

**2011 DUANE ARNOLD ENERGY CENTER**

**INITIAL EXAMINATION**

**OUTLINE SUBMITTAL**



April 7, 2011

NG-11-0123  
NUREG 1021

U.S. Nuclear Regulatory Commission, Region III  
Attention: Dell McNeil  
2443 Warrenville Road  
Suite 210  
Lisle, IL 60532-4352

Duane Arnold Energy Center  
Docket 50-331  
License No. DPR-49

Examination Material for Duane Arnold Energy Center Initial License  
Examination Week of June 27, 2011

In accordance with the guidelines of NUREG 1021, "Operating License Examination Standard for Power Reactors," Revision 9, we are sending you the integrated examination outlines for the initial license examinations to be administered at our facility the week of June 27, 2011.

NUREG 1021 physical security requirements state that the enclosed examination materials shall be withheld from public disclosure until after the examination is complete.

You may direct any questions or comments regarding this material to Curtis Hansen or Wayne Render at 319-851-7268.

This letter contains no new commitments.

A handwritten signature in black ink that reads "Christopher R. Costanzo".

Christopher R. Costanzo  
Vice President, Duane Arnold Energy Center  
NextEra Energy Duane Arnold, LLC

Enclosure

CC: Chief Operator License Branch, Region III  
NRC Resident Inspector  
NRC Document Control Desk

BLIND CARBON COPY LIST FOR NG-11-0123

April 7, 2011

D. Curtland w/o  
G. Pry w/o  
C. Hansen w/o  
W. Render w/o  
IRMS w/o  
S. Catron w/o  
W. Simmons w/o  
Licensing CTS Project w/o

SUBJECT: Examination Material for Duane Arnold Energy Center Initial  
License Examination Week of June 27, 2011

FILE CODES: A117a

Facility:	DAEC		Date of Examination:	6/ 2011		
Item	Task Description	Initials				
		a	b*	c#		
W R I T T E N	1. a. Verify that the outline(s) fit(s) the appropriate model per ES-401.	coll	ll	sm		
	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.	coll	ll	sm		
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	coll	ll	sm		
	d. Assess whether the justifications for deselected or rejected K/A statements are appropriate.	coll	ll	sm		
S I M U L A T O R	2. 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.	coll	ll	sm		
	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.	coll	ll	sm		
	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.	coll	ll	sm		
W / T	3. a. Verify that 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.	coll	ll	sm		
	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	coll	ll	sm		
	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.	coll	ll	sm		
G E N E R A L	4. a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	coll	ll	sm		
	b. Assess whether the 10CFR 55.41/43 and 55.45 sampling is appropriate.	coll	ll	sm		
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	coll	ll	sm		
	d. Check for duplication and overlap among exam sections.	coll	ll	sm		
	e. Check the entire exam for balance of coverage.	coll	ll	sm		
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	coll	ll	sm		
Printed Name / Signature		Date				
a. Author	<i>[Signature]</i>	4/8/11				
b. Facility Reviewer (*)	<i>[Signature]</i>	4/8/11				
c. NRC Chief Examiner (#)	Don R. McNeil / <i>[Signature]</i> for CDZ	4/21/2011				
d. NRC Supervisor	Michael E. Bielby / <i>[Signature]</i> for H. Peterson	4/22/2011				
NOTE: # Independent NRC reviewer initial items in Column "c", chief examiner concurrence required.						
* Not applicable for NRC-prepared examination outlines						

Facility: DAEC NRC

Date of Examination: 6/2011

Examination Level (circle one):

RO SRO

Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	D, S	<u>Performance of Attachment 10, Volume Weighted Drywell Average Air Temperature, of STP 3.0.0-01, Instrument Checks.</u> The candidate will determine the weighted volume average air temperature is above 135°F. K/A: 2.1.18 (3.6) Ability to make accurate, clear and concise logs, records, status boards, and reports.
Conduct of Operations	N, R	<u>Verification of License Requirements</u> Given information related to maintenance of active license status for three operators, the candidate will determine which operator(s), if any, is(are) qualified to relieve the watch. (the candidate will be given the status of 3 operators in regard to last medical exam, hours worked in last quarter, SCBA fit test latest date etc. AND given the procedure that describes the requirements, determine if anyone meets eligibility requirements) K/A: 2.1.4 (3.3) Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.
Equipment Control	M, R	<u>Identify the blocking points required for a pump motor replacement on a RBCCW pump.</u> The candidate will determine blocking points, tag types, and component position for a clearance on a RBCCW pump. K/A: 2.2.13 (4.3) Knowledge of tagging and clearance procedures
Radiation Control	D, R	<u>Inspection Of High Radiation Areas</u> The candidate will determine the expected exposure for the task and select the operator who can perform the task without exceeding DAEC limits. K/A 2.3.12 (3.7) 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.

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 &amp; Criteria:

(C)ontrol room, (S)imulator, or Class(R)oom

(D)irect from bank ( $\leq 3$  for ROs;  $\leq 4$  for SROs & RO retakes)(N)ew or (M)odified from bank ( $\geq 1$ )(P)revious 2 exams ( $\leq 1$ ; randomly selected)

Facility: DAEC NRC

Date of Examination: 6/2011

Examination Level (circle one):

RO **SRO**

Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	<p><u>Performance of Attachment 11, Core Thermal Limits Check, of STP 3.0.0-01, Instrument Checks.</u></p> <p>The candidate will perform the Core Thermal Limits check, determine that 2 values are OOS and reference the appropriate TS and recommend actions as required.</p> <p>K/A: 2.1.18 (3.6) Ability to make accurate, clear and concise logs, records, status boards, and reports.</p>
Conduct of Operations	N, R	<p><u>Verification of License Requirements</u></p> <p>Given information related to maintenance of active license status for three operators, the candidate will determine which operator(s), if any, is(are) qualified to relieve the watch.</p> <p>(the candidate will be given the status of 3 operators in regard to last medical exam, hours worked in last quarter, SCBA fit test latest date etc. AND given the procedure that describes the requirements, determine if anyone meets eligibility requirements)</p> <p>K/A: 2.1.4 (3.8) Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.</p>
Equipment Control	M, S	<p><u>Review the isolation points for RWS Bay "B" Diver Inspection &amp; "B" Core Spray Pump Motor Inspection by Electrical maintenance. Evaluate TS implications.</u></p> <p>The candidate will review the clearance requests for the work above and find an error on each one. Determines TS applicability.</p> <p>K/A: 2.2.13 (4.3) Knowledge of tagging and clearance procedures</p>
Radiation Control	P, R	<p><u>Dose and Exposure Authorization Review</u></p> <p>The candidate will determine the dose for a given task the need for an Emergency Exposure Authorization. Complete required paperwork</p> <p>K/A 2.3.4 (3.7) Knowledge of radiation exposure limits under normal or emergency conditions</p>
Emergency Plan	D, R	<p><u>Emergency Classification/Reclassification</u></p> <p>Given a set of plant conditions determine the appropriate EAL classification. Then, based on new information, reclassify the event. TIME CRITICAL.</p> <p>K/A 2.4.41 (4.6) Knowledge of the emergency action level thresholds and classifications.</p>
<p>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.</p>		
<p>*Type Codes &amp; Criteria:</p> <p>(C)ontrol room, (S)imulator, or Class(R)oom</p> <p>(D)irect from bank (<math>\leq 3</math> for ROs; <math>\leq 4</math> for SROs &amp; RO retakes)</p> <p>(N)ew or (M)odified from bank (<math>\geq 1</math>)</p> <p>(P)revious 2 exams (<math>\leq 1</math>; randomly selected)</p>		

Facility:	DAEC	NRC	Date of Examination:	6/2011
Exam Level:	<b>RO</b>	SRO-I SRO-U	Operating Test No.:	2011 NRC
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
S-1	<u>Reset a Scoop Tube Lockup on the A and B Recirc MG Sets</u> The operators will reset the Recirc MG Set Scoop tubes IAW OI 264.  K/A 202002 A4.01 3.3/3.	D, S	Reactivity Control (1)	
S-2	<u>Swap from the "B" FRV to the Startup FRV. Failure of the S/U FRV</u> The operator will shift feedwater level control from the B FRV to the S/U FRV IAW OI 644. The S/U FRV will fail requiring the B FRV to be placed back in service.  K/A 259002 A4.03 3.8/3.6	M, A, L, S	Reactor Water Inventory Control (2)	
S-3	<u>Establish a Leakage Path to the Main Condenser IAW AOP 672.2</u> The operator will establish a leakage path with the MSIVs closed following a fuel failure.  K/A 239003 A4.08 3.1/2.9	D, S	Radioactivity Release (9)	
S-4	<u>Manual Startup Using The Test Pot To Control HPCI In pressure control mode</u> The operator will place HPCI in service using the test pot and in the pressure control mode IAW OI 152, Section 5.1. During the evolution the min flow valve will fail to close.  K/A 206000 A4.01 3.8/3.7	N, A, S	Heat Removal From the Reactor Core (4)	
S-5	<u>Defeat Containment Atmosphere Monitoring Sample Line Isolation and Place H<sub>2</sub>O<sub>2</sub> Analyzers in Service</u> The operator will open Drywell and Torus sample lines after a PCIS 3 isolation and re-establish H <sub>2</sub> -O <sub>2</sub> Analyzers.  K/A 223001 A4.04 3.5/3.6	N, S	Containment Integrity (5)	
S-6	<u>Main Generator Synch to Grid</u> The operator will perform sections of OI 698 section 3.3 complete thru step 2, to synch the turbine to the grid. While loading the generator a primary lockout will occur and the generator will fail to trip. The generator trip PB will also fail requiring the operator to manually open the outputs and exciter field breaker (1C08C A-1)  K/A 262001 A4.04 3.6/3.7	M, A, S	Electrical (6)	
S-7	<u>Perform Downscale/Upscale Trip Operational Check of ARMs</u> The operator will perform the Downscale/Upscale trip operational check of ARM RI-9167, Reactor Building Railroad Access Area IAW OI-879.2.  K/A 272001 A4.02 3.0/3.0)	D, S	Instrumentation (7)	

Facility:	DAEC	NRC	Date of Examination:	6/2011
Exam Level:	<b>RO</b>	SRO-I	SRO-U	Operating Test No.: 2011 NRC
Control Room Systems <sup>®</sup> (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)				
System / JPM Title			Type Code*	Safety Function
S-8	<u>Install EOP Defeat 4 with a Group 7 Isolation</u> Install EOP Defeat 4 to restore Drywell cooling. (Alternate Path requires Well Water to be secured prior to installing Defeat 4, and then Well Water must be restarted).  K/A 400000 A4.01 3.1/3.0	D, A, EN, S	Plant Service Systems (8)	
P-1	<u>Manually Initiate Cable Spreading Room CO<sub>2</sub> Flood System</u> The operator will initiate Cable Spreading Room CO <sub>2</sub> Flood System but the alternate means will be required.  K/A 286000 2.1.30 4.4/4.0	P, A, R	Plant Systems (8)	
P-2	<u>Startup the "A" RPS generator set IAW OI 358</u> The operator will perform the in-plant actions to start up the "A" RPS MG set. EPA reset will be required  K/A 212000 2.1.20 4.6/4.6	M	Instrumentation (7)	
P-3	<u>Maximize CRD Injection IAW AIP 407</u> The operator will maximize the CRD System as a means of injecting water into the RPV when normal injection systems are inadequate or unavailable.  K/A 201001 2.1.23 4.3/4.4	N, E, R	Reactivity Control (1)	
<sup>®</sup> 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 / SRO-I / SRO-U		
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineering Safeguards Feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator		4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ $\geq 1 / \geq 1 / \geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$		



Facility:	DAEC	NRC	Date of Examination:	6/2011
Exam Level:	RO	<b>SRO-I</b>	SRO-U	Operating Test No.: 2011 NRC
Control Room Systems <sup>®</sup> (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)				
System / JPM Title			Type Code*	Safety Function
S-1				
S-2	<u>Swap from the "B" FRV to the Startup FRV. Failure of the S/U FRV</u> The operator will shift feedwater level control from the B FRV to the S/U FRV IAW OI 644. The S/U FRV will fail requiring the B FRV to be placed back in service.  K/A 259002 A4.03 3.8/3.6	M, A, L, S	Reactor Water Inventory Control (2)	
S-3	<u>Establish a Leakage Path to the Main Condenser IAW AOP 672.2</u> The operator will establish a leakage path with the MSIVs closed following a fuel failure.  K/A 239003 A4.08 3.1/2.9	D, S	Radioactivity Release (9)	
S-4	<u>Manual Startup Using The Test Pot To Control HPCI In pressure control mode</u> The operator will place HPCI in service using the test pot and in the pressure control mode IAW OI 152, Section 5.1. During the evolution the min flow valve will fail to close.  K/A 206000 A4.01 3.8/3.7	N, A, S	Heat Removal From the Reactor Core (4)	
S-5	<u>Defeat Containment Atmosphere Monitoring Sample Line Isolation and Place H<sub>2</sub>O<sub>2</sub> Analyzers in Service</u> The operator will open Drywell and Torus sample lines after a PCIS 3 isolation and re-establish H <sub>2</sub> -O <sub>2</sub> Analyzers.  K/A 223001 A4.04 3.5/3.6	N, S	Containment Integrity (5)	
S-6	<u>Main Generator Synch to Grid</u> The operator will perform sections of OI 698 section 3.3 complete thru step 2, to synch the turbine to the grid. While loading the generator a primary lockout will occur and the generator will fail to trip. The generator trip PB will also fail requiring the operator to manually open the outputs and exciter field breaker (1C08C A-1)  K/A 262001 A4.04 3.6/3.7	M, A, S	Electrical (6)	
S-7	<u>Perform Downscale/Upscale Trip Operational Check of ARMs</u> The operator will perform the Downscale/Upscale trip operational check of ARM RI-9167, Reactor Building Railroad Access Area IAW OI-879.2.  K/A 272001 A4.02 3.0/3.0)	D, S	Instrumentation (7)	

Facility:	DAEC	NRC	Date of Examination:	6/2011
Exam Level:	RO	<b>SRO-I</b>	SRO-U	Operating Test No.: 2011 NRC
Control Room Systems <sup>@</sup> (8 for RO; 7 for SRO-I; 2 or 3 for SRO-U, including 1 ESF)				
System / JPM Title			Type Code*	Safety Function
S-8	<u>Install EOP Defeat 4 with a Group 7 Isolation</u> Install EOP Defeat 4 to restore Drywell cooling. (Alternate Path requires Well Water to be secured prior to installing Defeat 4, and then Well Water must be restarted).  K/A 400000 A4.01 3.1/3.0		D, A, EN, S	Plant Service Systems (8)
P-1	<u>Manually Initiate Cable Spreading Room CO<sub>2</sub> Flood System</u> The operator will initiate Cable Spreading Room CO <sub>2</sub> Flood System but the alternate means will be required.  K/A 286000 2.1.30 4.4/4.0		P, A, R	Plant Systems (8)
P-2	<u>Startup the "A" RPS generator set IAW OI 358</u> The operator will perform the in-plant actions to start up the "A" RPS MG set. EPA reset will be required  K/A 212000 2.1.20 4.6/4.6		M	Instrumentation (7)
P-3	<u>Maximize CRD Injection IAW AIP 407</u> The operator will maximize the CRD System as a means of injecting water into the RPV when normal injection systems are inadequate or unavailable.  K/A 201001 2.1.23 4.3/4.4		N, E, R	Reactivity Control (1)
<sup>@</sup> 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 / SRO-I / SRO-U		
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineering Safeguards Feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator		4-6 / 4-6 / 2-3  $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ $\geq 1 / \geq 1 / \geq 1$ (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$		

Facility:	DAEC	NRC	Date of Examination:	6/2011
Exam Level:	RO	<b>SRO-I</b>	SRO-U	Operating Test No.: 2011 NRC

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

System / JPM Title	Type Code*	Safety Function
<b>S-8</b> <u>Install EOP Defeat 4 with a Group 7 Isolation</u> Install EOP Defeat 4 to restore Drywell cooling. (Alternate Path requires Well Water to be secured prior to installing Defeat 4, and then Well Water must be restarted).  K/A 400000 A4.01 3.1/3.0	D, A, EN, S	Plant Service Systems (8)
<b>P-1</b> <u>Manually Initiate Cable Spreading Room CO<sub>2</sub> Flood System</u> The operator will initiate Cable Spreading Room CO <sub>2</sub> Flood System but the alternate means will be required.  K/A 286000 2.1.30 4.4/4.0	D, A, R	Plant Systems (8)
<b>P-2</b> <u>Startup the "A" RPS generator set IAW OI 358</u> The operator will perform the in-plant actions to start up the "A" RPS MG set. EPA reset will be required  K/A 212000 2.1.20 4.6/4.6	M, A	Instrumentation (7)
<b>P-3</b> <u>Maximize CRD Injection IAW AIP 407</u> The operator will maximize the CRD System as a means of injecting water into the RPV when normal injection systems are inadequate or unavailable.  K/A 201001 2.1.23 4.3/4.4	N, E, R	Reactivity Control (1)

<sup>@</sup> 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 / 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
(EN)gineering Safeguards Feature	≥ 1 / ≥ 1 / ≥ 1 (control room system)
(L)ow-Power / Shutdown	≥ 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:	DAEC	NRC	Date of Examination:	6/2011
Exam Level:	RO	SRO-I	SRO-U	Operating Test No.: 2011 NRC
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
S-1				
S-2 <u>Swap from the "B" FRV to the Startup FRV. Failure of the S/U FRV</u> The operator will shift feedwater level control from the B FRV to the S/U FRV IAW OI 644. The S/U FRV will fail requiring the B FRV to be placed back in service. K/A 259002 A4.03 3.8/3.6			M, A, L, S	Reactor Water Inventory Control (2)
S-3 <u>Establish a Leakage Path to the Main Condenser IAW AOP 672.2</u> The operator will establish a leakage path with the MSIVs closed following a fuel failure. K/A 239003 A4.08 3.1/2.9			D, S	Radioactivity Release (9)
S-4				
S-5				
S-6				
S-7				
S-8 <u>Install EOP Defeat 4 with a Group 7 Isolation</u> Install EOP Defeat 4 to restore Drywell cooling. (Alternate Path requires Well Water to be secured prior to installing Defeat 4, and then Well Water must be restarted). K/A 400000 A4.01 3.1/3.0			D, A, EN, S	Plant Service Systems (8)
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@ 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 / SRO-I / SRO-U	
(A)lternate path			4-6 / 4-6 / 2-3	
(C)ontrol room				
(D)irect from bank			$\leq 9 / \leq 8 / \leq 4$	
(E)mergency or abnormal in-plant			$\geq 1 / \geq 1 / \geq 1$	
(EN)gineering Safeguards Feature			$\geq 1 / \geq 1 / \geq 1$ (control room system)	
(L)ow-Power / Shutdown			$\geq 1 / \geq 1 / \geq 1$	
(N)ew or (M)odified from bank including 1(A)			$\geq 2 / \geq 2 / \geq 1$	
(P)revious 2 exams			$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	
(R)CA			$\geq 1 / \geq 1 / \geq 1$	
(S)imulator				

Facility: DAEC			Date of Exam: June 2011						Operating Test No.: 1								
A P P L I C A N T	E V E N T  T Y P E	Scenarios															
		1			2			3			4			T O T A L	M I N I M U M(*)  R I U		
		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 1	RX			-					2					1	1	1	0
	NOR			1			1		-					2	1	1	1
	I/C			3,5,7			2,4		4,5					7	4	4	2
	MAJ			6			6		6					3	2	2	1
	TS			-			-		-					0	0	2	2
RO 2	RX			-					2				-	1	1	1	0
	NOR			1					-				1	2	1	1	1
	I/C			3,5,7					4,5				5,6,9	8	4	4	2
	MAJ			6					6				8	3	2	2	1
	TS			-					-				-	0	0	2	2
RO 3	RX			-					2					1	1	1	0
	NOR			1					-					1	1	1	1
	I/C			3,5,7					4,5					5	4	4	2
	MAJ			6					6					2	2	2	1
	TS			-					-					0	0	2	2
RO 4	RX		2								-			1	1	1	0
	NOR						1			1				2	1	1	1
	I/C		4,5,7				2,4			3,5,7,8				9	4	4	2
	MAJ		6				6			6				3	2	2	1
	TS						-			-				0	0	2	2
RO-5	RX									-		3		1	1	1	0
	NOR						1			1		-		2	1	1	1
	I/C						2,4			3,5,7,8		4,6,7		9	4	4	2
	MAJ						6			6		8		3	2	2	1
	TS						-			-		-		0	0	2	2
SROU 1	RX				3			2						2	1	1	0
	NOR				1			1						2	1	1	1
	I/C				2,4, 5,7			3,4, 5,7, 8						9	4	4	2
	MAJ				6			6						2	2	2	1
	TS				2,4			4,5						4	0	2	2

Facility: DAEC			Date of Exam: June 2011									Operating Test No.: 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					
																R	I	U
SROU-2	RX	2						2						2	1	1	0	
	NOR	1						1						2	1	1	1	
	I/C	3,4,5, 7						3,4,5, 7,8						9	4	4	2	
	MAJ	6						6						2	2	2	1	
	TS	3,5						4,5						4	0	2	2	
SROI - 1	RX	2				3				-				2	1	1	0	
	NOR	1								1				2	1	1	1	
	I/C	3,4,5, 7				5,7				3,5,7, 8				10	4	4	2	
	MAJ	6				6				6				3	2	2	1	
	TS	3,5								-				2	0	2	2	
SROI - 2	RX	2				3					3			3	1	1	0	
	NOR	1				-					1			2	1	1	1	
	I/C	3,4,5, 7				5,7					4,5,6, 7,9			11	4	4	2	
	MAJ	6				6					8			3	2	2	1	
	TS	3,5				-					2,4,6			5	0	2	2	
SROI - 3	RX					3		2						2	1	1	0	
	NOR					-		1						1	1	1	1	
	I/C					5,7		3,4,5, 7,8						7	4	4	2	
	MAJ					6		6						2	2	2	1	
	TS					-		4,5						2	0	2	2	
SROI - 4	RX		2		3									2	1	1	0	
	NOR		-		1									1	1	1	1	
	I/C		4,5,7		2,4,5, 7									7	4	4	2	
	MAJ		6		6									2	2	2	1	
	TS		-		2,4									2	0	2	2	
SROI - 5	RX		2		3									2	1	1	0	
	NOR		-		1									1	1	1	1	
	I/C		4,5,7		2,4,5, 7									7	4	4	2	
	MAJ		6		6									2	2	2	1	
	TS				2,4									2	0	2	2	

Facility: DAEC

Date of Exam: June 2011

Operating Test No.: 1

## 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.

Facility: DAEC 2011 NRC		Date of Exam: 5/2011																			
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	5	3	3				3	3			3	20	3	4	7					
	2	1	1	1				2	1			1	7	2	1	3					
	Tier Totals	6	4	4				5	4			4	27	5	5	10					
2. Plant Systems	1	3	3	2	2	2	2	2	2	3	3	2	26	2	3	5					
	2	1	1	1	1	2	1	1	1	1	1	1	12	0	2	3					
	Tier Totals	4	4	3	3	4	3	3	3	4	4	3	38	4	4	8					
3. Generic Knowledge & Abilities Categories				1		2		3		4		10	1		2		3		4		7
				3		2		2		3			2		2		1		2		
<p>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).</p> <p>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.</p> <p>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 section D.1.b of ES-401, for guidance regarding elimination of inappropriate K/A statements.</p> <p>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.</p> <p>5. Absent a plant specific priority, only those KAs 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.</p> <p>6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.</p> <p>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/A's</p> <p>8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. 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.</p> <p>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 10CFR55.43</p>																					



BWR Examination Outline										
Emergency and Abnormal Plant Evolutions - Tier 1 Group 1 (RO/SRO)										
EAPE#/Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#	
295030 Low Suppression Pool Water Level / 5					X		EA2.01 - Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Suppression pool level	4.2	76	
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4					X		AA2.06 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Nuclear boiler instrumentation	3.3	77	
295018 Partial or Total Loss of CCW / 8					X		AA2.01 - Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: Component temperatures	3.4	78	
295025 High Reactor Pressure / 3						X	2.4.45 - Emergency Procedures / Plan: Ability to prioritize and interpret the significance of each annunciator or alarm.	4.3	79	
295019 Partial or Total Loss of Inst. Air / 8						X	2.4.35 - Emergency Procedures / Plan: Knowledge of local auxiliary operator tasks during emergency and the resultant operational effects.	4.0	80	
295023 Refueling Accidents / 8						X	2.2.22 - Equipment Control: Knowledge of limiting conditions for operations and safety limits.	4.7	81	
295021 Loss of Shutdown Cooling / 4						X	2.4.9 - Emergency Procedures / Plan: Knowledge of low power / shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	82	

BWR Examination Outline									
Emergency and Abnormal Plant Evolutions - Tier 1 Group 1 (RO/SRO)									
EAPE#/Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
295023 Refueling Accidents / 8	X						AK1.01 - Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS: Radiation exposure hazards	3.6	39
295025 High Reactor Pressure / 3	X						EK1.06 - Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE : Pressure effects on reactor water level	3.5	40
295024 High Drywell Pressure / 5	X						EK1.01 - Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE : Drywell integrity: Plant-Specific	4.1	41
295005 Main Turbine Generator Trip / 3		X					AK2.05 - Knowledge of the interrelations between MAIN TURBINE GENERATOR TRIP and the following: Extraction steam system	2.6	42
295003 Partial or Complete Loss of AC / 6		X					AK2.04 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF A.C. POWER and the following: A.C. electrical loads	3.4	43
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4		X					AK2.03 - Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and the following: Reactor water level	3.6	44
600000 Plant Fire On-site / 8			X				AK3.04 - Knowledge of the reasons for the following responses as they apply to PLANT FIRE ON SITE: Actions contained in the abnormal procedure for plant fire on site	2.8	45

BWR Examination Outline										
Emergency and Abnormal Plant Evolutions - Tier 1 Group 1 (RO/SRO)										
EAPE#/Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#	
295037 SCRAM Conditions Present and Reactor Power Above APRM Downscale or Unknown / 1			X				EK3.05 - Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Cold shutdown boron weight: Plant-Specific	3.2	46	
295019 Partial or Total Loss of Inst. Air / 8			X				AK3.02 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR: Standby air compressor operation	3.5	47	
295018 Partial or Total Loss of CCW / 8				X			AA1.02 - Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: System loads	3.3	48	
700000 Generator Voltage and Electric Grid Disturbances				X			AA1.04 - Ability to operate and/or monitor the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Reactor controls.	4.1	49	
295006 SCRAM / 1				X			AA1.02 - Ability to operate and/or monitor the following as they apply to SCRAM: Reactor water level control system	3.9	50	
295030 Low Suppression Pool Water Level / 5					X		EA2.02 - Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: Suppression pool temperature	3.9	51	
295021 Loss of Shutdown Cooling / 4					X		AA2.03 - Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING: Reactor water level	3.5	52	

BWR Examination Outline										
Emergency and Abnormal Plant Evolutions - Tier 1 Group 1 (RO/SRO)										
EAPE#/Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#	
295038 High Off-site Release Rate / 9					X		EA2.04 - Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE: Source of off-site release	4.1	53	
295031 Reactor Low Water Level / 2	X						EK1.03 - Knowledge of the operational implications of the following concepts as they apply to REACTOR LOW WATER LEVEL: Water level effects on reactor power	3.7	54	
295026 Suppression Pool High Water Temp. / 5						X	2.1.28 - Conduct of Operations: Knowledge of the purpose and function of major system components and controls.	4.1	55	
295004 Partial or Total Loss of DC Pwr / 6						X	2.4.31 - Emergency Procedures / Plan: Knowledge of annunciator alarms, indications, or response procedures.	4.2	56	
295016 Control Room Abandonment / 7						X	2.1.2 - Knowledge of operator responsibilities during all modes of plant operation.	4.1	57	
295028 High Drywell Temperature / 5	X						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE: Equipment environmental qualification	2.9	58	
K/A Category Totals	5	3	3	3	3/3	3/4	Group Point Total:		20/7	

BWR Examination Outline									
Emergency and Abnormal Plant Evolutions - Tier 1 Group 2 (RO/SRO)									
EAPE#/Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
295020 Inadvertent Cont. Isolation / 5 & 7					X		AA2.04 - Ability to determine and/or interpret the following as they apply to INADVERTENT CONTAINMENT ISOLATION: Reactor pressure	3.9	83
295017 High Off-site Release Rate / 9						X	2.1.19 - Conduct of Operations: Ability to use plant computers to evaluate system or component status.	3.8	84
295002 Loss of Main Condenser Vac / 3					X		AA2.04 - Ability to determine and/or interpret the following as they apply to LOSS OF MAIN CONDENSER VACUUM: Offgas system flow	2.9	85
295035 Secondary Containment High Differential Pressure / 5	X						EK1.02 - Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE: Radiation release	3.7	59
500000 High CTMT Hydrogen Conc. / 5		X					EK2.03 - Knowledge of the interrelations between HIGH CONTAINMENT HYDROGEN CONCENTRATIONS the following: Containment Atmosphere Control System	3.3	60
295007 High Reactor Pressure / 3			X				AK3.05 - Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE: Low pressure system isolation	3.0	61
295013 High Suppression Pool Temperature / 5				X			AA1.01 - Ability to operate and/or monitor the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Suppression pool cooling	3.9	62

BWR Examination Outline									
Emergency and Abnormal Plant Evolutions - Tier 1 Group 2 (RO/SRO)									
EAPE#/Name Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Q#
295036 Secondary Containment High Sump/Area Water Level / 5					X		EA2.03 - Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL: Cause of the high water level	3.4	63
295022 Loss of Control Rod Drive Pumps / 1						X	2.1.20 - Conduct of Operations: Ability to interpret and execute procedure steps.	4.6	64
295008 High Reactor Water Level / 2				X			AA1.03 - Ability to operate and/or monitor the following as they apply to HIGH REACTOR WATER LEVEL: Main steam system -	3.3	65
K/A Category Totals	1	1	1	2	1/2	1/1	Group Point Total:	7/3	

**BWR Examination Outline**  
**Plant Systems - Tier 2 Group 1 (RO/SRO)**

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Q#
218000 ADS								X				A2.03 - Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of air supply to ADS valves: Plant-Specific	3.6	86
259002 Reactor Water Level Control								X				A2.06 - Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of controller signal output	3.4	87
206000 HPCI											X	2.4.18 - Emergency Procedures / Plan: Knowledge of the specific bases for EOPs.	4.0	88
262001 AC Electrical Distribution											X	2.4.50 - Emergency Procedures / Plan: Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	4.0	89
300000 Instrument Air											X	2.1.7 - Conduct of Operations: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	4.7	90

BWR Examination Outline															
Plant Systems - Tier 2 Group 1 (RO/SRO)															
System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)			Imp. Q#
206000 HPCI	X											K1.10 - Knowledge of the physical connections and/or cause- effect relationships between HIGH PRESSURE COOLANT INJECTION SYSTEM and the following: Condensate storage and transfer system: BWR-2,3,4			3.4 1
211000 SLC	X											K1.01 - Knowledge of the physical connections and/or cause- effect relationships between STANDBY LIQUID CONTROL SYSTEM and the following: Core spray line break detection: Plant-Specific			3.0 2
400000 Component Cooling Water		X										K2.02 - Knowledge of electrical power supplies to the following: CCW valves			2.9 3
300000 Instrument Air		X										K2.02 - Knowledge of electrical power supplies to the following: Emergency air compressor			3.0 4
215005 APRM / LPRM			X									K3.08 - Knowledge of the effect that a loss or malfunction of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM will have on following: core thermal calculations			3.0 5



BWR Examination Outline															
Plant Systems - Tier 2 Group 1 (RO/SRO)															
System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Q#	
212000 RPS			X									K3.10 - Knowledge of the effect that a loss or malfunction of the REACTOR PROTECTION SYSTEM will have on following: The ability of the core cooling systems to provide adequate core cooling during loss of coolant accidents	3.5	6	
217000 RCIC				X								K4.04 - Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following: Prevents turbine damage: Plant-Specific	3.0	7	
205000 Shutdown Cooling				X								K4.03 - Knowledge of SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) design feature(s) and/or interlocks which provide for the following: Low reactor water level: Plant-Specific	3.8	8	
218000 ADS					X							K5.01 - Knowledge of the operational implications of the following concepts as they apply to AUTOMATIC DEPRESSURIZATION SYSTEM: ADS logic operation	3.8	9	
203000 RHR/LPCI: Injection Mode					X							K5.02 - Knowledge of the operational implications of the following concepts as they apply to RHR/LPCI: INJECTION MODE (PLANT SPECIFIC): Core cooling methods	3.5	10	

**BWR Examination Outline**  
**Plant Systems - Tier 2 Group 1 (RO/SRO)**

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Q#
209001 LPCS						X						K6.11 - Knowledge of the effect that a loss or malfunction of the following will have on the LOW PRESSURE CORE SPRAY SYSTEM: ADS	3.6	11
261000 SGTS						X						K6.03 - Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY GAS TREATMENT SYSTEM: Emergency diesel generator system	3.0	12
215003 IRM							X					A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM controls including: Reactor power indication response to rod position changes	3.7	13
223002 PCIS/Nuclear Steam Supply Shutoff							X					A1.03 - Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF controls including: SPDS/ERIS/CRIDS/GDS : Plant-Specific	2.5	14

BWR Examination Outline															
Plant Systems - Tier 2 Group 1 (RO/SRO)															
System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Q#	
239002 SRVs								X				A2.01 - Ability to (a) predict the impacts of the following on the RELIEF/SAFETY VALVES; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Stuck open vacuum breakers	3.0	15	
259002 Reactor Water Level Control								X				A2.05 - Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Loss of applicable plant air systems	3.2	16	
264000 EDGs									X			A3.06 - Ability to monitor automatic operations of the EMERGENCY GENERATORS (DIESEL/JET) including: Cooling water system operation	3.1	17	
262002 UPS (AC/DC)									X			A3.01 - Ability to monitor automatic operations of the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) including: Transfer from preferred to alternate source	2.8	18	
262001 AC Electrical Distribution										X		A4.04 - Ability to manually operate and/or monitor in the control room: Synchronizing and paralleling of different A.C. supplies	3.6	19	

BWR Examination Outline														
Plant Systems - Tier 2 Group 1 (RO/SRO)														
System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		Imp. Q#
215004 Source Range Monitor										X		A4.06 - Ability to manually operate and/or monitor in the control room: Alarms and lights		3.2 20
263000 DC Electrical Distribution										X		2.2.22 - Equipment Control: Knowledge of limiting conditions for operations and safety limits.		4.0 21
215005 APRM / LPRM										X		2.1.30 - Conduct of Operations: Ability to locate and operate components, including local controls.		4.4 22
218000 ADS	X											K1.01 - Knowledge of the physical connections and/or cause- effect relationships between AUTOMATIC DEPRESSURIZATION SYSTEM and the following: RHR/LPCI: Plant-Specific		4.0 23
212000 RPS									X			A3.05 - Ability to monitor automatic operations of the REACTOR PROTECTION SYSTEM including: SCRAM instrument volume level		3.9 24
209001 LPCS										X		A4.02 - Ability to manually operate and/or monitor in the control room: Suction valves		3.5 25
203000 RHR/LPCI: Injection Mode		X										K2.03 - Knowledge of electrical power supplies to the following: Initiation logic		2.7 26
K/A Category Totals	3	3	2	2	2	2	2	2/2	3	3	2/3	Group Point Total:		26/5

BWR Examination Outline															
Plant Systems - Tier 2 Group 2 (RO/SRO)															
System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		Imp.	Q#
202002 Recirculation Flow Control								X				A2.06 - Ability to (a) predict the impacts of the following on the RECIRCULATION FLOW CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low reactor water level: Plant-Specific		3.3	91
204000 RWCU											X	2.1.30 - Conduct of Operations: Ability to locate and operate components, including local controls.		4.0	92
201006 RWM								X				A2.05 - Ability to (a) predict the impacts of the following on the ROD WORTH MINIMIZER SYSTEM (RWH) (PLANT SPECIFIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Out of sequence rod movement; P-Spec(Not-BWR 6)		3.5	93
201002 RMCS	X											K1.04 - Knowledge of the physical connections and/or cause- effect relationships between REACTOR MANUAL CONTROL SYSTEM and the following: Rod block monitor: Plant-Specific		3.5	27

**BWR Examination Outline**  
**Plant Systems - Tier 2 Group 2 (RO/SRO)**

System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Q#
256000 Reactor Condensate		X										K2.01 - Knowledge of electrical power supplies to the following: System pumps	2.7	28
290003 Control Room HVAC			X									K3.01 - Knowledge of the effect that a loss or malfunction of the CONTROL ROOM HVAC will have on following: Control room habitability	3.5	29
233000 Fuel Pool Cooling/Cleanup				X								K4.06 - Knowledge of FUEL POOL COOLING AND CLEAN-UP design feature(s) and/or interlocks which provide for the following: Maintenance of adequate pool level	2.9	30
201006 RWM					X							K5.01 - Knowledge of ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following: Minimize clad damage if a control rod drop accident (CRDA) occurs: P-Spec(Not-BWR6)	3.3	31
245000 Main Turbine Gen. / Aux.						X						K6.10 - Knowledge of the effect that a loss or malfunction of the following will have on the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS: Lube oil system	2.8	32
202001 Recirculation							X					A1.02 - Ability to predict and/or monitor changes in parameters associated with operating the RECIRCULATION SYSTEM controls including: Jet pump flow	3.4	33

BWR Examination Outline														
Plant Systems - Tier 2 Group 2 (RO/SRO)														
System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Q#
272000 Radiation Monitoring								X				A2.15 - Ability to predict the impacts of the following on the RADIATION MONITORING SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Maintenance operations	2.5	34
286000 Fire Protection									X			A3.04 - Ability to monitor automatic operations of the FIRE PROTECTION SYSTEM including: System initiation	3.2	35
215002 RBM										X		A4.01 - Ability to manually operate and/or monitor in the control room: IRM/RBM recorder/switch: BWR-3,4,5	2.8	36
268000 Radwaste											X	2.4.21 - Emergency Procedures / Plan: Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	4.0	37

BWR Examination Outline Plant Systems - Tier 2 Group 2 (RO/SRO)														
System #/Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)		Imp. Q#
216000 Nuclear Boiler Inst.					X							K5.10 - Knowledge of the operational implications of the following concepts as they apply to NUCLEAR BOILER INSTRUMENTATION: Indicated level versus actual vessel level during vessel heatups or cooldowns		3.1 38
K/A Category Totals	1	1	1	1	2	1	1	1/2	1	1	1/1	Group Point Total:		12/3



Facility: Duane Arnold 2010 Audit		Date: 6/2011				
Category	KA #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.1	Knowledge of conduct of operations requirements	3.8	66		
	2.1.26	Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).	3.4	67		
	2.1.40	Knowledge of refueling administrative requirements	2.8	75		
	2.1.35	Knowledge of the fuel-handling responsibilities of SRO's.			3.9	94
	2.1.36	Knowledge of procedures and limitations involved in core alterations.			4.1	99
Subtotal				3		2
2. Equipment Control	2.2.39	Knowledge of less than or equal to one hour technical specification action statements for systems.	3.9	68		
	2.2.14	Knowledge of the process for controlling equipment configuration or status.	3.9	69		
	2.2.5	Knowledge of the process for making design or operating changes to the facility.			3.2	95
	2.2.19	Knowledge of maintenance work order requirements.			3.4	100
Subtotal				2		2

3. Radiation Control	2.3.7	Ability to comply with radiation work permit requirements during normal or abnormal conditions.	3.5	70		
	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	71		
	2.3.11	Ability to control radiation releases.			3.8	96
Subtotal				2		1
4. Emergency Procedures / Plan	2.4.28	Knowledge of procedures relating to a security event (non-safeguards information).	3.2	72		
	2.4.16	Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, AOP's and SAMG's.	3.5	73		
	2.4.8	Knowledge of how abnormal operating procedures are used in conjunction with EOPs	3.8	74		
	2.4.29	Knowledge of the emergency plan.			4.4	97
	2.4.46	Ability to verify that the alarms are consistent with the plant conditions.			4.2	98
Subtotal				3		2
Tier 3 Point Total:				10		7

Based on the validation week and the number of candidates, we did not use Scenarios 1 and 2 for the exam. In addition, the licensee requested that we avoid putting these in ADAMS so that they could still be used for exam material.

Scenario Event Description  
DAEC 2011 NRC Scenario 3

ES-D1

Facility:	DAEC	Scenario No.:	3	Op Test No.:	2011 NRC
Examiners:	_____	Operators:	SRO - _____		
	_____		RO - _____		
	_____		BOP - _____		
Initial Conditions:	<ul style="list-style-type: none"> <li>100% Reactor Power</li> <li>RCIC TS LCO 3.5.3.A. – Day 1 of 14 day LCO</li> </ul>				
Turnover:	<ul style="list-style-type: none"> <li>RCIC was operating in CST-CST for baseline vibration testing. An Engineer accidentally bumped the mechanical overspeed lever and RCIC tripped. A visual inspection determined no damage to RCIC and the trip is ready to be reset and placed in standby IAW OI-150, Section 3.3. The 2<sup>nd</sup> Assistant and the System Engineer are standing by in the RCIC room to observe the reset.</li> <li>Once RCIC is back in Standby, continue the to raise power with Control Rods. RE direction is to pull two steps of rods, then wait for conditioning.</li> </ul>				
Critical Tasks:	<ol style="list-style-type: none"> <li>With a Primary System discharging into secondary containment, insert a manual scram before any parameter reaches the Max Safe Operating Limit.</li> <li>With a Primary System discharging into secondary containment and the same parameter exceeding the Max Safe Operating Limit in more than one area perform an Emergency Depressurization.</li> </ol>				
Event No.	Malf. No.	Event Type*	Event Description		
1	N/A	N - BOP N - SRO	Unisolate and reset RCIC		
2	N/A	R – RO R - SRO	Raise reactor power with control rods.		
3	SW21D	C – BOP C - SRO	D Well Water Pump trip  AOP 408		
4	RR17A	C – RO C– SRO TS-SRO	"B" Reactor Recirc Pump speed controller fails downscale  AOP 255.2 TS 3.4.1		
5	RP02B	C-ALL TS-SRO	RPS "A" EPA Breaker Trip  AOP 358 TS 3.3.8.2., TS 3.6.1.3		
6	HP05, 08 ED06C	M-ALL	Unisolable HPCI leak in secondary containment, Startup XFMR Lockout  EOP-1, EOP-2, EOP-ED		
7	STRC01	C-BOP C-SRO	RCIC Fails to auto start		
8	Override DI-AD-19	C-BOP C-SRO	"One ADS SRV fails to open		
<p>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor</p>					

**DAEC 2011 NRC Scenario #3**

The scenario begins with reactor power at 90%. RCIC was operating in CST-CST for baseline vibration testing. An Engineer accidentally bumped the mechanical overspeed lever and RCIC tripped. A visual inspection determined no damage to RCIC and the trip is ready to be reset and placed in standby IAW OI-150, Section 3.3.

Once RCIC is placed in standby, the crew will continue to raise reactor power with control rods. Then the "B" Recirc Pump flow controller will fail downscale and the operators will lock up the scoop tube IAW the AOP. The SRO will address Technical Specifications (TS) for the speed mismatch.

An EPA breaker will trip on "A" RPS resulting in ½ scram. The crew will enter the AOP, transfer RPS to the alternate supply and the ½ scram will be reset. The SRO will address TS for the EPA trip.

The Main Turbine will experience high vibration and the crew will be required to lower reactor power. This results in lowering vibration on the Main Turbine. A leak will develop on the HPCI steam line in Secondary Containment and will not be isolable. Area temperatures will rise requiring EOP entry and a reactor scram (**CRITICAL TASK 1.0**). Additionally, as RPV level lowers RCIC will fail to initiate at its auto setpoint and must be placed in service manually for RPV level control. As area temperatures continue to rise, an Emergency Depressurization(ED) must be performed when the max safe operating limit is exceeded in more than one area (**CRITICAL TASK 2.0**). During the ED, one ADS SRV will fail to open and another SRV must be opened.

The scenario ends with the ED completed and RPV level at >170 inches.

Scenario Event Description  
DAEC 2011 NRC Scenario 4

ES-D1

Facility:	DAEC	Scenario No.:	4	Op Test No.:	2011 NRC
Examiners:	_____	Operators:	SRO -		
	_____		RO -		
	_____		BOP -		
Initial Conditions:	<ul style="list-style-type: none"> <li>Plant shutdown for refueling outage in progress</li> <li>Currently in IPOI-3, Section 5.0 Step (8)</li> <li>Step 31 of the Pull Sheet, 2 Rods at position 30</li> <li>Reactor Power 59%</li> </ul>				
Turnover:	<ul style="list-style-type: none"> <li>Perform STP 3.3.1.1-17 – MSIV Function Test</li> <li>Continue lowering power as directed with control rods</li> <li>Secure the second Feedwater and Condensate pumps at 50% power</li> </ul>				
Critical Tasks:	<ol style="list-style-type: none"> <li>Following a LOOP, manually start the "B" SBDG to re-power the Essential Bus.</li> <li>Recover RPV level prior to an Emergency Depressurization required.</li> </ol>				

  

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N - BOP N - SRO	MSIV Trip/Close Functional test
2	Override DI-MS-058	TS-SRO	MSIV fails closed  TS 3.6.1.3
3	N/A	R-RO R-SRO	Lower power with Control Rods
4	NM08C	C – RO C– SRO TS	"C" APRM Upscale, ½ Scram  Briefly in TS 3.3.1.1
5	Overrides An1c03b(2)	C-BOP C-SRO	"A" RHR pump start, fails to trip on overcurrent
6	ED08A	C – ALL TS	Loss of Bus 1A1  AOP304.1, AOP 264 TS – 3.4.1
7	FW02B RP05A OVERRIDE S	C-RO C-SRO	Loss of Condensate/Feedwater – Reactor Scram – RPS PB Failure  IPOI-5, EOP-1
8	ED01A,B,C RR15B DG02A STDG02	M - ALL	Loss of Offsite Power, "A" SBDG Output breaker will not close, "B" SBDG fails to Auto-Start, Small Recirc Break  EOP-1, EOP-2
9	RC05 HP03	C – BOP C – SRO	RCIC Fails, HPCI Controller fails in auto

  

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

**DAEC 2011 NRC Scenario #4**

The scenario begins with the reactor at 60% power and a shutdown in progress. The crew will perform the MSIV Trip/Close Functional Test. During the test, one MSIV will fail closed. The SRO will address Technical Specifications (TS) for the valve failure.

The crew will continue the shutdown by inserting control rods. While moving control rods, an APRM will fail upscale and the crew will take procedural actions to bypass the APRM and reset the ½ scram. Then, a RHR pump will spuriously start and its minimum flow valve will fail to open. The SRO will address TS and direct removing the pump from service. Once TS are addressed, a loss of Non Essential 4160v Bus 1A1 will occur. The crew will take actions IAW the AOP and address the resultant Recirc Pump trip and also swap bus power supplies. The SRO will address TS for single loop operation.

Then, the condensate pumps will trip causing a loss of Feedwater. The crew will insert a manual scram and the SRO will enter IPO-5 due to the scram and EOP-1 due to low RPV level. After the initial scram actions are performed, a LOOP will occur with a small drywell leak. The output breaker on the "A" SBDG will fail to close and cannot be closed. The "B" SBDG will fail to start and must be started manually to power an Essential Bus (**CRITICAL TASK 1.0**). As the operators attempt to recover RPV level, RCIC will fail and the HPCI flow controller must be operated in manual to permit level recovery before an Emergency Depressurization is required (**CRITICAL TASK 2.0**).

The scenario may be terminated when the "B" essential bus is recovered and RPV level is >170inches.