

**ADMINISTRATIVE TOPICS OUTLINE      FORM ES-301-1**

Facility: Columbia Generating Station		Date of examination: October 2002
Examination level: <b>SRO</b>		Operating test number:
Administrative Topic/Subject Description		Describe the method of evaluation: 1. ONE admin JPM, OR 2. TWO Administrative questions
A.1	Fuel Handling	2.1.20 4.3/4.2 – Ability to execute procedure steps.  Given PPM 1.3.40, ATT. 7.5 of 1.3.40, and LCS 1.9.2, determine allowable movement of heavy load over the spent fuel pool.
	JPM	
A.1	Shift Turnover	2.1.18 2.9/3.0 – Ability to make accurate, clear and concise logs, records, status boards, and reports.  Given a frozen simulator with out of service equipment, complete a shift turnover sheet for the on-coming Shift Manager.
	JPM	
A.2	Use of Piping and Instrumentation Drawings	2.1.24 2.8/3.1 – Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.  Use EWDs to explain the override function of LPCS-RMS-S21 for LPCS-V-5.
	JPM	
A.3	Radiation Exposure Limits	2.3.4 2.5/3.1 – Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.  Complete the paperwork for Planned Special Exposure. <b>2001 NRC EXAM</b>
	JPM	
A.4	Security	2.4.41 2.3/4.1 – Knowledge of Emergency Plan action level thresholds and classifications.  Given a table top scenario with a security event, complete a CNF form with the correct EAL based on the security event.
	JPM	

**ADMINISTRATIVE TOPICS OUTLINE      FORM ES-301-1**

Facility: Columbia Generating Station		Date of examination: October 2002
Examination level: <b>RO</b>		Operating test number:
Administrative Topic/Subject Description	Describe the method of evaluation: 1. ONE admin JPM, OR 2. TWO Administrative questions	
A.1	Plant Parameter Verification  JPM	2.1.7 3.7/4.4 – Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.  Using the graph in PPM 3.1.2, determine minimum feedwater temperature prior to entry into the Area of Increased Awareness.
	Shift Turnover  JPM	2.1.18 2.9/3.0 – Ability to make accurate, clear and concise logs, records, status boards, and reports.  Given a frozen simulator with out of service equipment, complete a shift turnover sheet for the on-coming Shift Manager.
A.2	Use of Piping and Instrumentation Drawings  JPM	2.1.24 2.8/3.1 – Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.  Use EWDs to explain the override function of LPCS-RMS-S21 for LPCS-V-5.
A.3	Use and functioning of personnel monitoring equipment  JPM	2.3.10 2.9/3.3 – Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.  Perform manual frisk of material into the Main Control Room. <b>1999 NRC Exam.</b>
A.4	Emergency facilities  2 questions	2.4.29 2.6/4.0 – Knowledge of the Emergency Plan.  At what Emergency Action Level does the Technical Support Center activate? <b>CLOSED REFERENCE</b>  Given a scenario with the Shift Manager out of the control room, determine who the Emergency Director is. <b>CLOSED REFERENCE</b>

**Facility:** COLUMBIA**Scenario No.:** 1**Op-Test No.:** 1**Examiners:** \_\_\_\_\_ **Operators:** \_\_\_\_\_

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**Initial conditions:** IC-194. The reactor is approaching criticality. IRM "C" is out of service and bypassed.

**Turnover:** A plant startup is in progress. The reactor is approaching criticality. The off-going shift pulled rods up through RWM group 12. The "C" IRM failed downscale 4 hours ago and the associated bypass switch is caution tagged. As the startup continues, RWCU will need to be lined up for reactor water level control.

Event No.	Malf. No.	Event Type*	Event Description
1.		R (RO)	Withdraw control rods to bring the reactor critical.
2.		N (BOP)	Establish Reactor Water Cleanup blow-down flow for Reactor Water Level control.
3.		C (BOP)	Loss of REA-FN-1B resulting in a high reactor building pressure and entry into EOP Secondary Containment Control, 5.3.1.
4.		I (RO)	IRM 'A' fails upscale resulting in a half scram on the 'A' side of RPS.
5.		M (All)	An earthquake results in a Loss of All Offsite Power and a LOCA. <b>(Columbia IPE)</b>
6.		C	The Division 1 emergency bus, SM-7, locks-out resulting in a loss of power to the bus and its loads.
7.		C	The output breaker of the HPCS diesel generator fails to auto close requiring the operator to manually close the breaker in order to operate HPCS.
8.		C	The injection valve for the 'C' loop of RHR, RHR-V-42C, fails to auto open on an injection signal.

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

Facility: COLUMBIA

Scenario No.: 2

Op-Test No.: 1

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
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**Initial conditions:** IC-194. The reactor is at 100% power on a beginning of life core. Diesel Generator #1 is operating at full load for its monthly operability check.

**Turnover:** The plant is at 100% power. DG-1 is fully loaded for OSP-ELEC-M701 (currently at step 7.5.62). There are 20 minutes left on the one-hour diesel run. Wetwell temperature is slowly rising due to two SRV's that are leaking by. The off-going shift recommends that suppression pool cooling be initiated as soon as you take the shift.

Event No.	Malf. No.	Event Type*	Event Description
1.		N (BOP)	Place RHR into the suppression pool cooling mode.
2.		C (BOP)	High-pressure feedwater heater '6A' level controller fails high resulting in the trip of feedwater heater '6A'.
3.		R (RO)	Reduces reactor power with recirc flow in accordance with the subsequent actions of ABN-POWER.
4.		C (RO)	The 'A' recirc pump fails to follow the automatic controller and must be taken to manual for reduction and balance of recirc flow.
5.		I (RO)	APRM 'A' GAF drifts down during the power reduction resulting in APRM indication reading non-conservative.
6.		N (BOP) C (BOP)	Reduces load on DG-1 at completion of OSP-ELEC-M701. DG-1 Governor begins oscillating requiring the emergency trip of the diesel from the control room. <b>(Columbia LER 98-014)</b>
7.		C (All)	DEH oil leak resulting in a Main Turbine trip and a loss of Bypass Valves.
8.		M (All)	Reactor scrams due to the Main Turbine trip. A 100% ATWS prevents inward rod movement by scram <b>(Columbia IPE)</b>
9.		C	The Graphical Display System (GDS) locks up during the Main Turbine trip transient.
10.		C	The SLC common discharge header ruptures in the reactor building preventing boron from reaching the core.

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

**Facility:** COLUMBIA**Scenario No.:** 3**Op-Test No.:** 1**Examiners:** \_\_\_\_\_ **Operators:** \_\_\_\_\_

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**Initial conditions:** IC-195. Reactor power is at 35% on a beginning of life core.

**Turnover:** The reactor is at 35% power with a reactor shutdown in progress. A power reduction to 30% has been directed, at which point, the 'B' reactor feedwater pump will be taken out of service. The SNE has recommended that the power decrease to 30% be accomplished by driving control rods.

Event No.	Malf. No.	Event Type*	Event Description
1.		R (RO)	Reactor power reduction to 30% by inserting control rods
2.		I (RO)	The RWM fails, requiring the RO to bypass the RWM.
3.		N (BOP)	The "B" RFP is removed from service
4.		I (RO)	The "C" Recirc Flow Unit fails downscale resulting in a rod block requiring the RO to bypass the unit.
5.		C (BOP)	The running plant service water pump trips. The standby plant service water pump fails to auto start requiring the BOP to manually start it.
6.		C (BOP)	The hotwell level controller fails downscale, requiring the BOP to manually restore level and transfer control to the standby controller.
7.		C (All)	The shaft of the running plant service water pump shears, resulting in a total loss of plant service water, requiring a manual reactor scram.
8.		M (All)	A large LOCA occurs on the "B" reactor recirc loop.
9.		C	The HPCS pump experiences reduced head resulting in the loss of injection capability.
10.		C	RHR pump 2A fails to auto start on its auto initiation signal requiring a manual start.

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

**Knowledge and Ability Record Form**  
 ref: NUREG - 1021 rev 8  
**BWR RO EXAM OUTLINE ES-401-2**

COUNT MATRIX

Summarizing Counts by K/A Group  
 for  
 BWR - Reactor Operator

	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	SG	Total
E/APE # - T1 Gp 1	2	4	2				2	2			1	13
E/APE # - T1 Gp 2	4	3	4				3	4			1	19
E/APE # - T1 Gp 3	1	0	2				1	0			0	4
Tier Totals	7	7	8				6	6			2	36
Plant Systems / T2 Gp 1	2	3	3	2	3	3	2	3	2	3	2	28
Plant Systems / T2 Gp 2	1	2	2	2	2	2	2	2	2	2	0	19
Plant Systems / T2 Gp 3	0	1	0	1	0	1	1	0	0	0	0	4
Tier Totals	3	6	5	5	5	6	5	5	4	5	2	51
Generic K/As / T3	CAT 1 - 4		CAT 2 - 3		CAT 3 - 2		CAT 4 - 4					13
Model Total												100



**BWR RO EXAM OUTLINE ES-401-2**

EMERGENCY & ABNORMAL PLANT EVOLUTIONS - TIER 1 GROUP I

BWR - Reactor Operator

Target: 13%

Actual: 13%

	E/APE # - NAME/SAFETY FUNCTION	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	295005 / Main Turbine Generator Trip / 3		X										AK2.03 – Recirculation System	3.2	1
2	295007 / High Reactor Pressure / 3			X									AK3.04 – Safety/Relief valve operation: Plant specific	4.0	1
3	295007 / High Reactor Pressure / 3								X				AA2.03 – Reactor Water Level	3.7	1
4	295010 / High Drywell Pressure / 5		X										AK2.04 – Nitrogen makeup system: Plant specific	2.6	1
5	295015 / Incomplete SCRAM / 1	X											AK1.03 – Reactivity effects	3.8	1
6	295015 / Incomplete SCRAM / 1		X										AK2.05 – Rod Worth Minimizer: Plant specific	2.6	1
7	295024 – High Drywell Pressure / 5							X					EA1.03 – LPCS: Plant specific	4.0	1

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8	295025 / High Reactor Pressure / 3							X				EA2.03 – Suppression Pool Temperature	3.9	1
9	295031 / Reactor Low Water Level / 2	X										EK1.03 – Water level effects on reactor power	3.7	1
10	295031 / Reactor Low Water Level / 2		X									EK2.04 – Rector Core Isolation Cooling: Plant specific	4.0	1
11	295037 / SCRAM Condition Present and Reactor Power above APRM Downscale or Unknown / 1			X								EK3.06 – Maintaining heat sinks external to the containment	3.8	1
12	500000 / High Containment Hydrogen Concentration / 5							X				EA1.07 – Nitrogen purge system	3.4	1
13	500000 / High Containment Hydrogen Concentration / 5										X	2.3.11 – Ability to control radiation releases	2.7	1
Category Point Totals:		2	4	2				2	2			1	Group Point Totals: 13	13

**BWR RO EXAM OUTLINE ES-401-2**

EMERGENCY & ABNORMAL PLANT EVOLUTIONS - TIER 1 GROUP II

BWR - Reactor Operator

Target: 19%

Actual: 19%

	E/APE # - NAME/SAFETY FUNCTION	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	295001 / Partial or Complete loss of Forced Core Flow Circulation / 1		X										AK2.02 - Nuclear Boiler Instrumentation	3.2	1
2	295002 / Loss of Main Condenser Vacuum / 3							X					AA1.07 - Condenser Circulating Water System	3.1	1
3	295003 / Partial or Complete Loss of AC Power / 6			X									AK3.06 - Containment isolation	3.7	1
4	295003 / Partial or Complete Loss of AC Power / 6								X				AA2.05 - Whether a partial or complete loss of AC power has occurred	3.9	1
5	295004 / Partial or Complete Loss of DC Power / 6		X										AK2.03 - DC bus loads	3.3	1

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6	295013 / High Suppression Pool Temperature / 5	X									AK1.01 – Pool stratification	2.5	1
7	295013 / High Suppression Pool Temperature / 5			X							AK3.01 – Suppression pool cooling operation	3.6	1
8	295016 / Control Room Abandonment / 7		X								AK2.02 – Local control stations: Plant specific	4.0	1
9	295012 / High Drywell Temperature / 5							X			AA2.01 – Drywell temperature	3.8	1
10	295017 / High Offsite Release Rate / 9							X			AA2.03 – Radiation levels: Plant specific	3.1	1
11	295018 / Partial or Complete Loss of Component Cooling Water Flow / 8							X			AA1.01 – Backup systems	3.3	1
12	295026 / Suppression Pool High Water Temperature / 5									X	2.1.25 – Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data	2.8	1

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13	295028 / High Drywell Temperature / 5	X										EK1.02 - Equipment environmental qualification	2.9	1
14	295030 / Low Suppression Pool Water Level / 5			X								EK3.06 - Reactor SCRAM	3.6	1
15	295004 / Partial or Complete Loss of DC Power / 6							X				AA2.01 - Cause of partial or complete loss of DC power	3.2	1
16	295033 / High Secondary Containment Area Radiation Levels / 9	X										EK1.03 - Radiation releases	3.9	1
17	295038 / High Off-Site Release Rate / 9	X										EK1.03 - Meteorological effects on off-site release	2.8	1
18	295038 / High Off-Site Release Rate / 9						X					EA1.06 - Plant ventilation	3.5	1
19	600000 / Plant Fire on Site / 8			X								AK3.04 - Actions contained in the abnormal procedure for plant fire on site	2.8	1
Category Point Totals:		4	3	4				3	4			1	Group point totals: 19	19

PLANT SYSTEMS - TIER 1 GROUP III

BWR - Reactor Operator

Target: 4%

Actual: 4%

	E/APE # - NAME/SAFETY FUNCTION	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	295032 / High Secondary Containment Area Temperature / 5			X									EK3.01 - Emergency/Normal depressurization	3.5	1
2	295032 / High Secondary Containment Area Temperature / 5			X									EK3.02 - Reactor SCRAM	3.6	1
3	295035 / Secondary Containment High Differential Pressure / 5	X											EK1.02 - Radiation release	3.7	1
4	295036 / Secondary Containment High Sump/Area Water Level / 5							X					EA1.04 - Radiation monitoring: Plant specific	3.1	1
Category Point Totals:		1	0	2				1	0			0	Group Point Totals: 4		4

**BWR RO EXAM OUTLINE ES-401-2**

PLANT SYSTEMS - TIER 2 GROUP I

BWR - Reactor Operator

Target: 28%

Actual: 28%

	SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	201002 / Reactor Manual Control System											X	2.4.6 – Knowledge of symptom based EOP mitigation strategies	3.1	1
2	202002 / Recirculation Flow Control System							X					A1.01 – Recirculation pump speed	3.2	1
3	203000 / RHR/LPCI Injection Mode: Plant specific		X										K2.03 – Initiation logic	2.7	1
4	203000 / RHR/LPCI Injection Mode: Plant specific				X								K4.02 – Prevention of piping overpressurization	3.3	1
5	209001 / Low Pressure Core Spray System						X						K6.03 – Torus/suppression pool water level	3.3	1
6	209002 / High Pressure Core Spray System	X											K1.03 – Water leg (jockey) pump	3.0	1
7	209002 / High Pressure Core Spray System						X						K6.03 – Component cooling water system	2.5	1

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8	212000 / Reactor Protection System						X						K6.05 – RPS sensor inputs	3.5	1
9	212000 / Reactor Protection System					X							K5.01 – Fuel thermal time constant	2.7	1
10	215003 / Intermediate Range Monitor (IRM)		X										K2.01 – IRM channels/detectors	2.5	1
11	215003 / Intermediate Range Monitor (IRM)			X									K3.04 – Reactor power indication	3.6	1
12	215004 / Source Range Monitor System (SRM)									X			A4.06 – Alarms and lights	3.2	1
13	215005 / Average Power Range Monitor/Local Power Range Monitor System			X									K3.03 – Reactor Manual Control system: Plant specific	3.3	1
14	215005 / Average Power Range Monitor/Local Power Range Monitor System									X			A4.02 – CRT display indicators: Plant specific	2.8	1



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15	217000 / Reactor Core Isolation Cooling			X									K3.02 – Reactor vessel pressure	3.6	1
16	217000 / Reactor Core Isolation Cooling					X							K5.01 – Indications of pump cavitation	2.6	1
17	218000 / Automatic Depressurization System	X											K1.03 – Nuclear Boiler instrumentation system	3.7	1
18	218000 / Automatic Depressurization System									X			A4.02 – ADS logic initiation	4.2	1
19	223001 / Primary Containment System and Auxiliaries		X										K2.09 – Drywell cooling fans: Plant specific	2.7	1
20	223001 / Primary Containment System and Auxiliaries									X			A3.02 – Vacuum breaker/relief valve operation	3.4	1
21	239002 / Relief/Safety Valves				X								K4.06 – Detection of valve leakage	3.5	1

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22	259001 / Reactor Feedwater System											X	2.4.25 – Knowledge of fire protection procedures	2.9	1
23	259002 / Reactor Water Level Control System								X				A2.02 – Loss of any number of reactor feed flow inputs	3.3	1
24	259002 / Reactor Water Level Control System									X			A3.03 – Changes in main steam flow	3.2	1
25	261000 / Standby Gas Treatment System							X					A1.07 – SBGTS train temperature	2.8	1
26	261000 / Standby Gas Treatment System								X				A2.12 – High fuel pool ventilation radiation: Plant Specific	3.2	1
27	264000 / Emergency Generators (Diesel/Jet)					X							K5.06 – Load sequencing	3.4	1
28	264000 / Emergency Generators (Diesel/Jet)								X				A2.09 – Loss of AC power	3.7	1
Category Point Totals:		2	3	3	2	3	3	2	3	2	3	2	Group Point Total: 28		28

**BWR RO EXAM OUTLINE ES-401-2**

PLANT SYSTEMS - TIER 2 GROUP II

BWR - Reactor Operator

Target: 19%

Actual: 19%

	SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	201003 / Control Rod Drive and Mechanism			X									K3.02 – Flux shaping	2.8	1
2	201004 / Rod Sequence Control System (Plant Specific)					X							K5.02 – Sequences and groups: BWR-4, 5	3.1	1
3	201004 / Rod Sequence Control System (Plant Specific)										X		A4.01 – System bypass switches: BWR-4, 5	3.4	1
4	201006 / Rod Worth Minimizer								X				A2.01 – Power supply loss: P-specific	2.5	1
5	202001 / Recirculation System										X		A4.01 – Recirculation pumps	3.7	1
6	204000 / Reactor Water Cleanup System									X			A3.01 – system pressure downstream of the pressure regulation valve: LP-RWCU	3.3	1

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7	205000 / Shutdown Cooling System (RHR Shutdown Cooling Mode)						X						K6.03 – Recirculation system	3.1	1
8	214000 / Rod Position Information System				X								K4.02 – Thermocouple	2.5	1
9	215002 / Rod Block Monitor System						X						K6.01 – RPS: BWR-3, 4, 5	3.0	1
10	226001 / RHR/LPCI: Containment Spray System Mode								X				A2.20 – Loss of coolant accident	3.7	1
11	226001 / RHR/LPCI: Containment Spray System Mode		X										K2.02 – Pumps	2.9	1
12	239001 / Main and Reheat Steam System		X										K2.01 – Main steam isolation valve solenoids	3.2	1
13	262001 / AC Electrical Distribution								X				A3.02 – Automatic bus transfer	3.2	1

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14	263000 / DC Electrical Distribution							X					A1.01 – Battery charging/discharging rate	2.5	1	
15	272000 / Radiation Monitoring System	X											K1.05 – Radwaste System	2.8	1	
16	290001 / Secondary Containment				X								K4.02 – Protection against over pressurization: Plant specific	3.4	1	
17	290001 / Secondary Containment							X					A1.01 – System lineups	3.1	1	
18	290003 / Control Room HVAC			X									K3.01 – Control room habitability	3.5	1	
19	290003 / Control Room HVAC					X							K5.02 – Differential pressure control	2.8		
Category Point Totals:		1	2	2	2	2	2	2	2	2	2	2	0	Group point totals: 19		19

**BWR RO EXAM OUTLINE ES-401-2**

PLANT SYSTEMS - TIER 2 GROUP III

BWR - Reactor Operator

Target: 4%

Actual: 4%

	SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	215001 / Traversing In- Core Probe				X								K4.01 – Primary containment isolation: Mark-I&II	3.4	1
2	215001 / Traversing In- Core Probe						X						K6.04 – Primary containment isolation system: Mark- I&II	3.1	1
3	233000 / Fuel Pool Cooling and Cleanup		X										K2.02 – RHR pumps	2.8	1
4	268000 / Radwaste							X					A1.01 – Radiation level	2.7	1
Category Point Totals:		0	1	0	1	0	1	1	0	0	0	0	Group point totals: 4		4

PLANT-WIDE GENERIC RESPONSIBILITIES TIER 3

BWR - Reactor Operator

Target: 13%

Actual: 13%

	Category	K/A	TOPICS	IMP	POINTS
1	Conduct Of Operations	2.1.7	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.	3.7	1
2		2.1.20	Ability to execute procedure steps.	4.3	1
3		2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	3.4	1
4		2.1.11	Knowledge of less than one hour technical specification action statements for systems.	3.0	1

5	Equipment Control	2.2.27	Knowledge of the refuel process.	2.6	1
6		2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	4.0	1
7		2.2.23	Ability to track limiting conditions for operations.	2.6	1

8	Radiation	2.3.9	Knowledge of the process for performing a containment purge.	2.5	1
9	Control	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	1

10	Emergency Procedures Plan	2.4.39	Knowledge of the ROs responsibilities in emergency plan implementation.	3.3	1
11		2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	3.3	1
12		2.4.46	Ability to verify that the alarms are consistent with the plant conditions.	3.5	1
13		2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions including: <ul style="list-style-type: none"> <li>1. Reactivity control</li> <li>2. Core cooling and heat removal</li> <li>3. Reactor coolant system integrity</li> <li>4. Containment conditions</li> <li>5. Radioactivity release control</li> </ul>	3.7	1
			Group point totals: 13		13



**COUNT MATRIX**

Summarizing Counts by K/A Group  
 for  
 BWR - Senior Reactor Operator

	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	Total
E/APE # - T1 Gp 1	4	4	3				2	9			4	26
E/APE # - T1 Gp 2	3	3	3				2	4			2	17
Tier Totals	7	7	6				4	13			6	43
Plant Systems / T2 Gp 1	2	2	2	2	2	2	3	2	2	1	3	23
Plant Systems / T2 Gp 2	0	1	1	1	1	2	2	1	1	1	2	13
Plant Systems / T2 Gp 3	0	0	0	1	0	1	1	0	0	0	1	4
Tier Totals	2	3	3	4	3	5	6	3	3	2	6	40
Generic K/As / T3	CAT 1 - 5    CAT 2 - 3    CAT 3 - 4    CAT 4 - 5										17	
Model Total												100

**BWR SRO EXAM OUTLINE ES-401-1**

**EMERGENCY & ABNORMAL PLANT EVOLUTIONS - TIER 1 GROUP I**

BWR - Senior Reactor Operator

Target: 26%

Actual: 26%

	E/APE # - NAME/SAFETY FUNCTION	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	295003 / Partial or Complete Loss of AC Power / 6			X									AK3.06 – Containment isolation	3.7	1
2	295003 / Partial or Complete Loss of AC Power / 6								X				AA2.05 – Whether a partial or complete loss of AC power has occurred	3.9	1
3	<b>295006 / Partial or Complete Loss of AC Power / 6</b>								X				AA2.05 – Whether a partial or complete loss of AC power has occurred 10CFR55.43.5	4.2	1
4	<b>295037 / Scram Condition Present and Reactor Power Above APRM Downscale or Unknown / 1</b>								X				EA2.06 – Ability to determine/interpret reactor pressure 10CFR55.43.5	4.1	1
5	295007 / High Reactor Pressure / 3								X				AA2.02 – Reactor power 10CFR55.43.5	4.1	1

**BWR SRO EXAM OUTLINE ES-401-1**

6	<b>295009 / Low Reactor Water Level / 2</b>										X	2.2.24 – Ability to analyze the affect of maintenance activities on LCO status 10CFR55.43.2	3.8	1
7	<b>295010 / High Drywell Pressure / 5</b>										X	2.4.6 – Knowledge of symptom based EOP mitigation strategies 10CFR55.43.5	4.0	1
8	295010 / High Drywell Pressure / 5		X									AK2.04 – Nitrogen makeup system: Plant specific	2.6	1
9	295013 / High Suppression Pool Temperature / 5	X										AK1.01 – Pool stratification	2.5	1
10	295013 / High Suppression Pool Temperature / 5			X								AK3.01 – Suppression pool cooling operation	3.6	1
11	295015 / Incomplete SCRAM / 1	X										AK1.03 – Reactivity effects	3.8	1
12	295015 / Incomplete SCRAM / 1		X									AK2.05 – Rod Worth Minimizer: Plant specific	2.6	1
13	<b>295016 / Control Room Abandonment / 7</b>							X				AA2.02 – Reactor water level 10CFR55.43.5	4.3	1

14	295016 / Control Room Abandonment / 7		X									AK2.02 – Local control stations: Plant specific	4.0	1
15	295007 / High Reactor Pressure							X				AA2.03 – Reactor water level 10CFR55.43.5	3.7	1
16	295017 / High Offsite Release Rate / 9							X				AA2.03 – Radiation levels: Plant specific	3.1	1
17	295014 / Inadvertent Reactivity Addition / 1							X				AA2.01 – Reactor power 10CFR55.43.5	4.2	1
18	295026 / Suppression Pool High Water Temperature / 5										X	2.1.25 – Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data	2.8	1
19	295030 / Low Suppression Pool Water Level / 5			X								EK3.06 – Reactor SCRAM	3.6	1
20	295006 / SCRAM / 1							X				AA2.01 – Reactor pressure 10CFR55.43.5	3.4	1
21	295031 / Reactor Low Water Level / 2	X										EK1.03 – Water level effects on reactor power	3.7	1

**BWR SRO EXAM OUTLINE ES-401-1**

22	295031 / Reactor Low Water Level / 2		X									EK2.04 - Rector Core Isolation Cooling: Plant specific	4.0	1
23	295037 / SCRAM Condition Present and Reactor Power above APRM Downscale or Unknown / 1			X								EK3.06 - Maintaining heat sinks external to the containment	3.8	1
24	295038 / High Off-Site Release Rate / 9	X										EK1.03 - Meteorological effects on off-site release	2.8	1
25	295038 / High Off-Site Release Rate / 9						X					EA1.06 - Plant ventilation	3.5	1
26	500000 / High Containment Hydrogen Concentration / 5						X					EA1.07 - Nitrogen purge system	3.4	1
Category Point Totals:		4	4	3			2	9			4	Group Point Totals: 26		26

**BWR SRO EXAM OUTLINE ES-401-1**

**EMERGENCY & ABNORMAL PLANT EVOLUTIONS - TIER 1 GROUP II**

BWR - Senior Reactor Operator

Target: 17%

Actual: 17%

	E/APE # - NAME/SAFETY FUNCTION	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	295004 / Partial or Complete Loss of DC Power / 6								X				AA2.01 – Cause of partial or complete loss of DC power 10CFR55.43.5	3.6	1S
2	295001 / Partial or Complete loss of Forced Core Flow Circulation / 1		X										AK2.02 – Nuclear Boiler Instrumentation	3.2	1
3	295004 / Partial or Complete Loss of DC Power / 6		X										AK2.03 – DC bus loads	3.3	1
4	<b>295005 / Main Turbine Trip / 3</b>											X	2.3.2 – Knowledge of the facility ALARA program 10CFR55.43.4	2.9	1
5	295005 / Main Turbine Generator Trip / 3		X										AK2.03 – Recirculation System	3.2	1

6	295018 / Partial or Complete Loss of Cooling Water Flow / 8						X				AA1.01 – Backup systems	3.3	1
7	<b>295019 / Partial or Complete Loss of Instrument Air / 8</b>							X			AA2.01 – Instrument Air System pressure 10CFR55.43.5	3.6	1
8	<b>295028 / High Drywell Temperature / 5</b>							X			EA2.05 – Torus/suppression chamber pressure: Plant specific 10CFR55.43.5	3.8	1
9	295028 / High Drywell Temperature / 5	X									EK1.02 – Equipment environmental qualification	2.9	1
10	295032 / High Secondary Containment Area Temperature / 5			X							EK3.01 – Emergency/Normal depressurization	3.5	1
11	295032 / High Secondary Containment Area Temperature / 5			X							EK3.02 – Reactor SCRAM	3.6	1

12	295033 / High Secondary Containment Area Radiation Levels / 9	X									EK1.03 – Radiation releases	3.9	1
13	295034 / Secondary Containment Ventilation High Radiation / 9							X			EA2.02 – Cause of high radiation levels 10CFR55.43.5	4.2	1
14	295035 / Secondary Containment High Differential Pressure / 5	X									EK1.02 – Radiation release	3.7	1
15	295036 / Secondary Containment High Sump/Area Water Level / 5							X			EA1.04 – Radiation monitoring: Plant specific	3.1	1
16	<b>600000 / Plant Fire on site / 8</b>									X	2.1.5 – Ability to locate and use procedures and directives related to shift staffing and activities 10CFR55.43.5	3.4	1



17	600000 / Plant Fire on Site / 8			X									AK3.04 - Actions contained in the abnormal procedure for plant fire on site	2.8	1
Category Point Totals:		3	3	3				2	4			2	Group point totals: 17		17

**PLANT SYSTEMS - TIER 2 GROUP I**

BWR - Senior Reactor Operator

Target: 23%

Actual: 23%

	SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	202002 / Recirculation Flow Control System							X					A1.01 - Recirculation pump speed	3.2	1
2	203000 / RHR/LPCI Injection Mode: Plant specific		X										K2.03 - Initiation logic	2.7	1
3	209002 / High Pressure Core Spray System	X											K1.03 - Water leg (jockey) pump	3.0	1
4	209002 / High Pressure Core Spray System						X						K6.03 - Component cooling water system	2.5	1
5	212000 / Reactor Protection System						X						K6.05 - RPS sensor inputs	3.5	1
6	215004 / Source Range Monitor System (SRM)										X		A4.06 - Alarms and lights	3.2	1

7	216000 / Nuclear Boiler Instrumentation										X	2.1.6 – Ability to supervise and assume management role during plant transients and upset conditions 10CFR55.43.5	4.3	1
8	215005 / Average Power Range Monitor/Local Power Range Monitor System			X								K3.03 – Reactor Manual Control system: Plant specific	3.3	1
9	216000/ Nuclear Boiler Instrumentation										X	2.2.5 – Knowledge of bases in technical specifications for limiting conditions for operations and safety limits 10CFR55.43.2	3.7	1
10	217000 / Reactor Core Isolation Cooling			X								K3.02 – Reactor vessel pressure	3.6	1
11	217000 / Reactor Core Isolation Cooling					X						K5.01 – Indications of pump cavitation	2.6	1
12	218000 / Automatic Depressurization System	X										K1.03 – Nuclear Boiler instrumentation system	3.7	1

13	223001 / Primary Containment System and Auxiliaries		X									K2.09 – Drywell cooling fans: Plant specific	2.7	1
14	223001 / Primary Containment System and Auxiliaries								X			A3.02 – Vacuum breaker/relief valve operation	3.4	1
15	<b>261000 / Standby Gas Treatment System</b>										X	2.2.14 – Knowledge of the process for making configuration changes 10CFR55.43.3	3.0	1
16	226001 / RHR/LPCI: Containment Spray System Mode							X				A2.20 – Loss of coolant accident	3.7	1
17	239002 / Relief/Safety Valves			X								K4.06 – Detection of valve leakage	3.5	1
18	259002 / Reactor Water Level Control System							X				A2.02 – Loss of any number of reactor feed flow inputs	3.3	1
19	261000 / Standby Gas Treatment System						X					A1.07 – SBGTS train temperature	2.8	1

**BWR SRO EXAM OUTLINE ES-401-1**

20	262001 / AC Electrical Distribution									X			A3.02 - Automatic bus transfer	3.2	1
21	264000 / Emergency Generators (Diesel/Jet)					X							K5.06 - Load sequencing	3.4	1
22	290001 / Secondary Containment				X								K4.02 - Protection against over pressurization: Plant specific	3.4	1
23	290001 / Secondary Containment							X					A1.01 - System lineups	3.1	1
Category Point Totals:		2	2	2	2	2	2	3	2	2	1	3	Group Point Total: 23		23

**PLANT SYSTEMS - TIER 2 GROUP II**

BWR - Senior Reactor Operator

Target: 13%

Actual: 13%

	SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	201001 / Control Rod Drive Hydraulic System											X	2.4.45 – Ability to prioritize and interpret the significance of each annunciator or alarm 10CFR55.43.5	3.6	1
2	201004 / Rod Sequence Control System (Plant Specific)					X							K5.02 – Sequences and groups: BWR-4, 5	3.1	1
3	201004 / Rod Sequence Control System (Plant Specific)										X		A4.01 – System bypass switches: BWR-4, 5	3.4	1
4	201006 / Rod Worth Minimizer								X				A2.01 – Power supply loss: P-specific	2.5	1
5	<b>202001 / Recirculation System</b>											X	2.2.25 – Knowledge of bases in technical specifications for limiting conditions for operations and safety limits 10CFR55.43.2	3.7	1

6	204000 / Reactor Water Cleanup System								X			A3.01 – system pressure downstream of the pressure regulation valve: LP-RWCU	3.3	1
7	205000 / Shutdown Cooling System (RHR Shutdown Cooling Mode)					X						K6.03 – Recirculation system	3.1	1
8	214000 / Rod Position Information System				X							K4.02 – Thermocouple	2.5	1
9	215002 / Rod Block Monitor System					X						K6.01 – RPS: BWR-3, 4, 5	3.0	1
10	215003 / Intermediate Range Monitor (IRM)		X									K2.01 – IRM channels/detectors	2.5	1
11	263000 / DC Electrical Distribution						X					A1.01 – Battery charging/discharging rate	2.5	1

12	272000 Radiation Monitoring System	X											K1.05 - Radwaste System	3.1	1
13	290003 / Control Room HVAC			X									K3.01 - Control room habitability	3.5	1
Category Point Totals:		1	1	1	1	1	2	1	1	1	1	2	Group point totals:		13



**PLANT SYSTEMS - TIER 2 GROUP III**

BWR - Senior Reactor Operator

Target: 4%

Actual: 4%

	SYSTEM #/NAME	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A TOPICS	IMP	POINTS
1	215001 / Traversing In-Core Probe				X								K4.01 – Primary containment isolation: Mark-I&II	3.4	1
2	215001 / Traversing In-Core Probe						X						K6.04 – Primary containment isolation system: Mark- I&II	3.1	1
3	288000 / Plant Ventilation System											X	2.4.30 – Knowledge of which events related to system operation/status should be reported to outside agencies 10CFR55.43.5	3.6	1
4	268000 / Radwaste							X					A1.01 – Radiation level	2.7	1
Category Point Totals:		0	0	0	1	0	1	1	0	0	0	1	Group point totals: 4		4

**BWR SRO EXAM OUTLINE ES-401-1**

**PLANT-WIDE GENERIC RESPONSIBILITIES TIER 3**

BWR - Senior Reactor Operator

Target: 17%

Actual: 17%

	Category	K/A	TOPICS	IMP	POINTS
1	Conduct of Operations	2.1.6	Ability to supervise and assume a management role during plant transients and upset conditions 10CFR55.43.5	4.3	1
2		2.1.13	Knowledge of facility requirements for controlling vital/controlled access 10CFR55.43.5	2.9	1
3		2.1.7	Ability to evaluate plant performance and make operational judgments base on operating characteristics, reactor behavior, and instrument interpretation	3.7	1
4		2.1.20	Ability to execute procedure steps	4.3	1
5		2.1.33	Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications 10CFR55.43.2, 43.3	4.0	1

6	Equipment	2.2.27	Knowledge of the refueling process 10CFR55.43.6	3.5	1
7		2.2.34	Knowledge of the affects of alterations on core configuration 10CFR55.43.6	3.3	1
8	Control	2.2.2	Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.	4.0	1

9	Radiation	2.3.3	Knowledge of SRO responsibilities for auxiliary system that are outside the control room (e.g., waste disposal and handling systems) 10CFR55.43.4	2.9	1
10		2.3.1	Knowledge of 10CFR20 and related facility radiation control requirements 10CFR55.43.4	3.0	1
11	Control	2.3.9	Knowledge of the process for performing a containment purge.	2.5	1
12		2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	1

13	Emergency  Procedures  Plan	2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls 10CFR55.43.2	4.0	1
14		2.4.39	Knowledge of the ROs responsibilities in emergency plan implementation.	3.3	1
15		2.4.45	Ability to prioritize and interpret the significance of each annunciator or alarm.	3.3	1
16		2.4.46	Ability to verify that the alarms are consistent with the plant conditions.	3.5	1
17		2.4.21	Knowledge of the parameters and logic used to assess the status of safety functions including: 1. Reactivity control 2. Core cooling and heat removal 3. Reactor coolant system integrity 4. Containment conditions 5. Radioactivity release control	3.7	1
			Group point totals: 17		

**INDIVIDUAL WALK-THROUGH TEST OUTLINE      FORM ES-301-2**

Columbia Generating Station      October 2002

Facility: Columbia Generatin Station		Date of examination: October 2002	
Exam level: RO /		SRO-I	
B.1 Control Room Systems			
System / JPM Title		Type Code*	Safety Function
a.	Start SGT for Containment Vent LR000165  Simulator	D, ESF	5
b.	Main Generator / Generator Capability Curve LR001153  Simulator	D, A  2000 NRC Exam	4
c.	Reactor Closed Cooling / Change RCC Pump  Simulator/2000 NRC Exam	D, A	8
d.	Start RCIC with Arm and Depress  Simulator	N, A, L	2
e.	AC Dist. / Transfer 480V Bus from Alt to Normal LR000227  Simulator	D, A  2000 NRC Exam	6
f.	Change Operating CRD Pump  Simulator	N	1
B2. Facility Walkthrough			
a.	Purge Drywell LR000164  Control Room	D, RCA	5
b.	Control Room Evacuation – ED on RPV level LR000147  Plant – Remote Shutdown	D, RCA	3
c.	Close RPS Breakers LR000173  Plant	D, RCA	7
d.	Manual Start of HPCS DG LR000199  Plant	D, RCA	6

**INDIVIDUAL WALK-THROUGH TEST OUTLINE      FORM ES-301-2**

Columbia Generating Station      October 2002

<b>Facility: Columbia Generatin Station</b>		<b>Date of examination: October 2002</b>	
<b>Exam level: RO</b>		<b>/ SRO-I</b>	
Spare JPMs			
System / JPM Title		Type Code*	Safety Function
1.	Vent Overpiston Area for Control Rod Insertion LR000258  Plant	D, RCA, L	1
2.	Suppression Pool to CST via FPC LR000208  Simulator	D	9
* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (L)ow power			
Indicates spare JPMs			

**INDIVIDUAL WALK-THROUGH TEST OUTLINE    FORM ES-301-2**  
 Columbia Generating Station    October 2002

Facility: Columbia Generatin Station		Date of examination: October 2002	
Exam level:		SRO-U	
B.1 Control Room Systems			
System / JPM Title / Type Codes *	Type Code	Safety Function	
a. Start SGT for Containment Vent LR000165  Simulator	D, ESF	5	
b. Main Generator / Generator Capability Curve LR001153  Simulator	D, A  2000 NRC Exam	4	
d. Start RCIC with Arm and Depress  Simulator	N, A, L	2	
B2. Facility Walkthrough			
b. Control Room Evacuation – ED on RPV level LR000147  Plant – Remote Shutdown	D, RCA	3	
d. Manual Start of HPCS DG LR000199  Plant	D, RCA	6	
Spare JPMs			
System / JPM Title / Type Codes *	Type Code	Safety Function	
1. Vent Overpiston Area for Control Rod Insertion LR000258  Plant	D, RCA, L	1	
2. Suppression Pool to CST via FPC LR000208  Simulator	D, RCA	9	
* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (L)ow power			
Indicates spare JPMs			