

Facility: <u>BYRON</u>		Date of Examination: <u>06/20/00</u>		
Item	Task Description	Initials		
		a	b*	c
WRITEN	a. Verify that the outline(s) fit(s) the appropriate model per ES-401.	bm GAW		AMS
	b. Assess whether the outline was systematically prepared and whether all knowledge and ability categories are appropriately sampled.	bm GAW		AMS
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	bm GAW		AMS
	d. Assess whether the repetition from previous examination outlines is excessive.	bm GAW		AMS
SIM	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, and major transients.	bm GAW		AMS
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity; ensure each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s)*, and scenarios will not be repeated over successive days.	bm GAW		AMS
	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.	bm GAW		AMS
W/T	a. Verify that: (1) the outline(s) contain(s) the required number of control room and in-plant tasks, (2) no more than 30% of the test material is repeated from the last NRC examination, (3)* no tasks are duplicated from the applicants' audit test(s), and (4) no more than 80% of any operating test is taken directly from the licensee's exam banks.	bm GAW		AMS
	b. Verify that: (1) the tasks are distributed among the safety function groupings as specified in ES-301, (2) one task is conducted in a low-power or shutdown condition, (3) 40% of the tasks require the applicant to implement an alternate path procedure, (4) one in-plant task tests the applicant's response to an emergency or abnormal condition, and (5) the in-plant walk-through requires the applicant to enter the RCA.	bm GAW		AMS
	c. Verify that the required administrative topics are covered, with emphasis on performance-based activities.	bm GAW		AMS
	d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on successive days.	bm GAW		AMS
GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	bm GAW		AMS
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	bm GAW		AMS
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	bm GAW		AMS
	d. Check for duplication and overlap among exam sections.	bm GAW		AMS
	e. Check the entire exam for balance of coverage.	bm GAW		AMS
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	bm GAW		AMS
a. Author	Printed Name / Signature		Date	
	George Wilson / <i>George Wilson Jr.</i>	Dell McNeil / <i>Dell McNeil</i>	2/23/00	
b. Facility Reviewer(*)	N/A			
c. Chief Examiner	Ann Marie Stone / <i>Ann Marie Stone</i>		3/9/00	(Certified) 5/3/00
d. NRC Supervisor	David Hills / <i>David Hills</i>		5/3/00	
(*) Not applicable for NRC-developed examinations.				

Facility: BYRONScenario No.: 1 (NEC)Op-Test No.: 00-301

Examiners: _____ Operators: _____

Objectives:

In accordance with plant procedures: Decrease reactor power, Respond to a failure of the steamline pressure transmitter for MFW pump, Respond to a failure of the controlling pressurizer level channel, Respond to a failure of the Auctioneering Tave circuit, Respond to a Rod Control Urgent Failure alarm, Respond to a faulted S/G, Respond to an ATWS, Respond to a failure of the emergency boration valve, Respond to a S/G tube rupture.

Initial Conditions:

Reactor power is 100%, MOL, Pressurizer level control is selected to 459/460, 1A D/G is OOS, 1A AFW pump is OOS.

Turnover:

Reactor Power is 100%, Lower Reactor Power to 95% for instrument cross-cals. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to injection pump replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1		R	POWER DECREASE (BORATE)
2		N	POWER DECREASE (TURBINE)
3		I	S/G STM PRESSURE FOR FEED PUMP CONTROL FAILS LOW (CONTROL OF FP)
4		I	CONTROLLING PZR LEVEL CHANNEL FAILS LOW (RESTORE LETDOWN)
5		I	AUCT TAVE CKT FAILS HIGH FOR ROD CONTROL
6		C	ROD CONTROL URGENT FAILURE (LOGIC CABINET)
7		M	1A S/G STEAM LEAK S/G SAFETIES STICK OPEN
8		C	RX TRIP FAILURE ATWAS
9		C	EMERGENCY BORATE VALVES FAILS
10		M	1/B S/G TUBE RUPTURE

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

Facility: <u>BYRON</u>	Scenario No.: <u>2 (NRC)</u>	Op-Test No.: <u>00-301</u>	
Examiners: _____	Operators: _____		
Objectives:			
<u>In accordance with plant procedures: Respond to a failure of the feed flow transmitter for #1 FRV, Respond to a failure of the power range channel N-41, Increase reactor power, Respond to a failure of the level transmitter for VCT, Respond to a large break LOCA, Respond to a failure of automatic FWI, Respond to a failure of automatic sump swapover.</u>			
Initial Conditions:			
<u>Reactor power is 45%, MOL, Pressurizer level control is selected to 459/460. 1A D/G is OOS, 1A AFW pump is OOS.</u>			
Turnover:			
<u>Reactor Power is 45%. STEP 63 OF 1BGP 100-3, POWER INCREASE TO 100%. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to injection pump replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.</u>			
Event No.	Malf. No.	Event Type*	Event Description
1		I	FEED FLOW TRANSMITTER FOR #1 FRV FAILS HIGH
2		I	PR CHANNEL N-41 FAILS HIGH
3		R	POWER INCREASE (DILUTE 50 GALLONS)
4		N	POWER INCREASE (TURBINE)
5		I	LT-185 INDICATING RECORDER FOR VCT FAILS HIGH DIVERT TO HUT NO AUTO SWAPOVER
6		M	LARGE BREAK LOCA
7		C	FAILURE OF FWI
8		C	FAILURE FOR AUTO SUMP SWAPOVER

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

Facility: BYRON Scenario No.: 3 (NRC) Op-Test No.: 00-301

Examiners: _____ Operators: _____

Objectives:

In accordance with plant procedures: Respond to a failure of the charging valve controller, Decrease reactor power for instrument cross cals, Respond to a failure of the steam dumps, Respond to a failure of the reactor protection system, Respond to a steam line rupture in containment, Respond to a failure of the MSIV's, Respond to a failure of containment spray pumps.

Initial Conditions:

Reactor power is 100%, MOL, Pressurizer level control is selected to 459/460, 1A D/G is OOS, 1A AFW pump is OOS, Steam Dumps in pressure mode due to testing.

Turnover:

Reactor Power is 100%, Lower Reactor Power to 95% for instrument cross-cals. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to injection pump replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. Steam Dumps in pressure mode due to testing. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1		I	CHARGING VALVE CONTROLLER FAILS FULL OPEN
2		R	POWER DECREASE (BORATE)
3		N	POWER DECREASE (TURBINE)
4		I	STEAM DUMPS FAIL OPEN
5		C	INADVERTENT SI
6		M	MAJOR STEAM LINE BREAK IN CONTAINMENT
7		C	FAILURE OF ALL MSIV'S TO CLOSE (UNCONTROLLED DEPRESSURIZATION ALL S/G'S)
8		C	FAILURE OF CONTAINMENT SPRAY PUMPS IN AUTO

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

Facility: <u>BYRON</u>	Scenario No.: <u>4 (N2C)</u>	Op-Test No.: <u>00-301</u>	
Examiners: _____	Operators: _____		
<p>Objectives:</p> <p><u>In accordance with plant procedures: Increase reactor power, Respond to a failure of the #1 FRV controller, Respond to a failure of power range channel N-42, Respond to a failure of #1 THot channel, Respond to a LOCA outside containment, Respond to a failure of the RWST valves, Respond to a failure of the Turbine.</u></p>			
<p>Initial Conditions:</p> <p><u>Reactor power is 45%, MOL, Pressurizer level control is selected to 459/460. 1A D/G is OOS, 1A AFW pump is OOS.</u></p>			
<p>Turnover:</p> <p><u>Reactor Power is 45%. STEP 63 OF 1BGP 100-3, POWER INCREASE TO 100%. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to injection pump replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.</u></p>			
Event No.	Malf. No.	Event Type*	Event Description
1		R	POWER INCREASE (DILUTE 50 GALLONS)
2		N	POWER INCREASE (TURBINE)
3		I	#1 FRV DRIFTS SHUT SLOWLY
4		I	PR CHANNEL N-42 FAILS LOW
5		I	#1 THOT (TAVE) CKT FAILS HIGH (LCO 3.0.3)
6		M	LOCA OUTSIDE CONTAINMENT
7		C	FAILURE OF RWST VALVES TO OPEN
8		C	FAILURE OF TURBINE TO TRIP

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

Facility: <u>BYRON</u>		Date of Examination: <u>06/20/00</u>
Examination Level (circle one): RO / SRO		Operating Test Number: <u>00-301</u>
Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	CONDUCT OF OPERATIONS	Perform a SDM Calculation
	CONDUCT OF OPERATIONS	Perform a Shift Turnover
A.2	EQUIPMENT CONTROL TAGGING AND CLEARANCE	Perform a Tagout of CS Pump
A.3	RADIATION CONTROL	Perform a Containment Entry at Power
A.4	EMERGENCY PLAN	Communication of NAR's Form

Facility: <u>BYRON</u>		Date of Examination: <u>06/20/00</u>
Exam Level (circle one): <u>RO</u> SRO(I) / SRO(U)		Operating Test No.: <u>00-301</u>
B.1 Control Room Systems		
System / JPM Title	Type Code*	Safety Function
a. Transfer to Hot Leg Recirculation (Alt Failure of 1A RHR Pump)	M,A,S,L	IV
b. Manual Makeup to VCT (Alt Normal Borate Valve Fails)	M,A,S	I
c. Control PZR Pressure in Manual (Alt PZR Press Control Switch Broke)	M,A,S	III
d. Control Steam Dumps in Various Modes	N,S,L	IV
e. Start up the 1A D/G (Alt Runaway D/G, Keeps Loading Uncontrolled)	M,A,S	VI
f. Channel Check of WRGM	D,C	VII
g. Cool the PRT	N,S	V
B.2 Facility Walk-Through		
a. S/U Rod Drive M/G Set	D	I
b. Manual Bypass Control of Charging	N,R	II
c. Unsteam Bound MD AFW Pump	N,R	IV
* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA		

Facility: <u>BYRON</u>		Date of Examination: <u>06/20/00</u>
Examination Level (circle one): RO SRO		Operating Test Number: <u>00-301</u>
Administrative Topic/Subject Description		Describe method of evaluation:
		1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	CONDUCT OF OPERATIONS	Perform a SDM Calculation
	CONDUCT OF OPERATIONS	Perform a Shift Turnover
A.2	EQUIPMENT CONTROL TAGGING AND CLEARANCE	Perform a Tagout of CS Pump
A.3	RADIATION CONTROL	Authorize a Gas Release
A.4	EMERGENCY PLAN	Classify Event and Complete NAR's Form

Facility: BYRON Date of Examination: 06/20/00
 Exam Level (circle one): RO / SRO(I) / SRO(U) Operating Test No.: 00-301

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a. Transfer to Hot Leg Recirculation (Alt Failure of 1A RHR Pump)	M,A,S,L	IV
b. Manual Makeup to VCT (Alt Normal Borate Valve Fails)	M,A,S	I
c. Control PZR Pressure in Manual (Alt PZR Press Control Switch Broke)	M,A,S	III
d. Control Steam Dumps in Various Modes	N,S,L	IV
e. Start up the 1A D/G (Alt Runaway D/G, Keeps Loading Uncontrolled)	M,A,S	VI
f. Channel Check of WRGM	D,C	VII
g. Cool the PRT	N,S	V

B.2 Facility Walk-Through

a. S/U Rod Drive M/G Set	D	I
b. Manual Bypass Control of Charging	N,R	II
c. Unsteam Bound MD AFW Pump	N,R	IV

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

Facility: Byron		Date of Exam: June 20, 2000						Exam Level: SRO					
Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	5	4	4				4	4			3	24
	2	2	2	4				2	4			2	16
	3	1	1	0				1	0			0	3
	Tier Totals	8	7	8				7	8			5	43
2. Plant Systems	1	1	2	2	3	3	1	2	1	1	1	2	19
	2	3	2	1	2	1	1	2	0	1	2	2	17
	3	0	0	1	1	0	0	0	1	1	0	0	4
	Tier Totals	4	4	4	6	4	2	4	2	3	3	4	40
3. Generic Knowledge and Abilities							Cat 1	Cat 2	Cat 3	Cat 4	17		
							4	4	4	5			
<p>Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).</p> <p>2. Actual point totals must match those specified in the table.</p> <p>3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.</p> <p>4. Systems/evolutions within each group are identified on the associated outline.</p> <p>5. The shaded areas are not applicable to the category/tier.</p> <p>6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.</p> <p>7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.</p>													

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1					X		A 2.05 UNCONTROLLED ROD WITHDRAWAL	4.6	1.0 C
000003 Dropped Control Rod / 1						X	K 2.4.4 ABILITY TO RECOGNIZE ABNORMAL CONDITIONS	4.3	1.0 C
000005 Inoperable/Stuck Control Rod / 1			X				K 3.01 BORATION AND EMERGENCY BORATION WITH STUCK ROD	4.3	1.0 C
000011 Large Break LOCA / 3						X	K 2.4.18 KNOWLEDGE OF SPECIFIC BASES FOR EOP'S	3.6	1.0 C
W/E04 LOCA Outside Containment / 3	X						K 1.2 PROCEDURES ASSOCIATED WITH LOCA OUTSIDE CONT	4.2	1.0 C
W/E01 & E02 Rediagnosis & SI Termination / 3		X					K 2.2 INTERRELATION OF SI TERM AND DHR	3.9	1.0 S
000015/17 RCP Malfunctions / 4				X			A 1.22 RCP SEAL FAILURE/MALFUNCTION	4.2	1.0 C
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4		X					K 2.02 NATURAL CIRCULATION AND HEAT REMOVAL SYSTEM	3.9	1.0 C
000024 Emergency Boration / 1			X				K 3.01 WHEN EMERGENCY BORATION IS REQUIRED	4.4	1.0 S
000026 Loss of Component Cooling Water / 8					X		A 2.01 LOCATION OF LEAK IN CCWS	3.5	1.0 C
000029 Anticipated Transient w/o Scram / 1				X			A 1.15 AFW SYSTEM	3.9	1.0 C
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4			X				K 3.02 ESFAS INITIATION	4.4	1.0 C
CE/A11; W/E08 RCS Overcooling - PTS / 4	X						K 1.2 NORMAL, ABNORMAL, AND EMERGENCY PROCEDURES	4.0	1.0 S
000051 Loss of Condenser Vacuum / 4					X		A 2.02 CONDITIONS REQUIRING RX/TURBINE TRIP	4.1	1.0 C
000055 Station Blackout / 6	X						K 1.01 BATTERY DISCHARGE RATES		1.0 C
000057 Loss of Vital AC Elec. Inst. Bus / 6						X	K 2.4.10 KNOWLEDGE OF ARP'S	3.1	1.0 C
000059 Accidental Liquid RadWaste Rel. / 9		X					K 2.01 ACCIDENTAL LIQ RELEASE AND RAD MONITORS	2.8	1.0 S
000062 Loss of Nuclear Service Water / 4				X			A 1.01 NSW TEMP INDICATIONS	3.1	1.0 C
000067 Plant Fire On-site / 9	X						K 1.01 FIRE CLASSIFICATIONS	3.9	1.0 C
000068 (BW/A06) Control Room Evac. / 8					X		A 2.09 SATURATION MARGIN	4.3	1.0 C
000069 (W/E14) Loss of CTMT Integrity / 5				X			A 1.2 OPERATING CHARACTERISTICS OF FACILITY		1.0 C
000074 (W/E06&E07) Inad. Core Cooling / 4	X						K 1.03 PROCESS FOR REMOVING DECAY HEAT FROM CORE	4.9	1.0 C
BW/E03 Inadequate Subcooling Margin / 4		X					K2.01 LOCA COOLDOWN AND INTERLOCKS	4.0	1.0 S
000076 High Reactor Coolant Activity / 9			X				K3.06 ACTIONS IN EOP	3.8	1.0 S
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:	5	4	4	4	4	3	Group Point Total:		24

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PWR SRO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

Form ES-401-3

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1		X					K 2.02 BREAKERS, RELAYS, AND DISCONNECTS	2.8	1.0 C
BW/A01 Plant Runback / 1									
BW/A04 Turbine Trip / 4									
000008 Pressurizer Vapor Space Accident / 3					X		A 2.12 PZR LEVEL INDICATIONS	3.7	1.0 C
000009 Small Break LOCA / 3			X				K 3.24 ECCS THROTTLING OR TERMINATION CRITERIA	4.6	1.0 S
BW/E08; W/E03 LOCA Cooldown - Depress. / 4			X				K 3.3 MANIPULATION TO OBTAIN RESULTS	3.9	1.0 C
WE11 Loss of Emergency Coolant Recirc. / 4		X					K 2.1 INTERRELATIONS BETWEEN COMPONENTS AND FAILURES	3.9	1.0 C
000022 Loss of Reactor Coolant Makeup / 2					X		A 2.02 CHARGING	3.2	1.0 C
000025 Loss of RHR System / 4			X				K 3.01 SHIFT TO ALTERNATE FLOWPATHS	3.4	1.0 C
000027 Pressurizer Pressure Control System Malfunction / 3				X			A 1.01 PZR HTRS, SPRAYS, AND PORVS	3.9	1.0 C
000032 Loss of Source Range NI / 7						X	2.1.33 ENTRY LEVEL FOR LCO	4.0	1.0 S
000033 Loss of Intermediate Range NI / 7	X						K 1.01 EFFECTS ON VOLTAGE CHANGES	3.0	1.0 S
000037 Steam Generator Tube Leak / 3					X		A 2.01 STEPS NEEDED TO VERIFY UNUSUAL READINGS	3.4	1.0 C
000038 Steam Generator Tube Rupture / 3			X				K 3.06 ACTIONS IN EOP'S	4.5	1.0 S
000054 (CE/E06) Loss of Main Feedwater / 4	X						K 1.01 MFW LINE BREAK DEPRESSURIZATION	4.3	1.0 C
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4					X		A 2.01 FACILITY CONDITIONS AND PROCEDURES	4.4	1.0 C
000058 Loss of DC Power / 6									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7						X	2.4.50 VERIFY SYSTEM ALARM SETPOINTS	3.3	1.0 S
WE16 High Containment Radiation / 9									
000065 Loss of Instrument Air / 8				X			A 1.03 RESTORATIONS OF SYSTEMS SERVED BY AIR	3.1	1.0 C
CE/E09 Functional Recovery									
K/A Category Point Totals:	2	2	4	2	4	2	Group Point Total:		16

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PWR SRO Examination Outline
Plant Systems - Tier 2/Group 1

Form ES-401-3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive					X							K 5.05 INTERPRETATION OF RODS	3.9	1.0 C
003 Reactor Coolant Pump							X					A 1.09 SEAL FLOW AND D/P	2.8	1.0 C
004 Chemical and Volume Control										X		A 4.18 EMERGENCY BORATE VALVE	4.1	1.0 C
013 Engineered Safety Features Actuation									X			A 3.02 ACTUATED EQUIPMENT	4.2	1.0 C
014 Rod Position Indication					X							K 5.01 RPIS AND STEP COUNTER	3.0	1.0 C
015 Nuclear Instrumentation							X					A 1.04 QPTR	3.7	1.0 C
017 In-core Temperature Monitor						X						K 6.01 SENSORS AND DETECTORS	3.0	1.0 C
022 Containment Cooling											X	G 2.1.32 SYSTEM LIMITS	3.8	1.0 C
025 Ice Condenser														
026 Containment Spray			X									K 3.01 EFFECT ON CCS	4.1	1.0 S
056 Condensate								X				A 2.04 LOSS OF COND PUMPS	2.8	1.0 C
059 Main Feedwater				X								K 4.19 FWI	3.4	1.0 C
061 Auxiliary/Emergency Feedwater		X										K 2.03AFW DIESEL PUMP	3.8	1.0 C
063 DC Electrical Distribution	X											K 1.04 BATTERY VENTILATION	2.7	1.0 S
068 Liquid Radwaste				X								K 4.01 SAFETY PRECAUTIONS	4.1	1.0 C
071 Waste Gas Disposal				X								K 4.01 PRESSURE FOR WGDT	3.0	1.0 C
072 Area Radiation Monitoring											X	G 2.1.14 SYSTEM STATUS CRITERIA	3.3	1.0 C
003 Reactor Coolant Pump			X									K3.03 CONTAINMENT	4.6	1.0 S
013 Engineered Safety Features Actuation		X										K2.01 ESFAS	3.8	1.0 S
061 Auxiliary/Emergency Feedwater					X							K5.01 AFW VS RCS HEAT	3.9	1.0 S
K/A Category Point Totals:	1	2	2	3	3	1	2	1	1	1	2	Group Point Total:		19

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PWR SRO Examination Outline
Plant Systems - Tier 2/Group 2

Form ES-401-3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant						X						K 6.02 RCP	3.8	1.0 C
006 Emergency Core Cooling		X										K 2.04 ESFAS OPERATED VALVES	3.8	1.0 C
010 Pressurizer Pressure Control									X			A 3.02 PZR PRESSURE	3.5	1.0 C
011 Pressurizer Level Control					X							K 5.12 PZR LEVEL PROGRAM	3.3	1.0 C
012 Reactor Protection														
016 Non-nuclear Instrumentation	X											K 1.01 RCS	3.4	1.0 C
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control										X		A 4.01 HRPS CONTROLS	4.0	1.0 C
029 Containment Purge											X	G 2.1.27 SYSTEM FUNCTION	2.9	1.0 C
033 Spent Fuel Pool Cooling				X								K 4.05 SDM	3.3	1.0 C
034 Fuel Handling Equipment				X								K 4.02 FUEL MOVEMENT	3.3	1.0 C
035 Steam Generator							X					A 1.01 S/G RANGE LEVEL	3.8	1.0 C
039 Main and Reheat Steam														
055 Condenser Air Removal			X									K 3.01 MAIN CONDENSER	2.5	1.0 C
062 AC Electrical Distribution		X										K 2.01 MAJOR SYSTEM LOADS	3.4	1.0 C
064 Emergency Diesel Generator	X											K 1.04 DC DISTRIBUTION SYSTEM	3.9	1.0 S
073 Process Radiation Monitoring	X											K 1.01 PRM SYSTEMS	3.9	1.0 C
075 Circulating Water							X					A 1.02 INTAKE LEVELS	2.5	1.0 S
079 Station Air										X		A 4.01 X-TIE WITH IAS	2.7	1.0 S
086 Fire Protection											X	G 2.1.28 MAJOR SYSTEM COMPONENTS	3.3	1.0 C
103 Containment														
K/A Category Point Totals:	3	2	1	2	1	1	2	0	1	2	2	Group Point Total:		17

ES-401

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

Form ES-401-3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp	Points
005 Residual Heat Removal														
007 Pressurizer Relief/Quench Tank								X				A 2.01 STUCK OPEN PORV	4.2	1.0 C
008 Component Cooling Water			X									K 3.01 LOADS OFF OF CCWS	3.5	1.0 C
041 Steam Dump/Turbine Bypass Control				X								K 4.09 COOLDOWN TAVE RELATIONSHIP	3.3	1.0 C
045 Main Turbine Generator														
076 Service Water														
078 Instrument Air									X			A 3.01 AIR PRESSURE	3.2	1.0 S
K/A Category Point Totals:	0	0	1	1	0	0	0	1	1	0	0	Group Point Total:		4

Plant-Specific Priorities

System / Topic	Recommended Replacement for...	Reason	Points

Plant-Specific Priority Total: (limit 10)

Facility:		BYRON	Date of Exam:		06/20/00	Exam Level:		SRO
Category	K/A #	Topic			Imp.	Points		
Conduct of Operations	2.1.1	Knowledge of Conduct of Ops			3.8	1.0 C		
	2.1.3	Knowledge of Shift Turnover			3.4	1.0 C		
	2.1.4	Knowledge of Shift Staffing			3.4	1.0 C		
	2.1.25	Ability to interpret graphs			3.1	1.0 S		
		Total				4.0		
Equipment Control	2.2.11	Knowledge of Temp Changes			3.4	1.0 C		
	2.2.12	Knowledge of Surveillances			3.4	1.0 C		
	2.2.13	Knowledge of Tagging			3.8	1.0 C		
	2.2.24	Ability to analyze the affect of mainten on LCOs			3.8	1.0 S		
		Total				4.0		
Radiation Control	2.3.1	Knowledge of 10CFR20			3.0	1.0 C		
	2.3.4	Knowledge of Exposure Limits			3.1	1.0 C		
	2.3.10	Ability to Reduce Exposure			3.3	1.0 C		
	2.3.11	Ability to control rad releases			3.2	1.0 S		
		Total				4.0		
Emergency Procedures/ Plan	2.4.1	Knowledge of EOP's			4.6	1.0 C		
	2.4.2	Knowledge of System Setpoints			4.1	1.0 C		
	2.4.3	Ability to Identify PAM			3.8	1.0 C		
	2.4.6	Knowledge of Mitigation Strategy			4.0	1.0 C		
	2.4.42	Knowledge of emergency response facility			3.7	1.0 S		
		Total						
Tier 3 Point Total (SRO)						17		

Facility: BYRON														Date of Exam: 06/20/00			Exam Level: RO		
Tier	Group	K/A Category Points											Point Total						
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *							
1. Emergency & Abnormal Plant Evolutions	1	4	1	3				4	3			1	16						
	2	2	2	4				2	5			2	17						
	3	1	1	0				1	0			0	3						
	Tier Totals	7	4	7				7	8			3	36						
2. Plant Systems	1	1	1	1	4	1	2	5	2	2	2	2	23						
	2	3	2	2	2	2	1	1	3	1	1	2	20						
	3	0	0	2	2	0	0	0	2	0	1	1	8						
	Tier Totals	4	3	5	8	3	3	6	7	3	4	5	51						
3. Generic Knowledge and Abilities							Cat 1	Cat 2	Cat 3	Cat 4	13								
							3	3	3	4									
<p>Note: 1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).</p> <p>2. Actual point totals must match those specified in the table.</p> <p>3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.</p> <p>4. Systems/evolutions within each group are identified on the associated outline.</p> <p>5. The shaded areas are not applicable to the category/tier.</p> <p>6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.</p> <p>7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.</p>																			

ES-401		PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1						Form ES-401-4	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1			X				K 3.01 BORATION AND EMERGENCY BORATION WITH STUCK ROD	4.0	1
000015/17 RCP Malfunctions / 4				X			A 1.22 RCP SEAL FAILURE/MALFUNCTION	4.0	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4		X					K 2.02 NATURAL CIRCULATION AND HEAT REMOVAL SYSTEM	3.6	1
000024 Emergency Boration / 1			X				K 3.01 WHEN EMERGENCY BORATION IS REQUIRED	4.1	1
000026 Loss of Component Cooling Water / 8					X		A 2.01 LOCATION OF LEAK IN CCWS	2.9	1
000027 Pressurizer Pressure Control System Malfunction / 3				X			A 1.01 PZR HTRS, SPRAYS, AND PORVS	4.0	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4			X				K 3.02 ESFAS INITIATION	4.4	1
CE/A11; W/E08 RCS Overcooling - PTS / 4	X						K 1.2 NORMAL, ABNORMAL, AND EMERGENCY PROCEDURES	3.4	1
000051 Loss of Condenser Vacuum / 4					X		A 2.02 CONDITIONS REQUIRING RX/TURBINE TRIP	3.9	1
000055 Station Blackout / 6	X						K 1.01 BATTERY DISCHARGE RATES	3.3	1
000057 Loss of Vital AC Elec. Inst. Bus / 6						X	K 2.4.10 KNOWLEDGE OF ARP'S	3.0	1
000062 Loss of Nuclear Service Water / 4				X			A 1.01 NSW TEMP INDICATIONS	3.0	1
000067 Plant Fire On-site / 9	X						K 1.01 FIRE CLASSIFICATIONS	2.9	1
000068 (BW/A06) Control Room Evac. / 8					X		A 2.09 SATURATION MARGIN	4.1	1
000069 (W/E14) Loss of CTMT Integrity / 5				X			A 1.2 OPERATING CHARACTERISTICS OF FACILITY	3.3	1
000074 (W/E06&E07) Inad. Core Cooling / 4	X						K 1.03 PROCESS FOR REMOVING DECAY HEAT FROM CORE	4.5	1
BW/E03 Inadequate Subcooling Margin / 4							N/A	0	0
000076 High Reactor Coolant Activity / 9							N/A	0	0
BW/A02&A03 Loss of NNI-X/Y / 7							N/A	0	0
K/A Category Totals:	4	1	3	4	3	1	Group Point Total:		16

ES-401		PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2						Form ES-401-4	
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1					X		A 2.05 UNCONTROLLED ROD WITHDRAWAL	4.4	1
000003 Dropped Control Rod / 1						X	K 2.4.4 ABILITY TO RECOGNIZE ABNORMAL CONDITIONS	4.0	1
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1		X					K 2.02 BREAKERS, RELAYS, AND DISCONNECTS	2.6	1
BW/A01 Plant Runback / 1							N/A	0	0
BW/A04 Turbine Trip / 4							N/A	0	0
000008 Pressurizer Vapor Space Accident / 3					X		A 2.12 PZR LEVEL INDICATIONS	3.4	1
000009 Small Break LOCA / 3			X				K 3.24 ECCS THROTTLING OR TERMINATION CRITERIA	4.1	1
000011 Large Break LOCA / 3						X	K 2.4.18 KNOWLEDGE OF SPECIFIC BASES FOR EOP'S	2.7	1
W/E04 LOCA Outside Containment / 3	X						K 1.2 PROCEDURES ASSOCIATED WITH LOCA OUTSIDE CONT	3.5	1
BW/E08; W/E03 LOCA Cooldown/Depress. / 4			X				K 3.0.3 MANIPULATION TO OBTAIN RESULTS	3.9	1
W/E11 Loss of Emergency Coolant Recirc. / 4		X					K 2.1 INTERRELATIONS BETWEEN COMPONENTS AND FAILURES	3.6	1
W/E01 & E02 Rediagnosis & SI Termination / 3							N/A	0	0
000022 Loss of Reactor Coolant Makeup / 2					X		A 2.02 CHARGING	3.2	1
000025 Loss of RHR System / 4			X				K 3.01 SHIFT TO ALTERNATE FLOWPATHS	3.1	1
000029 Anticipated Transient w/o Scram / 1				X			A 1.15 AFW SYSTEM	4.1	1
000032 Loss of Source Range NI / 7				X			A 1.01 MANUAL RESTORATION OF POWER	3.1	1
000033 Loss of Intermediate Range NI / 7							N/A	0	0
000037 Steam Generator Tube Leak / 3						X	A 2.01 STEPS NEEDED TO VERIFY UNUSUAL READINGS	3.0	1
000038 Steam Generator Tube Rupture / 3			X				K 3.06 ACTIONS IN EOP'S	4.2	1
000054 (CE/E06) Loss of Main Feedwater / 4	X						K 1.01 MFW LINE BREAK DEPRESSURIZATION	4.1	1
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4						X	A 2.01 FACILITY CONDITIONS AND PROCEDURES	3.4	1
000058 Loss of DC Power / 6							N/A	0	0
000059 Accidental Liquid RadWaste Rel. / 9							N/A	0	0
000060 Accidental Gaseous Radwaste Rel. / 9							N/A	0	0
000061 ARM System Alarms / 7							N/A	0	0
W/E16 High Containment Radiation / 9							N/A	0	0
CE/E09 Functional Recovery							N/A	0	0
K/A Category Point Totals:	2	2	4	2	5	2	Group Point Total:0		17

ES-401

PWR RO Examination Outline
Plant Systems - Tier 2/Group 1

Form ES-401-4

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive					X							K 5.05 INTERPRETATION OF RODS	2.8	1
003 Reactor Coolant Pump							X					A 1.09 SEAL FLOW AND D/P	2.8	1
004 Chemical and Volume Control										X		A 4.18 EMERGENCY BORATE VALVE	4.3	1
013 Engineered Safety Features Actuation									X			A 3.02 ACTUATED EQUIPMENT	4.1	1
015 Nuclear Instrumentation							X					A 1.04 QPTR	3.5	1
017 In-core Temperature Monitor						X						K 6.01 SENSORS AND DETECTORS	2.7	1
022 Containment Cooling											X	K 2.1.32 SYSTEM LIMITS	3.4	1
056 Condensate								X				A 2.04 LOSS OF COND PUMPS	2.6	1
059 Main Feedwater				X								K 4.19 FWI	3.2	1
061 Auxiliary/Emergency Feedwater		X										K 2.03AFW DIESEL PUMP	4.0	1
068 Liquid Radwaste				X								K 4.01 SAFETY PRECAUTIONS	3.4	1
071 Waste Gas Disposal				X								K 4.01 PRESSURE FOR WGDT	2.6	1
072 Area Radiation Monitoring											X	K 2.1.14 SYSTEM STATUS CRITERIA	2.5	1
001 Control Rod Drive				X								K 4.02 CONTROL ROD MODE SELECT	3.8	1
003 Reactor Coolant Pump								X				A 2.01 PROBLEMS WITH SEALS	3.5	1
004 Chemical and Volume Control						X						K 6.17 FLOW PATHS	4.4	1
004 Chemical and Volume Control			X									K 3.07 PZR LEVEL AND PRESSURE	3.8	1
013 Engineered Safety Features Actuation							X					A 1.05 MAIN STEAM PRESSURE	3.4	1
013 Engineered Safety Features Actuation										X		A 4.02 RESET OF ESFAS CHANNELS	4.3	1
015 Nuclear Instrumentation							X					A 1.01 NIS CALIBRATION	3.5	1
015 Nuclear Instrumentation									X			A 3.04 CHANNEL DEVIATION	3.3	1
061 Auxiliary/Emergency Feedwater							X					A 1.05 AFW FLOW/AMPS	3.6	1
061 Auxiliary/Emergency Feedwater	X											K 1.02 MFW SYSTEM	3.4	1
K/A Category Point Totals:	1	1	1	4	1	2	5	2	2	2	2	Group Point Total:		23

ES-401

PWR RO Examination Outline
Plant Systems - Tier 2/Group 2

Form ES-401-4

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant						X						K 6.02 RCP	3.6	1
006 Emergency Core Cooling		X										K 2.04 ESFAS OPERATED VALVES	3.6	1
010 Pressurizer Pressure Control									X			A 3.02 PZR PRESSURE	3.6	1
011 Pressurizer Level Control					X							K 5.12 PZR LEVEL PROGRAM	3.2	1
012 Reactor Protection								X				A 2.04 POWER SUPPLY	3.1	1
014 Rod Position Indication					X							K 5.01 RPIS AND STEP COUNTER	2.7	1
016 Non-nuclear Instrumentation	X											K 1.01 RCS	3.4	1
026 Containment Spray										X		A 4.01 CSS CONTROLS	4.5	1
029 Containment Purge											X	K 2.1.27 SYSTEM FUNCTION	2.8	1
033 Spent Fuel Pool Cooling				X								K 4.05 SDM	3.1	1
035 Steam Generator							X					A 1.01 S/G RANGE LEVEL	3.6	1
039 Main and Reheat Steam								X				A 2.04 STEAM DUMP	3.4	1
055 Condenser Air Removal			X									K 3.01 MAIN CONDENSER	2.5	1
062 AC Electrical Distribution		X										K 2.01 MAJOR SYSTEM LOADS	3.3	1
063 DC Electrical Distribution			X									K 3.02 COMPONENTS USING DC POWER	3.5	1
064 Emergency Diesel Generator				X								K 4.11 SAFEGUARDS LOAD SEQUENCER	3.5	1
073 Process Radiation Monitoring	X											K 1.01 PRM SYSTEMS	3.6	1
075 Circulating Water	X											K 1.02 LIQUID RADWASTE	2.9	1
079 Station Air											X	K 2.1.28 MAJOR SYSTEM COMPONENTS	3.2	1
086 Fire Protection								X				A 2.02 FPS HEADER PRESSURE	3.0	1
K/A Category Point Totals:	3	2	2	2	2	1	1	3	1	1	2	Group Point Total:		20

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 3											Form ES-401-4		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal								X				A 2.02 PRESSURE TRANSIENT	3.5	1
007 Pressurizer Relief/Quench Tank								X				A 2.01 STUCK OPEN PORV	3.9	1
008 Component Cooling Water			X									K 3.01 LOADS OFF OF CCWS	3.4	1
027 Containment Iodine Removal												N/A	0	0
028 Hydrogen Recombiner and Purge Control										X		A 4.01 HRPS CONTROLS	4.0	1
034 Fuel Handling Equipment				X								K 4.02 FUEL MOVEMENT	2.5	1
041 Steam Dump/Turbine Bypass Control				X								K 4.09 COOLDOWN TAVE RELATIONSHIP	3.0	1
045 Main Turbine Generator												N/A	0	0
076 Service Water												N/A	0	0
078 Instrument Air			X									K 3.02 SYSTEMS WITH AIR VALVES	3.4	1
103 Containment											X	K 2.1.33 ENTRY INTO TECH SPECS	3.4	1
K/A Category Point Totals:	0	0	2	2	0	0	0	2	0	1	1	Group Point Total:		8
Plant-Specific Priorities														
System / Topic		Recommended Replacement for...					Reason					Points		
Plant-Specific Priority Total: (limit 10)														

Facility:		BYRON	Date of Exam:		06/20/00	Exam Level:		RO
Category	K/A #	Topic	Imp.	Points				
Conduct of Operations	2.1.1	Knowledge of Conduct of Ops	3.7	1				
	2.1.3	Knowledge of Shift Turnover	3.0	1				
	2.1.4	Knowledge of Shift Staffing	3.4	1				
	Total			3				
Equipment Control	2.2.11	Knowledge of Temp Changes	2.5	1				
	2.2.12	Knowledge of Surveillances	3.0	1				
	2.2.13	Knowledge of Tagging	3.6	1				
	Total			3				
Radiation Control	2.3.1	Knowledge of 10 CFR 20	2.6	1				
	2.3.4	Knowledge of Exposure Limits	2.5	1				
	2.3.10	Ability to Reduce Exposure	2.9	1				
	Total			3				
Emergency Procedures/ Plan	2.4.1	Knowledge of EOP's	4.3	1				
	2.4.2	Knowledge of System Setpoints	3.9	1				
	2.4.3	Ability to Identify PAM	3.5	1				
	2.4.6	Knowledge of Mitigation Strategy	3.1	1				
	Total			4				
Tier 3 Point Total (RO)				13				

Facility: <u>Byron Nuclear Power Station</u>		Date of Examination: <u>6-20-00</u>		
Item	Task Description	Initials		
		a	b*	c
WRITEN	1. a. Verify that the outline(s) fit(s) the appropriate model per ES-401.	NA	NA	NA
	b. Assess whether the outline was systematically prepared and whether all knowledge and ability categories are appropriately sampled.			
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.			
	d. Assess whether the repetition from previous examination outlines is excessive.			
SIM	2. a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, and major transients.	JH	DOB	AMS
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity; ensure each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s)*, and scenarios will not be repeated over successive days.	NA	NA	AMS ①
	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.	JH	DOB	AMS
W/T	3. a. Verify that: (1) the outline(s) contain(s) the required number of control room and in-plant tasks, (2) no more than 30% of the test material is repeated from the last NRC examination, (3) no tasks are duplicated from the applicants' audit test(s), and (4) no more than 80% of any operating test is taken directly from the licensee's exam banks.	NA	NA	NA
	b. Verify that: (1) the tasks are distributed among the safety function groupings as specified in ES-301, (2) one task is conducted in a low-power or shutdown condition, (3) 40% of the tasks require the applicant to implement an alternate path procedure, (4) one in-plant task tests the applicant's response to an emergency or abnormal condition, and (5) the in-plant walk-through requires the applicant to enter the RCA.			
	c. Verify that the required administrative topics are covered, with emphasis on performance-based activities.			
	d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on successive days.			
GENERAL	4. a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	JH	DOB	AMS
	b. Assess whether the 10 CFR 55.41.43 ^{54.43} and <u>\$5.45</u> sampling is appropriate.	JH	DOB	AMS
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	NA	→	→
	d. Check for duplication and overlap among exam sections.	JH	DOB	AMS
	e. Check the entire exam for balance of coverage.	NA	NA	AMS
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	JH	DOB	AMS
a. Author	<u>Terry Holder</u>	Printed Name / Signature		Date
b. Facility Reviewer(*)	<u>Larry Bunker</u>	<u>Terry Holder</u>		<u>5-19-00</u>
c. Chief Examiner	<u>Ann Marie Stone</u>	<u>Ann Marie Stone</u>		<u>5-23-00</u>
d. NRC Supervisor	<u>DAVID L. PELTON</u>	<u>FOR D. HILLS</u>		<u>5/26/00</u>
(*) Not applicable for NRC-developed examinations.				

① NRC developed 24 scenarios with the intent on using 1 scenario a day + testing all candidates of 24
 Facility did not like this plan + it was agreed that the facility would generate 3 scenarios in order to complete testing of individual in one day.
 NUREG-1021, Revision 8

Simulation Facility BYRON Scenario No.: 1 (LFAC) Op Test No.: 1

Examiners: _____ Operators: _____ SRO

_____ RO

_____ BOP

Initial Conditions: IC-16; 50% power MOL, Equil. Xenon, 1B AF pump OOS, 1C HDP OOS, U-2 SAC OOS.
 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card.

Turnover: 50% Power Steady State, Equilibrium Xenon, MOL. The Diesel Driven Aux Feedwater Pump is OOS for replacement of a fuel injector. The pump has been OOS for 6 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is out of service for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift. 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card. Electrical Operations will be requesting a power increase to Full Power later in the shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload			Place Unit 2 SAC, 1C HD pump, 1B AF Pump out of service, and Set the Poll Status on the 1AR022J's to off on the RM11, verify/ select 1LT-558 as controlling channel for 1C SG.
Preload	BAT 1baf-oos	C BOP SRO	1B AF Pump OOS
Preload	RF RP84 RP15D	C RO SRO	1B SI Pump fails to start automatically (mrf RP84 open; imf RP15D)
1	TH03C	C RO BOP SRO	1C SGTL (20 gpm, 50 sec ramp)(SDG TH5)
2		N BOP SRO	Reduce Turbine Load for Plant Shutdown due to SG leakage > T.S.
		R RO	Lower reactor power using rods and/or boration
3	RX06L	I BOP SRO	1LT558 Failed High (MF RX06L 100% 3 sec ramp) (SDG RX19) SEE NEXT MALFUNCTION ALSO. Note 1.
4	RX29C	C BOP SRO	FRV 1FW530 Failed Closed in Automatic (MF RX29C 0, 3 sec ramp) (SDG RX21)
5	ED11A	C RO BOP SRO	Loss of Instrument Bus 111 (MF ED11A) (SDG ED6) SEE NEXT MALFUNCTION ALSO.
6	RX18A	I RO SRO	1A Tcold failed High (MF RX18A 630) (SDG RX2) Note 2
7	TH03C	M RO BOP SRO	1C SGTR (400 gpm) (SDG TH5)
8	Preload	C RO SRO	Manually start an SI pump
9		C RO BOP SRO	Manually Align ECCS for Injection

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

NOTE 1: RP20 Cab. Door #1 (MRF RP20 OPEN) (CLOSE) (SDG RX4)
 RX126 P-14 LB558B C1-753 BS-1 (MRF RX126 Trip) (SDG RX19)
 RX013 Lo-2 Rx Trip LB558C C1-753 BS-2 (MRF RX073 Trip) (SDG RX19)
 RX147 AMS Test Bypass Switch (MRF RX147 Trip) (SDG RX19)

NOTE 2: FW45A-D 1AF005 A-D IMF FW45A,B,C,D (0) (SDG FW13)
 RP20 Cab. Door #1 (MRF RP20 OPEN) (CLOSE) (SDG RX4)
 RX014 OPΔT Trip TB411G C1-124 BS-1 (MRF RX014 Trip) (SDG RX4)
 RX136 OPΔT Runback TB411H C1-124 BS-2 (MRF RX136 Trip) (SDG RX4)
 RX013 OTΔT Trip TB411C C1-124 BS-3 (MRF RX013 Trip) (SDG RX4)
 RX135 OTΔT Runback TB411D C1-124 BS-4 (MRF RX135 Trip) (SDG RX4)
 RX016 Low Tave FW Isol TB412G C1-121 BS-2 (MRF RX016 Trip) (SDG RX2)
 RX015 Lo-Lo Tave TB412D C1-121 BS-1 (MRF RX015 Trip) (SDG RX2)

Simulation Facility	BYRON	Scenario No.:	2 (FAC)	Op Test No.:	1
Examiners:	_____	Operators:	_____		SRO
	_____		_____		RO
	_____		_____		BOP
<p>Initial Conditions: IC-21, Reactor Power 100%, BOL, Equil. Xenon, 1B AF pump OOS, 1C HDP OOS, U-2 SAC OOS. 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card.</p> <p>Turnover: Reactor power is 100%. The Diesel Driven Aux Feedwater Pump is OOS for replacement of a fuel injector. The pump has been OOS for 6 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is out of service for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift. 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card. Electrical Operations has ordered Byron Unit 1 to lower power at 5 Mw/min after shift turnover to 900Mw.</p>					

Event No.	Malf. No.	Event Type*	Event Description
Preload			Place Unit 2 SAC, 1C HD pump, 1B AF Pump out of service, and Set the Poll Status on the 1AR022J's to off on the RM11.
Preload	BAT 1baf-oos	C BOP SRO	1B AF Pump OOS
Preload	FW43		1A AFW Pump fails to start
Preload	MRF RP34 OUT RP35 OUT RP60 OUT RP61 OUT		Failure of MSIV automatic closure signal
Preload	MS01A, 100		1A MSIV Fails to Close
1		R RO	Lower reactor power using rods and/or boration
		N BOP SRO	Set and lower turbine load at 5 Mw/min to 900Mw
2	CC02B, 134 CC01B	C BOP SRO	1A CC Pump trips coincident with 1B CC Pump discharge pressure switch failing as-is.
3	RX10A,0,20	I RO SRO	Impulse Pressure Channel PT-505 fails downscale on a 20 second ramp. NOTE 1
4	RX05, 0	I BOP SRO	Steam Header Pressure Detector PT-507 fails low
5	MS09,4.0 MLB/H	M RO SRO BOP	Main Steam Header Break with failure of MSIV auto closure
6	(MS01A)	C RO SRO BOP	1A Steam Generator MSIV failure to close both automatic and manual
7	(FW43)	M RO SRO BOP	1A MD AFW pump trip results in loss of feed.
8	TH11B, 100	C RO SRO	Pzr PORV 456 fails open

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

NOTE 1: RP20	Cab. Door #1	(MRF RP20 OPEN) (CLOSE) (SDG RX11)
RX143	PB505A	(MRF RX143 Trip) (SDG RX11)
RX149	Operating Bypass to Test-Trip	(MRF RX149 Trip) (SDG RX11)
SE:PN0470	AMS in Test	(IOR SE:PN0470 ON)

Simulation Facility BYRON Scenario No.: Extra (FAC) Op Test No.: 1

Examiners: _____ Operators: _____ SRO

_____ RO

_____ BOP

Initial Conditions: IC-18; 75% power MOL, Equil. Xenon, 1B AF pump OOS, 1C HDP OOS, U-2 SAC OOS.
 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card.

Turnover: 75% power, steady state, equilibrium xenon. The Diesel Driven Aux Feedwater Pump is OOS for replacement of a fuel injector. The pump has been OOS for 6 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is out of service for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift. 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card. Raise turbine load to full power at 5 Mw/min.

Event No.	Malf. No.	Event Type*	Event Description
Preload			Place Unit 2 SAC, 1C HD pump, 1B AF Pump out of service, and Set the Poll Status on the 1AR022J's to off on the RM11.
Preload	BAT 1baf-oos	C BOP SRO	1B AF Pump OOS
Preload	RP02A&B	M RO BOP SRO	RX Trip Bkrs Fail to Open (SDG RP2)
1		N BOP SRO	Raise Turbine Load to Full Power at 5 Mw/min.
		R RO	Raise reactor power using rods and/or dilution
2	RX21A	I RO SRO	PZR Press Channel Failure (2500 psig, 3 sec ramp) (SDG RX8) Note 1
3	CC03B	I BOP SRO	CC Surge Tank Level Transmitter failed Low (0%) (SDG CC2) Note 2
4	RP10A	C RO BOP SRO	Inadvertent PHASE 'A' (SDG RP13) Delete Malfunction right after activation is complete. Note 3
5	TH10A&B ZDI1PK455B&C	C RO SRO	PZR Spray Valve 1RY455B&C failed Open (TH10A&B 100, 10) (SDG TH7) PZR Spray Valve Controller failed in Auto (IOR ZDI1PK455B&C AUTO OR if sprays are in manual for restoration INC) (SDG TH7)
6	Preload	M RO BOP SRO	ATWS (SDG RD1)
7	ZAO1SI412	C RO SRO	Rod speed indicator fails at 72 spm when value is reached (IOR ZAO1SI412 72) (SDG RD1)
8	MS03A&E	M RO BOP SRO	Steam Break on the 1A S/G (100%) (SDG MS1)

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

Note 1	MRF RP20 Open/Close	Protection Cabinet Door #1		(SDG RX10)
	MRF RX032 Trip	Pzr Hi Press Rx Trip	PB455A	C1-153 BS-1 (SDG RX10)
	MRF RX034 Trip	Pzr Low Press Rx Trip	PB455C	C1-153 BS-4 (SDG RX10)
	MRF RX035 Trip	Pzr Low Press SI	PB455D	C1-153 BS-3 (SDG RX10)
	MRF RX033 Trip	P11	PB455B	C1-153 BS-2 (SDG RX10)
	MRF RX013 Trip	OTΔT Rx Trip	TB411C	C1-124 BS-3 (SDG RX4)
Note 2	MRF RX135 Trip	OTΔT Runback	TB411D	C1-124 BS-4 (SDG RX4)
	MRF CC52 CLOSED	to shut 1CC185 to isolate 1CC183		(SDG CC2)
Note 3	MRF CC15/16 100	to drain CC Surge Tank		(SDG CC2)
	MRF WD14 BYPASS	to restore S/G sample flow		(SDG WD1)
	MRF RM01 RESET	to restore 1PR11J		(RFI RM)