

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q01

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000007	G2.1.7
Importance Rating	4.4	

K/A Statement: Reactor Trip: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation

Proposed Question:

An automatic reactor trip has occurred from 100% RTP.

Approximately TWO MINUTES after the trip the following indications are present in the Control Room:

- RCS pressure is 1675 psig
- RCS temperature is 540°F and slowly rising
- Pressurizer level is 31 inches
- SG1 pressure is 980 psig
- SG2 pressure is 870 psig and slowly rising
- SG1 level is 110 inches and lowering
- SG2 level is 40 inches
- CTMT pressure is 14.8 psia

Based on the above conditions, which of the following actions is REQUIRED?

- A. Isolate Letdown.
- B. Trip ALL Reactor Coolant Pumps.
- C. Take manual control of Main Feedwater flow to BOTH SGs.
- D. Actuate BOTH channels of SFCRS INITIATION and ISOLATION.

Proposed Answer:

A

Explanation:

- A. Correct – Per DB-OP-02000, Attachment 1, Attachment 8, and their associated Carry-Over Steps Page, IF AT ANY TIME Pressurizer Level is less than 40 inches, isolate letdown by shutting MU2B.
- B. Incorrect – SCM is greater than 20°F, therefore RCPs are NOT required to be tripped. Plausible since RCS Pressure is lower than expected for a plant trip without complications.
- C. Incorrect – SG 1 level is > 40 inches and lowering (normal for this event) It is not required to take manual control of feedwater flow unless they are being overfed or underfed. Plausible since SG level

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control setpoint is 40 inches for this scenario.

- D. Incorrect - Based on the indications given the Overcooling event has been terminated therefore SFRCS Initiation and Isolation is not required. Plausible since it would be required to Initiate AND Isolate SFRCS using SFRCS MANUAL ACTUATION switches if the Overcooling Event cannot be stopped IAW DB-OP-02000 Step 7.10.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE (p374)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam 2009 Q51 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55.41 (b)(5)
 55 Content: 55.43 _____

Modified by changing Distractors B and C and by changing pertinent parameter values in the stem of the question which make A now the correct answer.

The question meets Tier 1 criteria as it tests information contained in the site’s procedures, specifically the Emergency Operating Procedures.

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Examination Outline Cross-Reference: Q02

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000008	AK2.05
Importance Rating	3.9	

K/A Statement: Knowledge of the relationship between PRESSURIZER VAPOR SPACE ACCIDENT and the following systems or components: RCS

Proposed Question:

The Unit is at 100% RTP.

The following conditions are noted:

- RCS pressure is lowering
- ALL Pressurizer Heater Banks are ON
- Pressurizer UNCOMPENSATED Level is rising
- Containment radiation levels are rising

Which of the following describes the most likely event causing these indications?

- A. RCS leak in the letdown piping.
- B. Low failure of the pressure input the Pressurizer Heaters.
- C. Pressurizer vapor space leak.
- D. Pressurizer Spray Valve, RC 2, failed OPEN.

Proposed Answer:

C

Explanation:

- A. Incorrect – Pressurizer level will lower during an RCS leak, NOT rise. Plausible since other indications could be an RCS leak in the letdown piping.
- B. Incorrect – A low failure of the pressure input would not cause rising containment radiation levels. Plausible since other indications could be caused by a low failure of pressure input.
- C. Correct – These are all indications of a Pressurizer vapor space leak.
- D. Incorrect – A failed OPEN spray valve will NOT cause containment radiation levels to change. Plausible since other indications could be caused by a failed open spray valve.

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Examination Outline Cross-Reference: Q02

Technical Reference(s): RO-C-IF27A, Sensors and Detectors, slide 54;

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(8) & (10) _____
55.43 _____

The question meets Tier 1 criteria as it tests the assessment of integrated plant response to an abnormal event across multiple plant systems.

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Examination Outline Cross-Reference: Q03

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000011	EK3.08
Importance Rating	4.3	

K/A Statement: Large-Break LOCA: Knowledge of the reasons for the following responses and/or actions as they apply to LARGE-BREAK LOCA: Containment sump recirculation

Proposed Question:

The plant is operating at 100% RTP.

A Design Basis Loss of Coolant Accident (DBLOCA) occurs.

Which of the following describes the bases for the Borated Water Storage Tank (BWST) level at which the operators transfer Low Pressure Injection (LPI) Suction to the Emergency Sump?

The specified BWST level for transfer of LPI suction to the Emergency Sump is designed to _____.

- A. maximize Core cooling during the DBLOCA Injection Phase
- B. minimize Containment pressure during the DBLOCA Injection Phase
- C. ensure sufficient LPI Pump NPSH during the DBLOCA Recirculation Phase
- D. ensure sufficient LPI Pump NPSH prior to the completion of the transfer of LPI Suction to the Emergency Sump

Proposed Answer:

C

Explanation:

- A. Incorrect – Plausible misconception because Injection Phase water from the BWST is colder than Recirculation Phase water from the Containment Sump. Both items occur with larger Injection Phase volumes but are not the bases of the transfer setpoint.
- B. Incorrect – Plausible misconception because Injection Phase water from the BWST is colder than Recirculation Phase water from the Containment Sump.
- C. Correct – The permissive setpoint has been selected based on ensuring sufficient water has been exhausted to ensure enough water in the containment to provide required NPSH to the pumps (controlling

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Examination Outline Cross-Reference: Q03

consideration).

D. Incorrect – Plausible as this is the basis for the volume of the BWST.

Technical Reference(s): SD-042, Decay Heat Removal System Description (Item 2.1.2.3); T.S. Bases 3.5.2 and 3.5.4

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source:	Bank #	<u> X </u>
	Modified Bank #	<u> </u> (note changes or attach parent)
	New	<u> </u>
Question History:	Last NRC Exam	<u> 2015 Q4 </u> (if applicable)
Question Cognitive Level:	Memory / F undamental Knowledge	<u> X </u>
	Comprehension / Analysis / H igher Cognitive	<u> </u>
10 CFR Part	55.41	<u> (b)(5) & (10) </u>
55 Content:	55.43	<u> </u>

Comments:

The question meets Tier 1 criteria as it tests the assessment of integrated plant response to an emergency event across multiple plant systems.

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Examination Outline Cross-Reference: Q04

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000015	AA1.02
Importance Rating	3.2	

K/A Statement: Reactor Coolant Pump Malfunctions: Ability to operate and/or monitor the following as they apply to REACTOR COOLANT PUMP MALFUNCTIONS: RCP oil reservoir level and alarm indications

Proposed Question:

Reactor power is 100% RTP.

A rapid drop in RCP 1-1 Motor Lower Bearing oil level occurs.

The following indications are noted in the Control Room:

- PPC Point L788, RCP 1-1 Mtr Lwr Brg Low Oil Level, is in alarm.
- PPC Point T787, RCP 1-1 Mtr Lwr Brg Mt, is in alarm.
- RCP 1-1 Motor Lower Bearing temperature is 195°F and rising.

Given the above information, the operating crew MUST_____.

- A. trip the reactor per DB-OP-02000, RPS, SFAS, SFRCS TRIP OR SG TUBE RUPTURE and then stop RCP 1-1
- B. perform a power reduction to 72% and then stop RCP 1-1 per DB-OP-02515, REACTOR COOLANT PUMP AND MOTOR ABNORMAL OPERATION
- C. complete a Reactor Shutdown to MODE 3 per DB-OP-02504, RAPID SHUTDOWN and then stop RCP 1-1 for inspection
- D. add oil to RCP 1-1 oil system per DB-OP-06005, RC PUMP OPERATION and then monitor to ensure alarming conditions clear

Proposed Answer:

B

Explanation:

- A. Incorrect – Plausible as this would be the action directed by DB-OP-02515 if there were only 3 RCPs running when this condition occurred. Since the stem told us that the plant was at 100% reactor power when the alarms came in, we know that all 4 RCPs were running.
- B. Correct – DB-OP-02515 section 4.6 directs the crew to Attachment 1 when oil level alarms are received and/or bearing temperatures exceed 190 °F. Attachment 1 has the crew perform a rapid down power to

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Examination Outline Cross-Reference: Q04

≤72% and then stop RCP 1-1.

- C. Incorrect – Plausible as the applicant may assume the plant must be shutdown to inspect for the oil leak as this could be construed as a fire hazard in containment.
- D. Incorrect – Plausible as with the reactor shutdown and before RCP 1-1 is started operators would check oil levels and then monitor oil levels and bearing temperatures with the pump just started to ensure proper operation per DB-OP-06005. The RCP oil system is not to be breached with RCS temperature > 375 °F without Shift Manager and Operations Fire Protection Advisor permission due to flammability concerns.

Technical Reference(s):

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam TMI 2015 Q10 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55.41 (b)(5) & (10)
 55 Content: 55.43 _____

Comments:

Modified by: Answer and Distractors are all significantly changed.

The question meets Tier 1 criteria as it tests information contained in the site’s procedures, specifically the Abnormal Operating Procedures.

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Examination Outline Cross-Reference: Q05

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000022	AA2.08
Importance Rating	3.0	

K/A Statement: Ability to determine and/or interpret the following as they apply to LOSS OF REACTOR COOLANT MAKEUP: RCP seal flows, temperatures, pressures, and vibrations

Proposed Question:

The plant is at 100% RTP.

Subsequently, the following conditions are received:

- MU32, PRESSURIZER LEVEL CONTROL, opening
- MU19, RCP SEAL INJECTION FLOW CONTROL, opening
- Pressurizer Level is lowering
- MUT Level is rising
- 6-6-C, SEAL INJ TOTAL FLOW is LIT
- RCP Seal Return temperatures are rising

Subsequently, the crew entered DB-OP-02512, MAKEUP AND PURIFICATION SYSTEM MALFUNCTIONS and isolated letdown.

The operating crew MUST now _____.

- A. trip the Reactor and stop all RCPs
- B. place the Alternate MU Injection line in service
- C. place the standby Seal Injection Filter in service
- D. isolate RCP Seal Injection and the Normal MU flowpath

Proposed Answer:

D

Explanation:

- A. Incorrect – Plausible as this would be the action if both Seal Injection (MUP) and seal cooling (CCW) are lost to the RCPs.
- B. Incorrect – Plausible if the applicant correctly notes that a loss of a MUP but assumes the makeup is recovered by establishing the Alternate Injection lineup.
- C. Incorrect – Plausible as this is the action if the loss of seal injection was due to a clogged filter.
- D. Correct – A loss of a MUP will cause a loss of seal injection flow to the RCPs. DB-OP-02512, Section 4.1 will require the seal injection

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Examination Outline Cross-Reference: Q05

line AND MU32 to be isolated prior to starting the standby MUP.

Technical Reference(s):

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55.41 (b) (10)
 55 Content: 55.43 _____

The question meets Tier 1 criteria as it tests information contained in the site’s procedures, specifically the Abnormal Operating Procedures.

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Examination Outline Cross-Reference: Q06

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000025 AK3.01	
Importance Rating	3.8	

K/A Statement: Knowledge of the reasons for the following responses and/or actions as they apply to LOSS OF RESIDUAL HEAT REMOVAL SYSTEM: Shift to alternate flow path

Proposed Question:

The Unit is in MODE 5 after completion of a refueling outage.

Current plant conditions:

- Decay Heat Removal (DH) Pump 1 running in decay heat removal mode
- DH2 is out of service due to a motor fault
- Fuel handling operations are taking place in the Spent Fuel Pool
- A Steam bubble has been drawn in the PZR
- RCS Temperature is 130°F
- Pressurizer Level is 75 inches
- RCPs are not running
- Steam Generator 1 Operate Level is 98%
- Steam Generator 2 Operate Level is 99%

Subsequently, DH14B, DH COOLER 1 OUTLET FLOW CONTROL VALVE, fails Closed.

- Annunciator (3-1-H) LP INJ 1 FLOW LO alarms
- The Zone 3 operator reports DH14B cannot be manually opened

The operating crew MUST _____ per DB-OP-02527, LOSS OF DECAY HEAT REMOVAL.

- A. throttle open DH13B, DH CLR 1 BYPASS, to restore minimum flow
- B. lower level in a Steam Generator and establish heat transfer
- C. align spent fuel pool cooling for core cooling
- D. establish feed and bleed cooling using Gravity Drain of the BWST

Proposed Answer:

B

Explanation:

- A. Incorrect – Plausible as a minimum flow is required to prevent pump damage. Incorrect since the DH Pumps have a recirc flowpath.
- B. Correct – Per Attachment 3 when an intact steam generator exists with level between 16-97% steam generator heat transfer should be used.

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Examination Outline Cross-Reference: Q06

The motor driven feedpump will be used to maintain inventory in the SG.

- C. Incorrect – Plausible as this would be the correct action per Attachment 4 if the refueling gates were still removed and the plant was in MODE 6.
- D. Incorrect – Plausible since feed and bleed cooling is presented as a possible option. However, gravity draining from the BWST is not possible with these plant conditions (RCS Pressurized).

Technical Reference(s): DB-OP-02527, Loss of Decay Heat Removal (p20) loss of flow path and then RNO to loss of pumps

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55.41 (b) (5) & _____
 55 Content: (10)
 55.43 _____

The question meets Tier 1 criteria as it tests information contained in the site’s procedures, specifically the Abnormal Operating Procedures.

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Examination Outline Cross-Reference: Q07

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000026	AK1.02
Importance Rating	3.8	

K/A Statement: 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

Proposed Question:

Initial plant conditions:

- Component Cooling Water (CCW) Pump 2 is in service
- Component Cooling Water (CCW) Pump 1 is in standby
- Service Water (SW) Pumps 1 and 2 are in service

Subsequently:

- 11-2-B, CCW HX 2 OUTPUT TEMP HI is LIT
- SW1434, COMP COOLING WATER HX 2 Outlet is observed to be closed
- I&C reports the temperature transmitter to TIC1434 has failed sending a continuous close signal to SW1434

Subsequently, a plant transient occurs resulting in an SFAS Level 2 Actuation.

Regarding the Service Water System response, cooling to CCW HX2 will _____.

- A. remain isolated due to the TIC 1434 failure
- B. be maximized due to the SFAS Level 2
- C. control temperature at the TCV setpoint
- D. remain isolated until SW1434 is manually RESET

Proposed Answer:

B

Explanation:

- A. Incorrect – Plausible since there is a continuous close signal applied to the temperature controller.
- B. Correct – SFAS 2 vents air from SW1434 controls thus overriding the temperature controller signal. SW1434 fails open to its SFAS position on loss of air.

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Examination Outline Cross-Reference: Q08

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000027	G2.2.22
Importance Rating	4.0	

K/A Statement: Pressurizer Pressure Control System Malfunction (G2.2.22) EQUIPMENT CONTROL: Knowledge of limiting conditions for operation and safety limits

Proposed Question:

The reactor was operating at 100% RTP with the RCS at NOP and NOT.

Pressurizer level is at 220 inches when Pressurizer Spray Valve, RC2 failed OPEN.

The crew entered DB-OP-02513, PRESSURIZER SYSTEM ABNORMAL OPERATION and closed Pressurizer Spray Block Valve, RC10.

- Pressurizer level is now 225 inches.
- RCS pressure is now 2050 psig.

Based on these conditions, the crew MUST enter _____.

- A. LCO 3.4.1, RCS Pressure, Temperature, and Flow DNB Limits
- B. LCO 3.4.11, Pressurizer Pilot Operated Relief Valve (PORV)
- C. TNC 8.4.2, Pressurizer
- D. LCO 3.4.9, Pressurizer

Proposed Answer:

A

Explanation:

- A. Correct – When pressure decreased below 2064.8 psig with all four reactor coolant pumps running (implied since reactor power is 100% RTP), LCO 3.4.1 was no longer met. RCS pressure \geq 2064.8 psig with four RCPs running is “above the line” knowledge and is therefore expected to be recalled by RO candidates.
- B. Incorrect – Plausible because isolating the PORV is a step in the PZR Abnormal similar to isolating the spray valve. Isolating a PORV leads to entering TS 3.4.11.
- C. Incorrect – Plausible since this TRM takes into account pressurizer spray differential temperature. Under the conditions presented the spray differential temperature has not been exceeded. DB-OP-02513 supplemental actions have the operators control spray

Examination Outline Cross-Reference: Q08

conditions with RC10 shut to account for meeting this TRM.

- D. Incorrect – Plausible since this LCO addresses pressurizer parameters and pressure control devices, specifically level which is met through the transient and heaters which are not affected by this transient.

Technical Reference(s):

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55.41 (b) (5)
 55 Content: 55.43 _____

The question meets Tier 1 criteria as it tests information contained in the site’s procedures, specifically license documents.

Form 4.2-1 Written Examination Question Worksheet
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Examination Outline Cross-Reference: Q09

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000029 EK2.17	
Importance Rating	4.4	

K/A Statement: Knowledge of the relationship between ANTICIPATED TRANSIENT WITHOUT SCRAM (ATWS) and the following systems or components: Diverse scram system (BW)

Proposed Question:

The reactor is operating at 100% RTP when a main turbine trip occurs.

The control rod drive mechanisms (CRDMs) remain energized.

The ATC RO has depressed both Reactor Trip Pushbuttons IAW DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE without success.

The Diverse Scram System will deenergize the CRDMs when _____ (1) _____ with _____ (2) _____ logic.

- A. (1) Loop T_{HOT} is > 625°F
(2) 2 out of 2
- B. (1) RCS Extended Wide Range Pressure is > 2450 psig
(2) 2 out of 2
- C. (1) Loop T_{HOT} is > 625°F
(2) 1 out of 2
- D. (1) RCS Extended Wide Range Pressure is > 2450 psig
(2) 1 out of 2

Proposed Answer:

B

Explanation:

- A. Incorrect – Plausible as there is an RPS Trip signal when Loop T_{HOT} exceeds approximately 618°F. 2 out of 2 logic is correct.
- B. Correct – The Diverse Scram System will cause the degating of the CRDM Silicon Controlled Rectifiers and therefore the deenergization of the CRDM when both channels of PAM RCS Extended Wide Range Pressure exceed 2450 psig.
- C. Incorrect – Plausible as there is an RPS Trip signal when Loop T_{HOT} exceeds approximately 618°F. 1 out of 2 logic is used in other applications

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Examination Outline Cross-Reference: Q09

for part of the RPS trip system.

- D. Incorrect – Plausible as the Extended Wide Range Pressure instruments provide the trip signal for the Diverse Scram System. 1 out of 2 logic is used in other applications for part of the RPS trip system.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE; SD 052, System Description for Diverse Scram System

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 (b) (8) & (10) _____
 55.43 _____

The question meets Tier 1 criteria as it tests the applicant’s knowledge of the plant’s response to the progression of an emergency event.

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Examination Outline Cross-Reference: Q10

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000038	EK1.03
Importance Rating	3.6	

K/A Statement: Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to STEAM GENERATOR TUBE RUPTURE:
 Natural circulation

Proposed Question:

The following events have occurred:

- Steam Generator Tube Rupture
- Loss of Offsite Power (LOOP)

Current plant conditions:

- RCS pressure is 1500 psig
- T_{HOT} is 550°F

With these conditions which of the following describes the cooldown rate and target temperature per DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR STEAM GENERATOR TUBE RUPTURE, Section 8 STEAM GENERATOR TUBE RUPTURE?

- A. 50°F/hr to a T_{HOT} of 520°F
- B. 50°F/hr to a T_{HOT} of 500°F
- C. 100°F/hr to a T_{HOT} of 500°F
- D. 100°F/hr to a T_{HOT} of 520°F

Proposed Answer:

A

Explanation:

- A. Correct – Per step 8.31 of the Steam Generator Tube Rupture section of DB-OP-02000 R31 cooldown to 520°F at 50°F per hour with natural circulation. A loss of offsite power causes a loss of forced circulation.
- B. Incorrect – Plausible since 50°F per hour is correct for natural circulation and 500°F would be the correct target for forced circulation.
- C. Incorrect – Plausible since 100°F per hour and 500°F is correct for forced circulation.

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Examination Outline Cross-Reference: Q10

D. Incorrect – Plausible since 100°F per hour is correct for forced circulation and 520°F is correct for natural circulation system.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE (Step 8.31, p134)

Proposed references to be provided to applicants during examination: None

Learning Objective: OPS-GOP-307-05K
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam 2016 Q9 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge
 Comprehension / Analysis / **H**igher Cognitive
X

10 CFR Part 55 Content: 55.41 (b) (5) & (7)
 55.43

The question meets Tier 1 criteria as it tests information contained in the site’s procedures, specifically the Emergency Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
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Examination Outline Cross-Reference: Q11

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000040	AA1.05
Importance Rating	4.2	

K/A Statement: Ability to operate and/or monitor the following as they apply to STEAM LINE RUPTURE: Manual and automatic RPS trip initiation

Proposed Question:

The plant is operating at 100% RTP when the following indications are observed in the CTRM:

- Reactor power rising
- T_{AVE} lowering
- RCS Pressure lowering
- MU Flow rising
- Generated MWs begin to lower
- CTMT pressure at 16.6 psia and rising
- Containment radiation remains constant

The crew verifies NO personnel are in CTMT.

What operator actions MUST be taken NEXT?

- A. Immediately Trip the Reactor, ONLY then GO TO DB-OP-02000, RPS, SFAS, SFRCS Trip, or SG Tube Rupture.
- B. Immediately Trip the Reactor AND Initiate AND Isolate SFRCS using MANUAL ACTUATION Switches.
- C. Commence a Rapid Plant Shutdown until SGs are on Low Level Limit Control, then Trip the Reactor AND Initiate AND Isolate SFRCS using MANUAL ACTUATION Switches.
- D. Maintain Reactor power less than or equal to 100% RTP, THEN assess the plant conditions for leak isolation and continued operations.

Proposed Answer: **C**

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Examination Outline Cross-Reference: Q11

- Explanation:
- A. Incorrect – Plausible as this is an immediate operator action based on other plant conditions, but operators are also directed to INITIATE and ISOLATE SFRCS to isolate a steam leak which requires as reactor trip.
 - B. Incorrect – Plausible as the initial conditions provided in the question stem are the symptoms of a steam leak in containment per DB-OP-02525, STEAM LEAKS. The immediate actions of the procedure direct operators to Trip the Reactor and to INITIATE and ISOLATE SFRCS to place the plant in a safe condition and to attempt to isolate the Steam line fault if personnel are in containment. With the reactor at 100% RTP personnel would not be in containment.
 - C. Correct – Per the supplemental actions of DB-OP-02525 for a steam leak in containment, operators are directed to perform a plant shutdown to Low Level Limits, then trip the RX and Initiate and Isolate SFRCS.
 - D. Incorrect – Plausible since the supplemental actions of DB-OP-02525 for a steam leak in containment, operators are initially directed to reduce reactor power to keep it below 100% RTP. Incorrect since the next step directs a plant shutdown, power operations will not be maintained.

Technical Reference(s): DB-OP-02525, STEAM LEAKS; DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE; Davis Besse Updated Final Safety Analysis Report, Section 15.4.4 Steam Line Break

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b) (5) & (7) _____
 55.43 _____

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

This question meets Tier 1 criteria as it tests the applicant's knowledge of actions in the Abnormal and Emergency Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q12

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000054	AA2.05
Importance Rating	3.0	

K/A Statement: Ability to determine and/or interpret the following as they apply to LOSS OF MAIN FEEDWATER: Status of MFW pumps, regulating and stop valves

Proposed Question:

The reactor was at 100% RTP, when both MFW pumps trip.

Subsequently,

- ARTS initiated a Reactor Trip
- Both AFW Pumps initially start
- AFW Pump 1 then trips on overspeed
- Steam Generator 1 level is 22" and lowering

Based on these conditions, FW 612 and FW 601, SG 1 & 2 MAIN FEEDWATER STOP valves are _____ (1) _____?

IAW DB-OP-02000, Specific Rule 4 the crew MUST start the _____ (2) _____ and feed Steam Generator 1.

- A. (1) open
(2) Emergency Feedwater pump
- B. (1) open
(2) Motor Driven Feedwater pump
- C. (1) closed
(2) Emergency Feedwater pump
- D. (1) closed
(2) Motor Driven Feedwater pump

Proposed Answer:

D

Explanation:

- A. Incorrect – Plausible as OTSG levels < 23.5" would cause an SFRCS initiation but not an isolation. In this case the trip of both MFW pumps results in an SFRCS initiation AND isolation on reverse D/P across the feedwater check valves, therefore closing the MFW Isolation Valves. The second part is plausible as this would be the required action if both AFW pumps tripped and the MDFP did not start.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q12

- B. Incorrect – Plausible as OTSG levels < 23.5" would cause an SFRCS initiation but not an isolation. In this case the trip of both MFW pumps results in an SFRCS initiation AND isolation on reverse D/P across the feedwater check valves, therefore closing the MFW Isolation Valves. The second part is correct.
- C. Incorrect – Plausible as the first part is correct for an SFRCS initiation and isolation. The second part is plausible as this would be the required action if both AFW pumps tripped and the MDFP did not start.
- D. Correct – An SFRCS initiation and isolation occurs on reverse D/P when both MFW pumps trip. This results in a closing signal to the MFW isolation and regulating valves. With one AFW pump tripped and one running, SR4 directs the crew to start the MDFP and feed the affected SG.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE ; SFRCS Training Notes; SD-010, Steam and Rupture Control System.

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55.41 (b) (10)
 55 Content: 55.43 _____

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Emergency Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q13

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000055	EK1.07
Importance Rating	4.0	

K/A Statement: Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to STATION BLACKOUT: RCP seal leakage and inventory control

Proposed Question:

A large tornado impacted the site resulting in an Extended Loss of AC Power (ELAP).

There is NO indication of an RCS Leak.

To mitigate the loss of RCS inventory during an ELAP, DB-OP-02700 STATION BLACKOUT requires a Time Sensitive Operator Action for the crew to _____.

- A. verify letdown is aligned to the Makeup Tank
- B. isolate the Pressurizer PORV by closing the PORV Block Valve
- C. CLOSE MU38 to isolate RCP Seal Return
- D. CLOSE MU19 to isolate RCP Seal Injection

Proposed Answer:

C

Explanation:

- A. Incorrect – Letdown is isolated by closing MU3 (AOV). Plausible since this action maintains RCS inventory when the MUPs are in service.
- B. Incorrect – Plausible as this action is required by DB-OP-02000 and the Abnormal Operating Procedures if the Pressurizer PORV fails open. RC11 is powered by E16B which has been lost due to the station blackout.
- C. Correct – DB-OP-02700, requires a 10-minute time sensitive action to minimize loss of RCS inventory by closing MU38 RCP SEAL RETURN.
- D. Incorrect – Plausible as this is an action required in DB-OP-02522,

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q13

SMALL RCS LEAKS ATTACHMENT 6, Isolation of Leaks in the Makeup System. Isolating MU19 will NOT prevent a loss of RCS inventory in this scenario.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE; DB-OP-02700, STATION BLACKOUT; DB-OP-02522, SMALL RCS LEAKS.

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55.41 (b) (5) & (7) _____
 55.43 _____

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Emergency and Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q14

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000057	AA1.05
Importance Rating	3.7	

K/A Statement: Ability to operate and/or monitor the following as they apply to LOSS OF VITAL AC ELECTRICAL INSTRUMENT BUS: Backup instrument indications

Proposed Question:

Initial conditions:

- 100% RTP

The following occurs:

- Loss of power to 120 VAC Instrument Bus Y3

With these current plant conditions which of the following combinations of Nuclear Instruments WILL be used to monitor reactor power?

- A. (1) NI3 Intermediate Range
(2) NI7 Power Range
- B. (1) NI3 Intermediate Range
(2) NI8 Power Range
- C. (1) NI4 Intermediate Range
(2) NI7 Power Range
- D. (1) NI4 Intermediate Range
(2) NI8 Power Range

Proposed Answer:

A

Explanation (Optional):

- A. Correct – Y3 powers RPS Cabinet 3 which powers NI8 and NI4, therefore NI7 and NI3 (powered from Y4) will be available to monitor reactor power.
- B. Incorrect – NI8 will be de-energized. Plausible since NI3 is still energized.
- C. Incorrect – NI4 will be de-energized. Plausible since NI7 is still energized.
- D. Incorrect – Plausible as Y3 powers RPS Channel 3 which supplies NI4 and NI8.

Technical Reference(s):

DB-OP-06319, INSTRUMENT AC SYSTEM PROCEDURE

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q14

(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source:	Bank #	_____
	Modified Bank #	<u> X </u> (note changes or attach parent)
	New	_____
Question History:	Last NRC Exam	<u> DB 2020 Q57 </u> (if applicable)
Question Cognitive Level:	Memory / F undamental Knowledge	<u> X </u>
	Comprehension / Analysis / H igher Cognitive	_____
10 CFR Part 55 Content:	55.41	<u> (b)(5) & (7) </u>
	55.43	_____

Comments:

This question was significantly modified as the question stem was changed in a way that made a distractor the new correct answer.

This question meets Tier 1 criteria as it tests the applicant's knowledge of required actions during the progression of an event.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q15

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000058	AK2.07
Importance Rating	3.8	

K/A Statement: Knowledge of the relationship between LOSS OF DC POWER and the following systems or components: AFW

Proposed Question:

The Reactor is operating at 95% RTP due to the #2 Condensate Pump being OOS for maintenance.

Subsequently, the following annunciators are LIT:

- 1-5-F, DC PANEL VOLTAGE LO
- 1-6-A, INV YV1-YV3 TRBL
- 1-6-D, C1/D1 CONTROL PWR TRBL

The crew enters DB-OP-02537, LOSS OF D1P AND DAP and is required to Trip the Reactor and INITIATE and ISOLATE SFCRS.

Steam Generator 1 level will be maintained by placing ____ (2) ____.

- A. Loop 1 Main and Startup FW Valves in AUTO
- B. Loop 1 Main and Startup FW Valves in HAND
- C. AF3870, AUX FEED 1 TO SG1 STOP in CLOSED with the MDFP in service
- D. AF6452, SG1 AFW LEVEL CONTROL VALVE in AUTO supplied by AFPT 1

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Plausible as this would be true if condensate pump #2 was not OOS.
- B. Incorrect – Plausible if the operators confuse that MFW instead of AFW flow control would be affected by the loss in DC.
- C. Correct – A loss of D1P and DAP results in a loss of the #1 and #3 condensate pumps. With #2 OOS, DB-OP-02537 Supplemental Actions direct the crew to trip the Reactor and Initiate and Isolate SFCRS. With AFW now running, this loss in DC power causes AF6452 to fail open and an overfeed condition on SG1 will occur. AF3870, AUX FEED 1 TO SG1 STOP can be closed since D1PA is available in

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q15

this scenario. The MDFP will then be placed in service per Attachment 5.

D. Incorrect – Plausible as this is the normal alignment if there was not a loss of D1P and SFRCS was actuated.

Technical Reference(s): DB-OP-02537, LOSS OF D1P AND DAP; DB-OP-02707, LOSS OF DC
 (Attach if not previously provided, including version/revision number.) POWER; DB-OP-02000, DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(8) & (10) _____
 55.43 _____

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Emergency and Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q16

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000062	AA2.07
Importance Rating	3.0	

K/A Statement: 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

Proposed Question: The Reactor is operating at 75% RTP and in power ascension following a refueling outage.

- Service Water (SW) Pumps 1 and 2 are in service
- SW Pump 2 is supplying the secondary loads
- SW Pump 3 is available for operation

Subsequently, the following annunciators and computer alarms are LIT:

- 11-1-C, SW PMP 1 STRNR DISCH PRESS LO
- 11-1-B, CCW HX 1 OUTLET TEMP HI
- X002, SW PMP MTR TRBL
- P945, SW HDR 1 PRESS

The crew enters DB-OP-02511, LOSS OF SERVICE WATER PUMPS/SYSTEMS and LCO 3.7.8, SERVICE WATER SYSTEM.

The crew MUST align SW Pump 3 as 1 powered from (1) . LCO 3.7.8, SERVICE WATER SYSTEM will be met when (2) .

- A. (1) Bus D1
(2) SW Pump 3 is in service as 1
- B. (1) Bus C1
(2) SW Pump 3 is in service as 1
- C. (1) Bus D1
(2) SW Pump 1 is repaired
- D. (1) Bus C1
(2) SW Pump 1 is repaired

Proposed Answer: **B**

Explanation (Optional):

- A. Incorrect – Plausible because Part (1) would be correct if SW Pump 2 had failed, and Part (2) is correct.
- B. Correct – This is the correct supplemental action per DB-OP-02511. LCO 3.7.8 Bases indicates that the spare SW pump can be

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q16

substituted for the normal loop SW pump as long as it is powered from the same bus as the pump it is replacing.

- C. Incorrect – Plausible because Part (1) would be correct if SW Pump 2 failed. Part (2) is plausible since SW Pump 1 is still damaged however, the LCO is permitted to be exited once SW Pump 3 is aligned to SW Loop 1.
- D. Incorrect – Plausible as this is the correct Bus to power SW Pump 3 from, but the LCO is permitted to be exited once SW Pump 3 is aligned to SW Loop 1.

Technical Reference(s): DB-OP-02511, LOSS OF SERVICE WATER PUMPS/SYSTEMS; LCO 3.7.8, Service Water Systems.
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(10)
 55.43 _____

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q17

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	000065 AK3.14	
Importance Rating	4.2	

K/A Statement: Knowledge of the reasons for the following responses and/or actions as they apply to LOSS OF INSTRUMENT AIR: When to trip reactor if instrument air pressure is decreasing

Proposed Question:

Initial conditions:

- The Reactor is at 100% RTP
- Emergency Instrument Air Compressor (EIAC) is in lead
- Station Air Compressor 1 is in lag
- Station Air Compressor 2 breaker is racked out for maintenance

Subsequently, the following occurs:

- 9-3-E, STA AIR HDR PRESS LO alarms
- 9-1-F, INSTR AIR HDR PRESS LO alarms
- PI 810, INSTRUMENT AIR HEADER PRESS indicates 85 psig and slowly lowering
- PI 811, STATION AIR HEADER PRESS indicates 85 psig and slowly lowering
- An Operator reports an air leak in Station Air Receiver 1
- The plant is otherwise stable

Per DB-OP-02528, INSTRUMENT AIR SYSTEM MALFUNCTIONS which of the following actions will mitigate this condition?

- A. Dispatch an EO to VERIFY SA6445, SA/IA CROSSTIE SOLENOID and SA236, IA/SA CROSSTIE SOLENOID (SA6445) BYPASS are closed.
- B. Dispatch an EO to CLOSE SA18, STATION AIR HEADER BACK PRESSURE REG VALVE (SA2008) INLET ISOLATION VALVE.
- C. Notify Maintenance to immediately return Station Air Compressor 2 to service and verify all Air Compressors are running.
- D. IMMEDIATELY Trip the Reactor AND Initiate and Isolate SFRCS. Enter DB-OP-02000 RPS, SFAS, SFRCS TRIP, OR STEAM GENERATOR TUBE RUPTURE.

Proposed Answer:

A

Explanation (Optional):

- A. Correct – SA6445 is verified automatically closed by procedure and response not obtained would be to manually isolate which would separate the rupture air receiver from Instrument air and allow

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q17

Instrument air pressure to return to normal.

- B. Incorrect – Plausible because this is a directed action for Instrument and Station air continuing to lower. This assumes the leak is in the instrument air header and also SA2008 is downstream of the station air receiver so this would not isolate the leak.
- C. Incorrect – Plausible since verifying all available Air Compressors are running is directed but SAC 2 would not be considered available if it was out of service and the procedure does not direct a return to service.
- D. Incorrect – Plausible since this is the direction for secondary plant upsets or when instrument air pressure lowers to 75 psig.

Technical Reference(s): DB-OP-02528, INSTRUMENT AIR SYSTEM MALFUNCTIONS
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam 2016 Q14 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(5) & (10)
 55.43

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q18

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	BW E04 G2.1.30	
Importance Rating	4.4	

K/A Statement: Inadequate Heat Transfer – Loss of Secondary Heat Sink CONDUCT OF OPERATIONS: Ability to locate and operate components, including local controls

Proposed Question:

The Reactor was operating at 100% RTP.

- The MDFP was OOS for planned maintenance

An event occurs which causes the following conditions:

- Rising Containment temperatures and pressures without rising radiation levels
- SFRCS has actuated due to low pressure in Steam Generator 1
- AF3869, Auxiliary Feed Pump 1 to Steam Generator 2 Stop, failed closed due to a stem/disc failure

Subsequently, AFW Pump 2 trips and is damaged.

- Steam Generator 2 level is 15 inches and lowering
- Reactor pressure is 2000 psig and rising
- RCS temperature is 540°F and rising slowly
- The standby MUP has been placed in service

What actions per DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE MUST operators take to recover heat transfer?

- GO TO Attachment 4, Initiate MU/HPI Cooling per Specific Rule 4, Steam Generator Control.
- Open RC2A, Pressurizer PORV until RCS Subcooling Margin is 20°F IAW Section 6.0, Lack of Heat Transfer.
- Locally align then start the EFW pump to supply Steam Generator 2 IAW Attachment 5, Guidelines for Restoring Feedwater.
- Place AVV's in HAND per Attachment 3, Operation of AVV's and lower Steam Generator 2 pressure until secondary T_{SAT} is 50°F lower than incore thermocouple temperature.

Proposed Answer:

C

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q18

- Explanation (Optional):
- A. Incorrect – Plausible as this would be the required action if SG heat transfer is not available and RCS temperature exceeded 600°F.
 - B. Incorrect – Plausible as this would be the required action if while attempting to restore SG heat transfer, RCS pressure exceeded 2450 psig.
 - C. Correct – With the MDFP OOS and AFW not able to feed SG2, operators are directed to restore FW with Attachment 5. Section B specifically directs operators to locally operate EFW and AFW valves to align the EFW pump to SG2.
 - D. Incorrect – Plausible as this would be the required action if SG2 had proper level but no heat transfer. The level in SG2 is < 16 inches which is not adequate/proper level to carry out this action.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Emergency Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q19

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	000003 AK1.04	
Importance Rating	4.0	

K/A Statement: Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to DROPPED CONTROL ROD: Effect on power level and/or flux

Proposed Question:

The following symptoms are observed at 100% RTP:

- 5-1-E, CRD SYSTEM FAULT is in alarm
- 5-2-E, CRD ASYMMETRIC ROD is in alarm
- Computer Point Q178 CRD ASYMMETRIC ROD ALARM is in alarm
- CRD Mechanism Position Indication Panel - 0 PERCENT light for Rod 6 – 5 is LIT
- IN LIMIT on rod control panel is lit for Group 6

Based on the above plant conditions:

With NO operator action, reactor power will be (1) the initial reactor power and reactor coolant system average temperature (T_{ave}) will be (2) the initial T_{ave} approximately 5 minutes after the event.

- A. (1) noticeably less than
(2) noticeably less than
- B. (1) approximately the same as
(2) noticeably less than
- C. (1) noticeably less than
(2) approximately the same as
- D. (1) approximately the same as
(2) approximately the same as

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – Plausible as initially power decreases on a dropped rod, but as T_{AVE} lowers with a negative MTC the coolant becomes more dense and less neutrons escape the core and are absorbed by fuel thereby causing reactor power to raise back to approximately the same value as it was initially with a lower RCS temperature. Part (2) is correct as a rod block would prevent outward rod motion due to the asymmetric rod drop so temperature would be less than initial

Examination Outline Cross-Reference: Q19

temperature.

- B. Correct – Part (1) is correct since initially power decreases on a dropped rod, but as T_{AVE} lowers with a negative MTC the coolant becomes more dense and less neutrons escape the core and are absorbed by fuel thereby causing reactor power to raise back to approximately the same value as it was initially with a lower RCS temperature. Part (2) is correct as a rod block would prevent outward rod motion due to the asymmetric rod drop so temperature would be less than initial temperature.
- C. Incorrect – Plausible as initially power decreases on a dropped rod, but as T_{AVE} lowers with a negative MTC the coolant becomes more dense and less neutrons escape the core and are absorbed by fuel thereby causing reactor power to raise back to approximately the same value as it was initially with a lower RCS temperature. Part (2) is plausible as the Diamond board is in AUTO and would normally withdraw rods to account for T_{ave} changes. In this instance a rod withdraw block is in effect due to the asymmetric dropped rod.
- D. Incorrect – Plausible as Part (1) is correct. Initially power decreases on a dropped rod, but as T_{AVE} lowers with a negative MTC the coolant becomes more dense and less neutrons escape the core and are absorbed by fuel thereby causing reactor power to raise back to approximately the same value as it was initially with a lower RCS temperature. Part (2) is plausible as the Diamond board is in AUTO and would normally withdraw rods to account for T_{ave} changes. In this instance a rod withdraw block is in effect due to the asymmetric dropped rod.

Technical Reference(s): Davis Besse UFSAR Chapter 15.2 Class 1 Events Leading to No
 (Attach if not previously Radioactive Release at the Exclusion Zone, Section 15.2.3.2.3; DB-OP-
 provided, including 02516, CRD MALFUNCTIONS
 version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam 2022 Q82 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q19

10 CFR Part 55 Content: 55.41 (b)(5) &
(7)
55.43

Comments:

This question is significantly modified as the question stem was changed to ask about the response of reactor power and the answer and all distractors were changed.

This question meets Tier 1 criteria as it tests the applicant's knowledge of progression of an event.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q20

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	000005	AA2.05
Importance Rating	3.8	

K/A Statement: Ability to determine and/or interpret the following as they apply to INOPERABLE/STUCK CONTROL ROD: Ex-core NIS

Proposed Question:

The plant is operating at 75% RTP.

- Rod Index is at 265
- A power ascension to 100% RTP is started with Integrated Control System (ICS) in Full Automatic

At 85% RTP, the following conditions are noted:

- Annunciator 5-2-E, CRD ASYMMETRIC ROD alarms
- ASYMMETRY FAULT light on the Rod Control Panel is LIT
- The crew determines Control Rod 7-1 is STUCK at 65% and enters DB-OP-02516, CRD MALFUNCTIONS

The Axial Power Imbalance signal produced by the Power Nuclear Instrument (NI) nearest Control Rod 7-1 will be (1) negative COMPARED to the other three Power Range NIs.

IAW DB-OP-02516, CRD MALFUNCTIONS, 4.4 Stuck Control Rods (2).

- A. (1) less
(2) reduce power until rod alignment is restored
- B. (1) more
(2) reduce power until rod alignment is restored
- C. (1) less
(2) perform a rapid shutdown to MODE 3
- D. (1) more
(2) perform a rapid shutdown to MODE 3

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect – Plausible if the applicant confuses how Axial Power Imbalance is calculated. Part (2) is plausible as this is the required action for a misaligned control rod from Control Rod Group 7 which is not stuck. The question stem indicates that Rod 7-1 did not move when its group was given a withdrawal signal and is therefore stuck.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q20

- B. Incorrect – Plausible as part (1) is correct and part (2) is plausible as this is the required action for a misaligned control rod from Control Rod Group 7 which is not stuck. The question stem indicates that Rod 7-1 did not move when its group was given a withdrawal signal and is therefore stuck.
- C. Incorrect – Plausible if the applicant confuses how Axial Power Imbalance is calculated. Part (2) is correct.
- D. Correct – With Control Rod 7-1 $\geq 7\%$ below the other control rods in its group, flux as detected by the upper detector of the affected PRNI will be suppressed as compared to the other three channels. Axial Power Imbalance is calculated by subtracting the lower detector output from the upper detector output creating a -1 to -10 VDC signal. Per DB-OP-02516, CRD 7-1 must be declared inoperable and a rapid shutdown must be performed to be in MODE 3 in 6 hours per TS 3.1.4, Condition D.

Technical Reference(s): DB-OP-02516, CRD MALFUNCTIONS; SD 044, System Description for Nuclear Instrumentation/Reactor Protection System
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam 2015 Q19 (if applicable)

Question Cognitive Level: Memory / F undamental Knowledge _____
 Comprehension / Analysis / H igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(10)
 55.43 _____

Comments:

This question is significantly modified as the question stem was changed to ask about Axial Power Imbalance and the required actions per DB-OP-02516.

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q21

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	000028	G2.4.4
Importance Rating	4.5	

K/A Statement: (SF2 PZR LCS) PRESSURIZER LEVEL CONTROL SYSTEM (G.2.4.4) EMERGENCY PROCEDURES/PLAN: Ability to recognize abnormal indication for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.

Proposed Question:

The plant is operating at 100% RTP.

An event occurs which causes the following conditions:

- Tave is 582°F and stable
- RCS pressure is 2155 psig and stable
- Pressurizer level is 220 inches and lowering
- MUT level is 74 inches and rising
- MU flow is 0 GPM
- LD flow is 70 GPM

The crew enters DB-OP-02512, MAKEUP AND PURIFICATION SYSTEM MALFUNCTIONS.

At which Pressurizer Level is the crew required to Trip the Reactor prior to reaching Steam Generator Low Level Limits?

- A. 200 inches
- B. 160 inches
- C. 140 inches
- D. 100 inches

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – Plausible if the applicant believes that the reactor must be tripped when PZR level reaches 20" below setpoint. Letdown would be isolated at this Pressurizer Level during a transient.
- B. Correct – IAW DB-OP-02512, STEP 4.1.3 (or 4.2.2) IF AT ANY TIME PZR Level is less than the minimum required level in accordance with Curve CC.4.3, Minimum Pressurizer Level vs. RC Temperature of DB-OP-06703, Miscellaneous Operation Curves (minimum level for Tave

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q21

582°F is 160 inches).

- C. Incorrect – Plausible since 140 inches is the limit if Tave was 573°F which is possible if the crew started a down power.
- D. Incorrect – Plausible since this is the level at which the Reactor is required to be tripped for an RCS leak. The applicant may believe there is a leak in progress since PZR Level is lowering. MUT Level does NOT rise during an RCS leak.

Technical Reference(s): DB-OP-02512, MAKEUP AND PURIFICATION SYSTEM MALFUNCTIONS;
 (Attach if not previously SD 048, System Description for MAKEUP AND PURIFICATION, DB-PF-
 provided, including 06703 MISCELLANEOUS OPEARTION CURVES, DB UFSAR
 version/revision number.)

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher
 Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(10)
 55.43 _____

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q22

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	000033	G2.4.31
Importance Rating	4.2	

K/A Statement: LOSS OF INTERMEDIATE RANGE NUCLEAR INSTRUMENTATION (G2.4.31) EMERGENCY PROCEDURES/PLAN: Knowledge of annunciator alarms, indications, or response procedures.

Proposed Question:

The plant is in MODE 2 during a planned reactor startup.

- NI-3 indicates off scale low ($< 1 \times 10^{-10}$ AMPS)
- NI-4 indicates normal at 2×10^{-10} AMPS
- ROD INDEX is at 160

The CSRO has just declared NI-3 INOPERABLE due to improper overlap.

Prior to any other actions being taken, the following indications are observed:

- Annunciator 5-5-E, SUR ROD WITHDRAW INHIBIT alarms
- NI-3 still indicates $< 1 \times 10^{-10}$ AMPS
- NI-4 is observed to be failed high

The crew enters DB-OP-02505, NUCLEAR INSTRUMENTATION FAILURES.

What is the next REQUIRED action by the control room IAW DB-OP-02505, NUCLEAR INSTRUMENTATION FAILURES?

- A. Deenergize the Source Range Detectors.
- B. OPEN the CRD trip breakers within 1 hour.
- C. Suspend all positive reactivity manipulations ONLY.
- D. Reduce power to $< 1 \times 10^{-10}$ AMPS within 2 hours.

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – Plausible since this is the action if the IR Detectors fail low and cause the SR Detectors to energize. The detector failing high will NOT cause the SR Detectors to inadvertently energize.
- B. Correct – NI-3 INOPERABLE due to improper overlap. NI-4 is INOPERABLE because it is failed high. Because 2 Intermediate Range

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q22

NI's are INOPERABLE, DB-OP-02505, NUCLEAR INSTRUMENT FAILURES step 4.2.1 directs the operator to suspend all positive reactivity addition manipulations AND OPEN the CRD breakers within 1 hour. DB ITS LCO 3.3.10 (1 hour action).

- C. Incorrect – NI-3 is INOPERABLE because it is failed LOW. NI-4 is INOPERABLE because its power supply breaker, Y308 was inadvertently opened. Because 2 Intermediate range NI's are INOPERABLE, DB-OP-2505 NUCLEAR INSTRUMENT FAILURES step 4.2.1 directs the operator to suspend all positive reactivity addition manipulations (accomplished by the SUR ROD WITHDRAW INHIBIT) AND OPEN the CRD breakers within 1 HOUR. Plausible because "suspend all positive reactivity additions" is just one part of step 4.2.1 for two INOPERABLE Intermediate Range NI's.
- D. Incorrect – Plausible since reducing power to $< 1 \times 10^{-10}$ AMPS within 2 hours is a required action for 1 Intermediate Range Detector INOPERABLE.

Technical Reference(s): DB-OP-02505, NUCLEAR INSTRUMENTATION FAILURES, SD 044 System Description for NUCLEAR INSTRUMENTATION/REACTOR PROTECTION SYSTEM, DB-OP-02005 PRIMARY INSTRUMENTATION ALARM PANEL 5 ANNUNCIATORS, DB UFSAR, DB ITS LCO 3.3.10
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / Fundamental Knowledge _____
 Comprehension / Analysis / Higher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(10)
 55.43 _____

Comments:

This question meets Tier 1 criteria as it tests the applicant's knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q23

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	BW A01	AA1.08
Importance Rating	3.5	

K/A Statement: Ability to operate and/or monitor the following as they apply to (BW A01) PLANT RUNBACK: ICS

Proposed Question:

The plant is operating at 100% with the ULD in HAND due to a malfunction in AUTO.

A transient occurs. The following is reported:
 14-3-D, ICS MFP LOSS OR LO DEAR RUNBACK is LIT

The cause of this condition is ___(1)____.
 The plant will ___(2)____ reduce power to 55%.

- A. (1) Deaerator Storage Tank level of 3.5 feet
 (2) automatically respond to
- B. (1) Deaerator Storage Tank level of 3.5 feet
 (2) require the operators to manually
- C. (1) MFP 1 discharge pressure of 1450 psig
 (2) automatically respond to
- D. (1) MFP 1 discharge pressure of 1450 psig
 (2) require the operators to manually

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – Plausible since during normal operations, a runback signal generated would cause ICS to automatically runback to 55% power; however, the stem of the question has the ULD in HAND. Per DB-OP-2014, annunciator 14-3-D, the immediate action when any ICS H/A station is in HAND is to MANUALLY perform the runback. The first part of the question is correct.
- B. Correct – Per DB-OP-02014, the condition that gives this alarm (and, thus a MFW runback) are 75 psig sensed by PS 2729 or 2730, LSL 425 or 435 (Deaerator level) of 4 feet, or MFP discharge pressure of 1433 psig. Deaerator storage tank level presented in this question meets the runback condition. Additionally, since stem of the

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q23

question has the ULD in HAND. Per DB-OP-2014, annunciator 14-3-D, the immediate action when any ICS H/A station is in HAND is to MANUALLY perform the runback.

- C. Incorrect – Plausible since multiple conditions can cause this annunciator (and a MFW runback), including MFP discharge pressure. If the candidate does not recall the setpoint, (1433 psig), this distractor may be selected. Additionally, since during normal operations, a runback signal generated would cause ICS to automatically runback to 55% power; however, the stem of the question has the ULD in HAND. Per DB-OP-2014, annunciator 14-3-D, the immediate action when any ICS H/A station is in HAND is to MANUALLY perform the runback.
- D. Incorrect – Plausible since multiple conditions can cause this annunciator (and a MFW runback), including MFP discharge pressure. If the candidate does not recall the setpoint, (1433 psig), this distractor may be selected. The second part is correct.

Technical Reference(s): DB-OP-02014, ARP for Annunciator 14-3-D:
 (Attach if not previously IMMEDIATE ACTIONS - IF any ICS H/A Station is in HAND,
 provided, including THEN manually perform the runback function on those stations.
 version/revision number.) REFER TO DB-OP-06401, Integrated Control System Operating
 Procedure

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher
 Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7) _____
 55.43 _____

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Annunciator Response Procedures.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q24

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	000037	AA2.03
Importance Rating	4.0	

K/A Statement: Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Verification that the expected indication on main steam lines from the S/Gs should show increasing radiation levels

Proposed Question: DB-OP-02012, STM GEN/SFRCS ALARM PANEL 12 ANNUNCIATOR procedure directs Radiation Protection to be notified to take local surveys of the Main Steam Line area when annunciator 12-1-A, MN STM LINE 1 RAD HI comes into alarm.

Which of the following is the reason for this direction?

- A. To evaluate for initiating conditions into RA-EP-02861, RADIOLOGICAL INCIDENTS.
- B. To obtain data to support leak rate calculation for DB-OP-02522, SMALL RCS LEAKS.
- C. To project off site doses from the Station Vent in accordance with RA-EP-02240, OFFSITE DOSE ASSESSMENT.
- D. To verify affected SG diagnosis in accordance with DB-OP-02531, STEAM GENERATOR TUBE LEAK.

Proposed Answer: **D**

Explanation (Optional):

- A. Incorrect – Plausible because high radiation levels would be an initiating condition for the radiological incidents off normal procedure, but this alarm is to support indications of a steam generator tube leak.
- B. Incorrect – Plausible because there are leak rate calculations in DB-OP-02522. None of these calculations use rad surveys.
- C. Incorrect – Plausible Steam Generator Tube Leaks will cause a release of radioactive material but checking radiation levels in the Main Steam Line area will not allow determination of dose from the station vent.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q24

D. Correct – DB-OP-02012 directs checking symptoms in accordance with DB-OP-02531 along with alarm verification to access entry conditions into the steam generator tube leak abnormal procedure.

Technical Reference(s): DB-OP-02012 12-1-A, DB-OP-02531 (p4)
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam 2020 Q22 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive

10 CFR Part 55 Content: 55.41 (b)(8), (b)(10)
 55.43

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of the bases for actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q25

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	BW E08 EK 3.12	
Importance Rating	4.0	

K/A Statement: Knowledge of the reasons for the following responses and/or actions as they apply to LOCA COOLDOWN: Check that LPI flow meets flow criteria to secure HPI

Proposed Question: The Reactor has tripped from 100% RTP due to a large RCS leak.

- SFAS Level 4 has actuated; all safety systems responded as expected
- The crew is preparing to transfer ECCS Pump Suctions to the Emergency Sump
- LPI Injection flow has been 1500 gpm for > 20 minutes in BOTH LPI Lines (3000 gpm total LPI Injection Flow)

HPI pumps _____ (1) _____ be stopped prior to the transfer.

Piggyback Valves DH63 and DH64 are required to be _____ (2) _____.

- A. (1) CAN
(2) OPEN
- B. (1) CAN
(2) CLOSED
- C. (1) CANNOT
(2) OPEN
- D. (1) CANNOT
(2) CLOSED

Proposed Answer: **B**

Explanation (Optional):

- A. Incorrect – Part (1) is correct. HPI can be stopped if adequate LPI flow is GREATER THAN 1350 GPM for 20 minutes or more. Part (2) is incorrect. Plausible since the MUPs and CTMT Spray System are still in service, and they share common suction piping.
- B. Correct – Part (1) is correct. HPI can be stopped if adequate LPI flow is GREATER THAN 1350 GPM for 20 minutes or more. Part (2) is correct. Piggyback valves DH63 and DH64 are required to be closed IAW SR3 and they are verified closed prior to the sump transfer.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q25

- C. Incorrect – Part (1) is incorrect. HPI should be TERMINATED if adequate LPI flow is GREATER THAN 1350 GPM for 20 minutes or more. Part (2) is incorrect. Plausible since the MUPs and CTMT Spray System are still in service, and they share common suction piping.
- D. Incorrect – Part (1) is incorrect. HPI should be TERMINATED if adequate LPI flow is GREATER THAN 1350 GPM for 20 minutes or more. Part (2) is correct. Piggyback valves DH63 and DH64 are required to be closed IAW SR3 and they are verified closed prior to the sump transfer.

Technical Reference(s): DB-OP-02000 RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE, DP-OP-02000 BASES AND DEVIATION DOCUMENT, DB UFSAR; SR3, 3.4 (close piggyback valves) and 3.5 (HPI termination criteria),
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(5),(b)(10) _____
 55.43 _____

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Emergency Operating Procedures.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q26

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	BW E13 EK 1.15	
Importance Rating	3.3	

K/A Statement: Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to EOP RULES:
Tube to shell delta T.

Proposed Question: The reactor has tripped from 100% RTP due to a Loss of Off-Site power.

- AFW Pump 1 has tripped on overspeed
- Due to equipment issues, Steam Generator 1 can NOT be fed by any other pumps
- #2 Atmospheric Vent Valve is being utilized to maintain RCS temperature constant OR slightly lowering IAW SR 4, Steam Generator Control

Subsequently, AFW Pump 1 is reset and is now available for use.

- Steam Generator 1 level is 14"
- Steam Generator 1 pressure is 750 psig and stable
- Steam Generator 1 Shell avg. temperature: 534°F
- RCS Loop 1 Tave: 516°F

Based on current conditions, Steam Generator #1 _____.

- A. CAN be fed because SG Tube to Shell ΔT is $\leq 50^\circ F$
- B. CAN be fed because NO Loop 1 RCPs are in service
- C. CANNOT be fed because feeding a Dry Steam Generator is prohibited with tubes in tension
- D. CANNOT be fed because feeding a Dry SG is prohibited when at least one SG is providing heat transfer

Proposed Answer: **A**

Explanation (Optional): A. Correct - The given parameters indicate that the SG Tube to Shell ΔT is $-18^\circ F$. RCS Loop 1 Tave: $489^\circ F$ - SG# 1 Shell avg temp: $534^\circ F = -18 \Delta T$. The step in DB-OP-2000 Specific Rule 4 Steam Generator Control 4.4 states to check that SG Tube to Shell ΔT meets the following: Less than or Equal to $50^\circ F$ with tubes in TENSION.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q26

- B. Incorrect - First part is correct. Second part is incorrect. Plausible since RCPs do determine how much flow can be supplied to a dry SG NOT if you can feed it or not.
- C. Incorrect – Per specific Rule 4 the SGs can be fed when tubes are in tension as long as the ΔT is $<50^{\circ}F$.
- D. Incorrect – Plausible since the plant can be cooled down with one SG. A candidate may believe that it is conservative to not feed a dry steam generator if it's not needed. Feeding a dry SG could damage it if it is not within limits.

Technical Reference(s): DB-OP-02000 RPS, SFAS, SFRCs TRIP, OR SG TUBE RUPTURE, DP-OP-02000 BASES AND DEVIATION DOCUMENT
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(5), _____
 (b)(7) _____
 55.43 _____

Comments:

This question meets Tier 1 criteria as it tests the applicant's knowledge of actions found in the Emergency Operating Procedures.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q27

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	00003	A2.06
Importance Rating	3.5	

K/A Statement: Ability to (a) predict the impacts of the following on the REACTOR COOLANT PUMP SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: CCWS malfunction

Proposed Question: The Reactor is operating at 100% RTP with the following indications:

- 11-3-A, CCW SURGE TK LVL LO is LIT
- 11-2-A, CCW SURGE TK LVL LO-LO is LIT
- CCW Surge tank indicates 34"

What operator action(s) MUST be performed for the stated conditions?

- A. Start the standby CCW Pump.
- B. Trip the Reactor then Trip ALL RCPs.
- C. Stop ALL RCPs and ISOLATE Seal Return flow.
- D. Verify CCW is available to provide cooling to the RCPs.

Proposed Answer: **B**

Explanation (Optional):

- A. Incorrect - Plausible because the STBY CCW Pump is started per Attachment 2, Shutdown of a Leaking CCW Essential Header when level is at 33 inches.
- B. Correct - The direction from DB-OP-2523, CCW MALFUNCTIONS step 4.1.1 states that IF AT ANY TIME CCW surge tank reaches 35 inches, Trip the reactor, trip all RCPs and ensure non-essential CCW headers are isolated.
- C. Incorrect - Plausible because at 35" in the CCW surge tank, non-essential CCW loops are isolated. The applicant may believe that this would cause a loss of seal injection from the loss of CCW cooling to the Makeup pump and for seal return temperature to be > 200F due to the loss of CCW cooling to the seal return coolers. DB-OP-2515 RCP Malfunctions step 4.4.1 states that on a loss of CCW and Seal Injection to all RCPs is confirmed, then trip the reactor, stop all RCPs

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q27

and return to the AOP following immediate and supplemental actions. Step 4.4.2 would then direct the isolating Seal Return to have an idle RCP with Seal Return temperature greater than 200°F.

- D. Incorrect - Plausible because verifying CCW is available to provide cooling to the RCPs is directed by attachment 2 in DB-OP-2515 RCP Malfunctions step 4.3.4: Determine the cause of the loss of CCW flow. Refer to attachment 2 Verification of CCW flow to RCPs. However, CCW flow to ALL RCPs is lost once CCW surge tank drops below 35 inches and the non-essential header isolations automatically close.

Technical Reference(s): DB-OP-02515 RCP MALFUNCTIONS, DB-OP-02523 CCW
 (Attach if not previously provided, including version/revision number.) MALFUNCTIONS, ITS for DB, DB UFSAR, SD 016 CCW System

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(5)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q28

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	00003	G2.2.44
Importance Rating	4.2	

K/A Statement: REACTOR COOLANT PUMP SYSTEM: (EQUIPMENT CONTROL) Ability to interpret control indications to verify the status and operation of a system and understand how operator actions and directive affect plant and system conditions.

Proposed Question:

The plant is starting up following a refueling outage.

- RCPs 2-1 and 2-2 are running
- RCPs 1-1 and 1-2 are off

Preparations are being made to start RCP 1-2:

- RCS loop 1 WR Tc is 420°F
- Seal injection flow to RCP 1-2 is 3.5 gpm
- Upper and Lower bearing oil levels are normal
- All Bus voltages are normal
- CCW flows are normal
- HISMU59D, RCP 1-2 Seal Return Isolation, Red Light is ON
- Computer point P800, AC Oil Pmp Disch Press indicates NORM for RCP 1-2

Based on the above conditions, RCP 1-2 will ____ (1) ____.

Undervoltage Bypass Pushbuttons may be held in the BYPASS position for a MAXIMUM of ____ (2) ____.

- A. (1) NOT start
(2) 30 seconds
- B. (1) start
(2) 30 seconds
- C. (1) NOT start
(2) 1 minute
- D. (1) start
(2) 1 minute

Proposed Answer:

D

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q28

- Explanation (Optional):
- A. Incorrect. (1) Incorrect. All RCP start interlocks are met and the RCP will start. Plausible because the starting interlock based on RCS WR Tc is > 440°F for the 4th RCP only. (2) Incorrect. Undervoltage Bypass Pushbuttons may be operated for up to 1 minute. 30 seconds is plausible since it would allow enough time for the RCP amps to stabilize.
 - B. Incorrect. (1) is correct because all starting interlocks are met. (2) Incorrect. Undervoltage Bypass Pushbuttons may be operated for up to 1 minute. 30 seconds is plausible since it would allow enough time for the RCP amps to stabilize.
 - C. Incorrect. (1) Incorrect. All RCP start interlocks are met and the RCP will start. Plausible because the starting interlock based on RCS WR Tc is > 440°F for the 4th RCP only. (2) Correct - Undervoltage Bypass Pushbuttons may be operated for up to 1 minute.
 - D. Correct. (1) Bus voltage > 10.56 Kv, Seal Return Valve open, Seal Injection > 3 gpm, CCW flows normal, upper bearing oil level > -1.25", lower bearing oil level > -1.25", oil lift pressure > 60 psig, RX power < 60% RTP. (2) Correct - Undervoltage Bypass Pushbuttons may be operated for up to 1 minute.

Technical Reference(s): DB-OP-06005 RCP OPERATIONS, DB-OP-06900 PLANT HEATUP, DB-OP-06901 PLANT STARTUP, DB UFSAR
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(5)
 55.43 _____

Examination Outline Cross-Reference: Q28

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q29

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	00004	K5.11
Importance Rating	3.4	

K/A Statement: Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the CHEMICAL AND VOLUME CONTROL SYSTEM: PTS

Proposed Question: A transient has occurred which caused the Reactor to Trip due to low RCS Pressure:

- All Immediate Actions have been completed
- RCPs were tripped IAW Specific Rule 2
- HPI/LPI/MU has been placed in service per Attachment 8

Current conditions:

- One control rod has failed to fully insert
- Containment pressure is 0.5 psig and stable
- PZR level is 10"
- RCS temperature is 530°F and lowering
- RCS pressure is 1540 psig rising

Which of the following is the greatest concern while attempting to mitigate this event?

- A. Raise Subcooling Margin by ensuring full High Pressure Injection flow is maintained.
- B. Restoring PZR level by injecting with both the normal and alternate MU injection lines.
- C. Minimize Subcooling Margin by throttling Makeup Injection flow.
- D. Ensuring adequate Shutdown Margin by borating the RCS per Specific Rule 1.

Proposed Answer: **C**

Explanation (Optional):

- A. A. Incorrect. Plausible because full HPI flow is required when SCM is < 20°F subcooled. SCM must be correctly calculated in this scenario. In this instance SCM is > 20°F subcooled.
- B. Incorrect. Plausible since normal post trip PZR level setpoint is 100 inches. However, PZR level is not the greatest concern. Restoring

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Examination Outline Cross-Reference: Q29

SCM is the basis behind maximizing MU flow with both trains. In this instance SCM is > 20°F subcooled.

- C. Correct. The greatest concern for this condition is the combination of high thermal stress and high-pressure stress on the Reactor vessel wall, which will lead to a pressurized thermal shock condition under natural circulation conditions. Specific Rule 5 for Pressurized Thermal Shock is applicable with no RCPs running and MUP injecting via normal and alternate paths from the BWST per Attachment 8.
- D. Incorrect. Plausible because SDM is a concern. However, emergency boration is only required if more than one Control Rod failed to insert or if IR/SR indication is rising.

Technical Reference(s): DB-OP-02000 RPS, SFAS, SFRCS TRIP or SGTR, DB UFSAR
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(5)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q30

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	00005	K3.01
Importance Rating	4.5	

K/A Statement: Knowledge of the effect that a loss or malfunction of the RESIDUAL HEAT REMOVAL SYSTEM will have on the following systems or components: RCS

Proposed Question:

The plant has just been shutdown for a refueling outage.

- MODE 5, RCS Pressure and Temperature are stable after stopping all RCPs
- RCS drain preparations are in progress
- DHR Train 1 cooling flow is 3000 GPM and stable

Suddenly, power to the solenoid valve for DH 14B, DH COOLER 1 OUTLET FLOW CONTROL is lost.

RCS temperature will (1).

RCS temperature will be restored by throttling (2).

- A. (1) rise
(2) DH13B, DH CLR 1 BYPASS
- B. (1) rise
(2) DH1B, DH PUMP 1 TO RCS ISO
- C. (1) lower
(2) DH13B, DH CLR 1 BYPASS
- D. (1) lower
(2) DH1B, DH PUMP 1 TO RCS ISO

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect. Part (1) Plausible for a fail position of CLOSED. However, DH 14B fails open. Part (2) is plausible since DH 13B is used to control temperature and flow during normal ops.
- B. Incorrect. Part (1) Plausible for a fail position of CLOSED. However, DH 14B fails open. Part (2) is correct.

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Examination Outline Cross-Reference: Q30

- C. Incorrect. Part (1) is correct. DH 14B will fail open to the mechanical stop which will cause RCS Temperature to lower. Part (2) is plausible since DH 13B is used to control temperature and flow during normal ops.
- D. Correct. Part (1) is correct. DH 14B will fail open to the mechanical stop which will cause RCS Temperature to lower. Part (2) is correct. IAW DB-OP-02003, 3-2-H LP INJ 1 FLOW HI, DH 14B, DH 13B, or DH 1B are throttled to restore flow of 3000 GPM or less. Throttling DH 13B will not restore temperature.

Technical Reference(s): SD 42 system description for DECAY HEAT REMOVAL, DB-OP-02003 R19, (Attach if not previously provided, including version/revision number.) 3-2-H LP INJ 1 FLOW HI Step 3.2, OS-004 Sh1, Decay Heat Removal

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
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Examination Outline Cross-Reference: Q31

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	00006	K1.02
Importance Rating	4.4	

K/A Statement: Knowledge of the physical connections and/or cause and effect relationships between the EMERGENCY CORE COOLING SYSTEM and the following systems: ESFAS

Proposed Question: The plant is operating at 100 % RTP with HPI PUMP 1 removed from service for maintenance and its breaker racked out.

The following conditions occur:

- RCS pressure is 1590 psig and lowering.
- Containment pressure is 18.0 psia and rising.
- Pressurizer level is 265 inches and rising.

With NO operator action, what is the status of the HPI pump Safety Actuation Monitoring (SAM) lights?

HPI Pump 1 SAM light is (1) .

HPI Pump 2 SAM light is (2) .

- A. (1) OFF
 (2) OFF
- B. (1) OFF
 (2) DIM
- C. (1) DIM
 (2) DIM
- D. (1) FLASHING
 (2) DIM

Proposed Answer: **B**

Explanation (Optional): A. Incorrect. SFAS level 2 actuation will occur if RCS pressure is \leq 1600 psig OR CTMT pressure is \geq 18.7 psia. Level 2 starts both HPI pumps, however HPI #1 is tagged out for maintenance. The SAM light for HPI 1 would be off and remain off. The SAM light for HPI 2 would be DIM following the SFAS actuation due to low RCS pressure below the setpoint.

B. Correct. SFAS level 2 actuation will occur if RCS pressure is \leq 1600

Examination Outline Cross-Reference: Q31

psig OR CTMT pressure is ≥ 18.7 psia. Level 2 starts both HPI pumps, however HPI #1 is tagged out for maintenance. The SAM light for HPI 1 would be off and remain off and HPI 2 would be DIM following the SFAS actuation due to low RCS pressure below the setpoint.

- C. Incorrect. SFAS level 2 actuation will occur if RCS pressure is ≤ 1600 psig OR CTMT pressure is ≥ 18.7 psia. Level 2 starts both HPI pumps, however HPI #1 is tagged out for maintenance. The SAM light for HPI 1 would be off and remain off. The SAM light for HPI 2 would be DIM following the SFAS actuation due to low RCS pressure below the setpoint. Plausible because both DIM is the expected condition for both pumps following SFAS actuation if both pumps are in operable.
- D. Incorrect. SFAS level 2 actuation will occur if RCS pressure is ≤ 1600 psig OR CTMT pressure is ≥ 18.7 psia. Level 2 starts both HPI pumps, however HPI #1 is tagged out for maintenance. The SAM light for HPI 1 would be off and remain off. The SAM light for HPI 2 would be DIM following the SFAS actuation due to low RCS pressure below the setpoint. Plausible because a FLASHING light is observed when the SFAS actuation occurs, is blocked and positioned out of its SFAS required position, which would be the case for an open breaker on the HPI pump, however the component would not have been blocked.

Technical Reference(s): DB-OP-06405, SAFETY FEATURES ACTUATION SYSTEM PROCEDURE, Attachment 2, SAM lights; SD 02: System Description for SFAS F 2.3-3-1
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(2)
 55.43 _____

Examination Outline Cross-Reference: Q31

Comments:

Form 4.2-1 Written Examination Question Worksheet
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Examination Outline Cross-Reference: Q32

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	00007	K4.05
Importance Rating	2.6	

K/A Statement: Knowledge of PRESSURIZER RELIEF/QUENCH TANK SYSTEM design features and/or interlocks that provide for the following: Draining PRT/Quench tank.

Proposed Question:

Quench Tank (QT) conditions:

- Level is at 9ft 6in and slowly rising
- Temperature is at 85°F
- Pressure is 25 psig

Which of the following statements is correct?

The QT Circ Pump _____.

- A. AUTO starts due to high level and pumps the QT automatically to the Miscellaneous Waste Drain Tank.
- B. AUTO starts due to high level and pumps the QT automatically to the Reactor Coolant Drain Tank.
- C. is not required to lower level in the QT. The QT will AUTO drain to the Reactor Coolant Drain Tank due to high level.
- D. is not required to lower level in the QT. The QT will AUTO drain to the Miscellaneous Waste Drain Tank due to high level.

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect. The Quench tank is normally aligned to automatically drain to the RC drain tank via RC225A when level is greater than 9 ft 6 in. Plausible since most other tanks require a pump to transfer water and many systems drain or are pumped to the Misc Waste Drain Tank (MWDT).
- B. Incorrect. The Quench tank is normally aligned to automatically drain to the RC drain tank via RC225A when level is greater than 9 ft 6 in. Plausible since most other tanks require a pump to transfer water and the QT does drain to the Reactor Coolant Drain Tank (RCDT).
- C. Correct. The Quench tank is normally aligned to automatically

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Examination Outline Cross-Reference: Q32

drain to the RCDT via RC225A when level is greater than 9 ft 6 in.
 The QT Circ Pump is not required to drain the QT.

- D. Incorrect. The Quench tank is normally aligned to automatically drain to the RCDT via RC225A when level is greater than 9 ft 6 in. Plausible since the QT Circ Pump is not required to drain the QT and many systems drain to the MWDT.

Technical Reference(s): DB-OP-06004, System procedure for QUENCH TANK Limit and
 (Attach if not previously Precaution 2.2.4, and Attachment 3; SD 039B, System Description for
 provided, including REACTOR COOLANT SYTEM ACCESSORY SYSTEMS Section 2.1.2.1.4,
 version/revision pages 2-3 and 2-4
 number.)

Proposed references to be None
 provided to applicants during
 examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher
 Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
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Examination Outline Cross-Reference: Q33

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	00008	K2.02
Importance Rating	3.9	

K/A Statement: Knowledge of electrical power supplies to the following (SF8 CCW)
 COMPONENT COOLING WATER SYSTEM: CCW pumps

Proposed Question:

The plant is operating at 100% RTP.

5 minutes ago, the following alarm was received:

- 1-3-D, BUS C1 LOCKOUT

What is the status of CCW pump 1?

- A. DEENERGIZED.
- B. ENERGIZED and powered from the #1 EDG.
- C. ENERGIZED and powered from C2 Bus.
- D. ENERGIZED and powered via the alternate source breaker.

Proposed Answer:

A

Explanation (Optional):

- A. Correct. The C1 Bus lockout condition opens the supply breaker and all load breakers. CCW pump 1 is powered from the C1 Bus.
- B. Incorrect. The C1 Bus lockout condition opens the supply breaker and all load breakers. Plausible because the EDG starts on C1 Bus undervoltage but the EDG would run unloaded until it is locally shutdown due to no cooling water available.
- C. Incorrect. The C1 Bus lockout condition opens the normal supply breaker from C2 and opens all load breakers. Plausible because the C2 bus would still be energized in this condition, and if the CCW pump were powered from the C2 bus it would be energized.
- D. Incorrect. The C1 Bus lockout condition opens the supply breaker and all load breakers. Plausible because if the applicate believes the lockout was on the C2 bus, the C1 bus would dead bus fast transfer to the alternate source, and the CCW pump would still be energized, but via the alternate source.

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Examination Outline Cross-Reference: Q33

Technical Reference(s): DB-OP-02521, Step 3.1.1 for C1 lockout, emergency shutdown the EDG.
(Attach if not previously DB-OP-02001, Electrical distribution alarm panel 1 annunciators; 1-3-D p
provided, including 60, SD 003A, System Description for 4160 VOLT AUXILIARY SYSTEM
version/revision number.) Section 2.1.2.6,b. bus lockout for essential buses, C1, page 2-4

Proposed references to be provided None
to applicants during examination:

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher
Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(7) _____
55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q34

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	00008	K6.04
Importance Rating	3.9	

K/A Statement: Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the CCW system: CCW pump(s).

Proposed Question:

Initial conditions:

- 100% Power
- Component Cooling Water (CCW) Pump 2 is in service

The following occurs:

- CCW Pump 2 shears its shaft
- CCW Pump 1 fails to auto start

One minute later the Reactor Operator starts CCW Pump 1 and stops CCW Pump 2.

The following Annunciator alarms have been received and have NOT been acknowledged:

- 11-4-B, CCW PMP 1 FLOW LO
- 11-5-B, CCW PMP 2 FLOW LO
- 6-5-B, SEAL CCW FLOW LO
- 2-3-A, LETDOWN TEMP HI ALARMS

NO other Annunciators are in alarm.

All automatic actions have completed, and NO other operator actions have been taken.

Based on these conditions, which of the following identifies the actions required to restore CCW system flow to its normal value at 100% RTP?

- Open Reactor Coolant Pump Sealing Cooling CCW Return Valves
- Close Loop 2 Non-Essential CCW Isolation Valves
- Stop the standby CRD Cooling Booster Pump
- Restore Letdown

Proposed Answer:

D

**Form 4.2-1 Written Examination Question Worksheet
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Examination Outline Cross-Reference: Q35

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000010	K2.02
Importance Rating	3.1	

K/A Statement: Knowledge of electrical power supplies to the PZR pressure controller: SF3 PZR PCS, PRESSURIZER PRESSURE CONTROL SYSTEM

Proposed Question:

Essential Bank 2 Pressurizer heater bank control switch is in the ON position.

If RCS pressure is stable at the normal operating point, and Pressurizer level fails to 37", which of the following explains the status of the Essential Bank 2 heaters?

The heater bank is _____.

- A. energized because manual control overrides the Pressurizer low-low level heater cutoff
- B. de-energized because the Pressurizer low-low level heater cutoff overrides manual control
- C. energized because Pressurizer level is above the low-low level heater cutoff setpoint
- D. de-energized because normal RCS pressure is above the heater bank cycle setpoint

Proposed Answer:

A

Explanation (Optional):

- A. Correct. In automatic, the design of the Pressurizer Heaters removes power on LOW LOW pressurizer Level (40 inches). Operating the Pressurizer in manual (ON) overrides this design feature.
- B. Incorrect. Plausible if the candidate does not understand that the ON position for the heaters overrides the Low-level cutoff.
- C. Incorrect. Plausible if the candidate does not know the setpoint for low low pressurizer level and thinks it is less than 40 inches. A pressurizer level of 37 inches is still above the top of all Pressurizer heaters.
- D. Incorrect. Plausible because this bank of heaters is off at normal

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Examination Outline Cross-Reference: Q35

RCS Pressure when in AUTO.

Technical Reference(s): DB-OP-06407, NON NUCLEAR INSTRUMENTATION SYSTEM OPERATING
(Attach if not previously PROCEDURE; SD 048, System Description for Non Nuclear
provided, including Instrumentation
version/revision number.)

Proposed references to be provided None
to applicants during examination:

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # _____ (note changes or attach parent)
New _____

Question History: Last NRC Exam DB2013 Q36 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher
Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(7)
55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q36

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000012	G2.4.35
Importance Rating	3.8	

K/A Statement: Knowledge of nonlicensed operator responsibilities during an emergency: REACTOR PROTECTION SYSTEM (2.4.35) EMERGENCY PROCEDURES/PLAN

Proposed Question: The plant is operating at 100% RTP when a loss of both MFW pumps occurs.

The following conditions are noted:

- RCS pressure is 2400 psig and rising
- Rx power is 100% RTP
- The turbine is NOT tripped

Assuming previously performed required actions have failed, what is the NEXT anticipated action(s) for the given conditions?

- A. Attempt to Trip the Main Turbine by pressing the EMERGENCY TRIP pushbuttons.
- B. Locally open A, B and C RTBs from the low voltage switchgear room.
- C. Shift the MDFWP from MFW to the AFW mode per Attachment 5: Guidelines for Restoring Feedwater, section F.
- D. Initiate AND Isolate SFRCS using MANUAL ACTUATION switches.

Proposed Answer: **B**

Explanation (Optional):

- A. Incorrect - The reactor should have tripped with RCS pressure greater than the RPS setpoint of 2355 psig. Plausible because tripping the turbine is an expected action when the reactor is tripped, however, DB-OP-02000 specifically prohibits continuing past RNO step 3.3 until the reactor has been shutdown.
- B. Correct - The reactor should have tripped with RCS pressure greater than the RPS setpoint of 2355 psig. Per the Immediate Action RNO step 3.3 locally open the RTBs is a required action to shutdown the reactor.
- C. Incorrect - The reactor failed to trip when RCS pressure exceeded

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Examination Outline Cross-Reference: Q36

2355 psig setpoint. Plausible because the action to swap the MDFP from MFW mode to AFW mode is a possible action for the loss of AFW at lower power levels.

- D. Incorrect - The reactor should have tripped with RCS pressure greater than the RPS trip setpoint of 2355 psig, This is the expected action when the Reactor trips but the Turbine does not.

Technical Reference(s): RA-EP-02410 OSC activation and response
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(10)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q37

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000013	A3.12
Importance Rating	3.9	

K/A Statement: Ability to monitor automatic features of the (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM including ESFAS permissives.

Proposed Question:

The plant is in MODE 3 and being shutdown for a refueling outage.

During the controlled RCS depressurization, the following indications and alarms are present:

- RC2A3 SFAS CH 4 RCS Pressure is: 1665 psig
- RC2B3 SFAS CH 3 RCS Pressure is: 1677 psig
- RC2A4 SFAS CH 2 RCS Pressure is: 1662 psig
- RC2B4 SFAS CH 1 RCS Pressure is: 1679 psig
- 5-2-C, RC Low Pressure Trip Block Permit is LIT.

Based on the above indications, conditions are (1) to block the SFAS Low RCS Pressure Trip.

 (2) to adequately block the SFAS Low RCS Pressure Trip during the controlled shutdown.

- A. (1) met
 (2) SFAS CH 1 and CH 2 LO TRIP BLK pushbuttons are used
- B. (1) met
 (2) SFAS CH 2 and 4 equipment block pushbuttons are used
- C. (1) NOT met
 (2) The SFAS Shutdown Bypass Key switch MUST be used
- D. (1) NOT met
 (2) At least 3 SFAS Channels MUST be blocked

Proposed Answer: **D**

- Explanation (Optional):
- A. Incorrect. Plausible because SFAS has two actuation channels. SFAS requires that a minimum of 3 of 4 trip bistables must be blocked (<1670 psig) to adequately block SFAS operation.
 - B. Incorrect. Plausible because the applicant may believe that only 2 of 4 bistables are required to be below the block setpoint. Also plausible

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Examination Outline Cross-Reference: Q37

because the SFAS equipment can be blocked at the component level using the SFAS equipment block pushbuttons after an actuation.

- C. Incorrect. Plausible because the conditions are NOT met to block the RC Low pressure trip on at least 3 of 4 channels. The applicant may believe that the shutdown bypass keyswitch could be used to prevent actuation, however use of this keyswitch is restricted to MODES 5, 6 or defueled.
- D. Correct. The SFAS Block permissive logic requires that a minimum of 3 of 4 trip bistables must be blocked (<1670 psig) to adequately block SFAS operation.

Technical Reference(s): System Description 002 for (SFAS) Step 2.1.2.6 three of four needed to
 (Attach if not previously block; DB-OP-02005, Primary Instrumentation Alarm Panel 5
 provided, including Annunciators; DB-OP-06903, Caution 3.37.2 SFAS RCS LO PRESS TRIP
 version/revision number.) BLOCK PERMISSIVE is 1670 psig

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher
 Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q38

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000013	K6.10
Importance Rating	4.0	

K/A Statement: Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF2 ESFAS ENGINEERED SAFETY FEATURES ACTUATION SYSTEM): Feedline break.

Proposed Question:

A plant transient occurred causing the Reactor to trip.

The following indications were noted just prior to the trip:

- Rx power is 97% and lowering
- Steam Generator 1 Pressure 900 psig and rising
- Steam Generator 2 Pressure 880 psig and stable
- Pressurizer level is 225" and rising
- Pressurizer Pressure is 2260 psig and rising
- Feedwater Header Pressure at the outlet of HPFW Heaters 1-6 and 2-6 is 750 psig and lowering

Based on the indications above, the SFRCS (Steam and Feed Rupture Control System) actuation will feed _____ Steam Generator(s) with Auxiliary Feedwater.

- A. ONLY #1
- B. ONLY #2
- C. BOTH
- D. NEITHER

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect - Plausible because on a loss of MFW, as indicated by SG - FW reverse d/p high > 125 psid, SFRCS will start AFW and feed both SGs via the AFW system piping. On a low main steam line pressure of < 630 psig, the SFRCS system will isolate the first SG to reach the setpoint and align AFW to feed the second SG. Since neither SG has reached the 640psig setpoint, AFW would not be isolated to either SG.
- B. Incorrect - Plausible because on a loss of MFW, as indicated by SG - FW reverse d/p high > 125 psid, SFRCS will start AFW and feed both SGs via the AFW system piping. On a low main steam line pressure

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Examination Outline Cross-Reference: Q38

of < 630 psig, the SFRCS system will isolate the first SG to reach the setpoint and align AFW to feed the second SG. Since neither SG has reached the 640 psig setpoint, AFW would not be isolated to either SG.

- C. Correct – The conditions in the stem are indicative of a feed line rupture. With SG – FW d/p > 125 psid, SFRCS will initiate and feed both SGs with AFW.
- D. Incorrect - Plausible because on a SG - FW reverse d/p high of > 125 psid, SFRCS will start AFW and feed both SGs via the AFW system piping. The applicant may believe incorrectly that both SGs are required to have a high feedwater line check valve reverse d/p to get the SFRCS initiation, in which case main feedwater would still be feeding both SG's, not AFW.

Technical Reference(s): SD 010, System Description for SFRCS Section 3.3 Setpoints; OS12A, (Attach if not previously provided, including version/revision number.) MFW system drawing, DB UFSAR

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q39

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000022	A1.02
Importance Rating	3.9	

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operation of the (SF4 CCS) CONTAINMENT COOLING SYSTEM, including containment pressure.

Proposed Question: The plant is operating at 100% RTP with 1 AND 2 Containment Air Coolers (CAC) in FAST speed.

Which of the following conditions or malfunctions would require Technical Specification action within one hour or less?

- A. Loss of a running Containment Air Cooler resulting in Containment pressure rising to 28" H2O gauge.
- B. Outside air temperature changes resulting in Containment Average Temperature rising to 118°F.
- C. One Containment Spray train is removed from service.
- D. CV5070, Containment Vacuum Relief Isolation, failed its closed stroke time and is declared inoperable.

Proposed Answer: **A**

- Explanation (Optional):
- A. Correct. Containment pressure exceeding LCO 3.6.4 maximum value of 25" H2O requires restoring pressure to within limits in one hour.
 - B. Incorrect. Plausible because Containment Average Temperature above 120F requires entering LCO 3.6.5 but has an 8-hour completion time to restore to normal.
 - C. Incorrect. Plausible because one containment spray train removed from service requires entering LCO 3.6.6 condition A, however Condition A has a 7-day completion time.
 - D. Incorrect. Plausible because CV5070 is a containment isolation valve and would require entering LCO 3.6.3 condition A, however it is a 4-hour completion time.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q39

Technical Reference(s): ITS rev 338 for Davis Bessie, TS 3.6 Containment Systems
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(5)
55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q40

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000026	A2.09
Importance Rating	2.8	

K/A Statement: Ability to (a) predict the impacts of the following on the (SF5 CSS) CONTAINMENT SPRAY SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations; Radiation hazard potential of BWST/RWST

Proposed Question: A Large Break Loss of Coolant Accident occurs causing a Loss of SCM.
 The crew has completed the required actions in DB-OP-02000, Section 5, LACK OF ADEQUATE SUBCOOLING MARGIN and routed to Section 10, Large LOCA Cooldown.

- (1) When is power aligned to the BWST outlet valves and Containment Sump Isolation Valves during a large break LOCA?
- (2) How is the radiation hazard minimized when restoring power to DH7A, DH7B, DH9A, DH9B and HP31?
 - A. (1) When annunciator 5-3-A, BWST LOLO LVL XFER TO EMER SUMP alarms to prevent the loss of NPSH to running ECCS pumps.
 (2) A Radiation Protection Technician is required to accompany the operator during the task to ensure the minimum dose is received.
 - B. (1) When annunciator 5-3-A, BWST LOLO LVL XFER TO EMER SUMP alarms to prevent the loss of NPSH to running ECCS pumps.
 (2) The operator must follow the prescribed route to avoid an exposure significantly higher than the projected 2 rem.
 - C. (1) Within 23 minutes from the time RCS leakage indicated a Large Break LOCA.
 (2) A Radiation Protection Technician is required to accompany the operator during the task to ensure the minimum dose is received.
 - D. (1) Within 23 minutes from the time RCS leakage indicated a Large Break LOCA.
 (2) The operator must follow the prescribed route to avoid an exposure significantly higher than the projected 2 rem.

Proposed Answer: **D**

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q40

- Explanation (Optional):
- A. Incorrect. Part (1) Plausible because this annunciator comes in at 9.0 ft in the BWST and the ARP directs the transfer of the suction from the BWST to the Emergency Sump if DB-OP-2000 is in effect. Part (2) is plausible since RP coverage is required for many dose significant jobs and/or the dose rates are unknown.
 - B. Incorrect. Part (1) Plausible because this annunciator comes in at 9.0 ft in the BWST and the ARP directs the transfer of the suction from the BWST to the Emergency Sump if DB-OP-2000 is in effect. Part (2) is correct.
 - C. Incorrect. Plausible because Part (1) is correct. Part (2) is plausible since RP coverage is required for many dose significant jobs and/or the dose rates are unknown.
 - D. Correct. Part (1) is correct. This is an TCOA (23 MIN) to ensure the ECCS suction is ready to transfer when BWST level is 9.0 ft. Part (2) is correct. A worst-case dose of 2 REM was predicted. Failure to follow the prescribed route could result in a significantly higher dose. This dose is within the limits established for annual personnel dose and planned special exposure.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP or SG TUBE RUPTURE
 (Attach if not previously Attachment 7, words at the front of Attachment and Warning
 provided, including Attachment 7, DB-OP-02000 Basis document, DB-OP-02005 PRIMARY
 version/revision number.) INSTRUMENTATION ALARM PANEL 5 ANNUNCIATORS PURIFICATION

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / Fundamental Knowledge X
 Comprehension / Analysis / Higher
 Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(5)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q41

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000026	K2.01
Importance Rating	3.9	

K/A Statement: Knowledge of electrical power supplies to the following CONTAINMENT SPRAY SYSTEM: Containment spray pumps

Proposed Question:

The plant is operating at 100% RTP.

The following events then occur:

- A Large Break LOCA
- Total loss of offsite power
- Containment pressure is 42 psia
- Emergency Diesel Generator 1 fails to start and CANNOT be manually started

Based on these conditions, what will be the status of the Containment Spray Pumps?

Containment Spray Pump 1 will be (1) and
 Containment Spray Pump 2 will be (2) .

- A. (1) running
 (2) running
- B. (1) running
 (2) stopped
- C. (1) stopped
 (2) stopped
- D. (1) stopped
 (2) running

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect – Containment Spray Pump 1 (P56-1) will have no power since EDG 1 did not start - Plausible as both pumps would have received a start signal on high containment pressure of 40 psia.
- B. Incorrect – Containment Spray Pump 2 (P56-2) will have a start signal from high containment pressure, and it will have power from the EDG 2. Containment Spray Pump 1 (P56-1) will have no power since EDG 1 did not start – Plausible as the actual condition is one

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q41

containment spray pump running and one NOT running due to containment pressure and the loss of power to a safety bus.

- C. Incorrect – Containment Spray Pump 2 (P56-2) will have a start signal from high containment pressure, and it will have power from the EDG 2. Containment Spray Pump 1 (P56-1) will have no power since EDG 1 did not start – Plausible if candidate does not know SFAS Level 4 setpoint for high containment pressure.
- D. Correct – Containment Spray Pump 2 (P56-2) will have a start signal from high containment pressure, and it will have power from the EDG 2. Containment Spray Pump 1 (P56-1) will have no power since EDG 1 did not start.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE; SD 022A, SYSTEM DESCRIPTION FOR CONTAINMENT SPRAY
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: OPS-SYS-306-10K
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam DB 2011 Q44 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q42

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000039	A3.01
Importance Rating	2.8	

K/A Statement: Ability to monitor automatic features of the MAIN AND REHEAT STEAM SYSTEM, including: Moisture separator reheater steam supply

Proposed Question: The Reactor is being maneuvered from 100% to 5% RTP in accordance with DB-OP-06902, POWER OPERATIONS:

MS 195A and MS 195B RSHLVs (Reheat Steam High Load Valves), will automatically CLOSE when unit load reaches approximately _____.

- A. 850 MWe
- B. 600 MWe
- C. 270 MWe
- D. 90 MWe

Proposed Answer: **B**

Explanation (Optional):

- A. Incorrect – 850 Mwe corresponds to ~90% power which is where the Auxiliary Feed Pump Turbine Main Steam Minimum flow lines are removed from service.
- B. Correct – 2nd Stage Reheat HI Load Valves (MS 195A & B) Auto Close at 600 MWe (sensed by Cross around pressure).
- C. Incorrect – Plausible as 270 MWe (LLs) is power when DB-OP-06902, POWER OPERATIONS direct that S/G REACTOR DEMAND H/A Station is placed in HAND.
- D. Incorrect – Plausible as 10% turbine load (90 MWe) (sensed by cross around pressure) is when the 2nd Stage Reheat Source valves automatically close.

Technical Reference(s): DB-OP-06902, POWER OPERATIONS (p81)
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q42

Learning Objective: OPS-SYS-204
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher
Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(7)
55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q43

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000053	A1.09
Importance Rating	3.6	

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operation of the INTEGRATED CONTROL SYSTEM (BW), including: RCS flow (RCP status)

Proposed Question:

Plant conditions:

- The plant is at 79% RTP
- Normal equipment lineups exist
- ICS is in automatic

Subsequently, Reactor Coolant Pump 1-1 trips.

With the above condition, _____.

- A. RPS will trip the Reactor
- B. ICS will reduce reactor power to 45% RTP
- C. ICS will reduce reactor power to 55% RTP
- D. ICS will reduce reactor power to 75% RTP

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect – Plausible if the examinee believes the reactor will trip due to an RPS Flux/ Δ Flux/ Flow Trip or being above the 3 RCP Hi Flux Trip Setpoint for 3 RCP operations (80.6%) is manually set by I&C. In this case the Hi Flux Trip Setpoint is still at 104.7% RTP.
- B. Incorrect – Plausible as TS 3.1.4 power limit is 45% RTP when the combination of a dropped rod and 3 RCPs exists.
- C. Incorrect – Plausible as the limit for 1 MFW pump in operation is 55% and the limit when deaerator level is low is also 55% RTP.
- D. Correct – DB-OP-02014, MSR/ICS ALARM PANEL 14 ANNUNCIATORS alarm 14-3-C, ICS RCP LOSS RUNBACK has the operator verify the runback to 75% RTP due to the tripped RCP.

Technical Reference(s):

SD 045, SYSTEM DESCRIPTION FOR INTEGRATED CONTROL SYSTEM

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q43

(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: OPS-SYS-514-04K
(required, if available)

Question Source: Bank # _____
Modified Bank # X (note changes or attach parent)
New _____

Question History: Last NRC Exam DB 2008 Q61 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(5)
55.43 _____

Comments:

Modified by changing the event, and distractor with 55% value and reordered distractors.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q44

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000059	K1.13
Importance Rating	2.9	

K/A Statement: Knowledge of the physical connections and/or cause and effect relationships between the MAIN FEEDWATER SYSTEM and the following system: S/GB system

Proposed Question:

Initial Conditions:

- Startup is in progress at 10% RTP
- Steam Generator blowdown lines are in service

Which of the following WILL automatically isolate this flow path?

- A. Manual SFRCS Initiate ONLY actuation.
- B. Loss of all Reactor Coolant Pumps.
- C. Feedwater deviation that results in Steam Generator Low Level.
- D. Feedwater deviation that results in Steam Generator High Level.

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect – Manual actuation of SFRCS would result in the initiation of AFW but would not cause an isolation of blowdown. Plausible as SFRCS can isolate blowdown and SFRCS would INITIATE. In this instance, it would not cause isolation of blowdown.
- B. Incorrect – Loss of All RCPs trip provides mitigation for a loss of off-site power resulting in loss of four reactor coolant pumps, which causes loss of reactor coolant flow and therefore auxiliary feedwater is needed to establish reactor coolant natural circulation flow. Plausible as SFRCS can isolate blowdown and SFRCS would INITIATE. In this instance, it would not cause isolation of blowdown.
- C. Incorrect – The low-level trip does not differentiate which steam generator has low inventory or which steam generator signaled low level first. The SFRCS will not isolate main feedwater flow to and main steam from either steam generator but will initiate turbine driven auxiliary feedwater flow from both auxiliary feedwater trains to their respective steam generators. Plausible as SFRCS can isolate

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q44

blowdown and SFCRS would INITIATE. In this instance, it would not cause isolation of blowdown.

D. Correct – Steam Generator High Level causes an SFCRS INITIATION and ISOLATION. This isolation would cause blowdown to be isolated.

Technical Reference(s): SD 10, SYSTEM DESCRIPTION FOR STEAM AND FEEDWATER LINE
 (Attach if not previously RUPTURE CONTROL SYSTEM
 provided, including
 version/revision number.)

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam DB 2016 Q47 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge
 Comprehension / Analysis / **H**igher
 Cognitive X

10 CFR Part 55 Content: 55.41 (b)(2 to 9)
 55.43

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q45

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000061	A1.02
Importance Rating	3.8	

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operation of the AUXILIARY/EMERGENCY FEEDWATER SYSTEM, including: S/G pressure

Proposed Question:

The plant tripped from 100% RTP.

- Steam Generator 1 pressure is 600 psig; level is 52 inches
- Steam Generator 2 pressure is 640 psig; level is 58 inches

Which of the following is the expected plant response to these plant conditions?

- A. AFW is feeding Steam Generator 1 ONLY
- B. AFW is feeding Steam Generator 2 ONLY
- C. MFW is feeding BOTH Steam Generators
- D. AFW is feeding BOTH Steam Generators

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – Plausible as AFW starts on low SG water level (23.5”). SG 1 has a lower level but is above the AFW start setpoint. SG 1 is below the AFW auto start on SFRCS actuation and isolation for low steam pressure (< 630 psig). Plausible if student assesses that the low pressure SG requires AFW flow.
- B. Correct – The SFRCS Actuation /Isolation setpoint for Steam Line Low Pressure is 630 psig per Table 3.3-1, SFRCS Setpoints, located in System Description (SD-10), Rev. 7. Therefore, SG 1 will be isolated and SG 2 will be fed from AFW.
- C. Incorrect – Plausible as MFW was feeding both SGs at the start of the event and would continue to feed both SGs until pressure < 630 psig or level <23.5”.
- D. Incorrect – Plausible as SG 1 is below the SFRCS low pressure actuation and isolation set point which causes AFW to auto start.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q45

Technical Reference(s): Drawing OS-17A, Sheet 1, AUXILIARY FEEDWATER SYSTEM, Rev. 35;
 (Attach if not previously SD-10, STEAM AND FEEDWATER LINE RUPTURE CONTROL SYSTEM
 provided, including (SFRCs), Rev. 7
 version/revision number.)

Proposed references to be provided None
 to applicants during examination:

Learning Objective: OPS-SYS-523-04K
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam DB 2004 Q47 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge
 Comprehension / Analysis / **H**igher
 Cognitive X

10 CFR Part 55 Content: 55.41 (b)(5)
 55.43

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q46

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000061	A4.03
Importance Rating	4.1	

K/A Statement: Ability to manually operate and/or monitor the AUXILIARY/EMERGENCY FEEDWATER SYSTEM in the control room: AFW pump turbines

Proposed Question:

Initial conditions:

- The plant is shutdown due to an extended loss of offsite power event
- Both Emergency Diesel Generators are running and are supplying the C1 and D1 busses
- The SBO Diesel Generator is powering the D2 bus
- Both Auxiliary Feedwater Pumps (AFP) are running being supplied by Main Steam
- Condensate Storage Tank levels are 5.0 feet in both tanks and slowly lowering

Subsequently,

- 10-5-G, AFP 1 SUCTION PRESS LO is LIT
- 10-5-H, AFP 2 SUCTION PRESS LO is LIT
- 10-4-1, AFP 1 TRBL is LIT
- SW1382, SERVICE WATER SUPPLY TO AFPT1 has failed in the CLOSED position

As the Control Room Operator, you MUST _____.

- A. verify MS106 and MS106A (Main Steam supply to AFPT1) are CLOSED
- B. start the Motor Driven Feedwater Pump
- C. stop both AFPs and initiate MU/HPI cooling
- D. start the Emergency Feedwater Pump

Proposed Answer:

 A

Explanation (Optional):

- A. Correct – With a AFP 1 TRBL ALARM in (pump suction <3.8 psig for >60 seconds) the AFPT steam inlet valves auto close to prevent pump damage.
- B. Incorrect – Plausible since the MDFP does have a power source and can receive water from the SW System; however it would require a manual valve lineup.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q46

- C. Incorrect – Plausible since this would be the mode of cooling if all feedwater was lost; however, feedwater will not be lost in this situation since SW will supply water to AFP 2.
- D. Incorrect – Plausible if main and auxiliary feedwater were lost this would be the required action. In this instance service water is still available to AFP2.

Technical Reference(s): SD 015, SYSTEM DESCRIPTION FOR AUXILIARY FEEDWATER SYSTEM;
 (Attach if not previously DB AFW Simplified Powerpoint
 provided, including
 version/revision number.)

Proposed references to be provided None
 to applicants during examination:

Learning Objective: OPS-SYS-523-04K
 (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam DB 2008 Q24 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher
 Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

Question was modified by changing stem conditions to make distractor A now the correct and answer. Original correct answer D was replaced with a new distractor.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q47

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000062	K6.02
Importance Rating	3.4	

K/A Statement: Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the AC ELECTRICAL DISTRIBUTION SYSTEM: Breakers, relays, and disconnects

Proposed Question:

- Given the following plant conditions:
- HPI 1 pump breaker is in the TEST position
 - Control power fuses are installed

The primary breaker connection _____ (1) _____ connected to the bus.
 The breaker can be operated _____ (2) _____.

Which of the following completes the statements above?

- A. (1) is NOT
 (2) remotely ONLY
- B. (1) is NOT
 (2) locally or remotely
- C. (1) is
 (2) remotely ONLY
- D. (1) is
 (2) locally or remotely

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – First part is correct. Second part is incorrect. Plausible if the applicant believes that with the breaker in test, it can only be operated with the same control room switch used to start the pump.
- B. Correct – Each breaker unit of 4160 switchgear has operating, test, and withdrawn positions. In the test position, the primary contacts are disconnected, and the auxiliary contacts for breaker and control circuit testing from local or remote points are operable. In the withdrawn position, all connections are disconnected.
- C. Incorrect – First part is incorrect. Plausible because when in TEST the auxiliary contacts for breaker and control circuit testing is operable. Second part is incorrect. Plausible if the applicant believes that with the breaker in TEST, it can only be operated with the same

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q47

control room switch used to start the pump.

- D. Incorrect – First part is incorrect. Plausible because when in TEST the auxiliary contacts for breaker and control circuit testing are operable. Second part is correct.

Technical Reference(s): SD 003A, 4160 VOLT AUXILIARY SYSTEM (p2-13 first bullet)
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: OPS-SYS-405-5K
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam Oconee 2018 (if applicable)
Q49

Question Cognitive Level: Memory / **F**undamental Knowledge
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q48

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000063	A2.04
Importance Rating	3.9	

K/A Statement: Ability to (a) predict the impacts of the following on the DC ELECTRICAL DISTRIBUTION SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Battery malfunctions

Proposed Question: Technical Specification Surveillance Requirement 3.8.6.5 is in progress on Station Battery 1P when the following information is determined:

- A Float Charge in progress
- Pilot Cell 42 has an Individual Cell Voltage (ICV) of 2.05 VDC
- Electrolyte temperature is 85°F
- Float current is 3 amps

Based on this information what must the crew IMMEDIATELY do?

- A. Declare Battery 1P INOPERABLE.
- B. Raise battery charger DBC1P DC output voltage.
- C. Start an additional ventilation fan in the Battery 1P room.
- D. Perform a Battery Discharge Performance Test on Station Battery 1P.

Proposed Answer: **A**

Explanation (Optional):

- A. Correct – With an ICV < 2.07 V and float current > 2 amps battery 1P must be declared INOPERABLE immediately per TS 3.8.6, Condition F.
- B. Incorrect – Plausible as the applicant will have recognized that ICV is low and that TS 3.8.6 requires correction in 24 hours most likely by performing an equalizing battery charge which includes raising charger output voltage.
- C. Incorrect – Plausible as increasing ventilation is a requirement if hydrogen concentration or temperature in the battery compartment is out of specification.
- D. Incorrect – Plausible as this is a required action if the applicant assesses that the battery shows signs of its battery capacity < 80% RTP.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q48

Technical Reference(s): TECHNICAL SPECIFICATION 3.8.6, BATTERY PARAMETERS; DB_DC
(Attach if not previously INST POWER POWERPOINT (p3.8.6-1)
provided, including
version/revision number.)

Proposed references to be provided None
to applicants during examination:

Learning Objective: OPS-SYS-409-08K
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
Comprehension / Analysis / **H**igher
Cognitive X

10 CFR Part 55 Content: 55.41 (b)(5)
55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q49

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000064	K4.01
Importance Rating	4.0	

K/A Statement: Knowledge of EMERGENCY DIESEL GENERATOR SYSTEM design features and/or interlocks that provide for the following: Trips while loading the EDG (frequency, voltage, and speed)

Proposed Question: Emergency Diesel Generator (EDG) 1 started and connected to its associated bus in response to a loss of offsite power:

 If protective trip _____ actuates, AC101, EDG 1 Output Breaker will OPEN AND the engine will shutdown.

- A. engine overspeed
- B. low lube oil pressure
- C. high jacket water temperature
- D. reverse power

Proposed Answer: **A**

Explanation (Optional):

- A. Correct – The Engine Overspeed trip will open the output breaker and cause the engine to shutdown during an under-voltage emergency start condition.
- B. Incorrect – Plausible if the applicant does not recall that this trip is bypassed during emergency starts.
- C. Incorrect – Plausible if the applicant does not recall that this trip is bypassed during emergency starts.
- D. Incorrect – Plausible if the applicant does not recall that this trip is bypassed during emergency starts.

Technical Reference(s): SD 03B R7, SYSTEM DESCRIPTION FOR EMERGENCY DIESEL GENERATORS AND STATION BLACKOUT DIESEL GENERATORS (p1-10, p2-21)
 (Attach if not previously provided, including version/revision number.)

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q49

Proposed references to be provided None
to applicants during examination:

Learning Objective: OPS-SYS-406-12K
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q50

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000073	A4.04
Importance Rating	3.2	

K/A Statement: Ability to manually operate and/or monitor the PROCESS RADIATION MONITORING SYSTEM in the control room: Alarm and/or interlock setpoint checks and adjustments

Proposed Question: The BOP Reactor Operator inadvertently set the WARN Alarm setpoint higher than the HIGH Alarm setpoint on RI 1770A1, CLEAN WASTE SYSTEM OUTLET radiation monitor.

How will the individual be notified of this error?

- A. The digits will flash when the HIGH pushbutton is depressed to check the HIGH Alarm setpoint.
- B. Annunciator (7-1-B) CLN WST SYS OUT RAD HI will alarm after entering the HIGH Alarm setpoint.
- C. An error code will be displayed on RI 1770A1 when the WARN Alarm setpoint is entered.
- D. The WARN lamp will flash when the module is placed back into the panel.

Proposed Answer: **C**

Explanation (Optional):

- A. Incorrect – Plausible since the digits normally flash when entering the setpoints.
- B. Incorrect – Plausible since 7-1-B comes into alarm when doing the functional test.
- C. Correct – IAW DB-OP-03011, Attachment 20 NOTE 2, an error message will be displayed if the HIGH Alarm setpoint is adjusted lower than the WARN Alarm setpoint.
- D. Incorrect – Plausible as this is a valid indication for the Ri1770A1 when the WARN/ALERT Alarm setpoint has been exceeded. The module has to be partially pulled from the panel when setting the alarms.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q50

Technical Reference(s): SD 017A, SYSTEM DESCRIPTION FOR PROCESS RADIATION
(Attach if not previously MONITORS; DB-OP-03011, RADIOACTIVE LIQUID BATCH RELEASE
provided, including version/revision number.)

Proposed references to be provided None
to applicants during examination:

Learning Objective: OPS-SYS-111-05K
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher
Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(7)
55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q51

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000076	K3.04
Importance Rating	2.7	

K/A Statement: Knowledge of the effect that a loss or malfunction of the SERVICE WATER SYSTEM will have on the following systems or system parameters: Turbine building CCW

Proposed Question:

The Reactor is at 75% RTP with the following lineup:

- Service Water (SW) Pumps 1 and 2 are in service
- SW Pump 2 is supplying the secondary loads
- Turbine Plant Cooling Water (TPCW) Heat Exchanger 1 and 2 are in service
- TIC630, #1 TPCW HX TEMPERATURE CONTROLLER is in MANUAL, controlling at 85°F
- TIC631, #2 TPCW HX TEMPERATURE CONTROLLER is in AUTO, set point at 85°F

Subsequently,

A crack develops in the sensing line for PSL 1377A, SERVICE WTR PMP 2 DISCH, resulting in pressure lowering to 47 psig on PSL 1377A.

What is the expected plant response to these conditions?

- A. SW1395, SW HDR 2 TO TPCW HX, CLOSES.
- B. SW1399, SW HDR 1 TO TPCW HX, OPENS.
- C. SW1395 AND SW1399 receive CLOSE signals.
- D. SW630, TPCW HX 1 TEMPERATURE REG OUTLET fully OPENS.

Proposed Answer:

A

Explanation (Optional):

- A. Correct – SW 1395 is interlocked with and CLOSES when PSL 1377A drops below 48.5 psig to protect essential SW loads from a potential break in the non-essential SW piping.
- B. Incorrect – Plausible if the applicant assesses that a loss of cooling to the secondary loads would be automatically accounted for by aligning SW train 1.
- C. Incorrect – Plausible as SW1399 is interlocked with PSL1376A and would close if PSL1376A was also reading < 50 psig. PSL1376A is not affected by this leak and would be reading normally at ~100

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q51

psig.

- D. Incorrect – Plausible as isolation of Service Water to the TPCW Heat Exchanger would cause temperatures in the TPCW system to rise and if TC630 was in AUTO, SW630 would OPEN to counter rising temperature.

Technical Reference(s): SD-018, SW SYSTEM DESCRIPTION; SD-021, TPCW SYSTEM DESCRIPTION; DB-OP-02511, LOSS OF SW PUMPS/SYSTEMS; DB-OP-02514, TURBINE PLANT COOLING WATER MALFUNCTIONS; AND M-041A, B, & C, SW PIPING DIAGRAMS. OS-020 SH1 R104, OS-020 SH2 R54 CL-6, DB-OP-06261 R75 (p23), SW SYSTEM OPERATING PROCEDURE (Note 3.1.9.e through 3.1.9.1).

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam N/A (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q52

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000078	A3.03
Importance Rating	2.9	

K/A Statement: Ability to monitor automatic features of the INSTRUMENT AIR SYSTEM, including: Air compressor loading/unloading

Proposed Question:

The reactor is at 100% RTP with the following Instrument and Station Air Compressor (SAC) Configuration:

- SAC-2 in Lead
- SAC-1 in Standby
- EIAC in Standby

Subsequently, SAC 2 malfunctions and is running unloaded.

If SAC 1 does NOT Auto Start, the EIAC should Auto Start when the EIAC Receiver air pressure lowers to _____.

- A. 100 psig
- B. 97 psig
- C. 95 psig
- D. 90 psig

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Plausible because SAC 1 Auto Starts at 100 psig.
- B. Incorrect – Plausible since 9-3-E STA AIR HDR PRESS LO Alarm comes in at 97 psig.
- C. Correct – Since the outlet piping of all 3 receivers is connected via normally OPEN valves, all 3 receivers would experience the drop in pressure when SAC 2 is running unloaded and SAC 1 fails to start. The EIAC will START when pressure in its receiver is 95 psig and lowering.
- D. Incorrect – Plausible since SA valves begin to throttle close at 90 psig.

Technical Reference(s):

SD-001, INSTRUMENT AIR SYSTEM DESCRIPTION; DB-OP-02528 LOSS OF INSTRUMENT AIR ABNORMAL OPERATING PROCEDURE; DB-OP-06251, STATION AND INSTRUMENT AIR SYSTEM OPERATING

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q52

(Attach if not previously provided, including version/revision number.) PROCEDURE; AND M-015A, C, & D, INSTRUMENT AIR PIPING DIAGRAMS

Proposed references to be provided to applicants during examination: None

Learning Objective: OPS-SYS-602-08K
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(7)
55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q53

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	000078	A4.03
Importance Rating	3.2	

K/A Statement: Ability to manually operate and/or monitor the INSTRUMENT AIR SYSTEM in the control room: Isolation/restoration of instrument air to isolated components/systems

Proposed Question: A reactor startup is in progress with power 35% RTP and all four Reactor Coolant Pumps (RCPs) in service.

Subsequently, a small earthquake (magnitude LESS THAN the Safe Shutdown Earthquake) causes leaks in the instrument air piping which results in a loss of ALL available air to the following components:

- MU3, LETDOWN ISOLATION VALVE
- MU32, MAKE-UP FLOW CONTROLLER
- MU38, RCP SEAL RETURN ISOLATION VALVE
- MU39, BATCH FLOW CONTROLLER
- SW1424, COMPONENT COOLING WATER (CCW) HEAT EXCHANGER 1-1 TEMPERATURE CONTROL VALVE

What is the expected component response to these malfunctions?

- A. MU3 fails CLOSED isolating Letdown.
- B. MU38 fails OPEN maintaining RCP Seal Return flow.
- C. MU32 fails AS-IS maintaining current makeup flow to the RCS.
- D. SW1424 fails AS-IS maintaining stable CCW system temperature.

Proposed Answer: **A**

- Explanation (Optional):
- A. Correct – MU3 fails CLOSED on a loss of instrument air isolating Letdown.
 - B. Incorrect – MU38 fails CLOSED on a loss of instrument air. Plausible as MU19 RCP Seal Injection Flow Controller fails open on a loss of instrument air.
 - C. Incorrect – MU32 fails OPEN on a loss of instrument air. Plausible since other valves lockup in their current position on certain failures.
 - D. Incorrect – SW1424 fails OPEN on a loss of instrument air. Plausible if the applicant does not remember failure mode of SW1424 and

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q53

believes it is reasonable to maintain stable CCW system temperature.

Technical Reference(s): SD-001, INSTRUMENT AIR, SD-018, SERVICE WATER, AND SD-048, MAKEUP AND PURIFICATION SYSTEM DESCRIPTIONS; DB-OP-02528 LOSS OF INSTRUMENT AIR ABNORMAL OPERATING PROCEDURE; RA-EP-02820, EARTHQUAKE EMERGENCY PLAN OFF NORMAL OCCURRENCE PROCEDURE; DB-OP-06006, MAKEUP AND PURIFICATION SYSTEM PROCEDURE; DB-OP-06902, POWER OPERATIONS; M-031A, B, & C, MAKE UP & PURIFICATION, M-041B, PRIMARY SERVICE WATER, AND M-900I, INSTRUMENT AIR PIPING DIAGRAMS PIPING DIAGRAMS

DB-OP-02528 R28, LOSS OF IA ABN OPERATING PROCEDURE. (p51) (p50 MU32, 51 MU3, 59 MU38,66 SW1424). OS-002 for MU&P valve failure positions.

Proposed references to be provided to applicants during examination: None

Learning Objective: OPS-SYS-602-08K (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q54

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	103	K3.04
Importance Rating	3.0	

K/A Statement: Knowledge of the effect that a loss or malfunction of the CONTAINMENT SYSTEM will have on the following systems or system parameters: Shield building vent system

Proposed Question: The reactor is at 100% RTP.
 Fuel Handling is in progress.
 The Zone 3 operator reports that one of the blowout panels in MPR 4 is damaged. Light can be seen through the damaged panel.

Which of the following ventilation system(s) is(are) impacted?

- A. Station Emergency Ventilation System (EVS) Train 2 ONLY
- B. Station EVS Trains 1 and 2
- C. Aux Building Radwaste Ventilation System
- D. Fuel Handling Ventilation System

Proposed Answer: **B**

Explanation (Optional):

- A. Incorrect – Both trains of Station EVS draw on MPR 4. Plausible if the candidate believes the event numbered rooms go to the even numbered train of EVS.
- B. Correct – The EVS trains are redundant to another. Each train has separate ductwork but both trains draw from Mechanical Penetration Room 4. Therefore, a leak on the blowout panel will impact the ability to draw the designed 0.25" vacuum between the annulus to atmosphere.
- C. Incorrect – Aux Building Radwaste Ventilation does not draw a suction on MPR 4. Plausible since MPR 4 is considered a part of the auxiliary building.
- D. Incorrect – Fuel Handling Ventilation does not draw off MPR 4. Plausible since fuel handling operations in the SFP are in progress and the SFP Area EVS system shares ductwork and fans with the

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q54

Station EVS.

Technical Reference(s): OS-033D R16, EMERGENCY VENTILATION SYSTEM
(Attach if not previously SD-022C, EMERGENCY VENTILATION SYSTEM DESCRIPTION; Section
provided, including 1.1, System Boundaries and Functions, 1.2.1 Design Requirements
version/revision number.) Section 2.1.2, pages 2-1 to 2-2, EVS Fan C30-1 started by RE8446 and
EVS Fan C30-2 started by RE8447; DB-OP-00030 FUEL HANDLING
OPERATIONS AND DB-OP-06904, SHUTDOWN OPERATIONS
PROCEDURES; OS-034 SH.1&3, AUXILIARY BUILDING RADIOACTIVE
HVAC SYSTEMS OPERATIONAL SCHEMATICS

Proposed references to be provided None
to applicants during examination:

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
Comprehension / Analysis / **H**igher
Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7) _____
55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q55

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	00002	A4.03
Importance Rating	4.0	

K/A Statement: Ability to manually operate and/or monitor the REACTOR COOLANT SYSTEM in the control room: Indications and controls necessary to recognize and correct saturation conditions

Proposed Question:

A Reactor Trip has occurred from 100% RTP.

- The following conditions are noted:
- SFAS Actuation - Levels 1-3
- Subcooling Margin indicates 0°F
- Incore Thermocouple temperatures are lowering and alternating between saturated and superheated conditions (approximately 10°F superheated)
- RCS Temperature vs. Pressure plot is trending parallel to the Saturation Curve

All actions for DB-OP-02000, RPS, SFAS, SFRCS TRIP AND SG TUBE RUPTURE for these plant conditions have been completed.

Which of the following describes the primary mode of RCS cooling for these conditions?

- A. Forced Circulation Cooling.
- B. Single Phase Natural Circulation Cooling.
- C. Conduction Cooling.
- D. Boiler Condenser Cooling.

Proposed Answer:

D

Explanation (Optional):

At Davis-Besse, the term Boiler Condenser is used vice Reflux. This knowledge is required to determine if the appropriate EOP Section to mitigate the event is Loss of Subcooling Margin or Inadequate Core Cooling. During Boiler Condenser Cooling, Incore thermocouples can trend slightly superheated, but that is not an indication that core cooling is inadequate. Direction to address the situation presented is provided by DB-OP-02000, Section 5, Loss of Subcooling Margin.

The following discussion of Boiler Condenser Cooling is provided by the Technical Bases Document Volume 3 (this is the generic EOP

Examination Outline Cross-Reference: Q55

Bases for all B&W plants) "Boiler condenser cooling occurs when RC is boiled in the reactor core forming steam (removing core heat) which then flows through the hot leg piping to the SG where it condenses in the SG tubes. The condensed water then returns to the core by the cold leg piping. For the condensed water to flow back into the reactor core, the RC water level in the SG must be above the elevation of the RCP internal lip. This will provide the driving force to allow the water in the cold leg pipe to flow up and over the RCP discharge into the reactor vessel."

- A. Incorrect – Plausible because forced circulation is the primary means of heat transfer following a reactor trip. Candidate should understand the EOP actions have been completed and must know that RCPs are shutdown on a loss of SCM (SCM is less than 20°F subcooled), therefore Forced Circulation is incorrect.
- B. Incorrect – Plausible because Single Phase Natural Circulation Cooling is the primary means of heat transfer following a reactor trip when RCPs are not available. Candidate should understand the EOP actions have been completed and must know that RCPs are shutdown on a loss of SCM (SCM is less than 20°F subcooled), therefore single-phase Natural Circulation is incorrect.
- C. Incorrect – Plausible because conduction heat transfer from the RCS to Containment is occurring because the temperature of the RCS is higher than the temperature of Containment. Reflective insulation is installed on RCS piping to limit this heat transfer. While conductive heat transfer is occurring, it is not the primary mode of RCS cooling, therefore Conductive Cooling is incorrect.
- D. Correct – With the RCS Saturated, Boiler condenser cooling occurs when RC is boiled in the reactor core forming steam (removing core heat) which then flows through the hot leg piping to the SG where it condenses in the SG tubes. The condensed water then returns to the core by the cold leg piping. For the conditions provided, boiling in the core is occurring (Subcooling Margin indicates 0°F). Lowering incore temperatures indicate cooling is occurring. For these plant conditions, that cooling would be boiler condenser cooling, therefore this response is the only correct response.

Technical Reference(s):
(Attach if not previously
provided, including
version/revision number.)

DB-OP-02000 Bases and Deviation Document R22, Step 5.6. & 9.0
B&W Technical Bases Document Volume 3 R12, Page III.B.12 (page 168
of 862 on pdf viewer)

Proposed references to be provided
to applicants during examination: None

Learning Objective: OPS-GOP-300-09K
(required, if available)

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q55

Question Source: Bank # X
Modified Bank # _____ (note changes or attach parent)
New _____

Question History: Last NRC Exam 2022 NRC Q4 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q56

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	000014	K2.04
Importance Rating	3.0	

K/A Statement: Knowledge of electrical power supplies to the following: ROD POSITION INDICATION SYSTEM: Rod position main control room display panel

Proposed Question:

Reactor Power was operating at 100% RTP.

A loss of Off-Site power occurs causing the reactor to trip.

The CRD Position Indication Panel ____ (1) ____ indicate Relative Rod Position.

The individual 0 Percent lights will be ____ (2) ____ for Groups 1-7.

- A. (1) will
(2) ON
- B. (1) will
(2) OFF
- C. (1) will NOT
(2) ON
- D. (1) will NOT
(2) OFF

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Part 1 is wrong. E2 and F2 are depowered when off-site power is lost. Plausible since Relative position now changes to 0 when the reactor is tripped. Part 2 is correct. YBU provides backup power to the 0% LED lights.
- B. Incorrect – Part 1 is wrong. E2 and F2 are depowered when off-site power is lost. Plausible since Relative position now changes to 0 when the reactor is tripped. Part 2 is wrong. YBU provides backup power to the 0% LED lights. Plausible since redundant indications should come from different power supplies.
- C. Correct – E2 and F2 are depowered when off-site power is lost. Relative position indication will be lost. YBU provides backup power

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q56

to the 0% LED lights.

- D. Incorrect – Plausible since it may be assumed that power is lost to the PI Panel due to the loss of Off-Site power and reactor status (Immediate Action) is checked by NIs not Rod Position.

Technical Reference(s): DB-OP-02542 R17, LOSS OF YBU (p11)
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q57

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	000015	G2.2.2
Importance Rating	4.6	

K/A Statement: NUCLEAR INSTRUMENTATION SYSTEM EQUIPMENT CONTROL: Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels

Proposed Question:

The crew is performing DB-OP-06901, PLANT STARTUP and DB-OP-06912, APPROACH TO CRITICALITY.

While the Reactor Operator is withdrawing Group 6, the following plant parameters/conditions are observed:

- Rod Index is at 130 and rising
- Startup Rate rises to 1.0 decade per minute (DPM)
- Source Range Nuclear Instrument (NI) counts are 1400 and rising

The Reactor Operator STOPS withdrawing Regulating Group 6, and observes the following plant parameters/conditions:

- Rod Index is at 150 and steady
- Startup Rate is 0.8 decade per minute (DPM) and steady
- Source Range Nuclear Instrument (NI) counts are 1650 and rising

What action should the Reactor Operator take in response to the indicated plant parameters/conditions with NO Rod motion?

- A. Immediately insert control rods to reduce the Startup Rate to less than 0.5 DPM.
- B. Maintain current Rod Index until the Point of Adding Heat (POAH) is reached to stabilize power.
- C. Continue WITHDRAWING Rods in small increments to re-establish a Startup Rate of 1.0 DPM.
- D. TRIP the reactor because the Source Range NIs are not responding correctly.

Proposed Answer:

A

Explanation (Optional):

- A. Correct – The applicant must recognize that 0.8 DPM is too high and that rods must be inserted to lower DPM to 0.5 or less (per DB-OP-06912 precaution 2.1.2).

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Examination Outline Cross-Reference: Q57

- B. Incorrect – SUR is too high with no rod motion and that rods must be inserted to lower DPM to 0.5 or less (per DB-OP-06912 precaution 2.1.2). Plausible since the POAH is the next power level that the plant is raised to, after the Reactor becomes critical.
- C. Incorrect – The maximum startup rate with no rod motion out is 0.5 decade per minute (DPM). The maximum startup rate during control rod withdrawal is 1.0 DPM. Plausible if the applicant forgets the SUR restrictions but recognizes that the reactor is not yet critical and rods must be withdrawn to add reactivity to bring the reactor critical.
- D. Incorrect – The maximum startup rate with no rod motion out is 0.5 decade per minute (DPM). Plausible if the applicant believes the reactor should be tripped when the maximum SUR is exceeded.

Technical Reference(s): SD-044, NUCLEAR INSTRUMENTATION/REACTOR PROTECTION SYSTEM DESCRIPTION; DB-OP-02505, NUCLEAR INSTRUMENTATION FAILURES; DB-OP-06403, REACTOR PROTECTION SYSTEM (RPS) AND NUCLEAR INSTRUMENTATION (NI) OPERATING PROCEDURE; DB-OP-06901, PLANT STARTUP; DB-OP-06912, APPROACH TO CRITICALITY (Steps 2.1.2 and 2.1.3 p3)

(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(6)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q58

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	000016	A1.01
Importance Rating	3.2	

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operation of the NONNUCLEAR INSTRUMENTATION SYSTEM, including: Lights and alarms

Proposed Question: Steam Generator 1 Startup Range Level transmitter selected to ICS rapidly fails to 0 inches.

The following annunciators alarm:

- 14-4-E, ICS INPUT MISMATCH
- 14-4-F, ICS INPUT TRANSFER

The plant remains stable at 100% RTP.

The light(s) behind ____ (1) ____ pushbutton selector switch(es) is(are) lit.

The ____ (2) ____ pushbutton(s) MUST be depressed to reset Annunciators 14-4-E and 14-4-F.

- A. (1) BOTH X and Y
(2) associated SASS Annunciator RESET AND the Y selector switch
- B. (1) BOTH X and Y
(2) associated SASS Annunciator RESET ONLY
- C. (1) Y ONLY
(2) associated SASS Annunciator RESET AND the Y selector switch
- D. (1) Y ONLY
(2) associated SASS Annunciator RESET ONLY

Proposed Answer: **B**

Explanation (Optional): A. Incorrect – Plausible since part (1) is correct. The automatic transfer from the failed signal to the good signal is indicated to the operator both by the lights behind the pushbutton selector switches and by the station annunciator. Part (2) is wrong. Depressing just the SASS Annunciator RESET pushbutton for the appropriate SASS module will clear the Control Room Annunciator Panel. Part 2 is plausible since the Y instrument is now providing the input to ICS.

Form 4.2-1 Written Examination Question Worksheet
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Examination Outline Cross-Reference: Q58

- B. Correct – Part (1): The automatic transfer from the failed signal to the good signal is indicated to the operator both by the lights behind the pushbutton selector switches and by the station annunciator. Part (2): Depressing the SASS Annunciator RESET pushbutton for the appropriate SASS module will clear the Control Room Annunciator Panel Alarm.
- C. Incorrect – Part (1) is wrong. It is plausible since the Y instrument is now providing the input to ICS. Part (2) is wrong. See distractor "A" for explanation.
- D. Incorrect – Part (1) is wrong. It is plausible since the Y instrument is now providing the input to ICS. Part (2) is correct.

Technical Reference(s): DB-OP-02014 R17, MSR/ICS ALARM PANEL 14 ANNUNCIATORS (14-4-E, p45, 14-4-F 47), DB-OP-06407 R20, NON NUCLEAR INSTRUMENTATION SYSTEM OPERATING PROCEDURE (Attachment 10, pages 65-66)
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(5)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q59

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	000033	K5.06
Importance Rating	3.7	

K/A Statement: Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the SPENT FUEL POOL COOLING SYSTEM: Shielding (water level)

Proposed Question:

The plant has just completed a refueling outage and returned to 100% RTP.

Spent Fuel Pool (SFP) water level is at its normal level.

Subsequently, a significant non-isolable crack develops at the connection between the SFP Pump discharge piping and the Decay Heat System.

Assuming NO OPERATOR ACTION, how is the plant impacted?

SFP water level will stop lowering at approximately (1) feet.
 Radiation levels on the SFP Bridge (2).

- A. (1) 23
(2) DO NOT change
- B. (1) 23
(2) will rise
- C. (1) 18
(2) DO NOT change
- D. (1) 18
(2) will rise

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect – Plausible as the Technical Specifications require level to be at least 23 feet above the spent fuel assemblies. SFP water level WILL LOWER to 18 Feet (EL. 596'-0"). The SFP Pump will stop drawing a suction from the spent fuel pool when level lowers below

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q59

19 feet and the return line will stop contributing to the leak when level reaches 18 feet due to modification MOD 99-0051 which cut the return line at the 18 foot elevation to prevent a piping failure from draining the pool any further. Area radiation levels WILL RISE due to less water shielding. Plausible if the applicant believes that the design will maintain constant level in the SFP.

- B. Incorrect – Plausible as the Technical Specifications require level to be at least 23 feet above the spent fuel assemblies. SFP water level WILL LOWER to 18 Feet (EL. 596'-0"). The SFP Pump will stop drawing a suction from the spent fuel pool when level lowers below 19 feet and the return line will stop contributing to the leak when level reaches 18 feet due to modification MOD 99-0051 which cut the return line at the 18 foot elevation to prevent a piping failure from draining the pool any further. Plausible because area radiation levels WILL RISE due to less water shielding and the applicant confuses the low water level alarm setpoint with the pump trip setpoint.
- C. Incorrect – Plausible as Part (1) is correct. Plausible as due to 4'-6" less water above the fuel racks, area radiation levels WILL RISE. Area radiation levels WILL NOT rise to ARM alarm setpoints.
- D. Correct – SFP water level WILL LOWER to 18 Feet (EL. 596'-0"). The SFP Pump will stop drawing a suction from the spent fuel pool when level lowers below 19 feet and the return line will stop contributing to the leak when level reaches 18 feet due to modification MOD 99-0051 which cut the return line at the 18 foot elevation to prevent a piping failure from draining the pool any further. Radiation levels WILL RISE due to less water shielding.

Technical Reference(s): DB-OP-02547 SPENT FUEL POOL COOLING MALFUNCTIONS; step 2.2.3, Attachment 1 SFP level schematic, M-035 SPENT FUEL POOL COOLING SYSTEM P&ID; OS-007 SPENT FUEL POOL COOLING SYSTEM OPERATIONAL SCHEMATIC; SD 024 SPENT FUEL POOL COOLING AND CLEANUP SYSTEM DESCRIPTION
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / Fundamental Knowledge _____

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q59

		Comprehension / Analysis / <u>H</u> igher Cognitive	
10 CFR Part 55 Content:	55.41	<u>(b)(5)</u>	<u>X</u>
	55.43	<u> </u>	

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q60

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	000034	K6.02
Importance Rating	3.4	

K/A Statement: Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the FUEL HANDLING EQUIPMENT SYSTEM: RMS

Proposed Question:

The plant is operating at 100% RTP.

- Movement of fuel in the Spent Fuel Pool is in progress

The following event occurs:

- RE 8446, Fuel Handling Area Ventilation System Exhaust Radiation Monitor fails HIGH.

How will the Fuel Handling and Emergency Ventilation Systems respond to these conditions?

Fuel handling supply and exhaust fans ____ (1) ____.
 Station EVS ____ (2) ____.

- A. (1) stay running
 (2) starts automatically
- B. (1) TRIP
 (2) starts automatically
- C. (1) stay running
 (2) stays shutdown
- D. (1) TRIP
 (2) stays shutdown

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – Plausible since a trip of related RE 5403, Fuel Area Exhaust Monitor will not cause Fuel Handling Supply and Exhaust to shutdown and since part (2) is correct.
- B. Correct – IAW OS-0033D and OS-034 sh1 fuel handling supply and exhaust FANS TRIP and EVS starts automatically on a RE 8446 High radiation alarming condition.
- C. Incorrect – Plausible since a trip of related RE 5403, Fuel Area Exhaust Monitor will not cause Fuel Handling Supply and Exhaust to

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q60

shutdown and EVS would stay shutdown.

- D. Incorrect – Plausible, in general process radiation monitors will cause realignment of the system and SU of the backup system. Plausible as EVS is manually started for high radiation in other Aux building ventilation systems.

Technical Reference(s): DB-OP-02530 FUEL HANDLING ACCIDENT, Attachment 5, background information, page 2 of 3 last paragraph describes FH ventilation shutting down and EVS starting up. SD-022C, EMERGENCY VENTILATION SYSTEM DESCRIPTION Section 2.1.2, pages 2-1 to 2-2, EVS Fan C30-1 started by RE8446 and EVS Fan C30-2 started by RE8447.
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam NRC 2011 Q62 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q61

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	000041	K1.09
Importance Rating	3.0	

K/A Statement: Knowledge of the physical connections and/or cause and effect relationships between the STEAM DUMP/TURBINE BYPASS CONTROL SYSTEM and the following systems: Main Turbine / Generator system

Proposed Question:

Initial Conditions:

- The Reactor is operating at 22% RTP
- Main Turbine Load is at 140 MWe
- PIC ICS 12B (A), TURB BYPASS VALVES are in AUTO

Subsequently:

- The Main Turbine trips
- PRS SP16, TURBINE THROTTLE PRESS reads 875 psig
- PIC ICS10, TURBINE THROTTLE PRESS CONTROL Setpoint is set at 870 psig

Based on these conditions, the TBVs should (1) because (2) .

- A. (1) remain CLOSED
 (2) the 115 psig reactor trip bias is in effect
- B. (1) throttle OPEN
 (2) Turbine Header pressure is < Setpoint +10 psig
- C. (1) remain CLOSED
 (2) the 50 psig bias is in effect with Main Turbine load < 92 MWe
- D. (1) throttle OPEN
 (2) Turbine Header pressure has exceeded its Setpoint

Proposed Answer: **D**

- Explanation (Optional):
- A. Incorrect – Plausible this would be true if the reactor and turbine tripped, the 125psi bias would be in effect so TBVs would be closed. With reactor power at 22% RTP, a turbine trip does not result in a reactor trip.
 - B. Incorrect – Plausible because with the reactor not tripped and the turbine NOT tripped but carrying < 92 MW of load and pressure error > 10 psi a 0psi bias is established so with header pressure greater

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q61

than setpoint TBVs would be open. Incorrect since the difference is < 10 psig.

- C. Incorrect – Plausible because with the reactor operating and the turbine NOT tripped but carrying < 92 MW of load and the TBVs initially closed and pressure error < 10psi, the 50psi bias goes into effect and with turbine header pressure < 920psi TBVs will remain closed.
- D. Correct – With power initially at 22% RTP, a turbine trip will not result in a reactor trip. With the reactor operating and the turbine tripped, the TBV bias goes to 0 psi so the TBVs will open to establish Turbine Header pressure at the setpoint of 870 psig.

Technical Reference(s): SD-012A, SYSTEM DESCRIPTION FOR MAIN STEAM SYSTEM.
 (Attach if not previously DB-OP-06401 R31 Attachment 9 for PC ICS10 operation (p114)
 provided, including Attachment 10 for TBV operation and bias.
 version/revision number.) Crib Notes for Main Steam System
 DB-OP-06401 R31 Attachment 9 (p114)

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher
 Cognitive X

10 CFR Part 55 Content: 55.41 (b)(2 to 9)
 55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q62

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	000050	K6.03
Importance Rating	2.7	

K/A Statement: Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the CONTROL ROOM VENTILATION: Plant pneumatic system

Proposed Question:

The Reactor is operating at 100% RTP when the following annunciators alarm and indications are observed:

- 9-3-E, STA AIR HDR PRESS LO
- 9-1-F, INSTR AIR HDR PRESS LO
- PI 810, INSTRUMENT AIR HEADER PRESSURE indication rapidly lowering
- PI 811, STATION AIR HEADER PRESSURE indication rapidly lowering

The crew entered DB-OP-02528, INSTRUMENT AIR SYSTEM MALFUNCTIONS due to a severe loss of Instrument Air.

Based on these conditions, the Control Room Normal Ventilation system will _____ (1)_____.

If a subsequent small break LOCA occurs and containment pressure reaches 19.0 psia, with NO operator action the Control Room Emergency Ventilation system (CREVS) will _____ (2)_____.

- A. (1) shutdown
(2) remain OFF
- B. (1) remain ON
(2) remain OFF
- C. (1) shutdown
(2) AUTO start
- D. (1) remain ON
(2) AUTO start

Proposed Answer:

A

Explanation (Optional):

- A. Correct – The CR Normal Ventilation (CRNV) system will isolate and stop operating when instrument air is lost. Specifically, Control Room isolation dampers 5301A-H and 5311A-H will fail closed which will result in the CRNV fans tripping. The CREV system requires

Examination Outline Cross-Reference: Q62

operators to manually start and align. The dampers associated with the CREV are motor operated and would not be affected by the loss of instrument air. The high containment pressure signal caused by the LOCA would give the CRNV an isolation signal (which has already occurred due to the loss of instrument air) but does not automatically start the CREV system.

- B. Incorrect – Plausible as the CREV system dampers are motor operated, but the CRNV are pneumatic and fail closed on a loss of instrument air. Part 2 is correct.
- C. Incorrect – Plausible as Part 1 is correct and an SFAS Level 1 signal (containment pressure > 18.7 psia) results in numerous automatic actions including an isolation of the CRNV but it does not auto align and start CREV which is unaffected by the loss of instrument air.
- D. Incorrect – Plausible as the CREV system dampers are motor operated, but the CRNV are pneumatic and fail closed on a loss of instrument air. Part 2 is plausible as an SFAS Level 1 signal (containment pressure > 18.7 psia) results in numerous automatic actions including an isolation of the CRNV but it does not auto align and start CREV which is unaffected by the loss of instrument air.

Technical Reference(s):
 (Attach if not previously provided, including version/revision number.)

SD 029A, SYSTEM DESCRIPTION FOR CONTROL ROOM NORMAL VENTILATION; SD 029B, SYSTEM DESCRIPTION FOR CONTROL ROOM EMERGENCY VENTILATION; DB-OP-02528, INSTRUMENT AIR SYSTEM MALFUNCTIONS Attachment 15, HVAC system actions, Note 1, all non-safety ventilation shuts down on loss of IA; TECHNICAL SPECIFICATIONS BASES B3.7.10, CONTROL ROOM EMERGENCY VENTILATION SYSTEM (CREVS) states that CREVS is manually started. P&ID 32A CL 2 & 3

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7)
 55.43 _____

Examination Outline Cross-Reference: Q62

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q63

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	000055	K4.01
Importance Rating	3.3	

K/A Statement: Knowledge of CONDENSER AIR REMOVAL SYSTEM design features and/or interlocks that provide for the following: Draw main condenser vacuum

Proposed Question: The Reactor is operating at 75% RTP when the following conditions occur:

- Air intrusion results in condenser vacuum lowering to 5" HgA.
- The crew has entered and is taking out the actions of DB-OP-02518, HIGH CONDENSER PRESSURE.

Based on these conditions, the Condenser Vacuum system will AUTOMATICALLY _____.

- A. open AS1933, STEAM SUPPLY STOP VALVE TO STEAM HOGGER to place the Steam Hogger on-line
- B. open the steam supply, suction, and discharge valves for SJAЕ #2
- C. start the Mechanical Hogger and its cooling water support system
- D. open pressure control valve VS1061, VACUUM CONTROL

Proposed Answer: **C**

Explanation (Optional):

- A. Incorrect – Plausible as the steam hogger is the preferred system for initially drawing condenser vacuum during a plant start. It is not used on-line. AS1933 has an auto closure signal when the station vent VS926 and VS926A are closed or if exhaust vent pressure > 4 psig but no auto open signal.
- B. Incorrect – Plausible as a supplemental manual action of DB-OP-02518 is to reconfigure the SJAЕ lineup to support improving vacuum conditions.
- C. Correct – With the Mechanical Hogger in standby (control switch in neutral) it receives an auto start signal along with its cooling water system when condenser vacuum degrades to 4.5" HgA.
- D. Incorrect – Plausible as PCV VS1061 helps control condenser vacuum in Auto by opening to allow air intrusion if there is too much vacuum

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q63

which could cause condenser tube vibrations.

Technical Reference(s): SD 026B, SYSTEM DESCRIPTION FOR CONDENSER VACUUM SYSTEM;
 (Attach if not previously DB-OP-02518, HIGH CONDENSER PRESSURE Step 4.3 is to verify the
 provided, including mechanical hogger starts, Attachment 1 manually checks SJAE and
 version/revision number.) closes PCV1061; DB-OP-06231, VACUUM SYSTEM, Crib Notes for
 Vacuum System

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher
 Cognitive X

10 CFR Part 55 Content: 55.41 (b)(7) _____
 55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q64

Level	RO	SRO
Tier #	3	
Group #		
K/A #	G2.1.17	
Importance Rating	3.9	

K/A Statement: CONDUCT OF OPERATIONS: Ability to make accurate, clear, and concise verbal reports

Proposed Question:

You have just performed a turnover assuming the At-the-Controls Operator (ATC) role.

In accordance with NOP-OP-1002, CONDUCT OF OPERATIONS the _____ MUST be verbally informed.

- A. Zone 3 Equipment Operator
- B. Balance of Plant (BOP) Reactor Operator
- C. Command SRO
- D. Shift Manager

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Plausible as the RO ATC gives specific verbal commands to during normal shift operations.
- B. Incorrect – Plausible as the RO ATC and BOP share the control room as a watch station and regularly communicate with each other.
- C. Correct – NOP-OP-1002, Step 4.1.8.4 states, “The Command SRO is verbally informed that the RO ATC function has been assumed.
- D. Incorrect – Plausible as numerous reports are required to be made the Shift Manager by members of the operating crew.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q64

Technical Reference(s): NOP-OP-1002, CONDUCT OF OPERATIONS 4.1.8.4
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / Fundamental Knowledge X
Comprehension / Analysis / Higher Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(10)
55.43 _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q65

Level	RO	SRO
Tier #	3	
Group #		
K/A #	G2.1.15	
Importance Rating	2.7	

K/A Statement: CONDUCT OF OPERATIONS: Knowledge of administrative requirements for temporary management direction, such as standing orders, night orders, or operations memoranda.

Proposed Question: In accordance with NOP-OP-1002, CONDUCT OF OPERATIONS, Night Orders are valid for a MAXIMUM of _____ day(s).

- A. 1
- B. 14
- C. 30
- D. 90

Proposed Answer: **B**

- Explanation (Optional):
- A. Incorrect – Plausible if the term Night Orders means that the information is only valid until the next day.
 - B. Correct – IAW NOP-OP-1002, Night Orders are for short-term communication only and are only valid for 14 days.
 - C. Incorrect – Plausible because NOP-OP-1002 discusses material deficiency tags which are required to be audited monthly.
 - D. Incorrect – Plausible because Standing Orders are reviewed on a Quarterly basis.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q65

Technical Reference(s): NOP-OP-1002, CONDUCT OF OPERATIONS, Step 4.15.2.2
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # (note changes or attach parent)
New

Question History: Last NRC Exam DB 2018 Q67 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive

10 CFR Part 55 Content: 55.41 (b)(10)
55.43

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q66

Level	RO	SRO
Tier #	3	
Group #		
K/A #	G2.2.6	
Importance Rating	3.0	

K/A Statement: Knowledge of the process for making changes to procedures.

Proposed Question:

IAW the guidance provided in NOP-SS-3001, PROCEDURE REVIEW AND APPROVAL, which of the procedure changes, listed below, MAY be made by using the Procedure Correction method?

- (1) Changes to setpoints
- (2) Changing component location
- (3) Changes to equipment position
- (4) Correcting Table of Contents
- (5) Correcting typographical errors
- (6) Changing the purpose of the procedure

- A. 1, 2, & 4
- B. 2, 4, & 5
- C. 1, 3, & 6
- D. 3, 5, & 6

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – Changes to setpoints shall NOT be made using the Procedure Correction method. Plausible as items 2&4 are allowed.
- B. Correct – Item 2: Changing component location, Item 4; Correcting Table of Contents, and Item 5: Correcting editorial errors such as typographical errors are all allowed.
- C. Incorrect – Items 1 & 3 Changes to setpoints and equipment position shall not be made using the Procedure Correction method. Plausible as Item 6, Changing the purpose of the procedure, is a “significant change” as defined by NOP-SS-3001 but may be confused with changing the title of a procedure which is allowed by the Procedure Correction process.
- D. Incorrect – Item 3: Changes to equipment position shall not be made using the Procedure Correction method. Plausible as Item 6, Changing the purpose of the procedure, is a “significant change” as defined by NOP-SS-3001 but may be confused with changing the title

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q66

of a procedure which is allowed by the Procedure Correction process, and Item 5: Correcting editorial errors such as typographical errors is allowed.

Technical Reference(s): NOP-SS-3001, PROCEDURE REVIEW AND APPROVAL, Step 4.2.1.3,
(Attach if not previously Procedure Correction
provided, including
version/revision number.)

Proposed references to be provided None
to applicants during examination:

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # (note changes or attach parent)
New

Question History: Last NRC Exam DB 2011 Q68 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher
Cognitive

10 CFR Part 55 Content: 55.41 (b)(10)
55.43

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q67

Level	RO	SRO
Tier #	3	_____
Group #	_____	_____
K/A #	G2.2.43	_____
Importance Rating	3.0	_____

K/A Statement: EQUIPMENT CONTROL: Knowledge of the process used to track inoperable alarms

Proposed Question:

The Reactor is in MODE 1 with the following condition:

- 3-1-C, BWST LVL LO annunciator is repeatedly alarming and clearing.
- Maintenance has informed operations that the annunciator is repeatedly alarming due to a circuit fault.
- Due to the nature of the fault, maintenance has reported that it will be an extended period of time until repairs can be made.

In accordance with NOP-OP-1002, CONDUCT OF OPERATIONS annunciator 3-1-C (1) be disabled.

Compensatory measures and increased monitoring for nuisance alarm annunciator 3-1-C shall be documented in the (2).

- A. (1) should
(2) Unit Narrative Log
- B. (1) should NOT
(2) Unit Narrative Log
- C. (1) should
(2) Inoperable Equipment Tracking Log
- D. (1) should NOT
(2) Inoperable Equipment Tracking Log

Proposed Answer:

A

Explanation (Optional):

- A. Correct – Per NOP-OP-1002, this annunciator should be considered a nuisance alarm as it is being caused by a faulted circuit and not an actual condition. Since the nuisance alarm will take an extended period of time to correct it SHOULD be disabled. The additional monitoring and compensatory measures taken because the nuisance alarm exists whether it is disabled or not are to be recorded in the Unit Logs.
- B. Incorrect – Plausible because this would be true if the nuisance alarm were expected to be repaired in a short period of time the

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q67

alarm SHOULD NOT be disabled. Part (2) is correct.

- C. Incorrect – Plausible as Part (1) is correct. Part (2) is plausible as this is the log called out in nop-op-1002 and DB-OP-00018, INOPERBALE EQUIPMENT TRACKING LOG to track equipment required to be operable or functional to meet the requirements of the Technical Specifications, TRM, and ODCM.
- D. Incorrect – Plausible because this would be true if the nuisance alarm were expected to be repaired in a short period of time the alarm SHOULD NOT be disabled. Part (2) is plausible as this is the log called out in nop-op-1002 and DB-OP-00018, INOPERBALE EQUIPMENT TRACKING LOG to track equipment required to be operable or functional to meet the requirements of the Technical Specifications, TRM, and ODCM.

Technical Reference(s): NOP-OP-1002, CONDUCT OF OPERATIONS Step 4.9.2.14 for definition of
 (Attach if not previously nuisance alarms; 4.9.2.18 for documenting in the Narrative log; DB-OP-
 provided, including 00018, INOPERBALE EQUIPMENT TRACKING LOG
 version/revision number.)

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher
 Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(10)
 55.43 _____

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q68

Level	RO	SRO
Tier #	3	
Group #		
K/A #	G2.3.5	
Importance Rating	2.9	

K/A Statement: RADIATION CONTROL: Ability to use RMSs, such as fixed radiation monitors and alarms or personnel monitoring equipment

Proposed Question:

The Reactor is at 50% RTP.

The Reactor Operator selects the GROSS mode on RE609, Main Steam Line 1 Radiation Monitor.

Operating the radiation monitor in the GROSS mode will result in displayed count rate _____.

- A. rising due to the extended band of isotopes the RE would detect
- B. rising due to the detector saturating in the elevated radiation field
- C. lowering due to lower detector sensitivity to N-16 gammas
- D. lowering since GROSS mode only indicates when the reactor is shutdown

Proposed Answer:

A

Explanation (Optional):

- A. Correct – In the analyze mode the detector is calibrated for N16 gammas. The Gross mode allows a greater band of isotopes to be detected therefore the displayed output will be greater.
- B. Incorrect – Plausible since the detector could saturate but this would cause the count rate to lower.
- C. Incorrect – Plausible since N16 gammas are what the analyze mode is calibrated for.
- D. Incorrect – Plausible since this is when the detector is procedurally placed in the GROSS mode.

Technical Reference(s):
(Attach if not previously provided, including version/revision number.)

BASES AND DEVIATION DOCUMENT FOR DB-OP-02000, Rev 22. Steps 4.12 and 4.13 p36, verify RE609 in GROSS.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q68

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source:	Bank #	<u>X</u>
	Modified Bank #	<u> </u> (note changes or attach parent)
	New	<u> </u>
Question History:	Last NRC Exam	<u>DB 2022 Q50</u> (if applicable)
Question Cognitive Level:	Memory / F undamental Knowledge	<u>X</u>
	Comprehension / Analysis / H igher Cognitive	<u> </u>
10 CFR Part 55 Content:	55.41	<u>(b)(11) & (12)</u>
	55.43	<u> </u>

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q69

Level	RO	SRO
Tier #	3	_____
Group #	_____	_____
K/A #	G2.4.26	_____
Importance Rating	3.1	_____

K/A Statement: Knowledge of facility protection requirements, including fire brigade and portable firefighting equipment usage.

Proposed Question:

Reactor power is 75% RTP.

- All 3 Condensate Pumps are running

Per DB-OP-02529, FIRE PROCEDURE, which of the following conditions requires IMMEDIATE activation of the Fire Brigade?

- A small brush fire near the switchyard fence.
- Simultaneous fire alarms received in physically separate regions of the plant.
- A trip of Condensate Pump 2 and a report of a slight electrical odor in High Voltage Switchgear Room 2.
- A single Fire Detection Zone alarm and a simultaneous start of a Fire Pump.

Proposed Answer:

D

Explanation (Optional):

- Incorrect – Plausible as a fire outside the Protected Area which affects plant equipment is an entry condition for DB-OP-02529. In addition, the Fire Brigade could be activated in this instance but it would require Shift Manager judgement and direction which was not indicated in the question stem or answer choice.
- Incorrect – Plausible as the fire brigade must be immediately activated if multiple fire alarms are received in ADJACENT plant locations.
- Incorrect – Plausible as the fire brigade must be activated if there is a fire in an area that has safe shutdown equipment that results in Spurious actuation of safe shutdown equipment. Incorrect since B Bus nor Condensate Pump 2 are safe shutdown equipment.
- Correct – DB-OP-02529, FIRE PROCEDURE, step 2.2 directs activating the fire brigade IF a single Fire Detection Zone or Fire Suppression Area alarm is received AND a simultaneous start of a

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q69

Fire Pump occurs.

Technical Reference(s): DB-OP-02529, FIRE PROCEDURE, Step 2.2
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # (note changes or attach parent)
New

Question History: Last NRC Exam DB 2016 Q75 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive

10 CFR Part 55 Content: 55.41 (b)(10)
55.43

Comments:

K/A Change.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q70

Level	RO	SRO
Tier #	4	
Group #		
K/A #	192006	K1.13
Importance Rating	3.0	

K/A Statement: FISSION PRODUCT POISONS: Plot the curve and explain the reasoning for the reactivity insertion by xenon-135 versus time for the following: reactor shutdown

Proposed Question:

The reactor is shutdown after sustained power operations at 100% RTP.

Explain the shape and reason for the plot of Xe^{135} concentration in the reactor core at:

- 4 hours after shutdown
 - 24 hours after shutdown
- A. INCREASING in BOTH instances due to the decay of I^{135} .
- B. DECREASING in BOTH instances since Xe^{135} production from fission has stopped.
- C. INCREASING at 4 hours due to the decay of I^{135} and DECREASING at 24 hours since Xe^{135} production from fission has stopped.
- D. DECREASING at 4 hours since Xe^{135} production from fission has stopped and INCREASING at 24 hours due to the decay of I^{135} .

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Xe^{135} concentration will rise sharply for the first approximately 12 hours after a shutdown from 100% power as gains due to I^{135} decay will greatly outweigh Xe^{135} losses since I^{135} decay to Xe^{135} has a shorter half-life than Xe^{135} decay and since neutron absorption by Xe^{135} has greatly lowered with neutron flux greatly lowered post shutdown. After 12 hours Xe^{135} concentration will lower as production from fission of I^{135} has stopped.
- B. Incorrect – Plausible as Xe^{135} concentration will decrease for this reason after 12 hours following shutdown.
- C. Correct – Xe^{135} concentration will rise sharply for the first approximately 12 hours after a shutdown from 100% power as gains due to I^{135} decay will greatly outweigh Xe^{135} losses since I^{135} decay to Xe^{135} has a shorter half-life than Xe^{135} decay and since neutron absorption by Xe^{135} has greatly lowered with neutron flux

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q70

greatly lowered post shutdown. After 12 hours Xe135 concentration will lower as production from fission of I135 has stopped.

- D. Incorrect – Plausible as concentration will eventually decrease due to loss of production from fission, but not until concentration peaks at 12 hours.

Technical Reference(s):
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # X (note changes or attach parent)
New _____

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 (b)(1)
55.43 _____

Comments:

Modified from PWR GFES Exam Bank Question P59 by changing timeline and what is being asked.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q71

Level	RO	SRO
Tier #	4	_____
Group #	_____	_____
K/A #	192007	K1.05
Importance Rating	3.2	_____

K/A Statement: FUEL DEPLETION AND BURNABLE POISONS: Describe the effects of boration/dilution on reactivity during forced-flow and natural circulation conditions

Proposed Question: The Reactor is in MODE 4. The crew is performing DB-OP-06001, BORON CONCENTRATION CONTROL.

Compared to adding boric acid to the reactor coolant system (RCS) during forced circulation, adding boric acid during natural circulation requires ____ (1) ____ time to achieve complete mixing in the RCS.

After complete mixing occurs, a 1 ppm increase in RCS boron concentration during natural circulation will cause a/an ____ (2) ____ change in reactivity for a given reactor coolant temperature.

- A. (1) more
(2) smaller
- B. (1) more
(2) equal
- C. (1) less
(2) smaller
- D. (1) less
(2) equal

Proposed Answer: **B**

Explanation (Optional):

- A. Incorrect – Plausible as part 1 of the question is correct. Part 2 is plausible if the applicant confuses the effect of a lower RCS flow rate on heat transfer with impact on reactivity.
- B. Correct – With at least 1 RCP running or DHR pump operating in shutdown cooling mode of operation boron that is added to the RCS will more quickly achieve complete mixing as compared to the lower flow rates achieved when in natural circulation. Once complete mixing has occurred whether in natural circulation or in forced convection mode the reactivity effect of adding boron is only affected

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q72

Level	RO	SRO
Tier #	4	
Group #		
K/A #	192008	K1.03
Importance Rating	4.0	

K/A Statement: REACTOR OPERATIONAL PHYSICS: (STARTUP AND APPROACH TO CRITICALITY) Describe count rate and instrument response that should be observed for rod withdrawal during the approach to criticality

Proposed Question:

A reactor startup is in progress in accordance with DB-OP-06901, PLANT STARTUP with the crew taking actions informed by DB-OP-06912, APPROACH TO CRITICALITY.

The reactor has an estimated initial K_{eff} of 0.8 with a stable source range count rate of 100 cps as indicated on NI5874A.

If control rods are withdrawn until K_{eff} equals 0.95, at what value will the count rate stabilize on NI5874A?

- A. 150 cps
- B. 200 cps
- C. 250 cps
- D. 400 cps

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect – Plausible as K_{eff} changed by 0.15 which the applicant could mistake for counts now reading 150 cps.
- B. Incorrect – Plausible as the applicant will be attempting to assess count rate doubling during the approach to criticality.
- C. Incorrect – Plausible since K_{eff} changed by .15 which could be assessed as counts increasing by 150% to 250 cps.
- D. Correct – The count rate for a subcritical reactor is determined by the inverse of $1-k_{eff}$. The count rate ratio is equivalent to the inverse ratio of $1-k_{eff}$ which leads to a new stable value of 400 cps.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q72

Technical Reference(s): DB-OP-06901, PLANT STARTUP; DB-OP-06912, APPROACH TO CRITICALITY
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # (note changes or attach parent)
New

Question History: Last NRC Exam (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive

10 CFR Part 55 Content: 55.41 (b)(1)
55.43

Comments:

From PWR GFES bank question QID P848.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q73

Level	RO	SRO
Tier #	4	
Group #		
K/A #	193003	K1.25
Importance Rating	3.4	

K/A Statement: STEAM: Explain and use saturated and superheated steam tables

Proposed Question:

The Reactor is at 100% RTP with the Moisture Separator Reheaters in service.

Based on the following conditions:

- The HP turbine exhaust enters the MSR reheater section as dry saturated steam.
- The exhaust enters and exits the reheater section at 200 psia and a flow rate of 8.77E6 lbm/hr.
- The main steam heat transfer rate in the reheater section is 6.05E6 Btu/hr.

What is the approximate temperature of the HP turbine exhaust leaving the reheater section of the MSR?

- A. 450°F
- B. 475°F
- C. 500°F
- D. 525°F

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Plausible if the applicant did not interpolate in the superheated steam tables and selected the lower temperature.
- B. Incorrect – Plausible if the applicant did not interpolate in the superheated steam tables and selected the higher temperature.
- C. Correct – Using the formula $\dot{Q} = \dot{m} \Delta h$ and knowing values for \dot{Q} , \dot{m} , and the inlet enthalpy which is the enthalpy for saturated vapor at 200 psia, the enthalpy for the superheated steam can be determined at the MSR exit. With this value an interpolation is performed and $\sim 500^\circ\text{F}$ is determined. $\dot{Q} = \dot{m} \Delta h$
 Dry saturated h for 200 psia = 1198.8 BTU/lbm
 $6.05\text{E}8 \text{ BTU/Hr} = 8.77 \text{ lbm/Hr} (h_x - 1198.8) \text{ BTU/lbm}$
 $h_x = 1267.8 \text{ BTU/Hr}$ Superheated h for 200 psia @ 1267.8 BTU/Hr =

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q73

~500°F

- D. Incorrect – Plausible if the applicant interpolated between the adjacent columns in the superheated steam tables.

Technical Reference(s): SD-012A, Main Steam
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: **STEAM TABLES, CALCULATION SHEET**

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # X (note changes or attach parent)
New _____

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 (b)(14)
55.43 _____

Comments:

GFES PWR Bank QID 3939

Question stem was significantly modified to make operationally valid for Davis-Besse.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q74

Level	RO	SRO
Tier #	4	
Group #		
K/A #	193004	K1.15
Importance Rating	2.8	

K/A Statement: THERMODYNAMIC PROCESS: (THROTTLING AND THE THROTTLING PROCESS) Determine the exit conditions for a throttling process based on the use of steam and/or water

Proposed Question:

Plant Conditions:

- RCS pressure is 2185 psig
- Pressurizer Temperature is 650°F
- Pressurizer Quench Tank pressure is 10 psig
- Pressurizer PORV, RC2A is leaking

Based on these conditions, what do you expect the PORV leak detection temperature instrument TE RC12-1 to be reading?

- A. 140°F
- B. 193°F
- C. 240°F
- D. 300°F

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Plausible if the applicant determines that the conditions downstream of the PORV remain constant as a saturated vapor at 1122 Btu/lbm. Therefore, pressure would be 4 psia and T_{sat} at 140F.
- B. Incorrect – Plausible if the applicant uses 10 psia when assessing the steam tables instead of 10 psig when determining saturation conditions downstream of the PORV.
- C. Correct – Throttling is an isenthalpic process. The applicant should determine the enthalpy of saturated vapor at 2185 psig (2200 psia) which is 1122 Btu/lbm. The pressure in the Quench Tank is 10 psig (25 psia). Since the enthalpy remains constant it can be seen that at 10 psig, 1122 is in between the enthalpy of saturated liquid and saturated vapor therefore saturation conditions exist. Therefore, the temperature would be 240°F.
- D. Incorrect – Plausible if the applicant believes temperature in the line will be between saturation conditions in the pressurizer and in the

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q74

quench tank.

Technical Reference(s): SD 039A, SYSTEM DESCRIPTION FOR REACTOR COOLANT SYSTEM; SD
(Attach if not previously 039B, SYSTEM DESCRIPTION FOR REACTOR COOLANT SYSTEM
provided, including ACCESSORY SYSTEMS
version/revision number.)

Proposed references to be provided **STEAM TABLES**
to applicants during examination:

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # (note changes or attach parent)
New

Question History: Last NRC Exam (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge
Comprehension / Analysis / **H**igher
Cognitive X

10 CFR Part 55 Content: 55.41 (b)(14)
55.43

Comments:

GFES PWR Exam Bank P76.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q75

Level	RO	SRO
Tier #	4	
Group #		
K/A #	193010	K1.06
Importance Rating	3.8	

K/A Statement: BRITTLE FRACTURE AND VESSEL THERMAL STRESS: Define PTS

Proposed Question:

The plant was operating at 100% RTP when a loss of Off-Site power occurred.

Which of the following events would be MOST likely to cause a pressurized thermal shock (PTS) to the reactor vessel?

- A. Starting an RCP in an idle RCS loop with the associated SG temperature less than the loop temperature after Off-Site power is restored.
- B. Exceeding the 50°F/hr heat up rate limits post trip due to a loss of heat transfer event.
- C. Maintaining full MU/HPI flow during and after a complete and unisolable rupture of a reactor vessel hot leg nozzle.
- D. Maintaining full MU/HPI flow during and after a complete and unisolable Main Steam line rupture in CTMT.

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect – Plausible as starting an RCP raises loop pressure.
- B. Incorrect – Per DB-OP-02000, Specific Rule 5 PTS is a concern post trip when RCS temperature is < 360°F and cooldown rate exceeds the PTLR limits. This is plausible as heatup rate is exceeded in this event.
- C. Incorrect – Plausible as a Large LOCA will cause an RCS cooldown, but the RCS will be depressurized in this instance.
- D. Correct – An overcooling event has occurred which will significantly cool down the RCS. Continuous ECCS injection will repressurize the RCS. PTS is likely to occur with cooler RCS temperatures and higher pressures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q75

Technical Reference(s): DB-OP-02000 Basis and Deviation Document R22 (SR5 p455)
(Attach if not previously provided, including version/revision number.) DB-OP-06900, PLANT HEATUP; DB-OP-02000, RPS, SFAS, SFRCs TRIP, OR SG TUBE RUPTURE SR5

Proposed references to be provided to applicants during examination: None.

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # (note changes or attach parent)
New

Question History: Last NRC Exam (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive

10 CFR Part 55 Content: 55.41 (b)(14)
55.43

Comments:

PWR GFES Bank QID P2800.

K/A Change.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q76

Level	RO	SRO
Tier #	_____	1
Group #	_____	1
K/A #	000009	G2.4.22
Importance Rating	_____	4.4

K/A Statement: Small Break LOCA / EMERGENCY PROCEDURES/PLAN: Knowledge of the bases for prioritizing safety functions during abnormal and emergency operations

Proposed Question: A small break LOCA resulted in a loss of Subcooling Margin (SCM). The Crew has completed all Immediate Actions and have routed to Section 5, LACK OF ADEQUATE SUBCOOLING MARGIN.

The following plant conditions CURRENTLY exist:

- RCS pressure is 1300 psig.
- RCS T-cold is 545°F and decreasing.
- RCS average incore temperature is 542°F and decreasing.
- Pressurizer level is 45" and increasing.
- Steam generator levels are being maintained per Specific Rule 4.

Given the above conditions, the Command SRO should direct the crew to ____ (1) ____ and route to Section ____ (2) ____ WITH SGS REMOVING HEAT COOLDOWN.

- A. (1) cooldown at a limit of 50°F/hr
(2) 11.0 RCS SATURATED
- B. (1) cooldown at a limit of 100°F/hr
(2) 11.0 RCS SATURATED
- C. (1) cooldown at a limit of 50°F/hr
(2) 13.0 RCS SUBCOOLED
- D. (1) cooldown at a limit of 100°F/hr
(2) 13.0 RCS SUBCOOLED

Proposed Answer: **C**

- Explanation (Optional):
- A. Incorrect – Plausible because Specific Rule 5 (PTS) is invoked which requires cooldown at less than 50°F/hr. SCM is adequate in this scenario, therefore the crew should route to Section 13, RCS Subcooled.
 - B. Incorrect – Plausible because cooldown limit is normally up to

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q76

100°F/hr. Cooldown is limited to less than 50°F/hr if possible, by Specific Rule 5 (PTS). SCM is currently adequate in this scenario, therefore the crew should route to Section 13, RCS Subcooled.

- C. Correct – PTS is invoked (No RCPs running and HPI injecting due to initial LOSCM) which requires minimizing cooldown rate, if possible, to less than 50°F/hr. SCM is adequate in this scenario, therefore the crew should route to Section 13, RCS Subcooled.
- D. Incorrect – Plausible because the cooldown limit is normally up to 100°F/hr. Cooldown is limited to less than 50°F/hr if possible, by Specific Rule 5 (PTS). SCM is adequate in this scenario, therefore the crew should route to Section 13, RCS Subcooled.

Technical Reference(s): DB-OP-02000 RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE – Specific Rules 3 and 5.
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: **STEAM TABLES**

Learning Objective: OPS-GOP-301-05S
 (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(5)

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Emergency Operating Procedures.

Modified stem of question and changed answer and distractors.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q77

Level	RO	SRO
Tier #	_____	1
Group #	_____	1
K/A #	000026	AA2.06
Importance Rating	_____	3.3

K/A Statement: Ability to determine and/or interpret the following as they apply to LOSS OF COMPONENT COOLING WATER: The length of time after the loss of CCW flow to a component before that component may be damaged

Proposed Question:

The Reactor is operating at 100% RTP.

- A large leak was identified on the CCW Loop 2 Essential Header.
- CCW Pump 2 control switch is placed in LOCKOUT and the close power fuses have been pulled.
- The crew enters the applicable conditions for LCO 3.7.7 Component Cooling Water (CCW) System and LCO 3.8.1 AC SOURCES – Operating.
- A Safety Function Determination for the Supported System(s) have been completed.

The REQUIRED ACTIONS for LCO 3.5.2 ECCS – Operating (1) required to be performed.

If an emergency event were to subsequently occur, the Train 2 HPI and LPI pumps (2).

- A. (1) are NOT
(2) may be operated for up to one hour
- B. (1) are NOT
(2) must be tripped immediately
- C. (1) are
(2) may be operated for up to one hour
- D. (1) are
(2) must be tripped immediately

Proposed Answer:

A

Explanation (Optional):

- A. Correct – Part (1) LCO 3.0.6 and 3.7.7 require entry into LCO 3.7.7 Condition A and LCO 3.8.1 Condition B for the plant conditions indicated in the question stem. LCO 3.0.6 along with direction from 3.7.7 do not require the supported HPI/LPI ECCS equipment LCO 3.5.2 Actions to be performed. The LCO is still not met.. Part (2) DB-

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q77

OP-02523 Attachment 2 indicates that MU, HPI, and LPI pumps on the effected loop may be operated for up to 1 hour with no/degraded CCW cooling.

- B. Incorrect – Plausible as Part (1) is correct. Part (2) is plausible since some equipment (EDG for example) is required to be tripped immediately when its cooling has been lost.
- C. Incorrect – Plausible as HPI/LPI ECCS equipment is supported by CCW. Part (2) is correct.
- D. Incorrect – Plausible as Part (1) is correct. Part (2) is plausible since some equipment (EDG for example) is required to be tripped immediately when its cooling has been lost.

Technical Reference(s): DB-OP-02523 R13, COMPONENT COOLING WATER SYSTEM
 (Attach if not previously MALFUNCTIONS – Attachment 2 (p60)
 provided, including
 version/revision number.)

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam 2008 Q45 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher
 Cognitive _____

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(5)

Comments:

This question was considered significantly modified as the question stem was changed to ask about LCO action statements to enter (SRO ONLY) and the distractors and answer were all changed to address change in question stem.

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q78

Level	RO	SRO
Tier #		1
Group #		1
K/A #	000056	AA2.81
Importance Rating		3.7

K/A Statement: Ability to determine and/or interpret the following as they apply to LOSS OF OFFSITE POWER: S/G level and pressure

Proposed Question:

Plant startup in progress with reactor power at 1% RTP.

An event occurs which causes a loss of offsite power

- All plant systems have responded properly
- The crew entered DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE and completed all Immediate Actions

(1) Which of the following describes the expected plant response to this event?

(2) What action should the Command SRO direct NEXT to mitigate the transient?

- A. (1) Each AFW Train will maintain its respective SG at 49 inches.
(2) Establish Pressurizer Level at 100 inches.
- B. (1) Each AFW Train will maintain the opposite SG at 55 inches.
(2) Establish Pressurizer Level at 100 inches.
- C. (1) Each AFW Train will maintain its respective SG at 49 inches.
(2) Restore instrument air to the Atmospheric Vent Valves.
- D. (1) Each AFW Train will maintain the opposite SG at 55 inches.
(2) Restore instrument air to the Atmospheric Vent Valves.

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Plausible as Part (1) is correct. Part (2) is plausible as this action will be required but will be done per Attachment after IA is restored to the AVVs per SR 4.
- B. Incorrect – Plausible because each AFW train monitors both SG conditions such as level and is able to supply the cross-train SG under some conditions. For example, if a single SG isolated on low SG pressure, both AFW Trains will align to feed the good SG with the cross-train pump attempting the control level at 55 inches while the onside AFW train controls at 49 inches to prevent hunting. This response is incorrect because it does not describe the expected plant

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q78

response to this event. Part (2) is plausible as this action will be required but will be done per Attachment after IA is restored to the AVVs per SR 4.

- C. Correct – SFRCS will actuate on the loss of all RCPs when the LOOP occurs, causing both AFW Pumps to start and control level their respective SG at 49". The LOOP will result in a loss of IA to the AVVs which must be restored to avoid opening a Main Steam Safety Valves.
- D. Incorrect – Plausible because each AFW train monitors both SG conditions such as level and is able to supply the cross-train SG under some conditions. For example, if a single SG isolated on low SG pressure, both AFW Trains will align to feed the good SG with the cross-train pump attempting the control level at 55 inches while the onside AFW train controls at 49 inches to prevent hunting. This response is incorrect because it does not describe the expected plant response to this event. Part (2) is correct.

Technical Reference(s): DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam 2022 Q13 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(5)

Comments:

This question was considered significantly modified as the question stem was changed to ask about procedure decision points/hierarchy (SRO ONLY) and the distractors and answer were all changed to address changes in the question stem.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

This question meets Tier 1 criteria as it tests the applicant's knowledge of actions found in the Emergency and Abnormal Operating Procedures.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q79

Level	RO	SRO
Tier #		1
Group #		1
K/A #	000057	G2.4.06
Importance Rating		4.7

K/A Statement: Loss of Vital AC Instrument Bus EMERGENCY PROCEDURES/PLAN: Knowledge of emergency and abnormal operating procedures major action categories

Proposed Question:

The following plant conditions have occurred from 80% RTP:

- ICS runback in progress
- Deaerator #1 level indicates 7.8 feet
- Deaerator #2 level indicates 0 feet
- #1 MFPT speed indicates 4950 rpm
- #2 MFPT speed indicates 0 rpm
- NNI-X ABT transferred to alternate power supply
- EIAC indicating lights are out
- Instrument Air Header pressure indicates 0 psig

The following annunciators (among others) are LIT:

- 1-1-K, EDG 2 TRBL
- 3-1-C, BWST LVL LO
- 3-3-B, SFP TEMP HI
- 14-2-D, ICS/NNI 118V AC PWR TRBL

Based on these conditions, the Command SRO will direct the crew to _____.

- A. stabilize the plant by placing ICS Hand/Auto stations in HAND in accordance with DB-OP-02532, LOSS OF NNI/ICS POWER.
- B. trip the reactor in accordance with DB-OP-02542, LOSS OF YBU.
- C. place BOTH ICS Feedwater Loop Hand/Auto Stations in HAND to stabilize RCS T_{AVE} in accordance with DB-OP-02526, PRIMARY TO SECONDARY HEAT TRANSFER UPSET.
- D. verify SAC 1 and 2 are running in accordance with DB-OP-02528, INSTRUMENT AIR MALFUNCTIONS.

B

Explanation (Optional):

- A. Incorrect – Plausible as an instrument bus power supply has failed as is indicated by the diverse number of indications and alarms which have suddenly occurred. One of these is the NNI-X ABT switching to

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q79

the alternate power supply.

- B. Correct – A loss of instrumentation bus YBU requires a reactor trip IAW DB-OP-02542. A loss of YBU gives all of the indications and alarms provided in the stem.
- C. Incorrect – Plausible as a loss of YBU will cause the #2 MFPT speed to indicate 0 in the main control room. The pump will not have actually tripped.
- D. Incorrect – Plausible as the loss of YBU will cause the EIAC to trip and will cause all of the control instrument air header pressure indicators to read zero. The SACs are not affected by the loss of YBU.

Technical Reference(s): DB-OP-02542, LOSS OF YBU.
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam 2005 Q79 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(5)

Comments:

This question was considered significantly modified as the question stem was changed to ask about a different instrumentation bus failure and 2 distractors were changed.

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Abnormal Operating Procedures.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q80

Level	RO	SRO
Tier #		1
Group #		1
K/A #	000058	G2.1.08
Importance Rating		4.1

K/A Statement: Loss of DC Power CONDUCT OF OPERATIONS: Ability to coordinate personnel activities outside the control room

Proposed Question:

The Reactor was operating at 45% RTP, during power ascension following a refueling outage, when the following alarms were received:

- 1-5-F, DC PANEL VOLTAGE LO
- 1-6-G, DC BUS 2 TRBL
- 1-6-K, YV2-YV4 TRBL

An equipment operator sent to investigate reports that +125V DC PNL D2P reads zero volts.

Based on these indications the Command SRO will need to direct an equipment operator to _____.

- A. open MU38, RCP SEAL RETURN within 30 minutes and serve as a dedicated operator.
- B. throttle open CD81, CNDS PUMPS MINIMUM RECIRC BYPASS when condensate flow drops to < 1.0 mpph.
- C. place the DC control power knife switch in the ALTERNATE DBP07 position at the D2 Bus.
- D. throttle closed FW6398, MDFP ISOLATION TO SG1 to prevent overflow of SG1.

Proposed Answer:

A

Explanation (Optional):

- A. Correct – The event described is a failure of DC Bus D2P. Per DB-OP-02538, LOSS OF D2P AND DBP Attachment 3, MU38 will fail closed and must be locally reopened within 30 minutes with RCPs running. In addition, a local, dedicated operator must be stationed at MU38 to close it if a subsequent SFAS Level 3 signal is received.
- B. Incorrect – Plausible as this is a locally required action required for a loss of DC Bus D1P per DB-OP-02537, LOSS OF D1P AND DAP.
- C. Incorrect – Plausible as this is a locally required action required for a loss of DC Bus D2N per DB-OP-02540, LOSS OF D2N AND DBN.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q80

D. Incorrect – Plausible as this is a locally required action required for a loss of DC Bus D1N resulting in a reactor trip where the MDFP is used to maintain SG level per DB-OP-02539, LOSS OF D1N AND DAN.

Technical Reference(s): DB-OP-02538, LOSS OF D2P AND DBP
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(1)&(5)

Comments:

This question meets Tier 1 criteria as it tests the applicant's knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q81

Level	RO	SRO
Tier #		1
Group #		1
K/A #	000077	AA2.06
Importance Rating		3.4

K/A Statement: Ability to determine and/or interpret the following as they apply to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES: Generator frequency

Proposed Question: A grid disturbance is occurring. The crew enters DB-OP-02546, DEGRADED GRID.

The following plant conditions exist:

- Generator Output = 850 MWe and (+) 450 MVARs
- Generator Hydrogen Pressure = 60 psig
- Generator Output Voltage = 24.5 KV

In accordance with DB-PF-06703, CC9.5 ESTIMATED CAPABILITY CURVES – LEAD-LAG, the Generator output (1) within the limits of the Generator Capability Curve.

Subsequently:

- Switchyard Alarm 25-3-C, SYS FREQUENCY LOW is in alarm
- The BOP Reactor Operator reports Generator Frequency is at 57.0 Hz
- Turbine vibrations are slightly elevated and rising

The Command SRO (2) required to direct the ATC Reactor Operator to trip the Reactor.

REFERENCE PROVIDED

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

Proposed Answer: **A**

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q81

- Explanation (Optional):
- A. Correct – Part (1) is correct as the generator output is within the limits of the Generator Capability Curve (CC9.5). Part (2) is correct as an automatic generator trip on low frequency should have occurred at 57.7 Hz (relays 81U1 and 81U2) and since it did not occur (based on stem conditions) it must be manually tripped. At power levels >40% the SRO will direct the Reactor to be tripped.
 - B. Incorrect – Part (1) is plausible since it would be correct if power factor were leading or if Gen H2 pressure were lower. Part (2) is correct.
 - C. Incorrect – Plausible as Part (1) is correct. Part (2) is plausible as there is not a specific procedure step in DB-OP-02546 to trip the main turbine if generator frequency is too low.
 - D. Incorrect – Part (1) is plausible since it would be correct if power factor were leading or if Gen H2 pressure were lower. Part (2) is plausible as there is not a specific procedure step in DB-OP-02546 to trip the main turbine if generator frequency is too low.

Technical Reference(s): DB-OP-02546, DEGRADED GRID; DB-PF-06703, CC9.5 ESTIMATED CAPABILITY CURVES – LEAD-LAG; DB-OP-06301, GENERATOR AND EXCITER OPERATING PROCEDURE; SD-005, SYSTEM DESCRIPTION FOR MAIN GENERATOR AND AUXILIARIES
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: **DB-PF-06703, CC9.5 ESTIMATED CAPABILITY CURVES – LEAD-LAG**

Learning Objective:
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam Oconee 2015 Q81 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41
 55.43 (b)(5)

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q82

Level	RO	SRO
Tier #		1
Group #		2
K/A #	000024	AA2.05
Importance Rating		3.9

K/A Statement: Ability to determine and/or interpret the following as they apply to EMERGENCY BORATION: Amount of boron to add to achieve required SDM

Proposed Question:

An event has occurred which leaves rod index in the Unacceptable region at 230 Rod Index.

The Core Operating Limits Report shows rods entering the:

- Restricted region at 240 rod index
- Acceptable region at 255 rod index

Reactor Operators Guidance:

- 2 gallons boric acid per rod index

With power remaining constant:

(1) What is the MINIMUM required acid which is REQUIRED to be added to meet shutdown margin requirements?

AND

(2) What is the Technical Specification basis for this addition?

- A. (1) 20 gallons
(2) regulating rods may be inserted too far to provide sufficient negative reactivity insertion following a reactor trip
- B. (1) 50 gallons
(2) regulating rods may be inserted too far to provide sufficient negative reactivity insertion following a reactor trip
- C. (1) 20 gallons
(2) precludes long term depletion with abnormal group insertions or configurations and limits the potential for an adverse xenon redistribution
- D. (1) 50 gallons
(2) precludes long term depletion with abnormal group insertions or configurations and limits the potential for an adverse xenon redistribution

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q82

Proposed Answer: **A**

- Explanation (Optional):
- A. Correct – Part (1) 20 gallons will move rods to the restricted region. SDM is met in the restricted region Part (2) is correct per TS bases 3.2.1.D.1.
 - B. Incorrect – Plausible since (1) 50 gallons will place rods in the acceptable region which is not required to meet SDM. Part (2) is correct.
 - C. Incorrect – Plausible since (1) 20 gallons is correct and Part (2) is the bases for going from the restricted to acceptable region
 - D. Incorrect – Plausible since (1) 50 gallons will place rods in the acceptable region and Part (2) is bases for going from restricted to acceptable region.

Technical Reference(s): TS 3.2.1 REGULATING ROD INSERTION LIMITS – Bases.
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam DB 2016 Q83 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher Cognitive

10 CFR Part 55 Content: 55.41
 55.43 (b)(5)

Comments:

This question meets Tier 1 criteria as it tests the applicant’s knowledge of actions found in the Annunciator Response and Abnormal Operating Procedures.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q83

Level	RO	SRO
Tier #		1
Group #		2
K/A #	000061	G2.1.25
Importance Rating		4.2

K/A Statement: Area Radiation Monitoring System Alarms CONDUCT OF OPERATIONS: Ability to interpret reference materials, such as graphs, curves, and tables (reference potential)

Proposed Question:

At 0800, a LOCA occurred inside of containment with the reactor operating at 100% RTP.

The crew entered and performed the immediate actions of DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG TUBE RUPTURE.

At 0815, the Shift Manager declared an ALERT based on a loss of the RCS Barrier associated with UNISOLABLE RCS leakage.

At 0905 the following conditions exist:

- Containment Area Rad Monitor RE 4596A reads 2600 R/hr
- Containment Area Rad Monitor RE 4596B reads 2500 R/hr
- Containment pressure is 41 psia
- CTMT Spray Pump 1 and 2 are running

Based on these conditions, the Shift Manager MUST _____.

REFERENCE PROVIDED

- A. determine a concurrent EAL ALERT entry condition exists due to RE 4596A and RE 4596B exceeding the RCS Barrier Loss value
- B. declare a SITE AREA EMERGENCY due to RE 4596A exceeding the RCS Barrier Loss and FC Barrier Loss values
- C. declare a SITE AREA EMERGENCY due to a loss of the RCS Barrier and a potential loss of the Containment Barrier due to pressure exceeding 40 psia
- D. declare a GENERAL EMERGENCY due to a loss of the RCS and FC Barriers due to RE 4596A exceeding loss values and a potential loss of the Containment Barrier due to pressure exceeding 40 psia

Proposed Answer:

B

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q83

- Explanation (Optional):
- A. Incorrect – Plausible if it had been less than 1 hour since reactor had been shutdown. Since it has been between 1-2 hours since the event occurred, RE 4596A has exceeded the new FC loss threshold as well so a loss of FC barrier has occurred.
 - B. Correct – With RE 4596A exceeding 2560 R/hr and it being greater than 1 hour since the reactor was shutdown, Table F-2 of the Hot EAL Chart indicate a loss of both the Fuel Cladding and RCS Barriers. Therefore, EAL FS1 must be declared due to a loss of 2 fission product barriers.
 - C. Incorrect – Plausible as the values of RE 4596A and B would only indicate a loss of the RCS barrier if the it had been less than 1 hour since the LOCA occurred. Also a potential loss of the containment barrier is considered to have occurred if containment pressure > 40 psia (which it is) with < 1 full train of containment cooling running. According to Table F-3 of the Hot EAL Chart a full train of containment cooling is 2 containment spray pumps running.
 - D. Incorrect – Plausible as the loss of the FC and RCS barriers has occurred due to RE 4596A reading, but a potential loss of the containment barrier has not occurred since at least 1 train of containment cooling is running with containment pressure > 40 psia.

Technical Reference(s): Davis-Besse EAL Wall Board – Hot EALs RCS Barrier – Loss (provided in stem, RCS Loss A.1). added Fuel Clad Loss, C.1 in FPB matrix, FS1, loss of any 2 barriers.
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: **Davis-Besse EAL Wall Board – Hot EALs**

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(5)

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

This question meets Tier 1 criteria as it tests the applicant's knowledge of actions found in the Emergency Procedures.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q84

Level	RO	SRO
Tier #		1
Group #		2
K/A #	000078	G2.4.38
Importance Rating		4.4

K/A Statement: RCS Leak / EMERGENCY PROCEDURES/PLAN: Ability to take actions required by the facility emergency plan implementing procedures, including supporting or acting as emergency coordinator

Proposed Question: The reactor is in MODE 1 when a significant RCS Leak occurs requiring the crew to manually trip the reactor, align maximum makeup flow, and start high pressure injection.

The Shift Manager declares an ALERT under EAL FA1.

The Shift Manager MUST _____.

- A. direct that there be NO eating, drinking, smoking, or chewing
- B. evacuate all non-essential personnel within the protected area
- C. initiate personnel accountability procedures
- D. activate the Emergency Response Organization

Proposed Answer: **D**

- Explanation (Optional):
- A. Incorrect – Plausible as this an action required for a SITE AREA EMERGENCY.
 - B. Incorrect – Plausible as this an action required for a SITE AREA EMERGENCY.
 - C. Incorrect – Plausible as assembly actions are performed for an ALERT, but accountability actions are only if desired and are not required until a SITE AREA EMERGENCY is declared.
 - D. Correct – Activation of the Emergency Response Organization is required upon the declaration of an ALERT.

Technical Reference(s): NOP-LP-5502
(Attach if not previously provided, including version/revision number.)

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q84

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(5)

Comments:

This question meets Tier 1 criteria as it tests the applicant's knowledge of actions found in the Emergency Procedures.

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q85

Level	RO	SRO
Tier #		1
Group #		2
K/A #	BW A05 AA2.16	
Importance Rating		3.0

K/A Statement: Ability to determine and/or interpret the following as they apply to EMERGENCY DIESEL ACTUATION: Makeup pump, tank, valves, and/or flow

Proposed Question: The Reactor is at 100% RTP.

- C1 Alternate Source Breaker, ABDC1 is removed from its cubicle for maintenance.

Subsequently:

- Breaker AC110, BUS TIE FROM C2 BUS fails open.
- EDG 1 starts and is powering Bus C1

While EDG 1 is operating in this configuration:

- 1-4-A, EDG 1 DAY TK LVL LO is LIT
- An Equipment Operator reports that the Emergency Fuel Oil Transfer Pump 1 breaker tripped on overcurrent

Assuming ABDC1 and AC110 can NOT be restored in a timely manner, the Command SRO should direct _____.

- A. gravity filling of the EDG 1 Day Tank from the EDG Fuel Storage (Week) Tank 1
- B. the SBODG be placed in service to supply Bus C1
- C. filling EDG 1 Day Tank using Diesel Fuel Oil Transfer Pump 2
- D. ordering a fuel truck to directly fuel the EDG 1 Day Tank

Proposed Answer: **C**

Explanation (Optional):

- A. Incorrect – Plausible as this is a method used for filling the Diesel Fire Pump Day Tank located in DB-OP-06273.
- B. Incorrect – Plausible since the SBODG can supply C1 during other scenarios, but not directly. In this scenario, the breakers to line-up the SBODG to C1 are unavailable.
- C. Correct – With the Train 2 emergency diesel fuel transfer system powered and available, the day tanks can be filled using Diesel Fuel

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q85

Oil Transfer Pump 2.

- D. Incorrect – Plausible as this is an infrequent but proceduralized method of filling the Diesel Fire Pump Day Tank in DB-OP-06273. Fuel trucks are also used for the SBODG Fuel Oil Tank, but NOT the EDG Day Tanks.

Technical Reference(s): DB-OP-06273, DIESEL FUEL OIL TRANSFER
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(5)

Comments:

This question meets Tier 1 criteria as it tests the applicant's knowledge of actions found in the Abnormal Operating Procedures.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q86

Level	RO	SRO
Tier #		2
Group #		1
K/A #	00005	G2.4.46
Importance Rating		4.2

K/A Statement: RESIDUAL HEAT REMOVAL SYSTEM, EMERGENCY PROCEDURES/PLAN:
 Ability to verify that the alarms are consistent with the plant conditions

Proposed Question:

Initial Plant Conditions:

- The Reactor is shutdown in MODE 5
- RCS Cooldown and depressurization are in progress
- DHR Loop 1 aligned for Standby DHR operation
- DHR Loop 2 in service
- Conditions have been established to stop all Reactor Coolant Pumps
- RCS Temperature is 160°F
- RCS Pressure is 210 psig
- Pressurizer Level is 85 inches

When the last RCP is stopped, an event occurs. The following conditions are noted:

- 3-1-I, LP INJ 2 FLOW LO is LIT
- Incore thermocouple temperatures are rising
- No flow on FYI DH2A, LPI/DH PUMP 2 OUTLET FLOW
- DHR Pump 1 Breaker Status Light is Green
- DHR Pump 2 Breaker Status Light is Red
- DH1A, DH PUMP 2 DISCHARGE TO RCS is closed
- Pressurizer Level is slowly rising

The Command SRO should direct the crew to perform which of the following procedures to mitigate this event?

- A. DB-OP-02000, RPS, SFAS, SFRCS TRIP OR SG TUBE RUPTURE
- B. DB-OP-02527, LOSS OF DECAY HEAT REMOVAL, Section 4.1, Loss of DHR Pump
- C. DB-OP-02527, LOSS OF DECAY HEAT REMOVAL, Section 4.2, Loss of DHR Flowpath
- D. DB-OP-02527, LOSS OF DECAY HEAT REMOVAL, Section 4.3, Loss of DHR Inventory.

Proposed Answer:

C

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q86

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(5) _____

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q87

Level	RO	SRO
Tier #	_____	2
Group #	_____	1
K/A #	00006	A2.15
Importance Rating	_____	3.5

K/A Statement: 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: Vortex/cavitation

Proposed Question:

A Large Break LOCA has occurred, and the following indications exist:

- Containment pressure is 42 psia
- RCS pressure is 150 psig
- The HPI and MU Pumps have been stopped IAW Specific Rule 3
- BWST level is 9 feet
- DH9B, Containment Emergency Sump Isolation Valve is open
- DH9A, Containment Emergency Sump Isolation Valve FAILED to open

In accordance with DB-OP-02000, Attachment 7, TRANSFERRING LPI SUCTION TO THE EMERGENCY SUMP, the Command SRO must direct the crew to Block and Stop LPI Pump 2 and CTMT Spray Pump 2 _____ (1) _____.

The Command SRO will direct _____ (2) _____.

- A. (1) IMMEDIATELY, the pumps will be restarted when the transfer is complete
 (2) equipment operators to locally deenergize and open DH9A
- B. (1) IF AT ANY TIME cavitation (fluctuating flow or pump amps) is noted
 (2) an RO to manually trip Train 2 SFAS Level 5 Output Modules and then open DH9A from the CTRM
- C. (1) IMMEDIATELY, the pumps will be restarted when the transfer is complete
 (2) an RO to manually trip Train 2 SFAS Level 5 Output Modules and then open DH9A from the CTRM
- D. (1) IF AT ANY TIME cavitation (fluctuating flow or pump amps) is noted
 (2) equipment operators to locally deenergize and open DH9A

Proposed Answer:

B

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q87

- Explanation (Optional):
- A. Incorrect – Plausible as the applicant could determine that all Train 2 pumps need to be stopped with DH9A closed and BWST at 9ft. In addition, when an MOV does not reposition, there are instances where the CTRM will direct the valve breaker opened and operated locally from the field to reposition the valve.
 - B. Correct – DB-OP-02000, Attachment 7 directs operators to Block and Stop pumps experiencing fluctuating flow and motor amps. To open DH9A, the crew will need to manually trip SFAS Level 5 for BWST level and then open DH9A.
 - C. Incorrect – Plausible as the applicant could determine that all Train 2 pumps need to be stopped with DH9A closed and BWST at 9ft. Part 2 is correct.
 - D. Incorrect – Plausible Part 1 is correct. When an MOV does not reposition, there are instances where the CTRM will direct the valve breaker opened and operated locally from the field to reposition the valve.

Technical Reference(s): DB-OP-02000, Attachment 7, TRANSFERRING LPI SUCTION TO THE EMERGENCY SUMP
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / Fundamental Knowledge _____
 Comprehension / Analysis / Higher Cognitive X

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(5)

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q88

Level	RO	SRO
Tier #		2
Group #		1
K/A #	000012	G2.1.6
Importance Rating		4.8

K/A Statement: REACTOR PROTECTION SYSTEM, CONDUCT OF OPERATIONS: Ability to manage the control room crew during plant transients (SRO Only)

Proposed Question:

Initial plant conditions:

- Reactor power is at 100% RTP
- RPS Ch 3 is in Manual Bypass for I&C testing

The following event occurs:

- The following Annunciators alarm:
 - 4-4-B, HOT LEG PRESS HI
 - 4-4-C, HOT LEG PRESS LO
 - 4-1-D, PZR RLF VLV OPEN
 - 5-1-G, RPS CH 1 TRIP
- The PORV indicates OPEN
- PZR Heaters are OFF

The ATC RO completes all Immediate Actions from memory and reports the following:

- RCS Pressure is at 2010 psig and stable
- RCS Temperature is at 582°F and stable

Which of the following should the Command SRO direct NEXT?

- Trip the Reactor and GOTO DB-OP-02000, RPS, SFAS, SFRCS TRIP, OR SG Tube Rupture.
- Pull DB-OP-02004, REACTOR COOLANT ALARM PANEL 4 ANNUNCIATORS and complete required actions IAW Annunciator 4-4-B, HOT LEG PRESS HI.
- Provide an RCS Pressure control band using the PZR Heaters IAW NOP-OP-1002, CONDUCT OF OPERATIONS.
- Open RC11, PORV BLOCK VALVE to restore PORV operability IAW DB-OP-02513, PRESSURIZER SYSTEM ABNORMAL OPERATION.

Proposed Answer:

C

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Examination Outline Cross-Reference: Q88

- Explanation (Optional):
- A. Incorrect – Plausible since RPS Ch 3 is in Bypass and RPS CH 1 trips. Incorrect since the stem puts RPS in a 2 out of 3 trip logic and only one channel trips therefore the reactor does not trip.
 - B. Incorrect – These conditions require entry into an abnormal procedure that has Immediate Actions. Verifying IAs is a higher priority than reviewing an annunciator procedure. The ARP is reviewed for plant response as time permits. Plausible since ROs perform Annunciator reviews for unexpected conditions.
 - C. Correct – Setting a limit (control band) is required when manual actions are required IAW NOP-OP-1002, Step 4.10.3.
 - D. Incorrect – While important to restore operability to each component, the conditions in the stem give a stuck open PORV, in which TS 3.4.11, Condition A requires closing of the PORV block valve to maintain barrier integrity.

Technical Reference(s): DB-OP-01003, OPERATIONS PROCEDURE USE INSTRUCTIONS, 6.5.1
 (Attach if not previously provided, including version/revision number.) NOP-OP-1002, CONDUCT OF OPERATIONS (Rev. 17), 4.10.3

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(5)

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q89

Level	RO	SRO
Tier #		2
Group #		1
K/A #	000064	G2.2.45
Importance Rating		4.7

K/A Statement: EMERGENCY DIESEL GENERATOR SYSTEM, EQUIPMENT CONTROL Ability to determine and/or interpret TS with action statements of greater than 1 hour (SRO Only)

Proposed Question:

Initial Plant Conditions:

- The Reactor is at 100% RTP
- No safety equipment is removed from service

At 0800 on January 7th:

- During a routine surveillance, EDG 1 failed to reach rated speed and was shutdown and declared inoperable

At 0845 on January 7th:

- Surveillance Requirement 3.8.1.1 for OPERABLE offsite circuit(s) was completed

At 1100 on January 7th:

- Troubleshooting determined the EDG 1 governor was failed

Based on the above conditions and in accordance with Technical Specification 3.8.1 AC Sources - Operating, which REQUIRED ACTION and COMPLETION TIME is correct?

- Restore EDG 1 to OPERABLE status by 0800 on January 10th.
- Declare required features supported by EDG 1 inoperable by 1200 on January 7th.
- Determine EDG 2 is not inoperable due to common cause failure by 1100 on January 8th.
- Perform Surveillance Requirement 3.8.1.1 for OPERABLE offsite circuit(s) by 1645 on January 7th.

Proposed Answer:

D

Explanation (Optional):

- Incorrect – This is a 7-day action NOT 72 hours. Plausible since there are 72 hr actions like restoring HPI which is supplied by the EDG when

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(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q89

it's normal supply is lost.

- B. Incorrect – Plausible as this would be a possible required action per TS 3.8.1, Condition B.2. However, only when its redundant required feature(s) is inoperable.
- C. Incorrect – 1100 on 1/8 is past the required action time. Plausible as this would be a possible required action per TS 3.8.1, Condition B, Required Action B.3.1 if EDG 1 remained inoperable for greater than 24 hours.
- D. Correct – Perform SR 3.8.1.1 for OPERABLE offsite circuit(s) 1 hour AND Once per 8 hours thereafter.

Technical Reference(s): Technical Specific Bases 3.8.1 AC Sources – Operating.
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
 (required, if available)

Question Source: Bank # _____
 Modified Bank # _____ (note changes or attach parent)
 New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(3) & (5)

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q90

Level	RO	SRO
Tier #		2
Group #		1
K/A #	103 A2.04	
Importance Rating		3.4

K/A Statement: Ability to (a) predict the impacts of the following on the CONTAINMENT SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those operations Conditions requiring containment evacuation (including recognition of the alarm)

Proposed Question:

Initial Conditions:

- RCS drain has commenced for refueling outage
- The plant is in reduced inventory
- Decay Heat Removal loop 1 is in Operation
- Decay Heat Removal loop 2 is in Standby

The following occurs:

- CTMT Normal Sump Level is rising
- DH Pump 1 motor amps becomes erratic
- DH Pump 1 discharge pressure becomes erratic
- DH Pump 1 flow becomes erratic
- DB-OP-02527, LOSS OF DECAY HEAT REMOVAL is entered

Based on the above plant conditions, complete the following statements.

In accordance with DB-OP-02527, the NEXT action related to the Decay Heat Removal Pumps will be to (1). Containment evacuation (2) required.

- A. (1) start DH Pump 2
(2) is
- B. (1) stop DH Pump 1
(2) is
- C. (1) start DH Pump 2
(2) is NOT
- D. (1) stop DH Pump 1
(2) is NOT

Proposed Answer:

B

Examination Outline Cross-Reference: Q90

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q91

Level	RO	SRO
Tier #		2
Group #		2
K/A #	000035	G2.1.45
Importance Rating		4.3

K/A Statement: STEAM GENERATOR SYSTEM CONDUCT OF OPERATIONS: Ability to identify and interpret diverse indications to validate the response of another indication.

Proposed Question: The plant is operating at 100% RTP.

An event occurs which causes the following indications:

- 14-4-E, ICS INPUT MISMATCH is LIT
- 14-5-E, ICS SG 1 ON LO LVL LIMIT is LIT
- 12-3-A, SG 1 OPERATE LVL HI is LIT
- 12-4-A, SG 1 LVL LO is LIT
- Computer point L884, SG 1 LVL (NNI-X) on Plant Computer Group 61 is at 30 inches and slowly lowering
- Computer point L883, SG 1 LVL (NNI-Y) on Plant Computer Group 61 is at 240 inches and slowly rising

The Command SRO should direct the operators to establish manual control of feedwater flow and establish a proper demand signal in accordance with ____ (1) ____ to mitigate this event.

The BASIS for the Technical Specification LCO challenged (LCO 3.7.18, Steam Generator Level) by this event is to ensure Steam Generator (SG) water inventory is maintained ____ (2) ____.

- A. (1) NORM-OP-1002, CONDUCT OF OPERATIONS HANDBOOK
 (2) high enough to provide adequate primary to secondary heat transfer
- B. (1) NORM-OP-1002, CONDUCT OF OPERATIONS HANDBOOK
 (2) below initial SG inventory assumptions used in the main steam line break (MSLB) accident analysis
- C. (1) DB-OP-02532, LOSS OF NNI/ICS POWER
 (2) high enough to provide adequate primary to secondary heat transfer
- D. (1) DB-OP-02532, LOSS OF NNI/ICS POWER
 (2) below initial SG inventory assumptions used in the main steam line break (MSLB) accident analysis

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Examination Outline Cross-Reference: Q91

Proposed Answer: **B**

- Explanation (Optional):
- A. Incorrect – Plausible as part (1) is correct. Part (2) is plausible as it is the TS Basis for the low S/G Level Limit.
 - B. Correct – Malfunction is failure of controlling Startup (SU) level low which results in SG overfeed. See M-533-00171 R10. If the faulted instrument or component is apparent, action should be taken by the operator to establish manual control of the faulted component and a proper demand signal established IAW NORM-OP-1002, Conduct of Operations Handbook. DB-OP-02526 will be used if the cause is NOT apparent. See step 2.1.4 and 2.1.5. TS Bases for high S/G water level is listed in B 3.7.18 page B 3.7.18-1.
 - C. Incorrect – Part (1) is plausible if it is determined the cause of the event is a loss of ICS or NNI power. Part (2) is plausible because this is the TS basis for the low-level limit.
 - D. Incorrect – Part (1) is plausible if it is determined the cause of the event is a loss of ICS or NNI power. Part (2) is correct.

Technical Reference(s): NORM-OP-1002, CONDUCT OF OPERATIONS HANDBOOK; TS Bases for
 (Attach if not previously provided, including version/revision number.) TS 3.7.18.

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # _____
 Modified Bank # X (note changes or attach parent)
 New _____

Question History: Last NRC Exam 2015 Q93 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41 _____
 55.43 (b)(5)

Comments:

Modified question stem to indicate level lowering. All distractors and answers were changed.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q92

Level	RO	SRO
Tier #	_____	2
Group #	_____	2
K/A #	000045	G2.2.12
Importance Rating	_____	4.1

K/A Statement: MAIN TURBINE GENERATOR SYSTEM, EQUIPMENT CONTROL:
 Knowledge of surveillance procedures

Proposed Question:

DB-SS-04150, MAIN TURBINE STOP VALVE TEST and DB-SS-04159, ONLINE ELECTRICAL TRIP DEVICE TEST are BOTH scheduled to be performed during the shift.

During the performance of ____ (1) ____ the affected ARTS TURBINE-GEN Bypass Switch is required to be placed in the BYPASS position.

When the ARTS TURBINE-GEN Bypass Switch is placed in the BYPASS position, LCO 3.3.16, Anticipatory Reactor Trip System (ARTS) Instrumentation Condition A ____ (2) ____ met.

- A. (1) DB-SS-04159, ONLINE ELECTRICAL TRIP DEVICE TEST
 (2) is still
- B. (1) DB-SS-04159, ONLINE ELECTRICAL TRIP DEVICE TEST
 (2) is NOT
- C. (1) DB-SS-04150, MAIN TURBINE STOP VALVE TEST
 (2) is still
- D. (1) DB-SS-04150, MAIN TURBINE STOP VALVE TEST
 (2) is NOT

Proposed Answer: **C**

- Explanation (Optional):
- A. Incorrect – DB-SS-04159 does not require the ARTS TURBINE-GEN Bypass Switch placed in the BYPASS position. Plausible since a failed ETD could cause EHC pressure to lower to the ARTS Trip setpoint. Part (2) is correct as according to LCO 3.3.16 Table 3.3.16-1 only 3 channels are required to be operable when >45% power therefore LCO 3.3.16 is met.
 - B. Incorrect – DB-SS-04159 does not require the ARTS TURBINE-GEN Bypass Switch placed in the BYPASS position. Plausible since a failed ETD could cause EHC pressure to lower to the ARTS Trip setpoint. According to LCO 3.3.16 Table 3.3.16-1 only 3 channels are required to be operable when >45% power therefore LCO 3.3.16 is still being met. Plausible since 4 channels of RPS and SFAS are required to be

Examination Outline Cross-Reference: Q92

operable in Mode 1.

- C. Correct – During the performance of DB-SS-4150 the ARTS TURBINE-GEN Bypass Switch is required to be placed in the BYPASS position. According to LCO 3.3.16 Table 3.3.16-1 only 3 channels are required to be operable when >45% power therefore LCO 3.3.16 is met.
- D. Incorrect – Plausible as during the performance of DB-SS-4150 the ARTS TURBINE-GEN Bypass Switch is required to be placed in the BYPASS position. According to LCO 3.3.16 Table 3.3.16-1 only 3 channels are required to be operable when >45% power therefore LCO 3.3.16 is still being met. Plausible since 4 channels of RPS and SFAS are required to be operable in Mode 1.

Technical Reference(s): LCO 3.3.16, ANTICIPATORY REACTOR TRIP SYSTEM
 (Attach if not previously INSTRUMENTATION, Table 3.3.16-1; DB-SS—4150, MAIN TURBINE
 provided, including STOP VALVE TEST; DB-SS-04159, ONLINE ELECTRICAL TRIP DEVICE
 version/revision number.) TEST

Proposed references to be provided None
 to applicants during examination:

Learning Objective:
 (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam 2021 SRO Q18 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
 Comprehension / Analysis / **H**igher
 Cognitive

10 CFR Part 55 Content: 55.41
 55.43 (b)(2)

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q93

Level	RO	SRO
Tier #		2
Group #		2
K/A #	000068	A2.04
Importance Rating		3.8

K/A Statement: Ability to (a) predict the impacts of the following on the LIQUID RADWASTE SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Failure of automatic isolation

Proposed Question:

The crew is performing a Miscellaneous Waste Monitor Tank (MWMT) release in accordance with section 4.3 of DB-OP-03011, RADIOACTIVE LIQUID BATCH RELEASE.

The following release parameters exist:

- Actual Maximum Release Rate (MRR) is 100 gpm
- HS 1877 is in the DISCHARGE B position
- RE1878B are functional and aligned
- RE1878A is NON-Functional, all required actions have been completed to start the release

During the release, 7-1-D, MISC WST SYS OUT RAD HI alarms, and the following conditions are received:

- WM1876, MISC WST DISCH ISO VALVE, indicates OPEN
- WM1877A, MISC WST DISCH LOW FLOW CONTROL VLV, indicates CLOSED
- WM1877B, MISC WST DISCH HIGH FLOW CONTROL VLV, indicates OPEN
- RE1878B is observed to be failed high
- MWMT Transfer pump is running

Based on the above conditions:

- WM1876 and WM1877B should have CLOSED **AND** the MMWT Transfer pump will ____ (1) ____.
- The Command SRO will direct the crew to manually position components which should have repositioned and then, in accordance with DB-OP-0311, ____ (2) ____.

- A. (1) continue to RUN
 (2) direct Chemistry to recalculate the MRR and change high alarm setpoints proportionally per Attachment 22, RESPONSE TO A RE WARN OR HIGH ALARM, then proceed with the release
- B. (1) trip OFF

Examination Outline Cross-Reference: Q93

- (2) direct Chemistry to recalculate the MRR and change high alarm setpoints proportionally per Attachment 22, RESPONSE TO A RE WARN OR HIGH ALARM, then proceed with the release
- C. (1) continue to RUN
(2) restore the system to a normal line-up, complete the procedure for record close out and initiate a new release permit to complete the release
- D. (1) trip OFF
(2) restore the system to a normal line-up, complete the procedure for record close out and initiate a new release permit to complete the release

Proposed Answer:

C

Explanation (Optional):

- A. Incorrect – Plausible as Part (1) is correct. Part (2) is wrong since this is a failure of the RE’s to automatically close the discharge valves. They will be declared non-functional. The release cannot proceed unless ODCM actions are taken. L&P 2.1.6 states, “If for any reason, any liquid release must be stopped prior to its completion, careful consideration should be given to system restoration to a normal lineup, i.e. pumps shutdown, valve lineups restored.”
- B. Incorrect – Plausible as in other instances when isolation valves are shut the supporting pump will receive a trip signal. Part (2) is wrong. See A explanation.
- C. Correct – The MWDT Pump does not trip OFF. The release will be terminated due to a failure of the RE’s to close the discharge valves. ODCM actions will be required to start a new release if the RE’s are not fixed.
- D. Incorrect – Plausible as in other instances when isolation valves are shut the supporting pump will receive a trip signal and Part (2) is correct.

Technical Reference(s): DB-OP-03011, RADIOACTIVE LIQUID BATCH RELEASE; DB-OP-06111, MISCELLANEOUS LIQUID WASTE SYSTEM; 7-1-D MISC WST SYS OUT RAD HI; OS-29, OPERATIONAL SCHEMATIC MISCELLANEOUS LIQUID RADWASTE SYSTEM, Sheets 1 and 2. ODCM.

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source:

Bank #

Modified Bank # _____ (note changes or attach parent)

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q94

Level	RO	SRO
Tier #		3
Group #		
K/A #	G2.1.36	
Importance Rating		4.1

K/A Statement: CONDUCT OF OPERATIONS: Knowledge of procedures and limitations involved in core alterations

Proposed Question:

You are the Fuel Handling Director on the Main Fuel Handling Bridge over the Reactor Cavity.

A spent fuel assembly is in the main mast being transferred over the reactor core to its new location when a report is received that a Steam Generator nozzle dam has failed and refueling cavity level is lowering.

In accordance with DB-OP-00030, FUEL HANDLING OPERATIONS you MUST direct the Bridge Operator to place the spent fuel assembly in the _____.

- A. refuel canal racks
- B. transfer mechanism basket in the vertical position
- C. spent fuel pool (SFP) and then install the SFP gate
- D. core at any vacant location

Proposed Answer:

D

Explanation (Optional):

- A. Incorrect – Plausible as this is a location in the refuel cavity, but DB-OP-00030 ATT 1 requires all fuel assemblies be removed from the refuel canal racks under these conditions.
- B. Incorrect – Plausible as the transfer mechanism basket in the lowered or horizontal position is a permitted location for the fuel assembly.
- C. Incorrect – Plausible as installing the SFP gate is an immediate action under these conditions but moving the fuel assembly to the SFP first is an unnecessary delay.
- D. Correct – Lowering the spent fuel back into the reactor core ensures adequate shielding as level lowers in the reactor cavity due to the failure of the SG nozzle dam.

Form 4.2-1 Written Examination Question Worksheet
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Examination Outline Cross-Reference: Q94

Technical Reference(s): DB-OP-00030, FUEL HANDLING OPERATIONS, Attachment 1
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(6)

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q95

Level	RO	SRO
Tier #		3
Group #		
K/A #	G2.1.39	
Importance Rating		4.3

K/A Statement: CONDUCT OF OPERATIONS: Knowledge of conservative decision-making practices

Proposed Question: A severe thunderstorm WATCH has been issued for Ottawa County. The Shift Manager SHALL _____.

- A. stop ALL work until a YELLOW Risk Management Plan is in place
- B. stop work on equipment Danger Tagged OOS, that ONLY impacts PRA Risk
- C. post protected equipment barriers on offsite and onsite power equipment
- D. determine on a case-by-case basis if any Risk Management Actions will be taken

Proposed Answer: **D**

Explanation (Optional):

- A. Incorrect – Plausible as the would be required for a Severe Thunderstorm WARNING.
- B. Incorrect – Plausible as PRA Risk activities should typically be completed. This is assuming that completing this work will improve the Risk margin by making the equipment Available.
- C. Incorrect – Plausible because protected equipment barriers on onsite and offsite equipment are commonly used as a risk mitigating action for a severe weather WARNING.
- D. Correct – In accordance with NOP-OP-1007, Section 4.2.5.1 the Shift Manger must determine on a case-by-case basis any Risk Management Actions that will be taken during severe weather WATCHES.

Technical Reference(s): NOP-OP-1007, RISK MANAGEMENT, Step 4.2.5.1; NOP-OP-1002, Step 4.11.2.4
(Attach if not previously provided, including version/revision number.)

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(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q95

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(5)

Comments:

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q96

Level	RO	SRO
Tier #	_____	3
Group #	_____	_____
K/A #	G2.2.23	
Importance Rating	_____	4.6

K/A Statement: EQUIPMENT CONTROL: Ability to track TS limiting conditions for operation

Proposed Question:

The Reactor is at 100% RTP.

- At 0345 on February 8, HPI Pump 1 is declared inoperable.
- At 0700 on February 8, HPI Pump 2 is declared inoperable.
- At 0730 on February 8, HPI Pump 1 is restored to operable status.

Including any extensions that are permitted by Technical Specifications, what is the LATEST time and date to restore HPI Subsystem 2 to operable status without requiring a unit shutdown to commence?

- A. 0345 on February 11
- B. 0700 on February 11
- C. 0345 on February 12
- D. 0700 on February 12

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – plausible since this is the completion time required to be tracked with one pump inoperable.
- B. Correct – Tech Spec section 1.3 allows a 24-hour extension from the first pump inoperable completion time but not to exceed the stated completion time as measured from the discovery of the subsequent operability. The total Completion Time allowed for completing a Required Action to address the subsequent inoperability shall be limited to the *more restrictive* of either: The stated Completion Time, as measured from the initial entry into the Condition, plus an additional 24 hours; or the stated Completion Time as measured from discovery of the subsequent inoperability.
- C. Incorrect – plausible since this would be the time if a 24-hour extension was allowed from the first pump.
- D. Incorrect – plausible since this would be the time if a 24-hour

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q96

extension was allowed from the second pump.

Technical Reference(s): Davis-Besse Improved Technical Specifications, Section 1.3 –
(Attach if not previously COMPLETION TIMES; TS 3.5.2 – ECCS, OPERATING
provided, including
version/revision number.)

Proposed references to be provided **None.**
to applicants during examination:

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # _____ (note changes or attach parent)
New _____

Question History: Last NRC Exam DB 2016 Q97 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge _____
Comprehension / Analysis / **H**igher
Cognitive X

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(2)

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q97

Level	RO	SRO
Tier #	_____	3
Group #	_____	_____
K/A #	G2.2.25	
Importance Rating	_____	4.2

K/A Statement: EQUIPMENT CONTROL: Knowledge of the bases in TS for limiting conditions for operation and safety limits (SRO Only)

Proposed Question:

AXIAL POWER IMBALANCE limits as described in the COLR are established in accordance with Technical Specification Safety Limit 2.1.1.1 and Limiting Condition for Operation (LCO) 3.2.3.

The bases for the limits for (1) Safety Limit 2.1.1.1 and (2) LCO 3.2.3 are to?

- A. (1) ensure fuel centerline temperature and DNBR are within limits
(2) preserve the initial conditions of the safety analyses
- B. (1) provide the most restrictive of all possible reactor coolant pump-maximum THERMAL POWER combinations
(2) preserve the initial conditions of the safety analyses
- C. (1) ensure fuel centerline temperature and DNBR are within limits
(2) ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are NOT violated
- D. (1) provide the most restrictive of all possible reactor coolant pump-maximum THERMAL POWER combinations
(2) ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are NOT violated

Proposed Answer:

A

Explanation (Optional):

- A. Correct – The fuel centerline melt and DNBR fuel design limits are not directly monitored by installed plant instrumentation. Instead, monitoring the process variable AXIAL POWER IMBALANCE ensures that the core operates within the fuel design criteria. With AXIAL POWER IMBALANCE within the protective limits of the SAFETY LIMITS, fuel centerline temperature and DNBR are also within limits. The AXIAL POWER IMBALANCE operating limits in LCO 3.2.3, also specified in the COLR, preserve initial conditions of the safety analyses but are not reactor core SLs.
- B. Incorrect – Plausible as Part (1) is the bases for SAFETY LIMIT Curve

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Examination Outline Cross-Reference: Q97

Figure 2.1.1-1. Part (2) is correct.

- C. Incorrect – Plausible as Part (1) is correct. Part (2) is plausible as it is the bases for LCO 3.2.1 ROD INSERTION LIMITS.
- D. Incorrect – Plausible as Part (1) is the bases for SAFETY LIMIT Curve Figure 2.1.1-1. Part (2) is plausible as it is the bases for LCO 3.2.1 ROD INSERTION LIMITS.

Technical Reference(s): Improved Technical Specifications Bases Section 2.1 - SAFETY LIMITS;
(Attach if not previously LCO 3.2.3 - AXIAL POWER IMBALANCE.
provided, including
version/revision number.)

Proposed references to be provided None
to applicants during examination:

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher
Cognitive _____

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(2)

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q98

Level	RO	SRO
Tier #	_____	3
Group #	_____	_____
K/A #	G2.3.06	
Importance Rating	_____	3.8

K/A Statement: RADIATION CONTROL: Ability to approve liquid or gaseous release permits

Proposed Question: The crew is preparing to perform a liquid release of Clean Waste Monitor Tank 1 (CWMT 1).

Which condition would require the Shift Manager to NOT permit the release to occur?

- A. A release of the Miscellaneous Waste Monitor Tank is already in progress.
- B. Both radiation monitors RE1770A and RE1770B are NON-functional.
- C. Both CWMT release rate flow meters FI1700A and FQI1700A are NON-functional.
- D. Total dilution flow computer point F201 is NON-functional.

Proposed Answer: **A**

- Explanation (Optional):
- A. Correct – Per step 4.9.1 for approval of a CWMT1 release is to verify that NO other radioactive liquid release is in progress.
 - B. Incorrect – Plausible as radiation monitors RE1770A and B are vital to performing a controlled safe liquid release of the CWMT1, but the ODCM and DB-OP-03011 allows a release to occur if both channels are non-functional as long as two independent tank samples are performed, two independent release rate calculations are performed, and two independent discharge valve lineups are performed.
 - C. Incorrect – Plausible as every effort should be made to restore at least one of the flow instruments before a release is performed, but per the ODCM and DB-OP-03011, a release may take place if flow rate is estimated every 4 hours based on CWMT1 volume changes.
 - D. Incorrect – Plausible as every effort should be made to restore F201 prior to a liquid release, but the ODCM and DB-OP-03011 permit a release if F201 is OOS as long as flow to collection box is estimated every four hours using known collection box input data.

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q98

Technical Reference(s): DB-OP-03011, RADIOACTIVE LIQUID BATCH RELEASE
(Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective:
(required, if available)

Question Source: Bank # _____
Modified Bank # _____ (note changes or attach parent)
New X

Question History: Last NRC Exam _____ (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher Cognitive _____

10 CFR Part 55 Content: 55.41 _____
55.43 (b)(4)

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q99

Level	RO	SRO
Tier #		3
Group #		
K/A #	G2.4.05	
Importance Rating		4.3

K/A Statement: EMERGENCY PROCEDURES/PLAN: Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions

Proposed Question:

The Plant is operating at 100% RTP when the following occurs:

- Multiple Fire Alarms are received from Room 603, CONTROL ROOM AC EQUIPMENT ROOM, Fire Area HH
- The Fire Brigade is dispatched in accordance with DB-OP-02529, FIRE PROCEDURE
- The Fire Brigade Captain reports a significant fire is in progress and requests off-site assistance
- The ATC Reactor Operator reports High Pressure Injection Pump 2 and Containment Spray Pump 2 have spuriously started

Subsequently, the Reactor trips.

- NO other effects of the fire are indicated at this time

Which of the following procedures should the Command SRO transition to NEXT?

- A. DB-OP-02000, RPS, SFAS, SFRCS TRIP OR SG TUBE RUPTURE
- B. DB-OP-02501, SERIOUS STATION FIRE
- C. DB-OP-02508, CONTROL ROOM EVACUATION
- D. DB-OP-02519, SERIOUS CONTROL ROOM FIRE

Proposed Answer:

B

Explanation (Optional):

- A. Incorrect – Plausible because in general, the correct procedure to implement following a Reactor Trip is DB-OP-02000.
- B. Correct – Spurious operation of safety related equipment requires implementation of DB-OP-02501 which takes priority over DB-OP-02000. See DB-OP-01003, OPERATIONS PROCEDURE USE INSTRUCTIONS step 6.5.2.a.
- C. Incorrect – Plausible because DB-OP-02519, Serious Station Fire Attachment 20 for Fire Area HH directs use of DB-OP-02508,

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q99

CONTROL ROOM EVACUATION if the fire in area HH affects Control Room Habitability. In addition, a fire in the Control Room AC area could introduce smoke into the Control Room.

- D. Incorrect – plausible because a fire in the Control Room AC area could introduce smoke into the Control Room, however the Control Room circuits would not be involved in the fire which would require use of DB-OP-02519, SERIOUS CONTROL ROOM FIRE.

Technical Reference(s): DB-OP-01003, OPERATIONS PROCEDURE USE INSTRUCTIONS, Step 6.5.2.a. DB-OP-02501, Step 2.1.1 Symptoms for Serious Station Fire.
 (Attach if not previously provided, including version/revision number.)

Proposed references to be provided to applicants during examination: None

Learning Objective: (required, if available)

Question Source: Bank # X
 Modified Bank # (note changes or attach parent)
 New

Question History: Last NRC Exam DB 2015 Q99 (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge
 Comprehension / Analysis / **H**igher Cognitive X

10 CFR Part 55 Content: 55.41
 55.43 (b)(5)

Comments:

**Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)**

Examination Outline Cross-Reference: Q100

Level	RO	SRO
Tier #	_____	3
Group #	_____	_____
K/A #	G2.4.40	
Importance Rating	_____	4.5

K/A Statement: Knowledge of SRO responsibilities in emergency plan implementing procedures (SRO Only)

Proposed Question:

You are the licensed senior operator in the Control Room during an Emergency Plan activation that resulted from a tornado striking several locations on site.

The Shift Manager (Emergency Director) has directed you to perform an off-site dose assessment.

- Davis-Besse Unified RASCAL Interface (URI) Dose Assessment Software is NOT available.

As a result of the tornado strike, the following Meteorological Tower data is NOT functioning:

- Upper delta temperature
- Lower delta temperature
- All 10 meter wind direction indications

Given this set of circumstances, Stability Class _____ MUST be used during calculations of off-site dose.

- A. A – Extremely unstable
- B. B – Moderately unstable
- C. D - Neutral
- D. F – Moderately stable

Proposed Answer: **D**

Explanation (Optional):

- A. Incorrect – Plausible since Class A is most unstable. The candidate may think this is the most conservative since it's the only distractor with "Extremely".
- B. Incorrect – Plausible since Class B and Class F (the answer) both use moderately in their description.
- C. Incorrect – Plausible since Class D is neutral (middle of scale).
- D. Correct – Classes range from A to G. Class F is directed to be used

Form 4.2-1 Written Examination Question Worksheet
(Davis Besse – January, 2024)

Examination Outline Cross-Reference: Q100

by RA-EP-02240 if no indications available.

Technical Reference(s): RA-EP-02240, OFFSITE DOSE ASSESSMENT (p. 40), Attachment 7,
(Attach if not previously Meteorological Data, 4.d.
provided, including
version/revision number.)

Proposed references to be provided None
to applicants during examination:

Learning Objective:
(required, if available)

Question Source: Bank # X
Modified Bank # (note changes or attach parent)
New

Question History: Last NRC Exam (if applicable)

Question Cognitive Level: Memory / **F**undamental Knowledge X
Comprehension / Analysis / **H**igher
Cognitive

10 CFR Part 55 Content: 55.41
55.43 (b)(5)

Comments:

DB EXAM BANK ID: 290429