

OUTLINE SUBMITTAL AND NRC COMMENT

FOR THE QUAD CITIES INITIAL EXAMINATION - MAY 2005

SVP-04-108

December 20, 2004

Regional Administrator, Region III
U. S. Nuclear Regulatory Commission
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4352

Quad Cities Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Submittal of Integrated Initial License Training Examination Outlines

Enclosed are the examination outlines that support the Initial License Examination scheduled for May 2, 2005 through May 9, 2005 at Quad Cities Station.

This submittal includes all appropriate Examination Standard forms and outlines in accordance with NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 9.

In accordance with NUREG-1021, Revision 9, Section ES-201, "Initial Operator Licensing Examination Process," please ensure that these materials are withheld from public disclosure until after the examinations are complete.

Should you have any questions concerning this letter, please contact Mr. W. J. Beck, Regulatory Assurance Manager, at (309)-227-2800. For questions concerning examination outlines, please contact Mark Jensen at (309)-227-3438 or Mike Kaufman at (309)-227-4173.

Respectfully,



Timothy J. Tulon
Site Vice President
Quad Cities Nuclear Power Station

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Enclosures: (Hand delivered to Nicholas A. Valos, Chief Examiner, NRC Region III)

Examination Security Agreement - Form ES-201-3
Administrative Topics Outline (RO) - Form ES-301-1
Administrative Topics Outline (SRO) - Form ES-301-1
Control Room/In-Plant Systems Outline (RO) - Form ES-301-2
Control Room/In-Plant Systems Outline (SRO) - Form ES-301-2
BWR Examination Outline (RO & SRO) - Forms ES-401-1 and ES-401-3
Record of Rejected K/As - Form ES-401-4
Scenario Outlines (4) - Forms ES-D-1
Completed Checklist:
 Examination Outline Quality Checklist - Form ES-201-2
 Transient and Event Checklist - Form ES-301-5
 Competencies Checklist - Form ES-301-6

cc: Chief, Operations Branch - NRC Region III (without attachments)
NRC Senior Resident Inspector - Quad Cities Station (without attachments)

Facility:		Date of Examination:		
Item	Task Description	Initials		
		a	b*	c#
1. W R I T T E N	a. Verify that the outline(s) fit(s) the appropriate model, in accordance with ES-401.	J	B	NAV
	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.	J	B	NAV
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	J	B	NAV
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.	J	B	NAV
2. S I M U L A T O R	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.	M	B	NAV
	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 scenarios will not be repeated on subsequent days.	M	B	NAV
	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.	M	B	NAV
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	J	B	NAV
	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	J	B	NAV
	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.	J	B	NAV
4. G E N E R A L	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	J	B	NAV
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	J	B	NAV
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	J	B	NAV
	d. Check for duplication and overlap among exam sections.	J	B	NAV
	e. Check the entire exam for balance of coverage.	J	B	NAV
	f. Assess whether the exam fits the appropriate job level (RO or SRO)	J	B	NAV

a. Author	MICHAEL I. KAUFMAN <i>M. Kaufman</i> / MARK JENSEN <i>Mark Jensen</i>	Date	12/17/04
b. Facility Reviewer (*)	David M. Bowman <i>David Bowman</i>		12/17/04
c. NRC Chief Examiner (#)	Nicholas A. Valos <i>Nicholas A. Valos</i>		12-23-04
d. NRC Supervisor	RD Lankford <i>RD Lankford</i>		12/23/04

NOTE: # Independent NRC Reviewer initial items in Column "c" chief examiner concurrence required.

Facility: Quad Cities		Date of Examination: 05/02/2005
Examination Level: RO		Operating Test Number: 1
Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N, S	Perform Control Room Actions to assemble the fire brigade. 2.1.16
Conduct of Operations	N, S	Perform Electrical Distribution Surveillance for loss of two offsite lines. 2.1.31
Equipment Control	N	Determine proper isolation points to allow an RBCCW pump to be taken Out Of Service for Maintenance. 2.2.13
Radiation Control	D	Review a survey map and determine allowable stay time. 2.3.2
Emergency Plan		
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.		
* Type Codes & Criteria: (C)ontrol room (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected) (S)imulator		

Facility: <u>Quad Cities</u>		Date of Examination: <u>05/02/2005</u>
Examination Level: <u>SRO</u>		Operating Test Number: <u>1</u>
Administrative Topic (See Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N	Initiate Fire Impairment that requires compensatory actions. 2.1.25
Conduct of Operations	N	Review Mode Change Checklist. 2.1.12
Equipment Control	N,	Review Temporary Change Package to determine if it can be accepted for Operation. 2.2.11
Radiation Control	D	Review survey map and determine stay times. 2.3.2
Emergency Plan	M	Determine EAL classification and fill out NARS form. 2.4.41
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.		
* Type Codes & Criteria: (C)ontrol room (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected) (S)imulator		

Facility: <u>Quad Cities</u>		Date of Examination: <u>05/02/2005</u>
Exam Level: <u>RO</u>		Operating Test Number: <u>1</u>
Control Room Systems [@] (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)		
System / JPM Title	Type Code*	Safety Function
a. Bypass all Reactor Scram Signals. 295015.AK2.04	D, S	1
b. Inject SSMP to U2 with Normal Feed (14-1) unavailable. A2.04* * SSMP is a safety significant system not included in KAs. Choice modeled after HPCS (KA 209002).	A, L, M, S	2
c. Start HPCI in pressure control mode with spurious isolation. 295025.EA1.04	A, L, M, S	3
d. Start Shutdown Cooling with pump trip. 205000.A2.06	A, L, N, S	4
e. Vent the Primary Containment with the Hardened Vent. 295010.AA1.05	D, L, S	5
f. Shutdown EDG with early trip. 264000.A2.02	A, D, S	6
g. Perform post maintenance test on Fuel Pool Radiation Monitor with a failure of the trip signal. 272000.A1.02	N, S	7
h. Shutdown Standby Gas Treatment with failure of heater to trip. 261000.K4.03	A, D, S	9
In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)		
i. Align SSMP Room Cooler to Alternate Cooling (Fire Main). 295018.AA1.01	D, E, P, R	8
j. Inject SBLC Test Tank to RPV. 295031.EA1.08	D, L, R, E	2
k. Pull ARI fuses in Aux Electric Room during ATWS. 201001.K2.05	D, E	1
<p>@ All control room (and in-plant) systems must be different and serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>		
*Type Codes	Criteria for RO / SRO-I / SRO-U	
(A)lternate path	4-6 / 4-6 / 2-3	
(C)ontrol room		
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4	
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	
(L)ow-Power	≥ 1 / ≥ 1 / ≥ 1	
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	
(R)CA	≥ 1 / ≥ 1 / ≥ 1	
(S)imulator		

Facility: <u>Quad Cities</u>		Date of Examination: <u>05/02/2005</u>	
Exam Level: <u>SRO-I</u>		Operating Test Number: <u>1</u>	
Control Room Systems [@] (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U)			
System / JPM Title		Type Code*	Safety Function
a. Bypass all Reactor Scram Signals. 295015.AK2.04		D, S, L	1
b. Inject SSMP to U2 with Normal Feed (14-1) unavailable. A2.04* * SSMP is a safety significant system not included in KAs. Choice modeled after HPCS (KA 209002).		A, L, M, S	2
c. Start HPCI in pressure control mode with spurious isolation. 295025.EA1.04		A, L, M, S	3
d. Start Shutdown Cooling with pump trip. 205000.A2.06		A, L, N, S	4
e. Vent the Primary Containment with the Hardened Vent. 295010.AA1.05		D, L, S	5
f. Shutdown EDG with early trip. 264000.A2.02		A, D, S	6
g. Perform post maintenance test on Fuel Pool Radiation Monitor with a failure of the trip signal. 272000.A1.02		N, S	7
h.			
In-Plant Systems [@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
i. Align SSMP Room Cooler to Alternate Cooling (Fire Main). 295018.AA1.01		D, E, P, R	8
j. Inject SBLC Test Tank to RPV. 295031.EA1.08		D, L, R, E	2
k. Pull ARI fuses in Aux Electric Room during ATWS. 201001.K2.05		D, E	1
<p>@ All control room (and in-plant) systems must be different and serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>			
*Type Codes		Criteria for RO / SRO-I / SRO-U	
(A)lternate path		4-6 / 4-6 / 2-3	
(C)ontrol room			
(D)irect from bank		≤ 9 / ≤ 8 / ≤ 4	
(E)mergency or abnormal in-plant		≥ 1 / ≥ 1 / ≥ 1	
(L)ow-Power		≥ 1 / ≥ 1 / ≥ 1	
(N)ew or (M)odified from bank including 1(A)		≥ 2 / ≥ 2 / ≥ 1	
(P)revious 2 exams		≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	
(R)CA		≥ 1 / ≥ 1 / ≥ 1	
(S)imulator			

Facility: Quad Cities		Date of Exam: 5/2/05									Operating Test Number: 1					
A P P L I C A N T	E V E N T T Y P E	Scenarios												T O T A L †	M I N I M U M	
		1			2			3			4					
		Crew Position			Crew Position			Crew Position			Crew Position					
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P			
RO SRO-I SRO-U	RX		2			6			5			4				1*
	NOR															1*
	I/C		3,4			3,7			2,7			2,5				4*
	MAJ		7,8			8,9			8,9, 10			6,7,8				2
	TS															2
RO SRO-I SRO-U	RX	2				6			5			4				1*
	NOR	1				1			6			1				1*
	I/C	3,4,5, 6				2,3,5, 7			1,2,3, 7			2,3, 4,5				4*
	MAJ	7,8				8,9			8,9, 10			6,7, 8				2
	TS	4,5				4,5			1,4			2,3				2
RO SRO-I SRO-U	RX															1*
	NOR			1				1			6		1			1*
	I/C			5,6				2,5			1,3		3,4			4*
	MAJ			7,8				8,9			8,9, 10		6,7, 8			2
	TS															2
RO SRO-I SRO-U	RX															1*
	NOR															1*
	I/C															4*
	MAJ															2
	TS															2

Instructions:

1. Circle 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 do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in 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 requirement.

Author:

Mark Jensen

NRC Reviewer:

Nikolas A. Valon

† The "Total" number of events, malfunctions, and transients meet or exceed the "Minimum" number required for each applicant.

NAU

Facility: Quad Cities	Scenario No: 1	Op-Test No: 1
Examiners: _____	Operators: _____	
_____	_____	
_____	_____	

Initial Conditions: 80 MWe. Reactor startup is in progress. Containment inerting is in progress.

Turnover: The plant is operating at 80 MWe with a reactor startup in progress. The 1-0640-29B, B narrow range RPV level instrument is OOS reading downscale. The 1B EHC pump and HPCI are OOS. IRM #15 is bypassed. The crew is to transfer auxiliary power per QCGP 1-1 and continue the reactor startup. BPO has been notified of the power transfer.

Event No.	Malfunction Number	Event Type*		Event Description
1	N/A	BOP	N	Transfer Auxiliary Power
2	N/A	RO	R	Increase power with control rods
3	nm11a nm08c	RO	I	APRM drift with RBM 7 rod block
4	rd01r	RO, SRO	C, T	Uncoupled control rod
5	rc11 rc13	BOP, SRO	C, T	Steam leak in RCIC. Group V isolation fails to actuate
6	ia04a	BOP	C	Recoverable loss of instrument air
7	mc05	ALL	M	Circulating water rupture under the hotwell
8	rr11a	ALL	M	Leak in the A recirc suction / TAF blowdown

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (T)ech Spec

SUMMARY:

The plant is operating at approximately 80 MWe with a reactor startup in progress. Drywell inerting is in progress. The 1-0640-29B, B narrow range RPV level instrument is OOS reading downscale. The B EHC pump and HPCI are OOS. IRM #15 is bypassed.

The crew will assume the shift with orders to transfer auxiliary power (BOP-N) and continue the startup by pulling control rods (RO-R). During control rod withdrawal APRM #3 will drift high causing RBM #7 to enable and cause a rod out block (RO-I). After the APRM and/or RBM is bypassed a control rod will come uncouple at position 48 (RO-C, SRO-T). Actions to recouple the control rod will fail and it will be fully inserted.

An operator will report from the field that he felt vibrations in the plant and the seismograph has actuated.

A steam leak will develop in RCIC and the group V isolation will not actuate requiring the operator to isolate it manually (BOP-C, SRO-T).

A recoverable loss of instrument air will occur. The operator will start standby instrument and service air compressors (BOP-C). The NLO will be able to isolate the leak.

A rupture of the circulating water piping and subsequent flooding of the condensate pit will require the crew to scram the reactor and secure the condensate and feed pumps (M-All).

After the scram a leak in the A recirc suction header will develop. The crew will be unable to control level above the top of active fuel requiring a blowdown (M-All). RPV level will be recovered using low-pressure ECCS pumps.

The scenario will be terminated when primary containment parameters are lowering and RPV level is in a band of 0" - 48".

CRITICAL TASKS:

Critical task #1:

Critical task #2:

Facility: Quad Cities	Scenario No: 2	Op-Test No: 1		
Examiners: _____	Operators: _____	_____		
_____	_____	_____		
_____	_____	_____		
Initial Conditions: Full power, holding load. Torus cooling on.				
Turnover: The plant is holding load at rated reactor power. The 1B TBCCW pump and GCB 3-4 are OOS. @One control rod is inoperable and OOS on the RWM. Torus cooling is on A loop following a planned RCIC run. The RCIC run has been completed and the crew is to secure Torus cooling first thing this shift.				
Event No.	Malfunction Number	Event Type*		Event Description
1	N/A	BOP	N	Secure Torus cooling
2	fw17b	BOP	C	Condensate pump trip/recirc runback, BOP reset runback
3	rd19	RO	I	Loss of the A RWM
4	rm02m	SRO	T	Refuel floor rad monitor fails upscale
5	aoti1754012b loil07503b1 loil07503b2	BOP, SRO	C, T	Standby Gas Treatment starts with a failure or the heater
6	mc08	RO	R	Recoverable loss of main condenser vacuum, load drop
7	rp04a, rd05r	RO	C	Loss of A RPS, 5 rods scram in requiring an immediate reactor scram
8	rd13a and b, cr01 and 2	ALL	M	Delayed slow scram / gross fuel failure
9	rd14a, dihs10590303	ALL	M	Pipe rupture at scram discharge volume / QGA 300 blowdown due to 2 max safe rads

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (T)ech Spec

@ Which control rod cannot be determined until the new core load and rod pattern are in place in the Simulator.

SUMMARY:

The plant will be holding load at rated conditions. The 1B Turbine Building Closed Cooling Water (TBCCW) pump and Gas Circuit Breaker (GCB) 3-4 will be OOS. 1 inoperable control rod will be OOS on the Rod Worth Minimizer (RWM). APRM #1 will be bypassed. Torus cooling will be on A loop.

The crew will take the shift with orders to secure torus cooling which was running for an RCIC surveillance that has been completed (BOP-N). After Torus cooling has been secured the B condensate pump will trip causing a reactor recirc runback.

After the operator resets the recirc runback signal (BOP-C) the A RWM will fail. The crew will swap to the B RWM and take the previously OOS control rod back OOS (RO-I).

One of the refuel floor radiation monitors will fail upscale causing the reactor building vents to isolate and standby gas treatment (SGT) to autostart (SRO-T). The B SGT heater will not start (SRO-T). The operator will manually start A SGT and secure B (BOP-C).

A recoverable loss of vacuum will occur causing the need for a load drop (RO-R). The NLO dispatched will refill the loop seal on the turbine vacuum breaker and vacuum will return to normal.

A loss of A RPS will occur and 5 rods will scram in requiring an immediate reactor scram (RO-C). When the scram is inserted a SDV blockage will cause the rods to insert at a slower than normal rate resulting in gross fuel element failure (M-All). The piping will rupture at the scram discharge volume and the crew will blowdown due to 2 areas above max safe rads.

The scenario will be terminated when all 5 ADS valves are open and RPV pressure is dropping.

CRITICAL TASKS:

Critical task #1:

Critical task #2:

Facility: Quad Cities

Scenario No: 3

Op-Test No: 1

Examiners: _____

Operators: _____

Initial Conditions: 92% power, holding load

Turnover: The plant is holding load at 92% reactor power. The 10263-29B, B narrow range level instrument, is OOS reading downscale. The 1B TBCCW pump and HPCI are OOS. APRM #1 is bypassed. Continue to hold load.

Event No.	Malfunction Number	Event Type*		Event Description
1	dihs114011a, cs05a	BOP, SRO	C, T	A core spray pump autostart with a failure of the minimum flow valve to open
2	rd04r	RO, SRO	C, T	Control rod drifts out 3 notches
3	ano9017e12, dihs156041a lohs156041a4	BOP	C	Gland Steam Exhauster trip
4	ed02	SRO	T	Loss of Reserve Aux Transformer 12
5	N/A	RO	R	Load drop with recirc flow
6	N/A	BOP	N	Secure reactor feed pump and condensate pump
7	rr15a	RO	I	RPV level indicator fails upscale requiring manual level control
8	rp05a and b, ms05b	ALL	M	Inadvertent Group I isolation and subsequent break in B main steam line
9	pc01 dihs11001s17a dihs1100126b	ALL	M	Unable to spray DW, DW coolers trip, PSP blowdown
10	rr17a-d, rr19a-d, rr20a and b	ALL	M	Loss of all RPV level indication, RPV flooding

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (T)ech Spec

SUMMARY:

The plant is holding load at 92% power. The 1-0640-29B, B narrow range RPV level instrument is OOS reading downscale. The 1B TBCCW pump and HPCI are OOS. APRM #1 is bypassed.

When the crew assumes the shift the A core spray pump will autostart but its minimum flow valve will fail to open. The operator will secure the pump (BOP-C, SRO-T). A control rod will drift out 3 notches and will be inserted using the QCOA (RO-C, SRO-T). The on line gland sealing steam exhauster will trip requiring the other to be placed in service (BOP-C).

A loss of Reserve Aux Transformer 12 will occur (SRO-T). A load drop to less than 2511 MWth will be performed (RO-R) and 1 RFP and 1 condensate pump will be secured (BOP-N).

The other narrow range RPV level instrument will fail upscale causing the operator to take manual control of feedwater (RO-I).

An inadvertent Group I isolation will cause a steam leak in the drywell (M-All). Drywell sprays will be unavailable and the drywell coolers will not restart. The crew will blowdown due to the inability to stay within the PSP curve or maintain DW temperature (M-All).

When saturation conditions are met all RPV level instruments will become unavailable and the crew will flood the RPV (M-All).

The scenario will be terminated when the crew identifies indications that the RPV is flooded to the main steam lines.

CRITICAL TASKS:

Critical task #1:

Critical task #2:

Facility: Quad Cities	Scenario No: 4	Op-Test No: 1
Examiners: _____	Operators: _____	
_____	_____	
_____	_____	

Initial Conditions: 80% power, 2 RFP's on.

Turnover: The plant is holding load at 80% reactor power. The 1B EHC pump and GCB 3-4 are OOS. IRM # 15 is bypassed. The crew is to start 1C RFP from Bus 12 and secure 1B RFP first thing this shift.

Event No.	Malfunction Number	Event Type*		Event Description
1	N/A	BOP	N	Swap reactor feed pumps
2	rd07a	RO, SRO	C, T	A CRD pump trip
3	cu03, rp10a and b	BOP, SRO	C, T	Leak in the RWCU room, Group III fails to actuate
4	fw14c	BOP, RO	C, R	Heater tube leak, load drop
5	rr06a, rr07a	RO	C	A reactor recirc pump seal failure
6	sw02, mc01, mc04	ALL	M	Intake structure blockage, loss of circ water
7	rd13 a and b	ALL	M	1/2 core hydraulic ATWS
8	tc01, tc09 a - i	ALL	M	Turbine trip with no bypass valves

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (T)ech Spec

SUMMARY:

The plant is holding load at 80% power. 2 RFPs and 3 Condensate pumps are running. 1B EHC pump and GCB 3-4 are OOS. IRM #15 is bypassed.

The crew will take the shift with orders to swap RFPs (BOP-N). After the RFP swap the A CRD pump will trip requiring the B to be started (RO-C, SRO-TS).

A leak will develop in the RWCU system and the Group III will fail to actuate on high room temperature (BOP-C). The BOP will manually isolate it.

A tube leak in the A3 low-pressure heater will cause the bypass to open and the number 3 string to isolate. The RO will drop load and the BOP will close the heater string bypass (RO-R, BOP-C).

The A reactor recirc pump seals will fail causing DW pressure to rise. The RO will trip and isolate the pump (RO-C).

While actions are being taken to recover from the loss of a recirc pump there will be a blockage at the intake structure tripping the circulating water pumps requiring a scram (M-All). A half core hydraulic ATWS will occur (M-All). During the ATWS condenser vacuum will be lost requiring pressure control with ADS valves.

The scenario will be terminated when the actions of QCOP 0300-28 have been taken, Torus cooling is on and reactor pressure is under control with ADS valves

CRITICAL TASKS:

Critical task #1:

Critical task #2:

Facility Name: Quad Cities		Date of Exam: May 2 - 9, 2005																
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	4	3	N/A			4	3	N/A		3	20	3	4	7		
	2	1	1	2	N/A			1	1	N/A		1	7	2	1	3		
	Tier Totals	4	5	5	N/A			5	4	N/A		4	27	5	5	10		
2. Plant Systems	1	2	2	2	2	2	3	3	3	2	2	3	26	2	3	5		
	2	2	1	1	1	1	1	1	1	1	1	1	12	2	1	3		
	Tier Totals	4	3	3	3	3	4	4	4	3	3	4	38	4	4	8		
3. Generic Knowledge and Abilities Categories				1	2	3	4						10	1	2	3	4	7
				2	3	3	2							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 that are not included on the outline should be added. Refer to ES-401, Attachment 2, 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.
 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. 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.

ES-401	BWR Examination Outline							Form ES-401-1	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4			0 1				Reactor water level response	3.4	1
295003 Partial or Complete Loss of AC / 6				0 4			D.C. electrical distribution system	3.6	1
295004 Partial or Total Loss of DC Pwr / 6					0 3		Battery voltage	2.8	1
295005 Main Turbine Generator Trip / 3						01. 28	Knowledge of the purpose and function of major system components and controls.	3.2	1
295006 SCRAM / 1	0 1						Decay heat generation and removal.	3.7	1
295016 Control Room Abandonment / 7		0 3					Control room HVAC	2.9	1
295018 Partial or Total Loss of CCW / 8			0 6				Increasing cooling water flow to heat exchangers	3.3	1
295019 Partial or Total Loss of Inst. Air / 8		0 7					Condensate system	3.2	1
295021 Loss of Shutdown Cooling / 4				0 2			RHR/shutdown cooling	3.5	1
295023 Refueling Acc / 8					0 5		Entry conditions of emergency plan	3.2	1
295024 High Drywell Pressure / 5				0 8		01. 02	ADS. Plant-Specific; Knowledge of operator responsibilities during all modes of plant operation.	3.9; 3	2
295025 High Reactor Pressure / 3	0 2						Reactor vessel integrity	4.1	1
295026 Suppression Pool High Water Temp. / 5		0 6					Suppression pool level	3.5	1
295027 High Containment Temperature / 5							Suppressed - Not applicable at Quad Cities		0
295028 High Drywell Temperature / 5			0 4				Increased drywell cooling	3.6	1
295030 Low Suppression Pool Wtr Lvl / 5				0 2			RCIC. Plant-Specific	3.4	1
295031 Reactor Low Water Level / 2					0 4		Adequate core cooling	4.6	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1						01. 30	Ability to locate and operate components, including local controls	3.9	1
295038 High Off-site Release Rate / 9	0 1						Biological effects of radioisotope ingestion	2.5	1
600000 Plant Fire On Site / 8		0 1					Sensors, detectors and valves	2.6	1
K/A Category Totals:	3	4	3	4	3	3	Group Point Total:		20

ES-401		BWR Examination Outline							Form ES-401-1	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO)										
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#	
295002 Loss of Main Condenser Vac / 3									0	
295007 High Reactor Pressure / 3									0	
295008 High Reactor Water Level / 2					0 2		Steam flow/feedflow mismatch	3.4	1	
295009 Low Reactor Water Level / 2									0	
295010 High Drywell Pressure / 5			0 3				Radiation level monitoring	3.2	1	
295011 High Containment Temp / 5							Suppressed - Not applicable at Quad Cities		0	
295012 High Drywell Temperature / 5									0	
295013 High Suppression Pool Temp. / 5									0	
295014 Inadvertent Reactivity Addition / 1		0 7					Reactor power	3.9	1	
295015 Incomplete SCRAM / 1			0 1				Bypassing rod insertion blocks	3.4	1	
295017 High Off-site Release Rate / 9									0	
295020 Inadvertent Cont. Isolation / 5 & 7									0	
295022 Loss of CRD Pumps / 1	0 2						Reactivity control	3.6	1	
295029 High Suppression Pool Wtr Lvl / 5									0	
295032 High Secondary Containment Area Temperature / 5				0 2			Leak detection system concept Plant-Specific	3.4	1	
295033 High Secondary Containment Area Radiation Levels / 9									0	
295034 Secondary Containment Ventilation High Radiation / 9									0	
295035 Secondary Containment High Differential Pressure / 5									0	
295036 Secondary Containment High Sump/Area Water Level / 5									0	
500000 High CTMT Hydrogen Conc. / 5						01. 02	Knowledge of operator responsibilities during all modes of plant operation.	3	1	
K/A Category Totals:	1	1	2	1	1	1	Group Point Total:		7	

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO)											Form ES-401-1			
E/APE # / Name / Safety Function	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	#	
203000 RHR/LPCI: Injection	0 3											Condensate transfer	2.5	1	
205000 Shutdown Cooling Mode		0 1										Pump motors	3.1	1	
206000 HPCI			0 2									Reactor pressure control: BWR-2, 3, 4	3.8	1	
207000 Isolation (Emergency) Condenser												Suppressed - Not applicable at Quad Cities		0	
209001 LPCS				1 0								Testability of all operable components	2.8	1	
209002 HPCS												Suppressed - Not applicable at Quad Cities		0	
211000 SLC					0 3							Shutdown margin	3.2	1	
212000 RPS						0 2						Nuclear instrumentation	3.7	1	
215003 IRM							0 3					RPS status	3.6	1	
215004 Source Range Monitor								0 3				Stuck detector	3	1	
215005 APRM / LPRM									0 2			Full core display	3.5	1	
217000 RCIC							0 3			0 7		Reactor water level; Reactor pressure	4; 3.9	2	
218000 ADS											01; 28	Knowledge of the purpose and function of major system components and controls	3.2	1	
223002 PCIS/Nuclear Steam Supply Shutoff	1 3											Traversing in-core probe system	2.7	1	
239002 SRVs		0 1										02; 25	SRV solenoids : Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	2.8; 2.5	2
259002 Reactor Water Level Control			0 7									Reactor water level indication	3.4	1	
261000 SGTS				0 2								Charcoal bed decay heat removal	2.6	1	
262001 AC Electrical Distribution					0 1			0 9				Principle involved with paralleling two A.C. sources. Exceeding voltage limitations	3.1; 3.1	2	
262002 UPS (AC/DC)						0 3						Static inverter	2.7	1	
263000 DC Electrical Distribution							0 1					Battery charging/discharging rate	2.5	1	
264000 EDGs					0 1			0 5				Starting air; Synchronization of the emergency generator with other electrical supplies	3.8; 3.6	2	
300000 Instrument Air									0 2			Air temperature	2.9	1	
400000 Component Cooling Water										0 1		CCW indications and control	3.1	1	
Safe Shutdown Makeup											02; 22	Knowledge of limiting conditions for operations and safety limits.	3.4	1	
K/A Category Totals:	2	2	2	2	2	3	3	3	2	2	3	Group Point Total:		26	

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO)										Form ES-401-1			
E/APE # / Name / Safety Function	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	#
201001 CRD Hydraulic														0
201002 RMCS						0 1						Select matrix power	2.5	1
201003 Control Rod and Drive Mechanism							0 1					Reactor power	3.7	1
201004 RSCS												Suppressed - Not applicable at Quad Cities		0
201005 RCIS												Suppressed - Not applicable at Quad Cities		0
201006 RWM										0 5		Rod insert error indication: P-Spec(Not-BWR6)	3.2	1
202001 Recirculation														0
202002 Recirculation Flow Control														0
204000 RWCU	0 3											Reactor feedwater system	3.1	1
214000 RPIS														0
215001 Traversing In-core Probe														0
215002 RBM								0 2				Loss or reduction in recirculation system flow (flow comparator): BWR-3, 4, 5	3	1
216000 Nuclear Boiler Inst.														0
219000 RHR/LPCI: Torus/Pool Cooling Mode	0 9											Nuclear boiler instrumentation	3.3	1
223001 Primary CTMT and Aux.														0
226001 RHR/LPCI: CTMT Spray Mode														0
230000 RHR/LPCI: Torus/Pool Spray Mode														0
233000 Fuel Pool Cooling/Cleanup														0
234000 Fuel Handling Equipment											01. 28	Knowledge of the purpose and function of major system components and controls	3.2	1
239001 Main and Reheat Steam														0
239003 MSIV Leakage Control												Suppressed - Not applicable at Quad Cities		0
241000 Reactor/Turbine Pressure Regulator										0 2		Turbine acceleration control: Plant-Specific	2.6	1
245000 Main Turbine Gen. / Aux.				0 3								Sealing to prevent hydrogen leakage	2.7	1
256000 Reactor Condensate														0
259001 Reactor Feedwater														0
268000 Radwaste														0
271000 Offgas														0
272000 Radiation Monitoring		0 1										Main steamline radiation monitors	2.5	1
286000 Fire Protection														0
288000 Plant Ventilation														0
290001 Secondary CTMT				0 1								Off-site radioactive release rates	4	1
290003 Control Room HVAC														0
290002 Reactor Vessel Internals					0 5							Brittle fracture	3.1	1
K/A Category Totals:	2	1	1	1	1	1	1	1	1	1	1	Group Point Total:		12

ES-401		BWR Examination Outline						Form ES-401-1	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4									0
295003 Partial or Complete Loss of AC / 6						04.04	Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.3	1
295004 Partial or Total Loss of DC Pwr / 6					04		System lineups	3.3	1
295005 Main Turbine Generator Trip / 3									0
295006 SCRAM / 1						01.32	Ability to explain and apply system limits and precautions.	3.8	1
295016 Control Room Abandonment / 7									0
295018 Partial or Total Loss of CCW / 8						01.27	Knowledge of system purpose and/or function.	2.9	1
295019 Partial or Total Loss of Inst. Air / 8									0
295021 Loss of Shutdown Cooling / 4									0
295023 Refueling Acc / 8									0
295024 High Drywell Pressure / 5									0
295025 High Reactor Pressure / 3					02		Reactor power	4.2	1
295026 Suppression Pool High Water Temp. / 5									0
295027 High Containment Temperature / 5							Suppressed - Not applicable at Quad Cities		0
295028 High Drywell Temperature / 5									0
295030 Low Suppression Pool Wtr Lvl / 5									0
295031 Reactor Low Water Level / 2						01.02	Knowledge of operator responsibilities during all modes of plant operation.	4	1
295037 SCRAM Condition Present and Power Above APRM Downscale or Unknown / 1									0
295038 High Off-site Release Rate / 9									0
600000 Plant Fire On Site / 8					13		Need for emergency plant shutdown	3.8	1
K/A Category Totals:	0	0	0	0	3	4	Group Point Total:		7

ES-401	BWR Examination Outline							Form ES-401-1	
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (SRO)									
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3						01. 28	Knowledge of the purpose and function of major system components and controls	3.3	1
295007 High Reactor Pressure / 3									0
295008 High Reactor Water Level / 2									0
295009 Low Reactor Water Level / 2									0
295010 High Drywell Pressure / 5									0
295011 High Containment Temp / 5							Suppressed - Not applicable at Quad Cities		0
295012 High Drywell Temperature / 5					0 1		Drywell temperature	3.9	1
295013 High Suppression Pool Temp. / 5									0
295014 Inadvertent Reactivity Addition / 1									0
295015 Incomplete SCRAM / 1									0
295017 High Off-site Release Rate / 9					0 4		Source of off-site release	4.3	1
295020 Inadvertent Cont. Isolation / 5 & 7									0
295022 Loss of CRD Pumps / 1									0
295029 High Suppression Pool Wtr Lvl / 5									0
295032 High Secondary Containment Area Temperature / 5									0
295033 High Secondary Containment Area Radiation Levels / 9									0
295034 Secondary Containment Ventilation High Radiation / 9									0
295035 Secondary Containment High Differential Pressure / 5									0
295036 Secondary Containment High Sump/Area Water Level / 5									0
500000 High CTMT Hydrogen Conc. / 5									0
K/A Category Totals:	0	0	0	0	2	1	Group Point Total:		3

ES-401	BWR Examination Outline											Form ES-401-1		
Plant Systems - Tier 2/Group 1 (SRO)														
E/APE # / Name / Safety Function	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	#
203000 RHR/LPCI: Injection														0
205000 Shutdown Cooling Mode														0
206000 HPCI														0
207000 Isolation (Emergency) Condenser												Suppressed - Not applicable at Quad Cities		0
209001 LPCS								10				High suppression pool temperature	3.4	1
209002 HPCS												Suppressed - Not applicable at Quad Cities		0
211000 SLC														0
212000 RPS														0
215003 IRM														0
215004 Source Range Monitor														0
215005 APRM / LPRM														0
217000 RCIC														0
218000 ADS														0
223002 PCIS/Nuclear Steam Supply Shutoff														0
239002 SRVs														0
259002 Reactor Water Level Control														0
261000 SGTS											01.14	Knowledge of system status criteria which require the notification of plant personnel.	3.3	1
262001 AC Electrical Distribution														0
262002 UPS (AC/DC)														0
263000 DC Electrical Distribution											01.32	Ability to explain and apply system limits and precautions.	3.8	1
264000 EDGs														0
300000 Instrument Air														0
400000 Component Cooling Water											01.32	Ability to explain and apply system limits and precautions	3.8	1
Safe Shutdown Makeup								09				ADDED: Loss of Room Cooling* Modified after 209002.A2.09	2.6	1
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	3	Group Point Total:		5

ES-401	BWR Examination Outline													Form ES-401-1	
Plant Systems - Tier 2/Group 2 (SRO)															
E/APE # / Name / Safety Function	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#	
201001 CRD Hydraulic														0	
201002 RMCS														0	
201003 Control Rod and Drive Mechanism														0	
201004 RSCS												Suppressed - Not applicable at Quad Cities		0	
201005 RCIS												Suppressed - Not applicable at Quad Cities		0	
201006 RWM														0	
202001 Recirculation														0	
202002 Recirculation Flow Control														0	
204000 RWCU														0	
214000 RPIS														0	
215001 Traversing In-core Probe														0	
215002 RBM														0	
216000 Nuclear Boiler Inst.														0	
219000 RHR/LPCI: Torus/Pool Cooling Mode														0	
223001 Primary CTMT and Aux.														0	
226001 RHR/LPCI: CTMT Spray Mode														0	
230000 RHR/LPCI: Torus/Pool Spray Mode								1				Loss of, or inadequate, heat exchanger cooling flow	3.3	1	
233000 Fuel Pool Cooling/Cleanup								6						0	
234000 Fuel Handling Equipment														0	
239001 Main and Reheat Steam														0	
239003 MSIV Leakage Control												Suppressed - Not applicable at Quad Cities		0	
241000 Reactor/Turbine Pressure Regulator														0	
245000 Main Turbine Gen. / Aux.														0	
256000 Reactor Condensate														0	
259001 Reactor Feedwater											02.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits	3.7	1	
268000 Radwaste														0	
271000 Offgas														0	
272000 Radiation Monitoring														0	
286000 Fire Protection														0	
288000 Plant Ventilation														0	
290001 Secondary CTMT								05				High area temperature	3.3	1	
290003 Control Room HVAC														0	
290002 Reactor Vessel Internals														0	
K/A Category Totals:	0	0	0	0	0	0	0	2	0	0	1	Group Point Total:		3	

Facility Name: Quad Cities Date of Exam: May 2 - 9, 2005						
Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1. 11	Knowledge of less than one hour technical specification action statements for systems.	3	1		
	2.1. 14	Knowledge of system status criteria which require the notification of plant personnel.	2.5	1		
	2.1. 05	Ability to locate and use procedures and directives related to shift staffing and activities.			3.4	1
	2.1. 09	Ability to direct personnel activities inside the control room			4	1
	2.1.					
	2.1.					
	Subtotal				2	
2. Equipment Control	2.2. 11	Knowledge of the process for controlling temporary changes.	2.5	1		
	2.2. 22	Knowledge of limiting conditions for operations and safety limits.	3.4	1		
	2.2. 24	Ability to analyze the affect of maintenance activities on LCO status	2.6	1		
	2.2. 29	Knowledge of SRO fuel handling responsibilities.			3.8	1
	2.2. 03	(multi-unit) Knowledge of the design, procedural, and operational differences between units.			3.3	1
	2.2.					
Subtotal				3		2
3. Radiation Control	2.3. 11	Ability to control radiation releases.	2.7	1		
	2.3. 02	Knowledge of facility ALARA program.	2.5	1		
	2.3. 10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	1		
	2.3. 01	Knowledge of 10 CFR 20 and related facility radiation control requirements.			3	1
	2.3.					
	2.3.					
Subtotal				3		1
4. Emergency Procedures / Plan	2.4. 08	Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.	3	1		
	2.4. 24	Knowledge of loss of cooling water procedures.	3.3	1		
	2.4. 22	Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.			4	1
	2.4. 07	Knowledge of event based EOP mitigation strategies.			3.8	1
	2.4.					
	2.4.					
Subtotal				2		2
Tier 3 Point Total				10		7

QUAD CITIES MAY 2005 INITIAL LICENSE EXAM OUTLINE COMMENTS

#	Source	Comment	Resolution
1.	Dynamic Simulator Scenarios	The SRO should get credit for <u>all</u> the Events in a scenario (not just some).	Comment incorporated.