfunction of the ac distribution system will have on the following:~~ ~~(CFR: 41.7 / 45.6)~~ K3.02 Systems having pneumatic valves & control ~~K3.03 DC system~~	~~3.7~~ 3.4	49

063 DC Electrical Distribution				R			R					K4 Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7) K4.02 Breaker interlocks, permissives, bypasses and cross-ties.	2.9	50
												A1 Ability to predict and/or monitor changes in parameters associated with operating the DC electrical system controls including: (CFR: 41.5 / 45.5) A1.01 Battery capacity as it is affected by discharge rate	2.5	51
064 Emergency Diesel Generator						R						K6 Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: (CFR: 41.7 / 45.7) K6.07 Air receivers	2.7	52
073 Process Radiation Monitoring								R				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.01 Erratic or failed power supply	2.5	53
								S				**A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)** **A2.03 Calibration drift**	**2.9**	**89**
076 Service Water							R					A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: (CFR: 41.5 / 45.5) A1.02 Reactor and turbine building closed cooling water temperatures.	2.6	54
078 Instrument Air											**S**	**2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)**	**4.7**	**90**
103 Containment									R			A3 Ability to monitor automatic operation of the containment system, including: (CFR: 41.7 / 45.5) A3.01 Containment isolation	3.9	55
K/A Category Point Totals:	2	2	2	3	3	3	3	3 **3**	3	2	2 **2**	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		R										K2 Knowledge of bus power supplies to the following: (CFR: 41.7) K2.03 One-line diagram of power supplies to logic circuits	2.7	56
002 Reactor Coolant														
011 Pressurizer Level Control			R									K3 Knowledge of the effect that a loss or malfunction of the PZR LCS will have on the following: (CFR: 41.7 / 45.6) K3.01 CVCS	3.2	57
014 Rod Position Indication														
015 Nuclear Instrumentation	A2.02 Faulty or erratic operation of detectors or compensating components												3.1	3.5
016 Non-nuclear Instrumentation														
017 In-core Temperature Monitor						R						K6 Knowledge of the effect of a loss or malfunction of the following ITM system components: (CFR: 41.7 / 45.7) K6.01 Sensors and detectors	2.7	58
027 Containment Iodine Removal	R											K1 Knowledge of the physical connections and/or cause-effect relationships between the CIRS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8) K1.01 CSS	3.4	59
028 Hydrogen Recombiner and Purge Control											R	2.1.28 Knowledge of the purpose and function of major system components and controls. (CFR: 41.7)	4.1	60
~~029 Containment Purge~~ 041 SDCS A4.02 Ability to manually operate and/or monitor in the MCR the cooldown valves.										R		A4 Ability to manually operate and/or monitor in the control room: ~~(CFR: 41.7 / 45.5 to 45.8)~~ ~~A4.04 Containment evacuation signal~~	~~3.5~~ 2.7	61
033 Spent Fuel Pool Cooling														
034 Fuel Handling Equipment				S								**K4 Knowledge of design feature(s) and/or interlock(s) which provide for the following:** **(CFR: 41.7)** **K4.03 Overload protection**	**3.3**	**91**
035 Steam Generator									R			A3 Ability to monitor automatic operation of the S/G including: (CFR: 41.7 / 45.5) A3.01 S/G water level control	4.0	62
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator											S	~~2.1.27 Knowledge of system purpose and/or function.~~ ~~(CFR: 41.7)~~	**4.0**	**92**

2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation

055 Condenser Air Removal														
056 Condensate								R				A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13) A2.04 Loss of condensate pumps	2.6	63
~~068 Liquid Radwaste~~								S				~~A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Liquid Radwaste System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:~~ ~~(CFR: 41.5 / 43.5 / 45.3 / 45.13)~~ ~~A2.04 Failure of automatic isolation~~	~~3.3~~	~~93~~
071 Waste Gas Disposal							R					A1 Ability to predict and/or monitor changes in parameters(to prevent exceeding design limits) associated with Waste Gas Disposal System operating the controls including: (CFR: 41.5 / 45.5) A1.06 Ventilation system	2.5	64
072 Area Radiation Monitoring					R							K5 Knowledge of the operational implications of the following concepts as they apply to the ARM system: (CFR: 41.5 / 45.7) K5.01 Radiation theory, including sources, types, units, and effects	2.7	65
075 Circulating Water														
079 Station Air														
086 Fire Protection														
K/A Category Point Totals:	1	1	1	0 1	1	1	1	1 1	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	2.1.1	2.1.1 Knowledge of conduct of operations requirements. (CFR: 41.10 / 45.13)	3.8	66		
	2.1.8	2.1.8 Ability to coordinate personnel activities outside the control room. (CFR: 41.10 / 45.5 / 45.12 / 45.13)	3.4	67		
	2.1.26	2.1.26 Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen). (CFR: 41.10 / 45.12)	3.4	68		
	2.1.34	2.1.34 Knowledge of primary and secondary plant chemistry limits. (CFR: 41.10 / 43.5 / 45.12)			3.5	94
	2.1.13	2.1.13 Knowledge of facility requirements for controlling vital/controlled access. (CFR: 41.10 / 43.5 / 45.9 / 45.10)			3.2	95
	Subtotal			3		2
2. Equipment Control	~~2.2.4~~ 2.2.35	~~2.2.4 (multi-unit license) Ability to explain the variations in control board/control room layouts, systems, instrumentation, and procedural actions between units at a facility.~~ Ability to determine Technical Specification Mode of Operation. ~~(CFR: 41.6 / 41.7 / 41.10 / 45.1 / 45.13)~~	3.6	69		
	2.2.44	2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions. (CFR: 41.5 / 43.5 / 45.12)	4.2	70		
	2.2.11	2.2.11 Knowledge of the process for controlling temporary design changes. (CFR: 41.10 / 43.3 / 45.13)			3.3	96
	2.2.12	2.2.12 Knowledge of surveillance procedures. (CFR: 41.10 / 45.13)			4.1	97
	Subtotal			2		2
3. Radiation Control	2.3.7	2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions. (CFR: 41.12 / 45.10)	3.5	71		
	2.3.12	2.3.12 Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 45.9 / 45.10)	3.2	72		
	2.3.13	2.3.13 Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)			3.8	98

	Subtotal			2		1
4. Emergency Procedures / Plan	2.4.5	2.4.5 Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions. (CFR: 41.10 / 43.5 / 45.13)	3.7	73		
	2.4.20	2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)	3.8	74		
	2.4.37	2.4.37 Knowledge of the lines of authority during implementation of the emergency plan. (CFR: 41.10 / 45.13)	3.0	75		
	2.4.16	2.4.16 Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, and severe accident management guidelines. (CFR: 41.10 / 43.5 / 45.13)			4.4	99
	2.4.30	2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator. (CFR: 41.10 / 43.5 / 45.11)			4.1	100
	Subtotal			3		2
Tier 3 Point Total				10		7