

Facility: NMP 1 Examination Level: SRO-I		Date of Examination: 8/31/2009 Operating Test Number: 1
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations A-1-1	N, R	Evaluate Plant Chemistry Report and Respond
Conduct of Operations A-1-2	N, R	Initiate a manual tagging clearance
Equipment Control A-2	N, R	Evaluate Surveillance Results and Determine Tech Spec Implications
Radiation Control A-3	N, R	Determine Radiation Controls
Emergency Procedures/Plan A-4	M, R	Perform ED Functions
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 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:	Nine Mile Point Unit 1	Date of Examination:	August 2009
Exam Level:	SRO-I	Operating Test No.:	1
Control Room Systems [®] (7 for SRO-I)			
	System / JPM Title	Type Code*	Safety Function
S-1	Power PB16B from PB16A KA 262001.A4.01	S, N	6 Electrical
S-2	Withdrawal of Control Rod That Double Notches KA 201003.A2.03	S, L, D, A	1 Reactivity Control
S-3	Cooling Reactor Building Emergency Ventilation Charcoal Filter KA 261000.A4.03	N, S, EN	9 Radioactive release
S-4	Core Spray Pump operation per EOP-1, Attachment 4 209001.A4.01 (3.6) Ability to manually operate and / or monitor in the control room: Core Spray Pump	M, S, A, EN	2 Reactor water Level control
S-5	MSIV Stroke Testing for Post Maintenance Test 239001.A4.01 (4.0) Ability to manually operate and / or monitor in the control room: MSIV's	M, S	3 Reactor Pressure Control
S-6	Place 11 SDC Loop in Service KA 20500 A2.06	M,L,S, A	4 Heat Removal from the Core
S-7	Containment Spray in Torus Cooling KA 295026 EA1.01	P,S,A	5 Torus Cooling
In-Plant Systems [®] (3 for SRO-I)			
P-1	Scram Control Rods by pulling RPS Bus Fuses KA 212000.A2.20	N, R, A, E	7 Instrumentation
P-2	Loss of 115KV Power In Plant Load Reductions KA 262001.A2.03	D, R, E	6 Electrical

P-3	Remove ERV fuses in the plant KA 239002 A2.03	D,E, R	3 Reactor Pressure Control
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<p>@ 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.</p>	
* Type Codes	Criteria for RO / SRO-I / SRO-U
<p>(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator</p>	<p>4-6 / 4-6 / 2-3 $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ - / - / ≥ 1 (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$</p>

Facility: NMP Unit 1

Scenario No.: 2

Op-Test No.: 1

Examiners: _____

Operators: _____

Initial Conditions:

Unit 1 at 15% power. Reactor Water Cleanup system in service with PCV 33-39 in service. Turbine Building Exhaust Fan #11 is running.

Turnover: Unit 1 is in the process of starting up and is at 15% power. Mode switch has just been placed in run. Shift orders are to start the second condensate pump and then raise power using control rods to get 4-6 bypass valves open per N1-OP-43A step 5.1. Then synchronize and load the turbine and generator.

Generator Hydrogen and seal oil systems have been verified in service. Pre-startup checks are completed per N1-OP-32. The turbine steam chest warming is complete. Main condenser vacuum has been verified to be 26 " to 28 " HG. N1-Op-15A is complete through step F2.5 for the condensate pump start.

	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP	Start second condensate pump.
2	N/A	R-ATC	Raise Power by withdrawing Control Rods to get 4-6 bypass valves open.
3	RM64A	TS-CRS	Stack Rad monitor failure. TS call.
4	CU05 CU12	I-BOP I-SRO	Reactor Water Cleanup Pump High Pressure Control valve fails Open. System Trips but does not isolate.
5	NM19A	I-ATC I-SRO TS-CRS	APRM #11 fails upscale, half scram, bypass. TS Call.
6	RX01/MS 13A, C	M-Crew	Fuel Failure leads to MSL Rad Monitors >3.75 X NFPB. Initiate Scram and Manual Isolation. @ MSIV's fail to close.
7	MS01 Override	M-Crew C-BOP	MSL Break in Turbine Building. Enter Rad Control EOP. Running Turbine Building fan trips, 2 nd fan trips 1 minute later.
8	AD07B AD07E	C-BOP	Enter RPV control and Blowdown prior to GE. ERV 112 and 115 Fails closed.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: NMP 1	Scenario No.: 3	Op-Test No.: 1	
Examiners: _____	Operators: _____	_____	
Initial Conditions: Unit 1 at 100% power.			
Turnover: Unit 1 is at 100% power. Shift orders are to shift TBCLC pumps. Currently TBCLC pump 12 is running. Then reduce power to 95% using recirc flow, to support Turbine valve testing. N1-OP-43B has been marked up as complete up to F2.8. The RE is not in the control room. CRD Pump #12 – Inoperable Due to Motor fault. #12 Feedwater Pump inoperable due to Oil change. (Day 1 of 1 day planned outage).			
	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP	Shift TBCLC Pumps.
2	N/A	R-ATC	Lower power to 95% using recirc flow.
3	RR52 RP05A	TS-SRO	Respond to failure of reactor level instrument LT-36-03A with a failure to ½ scram
4	RR65C	C-BOP	Recirc Pump #13 Oscillates.. Take manual control #13 Recirc. Pump.
5	RR09C	C-ATC TS-CRS	Recirc #13 motor overheats, lower power, remove from service. TS Call
6	RR29	M-Crew C-ATC	Medium LOCA with an ATWS. Manual ARI fully inserts rods.
7	ED26	C-BOP	PB 11 failure to auto transfer
8	FW03A CT01A&D	M-Crew C-ATC	FP 11 trips on overload after restart. Cont. Spray 111 and 122 Trip
9	CS03C&D	C-BOP	Core Spray Isolation Valves Fails to open.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: NMP Unit 1

Scenario No.: 4

Op-Test No.: 1

Examiners: _____

_____Operators: _____

Initial Conditions:

- Unit 1 at 50% power.
- CRD pump #11 is out for maintenance
- #11 Feedwater pump is out of service for maintenance

Turnover :

Unit #1 is at 50% power for waterbox cleaning and rod sequence exchange. CRD pump #11 is tagged out for maintenance. Day 2 of a 3 day planned outage. #11 Feedwater pump is tagged for an oil change. Day 1 of a 1 day planned outage. MOD-8106 is tagged for maintenance. Day 1 of a 1 day planned outage.

Shift orders are to perform EC valve surveillance Loop 11 per N1-ST-Q4. N1-ST-Q4 is complete up to step 8.1.5. Once the surveillance is complete continue with rod sequence exchange.

	Malf. No.	Event Type*	Event Description
1	EC08B	N-BOP	Perform EC Valve Surveillance Loop 11 per N1-ST-Q4. The ST is complete up to step 8.1.5. TS call SRO
2	N/A	R-RO	Perform control rod sequence exchange.
3	RR52	TS-SRO	RPV pressure instrument fails downscale.
4	ED01B	C-BOP TS-SRO	Loss of 115 kV Line 1
5	DG04A	C-BOP	Failure of EDG 102 to Auto Start
6	MC01	M-All R-RO	Loss of Main Condenser Vacuum. Power is reduced to respond to lowering vacuum.
7	FW28A	C-BOP	HPCI 11 fails to auto initiate on low RPV water level
8	RR29	M-All	Recirculation Loop line break.
9	CS06	C-All	Core Spray Fails to Auto-Start
10	RR29	M-All	Recirculation Loop line break increases, requiring RPV blowdown
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Facility: NMP Unit 1

Scenario No.: 5

Op-Test No.: 1

Examiners: _____
_____Operators: _____
_____**Initial Conditions:**

Unit 1 Reactor at 82% power. The #112 Containment Spray Pump is tagged out of service for maintenance. The #12 CRD pump was returned to operations and PMT's completed per N1-ST-Q2 on the previous shift. The crew is requested to swap back to the #11 CRD pump.

Turnover :

Unit 1 Reactor at 82% power. The #112 Containment Spray Pump is tagged out of service for maintenance and will be returned to operations in four (4) hours The #12 CRD pump was returned to operations and PMT's completed per N1-ST-Q2 on the previous shift. The crew is requested to place #11 CRD pump in service.

	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP	Swap CRD pumps per N1-OP-5
2	FW22	C-BOP C-SRO R-ATC	FW Tube rupture in the #135 Feed Water Heater (FWH) causes a FWH isolation and resultant power rise due to loss of feedwater heating. FWH #135 is then isolated per N1-OP-16 Section H.
3	TC06	I-ALL C-ATC TS-SRO	The EPR malfunctions and begins to oscillate which requires a swap to MPR and entry into N1-SOP-31.2.
4	RD35A RD35B	TS-SRO	The #11 CRD pump trips. SRO must determine Tech Spec impact and enter N1-SOP-5.1.
5	RD03	TS-SRO	Three CRD accumulator pressures drop below required values which place the Unit on a 20 minute clock to SCRAM.
6	RD43	M-ALL	Following reports of an extended time frame to restore the CRD pumps the plant is scrammed and a hydraulic ATWS is identified. The ATWS will be exited with repeat manual scrams.
7	CU11 CU14	M-ALL	A rupture in the RWCU starts following the SCRAM and drives entry into EOP-5.
8	AD07	C-BOP	Effects of the secondary containment leak spread into a second area and require a blowdown per EOP-8. ERV 111 will not actuate and an alternate blowdown mechanism is required.

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

Facility: NMP Unit 1	Scenario No.: 6	Op-Test No.: 1	
Examiners: _____	Operators: _____	_____	
<p>Initial Conditions:</p> <ul style="list-style-type: none"> The plant is in 4-loop operation at 92.5% power. #122 Containment Spray Pump is out of service for maintenance. <p>Turnover :</p> <ul style="list-style-type: none"> Recirc Pump 14 was removed from service on the previous shift. Isolate Recirc Pump 14 in preparation for maintenance. #122 Containment Spray Pump is out of service for planned maintenance. 			
	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP R-ATC TS-SRO	Isolate Recirc Loop #4. Power is reduced with flow to support Recirc. Loop isolation.
2	RP22	TS-SRO C-BOP C-RO	Respond to trip of Reactor Protection System (RPS) UPS 162A. Multiple TS entry conditions.
3	AD05	C-CREW TS-SRO	ERV 111 open inadvertently
4	PC04	C-CREW	Respond to unisolable leak from torus.
5	RP05A LP01A, B RP09	M-CREW	Torus level drops below 10.5 feet and scram is directed per EOP-4. Respond to failure of RPS and ATWS at 90% power.
6	TU06	I-BOP I-SRO	Respond to trip of Main Turbine on thrust bearing wear detector.
7	TC12	C-SRO C-BOP	Bypass valves fail to a partially closed position requiring additional pressure control mechanisms to be initiated per EOP-3.
8	N/A	M-Crew	Blowdown on Torus level prior to dropping to 8 feet using bypass valves or other alternate blowdown systems.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Admin JPM Comment Resolution

JPM	Comment	Submitted By	Resolution	Resolved By
A-1-1	Format changes and procedure rev changed. Deleted critical task on Step 5.c and 5.d	T. Hooper	Accepted all changes.	D. Molteni / T. Hedigan
A-2	Format and wording changes for various steps.	T. Hooper	All comments accepted	Molteni / Hedigan
A-3	Format and wording changes with no impact on JPM	T. Hooper	All comments accepted	Molteni / Hedigan
A-3	Changed allowed answer on Step 4.d from 5 to 25 Rem	T. Hooper	Comment accepted based on action taken to prevent escalation to a general emergency	Molteni / Hedigan
A-4	Changed initiating cue to stand ED cue.	T. Hooper	Comment accepted	D. Molteni
A-4	Changed critical task to only include steps 3-7 on notification form	T. Hooper	Comment partially accepted. Steps 3-7 and 9 and 10 are critical to match corporate criteria for form accuracy	D. Molteni
A-4	Changed ground level wind direction to match elevated wind direction	T. Hooper	Comment accepted	D. Molteni

RO Outline

ES-401

BWR Examination Outline

Form ES-401-1

Facility:		Date of Exam:																
Nine Mile Point 1		August 2009																
Tier	Group	RO K/A Category Points												SRO-Only Points				
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total		
1. Emergency & Abnormal Plant Evolutions	1	5	3	3	N/A			4	3	N/A			2	20	NA	NA	NA	
	2	0	2	1				1	1				2	7	NA	NA	NA	
	Tier Totals	5	5	4				5	4				4	27	NA	NA	NA	
2. Plant Systems	1	3	3	4	3	2	3	2	2	2	1	1	26	NA	NA	NA		
	2	1	0	1	2	1	1	0	1	1	2	2	12	N A	N A	NA		
	Tier Totals	4	3	5	5	3	4	2	3	3	3	3	38	NA	NA	NA		
3. Generic Knowledge and Abilities Categories					1		2		3		4		10	N A	N A	N A	N A	NA
					3		2		2		3			N A	N A	N A	N A	

- 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.

RO OUTLINE

ES-401

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Form ES-401-1

ES-401		BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / 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	#
295001 Partial or Complete Loss of Forced Core Flow Circulation / 1 & 4	X						K1.02 - Knowledge of the operational implications of Power/Flow Distribution as it applies to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION	3.3	1
295003 Partial or Complete Loss of AC / 6			X				K3.05 -Knowledge of the reasons for the following responses as they relate to Partial or Complete Loss of AC: Reactor Scram	3.7	2
295004 Partial or Total Loss of DC Pwr / 6			X				K3.01 - Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF DC PWR: Load Shedding.	2.6	3
295005 Main Turbine Generator Trip / 3						X	G2.1.32 -Ability to explain and apply system limits and precautions as they relate to MAIN TURBINE GENERATOR TRIP.	3.8	4
295006 SCRAM / 1		X					K2.06 - Knowledge of the interrelations between SCRAM and the Following REACTOR POWER.	4.2	5
295016 Control Room Abandonment / 7				X			A1.07 Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT: Control room/local control transfer mechanisms.	4.2	6
295018 Partial or Total Loss of CCW / 8	X						K1.01 Knowledge of the operational implications of the Effects on component/system operations as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER	3.5	7
295019 Partial or Total Loss of Inst. Air / 8				X			A1.03 - Ability to operate and/or monitor the Instrument air compressor power supplies as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR.	3.0	8
295021 Loss of Shutdown Cooling / 4					X		A2.02 - Ability to determine and/or interpret RHR/shutdown cooling system flow as they apply to LOSS OF SHUTDOWN COOLING.	3.4	9
295023 Refueling Accident / 8				X			A1.07 - Ability to operate and/or monitor the Standby gas treatment system as they apply to REFUELING ACCIDENTS.	3.6	10
295024 High Drywell Pressure / 5		X					K2.07 -Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: PCIS/NSSSS	3.9	11

RO OUTLINE

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / 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	#
295025 High Reactor Pressure / 3		X					K2.08 - Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following: Reactor/turbine pressure regulating system: Plant Specific	3.7	12
295026 Suppression Pool High Water Temp. / 5	X						K1.01 - Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Pump NPSH	3.0	13
295027 High Containment Temperature / 5	N/A								
295028 High Drywell Temperature / 5					X		A2.01 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell temperature.	4.0	14
295030 Low Suppression Pool Water Level / 5	X						K1.03 - Knowledge of the operational implications of the following concepts as they apply to LOW SUPPRESSION POOL WATER LEVEL: Heat capacity.	3.8	15
295031 Reactor Low Water Level / 2					X		A2.04 – Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Adequate Core Cooling	4.6	16
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1			X				K3.07 - Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN : Various alternate methods of control rod insertion.	4.2	17
295038 High Off-site Release Rate / 9	X						K1.02 -Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE: Protection of the general public.	4.2	18
600000 Plant Fire On Site / 8				X			A1.05 -Ability to operate and / or monitor the following as they apply to PLANT FIRE ON SITE: Plant and Control room ventilation systems.	3.0	19
700000 Generator Voltage and Electric Grid Disturbances / 6						X	G2.1.25 – Ability to interpret reference materials such as graphs, curves, tables, etc. as it relates to GENERATOR VOLTAGE AND ELECTRICAL GRID DISTURBANCES.	3.9	20
K/A Category Totals:	5	3	3	4	3	2	Group Point Total:	20/7	

RO OUTLINE

ES-401

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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		X					AK2.05- Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following: Drywell Cooling and Ventilation.	3.7	21
295011 High Containment Temp / 5	N/A								
295012 High Drywell Temperature / 5				X			AA1.02- Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE : Drywell Cooling System.	3.8	22
295013 High Suppression Pool Temp. / 5									
295014 Inadvertent Reactivity Addition / 1		X					AK2.07- Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following: Reactor Power.	3.4	23
295015 Incomplete SCRAM / 1						X	G2.4.9- Knowledge of low power/shutdown implications in accident mitigation strategies, as it relates to Incomplete SCRAM.	3.8	24
295017 High Off-site Release Rate / 9									
295020 Inadvertent Cont. Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1					X		AA2.01 - Ability to determine and/or interpret the following as they apply to LOSS OF CRD PUMPS: Accumulator pressure.	3.5	25
295029 High Suppression Pool Wtr Lvl / 5									
295032 High Secondary Containment Area Temperature / 5									
295033 High Secondary Containment Area Radiation Levels / 9									

RO OUTLINE

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / 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	#
295034 Secondary Containment Ventilation High Radiation / 9			X				K3.02 - Knowledge of the reasons for the following responses as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION : Starting SBT.	4.1	26
295035 Secondary Containment High Differential Pressure / 5									
295036 Secondary Containment High Sump/Area Water Level / 5						X	G2.4.18 -Knowledge of the specific bases for EOPs for Secondary containment High Sump/Area Water Level.	3.3	27
500000 High CTMT Hydrogen Conc. / 5									
K/A Category Point Totals:	0	2	1	1	1	2	Group Point Total:		7/3

RO OUTLINE

ES-401

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Form ES-401-1

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / 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												N/A		
205000 Shutdown Cooling							X					A1.03 -Ability to predict and/or monitor changes in parameters associated with operating the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) controls including: Recirculation loop temperatures	3.3	28
206000 HPCI			X									K3.01 -Knowledge of the effect that a loss or malfunction of the HIGH PRESSURE COOLANT INJECTION SYSTEM will have on the following: Reactor Water Level Control.	4.0	29
206000 HPCI				X								K4.04 - Knowledge of HIGH PRESSURE COOLANT INJECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Resetting system isolations.	4.0	30
207000 Isolation (Emergency) Condenser	X											K1.11 -Knowledge of the physical connections and/or cause effect relationships between ISOLATION (EMERGENCY) CONDENSER and the following: Primary containment isolation system.	3.4	31
209001 LPCS							X					K6.11 -Knowledge of the effect that a loss or malfunction of the following will have on the LOW PRESSURE CORE SPRAY SYSTEM : ADS.	3.6	32
209001 LPCS		X										K2.03 -Knowledge of electrical power supplies for the LOW PRESSURE CORE SPRAY SYSTEM to the following: Initiation logic.	2.9	33
209002 HPCS												N/A		
211000 SLC					X							K5.04 - Knowledge of the operational implications of the following concepts as they apply to STANDBY LIQUID CONTROL SYSTEM : Explosive valve operation.	3.1	34
212000 RPS					X							K5.02 – Knowledge of the operational implications of the following concepts as they apply to RPS: Specific Logic Arrangements.	3.3	35

RO OUTLINE

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / 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	#
212000 RPS				X								K4.08- Knowledge of REACTOR PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Complete control Rod Insertion Following Scram Signal generation.	4.2	36
215003 IRM			X									K3.02 Knowledge of the effect that a loss or malfunction of the INTERMEDIATE Range Monitor (IRM) System will have on following: Reactor manual control.	3.6	37
215003 IRM		X										K2.01- Knowledge of electrical power supplies to the following: IRM channels/detectors.	2.5	38
215004 Source Range Monitor											X	G2.1.27- Knowledge of system purpose and/or function as related to Source Range Monitor.	3.9	39
215005 APRM / LPRM									X			A3.07- Ability to monitor automatic operations of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM including: RPS status.	3.8	40
217000 RCIC												N/A		
218000 ADS		X										K2.01- Knowledge of electrical power supplies to the following: ADS logic.	3.1	41
223002 PCIS/Nuclear Steam Supply Shutoff								X				A2.03- Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: System logic failures.	3.0	42
239002 SRVs			X									K3.02- Knowledge of the effect that a loss or malfunction of the RELIEF/SAFETY VALVES will have on following: Reactor over pressurization.	4.2	43
259002 Reactor Water Level Control	X											K1.09- Knowledge of the physical connections and/or cause effect relationships between REACTOR WATER LEVEL CONTROL SYSTEM and the following: P sat/T sat (compensation).	2.9	44
261000 SGTS						X						K6.04- Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY GAS TREATMENT SYSTEM : Process radiation monitoring.	2.9	45

RO OUTLINE

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / 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	#
262001 AC Electrical Distribution							X					A1.03- Ability to predict and/or monitor changes in parameters associated with operating the A.C. ELECTRICAL DISTRIBUTION controls including: Bus voltage.	2.9	46
262001 AC Electrical Distribution			X									K3.02- Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: Emergency generators.	3.8	47
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 the following: Transfer from preferred power to alternate power supplies.	3.1	48
263000 DC Electrical Distribution	X											K1.02 - Knowledge of the physical connections and/or cause-effect relationships between DC ELECTRICAL DISTRIBUTION SYSTEM and Battery charger and battery.	3.2	49
264000 EDGs									X			A3.01- Ability to monitor automatic operations of the EMERGENCY GENERATORS (DIESEL/JET) including: Automatic starting of compressor and emergency generator.	3.0	50
264000 EDGs										X		A4.05- Ability to manually operate and/or monitor in the control room: Transfer of emergency generator (with load) to grid.	3.6	51
300000 Instrument Air							X					A2.01 – Ability to (a) predict the impacts of the following on the INSTRUMENT AIR SYSTEM and (b) based on those predictions, use procedures to correct, control , or mitigate the consequences of those abnormal operation: Air dryer and filter malfunctions	2.9	52
400000 Component Cooling Water						X						K6.03 – Knowledge of the effect that a loss or malfunction of the following will have on the CCWS: Controllers and Positioners	2.9	53
K/A Category Point Totals:	3	3	4	3	2	3	2	2	2	1	1	Group Point Total:		26/5

RO OUTLINE

ES-401

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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	N/A													
201006 RWM					X							K5.11 -Knowledge of the operational implications of the following concepts as they apply to ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) : Insert error.	3.2	56
202001 Recirculation	X											K1.18 -Knowledge of the physical connections and/or cause effect relationships between RECIRCULATION SYSTEM and the following: RHR shutdown cooling mode.	3.3	55
202002 Recirculation Flow Control														
204000 RWCU										X		A4.06 – Ability to manually operate and/or monitor in the control room: System Flow	2.8	62
214000 RPIS														
215001 Traversing In-core Probe														
215002 RBM														
216000 Nuclear Boiler Inst.											X	G2.4.2 -Knowledge of system setpoints, interlocks and automatic actions associated with EOP entry conditions as related to Nuclear Boiler Instrumentation.	4.5	57
219000 RHR/LPCI: Torus/Pool Cooling Mode						X						K6.01 -Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE : A.C. electrical power .	3.2	58
223001 Primary CTMT and Aux.														

RO OUTLINE

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / SRO)											Form ES-401-1		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	IR	#
226001 RHR/LPCI: CTMT Spray Mode									X			A3.03 – Ability to monitor automatic operation of the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE: including: System Flow	2.8	64
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup				X								K4.06 - Knowledge of Fuel Pool Cooling And Clean Up design feature(s) and/or interlocks which provide for the following: Maintenance of adequate pool level.	2.9	59
234000 Fuel Handling Equipment														
239001 Main and Reheat Steam											X	G2.1.28 – Knowledge of the purpose and function of major system components and controls.	4.1	60
239003 MSIV Leakage Control														
241000 Reactor/Turbine Pressure Regulator														
245000 Main Turbine Gen. / Aux.														
256000 Reactor Condensate										X		A4.02 - Ability to manually operate and/or monitor in the control room: System motor operated valves	2.8	61
259001 Reactor Feedwater														
268000 Radwaste														
271000 Offgas														
272000 Radiation Monitoring														
286000 Fire Protection				X								K4.04 - Knowledge of FIRE PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Personnel safety during halon and/or carbon dioxide system actuation	3.2	63
288000 Plant Ventilation														

RO OUTLINE

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / 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	#
290001 Secondary CTMT								X				A2.01 - Ability to (a) predict the impacts of the following on Secondary Containment; and (b) based on those predictions, use procedures to correct control, or mitigate the consequences of those abnormal conditions: Personnel airlock failure.	3.3	54
290003 Control Room HVAC														
290002 Reactor Vessel Internals			X									K3.07 - Knowledge of the effect that a loss or malfunction of the REACTOR VESSEL INTERNALS will have on following: Nuclear boiler instrumentation	3.1	65
K/A Category Point Totals:	1	0	1	2	1	1	0	1	1	2	2	Group Point Total:		12/3

RO OUTLINE

ES-401 Generic Knowledge and Abilities Outline (Tier 3) Form ES-401-3

Category	K/A #	Topic	RO	
			IR	#
1. Conduct of Operations	2.1.3	Knowledge of shift or short-term relief turnover practices.	3.7	66
	2.1.32	Ability to explain and apply system limits and precautions.	3.8	67
	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	2.9	68
	Subtotal			
2. Equipment Control	2.2.13	Knowledge of tagging and clearance procedures.	4.1	69
	2.2.22	Knowledge of limiting conditions for operations and safety limits.	4.0	70
	Subtotal			
3. Radiation Control	2.3.11	Ability to Control Radiation Releases	3.8	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.	3.4	72
	Subtotal			
4. Emergency Procedures / Plan	2.4.1	Knowledge of EOP entry conditions and immediate action steps.	4.6	73
	2.4.29	Knowledge of the emergency plan.	3.1	74
	2.4.31	Knowledge of annunciator alarms, indications, or response procedures.	4.2	75
	Subtotal			
Tier 3 Point Total				10

SRO Outline

ES-401

BWR Examination Outline

Form ES-401-1

Facility:		Date of Exam:														
Nine Mile Point 1		August 2009														
Tier	Group	RO K/A Category Points											SRO-Only Points			
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total
1. Emergency & Abnormal Plant Evolutions	1	N/A											3	4	7	
	2	N/A											2	1	3	
	Tier Totals	N/A											5	5	10	
2. Plant Systems	1	N/A											2	3	5	
	2	N/A											1	1	1	3
	Tier Totals	N/A											4	4	8	
3. Generic Knowledge and Abilities Categories		1	2	3	4	N/A					1	2	3	4	7	
		NA	NA	NA	NA						2	2	1	2		

Note:

1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).
2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.
3. Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems/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.

SRO Outline

ES-401 2 Form ES-401-1

ES-401	BWR Examination Outline						Form ES-401-1		
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / 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									
295005 Main Turbine Generator Trip / 3									
295006 SCRAM / 1									
295016 Control Room Abandonment / 7						X	G2.4.30 -Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator, as it relates to Control Room Abandonment	4.1	81
295018 Partial or Total Loss of CCW / 8									
295019 Partial or Total Loss of Inst. Air / 8									
295021 Loss of Shutdown Cooling / 4						X	A2.04 - Ability to determine and/or interpret the following as they apply to LOSS of SHUTDOWN COOLING: Reactor Water Temperature.	3.6	78
295023 Refueling Acc / 8									
295024 High Drywell Pressure / 5						X	G2.1.23 - Ability to perform specific system and integrated plant procedures during different modes of plant operation, as it relates to HIGH DRYWELL PRESSURE.	4.3	79
295025 High Reactor Pressure / 3						X	G2.4.21 -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., as it relates to High Reactor Pressure.	4.6	80
295026 Suppression Pool High Water Temp. / 5									
295027 High Containment Temperature / 5	N/A								
295028 High Drywell Temperature / 5						X	A2.04 - Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE: Drywell pressure.	4.2	77

SRO Outline

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1 (RO / 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	#
295030 Low Suppression Pool Water Level / 5									
295031 Reactor Low Water Level / 2					X		A2.01 – Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL: Reactor water level.	4.6	76
295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown / 1									
295038 High Off-site Release Rate / 9									
600000 Plant Fire On Site / 8						X	G2.1.2 - Knowledge of operator responsibilities during all modes of plant operation: Plant Fire on Site	4.2	82
700000 Generator Voltage and Electric Grid Disturbances / 6									
K/A Category Totals:					3	4	Group Point Total:		20/7

SRO Outline

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / 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 Vacuum / 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	N/A								
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					X		A2.01 -Ability to determine and/or interpret the following as they apply to High Off-site Release Rate: Off-site Release Rate: Plant specific.	4.2	84
295020 Inadvertent Cont. Isolation / 5 & 7									
295022 Loss of CRD Pumps / 1									
295029 High Suppression Pool Water Level / 5									
295032 High Secondary Containment Area Temperature / 5						X	G2.4.6 - Knowledge of EOP mitigation strategies, as it relates to High Secondary Containment Area Temperature.	4.7	85
295033 High Secondary Containment Area Radiation Levels / 9									
295034 Secondary Containment Ventilation High Radiation / 9									
295035 Secondary Containment High Differential Pressure / 5									

SRO Outline

ES-401	BWR Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2 (RO / 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	#
295036 Secondary Containment High Sump/Area Water Level / 5					X		A2.01 -Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL : Operability of components within the affected area..	3.2	83
500000 High CTMT Hydrogen Conc. / 5									
K/A Category Point Totals:					2	1	Group Point Total:		7/3

SRO Outline

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / 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															
206000 HPCI															
207000 Isolation (Emergency) Condenser												X	G2.2.40-Ability to apply Technical Specifications for a system as it relates to Isolation Condensers.	4.7	87
209001 LPCS															
209002 HPCS	N/A														
211000 SLC															
212000 RPS															
215003 IRM												X	G2.2.22- Knowledge of limiting conditions for operations and safety limits as it relates to IRM's .	4.7	88
215004 Source Range Monitor											X		A2.02 - Ability to (a) predict the impacts of the following on the SOURCE RANGE MONITOR (SRM) SYSTEM; and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those abnormal conditions or operations: SRM inop condition .	3.7	89
215005 APRM / LPRM											X		A2.07-Ability to (a) predict the impacts of the following on the APRM / LPRM SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Recirc flow channels flow mismatch .	3.4	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	G2.2.25- Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits as it relates to AC Electrical Distribution .	4.2	86
262002 UPS (AC/DC)															

SRO Outline

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 1 (RO / 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	#
263000 DC Electrical Distribution														
264000 EDGs														
300000 Instrument Air														
400000 Component Cooling Water														
K/A Category Point Totals:							2				3	Group Point Total:		26/5

SRO Outline

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / 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											x	G2.1.40- Knowledge of refueling administrative requirements.	3.9	92
201004 RSCS	N/A													
201005 RCIS	N/A													
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														
223001 Primary CTMT and Aux.														
226001 RHR/LPCI: CTMT Spray Mode														
230000 RHR/LPCI: Torus/Pool Spray Mode														
233000 Fuel Pool Cooling/Cleanup														
234000 Fuel Handling Equipment				x								K4.02 - Knowledge of FUEL HANDLING EQUIPMENT design feature(s) and/or interlocks which provide for the following: Prevention of control rod movement during core alterations	4.1	93
239001 Main and Reheat Steam														
239003 MSIV Leakage Control	N/A													
241000 Reactor/Turbine Pressure Regulator														

SRO Outline

ES-401	BWR Examination Outline Plant Systems - Tier 2/Group 2 (RO / 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	#
245000 Main Turbine Gen. / Aux.														
256000 Reactor Condensate														
259001 Reactor Feedwater														
268000 Radwaste														
271000 Offgas								X				A2.04 – Ability to (a) predict the impacts of the following on the OFFGAS SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Offgas System high radiation.	4.1	91
272000 Radiation Monitoring														
286000 Fire Protection														
288000 Plant Ventilation														
290001 Secondary CTMT														
290003 Control Room HVAC														
290002 Reactor Vessel Internals														
K/A Category Point Totals:				1				1			1	Group Point Total:		12/3

SRO OUTLINE

Facility:		Limerick		Date of Exam:	
Category	K/A #	Topic	SRO-Only		
			IR	#	
1. Conduct of Operations	2.1.34	Ability to maintain primary and secondary plant chemistry within allowable limits.	2.9	94	
	2.1.35	Knowledge of the fuel-handling responsibilities of SROs..	3.9	95	
	Subtotal			2	
2. Equipment Control	2.2.39	Knowledge of less than or equal to one hour Technical Specification action statements for systems.	4.5	96	
	2.2.6	Knowledge of the process for making changes in procedures.	3.6	97	
	Subtotal			2	
3. Radiation Control	2.3.14	Knowledge of the radiation or contamination hazards that may arise during normal, abnormal or emergency conditions or activities.	3.8	98	
	Subtotal			1	
4. Emergency Procedures/Plan	2.4.29	Knowledge of the emergency plan.	4.4	99	
	2.4.18	Knowledge of the specific bases for EOP's.	4.0	100	
	Subtotal			2	
Tier 3 Point Total				7	

