ES-401

U. S. Nuclear Regulatory Commission			
Site-Specific SRO Written Examination			
Applicant Information			
Name:			
Date: 01/22/2018	Facility / Unit: Brunswick Unit 1/2		
Region: I II II III IV I	Reactor Type: W CE BW GE		
Start Time:	Finish Time:		
Instructions			
Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination you must achieve a final grade of at least 80 percent overall, with 70 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require a final grade of 80 percent to pass. You have 8 hours to complete the combined examination, and 3 hours if you are only taking the SRO portion.			
All work done on this examination is my own. I have neither given nor received aid.			
	Applicant's Signature		
Results			
RO/SRO-Only/Total Examination Values Points	//		
Applicant's Score Points	//		
Applicant's Grade Percent	//		

January 2019 NRC SRO Written Exam Answer Key



SRO Written Exam Reference Index

- 1. 0ASSD-02, Section A, Unit 2 CRS Actions, Figure 1
- 2. 0EOP-01-UG, User's Guide, Attachments:

5 (Drywell Spray Initiation Limit)
8 (Core Spray NPSH Limit)
13 (Core Spray Vortex Limit)
25 (Unit 1 RPV Level at LL4)
27 (Unit 1 RPV Level at LL5)

- 3. 0EOP-03-SCCP, Table SC-3, Area Radiation Limits
- 4. 0OI-01.07, Notifications, Attachment 1, Reportability Evaluation Checklist
- 5. AD-EP-ALL-0109, Offsite Protective Action Recommendations, Attachment 1, BNP Offsite PAR Determination Worksheet
- 6. Core Map
- 7. 0PEP-02.1, Brunswick Nuclear Plant Initial Emergency Actions, System Malfunctions, Hazards, and Fission Product Barriers sections.
- 8. LL-30024 SH0006, 125/250 Volt DC System Control Building Distribution Panel 3A
- 9. Technical Specifications, 3.1.3 Control Rod OPERABILITY
- 10. Technical Specifications, 3.1.4 Control Rod Scram Times
- 11. Technical Specifications, 3.3.1.1 Reactor Protection System (RPS) Instrumentation
- 12. Technical Specifications, 3.3.6.1 Primary Containment Isolation Instrumentation
- 13. Technical Specifications, 3.3.8.2 Reactor Protection System (RPS) Electric Power Monitoring
- 14. Technical Specifications, 3.5.1 ECCS—Operating
- 15. Technical Specifications, 3.6.4.3 Standby Gas Treatment (SGT) System
- 16. Technical Specifications, 3.8.7 Distribution Systems—Operating

76. Unit One is performing a startup with the following conditions:

IRM C is Inoperable and bypassed All other IRMs are on range 1 Mode switch in Startup

Subsequently, the high voltage power supply on IRM G fails low.

[Reference Provided]

Which one of the following completes both statements below?

The ability to manually withdraw control rods using the Rod Movement Control Switch is (1).

Tech Spec 3.3.1.1, Reactor Protection System (RPS) Instrumentation, requires placing IRM G in trip in (2).

- A. (1) NOT affected (2) 6 hours
- B. (1) NOT affected(2) 12 hours
- C. (1) prevented (2) 6 hours
- D. (1) prevented (2) 12 hours

77. Unit Two is at 100% power when the 2A Reactor Feed Pump trips and reactor water level lowers to 180 inches.

Which one of the following completes both statements below?

Reactor Recirc pumps will runback to Speed (1).

2AOP-04.0, Low Core Flow, (2) steps to reset the runback signal.

- A. (1) Limiter 1 (2) includes
- B. (1) Limiter 1(2) does NOT include
- C. (1) Limiter 2 (2) includes
- D. (1) Limiter 2 (2) does NOT include

78. A complete Loss of Offsite Power occurs. DG2, DG3, and DG4 have failed.

NOTE: RHR Loop B Valve Nomenclature 2-E11-F015B, Inboard Injection Valve

Which one of the following completes both statements below?

Given this condition, if a valid auto open signal demand to 2-E11-F015B subsequently occurs, the valve (1) auto open.

The CRS will direct 4160V Bus E4 to be energized IAW (2).

- A. (1) will
 (2) EOP-01-SBO-06, 4160V E-BUS CROSSTIE
- B. (1) will(2) EOP-01-SBO-08, SUPPLEMENTAL DG ALIGNMENT
- C. (1) will NOT(2) EOP-01-SBO-06, 4160V E-BUS CROSSTIE
- D. (1) will NOT
 - (2) EOP-01-SBO-08, SUPPLEMENTAL DG ALIGNMENT

 79. Unit Two is in MODE 4 with SDC in service on RHR loop A when a Reactor Steam Dome Pressure High signal occurs due to I&C error.
 A-03 2-1, *Core Spray Or RHR Pumps Running*, annunciator has cleared.
 Reactor Steam Dome Pressure High signal has been restored to operable by I&C.

Which one of the following completes both statements below?

RHR Inboard Injection Isolation Valve, E11-F015A (1) auto close.

IF RHR piping cooldown or drain down is NOT a concern, THEN the procedural steps for restoring RHR Loop A are contained in (2).

- A. (1) will
 - (2) 0AOP-15.0, Loss of Shutdown Cooling
- B. (1) will(2) 2OP-17.0, Residual Heat Removal System Operating Procedure
- C. (1) will NOT(2) 0AOP-15.0, Loss of Shutdown Cooling
- D. (1) will NOT
 - (2) 2OP-17.0, Residual Heat Removal System Operating Procedure

80. Unit Two is at 100% power. Unit One is a refueling outage with MCC 1CA under clearance.

The following events occur on Unit Two:

RPS EPA-3 tripped open due to a failure of its voltage sensing logic.

RPS EPA-4 remained closed.

RPS B was transferred to its alternate power supply IAW 2OP-03, Reactor Protection System Operating Procedure, Section 6.3.2, Transferring RPS Bus B from Normal to Alternate Power.

[Reference Provided]

IAW Tech Specs, which one of the following completes both statements below?

(1) RPS electric power monitoring assembly(ies) is(are) inoperable.

Unit Two operation (2) allowed to continue indefinitely.

- A. (1) One (2) is
- B. (1) One (2) is NOT
- C. (1) Two (2) is
- D. (1) Two (2) is NOT

81. Unit One has entered the ATWS Procedure.

Current plant conditions:

APRMs	16% power
Mode Switch	Shutdown
ARI	Initiated
Recirc Pumps	Tripped
RPV water level	150 inches
Torus temperature	95°F
Drywell pressure	2 psig
MSIVs	Open

Which one of the following completes both statements below?

IAW ATWS Procedure **RC/Q leg**, the priority action is to (1).

IAW ATWS Procedure **RC/L leg**, the **highest** reactor water level that can be established by the CRS as the upper end of the level band is (2).

- A. (1) initiate SLC
 - (2) 90 inches
- B. (1) initiate SLC(2) 206 inches
- C. (1) terminate and prevent injection into the RPV(2) 90 inches
- D. (1) terminate and prevent injection into the RPV(2) 206 inches

82. Unit Two Reactor Water Level trip units B21-LTM-N024A-1-1 (Low Level 2) and B21-LTS-N024A-1-2 (Low Level 3) were both taken out of service on Monday at 3 AM to perform SR 3.3.6.1.2 and SR 3.3.6.1.3 IAW 0MST-PCIS21Q, PCIS Rx Water LL2 and LL3 Div I Trip Unit Chan Cal and Func Test.

[Reference Provided]

IAW LCO 3.3.6.1, PCIS Instrumentation, which one of the following completes the statement below?

IF the allowable time to perform the surveillance expires, and the instruments have not yet been returned to service, THEN the latest time these channels must be placed in the tripped condition is:

- A. Monday at 3 PM
- B. Monday at 9 PM
- C. Tuesday at 3 AM
- D. Tuesday at 9 AM

83. Unit Two was operating at 50% power and an event occurred. The following alarms and indications are noted:

> A-02 (5-4) ECCS Div I RPT/ARI TR (red bar) A-02 (5-8) ECCS Div II RPT/ARI TR (red bar) A-05 (3-5) Reactor Vess Hi Press (yellow bar) A-03 (5-9) RHR Reactor Press Lo (red bar) A-05 (5-5) Pri Ctmt Hi/Lo Press (yellow bar) A-03 (4-9) RHR High Drywell Press (red bar) HPCI Equip Area High Temp RCIC Equip Area High Temp

In alarm In alarm NOT in alarm NOT in alarm In alarm 150°F 180°F

Subsequently, A-02 alarms 5-4 and 5-8 clear.

[Reference Provided]

Which one of the following completes both statements below? (assume no circuit alterations have been performed)

Group (1) valves are closed.

IAW OI-01.07, Notifications, the reportability for these conditions is **first** required to be made to the NRC within (2).

- A. (1) 5 ONLY (2) four hours
- B. (1) 5 ONLY(2) eight hours
- C. (1) 5 and 9 (2) four hours
- D. (1) 5 and 9
 - (2) eight hours

84. Unit Two is operating at 100% power when the turbine bypass valves open due to an EHC pressure regulator failure.

Assuming no operator action, which one of the following completes the statement below?

The **first** RPS scram signal that will be generated will be the <u>(1)</u> signal.

IAW the bases for Tech Spec 3.3.1.1, RPS Instrumentation, this RPS scram signal (2) assumed (credited) in the overpressurization protection analysis.

- A. (1) MSIV closure (2) is also
- B. (1) MSIV closure(2) is NOT
- C. (1) Turbine Trip/Turbine Stop Valves closure(2) is also
- D. (1) Turbine Trip/Turbine Stop Valves closure(2) is NOT

85. Unit Two was manually scrammed. The crew has entered RSP.6 control rods are still at position 02.

Which one of the following completes both statements below?

The RSP (1) required to be exited.

The CRS will direct LEP-02, Alternate Control Rod Insertion, (2).

- A. (1) is
 - (2) Section 2.2, Control Rod Insertion Verification
- B. (1) is
 - (2) Section 2.3, Reset RPS and Initiate a Manual Scram
- C. (1) is NOT(2) Section 2.2, Control Rod Insertion Verification
- D. (1) is NOT
 - (2) Section 2.3, Reset RPS and Initiate a Manual Scram

86. Unit Two has evacuated the control room due to a fire and is performing 0ASSD-02, Control Building, Section A, Unit 2 CRS Actions.

Current conditions are as follows:

RPV level (B21-LI-5977) is 25 inches and stable Reactor pressure is 700 psig Drywell temperature (Point 1 on 2-CAC-TR-778) is 252°F RCIC is injecting at 500 gpm

[Reference Provided]

IAW 0ASSD-02, which one of the following completes both statements below? (consider each statement separately)

RPV water level is currently (1) TAF.

Section A, Attachment 1, Unit 2 Reactor Vessel Rapid Depressurization, (2) required.

- A. (1) above
 - (2) is
- B. (1) above (2) is NOT
- C. (1) below (2) is
- D. (1) below (2) is NOT

87. A General Emergency has just been declared. An unisolable HPCI line break has occurred. Reactor Building negative pressure indicates 0 inches H2O. Drywell radiation monitors indicate 2400 R/hr. Dose assessments project that the on-going rad release will be 1100 mrem TEDE and 4511 mrem CDE thyroid at the site boundary in one hour. There are no known offsite impediments to evacuation.

Weather conditions for today (January 22nd) are:

Temperature	62°F
Upper wind speed	9.8 mph
Lower wind speed	7.3 mph
Upper wind direction	318.9°
Lower wind direction	314.3°

[Reference Provided]

IAW AD-EP-ALL-0109, Offsite Protective Action Recommendations, which one of the following identifies the minimum required zones for evacuation?

- A. 12 and 13
- B. 11, 12, and 13
- C. 1, 2, 12, and 13
- D. 1, 2, 11, 12, and 13

88. With Unit Two operating at 100% power, an inadvertent actuation of one Core Spray logic system occurs with the BOP operator observing the following:

SW-V103, RBCCW HXS SW INLET VLVclosedSW-V106, RBCCW HXS SW INLET VLVopenSW-V111, CONV SW TO VITAL HEADER VLVclosedSW-V117, NUC SW TO VITAL HEADER VLVopen

0AOP-16.0, RBCCW System Failure, is entered to supply reactor building closed cooling water from the conventional service water header. Service water flow cannot be determined.

Which one of the following completes both statement below?

Core Spray Logic (1) inadvertently actuated.

IAW 0AOP-16.0, the conventional service water header (2) required to be declared INOPERABLE for Tech Spec 3.7.2, SW System and UHS.

- A. (1) A
 - (2) is
- B. (1) A (2) is NOT
- C. (1) B
 - (2) is
- D. (1) B (2) is NOT

89. Unit Two is in MODE 4 with the following conditions:

SDC in service with ONLY the 2A RHR pump running RPV pressure is 0 psig RPV level is being maintained 200-220 inches Secondary Containment is considered functional per the requirements of 0AP-022, BNP Outage Risk Management.

Subsequently, the following timeline occurs:

<u>Time</u>

1100	A-03 (4-2) Reactor ADS Lo Water Level (red bar) is in alarm
	A-03 (2-1) Core Spray or RHR Pumps Running has cleared
1101	0AOP-15.0, Loss of Shutdown Cooling, was entered
1110	RPV pressure is 3 psig
1121	RVCP is entered
1130	A-02 (5-4) & (5-8) ECCS Div I(II) RPT/ARI Trip (red bar) are in alarm
1145	A-03 (6-9) Reactor Low Wtr Level Initiation (red bar) is in alarm
	A-03 (2-1) Core Spray or RHR Pumps Running is in alarm
1146	RPV water level has stabilized just below the A-03 (6-9) setpoint
	-

[Reference Provided]

Which one of the following completes both statements below?

IAW 0AOP-15.0, at time 1101, the CRS will direct (1).

The **highest** EAL classification for this event is (2).

- A. (1) the 2C RHR pump to be started(2) an Alert
- B. (1) the 2C RHR pump to be started(2) a Site Area Emergency
- C. (1) raising RPV water level to a band of 200 inches to 220 inches(2) an Alert
- D. (1) raising RPV water level to a band of 200 inches to 220 inches(2) a Site Area Emergency

- 90. Unit Two is operating at 100% power. CRD Pump B is under clearance. The following control rods have been declared SLOW.
 - 14-23 22-07
 - 30-27
 - 30-31
 - 42-23

Subsequently CRD Pump A trips due to filter d/p. A-05 (1-2), *CRD Hyd Temp High*, is received. The AO reports that CRD 26-31 temperature is reading 350 F and slowly rising. (This is the only CRD with a high temperature alarm) 0PT-14.2.1, Single Rod Scram Insertion Times Test, can NOT be performed.

[Reference Provided]

IAW A-05 (1-2) and Tech Specs, which one of the following completes both statements below?

Control Rod 26-31 must be declared (1).

Unit Two can remain at 100% power operation (2).

- A. (1) INOP
 - (2) for 12 hours
- B. (1) INOP(2) for 15 hours
- C. (1) SLOW (2) for 12 hours
- D. (1) SLOW
 - (2) indefinitely

- 41	

RA2.3 Alert

91. Lowering of spent fuel pool level to \leq 26.67 ft.

Which one of the following completes both statements concerning a loss of level in the spent fuel pool?

Entry into SCCP is **first** required when spent fuel pool water level is below (1).

IAW 0PEP-02.2.1, Emergency Action Level Technical Bases, 26.67 feet (2) correlate to a water level 10 feet above the top of the fuel racks.

- A. (1) Tech Spec 3.7.7, Spent Fuel Storage Pool Water level, LCO limit(2) does
- B. (1) Tech Spec 3.7.7, Spent Fuel Storage Pool Water level, LCO limit(2) does NOT
- C. (1) the A-04 (6-6), *Fuel Pool Level Low*, alarm setpoint(2) does
- D. (1) the A-04 (6-6), *Fuel Pool Level Low*, alarm setpoint(2) does NOT

92. The following timeline occurs on Unit Two:

<u>Time</u>

- 1000 Steam Cooling is entered with RPV pressure at 600 psig using SRVs
- 1005 Continuous pneumatic supply to the SRVs is lost
- 1007 The 2A RHR is running and lined up for injection

IAW Steam Cooling, which one of the following completes both statements below?

The reactor pressure band is limited to **no more than** (1).

Time (2) is the **earliest** that RPV pressure control is required to transition to EDP.

- A. (1) 800 psig (2) 1005
- B. (1) 800 psig (2) 1007
- C. (1) 1050 psig (2) 1005
- D. (1) 1050 psig (2) 1007

93. IAW 0PEP-02.2.1, Emergency Action Level Technical Basis, for SU6.1, Automatic or Manual Scram Fails to Shutdown the Reactor, which one of the following completes both statements below?

[Reference Provided]

An automatic initiation of ARI, that reduces reactor power to <2%, <u>(1)</u> considered a successful automatic scram.

A reactor shutdown achieved by the performance of 0EOP-01-LEP-02, Alternate Rod Insertions, actions (2) constitutes a successful manual scram.

- A. (1) is
 - (2) does
- B. (1) is (2) does NOT
- C. (1) is NOT (2) does
- D. (1) is NOT
 - (2) does NOT

94. Which one of the following completes both statements below IAW AD-OP-ALL-0105, Operability Determinations and Functionality Assessments?

The lowest level of approval for a Prompt Determination of Operability is by the (1).

The use of a Compensatory Measure (2) be used to restore a Structure, System, or Component (SSC) to OPERABLE.

- A. (1) Shift Manager
 - (2) can
- B. (1) Shift Manager(2) can NOT
- C. (1) CRS
 - (2) can
- D. (1) CRS
 - (2) can NOT

95. Unit Two is operating at 100% power with an active LCO (3.5.1, ECCS - Operating, Condition A) for RHR Pump 2A being Inoperable. The RHR pump is scheduled to be out of service for 5 days.

[Reference Provided]

Which one of the following completes both statements below?

IAW AD-WC-ALL-0200, On-Line Work Management, the RHR Pump 2A (2) required to be worked 24 hours/day until equipment is returned to operability.

IF RHR Room Cooler 2B is declared INOPERABLE at the same time as RHR Pump 2A, THEN Tech Spec 3.5.1, Condition J (1) required to be entered.

- A. (1) is NOT (2) is
- B. (1) is NOT (2) is NOT
- C. (1) is
 - (2) is
- D. (1) is (2) is NOT

96. Unit Two is in MODE 1 with all equipment OPERABLE.

The supply breaker to Substation E8, AK7, Bus E4 to Sub E8, tripped open, which caused a loss of power to Standby Gas Treatment (SGT) Train 2B. The supply breaker cannot be reclosed.

[Reference Provided]

Which one of the following completes both statements below IAW Tech Specs?

The crew (1) required to enter LCO 3.6.4.3, Standby Gas Treatment (SGT) System, Condition A.

LCO (2) applies to this condition.

- A. (1) is (2) 3.0.3
- B. (1) is (2) 3.0.6
- C. (1) is NOT (2) 3.0.3
- D. (1) is NOT (2) 3.0.6

- 97. IAW AD-EP-ALL-0204, Distribution of Potassium Iodide Tablets in the Event of a Radioiodine Release, which one of the following identifies who approves the administration of KI for **onsite** personnel?
 - A. EOF Director
 - B. Radiation Protection Supv
 - C. Emergency Coordinator
 - D. EOF Radiological Assessment Manager

- 98. The BSEP Radioactive Liquid Release Permit is being approved with the following step filled out on the permit:
 - 10. **Confirm** the following instrumentation is OPERABLE:
 - a. Liquid Radwaste Radioactivity Monitor, 2-D12-RM-K604 INOP
 - b. Liquid Radwaste Effluent Flow Measurement Device, 2-G16-FIT-N057 <u>CRS</u>

IAW 0OP-06.4, Discharging Radioactive Liquid Effluents to the Discharge Canal, which one of the following completes both statements below?

The BSEP Radioactive Liquid Release Permit (1) include a Shift Manager approval signature.

This Radioactive Liquid Release (2) if 2-D12-RM-K604 is INOP.

- A. (1) does (2) can still occur
- B. (1) does(2) is NOT allowed
- C. (1) does NOT (2) can still occur
- D. (1) does NOT (2) is NOT allowed

99. The STA is not in the control room.

An accident has occurred requiring entry into the EOPs. The SM has just made an EAL declaration.

IAW AD-OP-ALL-1001, Conduct of Abnormal Operations which one of the following completes both statements below?

The STA is required to report to the affected Control Room **no later than** (1) after being notified of entry into the EOPs.

The <u>(2)</u> position is required to perform an independent assessment of the Emergency Plan classification.

- A. (1) 10 minutes (2) STA
- B. (1) 10 minutes(2) CRS
- C. (1) 5 minutes (2) STA
- D. (1) 5 minutes (2) CRS

100. Unit Two is at 100% power when a LOOP occurs. Current plant conditions are below:

UA-12 (2-4) South RHR RM Flood Level Hi (blue bar)In alarmUA-12 (2-3) South CS RM Flood Level Hi (blue bar)In alarmA-05 (5-6) Pri Ctmt Press Hi Trip (red bar)In alarmReactor water level150 inches

IAW SCCP, which one of the following completes both statements below?

A primary system (1) discharging into the reactor building.

RB HVAC is required to be placed in service IAW (2).

- A. (1) is
 - (2) SEP-04, Reactor Building HVAC Restart Procedure
- B. (1) is
 - (2) OP-37.1, Reactor Building Heating and Ventilation System Operating Procedure
- C. (1) is NOT
 - (2) SEP-04, Reactor Building HVAC Restart Procedure
- D. (1) is NOT
 - (2) OP-37.1, Reactor Building Heating and Ventilation System Operating Procedure