QUESTIONS REPORT

for VCS 2009 NRC RO WORKSHEET (AFTER CHANGES FROM VALIDATION)

1. 001 A2.07 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 90% power
- An instrument failure causes a plant transient which results in a Reactor Trip.
- On the trip, TWO (2) control rods remain at 6 steps, ONE (1) control rod remains at 12 steps, and ONE (1) control rod remains at 18 steps.

Which ONE (1) of the following describes the required response?

A. Borate through the Boric Acid Blender and set the batch integrator to 2500 gallons.

B. Borate through the Boric Acid Blender and set the batch integrator to 5800 gallons.

C. Emergency borate 2500 gallons through MVT-8104, EMERG BORATE.

D✓ Emergency borate 5800 gallons through MVT-8104, EMERG BORATE.

Feedback

A. Plausible because Alternative action of Step 5 of EOP-1.1 *does* require a boration via (Emergency Boration) for greater than 1 control rod not fully inserted into the core (2500 gallons for 2 rods; 5800 gallons for greater than 2 rods. Also plausible because borating through the belender is one of the acceptable methods in AOP-106.1, *Emergency Boration.*

Incorrect because the first part identifies a possible but incorrect boration method and the incorrect amount of boric acid (2500 gallons) vs. the 5800 gallons required based upon the conditions given.

B Plausible because Alternative action of step 5 of EOP-1.1 *does* require a boration via (Emergency Boration) for greater than 1 control rod not fully inserted into the core (2500 gallons for 2 rods; 5800 gallons for greater than 2 rods. Also plausible because borating through the belender is one of the acceptable methods in AOP-106.1, *Emergency Boration.*

Incorrect because the first part identifies a possible but incorrect boration method.

C. Plausible because Alternative Action of Step 5 of EOP-1.1 does require a boration via (Emergency Boration) for greater than 1 control rod not fully inserted into the core (2500 gallons for 2 rods; 5800 gallons for greater than 2 rods.

Incorrect because the first part uses the correct boration method, however, identifies the incorrect amount of boric acid (2500 gallons) vs. the 5800 gallons required based upon the conditions given.

D. CORRECT: Based upon the given conditions the correct boration method and number of gallons of boric acid are identified per Alternative Action of Step 5 of EOP-1.1, (Emergency Boration of 5800 gallons for greater than 2 rods not fully inserted).

Notes

Ability to (a) predict the impacts of the following on the Control Rod Drive and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Effect of reactor trip on primary and secondary parameters and systems.

Tier: 2
Group: 2

Importance Rating: RO 4.1

Technical References:

- EOP-1.1, Rev 15
- NRC Bulletin 96-01
- WOG Background Document HES01BG.doc, HP-Rev 2, 4/30/05
- IC-5, p57, Rev 10

Proposed references to be provided to applicants during examination:

Learning Objective: IC-5-20.4

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5), (10)

Comments:

The KA is matched because the operator must know that a few rods stuck out of the core on a reactor trip and apply the correct procedure (i.e. emergency borate 5800 gallons).

2. 001 AK1.16 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A plant load increase at ½% per minute is in progress.
- A malfunction in the Rod Control System results in Control Rods stepping out TEN (10) steps, at which point they are placed in MANUAL and stop moving.
- The load increase is stopped 2 minutes after the failure.
- Control Rods are manually inserted to restore Tavg to Tref.

Considering ONLY the conditions stated, which ONE (1) of the following describes how Total Power Defect has been affected, AND how far Control Rods have been inserted to restore Tavg to Tref?

A. Remained the same;

less than10 steps

B. Remained the same;

10 steps

C✓ Increased;

less than10 steps

D. Increased;

10 steps

Feedback

A. Plausible 1st part because on an uncontrolled rod motion malfunction, negating all other effects (including the 1% turbine load increase), if Tavg is restored to match Tref, the total power defect remains unchanged since no net power change occurred.

Plausible because 2nd part is correct. Since the turbine load change is allowed to continue to increase for two minutes this will result in a net power change of a 1% power increase when Tavg is restored to Tref, Since no dilution has occurred and Tref has increased due to the change in turbine power rod height will have to be higher for Tavg to match Tref on the power increase. Rods would not have to be inserted the full 10 steps that they step out in order to match Tavg with Tref (to compensate for the positive reactivity of the 10 step withdrawal and because power defect added some negative reactivity).

Incorrect because power has increased by 1%, therefore, Total Power Defect has increased adding negative reactivity. (Ref VCSNS curve book Figure II-2). Since Tref as increased as a result of the turbine load increase, Tavg would have to be increased to match Tref. From the conditions stated, rod height will have to be higer to offset the negative reactivity inserted by the increase in Power Defect. Therefore, when the rods are manually inserted to match Tavg and Tref following the outward rod motion, the rods will not have been inserted the full 10 steps they withdrew.

B. Plausible 1st part because on an uncontrolled rod motion malfunction negating all other effects (including the 1% turbine load increase), if Tavg is restored to match Tref, the total power defect remains unchanged since no net power change occurred.

Plausible 2nd part because if no power change occurs, and negating all other effects, the amount of inward rod motion required to restore Tavg to Tref is the same as the total outward rod motion.

Incorrect because since the turbine load change is allowed to continue to increase for two minutes, this will result in a net power change of a 1% power increase when Tavg is restored to Tref, Since no dilution has occurred and Tref has increased due to the change in turbine power, rod height will have to be higher for Tavg to match Tref on the power increase. Rods would not have to be inserted the full 10 steps that they step out in order to match Tavg with Tref.

C. CORRECT: 1st part is correct. Because Power has increased by 1% Total Power Defect has increased (Ref VCSNS curve book figure II-2). Also correct because the turbine load change is allowed to continue to increase for two minutes this will result in a net power change of a 1% power increase when Tavg is restored to Tref, Since no dilution has occurred and Tref has increased due to the change in turbine power, and negative reactivity has been added due to the increase in total power defect, rod height will have to be higher for Tavg to match Tref on the power increase. Rods would not have to be inserted the full 10 steps that they step out in order to match Tavg with Tref (to compensate for the positive reactivity of the 10 step withdrawal and because power defect added some negative reactivity).

D. Plausible because 1st part is correct. Because power has increased by 1%, Total Power Defect has increased (Ref VCSNS curve book Figure II-2).

Plausible 2nd part because if no power change occurs, and negating all other effects, the amount of inward rod motion required to restore Tavg to Tref is the same as the total outward rod motion.

incorrect because since the turbine load change is allowed to continue to increase for two minutes this will result in a net power change of a 1% power increase when Tavg is restored to Tref, Since no dilution has occurred and Tref has increased due to the change in turbine power, rod height will have to be higher for Tavg to match Tref on the power increase. Rods would not have to be inserted the full 10 steps that they step out in order to match Tavg with Tref.

Notes

Knowledge of the physical connections and/or cause-effect relationships between Continuous Rod Withdrawal and the following: Definition and application of power defect.

Tier: 1
Group: 2

Importance Rating: RO 3.0

Technical References:

- TS-12, p11-12, Rev 4
- Figure II-2 (Rev 1-4-07) of the VC Summer Curve Book
- RT-13, p???, Rev ???

Proposed references to be provided to applicants during examination:

NONE

Learning Objective: RT-13-1547

Question History:

NEW

10 CFR Part 55 Content: 41(b)(1), (5), (10)

Comments:

The KA is matched because the operator must have knowledge of the definition and application of Power Defect and its operational implications (Shutdown Margin) as it applies to Continuous Rod Withdrawal.

3. 002 A4.02 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- ALL offsite power (ESF & BOP) is lost, resulting in a Reactor Trip.
- The operating crew is responding per EOP-1.1, *Reactor Trip Recovery*.
- Both MDEFPs are running.
- RCS prssure is 2085 psig.
- ALL S/G pressures are 1035 psig.
- The Core Subcooling Monitor is NOT available.

Which ONE (1) of the following combinations of RCS Thot and Tcold indicate that natural circulation is in progress?

	Thot (°F)	Tcold (°F)
A.	615	557
B.	615	550
C.	585	557
D.✓	585	550

A. Plausible because given Tcold is at no-load Tavg. Also plausible because it is possible to have a sgnificantly elevated Thot after a loss of forced cooling flow due to the loss of offsite power.

Incorrect because subcooling is less than 30°F. RCS pressure = 2085 psig = 2100 psia; Tsat for 2100 psia = 642.76°F - 615°F = 27.76°F subcooled.

B. Plausible because Tcold is correct for the given S/G pressure (1035 psig = 1050 psia; Tsat for 1050 psia = 550.53 °F). Also plausible because it is possible to have a sgnificantly elevated Thot after a loss of forced cooling flow due to the loss of offsite power.

Incorrect because subcooling is less than 30°F. RCS pressure = 2085 psig = 2100 psia; Tsat for 2100 psia = 642.76°F - 615°F = 27.76°F subcooled.

C. Plausible because subcooling is greater than 30°F and because Tcold is at no-load Tavg.

Incorrect because Tcold should be equivalent to the saturation temperature for the S/G pressure (1035 psig = 1050 psia; Tsat for 1050 psia = 550.53 °F).

D. CORRECT. RCS subcooling is greater than 30°F (RCS pressure = 2085 psig = 2100 psia; Tsat for 2100 psia = 642.76°F - 585°F = 57.76°F subcooled) <u>and</u> Tcold is equivalent to the saturation pressure for the given S/G pressure (1035 psig = 1050 psia; Tsat for 1050 psia = 550.53 °F) .

Notes

(Reactor Coolant) Ability to manually operate and/or monitor in the control room: Indications necessary to verify natural circulation form appropriate level, flow and temperature indications and valve positions upon loss of forced circulation.

Tier: 2
Group: 2

Importance Rating: RO 4.3

Technical Reference:

- Steam Tables
- EOP-1.1, Step 12

Proposed references to be provided to applicants during examination:

- Steam Tables

Learning Objective: EOP-1.3-07

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Open Reference questions EOPS 246 and AOPS 55 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(5), (7)

Comments:

The KA is matched because the operator must know the indications necessary to verify that Natural Circulation is occurring within the RCS, after a loss of Forced Circulation.

4. 003 G2.1.7 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 8% power
- The crew is making preparations to roll the Main Turbine to 1800 RPM.

Which ONE (1) of the following conditions requires the associated Reactor Coolant Pump(s) to be stopped IMMEDIATELY using SOP-101, *Reactor Coolant System*?

A. RCP 'C' lower seal water bearing temperature is 196°F and rising.

B. MVG-9600, RCP THERM BAR ISOL, closes due to a failure in the control circuit.

C. Annunciator RCP 'B' UP OIL RESVR HI/LO (XCP-617,1-4) actuates. Upper motor bearing temperature is 180°F and rising.

D✓ Annunciator RCP 'A' VIBR HI (XCP-617, 1-3) actuates. Shaft vibration is 15.1 mils and increasing at 0.1 mils per hour. Frame vibration is 5.1 mils and increasing at 0.1 mils per hour.

Feedback

A. Plausible because 196°F is above the lower *motor* bearing trip criteria.

Incorrect because the lower seal water bearing trip setpoint is 225°F..

B. Plausible because, if MVG-9600 were to close, CCW to the RCP thermal barriers would be lost, which could eventually require RCPs to be shutdown.

Incorrect because, even if all CCW were lost to the RCPs, the crew would still have 10 minutes to restore prior to securing the RCPs.

C. Plausible because ARP-001-XCP-617, 1-4, Corrective Action 3, requires monitoring T0413A, RCP A MTR UPPER RAD BRG T-TE418A.

Incorrect since the given temperature is below the setpoint of 195°F for securing the RCP.

D. CORRECT. IAW ARP-001-XCP-617, 1-3, Supplemental Action 2, if frame vibration is greater than 5 mils, the RCP should be secured if power is less than 38%.

Notes

(Reactor Coolant Pump) Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior and instrument interpretation.

Tier: 2
Group: 1

Importance Rating: RO 4.4

Technical Reference:

- ARP-001-XCP-617 (1-4)

Proposed references to be provided to applicants during examination:

Learning Objective: AB-4-20

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

Meets K/A by requiring an operational decision that must evaluate reactor power, TS requirements, the validity of the alarm, and RCP running time.

5. 004 A3.15 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- Mode 5
- The RCS is solid with pressure being automatically maintained.
- A licensed operator trainee inadvertently energized one set of PZR Backup Heaters.

Assuming NO operator action, which ONE (1) of the following describes the **FIRST** response to the rising RCS pressure?

A. The Letdown Line Relief Valve opens.

B. The RHR Suction Relief Valve(s) opens.

C. Annunciator LP LTDN FLO/PRESS HI actuates.

D.✓ Flow increases through PCV-145, Letdown Pressure Control Valve.

Feedback

A. Plausible because it is in the flow stream and may occur if PCV-145 were full open due to the rising pressure.

Incorrect because it would not open <u>before</u> the RHR Suction Reliefs (450 psig).

B. Plausible because they are in the flow stream and may lift if PCV-145 and the RHR Suction Reliefs were unable to terminate the rising pressure.

Incorrect because they would not open until 450 psig and PCV-145 will sense pressure increasing as pressure exceeds its normal setpoint of 350-400 psig.

C. Plausible because this would eventually occur at 400 psig if PCV-145 did not initially control the rising pressure.

Incorrect because, in this case, no adjustments to charging and letdown have been made and PCV-145 would act <u>first</u> and automatically maintain pressure until it is 100% open.

D. CORRECT. PCV-145 controls RCS pressure with the system solid. With the term "automatically" specified in Bullet 2, PCV-145 is set at 350 PSIG. As such, It will respond before the letdown relief (600 psig) and the RHR suction reliefs (450 psig). Until PCV-145 is 100% open, system pressure will be maintained.

Notes

Ability to monitor automatic operations of the Chemical and Volume control including: PZR pressure and temperature.

Tier: 2
Group: 1

Importance Rating: RO 3.5

Technical References:

- AB-7, Page 37
- AB-3, Figure AB 3.1 (Page 87 of 99)

Proposed references to be provided to applicants during examination:

Learning Objective: IC-3-13

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A by considering PCV-145 alignment and response to a change in PZR temperature and therefore pressure since the plant is solid.

6. 004 K2.05 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Which ONE (1) of the choices below completes the following statement?

LCV-115D, RWST TO CHARGING PUMPS, is powered from ______ and MVG-8106, CHARGING PUMP RECIRC, is powered from _______.

A. 1DA2Z; 1DB2Z

B. 1DB2Y; 1DB2Z

C.✓ 1DB2Y; 1DA2Y

D. 1DA2Z; 1DA2Y

Feedback

A Plausible because both choices are vital busses.

B Plausible because both choices are vital busses.

C. CORRECT. LCV-115D is powered from 1DB2Y and MVG-8106 is powered from 1DA2Y.

D. Plausible because both choices are vital busses.

Notes

(Chemical and Volume Control) Knowledge of electrical power supplies to the following: MOVs.

Tier: 2
Group: 1

Importance Rating: RO 2.7

Technical Reference:

- AB-3, Page 70 of 80

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-3-16

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A since applicant must know the power supply to injection-related CVCS MOV's. None of the valves are direct "give-aways" by bus letter designation.

7. 005 K5.02 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A cooldown is in progress.
- Mode 4 was just entered.
- RHR Train 'A' was just started in the cooldown mode.

Which ONE (1) of the following describes the operability of RHR Train 'A' with respect to Technical Specification 3.5.3, ECCS Subsystems – Tavg <350°F?

A.✓ INOPERABLE until Thot is < 250°F because of RHR suction voiding concerns.

B. INOPERABLE because it is no longer in the injection alignment described in the surveillance.

C. OPERABLE because Train 'A' is capable of being manually realigned to RWST in the injection mode.

D. OPERABLE because Train 'A' is fulfilling the core cooling basis for the Limiting Condition for Operation.

Feedback

A. CORRECT. IAW SOP-115, CAUTION 2.0. Realignment is NOT permitted by SOP-115 until Thot is <250°F due to the potential for voiding in the RHR Pump suction caused by the higher temperature.

B. Plausible because it would be correct for the Mode 1-3 LCO (TS 3.5.2) but Mode 4 is specified in the conditions. Since they must be opened for a cooldown alignment on Train A, the loop suction isolation valves will not be in their required alignment per survelliance 4.5.2.a. (LCO 3.5.2).

C. Plausible because it would be correct if Thot was <250°F. Realigning is prohibited by SOP-115 until Thot is <250°F.

D. Plausible because it is partially correct because RHR loop A *is* cooling the RCS, but not in the injection mode as prescribed by the LCO. It must also be capable of taking suction from the RWST and shifting to the containment sump. Realignment is NOT permitted by SOP-115 until Thot is <250°F due to the potential for voiding in the RHR pump suction caused by the higher temperature.

Notes

Knowledge of the operational implications of the following concepts as they apply to the (Residual Heat Removal): Need for adequate subcooling.

Tier: 2
Group: 1

Importance Rating: RO 3.4

Technical References:

- SOP-115, Precaution II.12 (Page 2 of 116)
- SOP-115, CAUTION 2.0 (Page 15 of 116)
- AB-7, Page 44 of 73

Proposed references to be provided to applicants during examination:

Learning Objective: AB-7-17

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5)

Comments:

Meets K/A because it considers the operational implication of placing RHR in service for cooldown at the high end of the temperature (lowest subcooling) range.

8. 006 A1.09 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A large break LOCA has occurred
- The operating crew has verified cold leg recirculation alignment per EOP-2.2, *Transfer to Cold Leg Recirculation.*
- RHR Pump 'A' amps have begun to oscillate

Which ONE (1) of the following is the required action to stabilize RHR Pump 'A' amps?

A. Go to EOP-2.4, *Loss of Emergency Coolant Recirculation.*

B. Place Charging Pump 'A' in PULL TO LK NON-A; then evaluate RHR Pump amps.

C. Ensure FCV-605A, A BYP, is closed; then throttle HCV-603A, A OUTLET to 2500 gpm.

D.✓ Ensure FCV-605A, A BYP, is closed; then throttle closed HCV-603A, A OUTLET as necessary.

Feedback

A. Plausible because this is an existing transition from EOP-2.2 if at least one train of recirculation cannot be established.

Incorrect because Train 'B' of RHR is still available and the transition to EOP-2.4 would not occur unless both trains could not be established.

B. Plausible because it is correct if EOP-2.2 corrective actions are unsuccessful and a flowpath cannot be established from an RHR sump. Also plausible because this is a typical action for a cavitating pump.

Incorrect because this would not be required until the RHR pump is secured.

C. Plausible because it is consistent with Step 15 of EOP-2.2 and *will* be performed prior to leaving EOP-2.2.

Incorrect because it is only necessary to throttle enough to stabilize RHR pump amps. It is possible that a flowrate above 2500 gpm will stabilize the pump, but it may also be necessary to throttle flow below 2500 gpm to stablize.

D. CORRECT. EOP-2.2 continuous action directs this action to reduce flow in the event of the onset of RHR Sump blockage.

Notes

Ability to predict and/or monitor changes in parameters associated with operating the (Emergency Core Cooling) controls including: Pump amperage, including start, normal and locked.

Tier: 2
Group: 1

Importance Rating: RO 2.8

Technical Reference:

- EOP-2.2, Step 12 (Page 8 of 12)

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-2.2-07

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Open Reference question EOPS 212 and Closed Reference questions AOPS 306 & 388 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(5)

Comments:

Meets K/A by requiring the operator to monitor parameters (pump amps) associated with operating ECCS controls (throttle HCV-603).

9. 007 A2.03 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 55% power
- A Main Generator Field Failure (40 Relay) occurs.
- ALL Pressurizer PORVs opened for ONE (1) minute before they could be closed.
- The NROATC notes that PRT pressure rises rapidly, then drops.

Which ONE (1) of the choices below completes the following statement?

Pressurizer Relief Tank (PRT) pressure will ______. The crew will then implement __________.

A. stabilize at a higher than normal pressure.

EOP-1.0, *Reactor Trip/Safety Injection Actuation;* then EOP-2.0, *Loss of Reactor or Secondary Coolant.*

B. stabilize at a higher than normal pressure.

AOP-214.2, *Response to Load Rejection/Runback;* then EOP-1.0, *Reactor Trip/Safety Injection Actuation;* then EOP-2.0, *Loss of Reactor or Secondary Coolant.*

C.✓ stabilize at a lower than normal pressure.

EOP-1.0, *Reactor Trip/Safety Injection Actuation;* then EOP-2.0, *Loss of Reactor or Secondary Coolant.*

D. stabilize at a lower than normal pressure.

AOP-214.2, *Response to Load Rejection/Runback;* then EOP-1.0, *Reactor Trip/Safety Injection Actuation;* then EOP-2.0, *Loss of Reactor or Secondary Coolant.*

Feedback

A. Plausible because PRT pressure could stabilize at a high pressure without rupturing the PRT rupture disc if the PORVs could be closed in a timely manner. Also plausible because the second half is the correct procedural flowpath.

B Plausible because PRT pressure could stabilize at a high pressure without rupturing the PRT rupture disc if the PORVs could be closed in a timely manner. Procedural flowpath is plausible because given information matches Entry Conditions into AOP-214.2; however, at 55% (just above P-9 setpoint of 50%), an immediate Reactor Trip will result from a Turbine Trip, which resulted from the generator field failure. See drawing E-203-201. (Field Failure (40)/Generator Backup Lockout (86GC)/Generator Electrical Fault/EHC System External Trips/Mechanical Trip Relay/Mechanical Trip Solenoids/Mechanical Trip Valve (Turbine Trip).

C. CORRECT. The PRT rupture disc will fail shortly after all PORVs open, then PRT pressure will drop and equalize with RB pressure. For this event, RB pressure will be less than the normal PRT pressure. The Field Failure will result in a Turbine Trip (see drawing E-203-201) and, at 55%, this will cause a Reactor Trip, so EOP-1.0 will be implemented. When the CRS reaches the diagnostic steps, RB sump levels will NOT be normal and this warrants a transition to EOP-2.0.

D. Plausible because the 1st part is correct - the PRT rupture disc will fail shortly after all PORVs open, then PRT pressure will drop and equalize with RB pressure.. Procedural flowpath is plausible because given information matches Entry Conditions into AOP-214.2; however, at 55% (just above P-9 setpoint of 50%), an immediate Reactor Trip will result from a TurbineTrip.

Notes

Ability to (a) predict the impacts of the following on the (Pressurizer Relief/Quench Tank) and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Overpressurization of the PZR.

Tier: 2
Group: 1

Importance Rating: RO 3.6

Technical Reference:

- AB-2, Page 46

Proposed references to be provided to applicants during examination:

Learning Objective: AB-2-27

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions EOPS 530 and RCS 41 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(5)

Comments:

A.

10. 008 A1.03 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A large break LOCA has occurred.
- Reactor Building Spray has actuated.
- The crew is performing EOP-1.0, *Reactor Trip/Safety Injection Actuation*.

Which ONE (1) of the following describes the resulting Component Cooling Booster Pump configuration and the indication on IPI-07103A (B,C), CC Booster Pump A (B,C) Discharge Pressure?

A. No pumps running; ZERO psig

B.✓ No pumps running; same as CCW header pressure

C. One Pump running; normal pressure

D. One pump running; shutoff head pressure

Feedback

A. Plausible if applicant knows that the running CC Booster Pump trips on Phase "B" but believes the pressure indication originates after MVG-9600.

B. CORRECT. Running CC Booster Pump trips on Phase "B". With the Phase "B" isolation and (MVG-9600) closed, CCW Header Pressure will be felt to the valve.

C. Plausible because this is the normal configuration and applicant may not realize that the CCBPs trip on a Phase "B" isolation signal.

D. Plausible because this is the normal configuration.

Notes

Ability to predict and/or monitor changes in parameters associated with operating the (Component Cooling Water) controls including: CCW pressure.

Tier: 2
Group: 1

Importance Rating: RO 2.7

Technical References:

- IB-2, Pages 30 and 46 of 66
- IB-2, Figure IB-2.2

Proposed references to be provided to applicants during examination:

None

Learning Objective: IB-2-15

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5)

Comments:

Meets K/A by monitoring Component Cooling Booster Pump status and predicting header pressure.

11. 008 AA1.06 002/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- RM-A2 gaseous and particulate radiation monitor indications are increasing.
- RB humidity is slowly increasing on the IPCS.
- RB pressure is 1.1 psig and slowly rising.
- Annunciators RBCU 1A/2A (1B/2B) DRN FLO HI (XCP-607 (608) 2-2) actuated.
- PZR PORV and safety valve tailpipe temperatures are slowly rising.
- PZR level is 59% and stable.
- RCS pressure is 2220 psig and slowly decreasing.

Which ONE (1) of the choices below completes the following statement?

A _______ is in progress and charging flow will _________ to maintain PZR level.

A. main steam line leak;

increase

B. main steam line leak;

decrease

C.✓ PZR steam space leak;

increase

D. PZR steam space leak;

decrease

A. Plausible because most of the given symptoms are consistent with a MSLB. Also plausible because the 2nd part is correct for a PZR steam space break.

Incorrect because RM-A2 would not be increasing for a MSLB.

B Plausible because most of the given symptoms are consistent with a MSLB.

2nd part is plausible because, for some steam line breaks, Tavg will decrease, pressurizer level setpoint will decrease, and charging flow ill decrese to restore PZR level to program level.

C. CORRECT. The given symptoms of RB pressure and humidity , RBCU drain flow high, tailpipe temperatures, and RM-A2 conditions are consistent with a PZR steam space break. As inventory is lost to the leak, PZR level will initially decrease and charging flow will increase when level drops below program.

D. Plausible because the 1st part is correct. 2nd part is plausible because, for steam space accidents, pressurizer level will eventually go off scale high and normal charging flow would decrease to zero. According to the WOG ES-1.2 Background Document (HES12BG.doc, HP-Rev. 2, 4/30/05, p41, Figure 13), the reference plant analysis for this event shows that the PZR level is at 100% within approximately 10 minutes.

Notes

Ability to predict and/or monitor changes in parameters associated with operating the operating the Pressurizer Vapor Space Accident controls including: Control of PZR level.

Tier: 1
Group: 1

Importance Rating: RO 3.6

Technical References:

- TS-16 (p12-13, Rev 5)
- EOP-2.1, Rev 13.
- WOG ES-1.2 Background Document (HES12BG.doc, HP-Rev. 2, 4/30/05, p41, Figure 13, p56)

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-2.1-03 & 04

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5), (10), (14)

Comments:

The KA is matched because the operator must demonstrate the ability to monitor Pzr level for expected response during a Pzr Vapor Space Accident, and identify operations necessary to restore Pzr level in the order that they must be taken.

12. 010 A2.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- Backup Group 1 PZR heaters control switch is in NORMAL-AFTER-STOP.
- Backup Group 2 PZR heaters control switch is in NORMAL-AFTER-START.
- Control Group 1 PZR heaters control switch is in NORMAL-AFTER-START.
- PZR HTR CNTRL OR BU GRP 1/2 TRIP (XCP-616, 3-1) has actuated.
- The NROATC then notes the following:

	Green Light	Amber Light	Red Light
B/U Group 1 Heaters:	ON	OFF	OFF
B/U Group 2 Heaters:	ON	ON	OFF
Control Group Heaters:	OFF	OFF	ON

Which ONE (1) of the choices below completes the following statement?

The _______ heaters have tripped and Technical Specification 3.4.3, *Pressurizer*, is ______.

A. B/U Group 2; met

B.✓ B/U Group 2; NOT met

C. B/U Group 1; met

D. B/U Group 1; NOT met

A. Incorrect because a set of tripped backup heaters, T.S. 3.4.3 is NOT met because the T.S. LCO requires two groups of PZR heaters. Plausible because the 1st part is correct. Group 2 status lights of Amber Light ON and Red Light OFF, along with the control switch in Normal-After-Start, indicate that they have tripped. T.S. 3.4.3 being met is plausible because a single set of backup heaters will exceed the minimum T.S. capacity of 125 KW for both required heater groups.

B. CORRECT. Group 2 status lights of Amber Light ON and Red Light OFF, along with the control switch in Normal-After-Start, indicate that they have tripped. Incorrect because a set of tripped backup heaters, T.S. 3.4.3 is NOT met because the T.S. LCO requires two groups of PZR heaters.

C. Plausible because Red Light is OFF for B/U Group 1; however, since the control switch is in Normal-After-Stop, this does NOT indicate that heaters have tripped.
T.S. 3.4.3 being met is plausible because a single set of backup heaters will exceed the minimum T.S. capacity of 125 KW for both required heater groups.

Incorrect because Group 1 status lights of Amber Light OFF and Red Light OFF, along with the control switch in Normal-After-Stop, are expected indications for heaters that have been intentionally secured, NOT tripped - a set of tripped backup heaters would have the Amber light ON. Also incorrect because T.S. 3.4.3 is NOT met because the T.S. LCO requires two groups of PZR heaters.

D. Plausible because the 2nd half is correct. Also plausible because Red Light is OFF for B/U Group 1; and this is a partial indication of tripped heaters.

Incorrect because Group 1 status lights of Amber Light OFF and Red Light OFF, along with the control switch in Normal-After-Stop, are expected indications for heaters that have been intentionally secured, NOT tripped - a set of tripped backup heaters would have the Amber light ON.

Notes

Ability to (a) predict the impacts of the following on the Pressurizer Pressure Control and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Heater failures.

Tier: 2
Group: 1

Importance Rating: RO 3.3

Technical References:

- IC-3, Table IC3.2 (Page 51 of 53)
- TS 3.4.3 (Page 3/4 3-9)

Proposed references to be provided to applicants during examination:

None

Learning Objective: IC-3-21 & 22

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

Meets K/A by predicting impact of B/U heater group breaker trip and determining when TS applies.

13. 011 EK3.15 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Which ONE (1) of the choices below completes the following statement?

After a LBLOCA, the crew must initiate Hot Leg Recirculation within 8 hours ______ to ensure that boiling in the core is terminated and to prevent boron precipitation in the event of a ______ Leg Break.

A. of the transfer to Cold Leg Recirculation;

Cold

B. of the transfer to Cold Leg Recirculation;

Hot

C.✓ after event initiation;

Cold.

D. after event initiation;

Hot.

A. Plausible because the 2nd part is correct. Also plausible because it is a common misconception that HLR must be initiated 8 hours after CLR. Incorrect since HLR must be initiated within 8 hours of the event..

B. Plausible because it is a common misconception that HLR must be initiated 8 hours after CLR. Incorrect since the limiting event is a Cold Leg Break, NOT a Hot Leg Break. According to WOG ES-1.4 Background Document, during the Hot Leg break CLR will be injected into the cold Legs and forward flush the core into, and out of, the Hot Legs alleviating the Boron buildup problem.

C. CORRECT. At Step 27 of EOP-2.0 the operator is directed to GO TO EOP-2.3 within 8 hours after event initiation. According to the WOG E-1 Background Document (HE1BG.doc, HP-Rev 2, 4/30/05), Step 19 each plant has a specific time following the initiation of a LOCA for switchover to hot leg recirculation. This time is established from analysis of the minimum time when boric acid concentrations could approach the solubility limit in the reactor vessel/core region following a double-ended COLD LEG guillotine break.

D. Plausible because the first part is correct. At Step 27 of EOP-2.0 the operator is directed to GO TO EOP-2.3 within 8 hours after event initiation. Incorrect since the limiting event is a Cold Leg Break, NOT a Hot Leg Break. According to WOG ES-1.4 Background Document, during the Hot Leg break CLR will be injected into the cold Legs and forward flush the core into, and out of, the Hot Legs alleviating the Boron buildup problem.

Notes

Knowledge of the effect that a loss or malfunction of the Large Break LOCA will have on the following: Criteria for shifting to recirculation mode.

Tier: 1
Group: 1

Importance Rating: RO 4.3

Technical References:

- EOP-1.0, Rev 22
- EOP-2.0, Rev 13
- EOP-2.2, Rev 14
- HE1BG.doc, HP-Rev 2, 4/30/05
- HES14BG.doc, HP-Rev 2, 4/30/05

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-2.3-1865

Question History:

None

10 CFR Part 55 Content: 41(b)(5), (10)

Comments:

The KA is matched because the operator must demonstrate knowledge for the reasons for the criteria for shifting recirculation mode as they apply to the Large Break LOCA.

14. 011 K6.05 002/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- LT-459, PZR LEVEL TRANSMITTER, has failed and is taken out of service.
- The PZR LEVEL CNTRL Switch is in the 460 + 461 position.

Which ONE (1) of the following identifies the Pressurizer level transmitter(s) required to meet the MINIMUM CHANNELS OPERABLE requirement of T.S. 3.3.3.6, Accident Monitoring Instrumentation?

A. LT-460 and LT-461 must be OPERABLE.

B.✓ Either LT-460 or LT-461 must be OPERABLE.

C. LT-460 and LT-462 must be OPERABLE.

D. Either LT-460 or LT-462 must be OPERABLE.

Feedback

A. Plausible because

B. CORRECT

C Plausible

Incorrect because

D Plausible

Notes

Knowledge of the effect that a loss or malfunction of the following will have on the Pressurizer Level Control: Function of PZR level gauges as post accident monitors.

Tier: 2
Group: 2

Importance Rating: RO 3.1

Technical Reference:

- IC-3, p33-35, Rev 9

Proposed references to be provided to applicants during examination:

None

Learning Objective: IC-3-3.1, 8.4 and 10.1

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

The KA is matched because the operator must have knowledge of the effect that a failure of a PZR level detectors has on Accident Mointoring T.S.

15. 012 K4.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 3% power
- Reactor Engineering is evaluating physics data prior to giving clearance to raise power.
- LT-460, Pressurizer Level Channel, failed and has been removed from service per AOP-401.6, *Pressurizer Level Control and Protection Channel Failure*.

The Pressurizer Water Level - High reactor trip is _______ to be operable for these conditions and when/if required, the number of remaining channels required to initiate a PZR high water level trip is ______.

A.✓ NOT required;

ONE (1)

B. required;

ONE (1)

C. NOT required;

TWO (2)

D. required;

TWO (2)

Feedback

A. CORRECT. TS Table 3.3-1 requires the trip function to be OPERABLE in in MODE 1. Since plant is at 3% (MODE 2), the high level trip function is NOT required. Since AOP-401.6 requires the failed channel bistables to be tripped, only one of the two remaining channels (LT-460, 461) are required to initiate a trip.

B. Plausible because the high level trip must be OPERABLE at power, but only in MODE 1. Also plausible because the second part is correct. However, the channel is only required in Mode 1. It is automatically bypassed in the low power condition (P-7).

C. Plausible because the first part is correct because TS Table 3.3-1 requires the trip function to be OPERABLE in in MODE 1. Also plausible because the logic would be correct if the failed channel were bypassed per Action 6.b of T.S. Table 3.3-1, rather than tripped per the AOP. The second part is incorrect in that the AOP-401.6 requires the failed channel bistables to be tripped; therefore, only one of the two remaining channels (LT-460, 461) are required to initiate a trip.

D. Plausible because the high level trip must be OPERABLE at power, but only in MODE 1. Also plausible because the logic would be correct if the failed channel were bypassed per Action 6.b of T.S. Table 3.3-1 rather than tripped per the AOP.

Notes

Knowledge of Reactor Protection design feature(s) and or interlock(s) which provide for the following: Trip logic when one channel OOC or in test.

Tier: 2
Group: 1

Importance Rating: RO 3.7

Technical References:

- TS Table 3.3-1, Line Item 11 (Page 143 of 588)
- TS Table 3.3-1, Action 6# (Pages 146 and 147 of 588)

Proposed references to be provided to applicants during examination:

None

Learning Objective: AOP-401.6-07

Question History:

NEW

10 CFR Part 55 Content: 41(b)(8), (10)

Comments:

Meets K/A by considering operability requirement and trip logic with a failed channel and one in test.

16. 012 K6.10 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- Mode 3
- The plant is being cooled down to Cold Shutdown per GOP-6, Plant Shutdown from Hot Standby to Cold Shutdown (Mode 3 to Mode 5).
- The NROATC begins depressurizing the RCS to 900-950 psig.
- At 1970 psig, the NROATC takes both PZR SI Train 'A', and Train 'B', Switches to BLOCK.
- PT-457, PRESSURIZER PRESSURE TRANSMITTER, fails HIGH.

Which ONE (1) of the following identifies the impact of this failure?

A. The automatic opening of the PZR PORVs is reset.

B. The Pressurizer Pressure Safety Injection block is automatically reset.

C. The automatic opening of the PZR PORVs is unaffected, provided both of the two remaining channels *exceed* 1985 psig.

D.✓ The Pressurizer Pressure Safety Injection block is unaffected, provided both of the two remaining channels remain *below* 1985 psig.

Feedback

A. Plausible because CAUTION 3.4.d of GOP-6 warns the operator that P-11 blocks the auto-opening of the PORVs and the failure of PT-457 HIGH would cause 1 channel to reset.

Incorrect because it takes 2/3 channels above 1985 psig to reset the block of the auto open signal to the PORVs.

B. Plausible because CAUTION 3.4.d of GOP-6 warns the operator that the SI blocks reset above 1985 psig and the failure of PT-457 HIGH would cause 1 channel to reset.

Incorrect because it takes 2/3 channels above 1985 psig to reset the block of the PZR Pressure SI.

C. Plausible because the 1st part would be true if 1 of the remaining channels were to rise above 1985 psig.

Incorrect because only 1 of the remaining channels rising above 1985 psig would remove the block of the auto-opening of the PZR PORVs.

D. CORRECT. 2 of 3 channels (PT-455, PT-456, & PT-457) below 1985 psig will allow manual blocking of the PZR Pressure SI. If PT-457 failed HIGH, the two remaining channels will still be below 1985 psig and the SI block is unaffected. (see Figure IC9.21, Sheet 2 of 2)

Notes

Knowledge of the effect that a loss or malfunction of the following will have on the Reactor Protection: Permissive circuits.

Tier: 2
Group: 1

Importance Rating: RO 3.3

Technical References:

- GOP-6, CAUTION 3.4.d
- Figure IC9.21, Sheet 2 of 2

Proposed references to be provided to applicants during examination:

None

Learning Objective: IC-3-22

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A in that the status of the P-11 Interlock must be determined on one of the input failures.

17. 013 K6.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- IPT-951B, Reactor Building Pressure Channel II, has failed HIGH.

Which ONE (1) of the choices below completes the following statement?

After IPT-00951B, Reactor Building Pressure Channel II, has been properly removed from service, which ONE (1) of the following indicates the number of OPERABLE channels required to initiate a HIGH-1 and a HIGH-3 RB Pressure actuation signal?

A. 1; 1

B.✓ 1; 2

C. 2; 1

D. 2; 2

Feedback

A. Plausible because the HI-1 channel would be tripped; therefore, only one remaining channels would be needed for HIGH-1 actuation. Also plausible since the second part would be correct if HI-3 were tripped, not bypassed. HI-3 is bypassed, NOT tripped, to prevent an inadvertent RB Spray on a channel or power supply failure. Incorrect since it would still require 2 of the 3 remaining channels to initiate a HIGH-3..

B. CORRECT because the HI-1 channel would be tripped; therefore only one remaining channels would be needed for HIGH-1 actuation. HI-3 is bypassed, NOT tripped (to prevent an inadvertent RB Spray on a channel or power supply failure); therefore, the HI-3 logic will be 2 of 3 remaining channels.

C. Plausible because this is the normal coincidence for HI-1. Also plausible since the second part would be correct if HI-3 were tripped, not bypassed. HI-3 is bypassed, NOT tripped, to prevent an inadvertent RB Spray on a channel or power supply failure. Incorrect since it would still require 2 of the 3 remaining channels to initiate a HIGH-3..

D. Plausible because this is the normal coincidence for HI-1 if no channels were already in the tripped condition. Incorrect since HI-I logic changes to 1 of 2 remaining channels. HI-3 is bypassed, NOT tripped (to prevent an inadvertent RB Spray on a channel or power supply failure); therefore, the HI-3 logic will be 2 of 3 remaining channels.

Notes

Knowledge of the effect that a loss or malfunction of the following will have on the (Engineered Safety Features Actuation): Sensors and detectors.

Tier: 2
Group: 1

Importance Rating: RO 2.7

Technical Reference:

- IC-9, Figure IC9.23 (Pages 125 and 126 of 132)

Proposed references to be provided to applicants during examination:

Learning Objective: IC-9-38

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A by requiring knowledge of automatic actuation of ESFAS with a failed input channel (RB Pressure).

18. 015 AK2.07 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- The NROATC notes the following conditions exist on RCP 'A':
    - #1 Seal Leakoff flow drops to 0.6 gpm.
    - RCP A STNDPIP LVL HI/LO (XCP-617, 2-4) has NOT actuated.
    - The Lower Seal Water Bearing Temperature is 205°F and increasing at 3°F/minute.
    - The Seal Water Outlet Temperature is 200°F and increasing at 2°F/minute.

Which ONE (1) of the following identifies the malfunction that has occurred AND the required action?

A.✓ The #1 Seal is NOT operating properly;

Trip the reactor and stop RCP 'A'.

B. The #1 Seal is NOT operating properly;

Reduce power to less than P-8 using GOP-4C, Rapid Downpower, stop RCP 'A', and perform a controlled shutdown of the plant.

C. The #2 Seal is NOT operating properly;

Trip the reactor and stop RCP 'A'.

D. The #2 Seal is NOT operating properly;

Reduce power to less than P-8 using GOP-4C, Rapid Downpower, stop RCP 'A', and perform a controlled shutdown of the plant.

Feedback

A. CORRECT. According to AB-4 (p46, Rev 12), a low #1 Seal Leakoff flow can be caused by improper operation of the #1 seal (i.e. it is cocked pinching off actual flow through the seal), or the #2 seal. In the case of the #2 Seal, the Seal is NOT seated properly robbing flow from the #1 Seal Leakoff line. Also according to AB-4 (p40-41), insufficient flow through the #1 seal can result in insufficient cooling and lubrication of the lower RCP Radial Bearing causing an increase in bearing water temperature and Sealwater outlet temperature. Since temperatures are increasing in the stated conditions, the cocking, or pinching off of flow, is indicated through the #1 Seal. AOP-101.2, Reactor Coolant Pump Seal Failure, (Rev 0) has the operator check for abnormal temperatures early in the mitigation process of an RCP Seal Failure event. Step 4 of the AOP evaluates the bearing water temperature and Sealwater outlet temperature to ensure that they are less than required limits (225°F and 235°F respectively), AND not significantly increasing. In both situations, the limits are NOT exceeded; however, temperatures are increasing at at least 2°F/minute. Because of this, the operator will be directed to trip the Reactor and stop the affected pump (Steps 6-8).

B. Plausible because the 1st part is correct. Also plausible because Step 6 of AOP-101.2 allows use of GOP-4C to place the plant in HOT STANDBY and because the Alternative Action for Step 6 requires load at less than 38% (P-8).

Incorrect since given condition of 100% requires a Reactor Trip.

C. Plausible because, with an unseated #2 seal, low leakoff flow would be indicated from the #1 seal. Also plausible since #2 seal failure is listed as a Probable Cause for RCP A(B,C) #1 SL LKOFF FLO HI/LO alarms. Also plausible because the 2nd part is correct for the given conditions.

Incorrect because the increase in water temperatures would not occur with an unseated #2 Seal. Flow would be normal through the radial bearing, providing normal cooling to the bearing.

D. Plausible because, with an unseated #2 seal, low leakoff flow would be indicated from the #1 seal. Also plausible since #2 seal failure is listed as a Probable Cause for RCP A(B,C) #1 SL LKOFF FLO HI/LO alarms. Also plausible because Step 6 of AOP-101.2 allows use of GOP-4C to place the plant in HOT STANDBY and because the Alternative Action for Step 6 requires load at less than 38% (P-8).

Incorrect because the increase in water temperatures would not occur with an unseated #2 Seal. Flow would be normal through the radial bearing, providing normal cooling to the bearing. Incorrect since given condition of 100% requires a Reactor Trip.

Notes

(RCP Malfunctions) Knowledge of electrical power supplies to the following: RCP seals.

Tier: 1
Group: 1

Importance Rating: RO 2.9

Technical References:

- AB-4, p40-41, 46, Rev 12
- AOP-101.2, Rev 0

Proposed references to be provided to applicants during examination:

None

Learning Objective: AOP-101.2-05

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions AOPS 356 and RCP 72 and Open Reference questions AOPS 99, 158, & 159 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(5), (10)

Comments:

The KA is matched because the operator must have knowledge of how the operation of the RCP Seals affect the continued operation of the RCP, and the implications of this (i.e. trip).

19. 016 K5.01 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 60% power
- An electrical fault occurs in the control circuit of the Turbine 1st Stage Pressure PT-446 input to the Reactor Control Unit (Speed and Direction Unit).

Which ONE (1) of the following identifies other signals that could be potentially affected by this fault?

REFERENCE PROVIDED

A. High Steamline Flow coincident with Lo-Lo Tavg actuation; AND

P-13 actuation.

B. High Steamline Flow coincident with Lo-Lo Tavg actuation; AND

Steam Dump actuation.

C. AMSAC actuation; AND

P-13 actuation.

D✓ AMSAC actuation; AND

Steam Dump actuation.

A. Plausible because PT-446 does provide an input to High Steam Flow Coincident with LO-LO Tavg MS line isolation signal and also provides 1 of 2 inputs to P-13. Incorrect because these are protection and permissives circuits which are electrically isolated from the *control* signal provided by PT-446 to the Rod Control Reactor Control Unit, and therefore could not be affected by an electrical fault in this circuit. (Ref IC15 pg 9; IC-9 ppg 26 and 57-60; Figure IC9.27; P Impulse Loop Drawings IPT00446-RC-0001(2)

B. Plausible because PT-446 does provide an input to High Steam Flow Coincident with LO-LO Tavg MS line isolation signal. Also plausible because PT-446 does provide a *control* signal input to Steam Dump Control Circuits. Incorrect because the 1st part is wrong in that the input to High Steam Flow Coincident with LO-LO Tavg MS line isolation signal is electrically isolated from the control signal provided by PT-446 to the Rod Control Reactor Control Unit, and therefore could not be affected by an electrical fault in this circuit.(Ref IC15 pg 9; IC-9 ppg 26 and 57-60; Figure IC9.27; P Impulse Loop Drawings IPT00446-RC-0001(2)

C. Plausible because PT-446 does provide 1 of 2 inputs to both the AMSAC Acutation circuitry and the P-13 Permissive. Incorrect because the 2nd part is wrong in that the input to the P-13 Permissive is electrically isolated from the control signal provided by PT-446 to the Rod Control Reactor Control Unit, and therefore could not be affected by an electrical fault in this circuit.(Ref IC15 pg 9; IC-9 ppg 26 and 57-60; Figure IC9.27; P Impulse Loop Drawings IPT00446-RC-0001(2)

D. Correct: PT-446 does provide an input to both the AMSAC Acutation circuitry and the Steam Dump Control Circuits. However these are not electrically isolated from the control signal provided by PT-446 to the Rod Control Reactor Control Unit, and therefore an electrical fault in this circuit could result in adverse effects on AMSAC actuation circuitry and Steam Dump Control Circuits.(Ref IC15 pg 9; IC-9 ppg 26 and 57-60; Figure IC9.27; P Impulse Loop Drawings IPT00446-RC-0001(2)

Notes

Knowledge of the operational implications of the following concepts as they apply to the Non-nuclear Instrumentation: Separation of control and protection circuits.

Tier: 2
Group: 2

Importance Rating: RO 2.7

Technical References:

- Figure IC9.27
- IC-9, p26, 57-60, Rev 13
- IC-15, p9, 40, Rev 8

Proposed references to be provided to applicants during examination:

- Figure IC9.27

Learning Objective: IC-9-03, 05.2

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5), (7)

Comments:

The KA is matched because the operator must have knowledge of the operational implications of separation of control and protection circuits in the Non-Nuclear Instrumentation such as Turbine 1st Stage Pressure instrumentation.

20. 022 A4.05 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Which ONE (1) of the choices below completes the following statement?

The maximum allowable containment temperature is _______, and is calculated by determining _______.

A. 120°F;

the average of all nine temperature elements

B. 135°F;

the average of all nine temperature elements

C✓ 120°F;

the average of the 3 temperature elements at each elevation, then taking the average of the average calculated at each elevation.

D. 135°F;

the average of the 3 temperature elements at each elevation, then taking the average of the average calculated at each elevation.

Feedback

A. 1st part plausible because this is the correct T.S. temperature limit for containment. (Ref T.S. 3.6.1.5).

2nd part plausible because there are nine temperature elements that are utilized for determining the average containment temperature. (Ref OAP -106.1 Attachment III ppg 10-13). Also plausible because surveillance requirement 4.6.1.5 states: The primary containment average air temperature shall bee the arithmetical average of the temperature at or above the following locations. 1) Elevation 412' - 3 locations. 2) Elevation 436' - 3 locations. 3) Elevation 463' - 3 locations. But does not completely describe the method of averaging these temperatures as detailed in OAP-106.1.

Incorrect because this is not the method for determining the arithmetical average for the T.S. reading of average containment temperature defined in OAP-106.1 attachment III ppg 10-13.

B. 1st part plausible because this is the High Temperature Alarm for the discharge of the Reactor Building Cooling Units. (Ref XCP-606 1-3). Also plausible because 135°F is the alarm setpoint for every HI TEMP alarm in the RB on the HVAC panel (see XCP-6210-LCB1).

2nd part plausible because there are nine temperature elements that are utilized for determining the average containment temperature. (Ref OAP -106.1

4.6.1.5 states: The primary containment average air temperature shall bee the arithmetical average of the temperature at or above the following locations. 1) Elevation 412' - 3 locations. 2) Elevation 436' - 3 locations. 3) Elevation 463' - 3 locations. But does not completely describe the method of averaging these temperatures as detailed in OAP-106.1

Incorrect 1st part because this is not the correct T.S. temperature limit for containment. (Ref T.S. 3.6.1.5). Also incorrect 2nd part because this is not the method for determining the arithmetical average for the T.S. reading of average containment temperature defined in OAP-106.1 Attachment III ppg 10-13.

C. CORRECT: This is the correct T.S. temperature limit for containment. (Ref. T.S. 3.6.1.5), and this represents the correct method for determining the T.S. average containment temperature reading. (Ref. OAP-106.1 Attachment III ppg 10-13).

D. 1st part plausible because this is the High Temperature Alarm for the discharge of the Reactor Building Cooling Units. (Ref XCP-606 1-3). Also plausible because 135°F is the alarm setpoint for every HI TEMP alarm in the RB on the HVAC panel (see XCP-6210-LCB1).

2nd part plausible because it is correct and represents the correct method for determining the T.S. average containment temperature reading. (Ref. OAP-106.1 Attachment III ppg 10-13).

Incorrect 1st part because this is not the correct T.S. temperature limit for containment. (Ref T.S. 3.6.1.5).

Notes

(Containment Cooling System) Ability to manually operate and/or monitor in the control room: Containment readings of temperature, pressure, and humidity system.

Tier:
Group:

Importance Rating: RO 3.8

Technical References:

- OAP-106.1, Attachment III, Pages 10-13 of 21
- T.S. 3.6.1.5

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-13-17, 18, & 19

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions TECH SPEC 93 & 94 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(7)

Comments:

The KA is matched because the operator must monitor RB temperature (via the Control Building Operator T.S. logs)

21. 022 AA2.02 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- The following annunciators actuate:
  - VCT LVL HI/LO
  - VCT LCV-115A TO HU-TK LVL HI
- Both VCT Level indications are reading 100%
- PZR level starts to decrease.
- The NROATC immediately notes the following conditions:
  - Charging flow decreases to 0 gpm.
  - Charging Pump amps are at minimum and steady.
  - Charging Pump discharge pressure is 15 psig.
- The operator then stops the Charging Pump and manually isolates Letdown.

Which ONE (1) of the following describes what happened to the Charging Pump?

A. The pump shaft sheared.

B. The suction to the pump was isolated.

C✓ Gas binding of the pump has occurred.

D. One phase of electrical power to the pump motor was lost.

Feedback

A. Plausible because, If the shaft were to shear, the indications would be similar to those described here for the Charging Pump. Incorrect because the VCT level indicators would not be at 100%, but, at this time, would be cycling between 70-80% as LCV-115A modulates.

B. Plausible because if the pump suction were isolated (such as in a hot short on LCV-115C), the indications would be similar to those described here for the Charging Pump. Incorrect because the VCT level indicators would not be at 100%, but, at this time, would be cycling between 70-80% as LCV-115A modulates.

C. CORRECT. According to AB3 (p28-31, Rev 13), if VCT level transmitter LT-115 fails high, a complete diversion of letdown flow occurs since this transmitter provides a backup signal to Letdown Divert Valve LCV-115A to divert to the Recycle Holdup Tank on high level in the VCT (80%). This channel also controls the start and stop signal for auto makeup which is lost now that level is failed high. In this situation, the VCT is no longer receiving letdown flow, but the Charging Pump is still removing water causing VCT level to decrease. When VCT level drops to 5%, RWST supply valves to the Charging Pump should open, and the VCT outlet valves should close, however, this automatic protection function requires signals from both the VCT level transmitters (LT-112 and LT-115), and LT-115 is failed high. With no operator action, the Charging Pump will drain the VCT and become gas bound, losing NPSH. According to AB3 (p30), the two transmitters share a common reference leg and sensing line, and are susceptible to a common mode failure. For instance, if both level transmitters were to fail high, as the conditions stated indicate, the loss of NPSH to the Charging Pump would occur as described above, and it would be masked by the simultaneous failure of LT-112. The VCT would appear full, when in actuality it has emptied, leading to a loss of Charging due to the gas binding of the pumps.

D. Plausible because, if one phase were to lose voltage, the indications would be similar to those described here for the Charging Pump, except that amps/flow would be low, although not at minimum/zero. Incorrect because the VCT level indicators would not be at 100%, but would be cycling between 70-80% as LCV-115A modulates.

Notes

Ability to (a) predict the impacts of the following the Loss of Reactor Coolant Makeup and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Charging pump problems.

Tier: 1
Group: 1

Importance Rating: RO 3.2

Technical References:

- AB-3, p28-31, Rev 12
- AOP-102.2, Rev 0

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-3-24

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

The KA is matched because the operator must demonstrate the ability to determine and interpret indications of Charging Pump problems that result in a loss of Charging.

22. 022 K1.02 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

After an SI, which ONE (1) of the following identifies the order of operation with respect to the Reactor Building Cooling Units (RBCUs)?

A.✓ Industrial Cooling swaps to Service Water; RBCUs start; Service Water Booster Pumps start

B. Industrial Cooling swaps to Service Water; Service Water Booster Pumps start; RBCUs start

C. RBCUs start; Service Water Booster Pumps start; Industrial Cooling swaps to Service Water

D. RBCUs start; Industrial Cooling swaps to Service Water; Service Water Booster Pumps start

Feedback

A. CORRECT. The ESFLS aligns RBCU to SW, via Output 3 of the ESFLS, then starts RBCUs in Step 6A and SW Booster Pump in Step 6B.

B. Plausible because it could be logical to align all cooling prior to starting the RBCUs but RBCUs are started before the SW Booster Pump.

C. Plausible because the RBCU is started before the SW Booster Pump but the cooling alignment was made by the ESFLS during Output 3.

D. Plausible because the first two are reversed.

Notes

Knowledge of the physical connections and/or cause-effect relationships between Containment Cooling and the following: SEC/remote monitoring systems.

Tier: 2
Group: 1

Importance Rating: RO 3.7

Technical References:

- GS-2, Pages 51/95
- GS-2, Table GS2.10 (Page 92/95)

Proposed references to be provided to applicants during examination:

Learning Objective: GS-2-06.3

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions CONTAINMENT CLG SYS 24 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A by considering order of operations by ESF Load Sequencer with respect to Reactor Building Cooling Unit.

23. 024 AK2.01 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 50% power
- It becomes necessary to Emergency Borate.
- The Boric Acid Filter will NOT pass flow.

In accordance with AOP-106.01, *Emergency Boration*, which ONE (1) of the following identifies the actions that must be taken to align the Charging Pump suction to the next PREFERRED boration source?

A. Open BOTH Boric Acid Tank to Charging Pump Suction Header Isolation Valves (XVD-8329 and XVD-8331);

Isolate Makeup Water to the Blender

B.✓ Open BOTH Boric Acid Tank to Charging Pump Suction Header Isolation Valves (XVD-8329 and XVD-8331);

Isolate the VCT

C. Open BOTH RWST to Charging Pump Suction Valves (LCV-115B and LCV-115D);

Isolate Makeup Water to the Blender

D. Open BOTH RWST to Charging Pump Suction Valves (LCV-115B and LCV-115D);

Isolate the VCT

Feedback

A. Plausible because the 1st part is correct. 2nd part is plausible because Step 3.c. of AOP-106.1 requires this action.

Incorrect since AOP-106.1, Step 4.c., Action/Expected Response, is worded as follows: "3) Close LCV-115C(E), VCT OUTLET ISOL" - the VCT is isolated when gravity draining, not the blender.

B. CORRECT. According to AOP-106.01 (Step 4, Rev 1), boration from the gravity drain line of the Boric Acid Tank is preferred over boration from the RWST (Cold Leg Injection), which is the Step 4 Alternative Action. Step 4.c., Action/Expected Response, is worded as follows: "3) Close LCV-115C(E), VCT OUTLET ISOL."

C. 1st part is plausible because this is one of the boration methods in AOP-106.1. 2nd part is plausible because Step 3.c. of AOP-106.1 requires this action.

Incorrect because Emergency Boration from the BAT is preferred over the RWST (Cold Leg Injection). Also incorrect since AOP-106.1, Step 4.c., Action/Expected Response, is worded as follows: "3) Close LCV-115C(E), VCT OUTLET ISOL" - the VCT is isolated when gravity draining, not the blender.

D. 1st part is plausible because this is one of the boration methods in AOP-106.1. Also plausible because the 2nd part is correct.

Incorrect because Emergency Boration from the BAT is preferred over the RWST (Cold Leg Injection).

Notes

(Emergency Boration) Knowledge of interrelationships between Emergency Boration and the following: Valves.

Tier: 1
Group: 2

Importance Rating: RO 2.7

Technical References:

- AOP-106.1, Rev 1
- AB-5, p21-22, 32-33, Rev 12

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-5 2.9, 3.5, 3.7, 6.8

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

The KA is matched because the operator must demonstrate knowledge of the interrelations between Emergency Boration procedure and the valves used to perform Emergency Boration (valve positions and order of preference).

24. 025 AK1.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

In accordance with Technical Specifications, which ONE (1) of the following conditions requires the most immediate action?

A. The unit is in Mode 1 at 100% power. RHR Pump 'A' breaker trips during a surveillance test.

B. The unit is in Mode 4 with RCP 'A' and both RHR loops in operation. RHR Pump 'A' breaker trips.

C. The unit is in Mode 5 with the RCS loops filled and S/G Wide Range levels are: 'A' - 22%; 'B' - 8%; 'C' - 18%. RHR Pump 'A' breaker trips. RHR Pump 'B' is started.

D✓ The unit is in Mode 6 with water level maintained at 4 feet above the reactor vessel flange. RHR Pump 'A' breaker trips. RHR Pump 'B' is started.

Feedback

A. Plausible because the RHR pumps are required to be OPERABLE in Mode 1.

Incorrect since this is a 72 hour action.

B. Plausible because, IAW T.S. 3.4.1.3, a combination of RHR loops and RC loops must be OPERABLE and or in operation.

Incorrect because, even with the RHR Pump 'A' trip, the minimum conditions of any combination of two loops is still met.

C. Plausible because IAW LCO 3.4.1.4.1 (applicable in Mode 5 with the RCS Loops filled), at least one RHR loops (Loop A or Loop B), be OPERABLE and in operation; AND that either the one additional loop be OPERABLE, or the Secondary side water level of at least two steam generators shall be greater than 10% of Wide Range indication.

Incorrect because, even if RHR Pump 'A' is NOT OPERABLE, at least two steam generators are greater than 10% of Wide Range indication and RHR loop 'B' is OPERABLE and in operation - the LCO is met.

D. CORRECT. LCO 3.9.7.2 is applicable in Mode 6 when water level above the top of the reactor pressure vessel flange is less than 23 feet . It requires that two independent RHR loops (Both Loop A and Loop B), be OPERABLE, and at least one in operation. If the A RHR Train Pump is NOT OPERABLE, then the LCO is NOT satisfied, and the ACTION is required. Action a states that immediate corrective action must be taken to return the A RHR Pump to OPERABLE status, OR to establish > 23 feet of water above the reactor pressure vessel flange, as soon as possible.

Notes

Knowledge of the physical connections and/or cause-effect relationships between Loss of RHR System and the following: Loss of RHRS during all modes of operation.

Tier: 1
Group: 1

Importance Rating: RO 3.9

Technical References:

- TS LCO 3.5.2
- TS LCO 3.4.1.3
- TS LCO 3.4.1.4.1
- TS LCO 3.9.7.2

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-7-17

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

The KA is matched because the operator must demonstrate knowledge of the operational implications (LCOs) of a loss of RHRS (Train A Pump inoperable) during all Modes of operation (The operator must consider the event for a Mode 3, 4, 5 and 6 scenario; and since the Mode 3 TS is the same as the Modes 1 and 2 Tech Spec, the operator is considering all modes of operation).

25. 026 A4.05 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A large break LOCA occurs.
- Reactor Building (RB) Pressure is 12.5 psig.

Which ONE (1) of the choices below completes the following statement?

The Reactor Building Spray Actuation signal can be reset ______.

A. by depressing <u>either</u> RB SPRAY RESET pushbutton.

B.✓ by depressing <u>both</u> RB SPRAY RESET pushbuttons.

C. ONLY after pressure has lowered below the setpoint, by depressing <u>either</u> RB SPRAY RESET pushbutton.

D. ONLY after pressure has lowered below the setpoint, by depressing <u>both</u> RB SPRAY RESET pushbuttons.

Feedback

A. Plausible because the manual *actuation* can be accomplished using <u>either</u> pair of switches. Signal can be reset with pressure still above the setpoint because this reset function is a Retentive Memory with Actuation Block, whose output can be removed (by RESET), regardless of the status of the actuating signal. Incorrect since both trains must be depressed to clear the rententive memory.

B. CORRECT. Signal can be reset with pressure still above the setpoint because this reset function is a Retentive Memory with Actuation Block, whose output can be removed (by RESET), regardless of the status of the actuating signal. Each of the two pushbuttons resets one train - both trains must be reset to clear the actuation signal.

C. Plausible if the RB Spray Actuation Signal were a Retentive Memory (such as HIGH-2 Main Steam Line Isolation AND the *manual* actuation of RB Spray), where the output would return to the last energized input. So, when the pushbuttons are depressed, the output signal is removed. When the pushbutton is released, the last energized input (the spray signal) is still there, so an output is again generated. Incorrect because the actuation signal is an Retentive Memory with Actuation Block. Incorrect since both trains must be depressed to clear the rententive memory.

D. Plausible if the RB Spray Actuation Signal were a Retentive Memory (such as HIGH-2 Main Steam Line Isolation AND the *manual* actuation of RB Spray), where the output would return to the last energized input. Also plausible because the 2nd half is correct. Incorrect because the actuation signal is an Retentive Memory with Actuation Block.

Notes

(Containment Spray) Ability to manually operate and/or monitor in the control room: Containment Spray reset switches

Tier: 2
Group: 1

Importance Rating: RO 3.5

Technical References:

- EOP-2.4 Step 7.c (Page 4 of 28)
- AB-8, Page 24 of 35

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-8-12

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions CONT SPRAY SYSTEM 45 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(7)

Comments:

Matches K/A in that it tests the ability to reset RB Spray with an actuation signal still present.

26. 026 G2.1.20 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions;

- 75% power
- A TOTAL loss of Component Cooling Water occurs.
- Local temperature monitoring is started on Charging Pump 'A'.
- The Charging Pump 'B' control switch is placed in Pull-to-Lock.
- Normal letdown is isolated.
- The crew initiates a load reduction at the maximum rate allowed by GOP-4C, *Rapid Downpower.*

The following parameters are observed on Charging Pump 'A' at 40% power, SEVEN (7) minutes after the loss of CCW.

- Gearbox Lube Oil Temperature 120°F and increasing at 1°F/minute
- Oil Cooler Outlet Temperature 135°F and increasing at 1°F/minute
- Thrust Bearing Temperature 156°F and increasing at 1.5°F/minute

In accordance with AOP-118.1, *Total Loss of Component Cooling Water*, which ONE (1) of the following describes the additional action, if any, that must be taken to continue running Charging Pump 'A'?

A. No actions are required, the plant will be off-line before a temperature limit is exceeded.

B. Established alternate cooling using the Demin Water System.

C. Established alternate cooling using the Fire Service System.

D✓ Established alternate cooling using the Chilled Water System.

Feedback

A. Plausible because, at the GOP-4C unloading rate of 5%/minute, the plant will be off-line within the 20 minute limit established in AOP-118.1 CAUTION before the Charging Pump limits are exceeded.

Incorrect because alternate cooling should still be established because the Charging Pump will be needed even after the plant is shutdown in order to supply RCP seal water.

B. Plausible because this is one of the methods of alternate cooling allowed in AOP-118.1, Step 4, Alternative Action.

Incorrect because, according to Alternative Action Step 4c, Demin Water is used ONLY if Chilled water is NOT available.

C. Plausible because this is one of the methods of alternate cooling allowed in AOP-118.1, Step 4, Alternative Action.

Incorrect because, according to Alternative Action Step 4c, Fire Service is used ONLY if Chilled Water and Demin Water are NOT available.

D. CORRECT. According to AOP-118.1 (Rev 2), CAUTION (& CAUTION - Step 3) 1, a charging pump can continue to run on a loss of CCW to its oil coolers for 20 minutes following the event initiation, or as long as local temperature monitoring is established and no limits identified on Page 4 of 4, on Attachment 1 are exceeded. The same Caution appears prior to Step 3. The limits established by Attachment 1 are 145°F for the Gearbox Lube Oil Temperature, 150°F for the Oil Cooler Outlet Temperature, and 180°F for the Thrust Bearing Temperature. None of these limits are presently exceeded and the earliest time that a limit is expected to be exceeded is 15 minutes (Oil Cooler Outlet Temperature at 150°F). With this in mind the crew will arrive at Step 3 of AOP-118.1 and move to the Alternative Action, initiate monitoring of Charging Pump temperatures, verify that Charging Pump 'A' can continue to run without CCW and proceed to Step 4. At Step 4 they will also implement the Alternative Action when it is determined that CCW cannot be restored. This will require the operator to place Charging Pumps 'B' and 'C' in PTL, isolate letdown, and initiate alternate cooling. All actions that are required by the procedure up to the initiation of alternate cooling have been completed as identified in the conditions of the question. The question is: "does alternate cooling need to be established, and if so, how?" While it is true that the plant will be off-line within 10 minutes at the GOP-4C unloading rate of 5%/minute, before the Charging Pump limits are exceeded, this has no bearing on whether or not alternate cooling should be established because the Charging Pump will be needed to continue running even after the plant is shutdown in order to supply RCP Sealwater. With this in mind, Alternative Cooling must be established for Charging Pump 'A'. The Step 4c Alternative Action identifies a hierarchy of systems to be used to provide this alternate cooling. The preferred method to use is the Chilled Water System. If this system is NOT available, then the Demin Water System should be used. If this system is NOT available, then the Fire Water System should be used.

Notes

Loss of Component Cooling Water: ability to execute procedure steps.

Tier: 1
Group: 1

Importance Rating: RO 4.6

Technical Reference:

- AOP-118.1, Rev 2, steps 3 & 4, and Attachment 1.

Proposed references to be provided to applicants during examination:

None

Learning Objective: AOP-118.1-03

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions AOPS 19, 155, & 321 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(10)

Comments:

The KA is matched because the operator must know major actions contained within the loss of CCW procedure (i.e. Charging Pump can continue to run without CCW until limits are exceeded and then Alternate Cooling must be established), and demonstrate the ability to choose an alternate cooling method from three options

27. 027 AK2.03 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- PZR pressure control is in AUTO at 2235 psig.
- Group 1 Backup Heaters are ON.
- Group 2 Backup Heaters are OFF.
- PT-444, PZR Pressure Transmitter, starts to drift HIGH.
- The operator places the Master Pressure Controller in MANUAL when PT-444 reads 2275 psig, but does NOT adjust the output of the controller.

Which ONE (1) of the choices below completes the following statement?

The final output on the Master Pressure Controller is ______ than its original output, AND the PZR Spray Valves will be ______ OPEN.

A. HIGHER;

approximately 80%

B.✓ HIGHER;

approximately 30%

C. the SAME as;

approximately 2-5%

D. the SAME as;

0%

A. Plausible because 1st part is correct. Incorrect because the 2nd part is wrong – This would be the position of the valve if the operator did not apply 25 psi bias, or it did not exist [100%/50 psi error x (40psi) = 80%].

B. CORRECT. According to IC-3 (p21, Rev 9), whether the Master Controller is in AUTO or MANUAL, both signals track each other, in order to ensure a bumpless transfer between controller operating modes. Because of this, when the operator places the Master Controller in MANUAL, the output will be retained from that point forward. According to IC-3 (p20-21), the Master Pressure Controller receives an input from PT-444 and compares actual PZR pressure to an established reference pressure of 2235 psig. The Proportional w/Integral Controller develops an output signal that is used to control the variable output PZR Heaters, the two spray valves and one of three PZR PORVs. According to IC-3 (p22), the two spray valves are controlled with individual proportional controllers whose output increases as the output of the Master Pressure Controller increases. In other words, as pressure rises above its reference setpoint, the output of the Master Pressure Controller rises, causing the two Spray Valve Controller outputs to also rise. However, the Spray Valve Controllers are biased so they do NOT start to increase their output until a 25 psig error exists. Furthermore, the Spray Valves start to open as its controller rises above 0% output (+25 psi error) and are fully open when its controller rises to 100% output (+75 psi error). As PT-444 fails high with the Master Pressure Controller in AUTO, a positive error occurs causing the Master Pressure Controller Output to Increase. As this output increases, the variable input heaters go to minimum power, and when the error increases to 25 psi, the Spray Valve Controller outputs start to increase, opening the spray valves. When the operator takes the Master Pressure Controller to MANUAL, and 2275 psig, the Manual setpoint has tracked along with the Auto setpoint and generates a bumpless transfer. If no adjustments in the output are made (as stated in the conditions), the Master Pressure Controller Output will control PZR pressure as if the PZR pressure were 2275 psig. With PZR pressure this high, the spray valves will open consistent with the existing error (40 psi). Since the PZR spray valves start to open at an error of 25 psi, and are fully open at a 75 psi error, and the Spray Valve Controller output varies proportionally, the spray valves should be open about 30% [100%/50 psi error x (40psi – 25 psi) = 30%].

C. Plausible because this would be true if the controller's auto & manual signal did not track each other. Incorrect because the controller tracks the auto and manual signals allows for a bumpless transfer. 2nd part is also wrong. Plausible because this has been one method in which PZR heaters have been operated in the past. The spray valves have been open a small amount because one group of BU heaters are energized.

D. Plausible because this would be true if the controller's auto & manual signal did not track each other. Incorrect because the controller tracks the auto and manual signals - allows for a bumpless transfer. 2nd part is also wrong. Plausible because this would be true in the absence of the bumpless transfer - the Master Controller Setpoint goes back to original and the spray valves were originally closed.

Notes

(Pressurizer Pressure Control System Malfunction) Knowledge of the interrelationships between Pressurizer Pressure Control Malfunctions and the following: Controllers and positioners.

Tier: 1
Group: 1

Importance Rating: RO 2.6

Technical Reference:

- IC-3, p12, 19-22, Rev 9

Proposed references to be provided to applicants during examination:

None

Learning Objective: AOP-401.6-7

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

The KA is matched because the operator must demonstrate knowledge of interrelations between the failure of a controlling channel of Pressurizer Pressure and the output of the Master Pressure Controller, and Spray Valve positioners.

28. 027 G2.4.31 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- Annunciator RB SPR NAOH STOR TK LVL HI/LO (XCP-608, 1-1) alarms on the MCB.
- LI-7356, NAOH TK LEVEL %, indicates 97%.

Which ONE (1) of the following identifies the TOTAL volume in the tank AND the status of the Spray Additive System?

REFERENCES PROVIDED

A. 3085.45 gallons;

OPERABLE.

B. 3085.45 gallons;

INOPERABLE.

C.✓ 3165.06 gallons;

OPERABLE.

D. 3165.06 gallons;

INOPERABLE.

Feedback

A. Plausible because this is the correct tank volume if the unusable portion below the pump suction centerline is not considered. Incorrect because the unusable portion *is* considered in the T.S. minimum value. Also plausible 2nd part is correct; however not for the given value of 3085.45 gals.

B. Plausible because this is the correct tank volume if the unusable portion below the pump suction centerline is not considered. Incorrect because the unusable portion *is* considered in the T.S. minimum value. 2nd part is plausible because it would be correct for the given value of 3085.45 gals. 2nd part is incorrect because actual volume considered in T.S. includes the unusable volume below the pump suction centerline.

C. CORRECT. According to Technical Specification LCO 3.6.2.2, the NaOH Tank must have between 3140 and 3230 gallons to be OPERABLE. To obtain the actual volume of the tank the operator must use Figure VI-27 from the VCS Curve Book. A NOTE on Figure VI-27 indicates that the figure only includes volume above the pump suction centerline, and that the Technical Specification includes the total volume of the tank. The figure identifies that the volume below the pump suction centerline is 79.61 gallons. With the level at 97%, the operator must use the figure to arrive at the precise tank total volume. The curve demonstrates that the level, which reads in percent, changes linearly with volume (not including the volume below the pump suction centerline). A table to the right of the curve shows precise level measurements at 5% intervals. A check of this tables shows that the change in volume throughout the curve is 31.81 gallons/% level indication. At 97% the volume above the pump suction centerline can be determined by adding the volume at 95% (3021.83 by the table) and the volume associated with 2% more or 63.62 gallons. With this in mind the volume of the tank that is above the pump suction centerline is 3085.45. To obtain the total tank volume, which is what the Technical Specification uses, 79.61 gallons must be added to this volume. When this is accomplished the total tank volume is found to be 3165.06 gallons, which satisfies the criteria of LCO 3.6.2.2.

D. Plausible because this is the correct volume. Incorrect since the given volume meets the minimum LCO value.

Notes

(Containment Iodine Removal) Knowledge of annunciators alarms, indications or response procedures.

Tier: 2
Group: 2

Importance Rating: RO 4.2

Technical References:

- TS 3.6.2.2
- VC Summer Station Curve Book, Figure VI-27
- ARP-001, Rev 8; XCP-609, ANN 1-1
- AB-8, p14-16, Rev 11

Proposed references to be provided to applicants during examination:

VC Summer Station Curve Book, Figure VI-27

Learning Objective: AB-8-09, 22.3

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

The KA is matched because the operator must have knowledge of the annunciator alarms, indications and response procedures (i.e. Technical Specifications), associated with the Spray Additive System, which is used to remove gaseous iodine in a post-accident environment.

29. 028 K3.01 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A LBLOCA occurs.
- Hydrogen Recombiner 'B' is OOS for maintenance.
- The crew places Hydrogen Recombiner 'A' in service when directed by the EOPs.
- RB Hydrogen concentration is 0.6% when the recombiner is started.

Which ONE (1) of the choices below completes the following statements?

After the Hydrogen Recombiner is placed in service, the RB Hydrogen concentration in the first 24 hours following the event is expected to ______.

If the Hydrogen Recombiner failed 24 hours after being placed in service the RB Hydrogen concentration 20 days after the event would be expected to be ______ 3%.

A. Decrease;

GREATER THAN

B. Decrease;

LESS THAN

C.✓ Increase;

GREATER THAN

D. Increase;

LESS THAN

Feedback

A. Plausible because the 2nd half is correct - H2 concentration is expected to be about 6-7% 20 days after the LOCA. Plausible because Figure 15.4-73 of the FSAR shows a decreasing H2 concentration 6 days after the LOCA if a hydrogen recombiner is operating.

B. Plausible because Figure 15.4-73 of the FSAR shows a decreasing H2 concentration 3 days after the LOCA if a hydrogen recombiner is operating. 2nd half is incorrect since H2 concentration is expected to be about 6-7% 20 days after the LOCA and will only be reduced to 3% if the recombiner continues to operate.

C. CORRECT. According to Figure 15.4-73 of the FSAR the post-LOCA RB Hydrogen concentration trend will increase for several days (~6 days) even with one Hydrogen Recombiner is operation. If the Recombiner were to fail 24 hours after placing it in service, Figure 15.4-73 of the FSAR shows that the Hydrogen concentration would slowly increase to about 7-8% over 1 month.

D. Plausible because the 1st part is correct - According to Figure 15.4-73 of the FSAR, the post-LOCA RB Hydrogen concentration trend will increase for several days (~6 days) even with one Hydrogen Recombiner is operation. 2nd half is incorrect since H2 concentration is expected to be about 6-7% 20 days after the LOCA and will only be reduced to 3% if the recombiner continues to operate.

Notes

Knowledge of the effect that a loss or malfunction of the Hydrogen Recombiner and Purge Control will have on the following: Hydrogen concentration in containment.

Tier: 2
Group: 2

Importance Rating: RO 3.3

Technical Reference:

- AB-15, p28, Rev 6; Figure AB15.9
- WOG ERG Executive Volume, PES Evaluations, (HP/LP-Rev 2, 4/30/05, p119)
- WOG E-1 Background Document (HE1BG, HP-Rev 2, 4/30/05, p84)
- OAP-103.2, Enclosure E, Section L

Proposed references to be provided to applicants during examination:

Learning Objective: AB-15-25.1

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

The KA is matched because the operator must demonstrate knowledge of the operational effect of the Hydrogen Recombiner, and the effect that its loss will have on the hydrogen concentration in Containment.

30. 029 EK1.02 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Which ONE (1) of the following is the MINIMUM value of Intermediate Range Startup Rate that must be met to allow transition out of EOP-13.0, *Response to Abnormal Nuclear Power Generation*?

A. -0.33 DPM

B. -0.2 DPM

C. 0.0 DPM

D.✓ <0.0 DPM

Feedback

A. Plausible because, on a Reactor Trip, this is the normal SUR observed.

Incorrect since Step 6 of EOP-13.0 requires a ONLY a negative SUR, not a minimum value.

B. Plausible because EOP-12.0, Rev 12, Attachment 1 uses the at least -0.2 DPM SUR to determine that the Subcriticality Critical Safety Function is satisfied (i.e. Green) instead of abnormally (i.e. Yellow) challenged.

Incorrect since Step 6 of EOP-13.0 requires a ONLY a negative SUR, not a minimum value.

C. Plausible because EOP-12.0, Rev 12, Attachment 1 uses 0 SUR to eliminate the need to go to EOP-13.0 when checking the status of the Subcriticality Critical Safety Function.

Incorrect since Step 6 of EOP-13.0 requires a negative SUR.

D. CORRECT. According to Steps 6 and 14 of EOP-13.0 (Rev 16), the criteria needed to allow transition from this procedure, in addition to power range instruments < 5%, and a negative startup rate on the Intermediate Range Channels. According to the WOG FR-S.1 Background Document (HFRS1BG.doc, HP-Rev 2, 4/30/05, p86 and 103), the negative SUR ensures that the reactor is subcritical, and ANY negative SUR is acceptable.

Notes

Knowledge of the physical connections and/or cause-effect relationships between ATWS and the following: Definition of reactivity.

Tier: 1
Group: 1

Importance Rating: RO 2.6

Technical References:

- EOP-13.0, Rev 16
- EOP-12.0, Rev 12
- WOG FR-S.1 Background Document (HFRS1BG.doc, HP-Rev 2, 4/30/05, p86 and 103)
- IC-8, p57, Rev 9

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-13-2042

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

The KA is matched because the operator must demonstrate knowledge of the operational implications (i.e. SUR will be negative and that any negative magnitude is sufficient) of the reactor following an ATWS in which sufficient negative reactivity has been added to bring the reactor safely to subcriticality

31. 033 G2.4.11 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 7% power
- Power is being raised slowly in preparation for rolling the Main Turbine.
- Annunciator SR/IR DETECTOR TROUBLE I (XCP-620, 3-1) just actuated.
- Intermediate Range Detector N-35 has failed LOW.

Which ONE (1) of the following is the required action?

A.✓ Place the N-35 LEVEL TRIP Switch in BYPASS and maintain power less than 10% until the channel is returned to service.

B. Place the N-35 LEVEL TRIP Switch in BYPASS and raise power to 12-15% while the channel is repaired.

C. Direct I&C to trip the N-35 associated bistables and maintain power less than 10% until the channel is returned to service.

D. Direct I&C to trip the N-35 associated bistables and raise power to 12-15% while the channel is repaired.

Feedback

A. CORRECT. The IR is bypassed (AOP-401.8, Step 2), rather than tripped, because protection logic is 1 of 2. Power is held less than 10% (below the IR trip block) in accordance with T.S. Table 3.3-1, Functional Unit 5 (Action 3). and per AOP-401.8, Step 3, Alternative Action.

B. Plausible because the 1st part is correct. Also plausible because power may be raised to the POAH if the failure occured between P-6 and 5%. Also plausible because power *could* be raised to just short of 10%. 12-15% is plausible because this is the next incremental power ascension in GOP-4A and would be the correct action if the failure had occured just above 10%.

Incorrect because both AOP-401.8 and T.S. Table 3.3-1 prohibit power ascension abover 10% with a failed IR channel.

C. Plausible because the 2nd part is correct. Also plausible because bistables *are* tripped for *Power* Range channels and other failed protection instruments.

Incorrect because the IR is bypassed (AOP-401.8, Step 2), rather than tripped, because protection logic is 1 of 2.

D. Plausible because bistables *are* tripped for *Power* Range channels and other failed protection instruments. Also plausible because power may be raised to the POAH if the failure occured between P-6 and 5%. Also plausible because power *could* be raised to just short of 10%. 12-15% is plausible because this is the next incremental power ascension in GOP-4A and would be the correct action if the failure had occured just above 10%.

Incorrect because the IR is bypassed (AOP-401.8, Step 2), rather than tripped, because protection logic is 1 of 2. Alos incorrect because both AOP-401.8 and T.S. Table 3.3-1 prohibit power ascension abover 10% with a failed IR channel.

Notes

(Loss of Intermediate Range NI) Knowledge of abnormal condition procedures.

Tier: 1
Group: 2

Importance Rating: RO 4.0

Technical Reference:

- IC-8, Figure IC8.5, Rev 9
- IC-9, p73, Table IC9.2, Rev 13
- Technical Specification LCO 3.3.1, Table 3.3-1, Functional Unit 5
- AOP-401.8, Step 5, Rev 3

Proposed references to be provided to applicants during examination:

Learning Objective: IC-8-44

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions NUC INST SYSTEM 6, 21, & 50 and TECH SPECS 52 to be classified as MODIFIED. Also similar to 2007 NRC exam - question RO-36 [015 A2.02])

10 CFR Part 55 Content: 41(b)(7), (10)

Comments:

The KA is matched because the operator must demonstrate knowledge of AOP-401.8 as it relates to a failed Intermediate Range NI Channel.

32. 035 A1.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- All Steam Generators are at programmed level.
- Steam Generator 'B' level is being controlled manually.

Subsequently, a Stator Cooling Turbine Runback occurs for 20 seconds and then stops.

Assuming NO operator action, which ONE (1) of the following describes the response of Steam Generator 'B' level?

A.✓ Initially decreases;

SG High-High water level will occur.

B. Initially decreases;

SG Low-Low water level will occur.

C. Initially increases;

SG High-High water level will occur.

D. Initially increases;

SG Low-Low water level will occur.

Feedback

A. According to TB5 (p34, Rev 8), the Stator Cooling Runback will run the Turbine back at 25%/minute. Therefore, a 20 second runback will result in a power reduction of 8-9%. When a downpower occurs, the SG level instrumentation, which monitors level within the downcomer region, will indicate an apparent loss of inventory, or "Shrink" within the SG, when in actuality the mass inventory is increasing (feed flow is greater than steam flow). According to IC-2 (p14), the effects of Shrink are most limiting at high power and maintaining the SG level within its normal band (as it was in the initial conditions) ensures that a sudden load rejection will NOT shrink level sufficiently to cause a reactor trip on the SG Low-Low level condition. With the feed flow adjusted to provide the B SG with 100% feed flow, a downpower will result in a net inventory increase within the B SG. Although the initial level indication will decrease, the inventory will actually increase and result in an increasing level to the point in which P-14 actuates. With no operator action, the Turbine will trip, the reactor will trip, all three MFPs will trip and a FWIS will occur.

B. Plausible because the 1st part is correct. Also plausible because a Low-Low level should occur in SGs 'A' & 'C' after the Turbine Trip. Incorrect because SG 'B' will decrease, but NOT reach a Low-Low level following the Turbine Trip since it was at a higher than normal level when the trip occured.

C. Plausible because because the 2nd part is correct. Also plausible because level will increase because FRV 'B' is in manual and will continue to feed SG 'B' at the original flow rate when the Shrink effect is over. Incorrect because level does not initially increase due to Shrink.

D. Plausible because level will increase because FRV 'B' is in manual and will continue to feed SG 'B' at the original flow rate when the Shrink effect is over. Incorrect because level does not initially increase due to Shrink. Also plausible because a Low-Low level should occur in SGs 'A' & 'C' after the Turbine Trip. Incorrect because SG 'B' will decrease, but NOT reach a Low-Low level following the Turbine Trip since it was at a higher than normal level when the trip occured.

Notes

Ability to predict and/or monitor changes in parameters associated with operating the Steam Generator controls including: S/G wide and narrow range level during startup, shutdown and normal operations.

Tier: 2
Group: 2

Importance Rating: RO 3.6

Technical References:

- IC-2, p13-15, p21-23, Figure IC2.2, Rev 9
- TB-5, p33-35, Rev 8
- IC-9, p45, 47, Rev 13

Proposed references to be provided to applicants during examination:

Learning Objective: IC-2-17

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5)

Comments:

The KA is matched because the operator must predict responses of SG Narrow Range level during normal operations associated with operating the SG controls (Steam Flow).

33. 038 EK1.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- The crew is responding to a SG tube rupture IAW EOP-4.0, *Steam Generator Tube Rupture.*
- The crew has completed dumping steam from the intact Steam Generators and
- Core Exit Thermocouples are stabilized at 498°F.
- The Steam Dump Controller has been placed in AUTO and set to 5.0 (for ruptured SG pressure range of 1001-1100 psig).
- The RCS Pressure has stabilized at 1750 psig.

The following indications exist on the Core Subcooling Monitor:

- Train A: – 46°F
- Train B: – 120°F

Which ONE (1) of the following represents the Core Subcooling Monitor Train that is reading correctly AND based on this, the correct procedure flowpath?

REFERENCE PROVIDED

A. Train A;

Remain in EOP-4.0, Steam Generator Tube Rupture.

B. Train A;

Transition to EOP-4.2, SGTR with Loss of Coolant – Subcooled Recovery Desired.

C.✓ Train B;

Remain in EOP-4.0, Steam Generator Tube Rupture.

D. Train B;

Transition to EOP-4.2, SGTR with Loss of Coolant – Subcooled Recovery Desired.

Feedback

A. Plausible because the Steam Dump Controller is set for 5.0 for a range of ruptured SG pressures of 1001-1100 psig. This range of pressure equates to a saturation temperature of approximately 544-556°F. Since CETs are given as 498°F, if the RCS pressure were 1000-1100, subcooling would indicate approximately 50°F (544-498=46; 556-498=58). Incorrect since given RCS pressure of 1750 psig results in subcooling of approximately 120°F. 2nd part is plausible since it is the actual correct procedural flowpath. It is incorrect if it is assumed that a Train A subcooling margin of 46°F is accurate. Subcooling less than 50°F indicates other problems exist and requires a transition to EOP-4.2.

B. Plausible because the Steam Dump Controller is set for 5.0 for a range of ruptured SG pressures of 1001-1100 psig. This range of pressure equates to a saturation temperature of approximately 544-556°F. Since CETs are given as 498°F, if the RCS pressure were 1000-1100, subcooling would indicate approximately 50°F (544-498=46; 556-498=58). Incorrect since given RCS pressure of 1750 psig results in subcooling of approximately 120°F. 2nd part is plausible since it is the correct procedural flowpath if it is assumed that a Train A subcooling margin of 46°F is accurate. Subcooling less than 50°F indicates other problems exist and requires a transition to EOP-4.2.

C. CORRECT. Given RCS pressure of 1750 psig = 1765 psia. Saturation temperature for 1750 psia is 617°F. Since CETs are 498°F; 617-498=119°F subcooling exists. At step 21 of EOP-4.0, the operator is asked to determine if RCS subcooling is > 50°F. Based on this, the procedure flowpath is determined. According to the WOG E-3 Background Document (HE3BG.doc, HP-Rev 2, 4/30/05), if > 50°F of RCS subcooling exists the operator continues in EOP-4.0. If not, an additional malfunction such as a LOCA is suspected because the cooldown step has been designed to place the plant in a condition where at least 20°F of subcooling exists, and coupled with the 30°F sucbooling allowed for instrument uncertainties, 50°F should exist.

D. Plausible because the 1st part is correct. Given RCS pressure of 1750 psig = 1765 psia. Saturation temperature for 1750 psia is 617°F. Since CETs are 498°F; 617-498=119°F subcooling exists. 2nd part is plausible since it is the correct procedural flowpath if a subcooling margin of 50°F is NOT established. Subcooling less than 50°F indicates other problems exist and requires a transition to EOP-4.2.

Notes

Knowledge of the physical connections and/or cause-effect relationships between Steam Generator Tube Rupture and the following: Use of steam tables.

Tier: 1
Group: 1

Importance Rating: RO 3.1

Technical References:

- Steam Tables
- EOP-4.0, Rev 18
- WOG E-3 Background Document (HE3BG.doc, HP-Rev 2, 4/30/05)

Proposed references to be provided to applicants during examination:

Steam Tables

Learning Objective: EOP-4.0-05.h

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10), (14)

Comments:

The KA is matched because the operator is placed in a situation where the RCS Subcooling must be verified manually, and then the operational implications of the correctly determined RCS Subcooling must be understood (i.e. if < 50°F subcooling exists in the post-cooldown phase of a SGTR, prior to RCS depressurization, the event is more complex than a SGTR, and a contingency procedure must be addressed).

34. 039 A2.04 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- The unit was at 100% power when the turbine tripped.
- All controllers were in the normal, full power alignment.
- The crew is performing EOP-1.1, *Reactor Trip Recovery*.
- Tavg is 557 °F, rising.
- The PERMISV C9 status light is DIM.

The required operator action is to use the _______ to lower Tavg. If this action is NOT taken, steam pressure will rise to ________.

A.✓ Steamline Power Reliefs;

1133 psig

B. Condenser Dumps;

1133 psig

C. Steamline Power Reliefs;

1176 psig

D. Condenser Dumps;

1176 psig

Feedback

A. CORRECT. At 1133 psig steam header pressure, the Steamline Power Reliefs shift from the Steam Dump Group 4 mode and open. With Tavg 557F and rising, Alternative Action of Step 3 of EOP-1.1 would apply. c) 1) & 2) require operation of the power reliefs if the Condenser is unavailable. Pressure would rise until the power reliefs swapped to the overpressure mode at 1133 psig, at which time the Tavg transient would be stopped.

B. Incorrect since the Steamline Power Reliefs would have to be used without the Condenser Avaliable (C-9). Plausible because the main steam pressure is correct. Also plausible because operation of the Condenser dumps is actually the preferred/first method addressed in the Alternative Action of Step 3 to control Tavg.

C. Incorrect because pressure would only rise to 1133 psig. Plausible because the pressure is the value that main steam pressure would rise to if the power reliefs did not actuate at 1133 psig. This is the lift value of the lowest steam line safety valve. Also plausible because these are the correct valves.

D. Incorrect because pressure would only rise to 1133 psig. Plausible because the pressure is the value that main steam pressure would rise to if the power reliefs did not actuate at 1133 psig. This is the lift value of the lowest steam line safety valve. Also plausible because operation of the Condenser dumps is actually the preferred/first method addressed in the Alternative Action of Step 3 to control Tavg

Notes

Ability to (a) predict the impacts of the following on the (Main and Reheat Steam) and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Malfunctioning steam dump.

Tier: 2
Group: 1

Importance Rating: RO 3.4

Technical References:

- TB-2, Page 24 of 62
- IC-1, Page 20 of 51
- EOP-1.1, Pages 3 and 4 of 16

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-1.1-07

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5)

Comments:

Matches K/A in that it requires the examinee to predict the impact (use of Steamline Power Reliefs) in EOP-1.1 of a malfunction of a Steam Dump component/input (C-9).

35. 039 K5.05 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A cooldown is in progress in accordance with GOP-6, *Plant Shutdown from Hot Standby to Cold Shutdown.*

Which ONE (1) of the following identifies the RCS temperature where the MOST restrictive cooldown limit is in effect and the reason?

A. RCS temperature greater than 200°F to prevent a non-ductile component failure.

B. RCS temperature greater than 200°F to prevent bubble formation in the reactor vessel head.

C.✓ RCS temperature less than 200°F to prevent a non-ductile component failure.

D. RCS temperature less than 200°F to prevent bubble formation in the reactor vessel head.

Feedback

A. Plausible because the TS dictated limit is applied until 200°F and the basis is correct. However, at < 200°F the facility procedure further restricts the cooldown limit to 50°F.

B. Plausible because the TS dictated limit is applied until 200°F and this is the basis for limiting a Natural Circulation cooldown rate to 50°F.

C. CORRECT IAW GOP-6 Reference Page, and T.S. 3/4.4.9 bases (page B 3/4 4-6&7).

D. Incorrect and plausible since this is the basis for limiting a Natural Circulation cooldown rate to 50°F.

Notes

Knowledge of the operational implications of the following concepts as they apply to the Main and Reheat Steam: Bases for RCS cooldown limits.

Tier: 2
Group: 1

Importance Rating: RO 2.7

Technical Reference:

- GOP-6, REFERENCE PAGE (Page 26 of 126)

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-2-26

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions EOPS 474 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(10)

Comments:

Meets K/A by identification of a changing limit and requiring knowledge of the reason.

36. 040 AG2.2.25 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Which ONE (1) of the choices below completes the following statement?

The Technical Specification basis for the minimum Shutdown Margin requirement in MODES 1 and 2 is to control the reactivity transient during a postulated main steam line break at the _______of core life, and _______ Tavg.

A. Beginning;

no load

B. Beginning:

full power

C.✓ End;

no load

D. End;

full power

Feedback

A. Plausible 1st part because the minimum Shutdown Margin requirement is applicable at all times in core life but the specific basis is for EOL when the Moderator Temperature Coeffecient provides the highest positive reactivity feedback. (Ref FSAR 15.4.2 Major Secondary System Pipe Rupture; Section 15.4.2.1.2 Analysis of Effects and Consequences ppg 15.4.21-15.4.23)

Plausible because 2nd part is correct. The reactivity effect is highes at no-load Tavg. based upon the highest secondary coolant mass for heat removal. (Ref FSAR 15.4.2 Major Secondary System Pipe Rupture; Section 15.4.2.1.2 Analysis of Effects and Consequences ppg 15.4.21-15.4.23)

Incorrect because (Ref T.S basis 3/4.1.1.1 and 3/4.1.1.2) and (Ref FSAR 15.4.2 Major Secondary System Pipe Rupture; Section 15.4.2.1.2 Analysis of Effects and Consequences ppg 15.4.21-15.4.23) In MODES 1 and 2 the most restrictive condition occurs at EOL.

B. Plausible 1st part because the minimum Shutdown Margin requirement is applicable at all times in core life but the specific basis is for EOL when the Moderator Temperature Coeffecient provides the highest positive reactivity feedback. (Ref FSAR 15.4.2 Major Secondary System Pipe Rupture; Section 15.4.2.1.2 Analysis of Effects and Consequences ppg 15.4.21-15.4.23)

Plausible 2nd part because significant heat removal and positive reactivity effects from the negative moderator temperature feedback still occur but are the most severe because secondary inventory in the SG is not as great as exist at

Incorrect because (Ref T.S basis 3/4.1.1.1 and 3/4.1.1.2) and (Ref FSAR 15.4.2 Major Secondary System Pipe Rupture; Section 15.4.2.1.2 Analysis of Effects and Consequences ppg 15.4.21-15.4.23) In MODES 1 and 2 the most restrictive condition occurs at EOL, with Tavg at no load operating temperature.

C. CORRECT: According to (Ref T.S basis 3/4.1.1.1 and 3/4.1.1.2) and (Ref FSAR 15.4.2 Major Secondary System Pipe Rupture; Section 15.4.2.1.2 Analysis of Effects and Consequences ppg 15.4.21-15.4.23) In MODES 1 and 2 the most restrictive condition occurs at EOL, with Tavg at no load operating temperature.

D. Plausible because 1st part is correct. ccording to (Ref T.S basis 3/4.1.1.1 and 3/4.1.1.2) and (Ref FSAR 15.4.2 Major Secondary System Pipe Rupture; Section 15.4.2.1.2 Analysis of Effects and Consequences ppg 15.4.21-15.4.23) In MODES 1 and 2 the most restrictive condition occurs at EOL.

Plausible in the 2nd part Plausible 2nd part because significant heat removal and positive reactivity effects from the negative moderator temperature feedback still occur but are the most severe because secondary inventory in the SG is not as great as exist at no load Tavg.

Incorrect because According to (Ref T.S basis 3/4.1.1.1 and 3/4.1.1.2) and (Ref FSAR 15.4.2 Major Secondary System Pipe Rupture; Section 15.4.2.1.2 Analysis of Effects and Consequences ppg 15.4.21-15.4.23) In MODES 1 and 2 the most restrictive condition occurs with Tavg at no load operating temperature.

Notes

(Steam Line Rupture) Knowledge of the bases in Technical Specification for limiting conditions for operations and safety limits.

Tier: 1
Group: 1

Importance Rating: RO 3.2

Technical References:

- TS-16, Pages 13-15 of 44
- FSAR, Chapter 15, Section 15.4.2

Proposed references to be provided to applicants during examination:

Learning Objective: TS-16-16

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5), (7)

Comments:

Meets K/A by testing knowledge of T.S. bases (SDM) for a MSLB.

37. 051 AA1.04 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- A leak develops in the Main Condenser causing vacuum to decrease.
- The crew enters the appropriate AOP.
- Main Condenser pressure INCREASES at 1" Hg Absolute every five minutes.
- The crew initiates a downpower in accordance with GOP-4C, *Rapid Downpower*, at 5%/minute.
- All control systems are in AUTO.

Which ONE (1) of the following conditions will REQUIRE the operator to trip the Reactor?

A. Main Condenser pressure rises above 5" Hg Absolute.

B.✓ Tavg is 12°F greater than Tref and Control Rods are moving inward at 72 steps/minute.

C. The ONE ROD ON BOTTOM (XCP-621, 3-1) annunciator alarms on the Main Control Board.

D. Tavg is 8°F greater than Tref and a single channel causes the OT ΔT (XCP-615, 3-2) annunciator.

Feedback

A. Plausible because AOP-206.1 has a Turbine Trip requirement at 5" with load <300MW (Caution 4) and another Turbine Trip requirement at 7.5". Incorrect because a *Reactor* Trip is NOT required for this condition.

B. CORRECT. According to the GOP-4C Reference Page (Rev 0), the operator must trip the Reactor if the Tavg/Tref mismatch exceeds 10°F.

C. Plausible because AOP-403.6, Dropped Control Rod, requires a Reactor Trip if more than one rod drops. Also plausible because the RODS ON BOTTOM annunciator requires a Reactor Trip for multiple dropped rods. Incorrect because this alarm comes in when only ONE rod has dropped. A reactor trip is NOT required for this condition because the GOP-4C criteria are NOT met.

D. Plausible because the OT ?T annunciator is indicative of a valid Reactor Trip condition, but a trip will not actuate unless 2/3 channels exceed the setpoint. Incorrect because this is NOT one of the trip criteria in GOP-4C.

Notes

Ability to predict and/or monitor changes in parameters associated with operating the Loss of Condenser Vacuum controls including: Rod position.

Tier: 1
Group: 2

Importance Rating: RO 2.5

Technical References:

- GOP-4C, Rev 0
- AOP-206.1, Rev 3
- ARP-001-XCP-621, Rev 5
- AOP-403.4, Rev 2

Proposed references to be provided to applicants during examination:

None

Learning Objective: GOP-A-02

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

The KA is matched because the operator must demonstrate the ability to monitor the Rod Control System for proper operation during a Loss of Main Condenser Vacuum.

38. 054 AK3.03 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A plant startup to 100% power was being conducted per GOP-4A, *Power Operation, (Mode 1 - Ascending).*
- Power was being maintained at 12-15% while preparing to synchronize the Main Generator to the grid.
- Main Feed Pump (MFP) 'A' was running.
- MFPs 'B' and 'C' were tripped.
- Main Feed Pump 'A' tripped for an unknown reason.
- The Reactor tripped on S/G Low-Low level and the operating crew is now implementing EOP-1.1, *Reactor Trip Recovery.*

Which ONE (1) of the following describes the response of the MDEFP Flow Control Valves (FCVs) and the MINIMUM actions necessary to throttle the FCVs?

A. The FCVs receive an open signal due to the trip of MFP 'A';

Take the MD EFP RESET Switch to RESET, take the individual FCV control switch to MAN, adjust the Hagan controller.

B. The FCVs receive an open signal due to the trip of MFP 'A';

Take the individual FCV control switch to MAN, adjust the Hagan controller.

C.✓ The FCVs receive an open signal due to the S/G Low-Low level;

Take the MD EFP RESET Switch to RESET, take the individual FCV control switch to MAN, adjust the Hagan controller.

D. The FCVs receive an open signal due to the S/G Low-Low level;

Take the individual FCV control switch to MAN, adjust the Hagan controller.

Feedback

A. Plausible because the 2nd part is correct - with an auto-open signal present, the MD EFP RESET Switch must be reset (even though it is labeled *EFP*, not *FCV*), then the individual MCB control switches must be taken to MAN, and the Hagan controller must be adjusted to throttle the FCVs. Also plausible, because the FCVs receive an open signal from the same signals that start the associated EFP, except the MDEFP FCVs do not open when all 3 MFPs trip.

Incorrect because the MDEFP FCVs only open on loss of 1DA/1DB, Low-Low S/G level, and SI, NOT trip of 3/3 MFPs.

B. Plausible because the 2nd half is true for *normal* plant conditions - in the absence of an auto-start condition of the MDEFPs, all that is required to throttle the FCVs is to take the control switch to MAN and adjust the Hagan controller. Also plausible, because the FCVs receive an open signal from the same signals that start the associated EFP, except the MDEFP FCVs do not open when all 3 MFPs trip.

Incorrect because the MDEFP FCVs only open on loss of 1DA/1DB, Low-Low S/G level, and SI, NOT trip of 3/3 MFPs.

C. CORRECT. The MDEFP FCVs open on the same signals that start the MDEFPs (loss of 1DA/1DB, Low-Low S/G level, and SI [NOT trip of 3/3 MFPs]). With an auto-start signal present fro the MDEFPs, the operator must take the MD EFP RESET Switch to RESET, the individual MCB control switches must be taken to MAN, and the Hagan controller must be adjusted to throttle the FCVs (see IB-3, pages 31-34, and Figure IB3.4).

D. Plausible because the 1st part is correct. Also plausible because the 2nd half is true for *normal* plant conditions - in the absence of an auto-start condition of the MDEFPs, all that is required to throttle the FCVs is to take the control switch to MAN and adjust the Hagan controller.

Notes

Knowledge of the effect that a loss or malfunction of the Loss of Main Feedwater will have on the following: Manual control of AFW flow control valves.

Tier: 1
Group: 1

Importance Rating: RO 3.8

Technical References:

- IB-3, p31-34; Figure IB3.4
- 1MS-41-011, Sheet 14

Proposed references to be provided to applicants during examination:

Learning Objective: EOP-1.1-07

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5), (10)

Comments:

The KA is matched because the operator must identify how manual control of the EFW System flow control valves is established during a Loss of Main Feed water event.

39. 055 EA1.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions

- 100% power
- A sustained loss of ALL AC power (ESF & BOP) occurs.
- The crew is implementing EOP-6.0, *Loss of All ESF AC Power.*
- Attempts to start both DGs are continuing.
- ALL INTACT Steam Generators are being depressurized.

Which ONE (1) of the following describes a condition that will require the crew to transition out of EOP-6.0 prior to restoring power to at least one AC ESF Bus?

A. The Tcolds for all three RCS Loops decreases to less than 280°F.

B. Both Intermediate and Source Range startup rates are positive.

C. Narrow Range levels in ALL 3 S/Gs drops below 30%.

D✓ Core Exit T/Cs indicate greater than 1200°F.

Feedback

A. Plausible because temperature may drop below the limit during this event, and would present a challenge to the Integrity Critical Safety Function that will require action by the operator within the body of EOP-6.0. Incorrect because this situation is an anticipated condition within EOP-6.0 during the SG depressurization. According to Step 19.c of EOP-6.0, the operator must verify the RCS Tcolds are greater than 280°F during the SG depressurization. If so, the crew is directed to stop the depressurization.

B. Plausible because a challenge to Subcriticality Critical Safety Function may occur during this event and, is so, will require action by the operator within the body of EOP-6.0. Incorrect. According to Step 20 of EOP-6.0, the operator is to monitor both the Intermediate and Source Range Nuclear Instrumentation channel startup rates during the SG depressurization and ensure that they are zero or negative. If they are positive, the depressurization should be stopped and the RCS allowed to heat up to add negative reactivity. The operator should NOT transition out of EOP-6.0 based on this indication. According to EOP-12.0 (Rev 12), this situation will result in an Orange Path on Subcriticality, the highest Critical Safety Function.

C. Plausible because this may occure during the depressurization and is part of the criteria that would require immediate transition to EOP-15.0 from *other* procedures. Incorrect because Step 19 of EOP-6.0, the operator is to simply verify SG levels >30%. If not, the Alternative Action directs maintaining max EFW flow until at least 1 SG is >30%, not transitioning out of EOP-6.0.

D. CORRECT. According to Note 3 prior to Step 1 of EOP-6.0 (Rev 21), the Critical Safety Function Status Trees should be monitored for information only during the performance of the EOP. It specifically states that procedures referenced from the status trees should NOT be referenced. According to Step 25 of EOP-6.0, the operator is directed to evaluate CETs and if > 1200°F transition to SACRG-1. According to the WOG ECA-0.0 Background Document (HECA00BG.doc, HP-Rev.2, 4/30/05, p133), this condition indicates that all attempts to restore core cooling have failed and core damage cannot be avoided. Transition to Severe Accident Control Room Guideline Initial Response – Step 1 is required. This is the ONLY time that the operator is directed to transition from EOP-6.0 with power established to at least one AC ESF Bus.

Notes

Ability to predict and/or monitor changes in parameters associated with operating the Station Blackout controls including: In-core thermocouple temperatures.

Tier: 1
Group: 1

Importance Rating: RO 3.7

Technical References:

- EOP-6.0, Rev 21, Steps 19.c, 20 and 25, and the Notes prior to Step 1.
- WOG ECA-0.0 Background Document (HECA00BG.doc, HP-Rev.2, 4/30/05, p133)
- EOP-12.0, Rev 12, Attachments 1, 2 and 4

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-6.0-08

Question History:

NEW

10 CFR Part 55 Content: 41(b)10

Comments:

The KA is matched because it requires the operator to monitor and operate (i.e. transition procedures) based on the Core Exit Thermocouples during a Station Blackout.

40. 056 AA2.02 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- Charging Pump 'A' is removed from service with its breaker racked down.
- Charging Pump 'B' is in standby.
- Charging Pump 'C' breaker is racked up onto Bus 1DA and running.
- ALL Offsite Power is lost.
- Both DG 'A' and 'B' start and restore power to their respective bus.
- The following ESFLS lights are LIT on the MCB:

TRAIN A:

- TRN BLACKOUT SEQ INIT
- STEP 1 through 5 START

TRAIN B:

- TRN BLACKOUT SEQ INIT
- STEP 1 through 8 START
- TRN BLACKOUT SEQ COMPLETE

Which ONE (1) of the following describes which Charging Pumps will be running?

A. NO Charging Pumps

B. ONLY Charging Pump 'B'

C✓ ONLY Charging Pump 'C'

D. BOTH Charging Pumps 'B' & 'C'

A. Plausible because Charging Pump 'B' does not receive a start signal on a blackout signal alone. Additionally, Charging Pump 'C' receives a trip signal (on output #5 from the ESFLS - which occurs at T = 0 on the blackout event) on a blackout if it is running with its same train Charging Pump breaker racked up. NO pumps would be running if Charging Pump 'A' breaker were racked up. Incorrect because Charging Pump 'C's' breaker is closed and is NOT tripped (since 'A' breaker is racked down) at the start of the event. When power is restored to the Bus 1DA, Charging Pump 'C' will restart.

B. This is plausible because ONLY the Train 'B' ESFLS has correctly completed its sequence. It is a common misconception that the Charging Pump starts on the ESFLS sequence, not as soon as power is restored (via Load Block #1). Incorrect because the Charging Pump 'B' breaker is open at the start of the event, and a blackout signal alone will NOT start a Charging Pump. Also incorrect since, when power is restored to Bus 1DA, Charging Pump 'C' will restart.

C. According to GS2 (p48-52, Rev 15), the ESFLS will respond to one of four events: (1) an undervoltage on the ESF Bus, (2) an SI actuation, (3) an SI actuation followed by an undervoltage on the ESF Bus, and (4) an undervoltage on the ESF Bus followed by an SI actuation. When the ESFLS is actuated it will trip loads, block others from tripping, realign equipment, and load components onto the ESF Bus in a series of 8 steps, dependent upon the initiating signal. The undervoltage on the ESF Bus, known as a blackout, is the event established in the conditions above. According to GS-2 (p51-52), 12 status lights per train are provided on the MCB to alert the operator to the status of the ESFLS. Each Train has a similar set of status lights. With the conditions established above, it is apparent that the B ESFLS has initiated its blackout load sequence, carried out all eight loading steps, and completed its sequencing. On the other hand, train 'A' has initiated its blackout load sequence, carried out the first five of the loading steps and failed to complete any further action. According to GS-2 (p58), the blackout signal alone does NOT start the Charging Pumps, but only trip and lockout Charging Pump 'C' under certain conditions (Charging Pump Breaker on the same train racked up). Since Charging Pump 'C' is racked up on Bus 1DA, and the Charging Pump 'A' breaker is racked down, the Charging Pump 'C' breaker will NOT trip. The Charging Pump 'C' breaker will be closed at the start of the event, and remain closed throughout the event. When the DG 'A' breaker closes in on ESF Bus 1DA, Charging Pump 'C' will re-energize. On the other hand, since Charging Pump 'B' is NOT running, even though the Train 'B' sequencer completes is sequencing correctly, its breaker will NOT be closed on a blackout signal alone.

D. Plausible because 'B' would have started if it were running prior to the LOOP. Alos plausible because Charging Pump 'C' is correct. Incorrect because Charging Pump 'B' breaker is open at the start of the event, and a blackout signal alone will NOT start a Charging Pump. This is also plausible because only the B Train ESFLS has correctly completed its sequence. It is a common misconception that the Charging Pump starts on the ESFLS sequence, not as soon as power is restored (via Load Block #1).

Notes

Ability to (a) predict the impacts of the following on the Loss of Off-site Power and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: ESF load sequencer status lights.

Tier: 1
Group: 1

Importance Rating: RO 3.5

Technical Reference:

- GS-2, p48-52, 56-58, 60, Rev 15

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-10-11

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions CVCS 19, 115, 117, & 159 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(7)

Comments:

The KA is matched because the operator must consider the condition of the Train A and B ESFLS Status lights, and determine the condition of the Charging Pumps, given an initial set of conditions, and a loss of offsite power event.

41. 057 G2.4.8 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- A reactor startup is in progress in accordance with GOP-3, *Reactor Startup from Hot Standby to Startup (Mode 3 to Mode 2).*
- Power has been raised to between 1% and 3%.
- Power is lost to APN-5901 when the associated inverter normal AC input breaker opens and the inverter fails to swap to alternate power.

Which ONE (1) of the following completes the statement below?

The operator will use ______ Procedure to respond to the plant symptoms, AND simultaneously refer to ______ Procedure to respond to, and correct the problem with the breaker failure and restore power to the APN.

A.✓ an Emergency Operating;

Annunciator Response

B. an Emergency Operating;

Abnormal Operating

C. ONLY an Abnormal Operating;

Annunciator Response

D. ONLY an Abnormal Operating;

Abnormal Operating

A. According to GS-2 (p44-45, Rev 15) operators are alerted to problems with inverters/instrument panels primarily through the receipt of annunciators on the MCB. Operators would respond to the event according to the directions of the Annunciator Response Procedure and dependent upon the symptoms of response of plant components to the failure. According to IC-8 (p50, Rev 9), APN-5901 provides indication and control power to Intermediate Range Channel NI-35. If Control Power is lost the Reactor Protection System will generate a trip signal on High Intermediate Range Flux in this instrument. According to IC-9 (p36, Rev 13), when 1 of 2 Intermediate Range instruments generate a trip signal with 3 of 4 power ranges less than 10% power, and automatic reactor trip is generated. Because of this, the reactor will trip, and the crew will enter EOP-1.0, Reactor Trip/Safety Injection Actuation. For the given conditions, annunciator INV 1/2 TROUBLE (XCP-636, 1-5) will alarm. Supplemental Actions in the ARP direct restoration of power per SOP-310.

B. Plausible becasue the 1st part is correct. Also plausible because one of several AOPs could be addressed; such as AOP-401.2, Protection Channel RCS Loop RTD Failure; AOP-401.4, Pressurizer Pressure Protection Channel Failure, and/or AOP-401.8, 9, or 10 Intermediate, Source or Power Range Channel Failure).Incorrect because there is no AOP that will correct the problem with the inverter and restoring power to the APN.

C. Plausible because the 2nd part is correct. Also plausible because, if the plant did NOT trip, one of several AOPs could be addressed such as AOP-401.2, Protection Channel RCS Loop RTD Failure; AOP-401.4, Pressurizer Pressure Protection Channel Failure, and/or AOP-401.8, 9, or 10 Intermediate, Source or Power Range Channel Failure). Incorrect because the plant will trip and EOP-1.0/1.1 would apply.

D. Plausible because, if the plant did NOT trip, one of several AOPs could be addressed such as AOP-401.2, Protection Channel RCS Loop RTD Failure; AOP-401.4, Pressurizer Pressure Protection Channel Failure, and/or AOP-401.8, 9, or 10 Intermediate, Source or Power Range Channel Failure). Incorrect because the plant will trip and EOP-1.0/1.1 would apply.

Notes

(Loss of Vital AC Inst. Bus) Knowledge of how abnormal operating procedures are used in conjunction with EOPs.

Tier: 1
Group: 1

Importance Rating: RO 3.8

Technical References:

- GS-2 (p44-45)
- IC-8 (p51)
- IC-9 (p36)

Proposed references to be provided to applicants during examination:

None

Learning Objective: GS-2-20

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7), (10)

Comments:

The KA is matched because the operator must have knowledge of how abnormal operating procedures are used in conjunction with EOPs during a Loss of 120 VAC Instrument Bus.

42. 059 K4.13 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 14% power
- A main turbine warmup is in progress.
- Main Feedwater (MFW) Pump "A" is in service.
- The normal feeder breaker for service bus XSW1A tripped open.

Which ONE (1) of the choices below completes the following statement?

The 'A' S/G FRV will be operated in ______ to prevent a ________.

A.✓ MANUAL;

High S/G level

B. AUTOMATIC;

High S/G level

C. MANUAL;

Low-Low S/G level

D. AUTOMATIC;

Low-Low S/G level

Feedback

A. CORRECT. IAW SOP-101, Section IV.A, Step 2.7, the FRV must be placed in MAN.

B. Incorrect since SOP-101 requires manual control. Plausible because AUTO is used when the loop is steaming properly with an RCP running.

C. Incorrect since S/G level will increase in the idle loop. Plausible since MAN is correct.

D. Incorrect since S/G level in the idle loop will increase, even after the FRV is placed in MAN-CLOSED. Also incorrect since SOP-101 requires manual control

Notes

Knowledge of Main Feedwater design feature(s) and or interlock(s) which provide for the following: Feedwater fill for S/G upon loss of RCPs.

Tier: 2
Group: 1

Importance Rating: RO 2.9

Technical Reference:

- SOP-101, Section IV.A, Step 2.7
- XCP-617, 1-1

Proposed references to be provided to applicants during examination:

None

Learning Objective: LOR-IDLE-LOOP-05; TS-12-20

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

K/A appears to have been written for a plant with a specific interlock. No such interlock at VCS. Attempted to meet K/A by requiring knowledge of MFW Pump response to a trip caused by loss of an RCP.

43. 061 AK3.02 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- The plant has tripped from 100% power.
- A Small Break LOCA inside Containment is in progress.
- RB pressure is 2.5 psig and steady.
- RM-G7, RB High Range Monitor, is in alarm and the alarm is determined to be valid.

Which ONE (1) of the following describes why the Annunciator Response Procedure for this alarm directs the operator refer to EOP-17.2, *Response to High Reactor Building Radiation Levels*?

This procedure will REQUIRE the operating crew to _________.

A. Ensure Containment Ventilation Isolation; AND

Verify that the RB Spray system is in service.

B.✓ Ensure Containment Ventilation Isolation; AND

Place both RBCU HEPA Filter trains in service.

C. Place both RB Charcoal Cleanup Units in service; AND

Verify that the RB Spray system is in service.

D. Place both RB Charcoal Cleanup Units in service; AND

Place both RBCU HEPA Filter trains in service.

Feedback

A. Plausible because the 1st part is correct. Also plausible because in EOP-2.0, the RB Spray System must be operated for a minimum of 2 hours condition to ensure radiation doses at the site boundary are within the assumptions of Accident Analysis (see PSEG-08, Appendix S) and because the RB Spray system may be operated in EOP-17.0. Incorrect since RB Spray is NOT operated in EOP-17.2.

B. According to the WOG FR-Z.3 Background Document (HFRZ3BD.doc, HP-Rev 2, 4/30/05), there are three major action items associated with this Functional Response Guideline; (1) Verify Containment Ventilation Isolation, (2) Place the Containment Atmosphere Filtration System in service, and Notify Plant Engineering Staff of Containment Radiation levels. Each of these Major Action Items have been retained in the VCS EOP-17.2 (Steps 1-3, Rev 4). Step 1 of this procedure directs the operator to verify Containment Ventilation Isolation Valves closed, and step 2 directs the operator to start both RBCU HEPA Filter trains.

C. Plausible because after evaluation by the TSC, the RB Charcoal Cleanup units *may* be placed in service; although they are NOT required. Also plausible because in EOP-2.0, the RB Spray System must be operated for a minimum of 2 hours condition to ensure radiation doses at the site boundary are within the assumptions of Accident Analysis (see PSEG-08, Appendix S) and because the RB Spray system may be operated in EOP-17.0. Incorrect since RB Spray is NOT operated in EOP-17.2. Also incorrect since PSEG-08, Appendix Q, requires a normal RB temperature and pressure prior to placing the RB Charcoal Cleanup Units in service (reason for given info of "RB pressure 2.5 psig and steady").

D. Plausible because after evaluation by the TSC, the RB Charcoal Cleanup units *may* be placed in service. Incorrect because they are NOT required. Also incorrect since PSEG-08, Appendix Q, requires a normal RB temperature and pressure prior to placing the RB Charcoal Cleanup Units in service (reason for given info of "RB pressure 2.5 psig and steady"). Also plausible because the 2nd part is correct.

Notes

Knowledge of the effect that a loss or malfunction of the ARM System Alarms will have on the following: Guidance contained in alarm response for ARM system.

Tier: 1
Group: 2

Importance Rating: RO 3.4

Technical References:

- ARP-019, Rev 2, Panel XCP-645, AP 4-5
- HFRZ3BD.doc, HP-Rev 2, 4/30/05
- EOP-17.2 (Steps 1-3, Rev 4)
- AB-17, p20, Rev 9
- PSEG-08, Appendix S

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-17.2-2193

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5), (10)

Comments:

The KA is matched because the operator must demonstrate knowledge of the reason for the guidance contained in the ARP for Area Monitor RM-G7 (i.e. Refer to EOP-17.2).

44. 061 K3.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- The reactor tripped when a loss of ALL off-site power (ESF & BOP) occurred.
- Emergency Feedwater has NOT been established to the Steam Generators.
- Condenser pressure is 5.5" Hg absolute.
- The crew has entered EOP-15.0, *Response to Loss of Secondary Heat Sink.*
- Steam Generator Wide Range levels are 50%, lowering slowly.

Which ONE (1) of the following describes the response of RCS temperature and pressure over the first 15-25 minutes?

A. RCS temperature is maintained by condenser steam dumps.

RCS pressure stabilizes below the PZR PORV setpoint.

B.✓ RCS temperature is maintained by SG power reliefs.

RCS pressure stabilizes below the PZR PORV setpoint.

C. RCS temperature rises steadily as SG level lowers.

RCS pressure rises to the PZR spray setpoint and cycles around this value.

D. RCS temperature rises steadily as SG level lowers.

RCS pressure rises to the PZR PORV setpoint and cycles around this value.

Feedback

A. Plausible since this would be the response if off-site power was available. Incorrect since offsite power is not available, Circ Water is lost; therefore, C-9 will be lost due to low vacuum. Also plausible because the 2nd part is correct.

B. CORRECT. With no off-site power the condenser is unavailable. RCS temperature will be maintained by the SG power reliefs. PZR pressure will track RCS temperature, and will stabilize below the PZR PORV setpoint. See Figures 1 (page 6) and 7 (page 39) from the ERG background doc FR-H.1.

C. Plausible because the 1st part would be the response as heat sink is being lost. Incorrect because, although pressure will eventually rise to the PZR spray setpoint, pressure will continue to rise to the PZR PORV's setpoint. See Figures 1 (page 6) and 7 (page 39) from the ERG background doc FR-H.1. Also see discussion of Period 4 on page 8.

D. Plausible because the 1st part would be the response as heat sink is being lost. Plausible because pressure will eventually rise to the PZR PORV's setpoint, and cycle around that value. See Figures 1 (page 6) and 7 (page 39) from the ERG background doc FR-H.1. Also see discussion of Period 4 on page 8.

Notes

Knowledge of the effect that a loss or malfunction of the Auxiliary/Emergency Feedwater will have on the following: RCS.

Tier: 2
Group: 1

Importance Rating: RO 4.4

Technical Reference:

- HFR1BG, Pages 3-9; and Figure 1

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-15.0-2098

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5)

Comments:

Meets K/A by requiring knowledge of effect of EFW/FW failure on major RCS parameters.

45. 061 K5.05 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- An AUTO SI actuated when a Pressurizer Safety Valve failed OPEN
- All Steam Generator (SG) Narrow Range levels are at 15%
- Tavg is 550 °F, lowering

Which one of the following is the required action with respect to Emergency Feedwater flow?

A. Maintain maximum available EFW flow until at least one SG narrow range level is greater than 30% [50%].

B. Reduce EFW flow as necessary to stabilize Tavg at the no load value.

C✓ Reduce total EFW flow to no less than 450 GPM to stop the cooldown.

D. Reduce EFW flow to each SG to no less than 50 GPM to stabilize Tavg at the no load value.

Feedback

A. Plausible because EFW flow adjustments are contingent on SG level and operator may elect this option if cooldown is not in progress.

Incorrect since cooldown is occurring, the operator should throttle to 450 GPM.

B. Plausible because it would be the correct action if any SG was > 26% [40%].

Incorrect since EOP-1.0, Step 9 Alternative Action, states that if at least 1 SG is NOT greater than 26%[40%], then the operator should throttle as necessary to stop the cooldown, but must maintain >450 gpm

C. CORRECT. Per EOP-1.0, Step 9 Alternative Action, if at least 1 SG is NOT greater than 26%[40%], then the operator should throttle as necessary to stop the cooldown, but must maintain >450 gpm.

D. Plausible because it is a minimum flow value for other conditions in EOP-3.1 (multiple faulted SG's).

Incorrect since EOP-1.0, Step 9 Alternative Action, states that if at least 1 SG is NOT greater than 26%[40%], then the operator should throttle as necessary to stop the cooldown, but must maintain >450 gpm

Notes

Knowledge of the operational implications of the following concepts as they apply to the Auxiliary/Emergency Feedwater: Feed Line Voiding and Water Hammer.

Tier: 2
Group: 1

Importance Rating: RO 3.6

Technical Reference:

- EOP-1.0, Step 9 (Continuous Action), Page 7 of 36

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-1.0-08

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

Not an exact K/A match because, due to a program error in the K/A random generator, the question was actually written to 061 K5.01, Relationship between AFW flow and RCS heat transfer. Based on a discussion with the NRC Chief Examiner, the question was left as-written to 061 K5.01. Question matches this K/A in that it tests knowledge of throttling EFW if an RCS cooldown is in progress.

46. 062 G2.4.46 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- The following annunciators actuate simultaneously:
  - EMERG AUX XFMR XTF-31 TRBL (XCP-633,1-4)
  - XFMR XTF31 LCKOUT 86T31 (XCP-639, 4-2)

Which ONE (1) of the following identifies the condition than can cause the simultaneous actuation of these alarms, and describes the expected status of Bus 1DB?

A. SUDDEN PRESSURE at 5.5 psi/sec;

Bus 1DB deenergized

B.✓ SUDDEN PRESSURE at 5.5 psi/sec;

Bus 1DB powered from EDG 'B'

C. WINDING OVERLOAD at 110°C;

Bus 1DB deenergized

D. WINDING OVERLOAD at 110°C;

Bus 1DB powered from EDG 'B'

Feedback

A. Plausible because SUDDEN PRESSURE causes 86T31 relay operation, which isolates the transformer from the bus by locking out the normal feeder breaker. Incorrect since, the 86T31 relay does NOT prevent the DG breaker from closing to restore power. Also plausible because a dead bus would be true for a 51BX lockout.

B. CORRECT. 86T31 locks out the normal and alternate (emergency) feed breakers and opens the OCB. Since the 86T31 does not lockout the DG breaker, the EDG will restore power to the bus.

C. Plausible because WINDING OVERLOAD is a valid input to the EMERG AUX XFMR XTF-31 TRBL annunciator. Incorrect since it does NOT actuate the 86T31 Relay.

D. Plausible because WINDING OVERLOAD is a valid input to the EMERG AUX XFMR XTF-31 TRBL annunciator. Incorrect since it does NOT actuate the 86T31 Relay. 2nd part is incorrect since the EDG 'B' will energize the bus. 2nd part is plausible because a dead bus would be true for a 51BX lockout.

Notes

(AC Electrical Distribution) Ability to verify that the alarms are consistent with the plant conditions.

Tier: 2
Group: 1

Importance Rating: RO 4.2

Technical References:

- ARP-001- XCP-633,1-4 (Page 6 of 58)
- ARP-001- XCP-639, 4-2 (23 of 39)

Proposed references to be provided to applicants during examination:

None

Learning Objective: GS-2-06

Question History:

NEW

10 CFR Part 55 Content: 41.10

Comments:

Meets K/A by demonstrating knowledge of expected ESF AC Bus status with two alarms actuated.

47. 062 G2.4.9 001/NEW//LOWER//RO/SUMMER/2/2009/NO

In accordance with the N+1 philosophy, which ONE (1) of the following describes the minimum AC power sources required by GOP-9, *Mid-Loop Operation*, for mid-loop operations?

A. ONE source of off-site power to the ESF buses and ONE Emergency Diesel Generator operable.

B. ONE source of off-site power to the ESF buses and BOTH Emergency Diesel Generators operable.

C✓ TWO independent sources of off-site power to the ESF buses and ONE Emergency Diesel Generator operable.

D. TWO independent sources of off-site power to the ESF buses and BOTH Emergency Diesel Generators operable.

Feedback

A. Plausible because T.S. 3.8.1.2 requires one circuit between the off-site transmission network and one EDG for Modes 5 and 6.

B. Plausible because this the reverse of the actual requirement. It contains two of one source (DGs) and one of the other sources (offsite) and this is a possible electrical configuration during an outage. Although the intent is to normally schedule bus outages around mid-loop operations, emerging issues may dictate this alignment.

C. CORRECT. IAW GOP-9, Step 3.6 (page 6 of 19).

D. Plausible because this is the guideline established in SSP-004, *Outage Safety Review Guidelines.* Also plausible because this is the LCO for T.S. 3.8.1.1, applicable in MODES 1-4.

Incorrect because it does not meet the requirements of GOP-9.

Notes

(AC electrical Distribution) Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.

Tier: 2
Group: 1

Importance Rating: RO 3.8

Technical Reference:

- GOP-9, Step 3.6 (Page 6 of 19)

Proposed references to be provided to applicants during examination:

Learning Objective: GOP-9-5102

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

This question addresses K/A by requiring knowledge of AC power source mitigating strategy/availability prior to entering a specific low power condition. The bases for the N+1 approach is to protect against a loss of RHR while at mid-loop.

48. 063 A4.01 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- The electric plant is in a normal, at-power lineup.
- Annunciator 7.2 KV BOP BUSSES LOSS OF DC (XCP-635, 6-1) has actuated.
- Electricians report that the supply breaker from DPN-1HX3 to XSW1A has tripped open.

Which ONE (1) of the following identifies the opening capability for the XSW1A feeder breaker ?

A.✓ Can only be opened manually at the breaker.

B. Can only be opened manually from the MCB.

C. Can be opened manually at the breaker or automatically by protective relay actuation.

D. Can be opened manually from the MCB or automatically by protective relay actuation.

Feedback

A. CORRECT. With no control power available, the breaker can only be operated locally.

B. Plausible because this is the normal method for operating the breaker if control power is available.

Incorrect since breaker operation from the MCB requires DC power.

C. Plausible because the first part is correct - with no control power available, the breaker can only be operated locally.

2nd part is incorrect because automatic tripping also requires DC power.

D. 1st part is plausible because this is the normal method for operating the breaker if control power is available.

Incorrect since breaker operation from the MCB requires DC power. 2nd part is incorrect because automatic tripping also requires DC power.

Notes

(DC Electrical Distribution) Ability to manually operate and/or monitor in the control room: Major breakers and control power fuses.

Tier: 2
Group: 1

Importance Rating: RO 2.8

Technical References:

- GS-1, Pages 17/18
- ARP-001-XCP-635, 6-1

Proposed references to be provided to applicants during examination:

None

Learning Objective: GS-1-12

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions TECH SPEC 64 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A by requiring knowledge of breaker indication and operating circuit with no DC control power available and the capability to operate the breaker in that status.

49. 064 A3.05 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

When restoring the vital buses to off-site power in accordance with SOP-306, *Emergency Diesel Generator,* the respective diesel generator speed and voltage droop circuits are placed in service when _______.

A. depressing the local TEST START pushbutton

B.✓ momentarily placing the MCB TEST Switch to START

C. depressing the local EMERG START RESET pushbutton

D. depressing the MCB EMERG START OVRRIDE pushbutton

Feedback

A. Plausible because this action would be true if the REMOTE/LOCAL/MAINT Switch on the local DG control panel were in LOCAL.

Incorrect since the TEST START pushbutton is not in the circuit with the mode switch normally in the REMOTE position.

B. CORRECT. The droop circuits are reinstated after the MCB TEST switch is momentarily placed in START (see IB-5, page 61 of 85 and drawing C-203-005).

C. Plausible because this action is part of the sequence of steps for locally restoring off-site power to the vital buses/shutting down the EDG and preparing it for AUTO start.

Incorrect because it is the operation of the local TEST START pushbutton that restores the droop circuits prior to synchronizing.

D. Plausible because this action is part of the sequence of MCB steps for restoring off-site power to the vital buses/shutting down the EDG by clearing the AUTO start signal.

Incorrect because it is the operation of the TEST Switch that restores the droop circuits prior to synchronizing.

Notes

Ability to manually operate and/or monitor automatic operations of the emergency diesel Generator including: Operation of the governor control of frequency and voltage control in parallel operation.

Tier: 2
Group: 1

Importance Rating: RO 2.8

Technical References:

- IB-5, Page 61
- SOP-306, Step 2.11 (Page 93 of 109)

Proposed references to be provided to applicants during examination:

Learning Objective: IB-5-07

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference question EMERGENCY DIESEL GENERATOR 147 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A by demonstrating understanding of when speed and voltage droop (real and reactive loading share) circuits become active following an emergency start.

50. 064 K4.10 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- Normal full power alignment

Which ONE (1) of the following Bus 1DA conditions will cause the Emergency Safeguards Loading Sequencer (ESFLS) to actuate in the BLACKOUT mode?

A.✓ A lightning strike causes a reduction in voltage to 5600V for 2 seconds.

B. A transformer windings problem causes a sustained voltage reduction to 6760V.

C. A degraded voltage sensor fails to ZERO while another degraded voltage sensor is being tested.

D. CCW Pump 'A' motor failure causes voltage on PHASE A of Bus 1DA to drop to 6500V for 5 seconds before the pump breaker trips.

Feedback

A. CORRECT. All three phases are <5760V for more than .25 seconds.

B. Plausible because it is a sustained problem of >3 seconds on all three phases. Also plausible because 6760 is close to 5760. Incorrect because it is above the degraded voltage setpoint (6580V).

C. Plausible because the voltage is below the undervoltage setpoint on one channel and the other may be tripped while testing is in progress. Incorrect because the logic is 3/3 phases below the setpoint (see DG DBD, page 3.9-13 & drawings B-208-037-ES66A/ES66B, & drawings B-208-024-DG22).

D. Plausible because it is below the degraded voltage setpoint for >5 seconds. Incorrect because it is only 1/3 sensors.

Notes

Knowledge of Emergency Diesel Generator design feature(s) and or interlock(s) which provide for the following: Automatic load sequencer: blackout.

Tier: 2
Group: 1

Importance Rating: RO 3.5

Technical Reference:

- GS-2, Page 67 of 95

Proposed references to be provided to applicants during examination:

Learning Objective: IB-5-19

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A by requiring applicant to know setpoint and logic for ESFLS Blackout loading.

51. 065 AK3.08 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- A pipe rupture in the Instrument Air System results in a sustained loss of system pressure.
- The operating crew implements the appropriate response procedures.
- Control of the EFW Flow Control Valves has been lost.

In accordance with AOP-220.1, *Loss of Instrument Air*, which ONE (1) of the following describes what is done to prevent exceeding MDEFP operating limitations?

A.✓ Expand the SG Narrow Range level control range AND alternate starting the two MD EFW Pumps.

B. Expand the SG Narrow Range level control range AND isolate blowdown and sampling from the Steam Generators.

C. Steam only one Steam Generator to control RCS temperature AND alternate starting the two MD EFW Pumps.

D. Steam only one Steam Generator to control RCS temperature AND isolate blowdown and sampling from the Steam Generators.

Feedback

A. CORRECT. According to AOP-220.1 (Rev 2), Step 9b, the operator will be required to control EFW Flow Control Valves manually to maintain Steam Generator Narrow Range levels between 55-65% in a post-reactor trip situation (Note that this step of the AOP can only be implemented if a reactor trip has occurred at step 4). The second NOTE before Step 9 states that if EFW Pumps must be stopped to control SG level, as is the case stated in the condition of the question, level should be allowed to decrease to 30% (i.e. expand the SG Narrow Range level control range), and the pumps should be alternated, to avoid exceeding the starting duty.

B. Plausible because EOP-1.0, Attachment 3, Step 4 directs isolation of blowdown and sampling, which will result in longer times between the need to refill the SGs. Also plausible because the 1st part is correct. Incorrect because there are NO action steps within AOP-220.1 to isolate blowdown and sampling from the Steam Generators.

C. Plausible because the SG PORVs must be manually controlled at Step 10 of the AOP. Manually opening only one PORV at a time will retain overall SG inventory for a longer period of time. Also plausible because the 2nd half is correct. Incorrect because Step 10 of the AOP directs that <u>all three</u> SG power reliefs be manually opened to control RCS temperature at 557°F. Also, the Caution prior to this step warns the operator about establishing a temperature differential between the RCS loops of greater than 25°F. CAUTION - Step 10 further warns against an unbalanced steamload, which could causea Steamline DELTA-P SI.

D. Plausible because the SG PORVs must be manually controlled at Step 10 of the AOP. Manually opening only one PORV at a time will retain overall SG inventory for a longer period of time. Also plausible because EOP-1.0, Attachment 3, Step 4 directs isolation of blowdown and sampling, which will result in longer times between the need to refill the SGs. Incorrect because Step 10 of the AOP directs that <u>all three</u> SG power reliefs be manually opened to control RCS temperature at 557°F. Also incorrect because there are NO action steps within AOP-220.1 to isolate blowdown and sampling from the Steam Generators.

Notes

Knowledge of the effect that a loss or malfunction of the Loss of Instrument Air will have on the following: Actions contained in EOP for loss of instrument air.

Tier: 1
Group: 1

Importance Rating: RO 3.7

Technical Reference:

- AOP-220.1, Rev 2

Proposed references to be provided to applicants during examination:

Learning Objective: AOP-220.1-5

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Open Reference question AOPS 129 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(10), (14)

Comments:

The KA is matched because the operator must demonstrate knowledge of the reasons for the actions contained in EOP for the loss of Instrument Air (AOP-220.1), even though the question is asked in reverse (Given why, what actions are necessary, rather than why is this action necessary).

52. 068 AA2.02 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- Following a Control Room Evacuation, the plant is being controlled in accordance with GOP-8, *Plant Shutdown from Hot Standby to Cold Shutdown with the Control Room Inaccessible Mode 3 to Mode 5.*
- The CRS has directed that the RCS be borated to raise boron concentration by 300 ppm.
- Present RCS boron concentration is 100 ppm.
- MVT-8104, Emergency BA Flow Control Valve, has been opened.
- Boric Acid Transfer Pump 'B' has been started.

Which ONE (1) of the following describes the CREP indication that will be used to monitor the amount of boron injected into the Reactor Coolant System AND the **MINIMUM** specific criteria which will be used to terminate the boration?

REFERENCES PROVIDED

A. FI-122B, CHARGING FLOW GPM;

30 gpm for 127 minutes

B. FI-122B, CHARGING FLOW GPM;

55 gpm for 52 minutes

C. FI-110A; EMERGENCY BA FLOW GPM;

30 gpm for 127 minutes.

D✓ FI-110A; EMERGENCY BA FLOW GPM;

55 gpm for 52 minutes.

Feedback

A. Plausible because FI-122B is also on the CREP and would be used if emergency borating by gravity drain. Incorrect since FI-110A would be used for emergency borating through MVG-8104. This is plausible because other procedures such as AOP-106.1 and EOP-1.1 require the operator to verify flow on FI-110A to be > 30 gpm to verify that Emergency Boration is occurring. The 127 minutes is based on a common error in reading Figure III-2 of the VCSNS Curve Book. The common error is that the column is incorrectly determined by adding the amount of change to the initial concentration (in this case, 300 + 100 = 400) instead of simply subtracting the final - initial. Based on this error, the amount of acid to be added = 2964 X CF of 1.28 for the temperature decrease (down to 200°F) = 3793.92 gallons. At 30 gpm, this would take approximately 126.5 minutes (Time = 3793.92 gallons/30 gpm=126.46 minutes).

Incorrect because this would result in MORE than the *minimum* boration. Also incorrect because FI-122 is not the Flow indicator utilized in GOP-8.0 Attachment XX

B. Plausible because FI-122B is also on the CREP and would be used if emergency borating by gravity drain. Also plausible because the 2nd part is correct. According to IC-10 (p11, Rev 6), the Emergency BA Flow (FI-110A) is provided on the B CREP. According to GOP-8, Attachment XX, the operator is required to verify flow on FI-110A, and then close MVT-8104 after the required amount of Boron has been injected. According to Figure III-2, RCS Boration, Gallons (VB) of Boric Acid Required (Rev 11/11/94) in the V.C. Summer Unit Number One Station Curve Book an increase of 300 ppm from the present RCS Boron Concentration of 100 ppm (100 ppm on the X Axis {Vertical} and 300 ppm on the Y Axis {Horizontal}) will require an addition of 2207 gallons. Applying the CF of 1.28 for the temperature decrease results in 2824.96 gallons of Boric Acid required (2207 X 1.28 = 2824.96). The addition of 2824.96 gallons of Boric Acid, which is being added at 55 gallons per minute, will require approximately 52 minutes (Time = 2824.96 gallons/55 gpm = 51.36 minutes).

Incorrect because FI-122 is not the flow indicator utilized in GOP-8.0, Attachment XX.

C. Plausible because the 1st part is correct. Also plausible because other procedures such as AOP-106.1 and EOP-1.1 require the operator to verify flow on FI-110A to be > 30 gpm to verify that Emergency Boration is occurring. The 127 minutes is based on a common error in reading Figure III-2 of the VCSNS Curve Book. The common error is that the column is incorrectly determined by adding the amount of change to the initial concentration (in this case, 300 + 100 = 400) instead of simplay subtracting the final - initial. based on this error and applying the CF of 1.28 for the temperature decrease, the amount of acid to be added = 3793.92 gallons. (2964 X 1.28 = 3793.92). At 30 gpm, this would take approximately 127 minutes (Time = 3793.92 gallons/30 gpm =126.46 minutes).

Incorrect because this would result in MORE than the *minimum* boration.

D. CORRECT. According to IC-10 (p11, Rev 6), the Emergency BA Flow (FI-110A) is provided on the 'B' CREP. According to GOP-8, Attachment XX, the operator is required to verify flow on FI-110A, and then close MVT-8104 after the required amount of Boron has been injected. According to Figure III-2, RCS Boration, Gallons (VB) of Boric Acid Required (Rev 11/11/94) in the V.C. Summer Unit Number One Station Curve Book an increase of 300 ppm from the present RCS Boron Concentration of 100 ppm (100 ppm on the X Axis {Vertical} and 300 ppm on the Y Axis {Horizontal}) will require an addition of 2207 gallons. Applying the CF of 1.28 for the temperature decrease (down to 200°F) results in 2824.96 gallons of Boric Acid required (2207 X 1.28 = 2824.96). The addition of 2824.96 gallons of Boric Acid, which is being added at 55 gallons per minute, will require approximately 52 minutes (Time = 2824.96 gallons /55 gpm = 51.36 minutes).

Notes

Ability to (a) predict the impacts of the following on the Control Room Evacuation and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Local boric acid flow.

Tier: 1
Group: 2

Importance Rating: RO 3.7

Technical References:

- IC-10, p11, Rev 6
- GOP-8, Rev 6, Attachment XX
- V.C. Summer Station Curve Book, Figure III-2, RCS Boration, Gallons (V_B) of Boric Acid Required (Rev 11/11/94)
- V.C. Summer Station Curve Book, Figure III-6, Boron Change Correction Factors, (Rev 11/11/94)

Proposed references to be provided to applicants during examination:

- V.C. Summer Unit Number One Station Curve Book:
  - Figure III-2, RCS Boration, Gallons (V_B) of Boric Acid Required (All 3 Pages)
  - Figure II-6, Boron Change Correction Factors (1 Page)

Learning Objective: GOP-8-5

Question History:

NEW

10 CFR Part 55 Content: 41(5), (10)

Comments:

The KA is matched because the operator must know the indications available at the CREP (i.e. determine) and demonstrate the ability to interpret the local BA flow indication with respect to completing a required boration for Shutdown Margin.

53. 072 K1.05 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- A double-ended shear of a tube occurs in Steam Generator 'A'.

Which ONE (1) of the following radiation monitors will provide the FIRST indication of this event AND how will this monitor trend over the course of the event?

A. RM-G19A, Main Steam Line Monitor;

Increase.

B.✓ RM-G19A, Main Steam Line Monitor;

Decrease.

C. RM-A9, Condenser Exhaust Monitor;

Increase.

D. RM-A9, Condenser Exhaust Monitor;

Decrease.

Feedback

A. Plausible because the 1st part is correct - according to GS-9 (p43, Rev 10), the RM-G19A will show the SGTR first, while RM-A9 is the most sensitive instrument, and will be the first indicator of a Steam Generator Tube *Leak*. Incorrect because, according to GS-9 (p45), the operator should expect the readings on the Steam Line Monitors to drop immediately after trip since the production of the short-lived N-16 gamma has ceased.

B. CORRECT. According to GS-9 (p43, Rev 10), the RM-G19A will show the SGTR first, while RM-A9 is the most sensitive instrument, and will be the first indicator of a Steam Generator Tube *Leak*. Also according to GS-9 (p45), the operator should expect the readings on the Steam Line Monitors to drop immediately after trip since the production of the short-lived N16 gamma has ceased.

C. Plausible because RM-A9 will actuate on a SGTR. Incorrect because, according to GS-9 (p43, Rev 10), RM-G19A will show the SGTR first, while RM-A9 is the most sensitive instrument, and will be the first indicator of a Steam Generator Tube *Leak*.

D. Plausible because RM-A9 will actuate on a SGTR. Incorrect because, according to GS-9 (p43, Rev 10), RM-G19A will show the SGTR first, while RM-A9 is the most sensitive instrument, and will be the first indicator of a Steam Generator Tube *Leak*. Also plausible because the 2nd half is correct. Also according to GS-9 (p45), the operator should expect the readings on the Steam Line Monitors to drop immediately after trip since the production of the short-lived N-16 gamma has ceased.

Notes

Knowledge of the physical connections and/or cause-effect relationships between Area Radiation Monitoring and the following: MRSS.

Tier: 2
Group: 2

Importance Rating: RO 2.8

Technical Reference:

- GS-9, p43-44, Rev 10

Proposed references to be provided to applicants during examination:

None

Learning Objective: GS-9-3.1, 3.3, 4.3, 5, 11, 17.1, 17.3, 22

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions AOPS 198, 349, to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(2), (9)

Comments:

The KA is matched because the operator must have knowledge of the physical connections between the Main Steam Line Monitors and the Main Steam System, as compared to the Condenser Exhaust Monitor and the Main Steam System; and have knowledge of the sensitivity/operation of each instrument.

54. 073 K3.01 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- A liquid waste discharge is in progress.
- Annunciator XCP-646 (2-6), MON TK DISCH RM-L5 TRBL, has actuated.

Which ONE (1) of the following PROBABLE CAUSES from XCP-646 (2-6) will automatically terminate the discharge?

A. Low flow.

B.✓ Loss of power to the monitor.

C. The RM-L5 INTERLOCK Switch is placed in ON.

D. Radiation level increases to the WARNING setpoint.

Feedback

A. Plausible because it is a valid cause for the alarm. Incorrect because the only cause of this alarm that will terminate the release by closing RCV-00018 is loss of power.

B. CORRECT. Loss of power is interlocked to closing RCV-00018.

C. Plausible because it is a valid cause for the alarm and it is a switch that interfaces with RCV-00018. Incorrect because the only cause of this alarm that will terminate the release by closing RC-00018 is loss of power.

D. Plausible because it is a valid cause for the alarm but the only cause of this alarm that will terminate the release by closing RCV-00018 is loss of power.

Notes

Knowledge of the effect that a loss or malfunction of the Process Radiation Monitoring will have on the following: Radioactive effluent releases.

Tier: 2
Group: 1

Importance Rating: RO 3.6

Technical Reference:

- ARP-019-XCP-646-2-6 (Page 13 of 29)

Proposed references to be provided to applicants during examination:

None

Learning Objective: GS-9-21

Question History:

NEW

10 CFR Part 55 Content: 41(b)(11)

Comments:

Matches the K/A in that it tests knowledge of a malfunction (loss of power) of the RMS (RM-L5) and its effect on a release (closes RCV-00018).

55. 074 EK3.03 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

With the plant operating at 35% power, which ONE (1) of the following conditions would require the plant to be placed in Hot Standby within ONE (1) hour because DNBR cannot be guaranteed to be maintained within required limits?

A.✓ RCP 'C' trips.

B. A plant transient causes Tavg to rise to 590°F.

C. A plant transient causes ΔI to exceed 5% from the target value.

D. A plant transient causes Pressurizer pressure to drop to 2200 psig.

A. CORRECT. According to Technical Specification LCO 3.4.1, Reactor Coolant Loops and Coolant Circulation, all three Reactor Coolant Loops shall be in operation (i.e. circulating Reactor Coolant) when in Modes 1 and 2. If not, the plant must be placed in Hot Standby within 1 hour. According to the Technical Specification Basis for LCO 3.4.1, this action is necessary because in Modes 1 and 2 the plant is designed to operate with three loops in operation to ensure that DNBR remains at or above its design limits for all normal and anticipated transients.

B. Plausible because this is associated with a DNBR-related Tech Spec. According to Technical Specification LCO 3.2.5, DNB Parameters, Pressurizer pressure shall be > 2206 psig when in Mode 1. If not, the operator must restore the parameter to within specification within 2 hours or reduce power to < 5% (Mode 2) within the next 4 hours. According to the Technical Specification Basis for LCO 3.2.5, this action is necessary because the parameters are no longer within the range assumed in the Safety Analysis.

Incorrect because the plant is NOT required to be placed in Hot Standby for this situation.

C. Plausible because ΔI outside of limits in the COLR would penalize the OTΔT stepoint, which is based on DNBR.

Incorrect because the plant is NOT required to be placed in Hot Standby due to DNBR considerations or ΔI outside of limits. Also incorrect since ΔI is not applicable when <50%. If > 50% <u>and</u> ΔI was outside of limits, then it must be restored to within limits within 15 minutes, which is within the 1 hour stipulated in the stem..

D. Plausible because this is associated with a DNBR-related Tech Spec. According to Technical Specification LCO 3.2.5, DNB Parameters, RCS Tavg shall be < 589.2°F when in Mode 1. If not, the operator must restore the parameter to within specification within 2 hours or reduce power to < 5% (Mode 2) within the next 4 hours. According to the Technical Specification Basis for LCO 3.2.5, this action is necessary because the parameters are no longer within the range assumed in the Safety Analysis.

Incorrect because the plant is NOT required to be placed in Hot Standby for this situation.

Notes

Knowledge of the effect that a loss or malfunction of the Inad. Core Cooling will have on the following: Placing the plant in hot standby status.

Tier: 1
Group: 2

Importance Rating: RO 3.4

Technical References:

- LCO 3.1.1.4
- LCO 3.2.5
- LCO 3.4.1
- Technical Specification Basis

Proposed references to be provided to applicants during examination:

None

Learning Objective: TS-12-20, SB-4-09

Question History:

NEW

10 CFR Part 55 Content: 41(b)(5), (10)

Comments:

The KA is matched because the operator must demonstrate knowledge of the reason for placing the plant in Hot Standby Status during a situation that creates an Inadequate Core Cooling (i.e. loss of DNBR) condition.

56. 075 K4.01 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 50% power
- Main Condenser Waterbox 'A' must be isolated.

Which ONE (1) of the following identifies the action necessary, if any, prior to isolation of the waterbox AND limitations that must be observed once the waterbox is isolated?

A. No action is necessary, the waterbox can be isolated at this power level;

Ensure Main Condenser backpressure does not exceed 7.5" Hg absolute.

B. No action is necessary, the waterbox can be isolated at this power level;

Ensure Circ Water Outlet temperature does not exceed 113°F.

C. Lower power to 40% prior to waterbox isolation;

Ensure Main Condenser backpressure does not exceed 7.5" Hg absolute.

D.✓ Lower power to 40% prior to waterbox isolation;

Ensure Circ Water Outlet temperature does not exceed 113°F.

Feedback

A. Plausible since other major secondary components, such as HP FW Heaters, can be isolated at this power level. Also plausible since 7.5" Hg abs is the Turbine Trip setpoint and since Main Condenser vacuum limits *are* established in SOP-207 prior to increasing load back above 40%. Incorrect since load must be initially reduced to less than 40%. Also incorrect since the Main Condenser vacuum limit is 4" Hg abs.

B. Plausible because the 2nd part is correct. Also plausible since other major secondary components, such as HP FW Heaters, can be isolated at this power level. Incorrect since load must be initially reduced to less than 40%.

C. Plausible because the 1st part is correct. Also plausible since 7.5" Hg abs is the Turbine Trip setpoint and since Main Condenser vacuum limits *are* established in SOP-207 prior to increasing load back above 40%. Incorrect since the Main Condenser vacuum limit is 4" Hg abs.

D. CORRECT. According to SOP-207, Section IV.A (&TB-8 (p23, Rev 10)), isolation of either the A or the B water box is permissible, provided power is reduced to 40%. Once the waterbox has been isolated, load may be increased to > 40% per GOP-4A, provided that the following conditions can be maintained: (1) Main Condenser Vacuum does not exceed 4" Hg absolute, (2) Auxiliary Condenser Vacuum does not exceed 9" Hg absolute, or (3) Circ Water Outlet temperature does not exceed 113°F.

Notes

Knowledge of Circulating Water design feature(s) and or interlock(s) which provide for the following: Heat sink.

Tier: 2
Group: 2

Importance Rating: RO 2.5

Technical Reference:

- TB-8, p23 & 30, Rev 10
- SOP-207, Section IV.A

Proposed references to be provided to applicants during examination:

None

Learning Objective: TB-8-3.2, 4.1, 7.12, 7.13, 20.1

Question History:

NEW

10 CFR Part 55 Content: 41(b)(4), (10)

Comments:

The KA is matched because the operator must have knowledge of a circulating water system design feature (double Main Condenser waterbox with individual isolation capability) which provides for the steam plant heat sink.

57. 076 K1.16 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- Service Water (SW) Pump 'A' was isolated due to a leak and placed in P-T-L
- The breaker is still racked up.
- SW Pump 'C' has been racked up for Bus 1EA but has not yet been started.

Which ONE (1) of the choices below completes the following statement?

If an automatic Safety Injection actuates at this time, SW Pump 'B' ______.

A. trips then restarts and SW Pump 'C' starts

B. trips then restarts and is the only running SW Pump

C. continues running and SW Pump 'C' starts

D✓ continues running and is the only running SW Pump

Feedback

A. Plausible because this would be correct if a coincidental loss of off-site power occurred and SW Pump "C" was in NORMAL-AFTER-START (see Fig. IB1.6). Incorrect since conditions do not stipulate a loss of power and both pumps are racked up and NOT running. Also incorrect because a running pump will not trip on an SI, as it would on a loss of power.

B. Plausible because this would be correct if a coincidental loss of off-site power occurred. Incorrect because a running pump will not trip on an SI, as it would on a loss of power.

C. Plausible because this would be correct if SW Pump "A" was in racked down (see Fig. IB1.6). Incorrect - with neither "A" Loop pump in NORMAL-AFTER- START and racked up, NO "A" Loop pump will start.

D. CORRECT. Running SW Pumps continue running if off-site power is maintained on an SI actuation. With neither "A" Loop pump in NORMAL-AFTER- START and racked up, NO "A" Loop pump will start.

Notes

Knowledge of the physical connections and/or cause-effect relationships between Service Water and the following: ESF.

Tier: 2
Group: 1

Importance Rating: RO 3.6

Technical Reference:

- IB-1, Pages 16, 31, 32, & 39/46, Figure IB1.5, Figure IB1.6
- GS-2, Page 52/98
- SOP-117, Enclosure A

Proposed references to be provided to applicants during examination:

None

Learning Objective: IB-1-13

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference question SERVICE WATER SYSTEM 20 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A by considering the impact of an SI (ESFLS actuation) on running SW Pumps in an interim alignment.

58. 077 AK2.02 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- Electrical grid disturbances on 230 KV Bus #1 have resulted in the operator making manual adjustments with the GEN FIELD VOLT ADJ (AUTO) Control Switch.
- The EX2000 Voltage Regulator Core 1 fails electrically.

Which ONE (1) of the following describes how the operator <u>adjustments</u> for the electrical grid disturbances affect the Main Generator load AND how the Main Generator Voltage Regulator will respond to this failure?

A.✓ Main Generator <u>reactive</u> load will vary; AND

A bumpless transfer to Core 2 will occur.

B. Main Generator <u>reactive</u> load will vary; AND

The Main Generator Breaker and Generator Field Breaker will OPEN.

C. Main Generator <u>real</u> load will vary; AND

A bumpless transfer to Core 2 will occur.

D. Main Generator <u>real</u> load will vary; AND

The Main Generator Breaker and Generator Field Breaker will OPEN.

A. Step 5 of AOP-301.1, Response to Electrical Grid Issues, (Rev. 0), directs the operator to ensure that the Main Generator loading is within the limits of the capability curve, and if NOT, make adjustments to the main Generator Voltage to ensure that the Main Generator MVARs remain within limits. According to TB-3 (p49-50, Rev 6), after synchronizing the Main generator to the grid, with the Voltage Regulator in AUTO, the GEN FIELD VOLTS ADJ is used to change a reference voltage signal, allowing the automatic regulator to adjust Exciter output and control reactive load on the Main Generator. According to TB-3 (p19-20), the Main Generator EX2000 Voltage Regulator employs three regulators, or cores; Core 1, Core 2 and Core 3. Where all three Cores are identical, Cores 1 and 2 are generating control signals, while Core 3 generates a supervisory & protection signal. When operating, either Core 1 or Core 2 is controlling the excitation of the Main Generator. While one Core is providing the control signal to the Exciter, the backup Core is generating the same signal but providing it to a dummy load resistor. In essence, this creates a "hot" backup that can be signaled to take control of the process immediately by a supervisory circuit. Core 3 is the supervisory circuit. According to TB-3 (p20), when Core 1 or Core 2 fails, Core 3 senses this and takes appropriate action. If the failed Core is the controlling Core, Core 3 generates a "bumpless transfer" to the standby Core. If the failed Core is the standby Core, Core 3 senses this and generates an alarm.

B. Plausible because the 1st part is correct. Also plausible because, according to TB-3 (p23), if a bumpless transfer failed to occur, Core 3 will function to trip both the Main Generator and the Generator Field Breaker. Incorrect because a protection action is NOT needed in the conditions established in the stem. The bumpless transfer action will occur before the protective action. The protective action will occur if both Core 1 and Core 2 have failed.

C. Plausible because the 2nd half is correct. Incorrect because, according to TB-3 (p49-50, Rev 6), after synchronizing the Main generator to the grid, with the Voltage Regulator in AUTO, the GEN FIELD VOLTS ADJ is used to change a reference voltage signal, allowing the automatic regulator to adjust Exciter output and control reactive load on the Main Generator.

D. Plausible because, according to TB-3 (p23), if a bumpless transfer failed to occur, Core 3 will function to trip both the Main Generator and the Generator Field Breaker. Incorrect because a protection action is NOT needed in the conditions established in the stem. The bumpless transfer action will occur before the protective action. The protective action will occur if both Core 1 and Core 2 have failed.

Notes

(Generator Voltage and Electric Grid Disturbances) Knowledge of electrical power supplies to the following: Breakers, relays.

Tier: 1
Group: 1

Importance Rating: RO 3.1

Technical References:

- TB-3, p19-20, 23, 49-50 Rev 6
- AOP-301.1, Rev 0

Proposed references to be provided to applicants during examination:

None

Learning Objective: TB-3-12

Question History:

NEW

10 CFR Part 55 Content: 41(b)(4), (5), (10)

Comments:

The KA is matched because the operator must demonstrate knowledge of the theory of AC Electrical Generator operation in parallel with other AC Sources, and the EX2000 Voltage Regulator transfer scheme (i.e. relays) and protective actions (i.e. breakers) as it pertains to the interrelations between Generator Voltage and Electric Grid Disturbances.

59. 078 K2.01 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- XSW-1DA2 is OOS while maintenance is working on the feeder breaker from the transformer.
- A loss of ALL (ESF & BOP) offsite power occurred, resulting in a loss of service buses and ESF buses.
- The Reactor tripped and SI actuated when steam dumps malfunctioned.
- Both Emergency Diesel Generators started and restored power to their respective ESF buses.
- ALL service buses remain deenergized.

When establishing Instrument Air to the RB, which ONE (1) of the following identifies the motor-driven air compressors with an available power supply?

A. XAC-3A ONLY

B. XAC-3B ONLY

C.✓ XAC-3A, Supplemental Air Compressor

D. XAC-3B, Supplemental Air Compressor

Feedback

A. Plausible if D/G 'B' did not start and restore power. 3A is powered from 1DA1 and the Supplemental is powered from 1DB1. Since both power supplies are available, 3A would NOT be the only IAC available.

B. Incorrect since 3B is powered from non-vital Bus 1A1 and off-site power is not available. Plausible if D/G 'B' did not start and restore power, non-vital power was available, and 1DA1 (vs. 1DA2) were OOS.

C. CORRECT. 3A is powered from 1DA1 and the Supplemental is powered from 1DB1, both of which are available.

D. Plausible if non-vital power was available and 1DA1 (vs. 1DA2) were OOS. Also plausible because the 2nd part is correct. Incorrect because non-vital power is lost and the 3B IAC is powered from 1A1.

Notes

Knowledge of electrical power supplies to the following: Instrument air compressor

Tier: 2
Group: 1

Importance Rating: RO 2.7

Technical References:

- GS-2, Table GS2.4 (Page 83/95)
- TB-12, Page 9/39
- SOP-220, Attachment II

Proposed references to be provided to applicants during examination:

None

Learning Objective: TB-12-05

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions INSTRUMENT AIR SYS 21, 37, 38, 39, 48, & 49 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(7)

Comments:

Meets K/A by requiring knowledge of which motor-driven compressors have a power supply available during a loss of off-site power.

60. 086 A3.01 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- A fire occurs in the transformer to Bus XSW-1C2, causing the bus to de-energize.
- The Fire Brigade responds 3 minutes after the event - routing, pressurizing and using fire hoses to fight the fire.

Which ONE (1) of the following describes the response of the fire pumps to this event?

A. The Electric Fire Pump started within one minute of the fire.

B✓ The Diesel Fire Pump started within one minute of the fire.

C. The Electric Fire Pump started when the fire hoses were used.

D. The Diesel Fire Pump started when the fire hoses were used.

Feedback

A. Plausible because the electric fire pump would auto start on lowering fire header pressure as fire hoses were pressurized and used to fight the fire. Incorrect because the electric fire pump is powered from XSW-1C2. Therefore, the Electric Fire Pump will NOT start because the bus is de-energized. Also incorrect because fire hoses are not pressurized until 3 minutes into the event as stated in the conditions.

B. CORRECT: According to GS-11 (p14), the Diesel Fire Pump receives electrical power for the Diesel Controller from APN-1C2; a power panel powered from XSW-1C2 (Table GS1.6). When AC power is lost to the diesel controller, the electronic controller initiates an 18 second time delay, after which the alarm circuit and the engine is automatically started (p16). Therefore the Diesel Fire Pump will start within one minute of the fire event.

C. Plausible because the electric fire pump would auto start on lowering fire header pressure as fire hoses were pressurized and used to fight the fire. Incorrect because the electric fire pump is powered from XSW-1C2. Therefore, the Electric Fire Pump will NOT start because the bus is de-energized. Also incorrect because fire hoses are not pressurized until 3 minutes into the event as stated in the conditions.

D. Plausible because the diesel fire pump would auto start on lowering fire header pressure as fire hoses when pressurized and used to fight 3 minutes into the event. Incorrect because the diesel fire pump controller receives electrical power for the diesel controller from APN-1C2; a power panel powered from XSW-1C2 (Table GS1.6). When AC power is lost to the diesel controller, the electronic controller initiates an 18 second time delay, after which the alarm circuit and the engine is automatically started (p16). Therefore the Diesel Fire Pump will start within one minute of the fire event.

Notes

Ability to monitor automatic operations of the Fire Protection including: Starting mechanisms of the fire water pumps.

Tier: 2
Group: 2

Importance Rating: RO 2.9

Technical References:

- GS-11, p13-18, Rev 11
- GS-1, p25, 27, 73, and 78, Rev 15

Proposed references to be provided to applicants during examination:

Learning Objective: GS-11-10.4, 12.1, 12.3, 15.2, 15.3, 18.3

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

The KA is met because the operator must know the automatic starting mechanisms of the fire water pumps under normal and abnormal conditions.

61. 103 A3.01 001/NEW//LOWER//RO/SUMMER/2/2009/NO

A small break LOCA has caused an SI actuation

Which ONE (1) of the following identifies the expected status of the specified indicating lights when performing EOP-1.0, Attachment 4 - *Containment Isolation Valve MCB Status Light Locations*?

	XCP-6104 Status Light "CRDM CLG WTR ISOL 7502 CLSD"	**XCP-6106 Status Light** "ACCUM N2 SPLY ISOL 8880 OPEN"
A.	DIM	DIM
B.	DIM	BRIGHT
C.	BRIGHT	BRIGHT
D.✓	BRIGHT	DIM

Feedback

A. Plausible as one of four possible combinations with the second part correct.

B. Plausible as one of four possible combinations and the exact opposite of correct.

C. Plausible as one of four possible combinations with the first part correct.

D. CORRECT. CRDM Cooling Water Isolations are normally open and close on Phase "A", going BRIGHT. Accumulator N2 Supply is normally in CLOSE/AUTO and will remain closed; staying DIM.

Notes

Ability to monitor automatic operations of the Containment including: Containment isolation.

Tier: 2
Group: 1

Importance Rating: RO 3.9

Technical Reference:

- EOP-1.0, Attachment 4 (Pages 25 and 26 of 36)

Proposed references to be provided to applicants during examination:

Learning Objective: EOP-1.0-08

Question History:

NEW

10 CFR Part 55 Content: 41(b)(9)

Comments:

Meets K/A by predicting the expected status of Containment Phase "A" Isolation valves following an automatic actuation.

62. E01 EK1.2 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Which ONE (1) of the following describes a situation upon which the crew should enter EOP-1.5, *Rediagnosis*?

A. With a Large Break LOCA in progress, the crew has entered EOP-16.0, *Response to Imminent Pressurized Thermal Shock*, and the CRS is sure that this is inappropriate.

B. The crew has entered GOP-6, *Plant Shutdown from Hot Standby to Cold Shutdown (Mode 3 to Mode 5)* from EOP-1.1, *Reactor Trip Response*, and the CRS wants to verify that this is the correct procedure.

C✓ The crew is operating in EOP-4.0, *Steam Generator Tube Rupture*, and the CRS is NOT sure that this procedure is appropriate.

D. Due to a LOCA without an SI in Mode 4, the crew has entered AOP-112.1, *Shutdown LOCA*, and it doesn't appear to be helping.

Feedback

A. Plausible because EOP-16.0 would not have been entered in the first place if EOP-1.0 had not already been imlemented/completed (this is an Entry Condition to EOP-1.5). Incorrectbecause the given condition in Choice A is a likely situation that the EOP is designed to deal with effectively, so EOP-1.5 would be unnecessary. EOP-16.0 is a RED Path Functional Response Procedure. According to OAP-103.4 (Step 6.17.i, Rev 0), once an FRG is entered due to a RED path, that procedure is executed to its completion unless a CSF of higher priority is challenged or the crew is directed out of the procedure. The WOG ES-0.0 Background Document confirms this by stating that Rediagnosis only applies to Optimal Recovery Procedures and NOT to Functional Response Procedures (HES00BD.doc, HP-Rev 2, 4/30/05, p1). In the Large Break LOCA event, EOP-16.0 should NOT be used in its entirety to stabilize the plant, and step 1 of this procedure will diagnose the LBLOCA Event and return the operator to the Procedure and Step in effect. The use of EOP-1.5 in this situation would be inappropriate.

B. Plausible because EOP-1.1 would not have been entered in the first place if EOP-1.0 had not already been imlemented/completed (this is an Entry Condition to EOP-1.5). Incorrect because, if the crew has transitioned to the GOP from EOP-1.1, SI is NOT in service, nor is it required, and the Entry Conditions for EOP-1.5 are NOT met.

C. CORRECT. According to the EOP-1.5 (Rev 2) Entry Conditions, the procedure can be entered based on operator judgment, but ONLY after completing EOP-1.0. According to Note 1a of EOP-1.5, the procedure should be used ONLY if SI is in service or required. According to the purpose statement of EOP-1.5, the procedure is used to determine or verify which procedure is most appropriate for restoring stable plant conditions. If the crew is operating in EOP-4.0, then EOP-1.0 has been completed and SI is in service. According to the Purpose Statement, the CRS can confirm that EOP-4.0 is the appropriate procedure by using EOP-1.5.

D. Plausible because OAP-103.4, Enclosure C states that EOP-1.5 is applicable in Modes 1-4. Incorrect because the Entry Conditions are NOT satisfied to use EOP-1.5 (EOP-1.0 has NOT been completed. The crew must remain in AOP-112.1.

The KA is matched because the operator must demonstrate knowledge of the situations in which EOP-1.5 may be implemented when uncertainty exists within Normal (GOP-6), Abnormal (AOP-112.1) and Emergency Operating Procedures (EOP-4.0 and 16.0).

Notes

Knowledge of the physical connections and/or cause-effect relationships between Rediagnosis and the following: Normal, abnormal and emergency operating procedures associated with (Reactor Trip or Safety Injection/Rediagnosis).

Tier: 1
Group: 2

Importance Rating: RO 3.4

Technical References:

- AOP-112.1, Rev 3
- EOP-1.0, Rev 22
- EOP-1.5, Rev 2
- OAP-103.4, Rev 0
- HES00BD.doc, HP-Rev 2, 4/30/05, p1, 14

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-1.5-1817

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

157a

63. E03 G2.4.21 001/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- After a LOCA, the crew has transitioned to EOP-2.1, *Post-LOCA Cooldown and Depressurization*, and is presently assessing the status of the Critical Safety Functions (CSFs).
- Maximum total EFW Flow is 400 gpm.
- The IPCS is unavailable.

Which ONE (1) of the following sets of conditions will result in an RED path to the Heat Sink CSF?

	A SG NR Level	B SG NR Level	C SG NR Level	Present RB Pressure	Peak RB Rad Levels
A.	12%	22%	32%	3 psig	10^5 mr/hr
B.	31%	32%	12%	3 psig	1200 mr/hr
C✓	28%	38%	48%	4 psig	10^5 mr/hr
D.	28%	28%	51%	4 psig	1200 mr/hr

Feedback

A. Plausible because it is a set or parameters that could exist after a LOCA and because 2 S/Gs are below the criteria for EXTREME challenge with NO adverse containment conditions. Given value of RB radiation levels is the correct *number* for integrated dose, but the wrong *units*. Incorrect because the CSF does NOT have an Extreme Challenge because there is at least one SG NR Level > 30% with a normal RB atmosphere.

B. Plausible because it is a set or parameters that could exist after a LOCA and because 1 S/G is below the criteria for EXTREME challenge with NO adverse containment conditions. Given value of RB radiation levels is above the correct *number* for dose rate, but the wrong *units*. Incorrect because the CSF does NOT have an Extreme Challenge because there is at least one SG NR Level > 30% with a normal RB atmosphere.

C. CORRECT. According to Attachment 3 of EOP-12.0 (Rev 12), Heat Sink, an EXTREME challenge (Red Path) on Heat Sink will exist if Total EFW is < 450 gpm (which is the case in all sets of conditions) and there is NOT at least one SG NR Level > 30% with a normal RB atmosphere, or there is NOT at least one SG NR Level > 50% with an adverse RB atmosphere. According to OAP-103.4 (Step 6.8, Rev 0), an adverse RB environment is an environment where RB Pressure is presently > 3.6 psig OR an environment in which RB Radiation levels have exceeded an integrated dose of 10^5 R (OR 1000 R/hr if the IPCS is unvailable) at anytime during the event. Given value of RB radiation levels is the correct *number* for integrated dose, but the wrong *units*. The CSF has an Extreme Challenge because there is NOT at least one SG NR Level > 50% with an adverse RB atmosphere.

D. Plausible because it is a set or parameters that could exist after a LOCA and because 2 S/Gs are below the criteria for EXTREME challenge with adverse containment conditions. Incorrect because the CSF does NOT have an Extreme Challenge because there is at least one SG NR Level > 50% with an adverse RB atmosphere. Given value of RB radiation levels is above the correct *number* for dose rate, but the wrong *units*.

NOTE: The reason that RB Rad Levels are provided is to lend some credibility between Choices A & B and between Choices C & D. Without these values, Choices A & B are practically the same. Units are provided in mr/hr to be able to provide numbers which meet the intgrated does value OR exceed the instantaneous dose rate values for adverse coniditions.

Notes

(LOCA Cooldown – Depress.) Knowledge of the parameters and logic used to assess the status of safety functions.

Tier: 1
Group: 2

Importance Rating: RO 4.0

Technical References:

- EOP-12.0, Rev 12
- OAP-103.4, Rev 0

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-12.0-2031

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

The KA is matched because it requires the operator to have knowledge of the parameters and logic used to assess the status of Safety Functions, such as Heat Sink.

64. E04 EA1.1 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- A LOCA has occurred in the Auxiliary Building.
- A Reactor Trip and Safety Injection are manually actuated.
- The crew has entered EOP-2.5, *LOCA Outside Containment*.

Which ONE (1) of the following describes the actions required to CLOSE MVG-8888A, RHR LP A TO COLD LEGS?

A. Take the MVG-8888A Control Switch on the MCB to CLOSE ONLY.

B. RESET Train A of Safety Injection; AND

Take the MVG-8888A Control Switch on the MCB to CLOSE.

C✓ Take the MVG-8888A Power Lockout Switch to ON; AND

Take the MVG-8888A Control Switch on the MCB to CLOSE.

D. RESET both trains of Safety Injection; AND

Take the MVG-8888A Control Switch on the MCB to CLOSE.

Feedback

A. Plausible because this would be correct for other valves in the RHR system that do NOT have a power lockout, such as MVG-8887A, RHR Hot Leg Cross-Connect Valves. Incorrect because 8888A does have a power lockout. The switch must be taken to ON in order to power the valve.

B. Plausible because other valves in the RHR System, such as MVG-8809A, receive a signal to open on an SI. Also plausible because SI Reset normally occurs prior to operation of 8888A. Incorrect since MVG-8888A does NOT receive a signal to position on an SIS; therefore reseting SI does not affect the ability to operate this valve.

C. According to AB-7 (p32-33, Rev 19), both the RHR to Cold Leg Injection Isolation Valves, MVG-8888A and B, are maintained OPEN during normal power operation, and to prevent inadvertent closure power lockout switches are used to interrupt power to their motors. These switches are normally maintained in the OFF position. According to AB-10 (p44, Rev 13), White Status lights for each valve having a Power Lockout are located on the MCB to show the actual valve position. These lights are powered from the opposite train (i.e. Train 'B' provides power for the status light indicating the position of the Train 'A' valves). In accordance with Table AB7.7, the operator must perform a two-switch operation to operate the valve; (1) the power lockout must be overridden by the MCB switch and then the valve must be manipulated using its respective MCB Switch.

D. Plausible because depressing both SI Reset pushbuttons is the normal method of resetting SI and this action is performed before manipulating RHR valves in the EOPs. Also plausible because other valves in the RHR System, such as MVG-8809A & B, receive a signal to open on an SI - both SI Reset pushbuttons must be reset to operate these valves. Incorrect because MVG-8888A does NOT receive a signal to position on an SIS; therefore reseting SI does not affect the ability to operate this valve.

Notes

Ability to predict to and/or monitor changes in parameters associated with operating the LOCA Outside Containment controls including: Components and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes and automatic and manual features.

Tier: 1
Group: 1

Importance Rating: RO 4.0

Technical References:

- AB-7, p32-33, Rev 20
- TS LCO 3.5.2
- AB-10 p45, Rev 13

Proposed references to be provided to applicants during examination:

Learning Objective: AB-7-11; AB-10-08; EOP-2.5-1889

Question History:

NEW

10 CFR Part 55 Content: 41(b)(7)

Comments:

The KA is matched because the operator must demonstrate the ability to manually operate an ECCS valve (MVG-8888A) as it applies to LOCA Outside Containment (i.e. EOP-2.5 will require that the operator close the valve) including automatic (i.e. No SIS) and manual (i.e. Power Lockout switch) features.

65. E05 EA2.1 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- MODE 3, following a plant trip.
- A Red Path exists on Heat Sink and the crew has entered the appropriate Functional Response Procedure.
- Attempts to restore Emergency Feedwater have been unsuccessful.
- All three Main Feedwater Pumps have tripped, but are available.
- Condensate Pump 'A' is running.
- Feedwater Booster Pumps 'A' and 'B' are running.
- PZR Pressure is 2250 psig and increasing slowly.

- The Steam Generator Wide Range Levels are as follows:
  - Steam Generator 'A' 6%
  - Steam Generator 'B' 12%
  - Steam Generator 'C' 32%

Which ONE (1) of the following describes the action that is required NEXT?

A. Attempt to restore flow from the Main Feedwater System.

B. Attempt to restore flow from the Condensate System.

C. Manually initiate Safety Injection and allow the PZR PORVs to automatically open and close.

D✓ Manually initiate Safety Injection and manually open the PZR PORVs.

Feedback

A. Pausible because this is one of the actions in EOP-15.0 and, since the MFPs are *available*, the crew may still be making efforts to restore feed flow using MFW while implementing Bleed and Feed. Incorrect since both the 'A' and 'B' SG Wide Range Levels are < 15%, Bleed and Feed is required NEXT.

B. Pausible because this is one of the actions in EOP-15.0 and, since two MFBPs and a Condensate pump are *running*, the crew may still be making efforts to restore feed flow using condensate flow while implementing Bleed and Feed. Incorrect since both the 'A' and 'B' SG Wide Range Levels are < 15%, Bleed and Feed is required NEXT.

C. Plausible because, according to the FR-H.1 Background Document (HFRH1BG.doc, HP-Rev 2, 4/30/05, p50), Feed and Bleed is the process of manually initiating high pressure safety injection and permitting the automatic cycling of the PZR PORVs at their set pressure to vent RCS inventory and provide decay heat removal and core cooling. Incorrect since VCSNS uses the Bleed and Feed methodology, not the Feed and Bleed.

D. According to the WOG F-0.3 Background Document (HF03BG.doc, HP-Rev. 2, 4/30/05) and OAP-103.2 (Rev 0), a Secondary Heat Sink has been defined as a total EFW flow of > 450 gpm, or at least one SG Narrow Range Level > 30% [50%]. The conditions have established that neither exist by identifying the existence of a Red Path on Heat Sink, the fact that attempts to restore EFW have been unsuccessful, and all three Wide Range levels are consistent with Narrow Range Levels that are off-scale low. According to EOP-15.0 (Rev 13), the strategy for restoring a Secondary Heat Sink involves two phases, the first in which the operator attempts to restore a Secondary Heat Sink by restoring EFW, MFW and Condensate in that order of preference; and the second which abandons the attempt to restore a Secondary Heat Sink, and initiates a Bleed and Feed cooling posture. The criteria for differentiating between the two phases, is identified in Caution – Steps 4 through 16, and states as follows: If Wide Range level in any two SGs is < 15% [25%] OR PZR pressure is greater than 2335 psig due to loss of Secondary Heat Sink, steps 17 through 24 should be immediately initiated for bleed and feed cooling. In this case, although the PZR pressure criteria is not met for Bleed and Feed, the SG Wide Range Level criteria is, and bleed and feed must be initiated. According to the FR-H.1 Background Document (HFRH1BG.doc, HP-Rev 2, 4/30/05, p50), Bleed and Feed is the process of manually initiating high pressure safety injection and manually opening the PZR PORVs to allow the injection of sufficient water to provide for decay heat removal and core cooling; and Feed and Bleed is the process of manually initiating high pressure safety injection and permitting the automatic cycling of the PZR PORVs at their set pressure to vent RCS inventory and provide decay heat removal and core cooling.

Notes

Ability to (a) predict the impacts of the following on the Inadequate Heat Transfer - Loss of Secondary Heat Sink and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Tier: 1
Group: 1

Importance Rating: RO 3.4

Technical References:

- WOG F-0.3 Background Document (HF03BG.doc, HP-Rev. 2, 4/30/05)
- OAP-103.2 (Rev 0)
- EOP-15.0 (Rev 13)
- FR-H.1 Background Document (HFRH1BG.doc, HP-Rev 2, 4/30/05, p50)

Proposed references to be provided to applicants during examination:

None

Learning Objective: EOP-15.0-2096

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions EOPS 262, 259, 221, 201, 146, & 21 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(5), (10)

Comments:

The KA is matched because the operator must interpret the facility conditions (i.e. the criteria for Bleed and Feed initiation have been met), and determine the appropriate strategy (i.e. manually initiate Safety Injection and manually open the Pzr PORVs) during a loss of Secondary Heat Sink.

66. G2.1.17 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Which ONE (1) of the following statements meets the station requirements for proper communication in accordance with OAP-100.4, *Communications*?

A. Control rods are stepping IN.

B. Tom, Place "C (*see*)" Charging Pump in PULL-TO-LOCK on Train "B (*bee*)".

C✓ Tom, Pressurizer pressure is 2205 psig, trending towards 2235 psig.

D. Turbine Building Operator: Perform SOP-214, Steps 2.14 and Steps 2.15. (procedure NOT available to the TBAO)

Feedback

A. Plausible because this is a common communication error during simulator training and evaluation. Incorrect because OAP-100.4, Section 8.9.b, specifies that the communication should also include whether or not the movement is expected for current plant conditions.

B. Plausible because this is a common communication error during simulator training and evaluation. Incorrect because OAP-100.4, Section 6.2, specifies that specifies that the phonetic alphabet be used when identifying equipement where letters are used to differentiate between components.

C. CORRECT. Includes first name first (per Section 8.2), a value, and trend in accordance with OAP-100.4, Section 6.4.

D. Plausible because this is a common communication error during simulator training and evaluation. Incorrect because OAP-100.4, Step 8.14.a, requires providing the page number AND, if the local operator does NOT have a procedure, no more than one step should be directed at a time.

Notes

(Conduct of Operations) Ability to make accurate, clear and concise verbal reports.

Tier: 3
Group: 1

Importance Rating: RO 3.9

Technical Reference:

- OAP-100.04, Step 6.4 (Page 4 of 27)

Proposed references to be provided to applicants during examination:

None

Learning Objective: SAP-124-6417, OAP-100.4-3

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

Meets K/A by requiring identification of a proper verbal communication in accordance with the operations communication standard: OAP-100.04, *Communications*.

67. G2.1.18 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- The unit is at 100% power.
- MCB logs are in progress.
- AUTO TOUR is not available.
- ECCS Accumulator 'A' MCB indicator is reading 60%, which is out-of-limit/spec.
- ECCS Accumulator 'A' indication on the computer is 75%.

In accordance with OAP-106.1, *Operating Logs*, which ONE (1) of the following are the MINIMUM actions REQUIRED with respect to logging ECCS Accumulator 'A' level?

A. Record the reading as 60%, red circle, inform the CRS, and continue with the logs.

B. Record the reading as 75% since it is the "in-spec" reading, inform the CRS, and continue with the logs.

C. Record the reading 75% since it is the "in-spec" reading, red circle, inform the CRS, explain actions taken in the Comments section.

D✓ Record the reading as 60%, red circle, inform the CRS, assign a number in the right margin, and explain actions taken in the Comments section.

Feedback

A. Plausible because 60% is the correct reading, and a red circle is required by OAP-106.1, Step 6.8. Incorrect since it is clearly below the T.S. lower limit and the operator must complete the remaining requirements of making note on log, requesting repair, etc.

B. Plausible because this appears to be the only accurate reading. Incorrect since the reading should be taken from the MCB indicator; not the computer. Also incorrect because OAP-106.1 requires a red circle, number to the right, and an explanation.

C. Plausible because this appears to be the only accurate reading. Incorrect since the reading should be taken from the MCB indicator; not the computer. Also incorrect because OAP-106.1 requires a number to the right.

D. CORRECT. OAP-106.1, Section 6.8.b. requires a red circle, a number in the right margin, the number referenced in the Comments sections, and an explanation of actions taken to restore the reading to within the required limit. The log, Attachment I, Page 13 of 68, requires the operator to inform the CRS if the reading is <66%.

Notes

(Conduct of Operations) Ability to make accurate, clear and concise logs, records, status boards and reports.

Tier: 3
Group: 1

Importance Rating: RO 3.6

Technical Reference:

- OAP-106.1, 6.8.c (Page 6 of 10)

Proposed references to be provided to applicants during examination:

None

Learning Objective: SAP-204-9; OAP-106.1-6407

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

Meets K/A by requiring application of department logkeeping requirements.

68. G2.1.43 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- After a refueling outage, a Reactor Startup is in progress in accordance with GOP-3, *Reactor Startup From Hot Standby to Startup.*
- The Rod Insertion Limit is C-118.
- The Estimated Critical Condition boundaries are D-30 to D-190.
- The crew has withdrawn Control Bank 'C' to 53 steps.
- The Duty Reactor Engineer reports the 1/M Plot predicts criticality at Control Bank 'C' at 108 steps.

Which one of the following are the MINIMUM required actions per GOP Appendix A, *Generic Operating Precautions*?

A. Dilute the RCS per REP-107.001, *Controlling Procedure for Refueling Startup and Power Ascension Testing.*

B.✓ Borate (normal method) as necessary to achieve the required Shutdown Margin; shutdown the Reactor per GOP-5 and recalculate the ECC.

C. Emergency Borate through MVT-8104, EMERG BORATE, to achieve the required Shutdown Margin and shutdown the Reactor per GOP-5.

D. Continue the startup, recalculate the Estimated Critical Condition, adjust the RCS boron concentration.

Feedback

A. Plausible because this would be the methodology for a refueling startup if criticality were not acheived by the Control Rod Bank D reaches the maximum rod withdrawal limit (see GOP-A, Step 2.8.j.1).

Incorrect since the crew must borate and shut down the Reactor.

B. CORRECT. GOP-APPENDIX A differentiates between actual criticality and predicted criticality below the insertion limit. For predicted criticality, boration rather than emergency boration is specified.

C. Plausible because it would be correct if criticality had been achieved below the insertion limit (GOP-APPENDIX A, 2.8.g).

Incorrect since a normal boration through the blender should be conducted.

D. Plausible because it is similar to action for criticality above the rod insertion limit but outside the ECC boundaries (GOP-APPENDIX A, 2.8.i).

Incorrect since, according to Step 2.8.h.2), the Reactor must be shut down.

Notes

(Conduct of Operations) Ability to use procedures to determine the effects on reactivity of plant changes.

Tier: 3
Group: 1

Importance Rating: RO 4.1

Technical Reference:

- GOP-APPENDIX A, Step 2.8 Pages 6-8/12

Proposed references to be provided to applicants during examination:

None

Learning Objective: GOP-A-02

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions AOPS 41, 42, 214, 215; NORMAL OPS 31; ROD CONTROL 43; AND Open Reference questions NORMAL OPS 60 and 61 to be classified as MODIFIED)

10 CFR Part 55 Content: 41.5

Comments:

Meets K/A by having examinee apply the requirements of a procedure (GOP-APPENDIX A) to changing conditions during a reactor startup; based on reactivity monitoring.

69. G2.2.14 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- Mode 6
- IFV-3531-O-EF, OPER-SG A MTR DR EF PUMP FLOW CONT VLV, has been isolated to replace the actuator.

Which ONE (1) of the choices below completes the following statement?

An ___________ Removal and Restoration will be used to track the status of IFV-3531-O-EF and a __________ chain will be installed when the valve is restored to the normal configuration.

A. ACTION;

RED

B. ACTION;

SILVER

C. OUTAGE;

RED

D.✓ OUTAGE;

SILVER

Feedback

A. Plausible because an Action R&R would be required for other Modes. RED is plausible because this chain color would be used for open valves.

Incorrect because Section 4.3.1 of OAP-106.3 states that if the R&R is generated for a system or component that has an LCO which is N/A in Modes 5 or 6, it should be an Outage R & R. Also incorrect because IAW OAP-106.3, Section 6.1.a.4), a *silver* chain should be used for valve handwheels locked in the NEUTRAL position.

B. Plausible because the 2nd part is correct - IAW OAP-106.3, Section 6.1.a.4). Also plausible because an Action R&R would be required for other Modes.

Incorrect because Section 4.3.1 of OAP-106.3 states that if the R&R is generated for a system or component that has an LCO which is N/A in Modes 5 or 6, it should be an Outage R & R.

C. Plausible because the 1st part is correct. Also, RED is plausible because this chain color would be used for open valves.

Incorrect because IAW OAP-106.3, Section 6.1.a.4), a *silver* chain should be used for valve handwheels locked in the NEUTRAL position.

D. CORRECT. Section 4.3.1 of OAP-106.3 states that if the R&R is generated for a system or component that has an LCO which is N/A in Modes 5 or 6, it should be an Outage R & R. IAW OAP-106.3, Section 6.1.a.4), a *silver* chain should be used for valve handwheels locked in the NEUTRAL position.

Notes

(Equipment Control) Knowledge of the process for controlling equipment configuration or status.

Tier: 3
Group: 2

Importance Rating: RO 3.9

Technical References:

- SAP-205, Step 4.3 (Page 5 of 13)
- OAP-106.1, Step 6.1.a (Page 3 of 12) and Att. 1I

Proposed references to be provided to applicants during examination:

None

Learning Objective: SAP-205-1

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

Meets K/A by requiring knowledge of the process for controlling equipment (IFV-3531-O-EF) configuration or status during Modes 5 & 6.

70. G2.2.37 001/MODIFIED//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- Charging/SI Pump 'B' is running
- The crew will be shifting to Charging/SI Pump 'C' running on Train 'B' in accordance with SOP-102, *Chemical and Volume Control System*.

Which ONE (1) of the following describes ECCS Subsystem/Train operability status while the procedure is performed?

A. Train 'B' is INOPERABLE <u>only</u> when both Charging/SI Pumps 'B' and 'C' breakers are closed.

B.✓ Train 'B' is INOPERABLE <u>only</u> when both Charging/SI Pumps 'B' and 'C' breakers are racked up.

C. Both trains remain OPERABLE because at least ONE pump is running throughout the procedure.

D. Both trains remain OPERABLE because the swing pump is available as the standby pump throughout the procedure.

Feedback

A. Plausible because this would be correct when both pumps are running. Incorrect because the Train would be INOPERABLE before both pumps are started - when both pumps breakers are racked up (the "<u>only</u>" makes it incorrect).

B. CORRECT. SOP-102, Precaution II.2.d, specifies that the train to which the swing pump will be aligned becomes INOPERABLE when both breakers are racked in on the same bus.

C. Plausible because both trains are OPERABLE up to the point where both breakers are racked in on the same bus at a time. Also plausible because Train 'A' is unaffected by the swap. Also plausible because at least ONE pump *will* be running throughout the procedure. Incorrect since Train 'B' will become INOPERABLE when both breakers are racked in on the same bus at a time.

D. Plausible because both trains are OPERABLE up to the point where both breakers are racked in on the same bus at a time. Incorrect since Train 'B' will become INOPERABLE when both breakers are racked in on the same bus at a time. 2nd part is plausible because the swing pump may be used as the standby pump if it is the only pump racked in on the train NOT in service. Also incorrect because the swing pump is not available as a standby pump during the swap.

Notes

(Equipment Control) Ability to determine operability and/or availability of safety related equipment.

Tier: 3
Group: 2

Importance Rating: RO 3.6

Technical References:

- SOP-102, Precaution II.2.d (Page 4 of 102)
- SOP-102, III.F. CAUTION 2.0 (Page 27 of 102)

Proposed references to be provided to applicants during examination:

None

Learning Objective: AB-10-23

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference questions CVCS 115 & 159 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(10)

Comments:

Meets K/A by requiring knowledge of system operability in an interim alignment. Attempted to keep within the realm of RO responsibility by posing the question around a precaution in a procedure that they would perform.

71. G2.3.11 001/NEW//LOWER//RO/SUMMER/2/2009/NO

A cooldown is in progress, in accordance with AOP-112.2, *Steam Generator Tube Leak Not Requiring SI,* for tube leakage in Steam Generator 'B'.

Which ONE (1) of the following identifies the status of PVT-2010, PWR RELIEF B, and MVG-2802A, MS LOOP B TO TD EFP?

	PVT-2010	MVG-2802A
A.	MAN/CLOSED	CLOSED/ENERGIZED
B.	MAN/CLOSED	CLOSED/DE-ENERGIZED
C.	AUTO/1150 PSIG	CLOSED/ENERGIZED
D.✓	AUTO/1150 PSIG	CLOSED/DE-ENERGIZED

Feedback

A. Plausible because PWR Relief B passes through this status in the steps to raise the setpoint and place it in AUTO. Also plausible since MVG-2802 A is closed. Incorrect since MVG-2802A de-energized.

B. Plausible because PWR Relief B passes through this status in the steps to raise the setpoint and place it in AUTO. Also plausible because the 2nd half is correct.

C. Plausible because the status of PWR Relief B is correct. Also plausible since MVG-2802 A is closed. Incorrect since MVG-2802A is also de-energized.

D. CORRECT. PWR Relief B is placed in MAN and CLOSED then the setpoint is raised to 1150 PSIG and it is placed in AUTO in order to provide relief capacity in the event of an over-pressurization. MVG-2802A is closed and locally de-energized to avoid an inadvertent release if the TDEFW Pump auto starts.

Notes

(Radiation Control) Ability to control radiation releases.

Tier: 3
Group: 3

Importance Rating: RO 3.8

Technical References:

- AOP-112.2, Step 17 (Page 12 of 51)
- AOP-112.2, Step 19 (Page 15 of 51)

Proposed references to be provided to applicants during examination:

None

Learning Objective: AOP-112.2-05

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

Comments:

Matches K/A in that it tests the ability to verify that release pathways (via MVG-2802A and PVT-2010) are isolated during a SGTL.

72. G2.3.5 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Prior to a Waste Monitor Tank release, which ONE (1) of the following identifies how the HI RAD setpoint for RM-L5, LIQUID WASTE EFFLUENT MONITOR, is adjusted and where the setpoint is found?

A. Set at 2X background;

Liquid Waste Release Permit

B. Set at 2X background;

HPP-904, *Use of the Radiation Monitoring System*

C.✓ Based on tank sample;

Liquid Waste Release Permit

D. Based on tank sample;

HPP-904, *Use of the Radiation Monitoring System*

Feedback

A. Plausible because the 2nd part is correct. Also plausible because the setpoint for normal operations is 2X background.

Incorrect because the setpoint is based on tank sample analysis.

B. Plausible because the setpoint for normal operations is 2X background, and, normally the setpoint would be found in HPP-904.

Incorrect because the setpoint is found on the LWRP for a release and because the setpoint is based on tank sample analysis .

C. CORRECT. The setpoint is based on tank sample analysis. SOP-108, *Liquid Waste Processing System*, Attachment VA, *Liquid Waste Release Worksheet,* specifies that the setpoint is on the LWRP. During normal operation, the setpoint is in HPP-904.

D. Plausible because the 1st part is correct.

Incorrect because SOP-108, *Liquid Waste Processing System*, Attachment VA, *Liquid Waste Release Worksheet,* specifies that the setpoint is on the LWRP. During normal operation, the setpoint is in HPP-904.

Notes

(Radiation Control) Ability to use radiation monitoring systems.

Tier: 3
Group: 3

Importance Rating: RO 2.9

Technical References:

- SOP-108, Attachment VA, Step 2.e (Page 112 of 194)
- HPP-710, Attachment 1, Section II (Page 41 of 48)
- HPP-904, 6.1.1 (Page 5 of 11)

Proposed references to be provided to applicants during examination:

Learning Objective: AB-16-17; HPP-710-03

Question History:

NEW

10 CFR Part 55 Content: 41(b)(11)

Comments:

Meets K/A by determining which RMS alarm must be adjusted and how to determine the setpoint for that alarm in an off-normal situation.

73. G2.3.7 001/NEW//LOWER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- Mode 5
- RHR is in service.
- A worker is assigned a task in the AB 436' West Penetration.
- An RWP was approved for the task and a STAY TIME Card was issued.

Which ONE (1) of the following applies when the STAY TIME is reached?

A. The worker <u>must</u> exit the area until a STAY TIME extension is approved by the job coverage HP Technician.

B✓ The worker <u>must</u> exit the area until a STAY TIME extension is approved by an HP Supervisor.

C. The worker <u>may</u> continue working until the ED alarm actuates then exit the area.

D. The worker <u>may</u> continue working, monitor the ED frequently, and call HP if a STAY TIME extension is required.

Feedback

A. Plausible because the 1st part is correct. Also plausible because the job coverage technician initially completes the Stay Time Card (see HPP-0401, 4.1.4.G.7)

Incorrect because STAY TIME extensions can be granted only by a HP Supervisor.

B. CORRECT. STAY TIME is a <u>required</u> part of the RWP if certain conditions are met. HPP-401 allows an HP Supervisor to approve STAY TIME Extensions provided certain criteria are met.

C. Plausible because this would be the RWP required action if the ED alarm actuated *before* the STAY TIME limit was reached. "Continue working" is plausible because, under normal conditions, an individual would not have to exit the area unless the ED actually alarmed.

Incorrect because the STAY TIME is based on a time <u>less than</u> the ED alarm setpoint.

D. "Continue working" is plausible because, under normal conditions, an individual would NOT have to exit the area unless the ED actually alarmed. Also plausible because monitoring the ED frequently is NOT unique to these conditions.

Incorrect because an HP Supervisor would need an actual ED reading to determine if the dose limit has been exceeded <u>before</u> issuing an extension - a call would not suffice. "Calling HP" is plausible because there are many radiological conditions that require HP to be called/contacted. Also plausible because HP would be *notified*.

Notes

(Radiation Control) Ability to comply with radiation work permit requirements during normal or abnormal conditions.

Tier: 3
Group: 3

Importance Rating: RO 3.5

Technical Reference:

- HPP-401, Step 4.1.4.G.5 (Page 7 of 20)

Proposed references to be provided to applicants during examination:

Learning Objective: SOT-3-1

Question History:

NEW

10 CFR Part 55 Content: 41(b)(12)

Comments:

Meets the K/A by demonstrating knowledge of the relationship between the RWP and STAY TIME calculation and the ability to take the proper actions.

74. G2.4.30 001/MODIFIED//HIGHER//RO/SUMMER/2/2009/NO

Which ONE (1) of the following identifies an event where the subsequent power change requires notification of the Chemistry Department and identifies the sample required to be analyzed?

A.✓ ONE of TWO running Main Feedwater Pumps trips at 65% power;

Iodine isotopic analysis

B. ONE of TWO running Main Feedwater Pumps trips at 65% power;

100/E-bar determination

C. ONE of THREE running Main Feedwater Pumps trips at 100% power;

Iodine isotopic analysis

D. ONE of THREE running Main Feedwater Pumps trips at 100% power;

100/E-bar determination

Feedback

A. CORRECT. AOP-210.3 specifies the maximum power level for one MFW Pump at 48%; a 17% reduction. AOP-210.3 requires the load reduction to be conducted IAW GOP-4B. The Reference Page for GOP-4B requires Att. III.H of GTP-702 be conducted for a thermal power change of >15%. Att. III.H requires STP-604.001 Isotopic Analysis for DE I-131. This exceeds the 15% in one hour T.S. requirement for an Iodine Isotopic Analysis.

B. Plausible because the 1st part is correct. Also plausible because 100/E-bar (Gross Activity) is another sampling component listed in T.S. Table 4.4-4.

Incorrect since the basis for the notification to sample is Iodine.

C. Plausible because it requires a power change from 100 to 91%. Also plausible because the 2nd part is correct.

Incorrect because the power change is less than 15% in one hour.

D. Plausible because it requires a power change from 100 to 91%. Also plausible because 100/E-bar (Gross Activity) is another sampling component listed in T.S. Table 4.4-4.

Incorrect since the basis for the notification to sample is Iodine. Also incorrect because the power change is less than 15% in one hour.

Notes

(Emergency Procedures/Plans) Knowledge of events related to system operations/status that must be reported to internal organizations or outside agencies.

Tier: 3
Group: 4

Importance Rating: RO 2.7

Technical References:

- AOP-210.3, Step 4 (Page 4 of 7)
- TS Table 4.4-4 (Page 261 of 588)

Proposed references to be provided to applicants during examination:

None

Learning Objective: GOPDOWN-7596; SB-4-18

Question History:

MODIFIED (Although written "from scratch", this question is similar enough to Closed Reference question NORMAL OPERATIONS 16 AND Open Reference question NORMAL OPERATIONS 39 to be classified as MODIFIED)

10 CFR Part 55 Content: 41(b)(10)

Comments:

Meets K/A by identification of an operational event requiring notification of an internal organization (Chemistry) and the specific reason for so doing.

QUESTIONS REPORT

for VCS 2009 NRC RO WORKSHEET (AFTER CHANGES FROM VALIDATION)

1. G2.4.32 002/NEW//HIGHER//RO/SUMMER/2/2009/NO

Given the following plant conditions:

- 100% power
- A severe lightning storm has resulted in problems with many Main Control Board annunciators.

Which ONE (1) of the following identifies the actions required and the procedure used to respond to the annunciator problems?

A. Silence alarms, list affected annunciators, acknowledge alarms, reset alarms;

OAP-100.5, Guidelines for Configuration Control and Operation of Plant Equipment

B.✓ Silence alarms, list affected annunciator panels, acknowledge alarms, reset alarms;

AOP-100.5, Loss of Main Control Board Annunciators

C. Test annunciator panels, list affected annunciator panels;

OAP-100.5, Guidelines for Configuration Control and Operation of Plant Equipment

D. Test annunciator panels, list affected annunciator panels;

AOP-100.5, Loss of Main Control Board Annunciators

Feedback

A. Plausible because the 1st part is correct. Also plausible because the correct procedure (AOP-100.5) specifically refers to OAP-100.5.

Incorrect because AOP-100.5, NOTE - Step 1, states that OAP-100.5 is only to be used for a loss of a single annunciator.

B. CORRECT. IAW Step 1 of AOP-100.5. NOTE - Step 1 of AOP-100.5 states that this procedure is to be used for loss of multiple MCB annunciators.

C. Plausible because these are the actions for a loss of power. Also plausible because the correct procedure (AOP-100.5) specifically refers to OAP-100.5.

Incorrect because these are the actions taken for loss of power, not a lightning strike.

D. Plausible because the 2nd part is correct. Also plausible because these are the actions for a loss of power.

Incorrect because these are the actions taken for loss of power, not a lightning strike.

11/21/08

Notes

(Emergency Procedures/Plans) Knowledge of operator response to loss of all annunciators.

Tier: 3
Group: 4

Importance Rating: RO 3.6

Technical Reference:

- AOP-100.5

Proposed references to be provided to applicants during examination:

Learning Objective: AOP-100.5-6

Question History:

NEW

10 CFR Part 55 Content: 41(b)(10)

<u>Comments:</u>

Matches the K/A in that it tests actions required in the procedure for loss of multiple MCB annunciators (AOP-100.5).

Po 11/21/08

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