Form 3.2-1 Administrative Topics Outline

REV. 1

Facility: Millstone 3 Date of Examination: 9/11/2023

Examination Level: RO ☒ SRO ☐ Operating Test Number: 2023 NRC

Administrative Topic (Step 1)	Activity and Associated K/A (Step 2)	Type Code (Step 3)
Conduct of Operations A.1.1	JPM: Calculate boron addition required to support EOP 3504, Cooldown Outside Control Room K/A: 2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management (RO rating: 4.3).	Location: R Source: N
Conduct of Operations A.1.2	JPM: Determine proper response to Reactor Coolant Pump Seal Alarms K/A: 2.1.19 Ability to use available indications to evaluate system or component status (RO rating: 3.9).	Location: S Source: N
Equipment Control A.2	JPM: Perform a manual Quadrant Power Tilt Ratio (QPTR) Surveillance. K/A: 2.2.12 Knowledge of surveillance procedures (RO rating: 3.7).	Location: R Source: P, D
Radiation Control A.3	JPM: Assess Emergency Dose Limits K/A: 2.3.12 Knowledge of radiological safety principles and procedures… (RO rating: 3.2).	Location: R Source: M

Form 3.2-1 Administrative Topics Outline

REV. 1

Facility: Millstone 3 Date of Examination: 9/11/2023

Examination Level: RO ☐ SRO ☒ Operating Test Number: 2023 NRC

Administrative Topic (Step 1)	Activity and Associated K/A (Step 2)	Type Code (Step 3)
Conduct of Operations A.1.1	JPM: Respond to Degrading Intake Conditions KA: GEN. 2.1.20 Ability to interpret and execute procedure steps. (SRO rating: 4.6).	Location: R Source: P, D
Conduct of Operations A.1.2	JPM: Determine time to core boil for venting the RCS K/A: 2.1.25 Ability to interpret reference materials, such as graphs, curves, and tables (SRO rating: 4.2).	Location: R Source: M
Equipment Control A.2	JPM: Determine response for blocking open a Cable Spreading Room door K/A: 2.2.21 Knowledge of pre- and post-maintenance operability requirements (SRO rating: 4.1).	Location: R Source: M
Radiation Control A.3	JPM: Respond to a Radiation Monitoring System trouble alarm K/A: 2.3.12 Knowledge of radiological safety principles and procedures pertaining to licensed operator duties, such as response to radiation monitor alarms… (SRO rating: 3.7).	Location: R Source: N
Emergency Plan A.4	JPM: Evaluate Possible Change to Protective Action Recommendations K/A: 2.4.44 Knowledge of emergency plan implementing procedures protective action recommendations (SRO rating 4.4).	Location: R Source: N

Form 3.2-2 Control Room / In-Plant Systems Outline

REV. 2

Facility: Millstone 3 Date of Examination: 9/11/23

Exam Level: RO ☒ SRO-I ☐ SRO-U ☐ Operating Test Number: 2023 NRC

System / JPM Title	Type Code	Safety Function
Control Room Systems		
a. S.1 / Second control rod drops during rod recovery (K/A: 001-A2.24)	D, A, S	1-001
b. S.2 / Establish Normal Charging and Letdown using GA-13 (K/A: 004-A2.07)	M, S	2-004
c. S.3 / Perform RCS Bleed and Feed in FR-H.1 (K/A: 010-A2.03)	D, A, S	3-010
d. S.4 / Sweep air from RHR Train 'A' (K/A: 005-A4.01)	N, A, L, S	4 PRI - 005
e. S.5 / Shift to Steam Generator Feedwater Flow Control Valves (K/A: 059-A4.03)	D, S	4 SEC - 059
f. S.6 / Respond to RMS-41/42 Alarm (K/A: 072-A3.01)	P, D, L, S	7-072
g. S.7 / Implement GA-30, Aligning RPCCW for RCS and SG Sampling (K/A: 008 CCWS A4.01)	P, D, EN, S	8-008
h. S.8 / Respond to smoke in the Control Room by operating the Control Room Emergency Ventilation System (K/A: 050-A2.02)	N, S	9-050
In-Plant Systems		
i. P.1 / Reset 3MSS*MSV5, Terry Turbine Trip Throttle Valve (K/A: W EPE-E05-EA 1.19)	P, D, R, E	4 SEC-061
j. P.2 / Establish Alternate Charging Pump Cooling Using Fire Water (K/A: 086-K1.01)	D, R, E, L	8-086
k. P.3 / Secondary side Plant Equipment Operator actions on a Control Room evacuation (K/A: APE-068 AA1.31)	M, A, E	6-064

Form 3.2-2 Control Room / In-Plant Systems Outline

REV. 2

Facility: Millstone 3 Date of Examination: 9/11/23

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test Number: 2023 NRC

System / JPM Title	Type Code	Safety Function
Control Room Systems		
a. S.1 / Second control rod drops during rod recovery (K/A: 001-A2.24)	D, A, S	1-001
b. S.2 / Establish Normal Charging and Letdown using GA-13 (K/A: 004-A2.07)	M, S	2-004
c. S.3 / Perform RCS Bleed and Feed in FR-H.1 (K/A: 010-A2.03)	D, A, S	3-010
d. S.4 / Sweep air from RHR Train 'A' (K/A: 005-A4.01)	N, A, L, S	4 PRI - 005
e. S.5 / Shift to Steam Generator Feedwater Flow Control Valves (K/A: 059-A4.03)	D, S	4 SEC - 059
f.		
g. S.7 / Implement GA-30, Aligning RPCCW for RCS and SG Sampling (K/A: 008 CCWS A4.01)	P, D, EN, S	8-008
h. S.8 / Respond to smoke in the Control Room by operating the Control Room Emergency Ventilation System (K/A: 050-A2.02)	N, S	9-050
In-Plant Systems		
i. P.1 / Reset 3MSS*MSV5, Terry Turbine Trip Throttle Valve (K/A: W EPE-E05-EA 1.19)	P, D, R, E	4 SEC-061
j. P.2 / Establish Alternate Charging Pump Cooling Using Fire Water (K/A: 086-K1.01)	D, R, E, L	8-086
k. P.3 / Secondary side Plant Equipment Operator actions on a Control Room evacuation (K/A: APE-068 AA1.31)	M, A, E	6-064

Form 3.2-2 Control Room / In-Plant Systems Outline

REV. 2

Facility: Millstone 3 Date of Examination: 9/11/23

Exam Level: RO ☐ SRO-I ☐ SRO-U ☒ Operating Test Number: 2023 NRC

System / JPM Title	Type Code	Safety Function
Control Room Systems		
a.		
b.		
c.		
d. S.4 / Sweep air from RHR Train 'A' (K/A: 005-A4.01)	N, A, L, S	4 PRI - 005
e.		
f.		
g. S.7 / Implement GA-30, Aligning RPCCW for RCS and SG Sampling (K/A: 008 CCWS A4.01)	P, D, EN, S	8-008
h. S.8 / Respond to smoke in the Control Room by operating the Control Room Emergency Ventilation System (K/A: 050-A2.02)	N, S	9-050
In-Plant Systems		
i.		
j. P.2 / Establish Alternate Charging Pump Cooling Using Fire Water (K/A: 086-K1.01)	D, R, E, L	8-086
k. P.3 / Secondary side Plant Equipment Operator actions on a Control Room evacuation (K/A: APE-068 AA1.31)	M, A, E	6-064

SEG# 2K23 NRC-02 Rev ; 1

Facility: Millstone 3 Scenario #.: 2
Scenario Source.: New Op. Test # 2K23 NRC-02
Examiners: Operators:

Initial Conditions: The plant is 100% power (EOL). ISO NE has issued a capacity deficiency alert.
Turnover: The following equipment is Out-Of-Service: 3RHS*P1B, 'B' RHR Pump, is tagged out to repair a pump seal leak. 'B' TPCCW pump is tagged out for motor repair.
Critical Tasks: 1.) Establish AFW flow during SBO before the levels in three SGs lower below 21% Wide range level conditions.
2.) Isolate RCP Seal Injection (3CHS*MV8109A, B, C & D) before a Charging Pump is started.

Event No.	Malf. No	Event Type*	Event Description
1	RCDI0023	C, MC – RO C, TS - SRO	'B' PORV Fails Open
2	FW14A	C – BOP C - SRO	First Point Feedwater Heater (FWH) develops a tube leak requiring heater string isolation
3	-	R – RO C – BOP C - SRO	Rapid downpower to 87% power at 3% / min
4	CV01	C – RO C, TS - SRO	Isolable RCS leak inside Containment
5	ED01 ED04D EG07A	M – RO M – BOP M - SRO	Loss of ALL AC Power. 'A' EDG trips. Bus differential on 'B' train 4kv Bus. Recovery with Station Blackout Diesel using ECA-0.0 and ECA-0.3. (CT2)
6	FW20C	C, MC – BOP C - SRO	Turbine Driven Aux Feed Pump Fails to start (CT1)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC) Manual Control			

NUREG 1021, ES-2.3, Form 2.3-2, Target Quantitative Attributes per Scenario Section, specifies a Target Range of "1-2" for Table item #4, *"EOPs entered/requiring substantive actions."* A detailed review of Scenario #2 confirms that the scenario is built to directly transition from E-0 to ECA-0.0, *"Loss of All AC Power,"* and that no Westinghouse Primary EOP (E-1, E-2, or E-3) will be entered/used. Consequently, a value of "0" will be assigned for Table Attribute Item 4 on Form 2.3-2, which is outside of the specified Target Range.

NUREG-1021, ES-3.3, Section B.2.g, *"EOP Operating Procedures Used,"* states *"Moreover, the primary scram response procedure that serves as the entry point for the EOPs is not counted."* A value of "0" for Table Attribute Item 4 on Form 2.3-2 was determined to be acceptable by the Chief Examiner on the basis that: (a) Scenario #2 is a complex scenario that exercises two Contingency EOP Procedures; ECA-0.0 for the *"Loss of All AC Power,"* and ECA-0.3 for the *"Loss of All AC Power - Recovery With the SBO Diesel,"* (b) ECA-0.0 requires the use of alternate decision paths and prioritization of actions within the EOPs to mitigate the Loss of All AC Power prior to the Loss of Secondary Heat Sink conditions, and (c) ECA-0.0 and ECA-0.3 both have measurable actions that must be taken by the crew.

SEG#_2K23 NRC-02_ Rev ; __1__

EXAM OVERVIEW

Millstone 2023 NRC Scenario 2

The plant is 100% power (EOL). ISO NE has issued a capacity deficiency alert.

The following equipment is Out-Of-Service: 3RHS*P1B, 'B' RHR Pump, is tagged out to repair a pump seal leak. 'B' TPCCW pump is tagged out for motor repair.

Shortly after taking the watch, the 'B' PORV fails open causing RCS pressure to lower rapidly. In order to mitigate, the RO will be required to take Immediate operator actions and close the 'B' PORV Block Valve. The US will enter AOP 3581, "Immediate Operator Actions" and ensure the plant is stable. The US enters TS 3.2.5.b DNB Parameters, TS 3.4.4 "Relief Valves" ACTION b, and TRM 3.4.11 b. "Reactor Coolant Vents" Action c.

Following this, tube leakage on the 1A high pressure Feedwater heater causes heater level to increase and reactor power to rise. The crew enters AOP 3567, "Operation with One Feedwater Heater String Isolated". The crew mitigates the event by down powering the unit to 87% power and isolating / bypassing the effected feedwater heater string.

Subsequently, an isolable leak develops on the normal letdown line inside Containment. The crew enters AOP 3555, RCS Leak, and successfully isolates the ~35 gpm leak using Attachment F "Isolating Letdown While Supplying Seal Injection At Normal Operating Pressure". The RO stabilizes Pressurizer level by performing GA-14, *Establish Head Vent Letdown.*

Following this, a loss of offsite power occurs and the reactor is shutdown. The 'A' EDG starts but experiences a mechanical failure. The 'B' EDG initially re-powers the remaining 4kv emergency bus and then a bus differential lockout occurs causing a station blackout. The crew transitions to ECA-0.0 *Loss of all AC Power.* While in ECA-0.0, the BOP recognizes that the Turbine Driven Aux Feed Pump failed to auto start. It's a **Critical Task** that the TDAFW Pp is started prior to SG dry-out. The crew chooses 4kv emergency bus 34C to re-power from the Station Blackout (SBO) diesel. After the crew takes action to isolate and align bus 34C, the BOP energizes the bus from the SBO diesel and the US transitions to ECA-0.3, *Loss of All AC Power – Recovery with the SBO Diesel.* In ECA-0.3, the crew stabilizes the plant and It is a **Critical Task** to isolate RCP Seal Injection before a Charging Pump is started. Once this is done, the scenario will end.

SEG# 2K23 NRC-03 Rev ; 1

Facility: Millstone 3 Scenario #.: 3
Scenario Source.: New Op. Test # 2K23 NRC-03
Examiners: Operators:

Initial Conditions: The plant is 97% power (EOL). LEFM is OOS for calibration. Calorimetric is selected to Feed Flow (venturis).
Turnover: The following equipment is Out-Of-Service: The 'A' Quench Spray Pump is out of service to repair an oil leak. The SBO diesel is tagged out to for a computer repair.
Critical Tasks:
1.) Energize at least one AC Emergency Bus before placing safeguards equipment hand switches in the pull-to-lock position.
2.) Manually actuate containment spray before either of the following two conditions occur: (1) FR-Z.1 Red Path condition is met OR (2) transition out of FR-Z.1 is made.

Event No.	Malf. No	Event Type*	Event Description
1	-	N - RO N- SRO	Shift SG Blowdown Tank vent path from atmosphere to the fourth point feedwater heaters
2	MB5B-A04	TS - SRO	SG Feed Isolation valve has low accumulator pressure
3	RX05_1A	I, MC – RO I – BOP I, TS - SRO	RCS temperature (CH. 1), fails high causing Control Rods to auto insert.
4	FW16B	R - RO C - BOP C - SRO	'B' Heater Drain Pump trips, rapid down power required
5	ED01 RP11M	C, MC- BOP C - SRO	Loss of offsite Power - Reactor trips. Manual actions needed to restore a single 4KV Emergency Bus. Crew transitions to ES-0.1. (CT1)
6	RC03A	M - RO M - BOP M - SRO	SBLOCA develops in ES-0.1. Transition to E-0.
7	CV23A	C, MC - RO C - SRO	Manual actions to start only available 'A' CHS Pp.
8	RC03A	M - RO M - BOP M - SRO	LBLOCA develops in E-0 with status trees in effect. Transition to Functional Recovery Procedures (includes establishing CTMT Spray using an alternate alignment in FR-Z.1). (CT2)

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC) Manual Control

SEG# 2K23 NRC-03 Rev ; 1

EXAM OVERVIEW

Millstone 2023 NRC Scenario 3

The plant is 97% power (EOL).

The following equipment is Out-Of-Service: The 'A' Quench Spray Pump is out of service to repair an oil leak. The SBO diesel is tagged out to for a computer repair. LEFM is OOS for calibration. The calorimetric is selected to Feed Flow (venturis).

The crew takes the watch with the direction to re-align the blowdown tank vent path from the atmosphere to the fourth point feedwater heaters. The RO utilizes OP 3316C to accomplish this task.

As the RO is performing this, the BOP receives a main board annunciator for low Nitrogen pressure for 'B' SG Feed Isolation Valve's actuator. The BOP has a Plant Equipment Operator (PEO) add nitrogen and the US enters TS 3.6.3.a, CTMT Isolation Valves.

Following this, RCS temperature (CH. 1) fails high causing control rods to auto insert. The RO implements AOP 3581, *Immediate Actions*, and places the Control Rods in manual. The US transitions to AOP 3571, *Instrument Failure Response*, to restore Rod Control to auto and address the failed instrument. The US enters TS 3.3.1 (for both FU7 and FU8) and TS 3.3.2 for FU 5.d.

Subsequently, the 'B' Heater Drain Pump trips. Due to low feed pump suction pressures, the BOP starts a third condensate pump and bypasses condensate demineralizers. The annunciator response procedure directs a downpower to 92% power. The crew enters AOP 3575, *Rapid Downpower*, and performs the downpower.

Following the downpower, a loss of offsite power occurs causing a reactor trip. The crew performs immediate actions of E-0, *Reactor Trip and Safety Injection.* On the reactor trip, the 'A' EDG Output Breaker fails to auto close and a catastrophic failure of the 'B' EDG (time delay of 40 seconds). In order to recover power to an emergency bus, the BOP must close the 'A' Emergency Diesel output breaker **(Critical Task)**. There is a potential for a Station Blackout depending on the timeliness of the BOP to manually close the 'A' EDG Output Breaker. Once power is restored to a single 4kv emergency bus, transition is made to ES-0.1. After taking actions to control RCS Temperature, a SBLOCA occurs. The crew exercises foldout page criteria for manual Safety Injection and transitions back to E-0.

In E-0, the RO must manually start the 'A' Charging Pump (which had a failure to automatically start). A short time later, the cold leg break worsens and becomes a LBLOCA. With status trees now in effect, the Core Cooling (driven from low plenum level) and Containment (driven from no QSS pumps operating) trees turn orange. Transition to Functional Recovery Procedures is required. FR-C.2 will be entered first on low RVLM's plenum level. Exit conditions should be met in step 1. FR-Z.1 will be entered next. With a quench spray pump unavailable, the crew will establish CTMT Spray using a RSS pump aligned to the RWST **(Critical Task)**.

SEG# 2K23 NRC-04 Rev ; 1

Facility: Millstone 3 Scenario #.: 4
Scenario Source.: New Op. Test # 2K23 NRC-04
Examiners: Operators:

Initial Conditions: The plant is 26% power (BOL) with the plant being returned to full power following a forced shutdown. Xenon is stable.

Turnover: The following equipment is Out-Of-Service: The 'B' Condensate Pump is out of service for a thrust bearing replacement. The 'C' CCP heat exchanger is out of service to repair a tube leak.

Critical Tasks: 1.) Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 is required (based upon ruptured SG pressure lowering to within 250 psi of the intact SGs). 2.) Control initial RCS cooldown to prevent either of the following: (1) transition to FR-P.1 on Orange Path condition OR (2) transition to ECA-3.1.

Event No.	Malf. No	Event Type*	Event Description
1	-	R - RO N - BOP N - SRO	Restore rod control and steam dumps systems iaw OP 3203, "Plant Startup". Raise reactor power to 30%.
2	CV04B	I, MC – RO I - SRO	Letdown heat exchanger outlet temperature instrument, 3CHS-TE130, fails low
3	-	TS –SRO C - RO	3CCI*P1A, SI PP 'A' COOLING PP, becomes inoperable
4	RX12P	I, MC - BOP I, TS - SRO	'D' SG level instrument drifts low and fails as-is
5	SG01A	C – RO C - SRO	'A' SG develops a 30 gpm tube leak
6	SG01A	M – RO M – BOP M - SRO	'A' SG tube leak becomes a 300 gpm rupture (CT1, CT2)
7	SI07B	C, MC – RO C - SRO	'B' SIH Pump fails to auto start (Man start available)
8	MS12A	C – BOP C - SRO	'A' MSIV stuck open, requires alternate isolation of 'A' SG (CT1)

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC) Manual Control

SEG# 2K23 NRC-04 Rev ; 1

EXAM OVERVIEW

Millstone 2023 NRC Scenario 4

The plant is 26% power (BOL) with the plant being returned to full power following a refueling outage. Xenon is stable.

The following equipment is Out-Of-Service: The 'B' Condensate Pump is out of service for a thrust bearing replacement. The 'C' CCP heat exchanger is out of service to repair a tube leak.

The crew will take the watch and perform actions of OP 3203, "*Plant Startup*". Actions include placing rod control in automatic and placing the steam dump controllers in Tavg mode. Following this, the crew will begin a planned power increase to 30% power.

Following this, a letdown temperature instrument fails low causing CCP flow to the Letdown HX to modulate closed. This raises actual letdown temperature. The crew responds using ARP (MB3A 5-5, Letdown HX Out Temp Hi) to control letdown temperature manually using diverse indications. If letdown temperature reaches 134 F, letdown flow will automatically bypass the letdown demins and this would need to be re-aligned.

Subsequently, a Plant Equipment Operator reports an oil leak on 3CCI*P1A, Safety Injection Pp 'A' Cooling Pump. On the field report, the US should determine that oil leak renders 3SIH*P1A, 'A' Safety Injection Pump inoperable. The crew should place 'A' Safety Injection Pump in Pull to Lock (3CCI*P1A does not have a pull to lock position available). US should enter TS 3.5.2, "ECCS Subsystems" and TRM 7.4, "Fire Related Safe Shutdown Components".

Then a controlling SG level instrument channel drifts low and fails as –is. This failure causes the 'D' Feedwater Regulating Valve (FRV) to modulate open, resulting in a SG overfeed event. The RO implements AOP 3581, "*Immediate Actions"*, and places 'D' FRV in manual. The US transitions to AOP 3571, "*Instrument Failure Response"*, to restore feed water control to auto and address the failed instrument. The Unit Supervisor will enter TS 3.3.1, "Reactor Trip Instrumentation" and TS 3.3.2.b, "ESFAS Instrumentation".

Following this, a 30 gpm tube leak develops on the 'A' Steam Generator. Because of the low power, the N16 radmonitors are not operational. The crew will not be able to determine the affected SG but they will implement actions of AOP 3576, *SG Tube Leak*, to determine the leak rate and minimize contamination. After these actions are complete, the tube ruptures creating a 300 gpm RCS leak. The crew will need to trip the Reactor and initiate Safety Injection and enter E-0, "Reactor Trip or Safety Injection".

From E-0, the crew will transition to E-3, *SG Tube Rupture*. During event response, 'B' SIH Pump fails to automatically start. Because 'A' SIH pump is in PTL (from earlier cooling pump oil leak), the RO needs to manually start the 'B' SIH pump. Additionally, 'A' MSIV fails to close complicating the recovery and requiring use of Attachment 'A' to complete isolation. The crew will stop feeding the ruptured 'A' SG and isolate the ruptured it from the other SG's (**Critical Task**). Then the crew establish and maintain the necessary subcooling (**Critical Task**) followed by RCS depressurization and terminating ECCS.

The scenario will terminate following completion of Step 20, *Stop ECCS Pumps*, of E-3.

SEG# 2K23 NRC-01 Rev ; 1 **(Spare - Not Used)**

Facility: Millstone 3 Scenario #.: 1

Scenario Source.: New Op. Test # 2K23 NRC-01

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: The plant is 93% power (BOL) with the plant being returned to full power following a refueling outage.

Turnover: The following equipment is Out-Of-Service: The 'B' Emergency Diesel Generator is OOS to repair an oil leak on the pre-lube pump. The 'B' Stator Cooling Pump is out of service for a bearing replacement.

Critical Tasks: 1.) Manually trip the Reactor from the Control Room before transition to FR-S.1 2.) Isolate faulted SG before either of the following two conditions occur: (1) FR-P.1 Orange Path condition is met OR (2) transition out of E-2 is made.

Event No.	Malf. No	Event Type*	Event Description
1	-	R – RO N – BOP N- SRO	Raise power to 97% iaw OP 3204 "At Power Operation"
2	RC23A	C, MC – RO C, TS - SRO	Pressurizer Spray Valve Fails Open
3	TC07D	C – BOP C - SRO	No. 4 Turbine Control Valve Fails Closed
4	-	TS – SRO C – BOP	Turbine Driven AFW Pump becomes inoperable with the 'B' EDG OOS
5	RP04B	C – RO C– BOP C, TS - SRO	Inadvertent 'B' Train Containment Depressurization Actuation (CDA)
6	TC01 RP10A RP10B	C, MC – BOP C - SRO	Turbine Trips w/ the Reactor failing to Auto Trip (CT1)
7	MS07A MS02D	M – RO M – BOP M - SRO	2 SG's become faulted on the transient (CT2)
8	RP11L	C, MC – RO C - SRO	FWI Components fail to isolate automatically (CT2)

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC) Manual Control

SEG# 2K23 NRC-01 Rev ; 1

EXAM OVERVIEW

Millstone 2023 NRC Scenario 1

The plant is 93% power (BOL) with the plant being returned to full power following a refueling outage. After an extended delay, 3DSM-P1B "Moisture Separator Drain Pump B" has been returned to service and the plant is ready for return to full power operation.

The following equipment is Out-Of-Service: The 'B' Emergency Diesel Generator is OOS to repair an oil leak on the pre-lube pump. Additionally, the 'B' Stator Cooling Pump is out of service for a bearing replacement.

The crew takes the watch and raises power in accordance with step 4.1.32c of OP 3204, "*At Power Operation*". After power is raised to ~97%, a pressurizer spray valve fails open lowering RCS pressure. The RO implements AOP 3581, "Immediate Actions" and is able to close the spray valve using RNO actions. The US will enter TS 3.2.5.b "DNB Parameters".

Following this, the No. 4 Turbine Control Valve fails closed causing a loss of Main Turbine load. The US enters AOP 3579, "Response to Turbine Runback / Loss of Turbine Load" and diagnoses the cause and addresses RIL.

Subsequently, the Turbine Driven AFW Pump becomes inoperable with the 'B' EDG OOS. The US enters TS 3.7.1.2.b "Auxiliary Feedwater System" Action c and TS 3.8.1.1 "AC Sources" Action b.3.

Then, an inadvertent 'B' Train Containment Depressurization Actuation (CDA) is generated. The US enters AOP 3583, "Inadvertent Containment Depressurization Actuation" and mitigates the event by stopping the containment spray pumps, restoring plant systems to normal, and addressing Tech Specs. The US enters TS 3.3.2 "ESFAS Instrumentation" and TS 3.4.6.1 "RCS Leak Detection". Depending on plant response & crew timeliness, the US may enter up to four additional Tech Specs.

Following this, the Main Turbine trips with the Reactor failing to auto trip. Auto Reactor trip and both MB Reactor trip switches are not functional requiring the BOP to isolate 480 Volt Load Centers 32B and 32N **(Critical Task)**. The crew enters E-0, "Reactor Trip or Safety Injection". On the Main Turbine trip, **two SG low set safety valves on 'A' SG stick open & 'D' SG steam line becomes breached.** Initially, a Safety Injection signal is generated on low pressurizer pressure. The auto Main Steam Line Isolation (MSI) signal will not be generated for several minutes (due to fault size). Once the crew diagnoses the faulted SG's, the BOP will isolate AFW flow. While performing E-0 Attachment B, the RO observes Feedwater Isolation Components on MB5 did not close. The RO closes the associated FWI valves **(Critical Task)**.

After meeting transition criteria for faulted SG's, the crew enters E-2, "Faulted SG Isolation". While in E-2, the crew completes the isolation for the two faulted SG's **(Critical Task)**. Once this is done, the scenario will end.

Form 4.1-PWR Pressurized-Water Reactor Examination Outline

Facility: Millstone 3 **K/A Catalog Rev. 3** **Rev.** 3 **Date of Exam:** 09/11/2023

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 and Abnormal Plant Evolutions	1	3	3	3				3	3			3	18	3	3	6
	2	0	2	1				1	2			2	8	2	2	4
	Tier Totals	3	5	4				4	5			5	26	5	5	10
2. Plant Systems	1	3	2	2	3	2	2	2	3	4	2	3	28	2	3	5
	2	1	1	1	1	1	1	0	1	0	1	1	9	0 / 2	1	3
	Tier Totals	4	3	3	4	3	3	2	4	4	3	4	37	4	4	8

3. Generic Knowledge and Abilities Categories	CO	EC	RC	EM	6	CO	EC	RC	EM	7
	2	2	1	1		2	2	1	2	

4. Theory	Reactor Theory	Thermodynamics	6
	3	3	

Notes: CO = Conduct of Operations; EC = Equipment Control; RC = Radiation Control;
EM = Emergency Procedures/Plan

* These systems/evolutions may be eliminated from the sample when Revision 2 of the K/A catalog is used to develop the sample plan.

** These systems/evolutions are only included as part of the sample (as applicable to the facility) when Revision 2 of the K/A catalog is used to develop the sample plan.

ES-4.1-PWR PWR Examination Outline (Millstone 3)

Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/**SRO**)

Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#

1	(000007) (EPE 7; BW E02 & E10; CE E02) Reactor Trip, Stabilization, Recovery					X		EA2.05 - Ability to determine and/or interpret the following as they apply to a Reactor Trip: Lights and alarms. (CFR: 41.7 / 45.5 / 45.6)	3.7	1
2	(000011) (EPE 11) Large-Break LOCA			X				EK3.12 - Knowledge of the reasons for the following responses and/or actions as they apply to a Large-Break LOCA: Actions contained in an EOP for large-break LOCA. (CFR: 41.5 / 41.10 / 45.6 / 45.13)	4.2	2
3	(000015) (APE 15) Reactor Coolant Pump Malfunctions					X		AA2.09 - Ability to determine and/or interpret the following as they apply to Reactor Coolant Pump Malfunctions: RCP high stator temperature. (CFR: 43.5 / 45.13)	3.3	3
4	(000022) (APE 22) Loss of Reactor Coolant Makeup					X		AA2.01 - Ability to determine and/or interpret the following as they apply to Loss of Reactor Coolant Makeup: Whether charging line leak exists. (CFR: 43.5 / 45.13)l	3.3	4
5	(000025) (APE 25) Loss of Residual Heat Removal System				X			AA1.20 - Ability to operate and/or monitor the following as they apply to the Loss of the Residual Heat Removal System: ECCS. (CFR: 41.7 / 45.5 / 45.6)	3.7	5
6	(000026) (APE 26) Loss of Component Cooling Water	X						AK1.02 - Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to Loss of Component Cooling Water: Loss of cooling to the CCWS. (CFR: 41.5 / 41.7 / 45.7 / 45.8)	3.8	6
7	(000029) (EPE 29) Anticipated Transient Without Scram						X	G2.4.20 – Knowledge of the operational implications of emergency and abnormal operating procedures warnings, cautions, and notes (CFR: 41.10 / 43.5 / 45.13)	3.8	7
8	(000038) (EPE 38) Steam Generator Tube Rupture		X					EK2.12 - Knowledge of the relationship between a Steam Generator Tube Rupture and the following systems or components: MFW system. (CFR: 41.7 / 41.8 / 45.4 / 45.7 / 45.8)	3.3	8
9	(000040) (APE 40; BW E05; CE E05; W E12) Steam Line Rupture – Excessive Heat Transfer						X	G2.1.19 – Ability to use available indications to evaluate system or component status. (CFR: 41.10 / 45.12)	3.9	9
10	(000054) (APE 54; CE E06) Loss of Main Feedwater	X						AK1.04 - Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to Loss of Main Feedwater: RCS parameters on a complete loss of feedwater (all SGs dried out). (CFR: 41.8 / 41.10 / 45.3)	3.9	10
11	(000055) (EPE 55) Station Blackout			X				EK3.01 - Knowledge of the reasons for the following responses and/or actions as they apply to a Station Blackout: Length of time for which battery capacity is designed. (CFR: 41.5 / 41.10 / 45.6 / 45.13)	4.1	11
12	(000057) (APE 57) Loss of Vital AC Instrument Bus		X					AK2.08 - Knowledge of the relationship between Loss of Vital AC Electrical Instrument Bus and the following systems or components: NI. (CFR: 41.7 / 45.7)	4.1	12
13	(000058) (APE 58) Loss of DC Power			X				AK3.02 - Knowledge of the reasons for the following responses and/or actions as they apply to Loss of DC Power: Actions contained in AOPs or EOPs for loss of DC power. (CFR: 41.5 / 41.10 / 45.6 / 45.13)	4.1	13
14	(000065) (APE 65) Loss of Instrument Air				X			AA1.03 - Ability to operate and/or monitor the following as they apply to Loss of Instrument Air: Restoration of systems served by instrument air when pressure is regained. (CFR: 41.7 / 45.5 / 45.6)	3.1	14

15	(000077) (APE 77) Generator Voltage and Electric Grid Disturbances	X						AK1.04 - Knowledge of the operational implications and/or cause and effect relationships of the following as they apply to Generator Voltage and Electric Grid Disturbances: Declining grid frequency or voltage. (CFR: 41.4 / 41.5 / 41.7 / 41.10 / 45.8)	3.6	15
16	(W E04) LOCA Outside Containment		X					EK2.05 - Knowledge of the relationship between LOCA Outside Containment and the following systems or components: RCS leakage paths to outside containment. (CFR: 41.7 / 41.8 / 45.2 / 45.4)	4.0	16
17	(W E11) Loss of Emergency Coolant Recirculation				X			EA1.15 - Ability to operate and/or monitor the following as they apply to Loss of Emergency Coolant Recirculation: CSS. (CFR: 41.5 to 41.8 / 45.5 to 45.8)	3.8	17
18	(BW E04; W E05) Inadequate Heat Transfer – Loss of Secondary Heat Sink						X	G2.4.31 - Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.10 / 45.3)	4.2	18
19	**(000008) (APE 8) Pressurizer Vapor Space Accident**					**X**		**AA2.20 - Ability to determine and/or interpret the following as they apply to a Pressurizer Vapor Space Accident: The effect of an open PORV or code safety based on observation of plant parameters. (CFR: 43.5 / 45.13)**	**4.0**	**76**
20	**(000009) (EPE 9) Small Break LOCA**						**X**	**G2.4.18 - Knowledge of the specific bases for emergency and abnormal operating procedures. (CFR: 41.10 / 43.1 / 45.13)**	**4.0**	**77**
21	**(000027) (APE 27) Pressurizer Pressure Control System Malfunction**					**X**		**AA2.14 - Ability to determine and/or interpret the following as they apply to a Pressurizer Pressure Control System Malfunction: RCP seal injection flow. (CFR: 43.5 / 45.13)**	**3.3**	**78**
22	**(000056) (APE 56) Loss of Offsite Power**						**X**	**G2.2.36 - Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operation. (CFR: 41.10 / 43.2 / 45.13)**	**4.2**	**79**
23	**(000062) (APE 62) Loss of Nuclear Service Water**					**X**		**AA2.07 - Ability to determine and/or interpret the following as they apply to Loss of Service Water: Implementation of TS requirements for loss of service water. (CFR: 43.5 / 45.13)**	**4.0**	**80**
24	**(W E04) LOCA Outside Containment**						**X**	**G2.1.20 - Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)**	**4.6**	**81**
K/A Category Totals:		3	3	3	3	6	6	Group Point Total:		24

ES-4.1-PWR	PWR Examination Outline (Millstone 3) Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/**SRO**)									
Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
25	000005 (APE 5) Inoperable/Stuck Control Rod		X					AK2.05 - Knowledge of the relationship between an Inoperable/Stuck Control Rod and the following systems or components: CRDS. (CFR: 41.7 / 45.7)	3.7	19
26	(000028) (APE 28) Pressurizer (PZR) Level Control Malfunction			X				AK3.03 - Knowledge of the reasons for the following responses and/or actions as they apply to a Pressurizer Level Control Malfunction: False indication of PZR level when PORV or spray valve is open and RCS is saturated. (CFR: 41.5 / 41.10 / 45.6 / 45.13)	3.8	20

27	(000033) (APE 33) Loss of Intermediate Range Nuclear Instrumentation					X		AA2.09 - Ability to determine and/or interpret the following as they apply to Loss of Intermediate Range Nuclear Instrumentation: Conditions that allow the bypass of an intermediate range level trip switch. (CFR: 43.5 / 45.13)	3.5	21
28	(000036) (APE 36; BW/A08) Fuel-Handling Incidents						X	G2.1.44 - Knowledge of RO duties in the control room during fuel handling, such as responding to alarms from the fuel handling area, communicating with fuel-handling personnel, operating systems from the control room to support fueling operations, or supporting instrumentation. (CFR: 41.10 / 43.7 / 45.12)	3.9	22
29	(000051) (APE 51) Loss of Condenser Vacuum						X	G2.1.7 – Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation. (CFR: 41.5 / 43.5 / 45.12 / 45.13)	4.4	23
30	(000024) (APE 24) Emergency Boration		X					AK2.08 - Knowledge of the relationship between Emergency Boration and the following systems or components: RWST. (CFR: 41.7 / 45.7)	3.8	24
31	000032 (APE 32) Loss of Source Range Nuclear Instrumentation				X			AA1.02 - Ability to operate and/or monitor the following as they apply to Loss of Source Range Nuclear Instrumentation: RPS. (CFR: 41.7 / 45.5 / 45.6)	3.7	25
32	(000069) (APE 69; W E14) Loss of Containment Integrity					X		(WE14) EA2.01 - Ability to determine and/or interpret the following as they apply to High Containment Pressure: Facility conditions and selection of appropriate procedures during abnormal and emergency operations. (CFR: 41.10 / 43.5 / 45.13)	3.7	26
33	**(000068) (APE 68; BW A06) Control Room Evacuation**					**X**		**AA2.09 - Ability to determine and/or interpret the following as they apply to Control Room Evacuation: Saturation margin. (CFR: 41.10 / 43.5 / 45.13)**	**3.8**	**82**
34	**(BW E09; CE A13**; W E09 & E10) Natural Circulation**						**X**	**(WE09) G2.4.51 – Knowledge of emergency operating procedure exit conditions (e.g., emergency condition no longer exists or severe accident entry is required). (CFR: 41.10 / 43.5 / 45.13)**	**4.0**	**83**
35	**(W E01 & E02) Rediagnosis & SI Termination**					**X**		**(WE01) EA2.09 - Ability to determine and/or interpret the following as they apply to Rediagnosis: Which procedure or procedure set should be transitioned to. (CFR: 41.10 / 43.5 / 45.13)**	**4.0**	**84**
36	**000074 (EPE 74; W E06 & E07) Inadequate Core Cooling**						**X**	**(WE06) G2.2.44 - 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. (CFR: 41.5 / 43.5 / 45.12)**	**4.4**	**85**
	(000001) (APE 1) Continuous Rod Withdrawal									
	000003 (APE 3) Dropped Control Rod									
	000037 (APE 37) Steam Generator Tube Leak									
	(000059) (APE 59) Accidental Liquid Radwaste Release									
	000060 (APE 60) Accidental Gaseous Radwaste Release									

	000061 (APE 61) Area Radiation Monitoring System Alarms									
	(000067) (APE 67) Plant Fire On Site									
	(000076) (APE 76) High Reactor Coolant Activity									
	000078 (APE 78*) RCS Leak									
	(W E13) Steam Generator Overpressure									
	(W E15) Containment Flooding									
	(W E16) High Containment Radiation									
	(BW A01) Plant Runback									
	(BW A02 & A03) Loss of NNI-X/Y									
	(BW A04) Turbine Trip									
	(BW A05) Emergency Diesel Actuation									
	(BW A07) Flooding									
	(BW E03) Inadequate Subcooling Margin									
	(BW E08; W E03) LOCA Cooldown – Depressurization									
	(BW E13 & E14) EOP Rules and Enclosures									
	(CE A11**; W E08) RCS Overcooling – Pressurized Thermal Shock									
	(CE A16) Excess RCS Leakage									
	(CE E09) Functional Recovery									
	(CE E13*) Loss of Forced Circulation / LOOP / Blackout									
K/A Category Totals:		0	2	1	1	4	4	Group Point Total:		12

ES-4.1-PWR	PWR Examination Outline (Millstone 3)														
	Plant Systems—Tier 2/Group 1 (RO/**SRO**)														
	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#

Item #															
37	(003) (SF4P RCP) Reactor Coolant Pump		X										K2.04 - Knowledge of electrical power supplies to the following: Containment isolation valves for RCP cooling water. (CFR: 41.7)	3.4	27
38	(003) (SF4P RCP) Reactor Coolant Pump					X							K5.07 - Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the Reactor Coolant Pump System: Starting one or more RCPs under various plant conditions. (CFR: 41.5 / 45.7)	3.5	28
39	(004) (SF1; SF2 CVCS) Chemical and Volume Control									X			A3.09 - Ability to monitor automatic operation of the Chemical and Volume Control System, including: VCT level. (CFR: 41.7 / 45.5)	3.7	29
40	(004) (SF1; SF2 CVCS) Chemical and Volume Control											X	G2.1.32 – Ability to explain and apply system precautions, limitations, notes, or cautions. (CFR: 41.10 / 43.2 / 45.12)	3.8	30
41	(005) (SF4P RHR) Residual Heat Removal										X		A4.02 - Ability to manually operate and/or monitor in the control room: RHR heat exchanger temperature/bypass control valves. (CFR: 41.7 / 45.5 to 45.8)	3.9	31
42	(006) (SF2; SF3 ECCS) Emergency Core Cooling								X				A2.13 - Ability to (a) predict the impacts of the following on the Emergency Core Cooling System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Inadvertent ECCS actuation. (CFR: 41.5 / 45.3 / 45.4 / 45.5)	3.6	32
43	(006) (SF2; SF3 ECCS) Emergency Core Cooling							X					A1.06 – Ability to predict and/or monitor changes in parameters associated with operation of the Emergency Core Cooling System, including: SCM. (CFR: 41.5 / 45.3 / 45.4 / 45.5)	3.9	33
44	(007) (SF5 PRTS) Pressurizer Relief/Quench Tank				X								K4.05 - Knowledge of Pressurizer Relief Tank/Quench Tank System design features and/or interlocks that provide for the following: Draining PRT/quench tank. (CFR: 41.7)	2.6	34

45	(008) (SF8 CCW) Component Cooling Water									X			A3.08 - Ability to monitor automatic features of the Component Cooling Water System, including: Automatic actions associated with the CCWS that occur as a result of an ESFAS signal. (CFR: 41.7 / 45.5)	4.1	35
46	(010) (SF3 PZR PCS) Pressurizer Pressure Control	X											K1.08 - Knowledge of the physical connections and/or cause and effect relationships between the Pressurizer Pressure Control System and the following systems: PZR LCS. (CFR: 41.2 to 41.9 / 45.7 / 45.8)	3.6	36
47	(012) (SF7 RPS) Reactor Protection							X					A1.04 – Ability to predict and/or monitor changes in parameters associated with operation of the Reactor Protection System, including: Single and multiple channel trip indicators. (CFR: 41.5 / 45.5)	3.8	37
48	(012) (SF7 RPS) Reactor Protection											X	G2.4.45 – Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)	4.1	38
49	(013) (SF2 ESFAS) Engineered Safety Features Actuation	X											K1.13 - Knowledge of the physical connections and/or cause and effect relationships between the Engineered Safety Features Actuation System and the following systems: HVAC for ESF equipment. (CFR: 41.2 to 41.9 / 45.7 / 45.8)	3.2	39
50	(022) (SF5 CCS) Containment Cooling											**X**	**COMPONENT (Breakers, Relays, and Disconnects): 191008 K1.06 – Interpreting a one-line diagram of control circuitry. (CFR: 41.7)**	**3.6**	40
51	(026) (SF5 CSS) Containment Spray										X		A4.01 - Ability to manually operate and/or monitor in the control room: CSS controls. (CFR: 41.7 / 45.5 to 45.8)	3.9	41
52	(039) (SF4S MSS) Main and Reheat Steam									X			A3.03 - Ability to monitor automatic operation of the Main and Reheat Steam System, including: Atmospheric relief valves. (CFR: 41.5 / 45.5)	3.7	42

53	(059) (SF4S MFW) Main Feedwater			X									K3.01 - Knowledge of the effect that a loss or malfunction of the Main Feedwater System will have on the following systems or system parameters: CDS. (CFR: 41.7 / 45.6)	3.2	43
54	(061) (SF4S AFW) Auxiliary/Emergency Feedwater								X				A2.07 - Ability to (a) predict the impacts of the following on the Auxiliary/Emergency Feedwater System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Air-operated valve, solenoid-operated valve, or motor-operated valve failure. (CFR: 41.5 / 45.6)	4.0	44
55	(061) (SF4S AFW) Auxiliary/Emergency Feedwater									X			A3.01 - Ability to monitor automatic features of the Auxiliary/Emergency Feedwater System, including: AFW system automatic start. (CFR: 41.7 / 45.7)	4.2	45
56	(062) (SF6 ED AC) AC Electrical Distribution						X						K6.11 - Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the AC Electrical Distribution System: Grounds. (CFR: 41.7 / 45.7)	3.1	46
57	(063) (SF6 ED DC) DC Electrical Distribution				X								K4.02 - Knowledge of DC Electrical Distribution System design features and/or interlocks that provide for the following: Breaker interlocks, permissives, bypasses, and cross-ties. (CFR: 41.7)	3.5	47
58	(064) (SF6 EDG) Emergency Diesel Generator		X										K2.02 - Knowledge of electrical power supplies to the following: Fuel oil pumps. (CFR: 41.7)	3.2	48
59	(064) (SF6 EDG) Emergency Diesel Generator			X									K3.01 - Knowledge of the effect that a loss or malfunction of the Emergency Diesel Generators will have on the following systems or system parameters: Systems controlled by automatic loader/sequencer. (CFR: 41.7 / 45.6)	4.2	49
60	(073) (SF7 PRM) Process Radiation Monitoring						X						K6.01 - Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the Process Radiation Monitoring System: PRM component malfunctions (CFR: 41.7 / 41.8 / 41.9)	3.2	50

61	(076) (SF4S SW) Service Water								X				A2.10 - Ability to (a) predict the impacts of the following on the Service Water System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Intake screen failure. (CFR: 41.5 / 43.5 / 45.3 / 45.6 / 45.13)	3.3	51
62	(078) (SF8 IAS) Instrument Air				X								K4.02 - Knowledge of the Instrument Air System design features and/or interlocks that provide for the following: Crossover to other pneumatic systems. (CFR: 41.7)	3.1	52
63	(078) (SF8 IAS) Instrument Air					X							K5.03 - Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the Instrument Air System: Loss of instrument air. (CFR: 41.5 / 45.7)	3.9	53
64	(103) (SF5 CNT) Containment	X											K1.07 - Knowledge of the physical connections and/or cause and effect relationships between the Containment System and the following systems: Containment vacuum system. (CFR: 41.9 / 45.7 / 45.8)	3.3	54
65	**(005) (SF4P RHR) Residual Heat Removal**											**X**	**G2.1.23 - Ability to perform general and/or normal operating procedures during any plant condition. (CFR: 41.10 / 43.5 / 45.2 / 45.6)**	**4.4**	**86**
66	**(008) (SF8 CCW) Component Cooling Water**											**X**	**G2.2.37 - Ability to determine operability or availability of safety-related equipment (SRO Only). (CFR: 43.2 / 43.5 / 45.12)**	**4.6**	**87**

67	**(013) (SF2 ESFAS) Engineered Safety Features Actuation**								**X**				**A2.05 - Ability to (a) predict the impacts of the following on the Engineered Safety Features Actuation System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of DC control power. (CFR: 41.5 / 41.7 / 41.10 / 43.5 / 45.3 / 45.13)**	**3.8**	**88**
68	**(062) (SF6 ED AC) AC Electrical Distribution**								**X**				**A2.21 - Ability to (a) predict the impacts of the following on the AC Electrical Distribution System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of vital AC electrical instrument buses. (CFR: 41.5 / 43.5 / 45.3 / 45.13)**	**4.3**	**89**
69	**(039) (SF4S MSS) Main and Reheat Steam**											**X**	**G2.2.45 – Ability to determine and/or interpret TS with action statements of greater than 1 hour (SRO Only). (CFR: 43.2 / 43.5 / 45.13)**	**4.7**	**90**
	025 (SF5 ICE) Ice Condenser														
	053 (SF1; SF4P ICS*) Integrated Control														
K/A Category Totals:		3	2	2	3	2	2	2	5	4	2	6	Group Point Total:		33

ES-4.1-PWR	PWR Examination Outline (Millstone 3) Plant Systems—Tier 2/Group 2 (RO/**SRO**)														
Item #	System / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	Q#
70	(001) (SF1 CRDS) Control Rod Drive				X								K4.24 - Knowledge of Control Rod Drive System design features and/or interlocks that provide for the following: Control bank sequence and overlap. (CFR: 41.6)	3.7	55
71	(011) (SF2 PZR LCS) Pressurizer Level Control		X										K2.03 - Knowledge of electrical power supplies to the following: Level channels and controllers. (CFR: 41.7)	3.3	56

72	015 (SF7 NI) Nuclear Instrumentation					X							K5.02 - Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the Nuclear Instrumentation System: Discrimination/compensation operation. (CFR: 41.5 / 45.7)	3.1	57
73	033 (SF8 SFPCS) Spent Fuel Pool Cooling			X									K3.02 - Knowledge of the effect that a loss or malfunction of the Spent Fuel Pool Cooling System will have on the following systems or system parameters: RMS. (CFR: 41.7 / 45.6)	2.9	58
74	041 (SF4S SDS) Steam Dump/Turbine Bypass Control						X						K6.10 - Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the Steam Dump System and Turbine Bypass Control: RCS. (CFR: 41.7 / 45.7)	3.5	59
75	035 (SF4P SG) Steam Generator								X				A2.03 - Ability to (a) predict the impacts of the following on the Steam Generator System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Pressure/level transmitter failure. (CFR: 41.5 / 43.5 / 45.3 / 45.5)	3.8	60
76	050 (SF9 CRV*) Control Room Ventilation										X		A4.01 - Ability to manually operate and/or monitor the control room: Initiate/reset system. (CFR: 41.7 / 45.5 to 45.8)	3.8	61
77	(068) (SF9 LRS) Liquid Radwaste	X											K1.07 - Knowledge of the physical connections and/or cause and effect relationships between the Liquid Radwaste System and the following systems: Sources of liquid wastes for LRS. (CFR: 41.7 to 41.9 / 45.8 / 45.9)	2.8	62
78	(072) (SF7 ARM) Area Radiation Monitoring											X	**COMPONENT (Sensors and Detectors): 191002 K1.22 (Radiation Detection) - Theory and operation of ion chambers, Geiger-Muller tubes, and scintillation detectors. (CFR: 41.7)**	**2.8**	63
79	**(016) (SF7 NNI) Nonnuclear Instrumentation**								**X**				**A2.02 - Ability to (a) predict the impacts of the following on the Nonnuclear Instrumentation System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of power supply. (CFR: 41.5 / 43.5 / 45.3 / 45.5)**	**3.3**	**91**

80	**(071) (SF9 WGS) Waste Gas Disposal**								**X**				**A2.05 - Ability to (a) predict the impacts of the following on the Waste Gas Disposal System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: RMS alarms and/or malfunctions. (CFR: 41.5 / 43.5 / 45.3 / 45.8 / 45.9 / 45.13)**	**3.1**	**92**
81	**(086) (SF8 FPS) Fire Protection**											**X**	**G2.2.38 – Knowledge of conditions and limitations in the facility license. (CFR: 41.7 / 41.10 / 43.1 / 45.13)**	**4.5**	**93**
	002 (SF2; SF4P RCS) Reactor Coolant														
	014 (SF1 RPI) Rod Position Indication														
	017 (SF7 ITM) In Core Temperature Monitor														
	(027) (SF5 CIRS) Containment Iodine Removal														
	(028) (SF5 HRPS) Hydrogen Recombiner and Purge Control														
	(029) (SF8 CPS) Containment Purge														
	(034) (SF8 FHS) Fuel Handling Equipment														
	045 (SF4S MTG) Main Turbine Generator														
	055 (SF4S CARS) Condenser Air Removal														
	056 (SF4S CDS) Condensate														
	(075) (SF8 CW) Circulating Water														

	079 (SF8 SAS**) Station Air														
K/A Category Totals:		1	1	1	1	1	1	0	3	0	1	2	Group Point Total:		12

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Millstone 3)	
Facility: Millstone 3		Date of Exam: 09/11/2023

Generic Knowledge and Abilities Outline (Tier 3) (RO/SRO)

Category	K/A #	Topic	Item #	RO IR	RO Q#	SRO-Only IR	SRO-Only Q#
1. Conduct of Operations	G2.1.3	Knowledge of shift or short-term relief turnover practices. (CFR: 41.10 / 45.13)	82	3.7	64		
	G2.1.39	Knowledge of conservative decision-making practices. (CFR: 41.10 / 43.5 / 45.12)	83	3.6	65		
	G2.1.1	**Knowledge of conduct of operations requirements. (CFR: 41.10 / 43.10 / 45.13)**	**84**			**4.2**	**94**
	G2.1.35	**Knowledge of the fuel handling responsibilities of SROs (SRO Only). (CFR: 43.7)**	**85**			**3.9**	**95**
	Subtotal			N/A	2	N/A	**2**
2. Equipment Control	G2.2.13	Knowledge of tagging and clearance procedures. (CFR: 41.10 / 43.1 / 45.13)	86	4.1	66		
	G2.2.14	Knowledge of the process for controlling equipment configuration or status. (CFR: 41.10 / 43.3 / 45.13)	87	3.9	67		
	G2.2.5	**Knowledge of the process for making design or operating changes to the facility, such as 10 CFR 50.59, "Changes, Tests and Experiments," screening and evaluation processes, administrative processes for temporary modifications, disabling annunciators, or installation of temporary equipment. (CFR: 41.10 / 43.3 / 45.13)**	**88**			**3.2**	**96**
	G2.2.19	**Knowledge of maintenance work order requirements. (CFR: 41.10 / 43.5 / 45.13)**	**89**			**3.4**	**97**
	Subtotal			N/A	2	N/A	**2**
3. Radiation Control	G2.3.11	Ability to control radiation releases. (CFR: 41.11 / 43.4 / 45.10)	90	3.8	68		
	G2.3.14	**Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities, such as analysis and interpretation of radiation and activity readings as they pertain to administrative, normal, abnormal, and emergency procedures or to analysis and interpretation of coolant activity, including comparison to emergency plan or regulatory limits (SRO Only). (CFR: 43.4 / 45.10)**	**91**			**3.8**	**98**
	Subtotal			N/A	1	N/A	**1**
4. Emergency Procedures / Plan	G2.4.26	Knowledge of facility protection requirements, including fire brigade and portable firefighting equipment usage. (CFR: 41.10 / 43.5 / 45.12)	92	3.1	69		
	G2.4.16	**Knowledge of emergency and abnormal operating procedures implementation hierarchy and coordination with other support procedures or guidelines, such as operating procedures, abnormal operating procedures, or severe accident management guidelines.**	**93**			**4.4**	**99**

		(CFR: 41.10 / 43.5 / 45.13)					
	G2.4.40	**Knowledge of SRO responsibilities in emergency plan implementing procedures (SRO Only). (CFR: 43.5 / 45.11)**	**94**			**4.5**	**100**
	Subtotal			N/A	1	N/A	**2**
Tier 3 Point Total				N/A	**6**	N/A	**7**

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Millstone 3)	
Facility: Millstone 3		Date of Exam: 09/11/2023

Theory (Tier 4) (RO)

Category	K/A #	Topic	Item #	RO IR	RO Q#
Reactor Theory	192003 (K1.01)	REACTOR KINETICS AND NEUTRON SOURCES - Explain the concept of subcritical multiplication. (CFR: 41.1)	95	2.8	70
	192005 (K1.06)	CONTROL RODS - Explain the shape of the curves for differential and integral rod worth versus position. (CFR: 41.1)	96	2.9	71
	192006 (K1.08)	FISSION PRODUCT POISONS - Describe the effects of xenon concentration on flux shape and control rod patterns. (CFR: 41.1)	97	3.4	72
	Subtotal			N/A	3
Thermodynamics	193004 (K1.15)	THERMODYNAMIC PROCESS: Throttling and the Throttling Process - Determine the exit conditions for a throttling process based on the use of steam and/or water. (CFR: 41.14)	98	2.8	73
	193007 (K1.08)	HEAT TRANSFER: Core Thermal Power - Calculate core thermal power using a simplified heat balance. (CFR: 41.14)	99	3.4	74
	193008 (K1.22)	THERMAL HYDRAULICS: Natural Circulation – Describe means to determine whether natural circulation flow exists. (CFR: 41.14)	100	4.2	75
	Subtotal			N/A	3
Tier 4 Point Total				N/A	**6**

Form 4.1-1 Record of Rejected Knowledge and Abilities

Refer to Examination Standard (ES)-4.2, "Developing Written Examinations," Section B.3, for deviations from the approved written examination outline.

Tier/Group	Randomly Selected K/A	Reason for Rejection
Tier 1 / Group 2	APE 24 **AK2.08** RO Q24	APE 59; K/A AK1.06 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test the originally selected APE and K/A pairing. Limited RO job function associated with APE 59 and AK1.06 combination. RO will understand that Circ Water provides Dilution Flow for Liquid Waste Discharges and inform the CRS if a Circ Pump is lost during a discharge. **CHIEF EXAMINER randomly re-selected APE 24; K/A AK2.08, for Q24 to maintain K/A category balance within the outline.**
Tier 2 / Group 1	007 **K4.05** RO Q34	SYSTEM 007; K/A K5.02 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test the selected K/A. Millstone 3 does not normally draw a Pressurizer bubble by routing water to the PRT. **CHIEF EXAMINER randomly re-selected K/A K4.05 for Q34 to maintain K/A category balance within the outline.**
Tier 2 / Group 1	103 **K1.07** RO Q54	SYSTEM 103; K/A 5.02 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test the selected K/A. Testing knowledge of the Containment Hydrogen Concentration threshold at which the Assistant Director of Technical Support (ADTS) is consulted to determine whether the CTMT Purge System should be placed in service using GA-24, at Step 18 of E-1, after the crew has aligned for Cold Leg Recirculation, is considered minutia. **CHIEF EXAMINER randomly re-selected K/A K1.07 for Q54 to maintain K/A category balance within the outline.**
Tier 3	Generic **G2.4.16** SRO Q99	Generic K/A G2.4.22 rejected. Facility was unable to develop an operationally valid and discriminating Tier 3 question at the SRO License level to test the selected K/A. **CHIEF EXAMINER randomly re-selected Generic K/A 2.4.16 for Q99 from the Emergency Procedures/Plan portion of Generic K/A Section 2.**
Tier 1 / Group 2	APE 005 **AK2.05** RO Q19	APE 001; K/A AK2.14 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test the originally selected APE and K/A pairing. Automatic Rod Withdrawal capability has been disabled at Millstone 3 for a number of years (i.e., several decades). **CHIEF EXAMINER randomly re-selected APE 005; K/A AK2.05, for Q19 to maintain K/A category balance within the outline.**

Tier 1 / Group 2	APE 032 **AA1.02** RO Q25	APE 067; K/A AA1.09 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test the originally selected APE and K/A pairing. The actions that can be taken at a Fire Zone Panel at Millstone 3 are very limited, and these actions are normally performed by non-licensed operators. **CHIEF EXAMINER randomly re-selected APE 032; K/A AA1.02, for Q25 to maintain K/A category balance within the outline.**
Tier 2 / Group 1	006 **A2.13** RO Q32	SYSTEM 006; K/A A2.08 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test Part 2 of the selected K/A without expending an inordinate amount of resources and time. **CHIEF EXAMINER randomly re-selected K/A A2.13 for Q32 to maintain K/A category balance within the outline.**
Tier 2 / Group 1	010 **K1.08** RO Q36	SYSTEM 010; K/A K1.06 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test the selected K/A due to limited physical connections between the CVCS and Pressurizer Pressure Control System. **CHIEF EXAMINER randomly re-selected K/A K1.08 for Q36 to maintain K/A category balance within the outline.**
Tier 2 / Group 1	076 **A2.10** RO Q51	SYSTEM 076; K/A A2.06 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test Part 2 of the selected K/A without expending an inordinate amount of resources and time. There are few Controllers/Positioners in the Service Water System and the procedural actions to mitigate a Controller/Positioner failure at the RO level are for the most part inconsequential. **CHIEF EXAMINER randomly re-selected K/A A2.10 for Q51 to maintain K/A category balance within the outline.**
Tier 2 / Group 2	015 **K5.02** RO Q57	SYSTEM 015; K/A K5.20 rejected. Facility was unable to develop an operationally valid and discriminating RO level question to test the selected K/A due to limited operational Impact associated with maximum disagreement between NIS channels. There are No Tech Spec implications. Procedural direction is simply to have the operators calibrate the NIS channels. **CHIEF EXAMINER randomly re-selected K/A K5.02 for Q57 to maintain K/A category balance within the outline.**
Tier 2 / Group 2	033 **K3.02** RO Q58	SYSTEM 029; K/A K3.01 rejected due to overlap concerns with the Operating Test. **CHIEF EXAMINER randomly re-selected SYSTEM 033; K/A K3.02 for Q58 to maintain K/A category balance within the outline.**

Tier 1 / Group 1	APE 027 **AA2.14** SRO Q78	APE 027; K/A AA2.03 rejected. Facility was unable to develop an operationally valid and discriminating SRO level question to test the selected K/A without expending an inordinate amount of resources and time. Knowledge of the effects of RCS pressure changes on key components in the plant is for the most part RO level knowledge. **CHIEF EXAMINER randomly re-selected K/A AA2.14, for Q78 to maintain K/A category balance within the outline.**
Tier 2 / Group 1	039 Generic **G2.2.45** SRO Q90	SYSTEM 103; Generic K/A G2.2.12 rejected due to overlap concerns with the Operating Test. **CHIEF EXAMINER randomly re-selected SYSTEM 039; Generic K/A G2.2.45, for Q90 to maintain K/A category balance within the outline.**