Facility: Cooper Nuclear Station Date of Exam: 2-28-2011

Tier	Group	RO K/A Category Points												SRO-Only Points						
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2		G*		Total		
1. Emergency & Abnormal Plant Evolutions	1	4	3	3	N/A			3	4	N/A		3	20	2		5		7		
	2	1	1	1				1	1			2	7	2		1		3		
	Tier Totals	5	4	4				4	5			5	27	4		6		10		
2. Plant Systems	1	2	2	2	3	2	2	2	3	3	3	2	26	2		3		5		
	2	1	1	2	1	1	1	1	1	1	1	1	12	1	1	1		3		
	Tier Totals	3	3	4	4	3	3	3	4	4	4	3	38	4		4		8		
3. Generic Knowledge and Abilities Categories		1		2		3		4						1	2	3	4			
		3		2		2		3					10	2	2	1	2	7		

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.
4. Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.
5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.
6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.
7.* The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.
8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IRs) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above; if fuel handling equipment is sampled in other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2 (Note #1 does not apply). Use duplicate pages for RO and SRO-only exams.
9. For Tier 3, select topics from Section 2 of the K/A catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

ES-401 BWR Examination Outline Form ES-401-1
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 RO

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4					X		AA2.05 Ability to determine and/or interpret Jet pump operability as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION:	3.1	53
295003 Partial or Complete Loss of AC / 6			X				AK3.06 Knowledge of the reasons for Containment isolation as they apply to PARTIAL OR COMPLETE LOSS OF A.C.POWER	3.7	46
~~295004 Partial or Total Loss of DC Pwr / 6~~						~~X~~	~~2.1.27 Knowledge of system purpose and/or function.~~	~~3.9~~	~~56~~
~~295004 Partial or Total Loss of DC Pwr / 6~~						~~X~~	~~2.1.26 Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).~~	~~3.4~~	~~56~~
295004 Partial or Total Loss of DC Pwr / 6						X	2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.	4.5	56
295005 Main Turbine Generator Trip / 3		X					AK2.01 Knowledge of the interrelations between MAIN TURBINE GENERATOR TRIP and RPS	3.8	43
295006 SCRAM / 1						X	2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	54
295016 Control Room Abandonment / 7				X			AA1.02 Ability to operate and/or monitor the reactor/turbine pressure regulating system as they apply to CONTROL ROOM ABANDONMENT:	2.9	49
295018 Partial or Total Loss of CCW / 8		X					AK2.01 Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER and system loads	3.3	42
295019 Partial or Total Loss of Inst. Air / 8		X					AK2.01 Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR and CRD hydraulics	3.8	44
~~295021 Loss of Shutdown Cooling / 4~~			~~X~~				~~AK3.03 Knowledge of the reasons for increasing drywell cooling as they apply to LOSS OF SHUTDOWN COOLING~~	~~2.9~~	~~45~~
295021 Loss of Shutdown Cooling / 4			X				AK3.01 Knowledge of the reasons for the following responses as they apply to LOSS OF SHUTDOWN COOLING: Raising reactor water level	3.3	45
295023 Refueling Acc / 8	X						AK1.03 Knowledge of the operational implications of inadvertent criticality as they apply to REFUELING ACCIDENTS	3.7	41
295024 High Drywell Pressure / 5	X						EK1.01 Knowledge of the operational implications of drywell integrity as they apply to HIGH DRYWELL PRESSURE	4.1	40
~~295025 High Reactor Pressure / 3~~					~~X~~		~~EA2.03 Ability to determine and/or interpret Suppression pool temperature as they apply to HIGH REACTOR PRESSURE:~~	~~3.9~~	~~57~~
295025 High Reactor Pressure / 3					X		EA2.02 Ability to determine and/or interpret Reactor power as they apply to HIGH REACTOR PRESSURE:	4.2	57
295026 Suppression Pool High Water Temp. / 5					X		EA2.02 Ability to determine and/or interpret Suppression pool level as they apply to SUPPRESSION POOL HI WTR TEMPERATURE:	3.8	51
~~295027 High Containment Temperature / 5~~									
295028 High Drywell Temperature / 5	X						EK1.01 Knowledge of the operational implications of the reactor water level measurement as they apply to HIGH DRYWELL TEMPERATURE	3.5	39
295030 Low Suppression Pool Wtr Lvl / 5				X			EA1.05 Ability to operate and/or monitor HPCI as they apply to LOW SUPPRESSION POOL WATER LEVEL:	3.5	50
~~295031 Reactor Low Water Level / 2~~	~~X~~						~~EK1.03 Knowledge of the operational implications of water level effects on reactor power as they apply to REACTOR LOW WATER LEVEL:~~	~~3.7~~	~~58~~
295031 Reactor Low Water Level / 2	X						EK1.01 Knowledge of the operational implications of Adequate Core Cooling as they apply to REACTOR LOW WATER LEVEL	4.6	58

295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1			X				EK3.03 Knowledge of the reasons for lowering reactor water level as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN:	4.1	47
~~295038 High Off-site Release Rate / 9~~						~~X~~	~~2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.~~	~~3.1~~	~~55~~
295038 High Off-site Release Rate / 9						X	2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.	4.2	55
600000 Plant Fire On Site / 8					X		AA2.05 Ability to determine and interpret Ventilation alignment necessary to secure affected area as they apply to PLANT FIRE ON SITE:	2.9	52
700000 Generator Voltage and Electric Grid Disturbances / 6				X			AA1.01 Ability to operate and/or monitor Grid frequency and voltage as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES:	3.6	48
K/A Category Totals:	4	3	3	3	4	3	Group Point Total:		20

ES-401 BWR Examination Outline Form ES-401-1
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 RO

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3		X					AK2.08 Knowledge of the interrelations between LOSS OF MAIN CONDENSER VACUUM and the Condenser circulating water system	3.1	60
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2	X						295008.AK1.03 Knowledge of the reasons for the following responses as they apply to HIGH REACTOR WATER LEVEL: Main turbine trip	3.4	59
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5									
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1			X				AK3.01 Knowledge of the reasons for bypassing rod insertion blocks as they apply to INCOMPLETE SCRAM	3.4	61
295017 High Off-site Release Rate / 9									
~~295020 Inadvertent Cont. Isolation / 5 & 7~~	~~X~~						~~AK1.04 Knowledge of the operational implications of Bottom head thermal stratification as they apply to INADVERTENT CONTAINMENT ISOLATION:~~	~~2.5~~	~~59~~
295022 Loss of CRD Pumps / 1					X		AA2.01 Ability to determine and/or interpret accumulator pressure as they apply to LOSS OF CRD PUMPS:	3.5	63
295029 High Suppression Pool Wtr Lvl / 5						X	2.4.1 Knowledge of EOP entry conditions and immediate action steps.	4.6	65
295032 High Secondary Containment Area Temperature / 5				X			EA1.05 Ability to operate and/or monitor affected systems so as to isolate damaged portions as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE:	3.7	62
295033 High Secondary Containment Area Radiation Levels / 9						X	2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	3.8	64
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High CTMT Hydrogen Conc. / 5									
K/A Category Point Totals:	1	1	1	1	1	2	Group Point Total:		7

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 RO												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
203000 RHR/LPCI: Injection Mode					X							K5.02 Knowledge of the operational implications of core cooling methods as they apply to RHR/LPCI INJECTION MODE.	3.5	9
205000 Shutdown Cooling						X						K6.04 Knowledge of the effect that a loss or malfunction of reactor water level will have on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE):	3.6	11
206000 HPCI							X					A1.08 Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE COOLANT INJECTION SYSTEM controls including system lineup	4.1	14
~~207000 Isolation (Emergency) Condenser~~														
~~207000 Isolation (Emergency) Condenser~~														
209001 LPCS				X								K4.01 Knowledge of LOW PRESSURE CORE SPRAY SYSTEM design feature(s) and/or interlocks which provide for prevention of over pressurization of core spray piping	3.2	7
~~209002 HPCS~~														
211000 SLC										X		A4.07 Ability to manually operate and/or monitor in the control room: Lights and alarms	3.6	23
212000 RPS								X				A2.08 Ability to (a) predict the impacts of Low reactor level on the REACTOR PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:	4.1	15
215003 IRM					X							K5.01 Knowledge of the operational implications of detector operation as they apply to INTERMEDIATE RANGE MONITOR (IRM) SYSTEM:	2.6	10
215004 Source Range Monitor		X										K2.01 Knowledge of electrical power supplies to the SRM channels/detectors	2.6	4
215005 APRM / LPRM			X									K3.07 Knowledge of the effect that a loss or malfunction of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM will have on the rod block monitor:	3.2	5
215005 APRM / LPRM									X			A3.02 Ability to monitor automatic operations of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM including: Full core display	3.5	17
217000 RCIC			X									K3.02 Knowledge of the effect that a loss or malfunction of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) will have on Reactor vessel pressure	3.6	6
217000 RCIC									X			A3.04 Ability to monitor automatic operations of the REACTOR CORE ISOL COOLING SYSTEM (RCIC) including, system flow.	3.6	18
218000 ADS											X	2.1.19 Ability to use plant computers to evaluate system or component status.	3.9	22
223002 PCIS/Nuclear Steam Supply Shutoff										X		A4.02 Ability to manually operate and/or monitor in the control room: Manually initiate the system	3.9	19
~~239002 SRVs~~											~~X~~	~~2.4.21 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~~	~~21~~

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 RO												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
239002 SRVs											X	2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	21
239002 SRVs								X				A2.03 Ability to (a) predict the impacts of Stuck open SRV 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:	4.1	26
259002 Reactor Water Level Control										X		A4.07 Ability to manually operate and/or monitor in the control room: All individual component controllers when transferring from automatic to manual mode	3.8	20
261000 SGTS	X											K1.12 Knowledge of the physical connections and/or cause/effect relationships between STANDBY GAS TREATMENT SYSTEM and the primary containment purge system:	3.1	2
261000 SGTS								X				A2.04 Ability to (a) predict the impacts of High train moisture content on the STANDBY GAS TREATMENT SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:	2.5	16
262001 AC Electrical Distribution		X										K2.01 Knowledge of electrical power supplies to the following: Off-site sources of power	3.3	3
262001 AC Electrical Distribution				X								K4.03 Knowledge of A.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the interlocks between automatic bus transfer and breakers	3.1	25
262002 UPS (AC/DC)				X								K4.01 Knowledge of UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) design feature(s) and/or interlocks which provide for transfer from preferred power to alternate power supplies.	3.1	8
263000 DC Electrical Distribution	X											K1.03 Knowledge of the physical connections and/or cause/effect relationships between D.C. ELECTRICAL DISTRIBUTION and battery ventilation:	2.6	1
264000 EDGs							X					A1.04 Ability to predict and/or monitor changes in parameters associated with operating the EMERGENCY GENERATORS (DIESEL/JET) controls including crank case temperature and pressure	2.6	13
~~300000 Instrument Air~~									~~X~~			~~A3.02 Ability to monitor automatic operations of the INSTRUMENT AIR SYSTEM including air temperature~~	~~2.9~~	~~17~~
400000 Component Cooling Water						X						K6. 07 Knowledge of the effect that a loss or malfunction of Breakers, relays, and disconnects will have on the CCWS	2.7	12
400000 Component Cooling Water									X			A3.01 Ability to monitor automatic operations of the CCWS including: Setpoints on instrument signal levels for normal operations, warnings, and trips that are applicable to the CCWS	3.0	24
~~400000 Component Cooling Water~~								~~X~~				~~A2.04~~	~~2.9~~	~~16~~
K/A Category Point Totals:	2	2	2	3	2	2	2	3	3	3	2	Group Point Total:		26

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 RO												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
201001 CRD Hydraulic														
201002 RMCS														
201003 Control Rod and Drive Mechanism				X								K4.08 Knowledge of CONTROL ROD AND DRIVE MECHANISM design feature(s) and/or interlocks which provide for the following: Monitoring CRD mechanism temperature	2.6	30
~~201004 RSCS~~														
201005 RCIS														
201006 RWM														
202001 Recirculation		X										K2.02 Knowledge of electrical power supplies to the following: Plant Specific - MG Set	3.2	28
~~202002 Recirculation Flow Control~~		~~X~~										~~K2.02 Knowledge of electrical power supplies to the following: Hydraulic power unit:~~	~~2.6~~	~~28~~
204000 RWCU														
214000 RPIS						X						K6.01 Knowledge of the effect that a loss or malfunction of the A.C. electrical power will have on the ROD POSITION INFORMATION SYSTEM:	2.5	32
215001 Traversing In-core Probe								X				A2.07 Ability to (a) predict the impacts of failure to retract during accident conditions on the TRAVERSING IN-CORE PROBE ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations	3.4	34
215002 RBM														
216000 Nuclear Boiler Inst.			X									K3.29 Knowledge of the effect that a loss or malfunction of the NUCLEAR BOILER Instrumentation will have on Jet pump flow monitoring:	3.1	38
219000 RHR/LPCI: Torus/Pool Cooling Mode			X									K3.01 Knowledge of the effect that a loss or malfunction of the RHR/LPCI: TORUS / SUPPRESSION POOL COOLING MODE will have on Suppression pool temperature control	3.9	29
223001 Primary CTMT and Aux.														
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode	X											K1.01 Knowledge of the physical connections and/or cause/effect relationships between RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE and the following: Suppression pool	3.6	27
233000 Fuel Pool Cooling/Cleanup					X							K5.07 Knowledge of the operational implications of the Maximum (abnormal) heat 102d load as they apply to FUEL POOL COOLING AND CLEAN-UP:	2.5	31
234000 Fuel Handling Equipment														
239001 Main and Reheat Steam														
239003 MSIV Leakage Control														
241000 Reactor/Turbine Pressure Regulator							X					A1.06 Ability to predict and/or monitor changes in parameters associated with operating the REACTOR/TURBINE PRESSURE REGULATING SYSTEM controls including: Main turbine steam flow 3.2	3.2	33
245000 Main Turbine Gen. / Aux.														

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 RO												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
256000 Reactor Condensate									X			A3.05 Ability to monitor automatic operations of the REACTOR CONDENSATE SYSTEM including: Lights and alarms	3.0	35
259001 Reactor Feedwater														
268000 Radwaste														
271000 Offgas														
272000 Radiation Monitoring											X	2.4.50 Ability to verify alarm setpoints and operate controls identified in the alarm response manual.	4.2	37
286000 Fire Protection														
288000 Plant Ventilation														
~~290001 Secondary CTMT~~										~~X~~		~~A4.04 Ability to manually operate and/or monitor in the control room: Auxiliary building area temperature:~~	~~2.6~~	~~36~~
290001 Secondary CTMT										X		A4.01 Ability to manually operate and/or monitor in the control room: Reactor building differential pressure: Plant-Specific	3.3	36
~~290003 Control Room HVAC~~											~~X~~	~~2.2.22 Knowledge of limiting conditions for operations and safety limits. (Note 1) ES-401-4 form~~	~~4.0~~	~~37~~
290002 Reactor Vessel Internals														
K/A Category Point Totals:	1	1	2	1	1	1	1	1	1	1	1	Group Point Total:		12

ES-401 BWR Examination Outline Form ES-401-1

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 SRO

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4									
295003 Partial or Complete Loss of AC / 6									
295004 Partial or Total Loss of DC Pwr / 6						X	2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.	4.2	76
~~295004 Partial or Total Loss of DC Pwr / 6~~					~~X~~		~~AA2.01 Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Cause of partial or complete loss of D.C. power.~~	~~3.6~~	~~76~~
295005 Main Turbine Generator Trip / 3									
295006 SCRAM / 1									
295016 Control Room Abandonment / 7									
295018 Partial or Total Loss of CCW / 8					X		AA2.03 Ability to determine and/or interpret the Cause for partial or complete loss as it apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER.	3.5	78
295019 Partial or Total Loss of Inst. Air / 8									
295021 Loss of Shutdown Cooling / 4									
295023 Refueling Acc / 8					X		AA2.05 Ability to determine and/or interpret the entry conditions of emergency plan as they apply to REFUELING ACCIDENTS.	4.6	77
295024 High Drywell Pressure / 5						X	2.4.6 Knowledge of EOP mitigation strategies.	4.7	80
~~295025 High Reactor Pressure / 3~~					~~X~~		~~EA2.03 Ability to determine and/or interpret suppression pool temperature as they apply to HIGH REACTOR PRESSURE:~~	~~4.1~~	~~78~~
~~295026 Suppression Pool High Water Temp. / 5~~					~~X~~		~~EA2.03 Ability to determine and/or interpret the Reactor Pressure as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE~~	~~4.0~~	~~76~~
~~295027 High Containment Temperature / 5~~						~~X~~	~~2.1.27 Knowledge of system purpose and/or function~~	~~4.0~~	~~81~~
~~295027 High Containment Temperature / 5~~						~~X~~	~~2.1.39 Knowledge of conservative decision making practices.~~	~~4.3~~	~~81~~
295032 High Secondary Containment Area Temperature / 5						X	2.4.9 - Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.	4.2	81
295028 High Drywell Temperature / 5									
295030 Low Suppression Pool Wtr Lvl / 5									
295031 Reactor Low Water Level / 2						X	2.4.3 Ability to identify post-accident instrumentation.	3.9	82
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1									
295038 High Off-site Release Rate / 9						X	2.2.42 Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	4.6	79
600000 Plant Fire On Site / 8									
700000 Generator Voltage and Electric Grid Disturbances / 6									

K/A Category Totals:					2	5	Group Point Total:		7

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 SRO							Form ES-401-1	
E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	IR	#
295002 Loss of Main Condenser Vac / 3									
295007 High Reactor Pressure / 3									
295008 High Reactor Water Level / 2									
295009 Low Reactor Water Level / 2									
295010 High Drywell Pressure / 5									
295011 High Containment Temp / 5									
295012 High Drywell Temperature / 5									
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1									
295015 Incomplete SCRAM / 1									
295017 High Off-site Release Rate / 9									
295020 Inadvertent Cont. Isolation / 5 & 7						X	2.2.22 Knowledge of limiting conditions for operations and safety limits.	4.7	84
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Wtr Lvl / 5					X		EA2.01 Ability to determine and/or interpret Suppression pool water level as they apply to HIGH SUPPRESSION POOL WATER LEVEL. 3.9	3.9	85
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9					X		EA2.01 Ability to determine and/or interpret Area radiation levels as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS.	3.9	83
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5									
500000 High CTMT Hydrogen Conc. / 5									
K/A Category Point Totals:					2	1			3

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 SRO												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
203000 RHR/LPCI: Injection Mode														
~~205000 Shutdown Cooling~~								~~X~~				~~A2.09 Ability to (a) predict the impacts of Reactor low water level on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:~~	~~3.8~~	~~86~~
206000 HPCI														
~~207000 Isolation (Emergency) Condenser~~														
209001 LPCS								X				A2.09 A2. Ability to (a) predict the impacts of low suppression pool level on the LOW PRESSURE CORE SPRAY SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations.	3.3	86
~~209002 HPCS~~														
211000 SLC														
212000 RPS								X				A2.19 Ability to (a) predict the impacts of Partial system activation (half-SCRAM) on the REACTOR PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations.	3.9	87
215003 IRM														
215004 Source Range Monitor														
215005 APRM / LPRM											X	2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	90
217000 RCIC														
218000 ADS														
223002 PCIS/Nuclear Steam Supply Shutoff														
239002 SRVs														
259002 Reactor Water Level Control														
261000 SGTS														
~~262001 AC Electrical Distribution~~											~~X~~	~~2.2.7 Knowledge of the process for conducting special or infrequent tests.~~	~~3.6~~	~~89~~
262001 AC Electrical Distribution											X	2.2.40 Ability to apply Technical Specifications for a system.	4.7	89
262002 UPS (AC/DC)														
263000 DC Electrical Distribution														

264000 EDGs										X	2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.	4.2	88
K/A Category Point Totals:							2			3	Group Point Total:		5

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 SRO												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
201001 CRD Hydraulic														
201002 RMCS														
201003 Control Rod and Drive Mechanism														
~~201004 RSCS~~														
201005 RCIS														
201006 RWM														
202001 Recirculation														
202002 Recirculation Flow Control														
204000 RWCU														
214000 RPIS														
215001 Traversing In-core Probe														
215002 RBM														
216000 Nuclear Boiler Inst.														
219000 RHR/LPCI: Torus/Pool Cooling Mode								X				A2.16 Ability to (a) predict the impacts of high suppression pool level on the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:	3.2	93
223001 Primary CTMT and Aux.								X				A2.07 Ability to (a) predict the impacts of High drywell pressure on the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:	4.3	91
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment														
239001 Main and Reheat Steam														
239003 MSIV Leakage Control														
241000 Reactor/Turbine Pressure Regulator														
245000 Main Turbine Gen. / Aux.														
256000 Reactor Condensate														
259001 Reactor Feedwater														
268000 Radwaste											X	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. 4.4	4.4	92
271000 Offgas														
272000 Radiation Monitoring														
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary CTMT														

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 SRO												Form ES-401-1	
System # / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G	K/A Topic(s)	IR	#
K/A Category Point Totals:								2			1	Group Point Total:		3

Facility: Cooper Nuclear Station Date of Exam: 2-28-2011

Category	K/A #	Topic	RO		SRO-Only	
			IR	#	IR	#
1. Conduct of Operations	2.1.5	2.1.5 Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	2.9	66		
	2.1.17	2.1.17 Ability to make accurate, clear, and concise verbal reports.	3.9	67		
	2.1.27	2.1.27 Knowledge of system purpose and/or function.	3.9	75		
	2.1.4	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.			3.8	94
	2.1.34	Knowledge of primary and secondary plant chemistry limits.			3.5	99
	Subtotal			3		2
2. Equipment Control	2.2.14	2.2.14 Knowledge of the process for controlling equipment configuration or status.	3.9	69		
	2.2.14	Knowledge of the process for controlling equipment configuration or status.	3.9	68		
	2.2.1	Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.			4.4	95
	2.2.43	Knowledge of the process used to track inoperable alarms.			3.3	98
	Subtotal			2		2
3. Radiation Control	2.3.11	2.3.11 Ability to control radiation releases.	3.8	70		
	2.3.4	2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions.	3.2	71		
	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.			3.8	96
	Subtotal			2		1
4. Emergency Procedures / Plan	2.4.43	2.4.43 Knowledge of emergency communications systems and techniques.	3.2	72		
	2.4.22	2.4.22 Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.	3.6	73		
	2.4.32	2.4.32 Knowledge of operator response to loss of all annunciators.	3.6	74		
	2.4.28	Knowledge of procedures relating to a security event (non-safeguards information).			4.1	97
	2.4.5	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.			4.3	100
	Subtotal			3		2
Tier 3 Point Total				10		7

Tier / Group	Randomly Selected K/A	Reason for Rejection
2/1	207000.A3.02	Cooper does not have an isolation condenser
2/1	207000.K3.02	Cooper does not have an isolation condenser
2/1 SRO	207000	Cooper does not have an isolation condenser
2/1	209002.A2.08	Cooper does not have a high pressure core spray system
2/1 SRO	209002	Cooper does not have a high pressure core spray system
2/2 SRO	201004	Cooper no longer uses a Rod Sequence Control System
1/1	295027.EK1.02	Cooper has a Mark I containment design not a Mark III.
1/1	295038 Generic 2.2.36	This Generic K/A deals with the effects of maintenance on the status of LCOs – A psychometrically valid question could not be developed based on 10CFR55.41.
3	2.2.4	Cooper is not a multi-unit facility
2/2	2.4.45	Replaced Generic K/A with a randomly selected A2 K/A to fill all blocks on form 401-1. **Note 1**
2/1	400000.A2.04	Could not come up with a psychometrically valid question for this K/A, Also CCW was sampled three times in this group. Randomly selected another system.
1/1	295004 G 2.1.27	Unable to develop a psychometrically valid question for this K/A. Randomly selected another generic K/A.
1/1	295021.AK3.03	Unable to develop a psychometrically valid question for this K/A. Cooper has no actions for ventilation on a loss of SDC. Randomly selected another K/A.
1/1	295025.EA2.03	Unable to develop a psychometrically valid question for this K/A. Randomly selected another K/A.
1/1	295031.EK1.03	Unable to develop a psychometrically valid question for this K/A. This question and question 47 were too similar.
1/2	295020.AK1.04	Unable to develop a psychometrically valid question for this K/A. Randomly selected another system.
2/1	239002. G 2.4.21	Unable to develop a psychometrically valid question for this K/A. Randomly selected another K/A.
2/1	300000.A3.02	Unable to develop a psychometrically valid question for this K/A. Randomly selected another system.
2/2	290001.A4.04	Unable to develop a psychometrically valid question for this K/A. Cooper does not have any buildings named or designated as Auxiliary Building. Randomly selected another K/A.
2/2	202002.K2.02	This topic is for a BWR 5/6, Replaced it with Equivalent BWR 3/4 topic 202001.K2.02
1/1 SRO	295025.EA2.03	Unable to develop a psychometrically valid question for this K/A. Too similar to another RO question. Randomly selected another K/A.
1/1 SRO	295026.EA2.03	Unable to develop a psychometrically valid question for this K/A. Too similar to another RO question. Randomly selected another system.

1/1 SRO	295027. G 2.1.27	Unable to develop a psychometrically valid question for this K/A. Randomly selected another generic K/A.
1/1 RO	295004 G2.1.27	Not on the approved list of K/As in NUREG 1021 for Generics for Tier 1 Group 1. Randomly selected and rejected again Generic K/A 2.2.26, as a psychometrically valid question could not be written. Randomly reselected the set again and got 2.4.4
1/1 SRO	295027	Cooper is a Mark I Design and this K/A is for a Mark III. Randomly selected another topic 295032 and randomly selected Generic 2.4.9
2/1 SRO	2.2.7	Not on list of approved K/As for Tier, Randomly selected 2.2.40.
2/1 SRO	205000.A2.09	Double Jeopardy with RO question, Randomly reselected 209001 as the Topic and maintained the same K/A A2.09.
3/1 SRO	G 2.1.34	Unable to write a psychometrically valid question for this K/A. Randomly selected G 2.1.34
3/2	2.2.36	Could not develop a generic RO question concerning maintenance affects on LCOs. Randomly selected K/A 2.2.14.
2/2	2.2.22	Could not develop a question for the system and the generic K/A selected. Randomly selected one of the open tier 2 systems and Randomly selected a new generic K/A. The system selected was 272000 Radiation Monitoring, The generic K/A was 2.4.50.
1/1 SRO	295004.AA2.01	Could not develop an SRO question using this K/A. Talked with NRC Lead Examiner and we selected a generic K/A to replace the old K/A. The Generic K/A selected was 2.2.25

Facility: Cooper Nuclear Station Date of Examination: 06/06/11

Examination Level: RO ☒ SRO ☐ Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N,R	Document the Maintenance of your active Reactor Operator License
Conduct of Operations	D,C	Perform RO (SRO) Review of Daily Logs
Equipment Control	N,R	Initiate an Operator Aid request.
Radiation Control	D,R	Determine Dosage On Workers For ALARA
Emergency Procedure/Plan		N/A

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

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Facility: Cooper Nuclear Station Date of Examination: 06/06/2011

Examination Level: RO ☐ SRO ☒ Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	N,R	Determine If A Working Hour Waiver Is Required
Conduct of Operations	N,R	Determine if Mode Change is Allowed
Equipment Control	D,R	Determine Refueling LCO for CRD Drive Removal
Radiation Control	D,R	Determine Dosage On Workers For ALARA
Emergency Procedure/Plan	D,R	Reportable Occurrence to NRC

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

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Facility: Cooper Nuclear Station Date of Examination: 6/06/11

Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test No.: 1

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

System / JPM Title	Type Code*	Safety Function
a. SKL034-20-100 SLC RWCU fails to isolate (Alt Path)	A,D,S	1
b. SKL034-20-XXX Withdraw SRMs during a Start-up (Alt Path)	A,N,L,S	7
c. SKL034-20-XXX Shift REC Heat Exchangers	N,S	8
d. SKL034-21-47 Operate RCIC in Press Control (Alt Path)	A,D,S	3
e. SKL034-21-06 Respond to a HPCI System Automatic Initiation.(Alt Path)	A,D,En,S	4
f. SKL034-20-XX Monitor SGT System Following Automatic Initiation (Alt Path)	A,N,S	9
g. SKL034-20-XXX Placing SDG In Service From Control Room	N, S	6
h. SKL034-21-XXX Vent Primary Containment using 2.4PC	N, S	5
In-Plant Systems @ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. SKL034-XX-XX Reboot OPC A Computer Server	N	7
j. SKL034-10-XX Transfer CPP power supply from CDP-1B (normal) to CDP-1A (emergency)	N	6
k. SKL034-10-85 Place standby CRD Flow Control Valve in Service When In service Valve Fails Closed	D,R	1

@ 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)gineered safety feature	- / - / ≥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: Cooper Nuclear Station Date of Examination: 6/06/11

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test No.: 1

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

System / JPM Title	Type Code*	Safety Function
a. SKL034-20-100 SLC RWCU fails to isolate (Alt Path)	A,D,S	1
b. SKL034-20-XXX Withdraw SRMs during a Start-up (Alt Path)	A,N,L,S	7
c. SKL034-20-XXX Shift REC Heat Exchangers	N,S	8
d. SKL034-21-47 Operate RCIC in Press Control (Alt Path)	A,D,S	3
e. SKL034-21-06 Respond to a HPCI System Automatic Initiation (Alt Path)	A,D,En,S	4
f. SKL034-20-XX Monitor SGT System Following Automatic Initiation(Alt Path)	A,N,S	9
g. SKL034-20-XXX Placing SDG In Service From Control Room	N, S	6
h.		
In-Plant Systems @ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. SKL034-XX-XX Reboot OPC A Computer Server	N	7
j. SKL034-10-XX Transfer CPP power supply from CDP-1B (normal) to CDP-1A (emergency)	N	6
k. SKL034-10-85 Place standby CRD Flow Control Valve in Service When In service Valve Fails Closed	D,R	1

@ 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)gineered safety feature	- / - / ≥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	

IC-121

Facility: Cooper Nuclear Station Scenario No.: NRC 1 Op-Test No.: 1

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: The plant is operating at approximately 85% power in single valve control with the Main Turbine Governor Valves. It is a red light day because record grid loads are expected.

Turnover: After turnover, the crew is to place the governor valves in Sequential GV control (Load Dispatcher has been notified) and continue the power ascension to 747 MWE net ~95% at <10 MWe per minute. Maintenance will be calling to start the HPCI Aux Oil Pump for Pump PM later in shift.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N	Place MT Gov Valves into sequential valve control
2	N/A	R	Raise power with RR flow
3	3	C,TS	HPCI Aux Oil system leak
4	4	I,TS	CRD FC-301 Auto Output fails low, three CRDs with High Temps
5	5	C,TS	SRV Fails Open
6	6	C,P	Two Rods Drift In, Manual Scram Failure, Manual ARI inserts rods
7	7	M,P	Earthquake; Suppression Pool Rupture: ED on Low SP/L

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

P Critical Tasks are located in Events 6 and 7.

Scenario Objective

Evaluate the crew's ability to perform normal operations and raise power during non-emergency operations.

Evaluate the crew's response to a lowering Suppression Pool Level and their ability to emergency depressurize the Reactor to suppress the steam in the torus before level gets too low and its energy is released into the Reactor Building.

Scenario Summary

Initial Conditions:

- The plant is operating at approximately 80% power
- No equipment out of service.
- It is a red light day because record grid loads are expected.

Events:

- Place MT Gov Valves into sequential valve control
- Raise power with RR flow
- HPCI Aux Oil System Leak, TS
- CRD FC-301 Auto Output fails low, three CRDs with High Temperatures, TS
- SRV Fails Open, TS
- Two Rods Drift In, Manual Scram Failure Manual ARI works
- Earthquake; Suppression Pool Rupture: ED on Low SP/L

Scenario Sequence

- Normal evolution - Place MT into Sequential Gov. Valve Control
- Reactivity manipulation - Raise Power with RR Flow
- Component Failure before the EOPs - HPCI Aux Oil System Leak
- Instrument Failure - CRD Flow Controller Auto signal fails, three CRDs with High Temperatures
- Component Failure before the EOPs - SRV Partial opening
- Component Failure before the EOPs - Two Rods Drift In, Manual Scram Failure Manual ARI works
- Major Event - Earthquake;
- Component Failure after the EOPs - Suppression Pool leak, below the water line: Emergency Depressurization on low Suppression Pool Level.

Event One: Place MT Gov Valves into sequential valve control

Malfunction Required:
No malfunction required; this is a normal manipulation for the BOP.

Objective:
Evaluate the crew's ability to select the Digital Electro Hydraulic Controller and perform the required manipulations on the touch screen to shift the main turbine valve governor control to a Sequential alignment.

Success Path:
The Operator, in accordance with Procedure 2.2.77.1, performs the steps necessary to make the Turbine Governor Valves transition smoothly from single valve control to sequential valve control which causes turbine efficiency improvement (MWatts increase).

Event Two: Raise Power with Reactor Recirc to 737 MWE Net ~ 90%

Malfunction Required:
No malfunction required, this is a normal manipulation for the BOP.

Objective:
Evaluate the RO ability to adjust Reactor Recirculation Pump flows to make power increase from ~80% to ~90%, by alternately raising flow on one RR Pump, letting the plant respond then making a similar adjustment on the other pump's controller.

Success Path:
Both Reactor Recirculation Pump's speeds are raised from ~65 to ~80; maintaining them within the required 5% allowed by Tech Specs, and it is done in accordance with Procedure 2.1.10.

Event Three: HPCI Aux Oil System Leak

Malfunction Required:
HP12 Active set at 100%, at the start of the scenario. This failure will not start until the HPCI Aux Oil Pump is started.

Objective:
Evaluate the crew's response to an oil leak in the HPCI control oil system while performing the section of the Operating Procedure for the HPCI system 2.2.33 to start

the Aux Oil Pump for maintenance. During this event the Operator will be required to secure the pump.
Evaluate the CRS's ability to determine that HPCI is Inoperable.

Success Path:
The HPCI system is declared Inoperable per TS 3.5.1. Condition "C" 14 day LCO. RCIC is checked to be operable within 1 hour and the Aux Oil Pump is secured to prevent operation.

Event Four: CRD FC-301 Auto Signal Failure

Malfunction Required:
Override 03A35A1 CRD-FC-301 CRD System Flow Control Setpoint set at 0%.
Malfunction PMIS N200 set at 380, N213 set at 402 and N214 set at 480.

Objective:
Evaluate the crew's response to CRD-FC-301 Automatic control signal failure resulting in high charging water pressure and low cooling water flow.
Evaluate the RO's ability to diagnose the controller has failed.
Evaluate the SRO's ability to determine if the CRDs which have high temperatures should be declared slow or inoperable.

Success Path:
CRD-FC-301 placed in Manual and CRD system flows and pressures returned to normal. SRO addresses CRDs with high temperatures.

Event Five: SRV Fails Open

Malfunction Required:
AD06b set at 50% to start the relief valve leaking then it is modified to 20% to minimize the heat addition to the torus.

Objective:
Evaluate the crew's performance of Abnormal Procedure 2.4SRV for a leaking SRV which has the Operator cycle the leaking valve to reseat it.
Evaluate the CRS addressing Technical Specification 3.6.2.1 for Suppression Pool Average Temperature, if the SRV is not closed within a short period of time.

Success Path:
The Operator notices and responds to the leaking SRV in accordance with Annunciator Procedures and 2.4SRV. The SRV will be cycled open then taken back to the closed position to reseat the valve. Once the valve has been cycled the tail pipe temperature starts lowering and the heat addition into the Torus is secured. The CRS determines

that Technical Specification 3.6.2.1 for Suppression Pool Average Temperature may apply depending on whether Suppression Pool Temperature at 95EF.

Event Six: Two Rods Drift In, Manual Scram Failure Manual ARI works

Malfunction Required:
RD162615 CRD 26-15 Slow Scram Time
RD162623 CRD 26-23 Slow Scram Time
RD162615 CRD 26-15 Scrammed
RD162623 CRD 26-23 Scrammed
Override Reactor Manual Scram Push Button position “Push Out”
Override Reactor Manual Scram Push Button light “Off”

Objective:
Evaluate the crew’s response in accordance with Abnormal Procedure 2.4CRD and their ability to recognize Scram Actions with more than one rod is drifting in. Also to recognize that the One Channel’s Manual Scram Push Button failed to work and the need to manually initiate ARI.

Success Path:
The Operator determines the ATWS when a manual scram fails to work when more than one rod is drifting and initiates ARI manually.

Event Seven: Earthquake; Suppression Pool leak: ED on low SP/L

Malfunction Required:
HV02b Major Earthquake set to 25%
PC08 Suppression Pool Water Leak 25% level lowers at -0.2”/min

Objective:
Evaluate the crew’s response to a major earthquake in accordance with Emergency Procedure 5.1Quake.
Evaluate the crew’s ability to monitor and control the consequences of an Unisolable leak in the torus below the normal water level.
Evaluate the crew’s ability to anticipate emergency depressurization and transfer as much energy to the condenser prior to emergency depressurizing the Reactor.

Success Path:
The crew emergency depressurizes the reactor when suppression pool level lowers to 9.6’.

Scenario Termination:

When the reactor is depressurized (50 psig above Torus pressure) and level is being maintained between +3” to +54” and the lead examiner has seen enough, the scenario may be stopped.

IC -122

Facility: Cooper Nuclear Station Scenario No.: NRC 2 Op-Test No.: 1

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: The plant is operating at approximately 100% with Surveillance 6.1DG101 in progress:

Turnover: After turnover, the crew is to secure DG#1 following its monthly test; LCO 3.8.1 Condition B is in effect.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N	DG-1 Monthly Surveillance
2	2	I,TS	RR Pump speed lowers
3	3	C	Combustion in the Off-Gas system
4	4	I,TS	FW and Main Turbine high water level instruments fail
5	5	M	Loss of Turbine High Pressure Fluid, requiring Manual Scram
6	6	C	Loss of Emergency Transformer, Loss of Critical Bus 1F
7	7	C,U	DG-1 Fails to Auto Start
8	8	M,U	Small Break LOCA, Containment Sprays

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

U Critical Tasks are located in Events 7 and 8.

IC -122

Scenario Objective

Evaluate the crew's ability to perform normal surveillances and to respond to instrument and component failures during non-emergency conditions.

Evaluate the crew's response to a rising reactor power level and a lowering Turbine High Pressure Fluid Reservoir.

Evaluate the crew's response to a small break LOCA which causes Drywell temperatures and pressures to rise and before 280°F in the Drywell the crew initiates Drywell Sprays to maintain temperature below 280°F.

Scenario Summary

Initial Conditions:

- The plant is operating at approximately 100% power
- No equipment out of service.
- 6.1DG.101 is in progress.
- DG-1 load was lowered to 1000 kW 5 minutes ago.

Events:

- DG-1 Monthly Surveillance
- RR Pump speed lowers – TS
- Combustion in the Off-Gas system
- FW and Main Turbine high water level instrument fails– TS
- High Pressure Fluid leak requiring Manual Scram
- Loss of Emergency Transformer, Loss of Critical Bus 1F
- DG-1 Fails to Auto Start
- Small Break LOCA, Containment Sprays

Scenario Sequence

- Normal activity - DG-1 Monthly Surveillance
- Instrument Failure – RR speed lowers
- Component Failure before EOPs – Combustion in the Off-Gas System
- Instrument Failure - FW and Main Turbine high water level instrument fails
- Major Failure – Loss of Turbine High Pressure Fluid, requiring Manual Scram
- Component Failure after EOPs - Loss of Emrg Transfmr, Loss of Critical Bus 1F
- Component Failure after EOPs - DG-1Fails to Auto Start
- Major Failure – Small break LOCA, with raising DW temperature and pressure
- Accident mitigation strategy - Containment Sprays

IC -122

Event One: DG-1 Monthly Surveillance

Malfunction Required:
No malfunction required; this is a normal manipulation for the BOP.

Objective:
Evaluate the crew during normal surveillance activities.
Evaluate the BOP Operator unloading and securing DG1 in accordance with 6.1DG.101, 31 day load test.

Success Path:
The #1 DG is unloaded from 1000 KW and the engine is secured in accordance with the surveillance procedure.

Event Two: RR Pump speed lowers

Malfunction Required:
RR17b set at 70%.
Override ZDIRRMGSWS16B(1) set to ON.

Objective:
Evaluate the crew's response to a failed Jordan RR controller.
Evaluate the CRS addressing Technical Specifications for RR loop mismatch.

Success Path:
RR Pump A speed is lowered until both loop flows are balanced within specification.
The CRS will review Tech Specs LCO 3.4.1 and consider RR Pump B not in service until pump speeds are matched.

Event Three: Combustion in the Off-Gas System

Malfunction Required:
OG02 SUSTAINED H2 BURN

Objective:
Evaluate the crew's response to combustion in the off-gas train as indicated by Annunciator B-3 / E-3 AUG OFFGAS TROUBLE and elevated temperatures on the Off-gas lines.
Evaluate the BOP Operator's ability to accurately communicate steps of the Abnormal Procedure to the Turbine Building Station Operator.

Success Path:
The steps on the Abnormal are performed and the combustion is extinguished.

IC -122

Event Four: FW and Main Turbine high water level instruments fail

Malfunction Required:
RR27a set at 0%.
RR27c set at 0%.

Objective:
Evaluate the crew's response to the failure 2 of the 3 RFP Turbine and Main Turbine high water level trip instrumentation.
Evaluate the CRS addressing Technical Specifications.

Success Path:
With only one instrument available (NBI-LT-52B) the crew will recognize that there is a loss of the two out of three logic for the high level trip for the RFP Turbines and the Main Turbine

The CRS declares the instruments inoperable in accordance with Tech Specs LCO 3.3.2.2. Condition A. Required Action A.1 Place channel in trip within 7 days, and Condition B Required Action B.1 Restore feedwater and main turbine high water level trip capability within 2 hours.

Event Five: Loss of Turbine High Pressure Fluid, requiring a Manual Scram

Malfunction Required:
TC10 Turbine High Press Fluid leak increased from 75%.

Objective:
Evaluate the pre-staging and conservative decision making prior to the need to scram the Reactor prior to losing Turbine High Pressure Fluid Pumps and control of Turbine GVs, Stop Valves and Bypass Valves.

Success Path:
Reactor is scrammed and pressure control is transferred to HPCI and SRVs.

Event Six: Loss of Emergency Transformer, Loss of Critical Bus 1F

Malfunction Required:
ED06 LOSS OF POWER (EMERGENCY 69KV TRANSFORMER)
ED08A 4160 BUS 1A FAILURE

Objective:

IC -122

Evaluate the crew's response to the loss of the Emergency Transformer and a subsequent loss of 1F Critical Bus, during the Scram recovery.
Evaluate the BOP's ability to enter Procedure 5.3EM-PWR and ensure the Critical Busses are powered by an emergency power source.
Evaluate the crew's ability to shift RPV level control to the High Pressure ECCS and RCIC systems due to a loss of all Condensate and Booster pumps.

Success Path:
Startup Transformer is supplying the Critical Busses until a fault causes the loss of 1F. RPV Level is being controlled within the +3 to 54 inch range with RCIC, CRD and HPCI.

Event Seven: DG-1 Fails to Auto Start

Malfunction Required:
DG06A Diesel Generator #1 Fails to Auto Start

Objective:
Evaluate the crew recognition that Diesel 1failed to auto start when required and to perform the necessary steps to start Diesel 1 and energize the Critical Bus.

Success Path:
Both Critical Busses are Energized; one from the Diesel Generator, the other from the Startup Transformer.

Event Eight: LOCA Containment Sprays

Malfunction Required:
RR20A Coolant Leakage Inside Primary Containment @ 12% with a ramp time of 10 minutes.

Objective:
Evaluate the crew response to a slow increase in Drywell Temperature and pressure and to vent Primary Containment in an attempt to control the pressure rise.
Evaluate the crew's ability to spray the Drywell in accordance with the EOPs to control pressure and temperature, as the LOCA gradually worsens.

Success Path:
Torus and Drywell Sprays are initiated prior to DW temperature reaching 280°F.

Scenario Termination:

When Reactor water level is being controlled between +3 and +54 inches and Drywell Sprays are controlling Drywell Pressure between 2 and 10 psig.

Facility: Cooper Nuclear Station Scenario No.: NRC 3 Op-Test No.: 1

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: The plant is operating at approximately 2.0% power, holding here to perform the 500 psig Reactor Building walkdown. After turnover, the crew is to shift CRD Pumps.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N	Shift CRD Pumps
2	2	C,TS	REC Pump B trip
3	3	I	IRM Inop Trip
4	4	I,TS	Drywell Radiation Monitor Isolation
5	5	C,R	Rod drop and stuck rods non-EOP rod driving
6	6	M	RCIC Steam Line Leak
7	7	C,P	Fuel failure ATWS EOP rod driving
8	8	C,P	Reactor Recirc Pump speed fails high
9	9	C,P	ED on Secondary Containment 2 Areas

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

P Critical Tasks are located in Events 7, 8 and 9.

Scenario Objective

Evaluate the Crew's ability to operate at low power levels.
Evaluate the Crew's response to a rod drop accident and fuel failure.
Evaluate the crew's actions when RCIC develops a steam line leak that will not fully isolate and when two areas in Secondary Containment exceed their Max Safe values the RPV is Emergency Depressurized to limit the release of highly radioactive steam through the RCIC steam line break.

Scenario Summary

Initial Conditions:

- The plant is operating at approximately 2.0% power
- The 500 psig Reactor Building walkdown is in progress.
- Shift CRD Pumps following turnover.

Events:

- Shift CRD Pumps
- REC Pump B trip
- IRM Inop Trip
- DW Vent Radiation Monitor Isolation
- Rod drop and stuck rods requiring EOP rod driving
- RCIC Steam Line Leak
- Fuel failure, ATWS EOP rod driving
- Reactor Recirc Pump speed fails high
- ED on Secondary Containment 2 Areas

Scenario Sequence

- Normal activity – Shift CRD Pumps "B" to "A"
- Component Failure before EOPs – REC Pump "B" Trip
- Instrument Failure before EOPs – IRM "C" Failure
- Instrument Failure before EOPs – DW Vent Radiation Monitor Isolation
- Component Failure before EOPs – Rod drop and stuck control rods requiring non-EOP driving
- Major Event – RCIC Steam Line Leak
- Component Failure after EOPs – Fuel failure ATWS EOP rod driving
- Component Failure after EOPs – Reactor Recirc Pump speed fails high
- Accident mitigation strategy – Emergency Depressurize the RPV

Event One: Shift CRD Pumps

Malfunction Required:
No malfunction required; this is a normal manipulation for the RO.

Objective:
Evaluate the crew during normal equipment shifting.
Evaluate the Reactor Operator shifting from the "B" CRD Pump running to the "A" CRD Pump running and securing the "B" Pump.

Success Path:
The "A" CRD Pump is running and the "B" CRD Pump is secured. All CRD parameters indicated on Panel 9-5 restored to within their normal band.

Event Two: REC Pump B trip

Malfunction Required:
SW11B – REC Pump Trip 1B.

Objective:
Evaluate the crew's response to the tripping of one of the three Reactor Equipment Cooling Pumps and takes appropriate action in accordance with the Annunciator Procedure to restart another pump prior to receiving an REC Isolation.
Evaluate the CRS addressing Technical Specifications.

Success Path:
The BOP Operator either responds quickly enough (within 1 minute) to the tripping of the pump and starts an additional REC Pump in accordance with the Annunciator Card. Or, the REC system isolation is reset following the restart of the third REC Pump and system flows and pressures are returned to normal.
The SRO will address Tech Specs and determine that LCO 3.7.3 Condition B, a 30 day LCO on one sub system.

Event Three: IRM Inop trip

Malfunction Required:
Malfunction NM13C – IRM INOP Channel-C.
NM06G IRM G Stuck and fully withdrawn

Objective:
Evaluate the crew's response to a failed Intermediate Range Monitor (IRM).
Evaluate the At the Controls (ATC) Operator's actions to determine the cause of the ½ Scram, and bypasses the failed IRM. This allows resetting the half-scram.
Evaluate the CRS addressing Technical Specifications for the failed IRM.

Success Path:
IRM - C is bypassed, and the CRS initiates an LCO on IRM C in accordance with Technical Specifications 3.3.1.1 (RPS Instrumentation) Table 3.3.1.1-1 Function 1. Also TRM T3.3.1 Function 2 potential LCO with one INOP IRM there remains the minimum number required of 6.

Event Four: Drywell Vent Radiation Monitor isolation

Malfunction Required:
Override 02S87 ZDIRMARA10AV[1] = CLOSE Drywell Vent Rad Mon. Isol Vlv.
Override 12A2AR1 RMV-RR-4 DW Vent Rad Monitor – Gas to 4.0E-006

Objective:
Evaluate the CRS addressing Technical Specifications for the failed Drywell Radiation Monitor.

Success Path:
CRS initiates an LCO on DW Radiation Monitor in accordance with Technical Specifications 3.4.5 (RCS Leakage Detection Instrumentation) b. Condition B, Required Action B.1 Grab Sample once per 12 hours and B.2 Restore within 30 days.

Event Five: Rod drop and stuck rods non-EOP rod driving

Malfunction Required:
RD02B ATWS South Bank set at 75%
CR023827 Increased Rod Worth on rod 38-27 set at 40%
RD133827 Rod Uncoupled
RD123827 Rod Stuck – Delete
CR01 Fuel Failure at 100%

Objective:
Evaluate the crew's response to approximately half of the control rod insertion on a reactor scram signal.
Evaluate the RO's ability to perform 2.4CRD and drive control rods using RMCS.
Evaluate the CRS implementing strategy for reactivity controls outside the EOPs.
Evaluate the crew's teamwork in installing jumpers and controlling Reactor Pressure and level.

Success Path:
Control Rods are inserted using RMCS.

Event Six: RCIC Steam Line Leak

Malfunction Required:
RC06 RCIC Steam Line Break in at 100%
RC07 Failure of RCIC Auto-Isolation
OR ZDIRCICSWS2(2) MO-16 C/S to OPEN
OR ZDIRCICSWS1(2) MO-15 C/S to OPEN
RF RC06A RCIC-MO-16 Control Power De-energized

Objective:
Evaluate the crew's response to a failure of RCIC to fully isolate during a RCIC Steam Line Break.
Evaluate the BOP's ability to monitor and report Secondary Containment Temperatures and Radiation Levels to the CRS.
Evaluate the crew's ability to continue Control Rod insertion in accordance with 2.4CRD and Emergency Depressurize the RPV when 2 Areas in Secondary Containment exceed Max Safe values.

Success Path:
RPV Level is being controlled within the +3 to 54 inch range with CRD and HPCI and Condensate. The Reactor is depressurized to <50 psig above Torus Pressure when two areas in Secondary Containment reach and exceed Max Safe values.

Event Seven: Fuel Failure ATWS EOP rod driving

Malfunction Required:
None

Objective:
Evaluate the crew recognition of two areas being above Max Safe Operating Temperature and entry into EOP 5A.
Evaluate the crew's ability work through EOP 5A to the point where it transitions to EOP 1A and eventually to 6A and 7A to give directions to drive control rods.

Success Path:
The Crew will enter EOPs and start driving control rods full in with EP 5.8.3 versus 2.4CRD.

Event Eight: Reactor Recirc Pump speed fails high

Malfunction Required:
RR17B RR MGSet Jordan Controller failure to 100
ZDIRRSWS2B[1] = ON Reset Scooptube Lockout

Objective:
Evaluate the crew recognition of the increasing speed of the B RR Pump.
Evaluate the crew's ability to monitor nuclear instrumentation and RR Pump speed.

Success Path:
The Crew will trip the RR Pump when it is determined that either it is at full speed or that the scoop tube lock will not stop the increase.

Event Nine: ED on Secondary Containment 2 Areas

Malfunction Required:
None

Objective:
Evaluate the crew response to a slow increase in Reactor Building Temperatures and Radiation levels to the point where the RPV must be Emergency Depressurized.
Evaluate the crew's ability to manually open 6 SRVs and reduce RPV Pressure to less than 50 psig above Torus pressure, in accordance with the EOPs.

Success Path:
RPV is depressurized to 50 psig above Torus pressure.

Scenario Termination:

When Reactor water level is being controlled between +3 and +54 inches and the RPV has been Emergency Depressurized and all but one Control Rod have been inserted.

Facility: Cooper Nuclear Station Scenario No.: NRC 4 (Spare) Op-Test No.: 1

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: The plant is operating at approximately 100% power. There are thunderstorms in the area and Nemaha Co. is in a thunderstorm watch. After turnover, the crew is to continue with the Core Spray Surveillance.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N,TS	CS Surveillance
2	2	C	CS Pump Trip
3	3	C,TS	Torus to Drywell Vacuum Breaker Opens
4	4	N	Severe Thunderstorm Warning, increased winds, shift Air Comps.
5	5	C,TS	Lightning Strike – 125V B Ground loss of HPCI Starter Rack
6	6	M,P	Lightning Strike – Both Reactor Feed Pump Suction Pressure Trip
7	7	C	Loss of 125VDC A
8	N/A	P	Emergency Depressurization to restore level with low pressure systems

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

P Critical Task are located in Event 5 and 7.

Scenario Objective

Evaluate the crew's ability to perform surveillance and normal operations and respond to instrument failure which has an input to the Reactor Vessel Level Control System.

Evaluate the crew's response to a loss of RPV level indication and entry into the RPV Flooding procedures.

Evaluate CRS ability to determine Tech Spec LCOs are not met and take appropriate Required Actions.

Scenario Summary

Initial Conditions:

- 100% Power
- Surveillance Procedure 6.1CS.101, CORE SPRAY TEST MODE SURVEILLANCE OPERATION (IST) (DIV 1) (92 day) is due to be performed at the beginning of shift.

Events:

- CS Surveillance
- CS Pump Trip
- Torus to Drywell Vacuum Breaker Opens
- Severe Thunderstorm Warning, increased winds, shift Air Comps.
- Lightning Strike – 125V B Ground loss of HPCI Starter Rack
- Lightning Strike – Both Reactor Feed Pump Suction Pressure Trip
- Loss of 125VDC A
- Emergency Depressurization to restore level with low pressure systems

Scenario Sequence

- Normal activity – CS Surveillance
- Component Failure before EOPs – CS Pump Trip
- Component Failure before EOPs - Torus to Drywell Vacuum Breaker Opens
- Abnormal event with Normal Activity – Severe TS Warning, shift Station Air Compressors.
- Component Failure before EOPs - Lightning Strike – 125VB Ground loss of HPCI Starter Rack
- Major Event - Lightning Strike – Both Rx Feed Pump Suction Pressure Trip circuit initiates
- Component Failure after EOPs – 125VDC Bus A failure
- Accident mitigation strategy – Alternate RPV Injection to control level

Event One: CS Surveillance

Malfunction Required:
None

Objective:
Evaluate the crew during normal equipment surveillance.
Evaluate SRO Tech Spec entry for CS surveillance

Success Path:
The A Core Spray Pump is started and the minimum flow valve is verified to close as flow is raised.
The SRO will address Tech Specs for inoperable subsystem and pump.

Event Two: CS Pump Trip

Malfunction Required:
CS01a Core Spray A pump trip.

Objective:
Evaluate the crew's response to the tripping of the CS Pump.
Evaluate the CRS directing the steps of the surveillance that must be performed and those to be N/Aed.

Success Path:
The Crew places the "A" Core Spray system valves back to the normal alignment.

Event Three: Torus to Drywell Vacuum Breaker NRV-21 opens

Malfunction Required:
PC02b Torus To Drywell Vacuum Breaker Failure NRV-21 (open) set at 100%

Objective:
Evaluate the crew's response to a vacuum breaker failing open.
Evaluate the CRS addressing Technical Specifications for inoperable vacuum breaker.

Success Path:
The SRO addresses Tech Specs and declares the vacuum breaker inoperable.

Event Four: NAWAS issues Severe Thunderstorm Warning

Malfunction Required:
HV03 Lightning Strike

Objective:
Evaluate the crew's response to a weather emergency and performance of mitigating steps.

Success Path:
The Crew enters 5.1Weather and prepares the site for severe weather. The crew shifts the Station Air Compressors and aligns REC to the running compressor.
The CRS ensures that a safety announcement is made over the Gaitronics to help protect the personnel on site.

Event Five: Lightning Strike - Lightning Strike – 125VB Ground loss of HPCI Starter Rack TS-3.0.3 Shutdown

Malfunction Required:
HV03 Lightning Strike
ED12A HPCI Starter Rack Loss of Power
OR RA:MUX01C072 125V DC B Bus Ground Annunciator

Objective:
Evaluate the crew's response to a ground on the 125 V DC System and subsequent loss of HPCI Starter Rack.
Evaluate the CRS addressing Technical Specifications.

Success Path:
The Crew identifies the loss of the HPCI Starter Rack by walking down the control board.
The CRS determines that HPCI is inoperable

Event Six: Lightning Strike – Both Rx Feed Pump Suction Pressure Trip circuit initiates

Malfunction Required:
HV03 Lightning Strike
FW01A Time Delay 10 seconds
FW01B Time Delay 15 seconds
Override Annunciator A1/A6 RFP A Suction Pressure Low ON
Override Annunciator A2/A3 RFP B Suction Pressure Low ON

Objective:
Evaluate the crew's response to the failure of the suction pressure switches for both Reactor Feed Pumps and timed sequence of tripping. This Results in the subsequent loss of feedwater to the vessel.

Success Path:
The Crew identifies the loss of feedwater and scrams the reactor prior to the automatic trip. The Crew should use their only available injection sources to maintain and recover level.

Event Seven: 125VDC Bus A failure

Malfunction Required:
ED12D Loss of 125 VDC Bus Distribution Panel

Objective:
Evaluate the crew's ability to recognize the loss of RCIC and inability of the remaining high pressure injection sources to restore level.

Success Path:
The Crew identifies the loss of RCIC and the inability to restore level. The Crew transitions to Alternate RPV Injection using SLC and CRD.

Event Eight: Anticipate emergency depressurization, or emergency depressurizes

Malfunction Required:
None

Objective:
Evaluate the crew's ability to recognize the inability of remaining high pressure injection sources to restore RPV water level and either Alternate Emergency Depressurizes or Emergency Depressurizes the RPV to allow low pressure systems to restore level.

Success Path:
The Crew identifies the loss of loss of RCIC to restore level. The Crew transitions to Alternate RPV Injection using SLC then to Emergency Depressurization to refill the vessel.

Scenario Termination:

When the rate of level decrease has slowed because of the use of alternate injection sources or the crew has emergency depressurized the vessel and injected with low pressure systems or at the direction of the lead examiner.