April 2007 Diablo Canyon NRC Written Exam Formal Comments

Question Number	Question, Answer and Reference	Recommendation	Justification
RO/SRO # 7	See attached	Accept A and C	Although question is technically correct the lack of a reference made the difficulty of the question too high. This is not recall knowledge information. This question relied on knowledge of an appendix (B) to the procedure that was referenced in the question and the choice (Seal Water Heat Exchanger) is the 4th item that is isolated based on the recommended order for isolation. Appendix B was not referenced in the question and no heat load isolation is done in the body of OP AP-11. The initial conditions included information that that the SFP temperature was above the CCW system temperature. Isolation of the SFP would produce a lowering of heat load on the CCW system without undue influence on power operation of the operating unit.
RO/SRO # 10	See attached	Accept A and B	Question did not include the status of RCS Letdown, without this information candidates would not know the proper procedure step to follow. Use of a PORV would accomplish the same thing as using auxiliary spray. If auxiliary spray is ineffective or letdown is not in service the response not obtained step is to use a PORV. Additionally License lesson plan LPE-0.2 “Natural Circulation Cooldown” step description states to use auxiliary spray, or one PORV.

April 2007 Diablo Canyon NRC Written Exam Formal Comments

Question Number	Question, Answer and Reference	Recommendation	Justification
RO/SRO #36	See attached	Accept A and B	B could be a correct answer due to the amount of positive reactivity added by a temperature drop to offset the negative reactivity from the power increase. First Case: C_B = 1600 ppm (assume BOL, $\alpha_D \approx -9.5$ pcm/%pwr, $\alpha_{iso} \approx -3$ pcm/°F). A 50 MWe increase in power ≈ 5% power. $\Delta\rho_D$ will add –47.5 pcm of reactivity, which must be offset by +47.5 pcm of reactivity by $\Delta\rho_{iso}$. This means Tavg would have to drop ≈ 16°F. Second Case: C_B = 300 ppm (assume EOL, $\alpha_D \approx -14.5$ pcm/%pwr, $\alpha_{iso} \approx -26$ pcm/°F). A 50 MWe increase in power ≈ 5% power. $\Delta\rho_D$ will add –72.5 pcm of reactivity, which must be offset by +72.5 pcm of reactivity by $\Delta\rho_{iso}$. This means Tavg would have to drop ≈ 3°F. The power increase added more negative reactivity (due to the stronger Doppler only power coefficient at EOL), and the associated temperature decrease added more positive reactivity (to offset the negative reactivity added by the Doppler only power coefficient).

April 2007 Diablo Canyon NRC Written Exam Formal Comments

Question Number	Question, Answer and Reference	Recommendation	Justification
RO/SRO #44	See attached	Accept B and C	CCW flow is not reduced by the operator, but flow is reduced by the loss of one of the running pumps, only one pump is left running. Overall system flow will be reduced. CCWS to RHR heat exchanger flow is not addressed in OP AP SD-4. The candidate could select B assuming that system flow is reduced by the loss of the pump. Data gathered from the simulator shows the following: Simulator Data (see graphs): CCW flows with CCW cut in to both RHR Heat Exchangers and 2 Pumps running: Header A Header B Header C 7746 9160 3948 CCW flows with CCW cut in to both RHR Heat Exchangers and 1 Pump running: Header A Header B Header C 5338 6492 2746
SRO #96	See Attached	Accept A and B	OP1.DC17 step 5.7.1 states that prior to entering Mode 4, TS Sheets shall be generated for any equipment which has not yet been restored to operable status. Based on the creation of these sheets both answers are correct. Question was not clear as to the current status of the plant, if the component was removed just prior to Mode 4 entry then an info only tech spec sheet would be used to track the inoperable equipment.

April 2007 Diablo Canyon NRC Written Exam Formal Comments

Question Number	Question, Answer and Reference	Recommendation	Justification
SRO #99	See Attached	Accept A and B	A pressurizer level backup control channel failure could produce the symptoms listed in the stem of the question. A failure of backup level control channel will isolate the letdown orifice isolation valves and cause the pressurizer level to increase. Charging flow will decrease to attempt to maintain pressurizer level on program. Pressurizer pressure would increase due to the pressurizer level increase. It is entirely reasonable for a relatively inexperienced candidate to rule out a letdown line failure with 0% indicated level in the reactor cavity sump and not necessarily equate this with a loss of instrument air to containment.

Question 7.

RO Question 34 rev1

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier:	_2___	_____
	Group:	_1___	_____
	K/A:	008 A1.02	
	Importance Rating:	2.9	3.1

Proposed Question:

GIVEN:

- Unit 1 is at 100% power.
- One CCW heat exchanger is in service.
- Containment temperature is 80°F
- Spent Fuel Pool temperature is 90°F

CCW heat exchanger outlet temperature is 85°F and increasing. The crew is going to reduce CCW loads in accordance with OP AP-11, Malfunction of Component Cooling Water system.

Which of the following CCW heat loads could the operators isolate to lower CCW temperature while the unit is at power?

A. SFP Heat Exchanger.

B. RCP thermal barriers.

C. Seal Water Heat Exchanger.

D. Containment Fan Cooling Units.

Proposed Answer:

C. Seal Water Heat Exchanger.

Explanation:

A incorrect. AP-11 states the SFP may act as a heat sink and should not be isolated.

B incorrect. Not isolated unless the reactor is tripped.

C correct. Isolated by opening the bypass and closing the inlet and outlet valves. Then CCW is secured to the heat exchanger.

D incorrect. AP-11 states the CFCUs may act as a heat sink and should not be isolated.

Technical Reference(s): AP-11, appendix B.

Proposed references to be provided to applicants during examination: None

Learning Objective: 3466 - Discuss the effects and actions associated with a loss of CCW.

Question Source:
New

Question History: Last NRC Exam: N /A

Question Cognitive Level:
Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41.5 - Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

Comments: Replaced question to focus on CCW temperature limit and action to prevent exceeding limit.

K/A: 008 A1.02 - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including: CCW temperature (2.9/3.1)

Appendix B

CCW Heat Load Isolation

1. SCOPE

   a. This appendix provides guidance for isolation of various CCW heat loads.

2. DISCUSSION

   a. The heat loads are listed in the recommended order for isolation. In addition, the isolation steps may be used to isolate equipment for leaks into or out of the CCW system.

   b. The CFCUs and the SFP Heat Exchanger may be used as heat sinks and should not be isolated from the CCW system unless leaking or the temperature in the CCW system will cause an increase in containment temperature above that allowed by Tech Specs.

   c. If letdown is desired, Normal Letdown at 45 gpm is less of a heat load on the CCW system than Excess Letdown at 40 gpm.

3. INSTRUCTIONS

   a. Boric Acid Evaporator

      1) Shutdown the Boric Acid Evaporator using OP B-1B:I, Section 6.3 for guidance.

      2) Shut CCW Supply and Return to BA Evap

         - Close CCW-351
         - Close CCW-352

      3) If cooling still required, open BA Evap Unit Crosstie Valves CCW-2-355 and CCW-2-356.

   b. Auxiliary Steam Drain Receiver Vent Condenser

      1) Transfer CCW supply to Unit 2(1):

         a) Open CCW-2(1)-355 and CCW-2(1)-356.

         b) Shut CCW-1(2)-355 and CCW-1(2)-356.

   c. Letdown Heat Exchanger

      1) Isolate Letdown

         a) Close CVCS-8149A, B, C

         b) Close LCV-459/460

      2) Reduce charging flow to minimum while maintaining 8-13 GPM seal injection flow to each RCP.

      3) Isolate normal or alternate charging as applicable:

         - Close CVCS-8146
         - Close CVCS-8147

Appendix B (Continued)

4) Verify closed HCV-133, Letdown from RHR system.

5) Place in manual and close PCV-135, Letdown Back Pressure Control Valve.

6) Isolate CCW flow to the Letdown Heat Exchanger

- Close CCW-406
- Close CCW-409

7) Establish Excess Letdown per OP B-1A:IV.

8) Verify PZR Pressure and Level are being maintained or trending toward the programmed band.

d. Seal Water Heat Exchanger

1) Isolate Reactor Coolant flow to the HX.

a) Open HX Bypass valve CVCS-8381(SC)

b) Close HX inlet valve CVCS-8398A(SO)

c) Close HX outlet valve CVCS-8398B(SO)

2) Isolate CCW flow to the HX.

- Close supply valve CCW-401
- Close return valve CCW-405

3) If the HX is being isolated due to leakage from the CCW system into the CVCS system, perform the following additional steps:

a) Take manual control of HC-130B (TCV-130) to control VCT outlet temp to 90-100°F.

b) Consider increasing letdown flow to 120 GPM per OP B-1A:XII in order to provide more cool water into the VCT.

4) Monitor RCP Seal/Bearing Temperatures. If any RCP No. 1 Seal outlet temp or RCP Radial Bearing outlet temp cannot be maintained below the alarm setpoint,

a) Trip the Reactor

b) Trip the RCPs

c) GO TO EOP E-O, REACTOR TRIP OR SAFETY INJECTION

Question 10.

RO Question 37

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier:	_2___	_____
	Group:	_1___	_____
	K/A:	010 G2.4.6	
	Importance Rating:	3.1	4.0

Proposed Question:

The crew is performing a cooldown and depressurization in accordance with E-0.3, Natural Circulation Cooldown With Steam Void in Vessel (With RVLIS).

Which of the following is the preferred method of depressurizing the RCS?

A. PORV

B. Aux Spray

C. Normal Spray

D. Operating ECCS pumps as necessary

Proposed Answer:

B. Aux Spray

Explanation:

A incorrect. A PORV is the backup if aux spray unavailable.

B correct. Preferred method is to establish letdown and use Aux spray.

C incorrect. No RCPs running to use normal sprary.

D incorrect. Not a method of pressure control.

Technical Reference(s): E-0.3, Natural Circulation Cooldown With Steam Void in Vessel (With RVLIS).

Proposed references to be provided to applicants during examination: None

Learning Objective: 7494 - Explain the actions to reduce effects of voiding in the RCS

Question Source:
New

Question History: Last NRC Exam: N/A

Question Cognitive Level:
Memory or Fundamental Knowledge X
Comprehension or Analysis ____

10 CFR Part 55 Content: 55.41.10 - Administrative, normal, abnormal, and emergency operating procedures for the facility.

Comments: No changes from initial submittal.

K/A: 010 G2.4.6 – Pressurizer Pressure Control - Knowledge symptom based EOP mitigation strategies. (3.1/4.0)

ACTION EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **CONTINUE RCS Cooldown And Initiate Depressurization Toward RHR Entry Conditions (Continued):**	
e. Check Letdown - IN SERVICE	e. To Reestablish Letdown: 1) Open TCV-130 to 40% demand. 2) Verify 8149A, B and C Closed. 3) Open LCV-459 and LCV-460. 4) Verify 8152 OPEN. 5) Open PCV-135 to 60% demand. 6) Verify at least 87 GPM charging flow 7) Open 8149B or C, 75 GPM Orifice Stop Valve. 8) Adjust PCV-135 for 350 PSIG on PI-135, AND Place in Auto. 9) Adjust TCV-130 for 90-110°F on TI-130 AND Place in Auto, if desired. 10) IF RV-8117 Letdown Relief Valve lifts, THEN Reduce Letdown pressure to 200 PSIG AND Check RV-8117 reseated by monitoring PRT parameters.

THIS STEP CONTINUED ON NEXT PAGE

ACTION EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. **CONTINUE RCS Cooldown And Initiate Depressurization Toward RHR Entry Conditions (Continued):**	
	11) IF Letdown CANNOT be established, THEN (a) Use one PZR PORV to Depressurize the RCS. (b) GO TO Step 4 (Next Page).
f. Use Auxiliary Spray and Depressurize as follows: 1) Open both PCV-455A and B 2) Open 8145 or 8148, Auxiliary Spray Vlvs 3) Close 8146 and 8147, Normal and Alt Chg to LP4 and LP3 Cold Leg Vlvs 4) Control RCS Pressure by: o Adjusting Charging flow o Bypassing Auxiliary Spray with PCV-455A or B o Controlling PZR Heaters as necessary	f. IF Auxiliary Spray is NOT desired, THEN Use one PZR PORV AND GO TO Step 4 (Next Page)
g. Maintain Delta-T between Aux Spray flow and PZR Steam Space LESS THAN 320°F (TI-454 and TI-126, or PPC address U0498)	g. Perform the following: 1) Stop Auxiliary Spray flow. 2) Continue Depressurization using one PZR PORV. 3) GO TO Step 4 (Next Page).

E-0.3 Procedure Review, Continued

E-0.3 steps
Obj 10, 11, 18, 19, 20

The following table describes the steps in E-0.3.

Action	Basis / Description
CAUTION: The first 14 steps of E-0.2 should be performed before continuing with this procedure.	E-0.3 is intended to be a supplement for E-0.2

Start an RCP
step 1
	• Forced circulation cooldown is preferred
	• If RVLIS > 100% start an RCP (use App. B)
	• If RVLIS < 100% then establish:
	  • PZR level > 57% (75%)
	  • Subcooling > 38°F (44°F)
	  • Start an RCP (use App. B)
	  • If can't establish prerequisites then skip starting an RCP
	• If successful then go to L-7 or L-5

PZR level step 2	• Operate heaters to saturate PZR • PZR level 20-30% • To accommodate void growth
Continue C/D and Depressurize step 3	• C/D rate < 100°F/hr, and within Foldout Page limits • Check SI blocked • Use Aux. Spray, or one PORV • Maintain PZR delta-T < 320°F
Inventory Control step 4-5	• Maintain PZR level 20-90% • Ensures PZR level remains in indicating range to preclude solid water cond., or shifting the void to the PZR • If PZR level > 90% then turn on PZR heaters and reduce level with charging control or by cooling down more • Check RVLIS Full Range > 76% • If not, then repress. and return to step 3
Isolate Accumulators steps 6-15	From this point E-0.3 is essentially the same as E-0.2

Question 36.

RO Question 63

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier:	_2___	_____
	Group:	_2___	_____
	K/A:	045 K5.17	
	Importance Rating:	2.5	2.7

Proposed Question:

GIVEN:

- The plant is at 90% power
- Control Rods are at 228 steps
- Boron concentration is 1600 ppm.

A control valve malfunction results in a step 50 MWe increase in load.

How would the initial plant response be different if the same 50 MWe step increase occurred when boron concentration was 300 ppm?

A. The RCS temperature change would be smaller.

B. More positive reactivity would be added.

C. The power change would be smaller.

D. The power defect would be smaller.

Proposed Answer:

A. The RCS temperature change would be smaller.

Explanation:

A correct. As load increases, temperature will decrease to add positive reactivity. At BOL, a small MTC will add less reactivity per degree change than at EOL. The temperature change at EOL will be less (more reactivity added per °F).

B incorrect. The power change is the same, the amount of positive reactivity that must be added by MTC will be the same (but less temperature change at EOL).

C incorrect. The power change will be the same. 50 MWe at BOL is about a 4.5% change (based on 1100 MWe), this is the same at EOL.

D incorrect. More power defect at EOL (4.5% change at EOL (2200 pcm) is about 100 pcm but only about 63 at BOL (1400 pcm)).

Technical Reference(s): R17-1F-3

Proposed references to be provided to applicants during examination: None

Learning Objective: 65587 - Describe the time effect of core age, moderator temperature and boron concentration on the moderator temperature coefficient.

Question Source:
New

Question History: Last NRC Exam: N/A

Question Cognitive Level:
Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41.1 - Fundamentals of reactor theory, including fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects.

Comments: No changes from initial submittal.

K/A: 045 K5.17 - Knowledge of the operational implications of the following concepts as the apply to the MT/B System: Relationship between moderator temperature coefficient and boron concentration in RCS as T/G load increases (2.5/2.7)

Figure 5-10. 3D Doppler Only Power Coefficient vs. Power Level at BOL and EOL, with HFP Equilibrium Xenon, and 3D Power Redistribution Effects

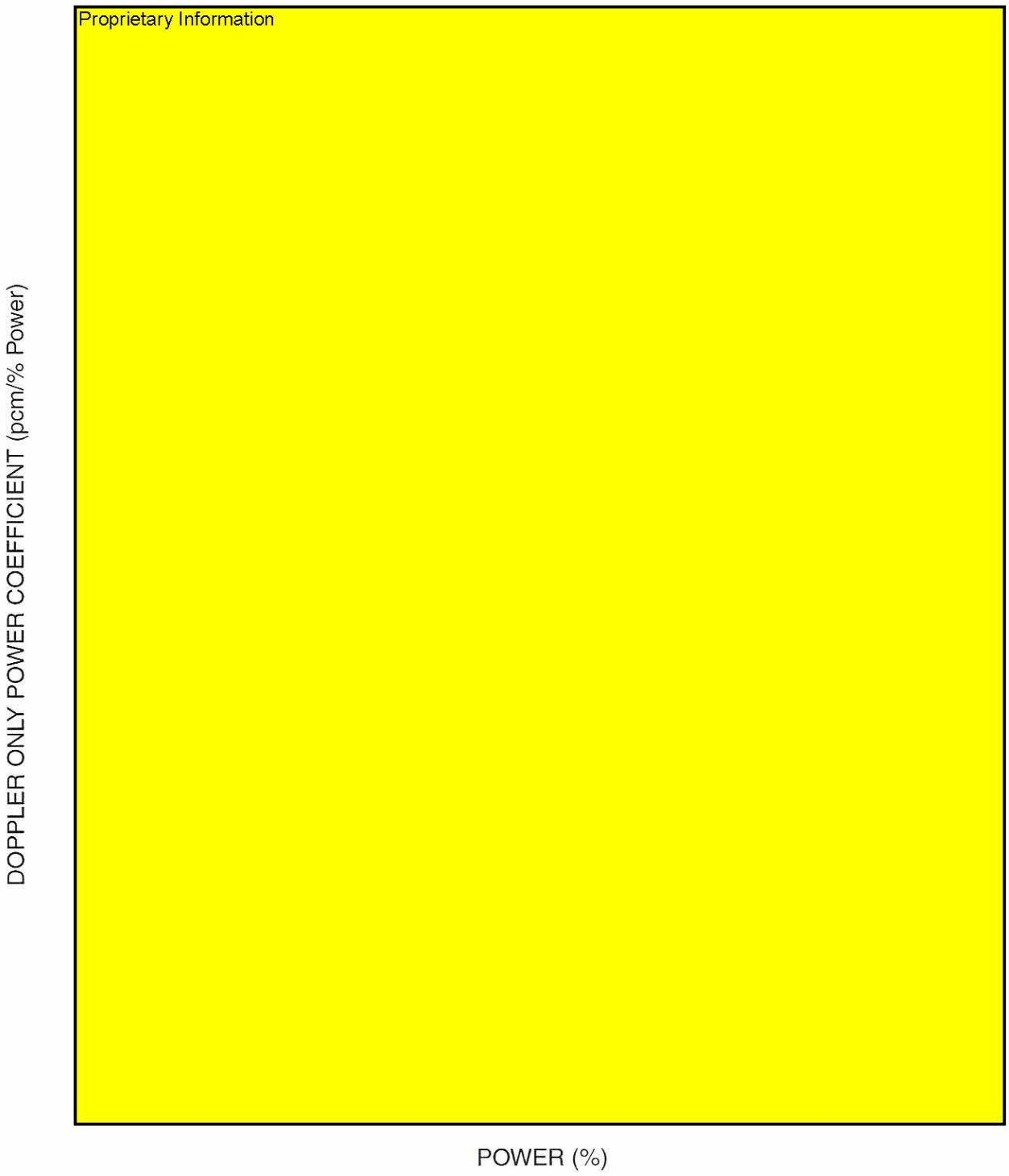


Figure 5-1. ARO Moderator and Isothermal Temperature Coefficients vs. Core Average Moderator Temperature at BOL, HFP Equilibrium Xenon

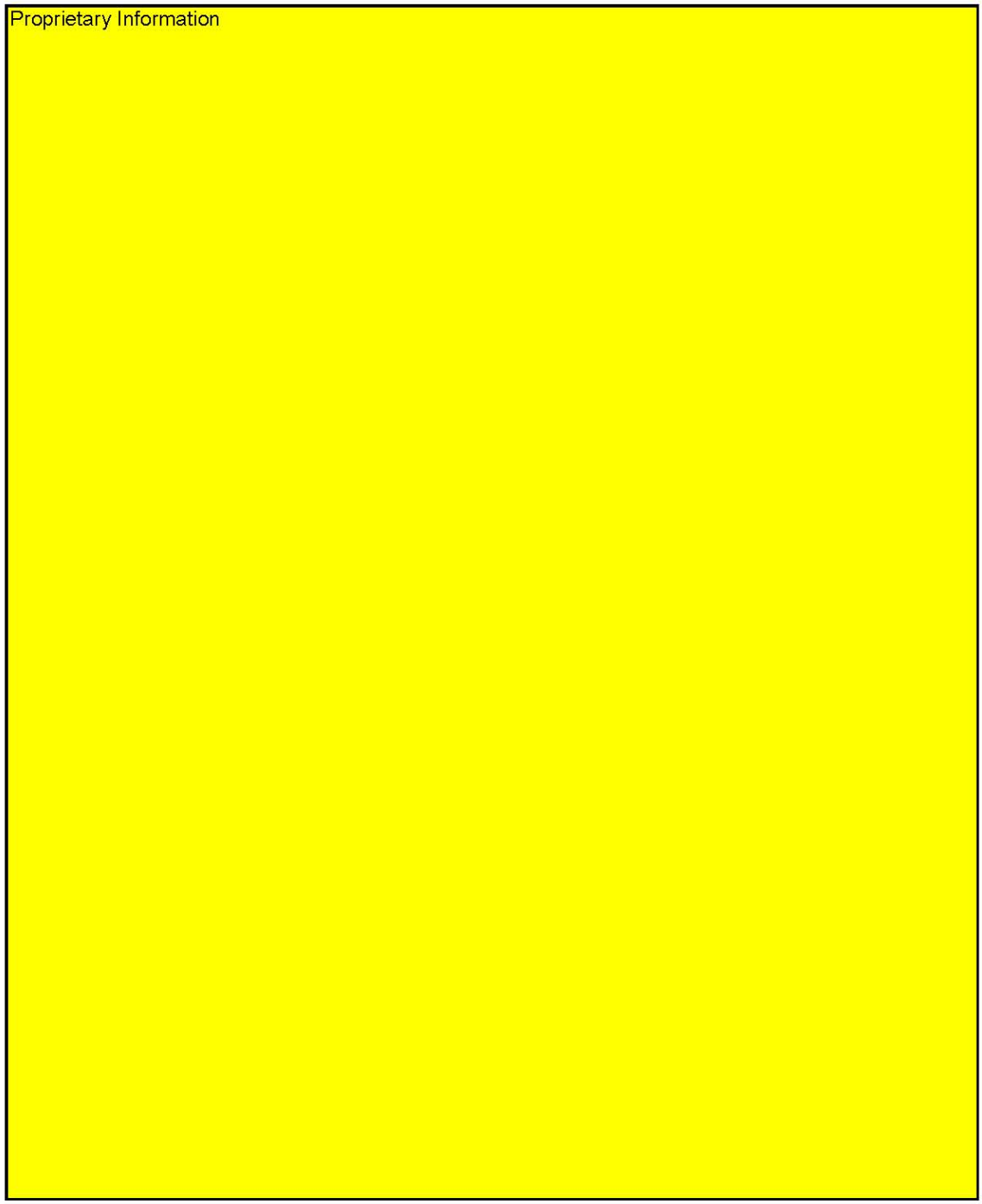
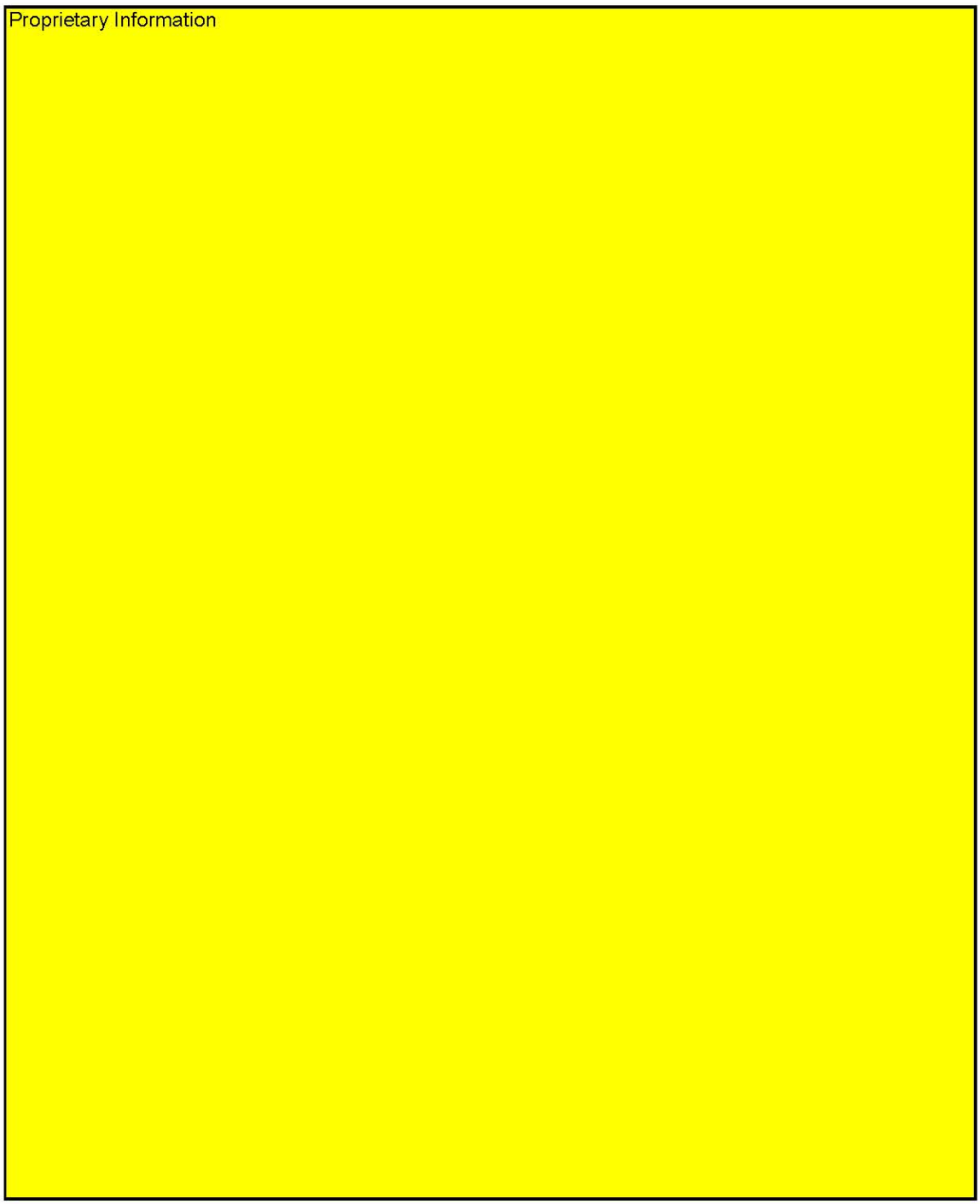


Figure 5-3. ARO Moderator and Isothermal Temperature Coefficients vs. Core Average Moderator Temperature at EOL, HFP Equilibrium Xenon



Question 44.

RO Question 6

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier:	_1___	_____
	Group:	_1___	_____
	K/A:	APE 025 AK2.03	
	Importance Rating:	2.7	2.7

Proposed Question:

GIVEN:

- Unit 1 has just entered MODE 5, cooling down for refueling.
- Both trains of RHR are in service.
- CCW pump 13 is out of service.

One of the two running CCW pumps trip. Due to increasing CCW temperatures the crew is reducing heat loads in accordance with OP AP-SD-4, Loss of Component Cooling Water.

When loads have been reduced, what will be the status of CCW flow to the RHR heat exchangers?

A. Isolated to both heat exchangers.

B. Reduced to both heat exchangers.

C. Unchanged to both heat exchangers.

D. Reduced to one heat exchanger and unchanged to other.

Proposed Answer:

C. Unchanged to both heat exchangers.

Explanation:

A incorrect. Flow is unchanged to both heat exchangers..

B incorrect. Flow is unchanged to both heat exchangers.

C correct. Loads affected are:
- Boric Acid evaporator
- RCPs
- Letdown
- ASDR.
- Flow is not changed to the RHR heat exchangers

D incorrect. Flow to both heat exchangers is unchanged.

Technical Reference(s): OP SD-4

Proposed references to be provided to applicants during examination: None

Learning Objective: 35316 - Identify the basic interrelationships between the RHR system and other systems.

Question Source:
New

Question History: Last NRC Exam: N/A

Question Cognitive Level:
Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41.7 - Design, components, and function of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Comments: No change from initial submittal

K/A: APE 025 AK2.03 - Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: Service water or closed cooling water pumps (2.7/2.7)

Loss of Component Cooling Water

12/13/06
EFFECTIVE DATE

PROCEDURE CLASSIFICATION: QUALITY RELATED

1. SCOPE

1.1 This procedure is used in Modes 5, 6 or core offload when Decay Heat Removal is threatened due to a failure of the CCW System. This failure may have been due to insufficient flow, CCW System IN or OUT leakage, inadequate makeup or high system temperature.

1.1.1 Step 1 selects the correct part of the procedure to use to resolve the current problem.

1.1.2 Steps 2 thru 7 are to be used if the CCW temperature is high or no ASW Pumps are available.

a. A second train of ASW is placed in service if available.

b. ASW flow is verified to be adequate, if not a transition to OP AP SD-3, "Loss of Auxiliary Salt Water" is made, unless this procedure was entered from OP AP SD-3 or it has been determined that ASW Pumps are not capable of being placed in service, then temporary cooling is aligned to the CCW Heat Exchangers.

c. Heat loads into the CCW System are then reduced and alternative methods of heat removal from the CCW System are attempted.

1.1.3 Steps 7 thru 10 are to be used if CCW System flow is low.

a. If no CCW pumps can be started or no ASW Pumps are available then the heat inputs to the CCW System are minimized and a transition is made to OP AP SD-0.

b. If only one CCW pump can be run then CCW flow is reduced to within the capability of one CCW pump.

1.1.4 Steps 11 thru 14 are to be used if there is a leak OUT of the CCW System.

a. Makeup capabilities are verified.

b. The leaking CCW component is identified and isolated.

1.1.5 Steps 15 thru 27 are to be used if there is a leak INTO the CCW System from a higher pressure system such as the Makeup System or the RCS.

a. Makeup is verified to not be the problem.

b. RCS pressure is reduced to minimize CCW System in-leakage.

c. The leaking CCW component is identified and isolated.

1.2 This procedure provides guidance for restoring flow, leak isolation and regaining level.

2. SYMPTOMS

2.1 CCW VITAL HEADER A/B (PK01-06)

2.2 CCW PUMPS (PK01-09)

2.3 CCW SYS SURGE TK LVL/MK-UP (PK01-07)

2.4 CCW HEADER C (PK01-08)

2.5 HIGH RADIATION (PK11-21)

ACTION / EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. GO TO Applicable Steps of this Procedure for Existing Problem with CCW System: • HIGH CCW System Temp - steps 2, 3, 4, 5, 0 and 7 • LOW CCW System Flow - steps 7, 8, 9 and 10 • CCW System OUT-Leakage - steps 11, 12, 13 and 14 • CCW System IN-Leakage - steps 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27	
2. PLACE a Second Train of ASW/CCW In Service per OP E-5:II Section 6.1[T31387]	
3. VERIFY ASW Flow to In Service CCW HX - ADEQUATE: • ASW Pp Amps - GREATER THAN 51 Amps	GO TO OP AP SD-3, LOSS OF AUXILIARY SALT WATER, unless this procedure was entered From OP AP SD-3 or it has been determined that ASW pumps are not capable of being placed in service, then implement Appendix E, Instructions for Loss of Ultimate Heat Sink and continue with step 4.
4. REDUCE CCW Heat Loads:[T31387] • SHUT DOWN the BA Evap • STOP ALL RCPs • ISOLATE Letdown • SWAP ASDR to Other Unit	

ACTION / EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. ESTABLISH Alternative Methods of Heat Transfer From The CCW System: T34915	
a. Heat Transfer to Containment:	
1) START AT LEAST Two CFCUs in Fast Speed WITH GREATER THAN 2000 GPM CCW Flow to ANY Running CFCU	1) RUN ANY AVAILABLE CFCU
2) ESTABLISH Containment Purge Using Fans E-3 AND S-3	2) IF Containment Closure is NOT in Effect, THEN OPEN the Equipment Hatch.
b. Heat Transfer to the Spent Fuel Pool:	
1) VERIFY CCW Flow to the Spent Fuel Pool HX - AT LEAST 2800 GPM (FI-197, 100' El Penetration area)	
NOTE 1: Full flow for Pp 1 is 55 PSID.	
NOTE 2: Full flow for Pp 2 is 39 PSID.	
2) VERIFY Spent Fuel Pp at MAXIMUM Flow	
3) MONITOR Spent Fuel Pool Temperature (TIC-651, 140' El FHB)	
6. ESTABLISH BACKUP Cooling to a CCP:	
IMPLEMENT Appendix C, BACKUP COOLING TO A ECCS CENTRIFUGAL CHARGING PUMP	

ACTION / EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. VERIFY Pps RUNNING – AT LEAST ONE CCW Pp AND ONE ASW Pp RUNNING	REDUCE Heat Input to CCW System: • STOP ALL RCPs. • ISOLATE Letdown. • SHUT DOWN the BA Evap. • IMPLEMENT Appendix C BACKUP COOLING TO A CCP. • SWAP ASDR to Other Unit. • SHUT DOWN the Waste Gas Compressor. • GO TO OP AP SD-0, LOSS OF OR INADEQUATE DECAY HEAT REMOVAL, step 7.
8. VERIFY CCW Pps - AT LEAST TWO RUNNING	VERIFY CCW FLOW - LESS THAN 9200 GPM AND GO TO step 9.
9. VERIFY CCW Temperature: • STABLE OR DECREASING AND • LESS THAN 75°F	GO TO step 1.
10. RETURN to Procedure AND Step In Effect	
11. CHECK CCW System Makeup Status:	
a. VERIFY Makeup Water System available • Makeup Water Transfer Pump ON • Adequate source of makeup water available	a. Refer to OP F-2:VII, "Alternate Makeup Water Sources to the CCW System."
b. Verify Makeup Valves maintaining Surge Tank Level	b. OPEN Makeup Bypass Valves: • CCW-62 (LCV-69) • CCW-65 (LCV-70)

ACTION / EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. CHECK CCW Surge Tk Level - ON SCALE	IF CCW Surge Tk Level is OFF SCALE LOW, THEN LOCALLY MONITOR CCW Pp for Signs of Pp Cavitation. IF A CCW Pp Cavitates, THEN STOP the Cavitating CCW Pp. IF NO CCW Pps are OPERATING, THEN: REDUCE Heat Input to CCW System: • STOP ALL RCPs. • ISOLATE Letdown. • SHUT DOWN the BA Evap. • IMPLEMENT Appendix C BACKUP COOLING TO A CCP. • SWAP ASDR to Other Unit. • SHUT DOWN the Waste Gas Compressor. • GO TO OP AP SD-0, LOSS OF OR INADEQUATE DECAY HEAT REMOVAL, step 7 while continuing to implement this procedure for recovery of CCW System.

ACTION / EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. LOCATE AND ISOLATE the Leak:	
a. Locally inspect CCW System to identify source of leakage	
b. Verify an entire CCW header will not have to be isolated	b. Implement Appendix A, Page 11 of this procedure.
c. Verify that surge tank and connecting piping are intact	c. Implement Appendix D, Page 22 of this procedure.
d. Isolate affected CCW component(s)	d. IF the affected component cannot be isolated, THEN refer to Appendix A, page 11, to clear the affected header.
14. RETURN to Procedure AND Step In Effect	
15. CHECK RM-17A AND RM-17B - NOT IN ALARM	VERIFY RCV-16 - CLOSED.
16. CHECK ANY RCP - RUNNING	GO TO step 18.
17. VERIFY RCP Cooling - AVAILABLE: • FCV-357 - OPEN	STOP ALL RCPs AND VERIFY RCP Seal Injection - IN SERVICE.
18. CHECK CCW Surge Tk Makeup - NOT LEAKING INTO CCW SYSTEM: • LCV-69 - CLOSED, NOT LEAKING BY • LCV-70 - CLOSED, NOT LEAKING BY	LOCALLY ISOLATE Leaking Valves.
19. REQUEST Chemistry to Sample CCW for RCS Activity	

ACTION / EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. CHECK IF RCPs Should be Stopped:	
a. CHECK RCPs - ANY RUNNING	a. GO TO step 24.
b. RCP Seal Delta-P - GREATER THAN 255 PSID	b. STOP ALL RCPs AND GO TO step 24.
21. Reduce RCS Pressure to Maintain RCP Seal Delta-P of 255 PSID	
22. CHECK CCW Surge Tk Level - STABLE	STOP ALL RCPs AND GO TO step 24.
23. GO TO Step 25	

****

CAUTION: Reducing RCS pressure below the CCW System pressure may cause mass loss from the CCW into the RCS. Monitor changes in CCW Surge Tanks as RCS pressure is reduced.

****

24. REDUCE RCS Pressure to Minimum

25. DETERMINE Leak Location:

- Radiation Surveys of Suspected Piping
- Selective Isolation of Primary Sides of Components
- Selective Isolation of CCW Sides of Components
- Verification of Recently Hung Clearances
- Isolation of Components Recently Returned to Service
- Temperature Surveys of Suspected Piping

26. ISOLATE Leak

27. Return to Procedure AND Step In Effect

END

3. APPENDICES

3.1 Appendix A, Clearing a Component Cooling Water Header

3.2 Appendix B, Estimation of Decay Heat and Heatup Rate

3.3 Appendix C, Backup Cooling to an ECCS Centrifugal Charging Pump

3.4 Appendix D, Loss of Surge Tank/CCW System Cross Tie Between Units

3.5 Appendix E, Instructions for Loss of Ultimate Heat Sink

3.6 Appendix F, Estimation of Decay Heat/Heat Removal Capability Graphs

4. ATTACHMENTS

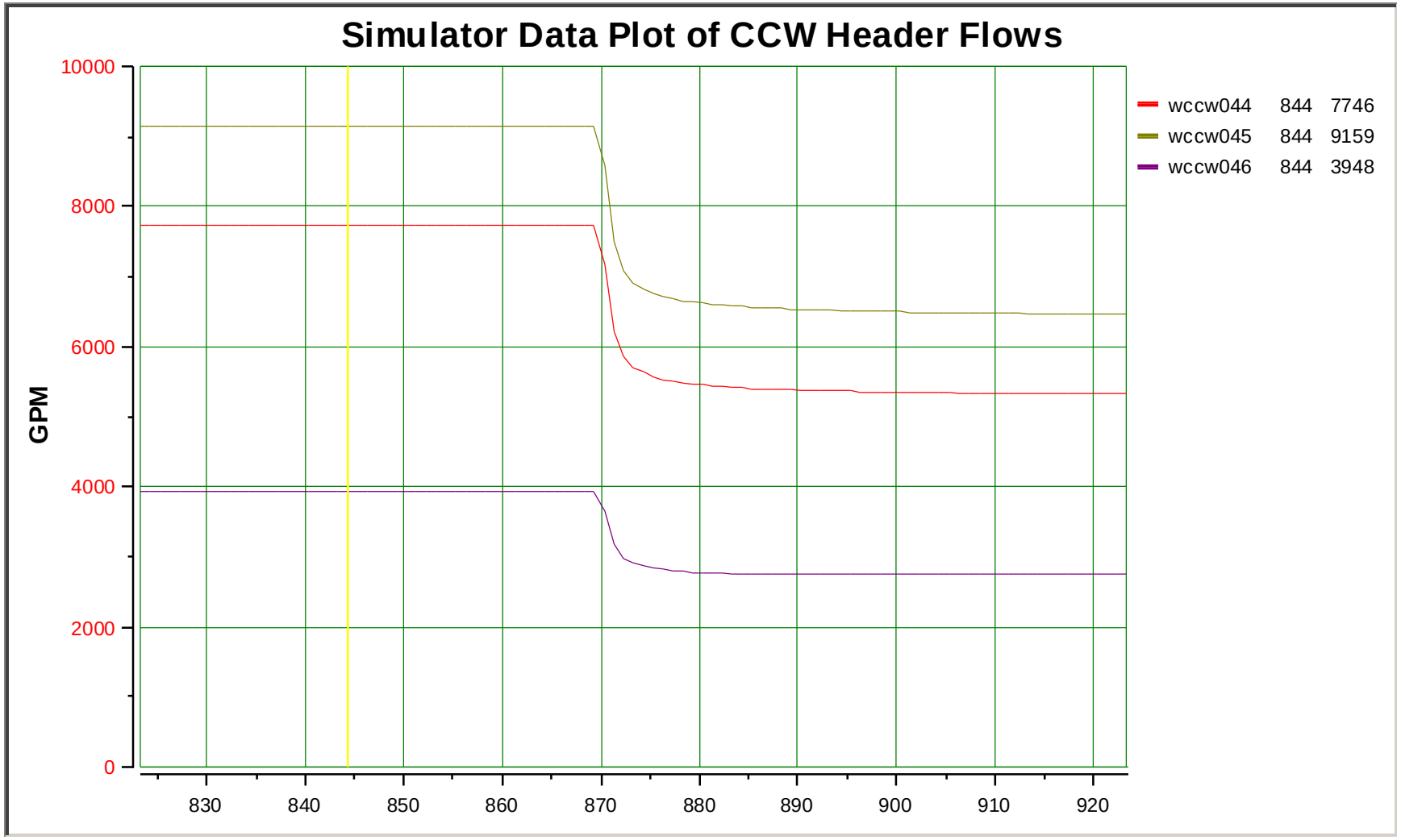
4.1 "FoldOut Page," 11/14/06

5. REFERENCES

5.1 NOS/ISAG Calculational File No. 920815-0, "Heatup Rates During an Outage," August 21, 1992.

5.2 NOS/ISAG Calculational File No. 920831-0, "Revised Inventory Factors for Reduced Inventory Operations," September 1, 1992.

5.3 NESNE Calculational File No. N-147, "Inventory Factors for RCS Heatup," August 19, 1994.


Simulator Data Plot of CCW Header Flows
GPM
10000
8000
6000
4000
2000
0
830
840
850
860
870
880
890
900
910
920
wccw044 844 7746
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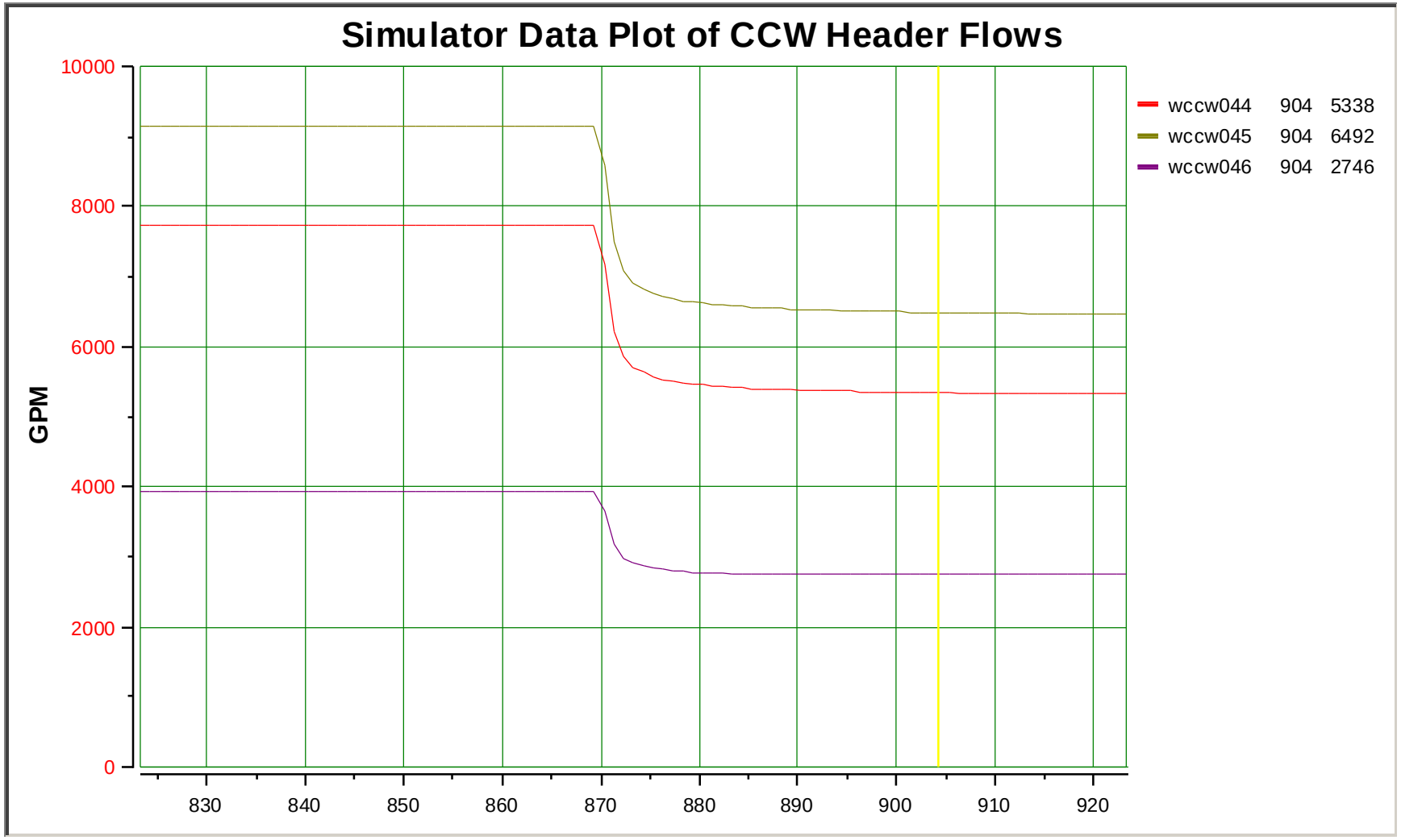
Simulator Data Plot of CCW Header Flows
GPM
10000
8000
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850
860
870
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890
900
910
920
wccw044 904 5338
wccw045 904 6492
wccw046 904 2746

Question 96.

SRO Question 96

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier:	_____	_3__
	Group:	_____	_2__
	K/A:	_____	G2.2.23
	Importance Rating:		3.8

Proposed Question:

Unit 1 is in MODE 5.

A component required to be OPERABLE in MODES 1 – 4 is removed from service.

In accordance with OP1.DC17, Control of Equipment Required by the Plant Technical Specifications or Other Designated Programs, how, if at all, is the inoperable equipment tracked?

A. Tracking is not done.

B. Using an Info TS sheet.

C. Using an Active TS sheet.

D. Documenting the inoperability each night in the Shift Manager Logs.

Proposed Answer:

A. Tracking is not done.

Explanation:

Only A is correct. From OP1.DC17, step 2.1.2 - During refueling outages (Modes 5 or 6) or at other times as approved by the operations manager, tracking of Info TSs will not be done. Elimination of Info TSs reduces unnecessary work tracked by other methods such as Mode transition checklist and clarifies the important TSs for the plant status.

Technical Reference(s): OP1.DC17, step 2.1.2

Proposed references to be provided to applicants during examination: None

Learning Objective: 3503 - Discuss administration requirements of Tech Spec status sheets

Question Source:
New

Question History: Last NRC Exam: N/A

Question Cognitive Level:
Memory or Fundamental Knowledge X
Comprehension or Analysis ____

10 CFR Part 55 Content:

55.43.2 - Facility operating limitations in the technical specifications and their bases.

Comments: No changes from initial submittal.

K/A: G2.2.23 - Ability to track limiting conditions for operations. (3.8)

TITLE: Control of Equipment Required by the Plant Technical Specifications or Other Designated Programs

10/06/05
EFFECTIVE DATE

PROCEDURE CLASSIFICATION: QUALITY RELATED
SPONSORING ORGANIZATION: OPERATIONS
REVIEW LEVEL: "A"

1. SCOPE

1.1 This procedure describes the methods for control and tracking of equipment inoperability as required by the Technical Specifications (TSs) or Equipment Control Guidelines (ECGs). In addition, risk significant equipment (designated per AD7.DC6, On-Line Maintenance Risk Management) unavailability shall also be tracked using this procedure.

1.2 Normally, Technical Specification Tracking sheets should only be used for the above items. However, other items (such as NPDES Permit required instrumentation) may be tracked if desired by the shift foreman (SFM).

2. DISCUSSION

2.1 When equipment required to comply with a TS or ECG LCO, including computer based equipment such as the PPC, EARS, SPDS and main annunciator system, is not able to meet the definition of operability, then tracking equipment status is normally performed using a TS sheet generated in PIMS.

2.1.1 TSs are considered either active or info. If the equipment inoperability causes entry into an action statement, then the TS sheet is considered active. Normally (Modes 1-4) both active and Info TS sheets are tracked for reference and status control purposes.

2.1.2 During refueling outages (Modes 5 or 6) or at other times as approved by the operations manager, tracking of Info TSs will not be done. Elimination of Info TSs reduces unnecessary work tracked by other methods such as Mode transition checklist and clarifies the important TSs for the plant status.

2.1.3 Operations provides a Tech Spec sheet usage guide which describes how to use the PIMS module.

2.2 All items which are risk significant as defined by AD7.DC6, "On-Line Maintenance Risk Management," are to be tracked per this procedure in Modes 1-4 if the equipment is risk significant for the current Mode.

2.3 Other items may also be tracked using a TS tracking sheet as desired by operations management.

5.6.4 The operations manager or operations director should be contacted prior to declaring the equipment operable for concurrence, excluding computer based systems and Emergency Planning equipment (ECG 52 series) which provide functions required by the ECGs. This concurrence shall be documented.

5.7 During Modes 5 and 6 as allowed by paragraph 2.1.2, tracking of the operability of equipment only required during Modes 1-4 is not required. The operability of this equipment shall be verified prior to Mode 4 entry via Mode transition checklists. The SFM should continue to track all Mode 5 and 6 TSs as well as those that apply AT ALL TIMES. Additionally the SFM should track emergent equipment problems which could impact Mode transitions until they are more formally tracked.[T31274]

5.7.1 Prior to entering Mode 4, TS Sheets shall be generated for any equipment which has not yet been restored to operable status.

5.8 Normally, only a single key for either SSPS Train A or B should be issued to prevent Train related problems.

5.9 When SSPS is in service, a component served by one SSPS Train shall not be removed from service with any component in the opposite Train inoperable or out-of-service, except under the following circumstances:[T31252]

5.9.1 The equipment removed from service/return to service is covered in an approved plant procedure which establishes the proper controls to ensure proper actions are taken and the equipment is returned to service when necessary. (Example: Equipment is removed and reinstated by OP L-1, "Plant Heat Up From Cold Shutdown to Hot Standby.")

5.9.2 A loss of safety function analysis has been performed per OP1.DC38, "Safety Function Determination Program."

5.9.3 The evolution is approved by the operations manager.

5.10 The following must be completed whenever a conditional surveillance is required to be performed by operations:[T32351]

5.10.1 Complete the "Conditional Surveillance Required" block of the Tech Spec sheet.

5.10.2 Attachment 8.1 shall be completed and should be reviewed by a second SRO (SFM).

5.10.3 If no other procedure provides documentation for completion of the conditional surveillance, then Attachment 8.2 shall be used to document completion of the conditional surveillance.

Question 99.

SRO Question 99

SRO Question 99 SRO Question 99

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier:	_____	_3__
	Group:	_____	_4__
	K/A:	_____	G2.4.4
	Importance Rating:		4.3

Proposed Question:

Unit 1 is at 50% power. All systems are in Auto.

The operator reports the following:

- Pressurizer pressure is 2250 psig and slowly increasing
- Pressurizer spray valves are closed
- Letdown Orifice Valves are closed
- Charging flow is decreasing
- Pressurizer Level 54% and increasing
- Reactor Cavity Sump levels are 0%

Which of the following abnormal operating procedures would be appropriate to address the current plant conditions?

A. AP-5, Malfunction of Eagle 21 Protection or Control Channel

B. AP-9, Loss of Instrument Air

C. AP-13, Malfunction of Reactor Pressure Control System

D. AP-18, Letdown Line Failure

Proposed Answer:

B. AP-9, Loss of Instrument Air

Explanation:

A incorrect. If a level channel had failed the spray valves would still operate. If a pressure channel failed, letdown would not be isolated.

B correct. Spray valves and letdown orifices would close on loss of air to containment. Loss of letdown causes pressurizer level to increase, which will cause charging to decrease.

C incorrect. System is responding to increasing pressurizer level.

D incorrect, conditions do not reflect those of a break in letdown.

Technical Reference(s): AP-9

Proposed references to be provided to applicants during examination: None

Learning Objective: 3478 - State the entry conditions for abnormal operating procedures

Question Source:
New

Question History: Last NRC Exam: N/A

Question Cognitive Level:
Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content:

55.43.5 - Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Comments: No changes from initial submittal.

K/A: G2.4.4 – Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (4.3)

Pressurizer Level Channel Failures

Controlling Channel Failure	Indications	Alarms	Plant Response
Controlling PZR level fails HI	PZR level meter goes Hi PZR level recorder (if selected) goes High	PROTECTION CHANNEL ACTIVATED (High Level trip) PK04-06, PZR LEVEL HI/LO PK05-21 PZR LEVEL HI/LO CONTROL PK05-01 RCP Seal Alarms PK05-01	Backup heaters will initially energize (+5% deviation) Charging flow will decrease, causing actual level to drop, which eventually will cause letdown to isolate at 17%, and heaters to turn off. After letdown is isolated, actual Pressurizer level will start to increase and eventually cause a high level reactor trip, if the PDP is in service. If the CCP is in service FCV-128 can fully close stopping the increase in PZR level. This response of FCV-128 would also cut off flow to the RCP seals.
Controlling PZR level fails Low (or loses power)	PZR level meter goes Low PZR level recorder (if selected) goes Low	PZR LEVEL HI/LO PK05-21 PZR LEVEL HI/LO CONTROL PK05-22	Charging flow will increase. Letdown will isolate and the heaters will turn off. Actual level will increase, which will eventually cause a high level reactor trip.
Backup PZR level fails low	PZR level recorder (if selected) goes Low	PZR LEVEL HI/LO CONTROL PK05-22	Letdown will isolate and the heaters will turn off
Backup or Non-selected PZR level fails high	PZR level recorder (if selected) goes High	PROTECTION CHANNEL ACTIVATED (High Level trip) PK04-06	None

Note: No effects other than indication if LT-462 fails or loses power.

April 2007 Diablo Canyon NRC Written Exam Analysis

This table is designed to meet the intent of item 6 from ES-403 "Written Examination Grading Quality Checklist". All questions missed by more than half the students will be evaluated for validity of the question.

Question # RO/SRO	Percentage missed	Question valid?	Remediation Required	Improvement in Training Materials Required?
7	100%	See Justification	YES	No
10	64%	See Justification	YES	No
18	73%	YES	YES	No
33	55%	YES	YES	No
36	64%	See Justification	YES	No
44	82%	See Justification	YES	No
45	82%	YES	YES	No
54	37%	YES	YES	No
60	55%	YES	YES	No
89	60%	YES	YES	YES
96	60%	See Justification	YES	No
99	80%	See Justification	YES	No

2007 DCPP NRC EXAM
QUESTION SUMMARY

	1	2	3	4	5	6	7	8	9	10
CANDIDATE										
1	X	X	X	X	X	X	A	X	X	X
2	X	B	C	X	X	X	A	B	X	A
3	X	B	X	X	X	X	A	X	D	C
4	X	B	X	X	X	X	A	X	X	A
5	X	X	X	X	X	X	A	X	X	X
6	X	X	X	X	X	X	A	X	A	C
7	X	X	D	C	X	D	A	B	X	A
8	X	X	X	X	X	X	A	X	X	X
9	X	X	X	X	X	X	A	X	X	X
10	X	B	D	X	X	X	D	X	X	A
11	X	X	X	X	X	X	A	X	X	A
ANSWER	**D**	**C**	**B**	**D**	**C**	**B**	**C**	**A**	**B**	**B**
	100.00%	63.64%	72.73%	90.91%	100.00%	90.91%	0.00%	81.82%	81.82%	36.36%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	11	12	13	14	15	16	17	18	19	20
CANDIDATE										
1	X	X	X	X	X	X	X	D	X	X
2	X	X	X	X	X	X	X	D	X	X
3	X	B	X	X	X	X	X	D	X	B
4	X	X	X	X	X	X	A	X	X	X
5	X	X	X	X	X	X	X	D	X	X
6	X	X	D	X	X	X	X	X	X	X
7	X	X	X	X	X	X	X	A	X	X
8	X	X	X	X	X	X	X	X	X	X
9	X	B	D	X	X	X	X	D	X	X
10	X	D	D	X	X	X	X	D	X	X
11	X	X	X	X	X	D	X	D	X	X
ANSWER	**A**	**A**	**C**	**B**	**C**	**B**	**D**	**C**	**A**	**D**
	100.00%	72.73%	72.73%	100.00%	100.00%	90.91%	90.91%	27.27%	100.00%	90.91%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	21	22	23	24	25	26	27	28	29	30
CANDIDATE										
1	X	X	D	X	X	X	X	X	X	X
2	X	X	D	X	X	X	B	X	D	X
3	A	X	X	X	X	X	X	X	B	B
4	X	X	D	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	B	X	X	X	X	C
7	X	X	X	A	X	X	X	X	B	X
8	X	X	X	X	X	X	X	X	X	X
9	X	X	X	X	X	X	X	X	X	B
10	D	A	D	X	X	X	X	X	X	C
11	X	X	X	X	X	X	B	X	X	X
ANSWER	**B**	**B**	**C**	**B**	**D**	**A**	**A**	**D**	**A**	**D**
	81.82%	90.91%	63.64%	90.91%	90.91%	100.00%	81.82%	100.00%	72.73%	63.64%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	31	32	33	34	35	36	37	38	39	40
CANDIDATE										
1	X	X	C	X	X	D	X	X	X	B
2	X	X	X	X	B	X	X	X	X	X
3	X	X	C	X	X	C	X	X	X	X
4	X	X	X	X	X	B	X	X	X	B
5	X	A	X	X	X	B	X	X	X	X
6	X	X	C	X	X	B	X	X	X	B
7	X	X	A	X	X	B	B	X	X	X
8	X	X	X	X	X	X	X	D	X	A
9	X	X	C	D	X	X	X	X	X	A
10	X	X	C	X	X	B	X	X	X	X
11	X	X	X	X	X	X	X	X	X	X
ANSWER	**A**	**D**	**D**	**C**	**A**	**A**	**A**	**C**	**D**	**D**
	100.00%	90.91%	45.45%	90.91%	90.91%	36.36%	90.91%	90.91%	100.00%	54.55%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	41	42	43	44	45	46	47	48	49	50
CANDIDATE										
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2	X	A	X	B	A	X	X	X	X	X
3	X	A	X	B	A	X	X	D	X	X
4	X	X	X	B	A	X	X	X	D	X
5	X	X	X	D	X	X	X	X	X	X
6	X	X	X	X	A	X	X	X	X	X
7	D	X	X	B	A	D	X	D	X	X
8	X	A	X	D	X	D	X	X	X	X
9	X	X	X	B	A	X	X	X	X	X
10	X	A	X	B	A	X	X	A	X	X
11	X	X	X	X	A	X	X	X	X	X
ANSWER	**B**	**C**	**D**	**C**	**B**	**C**	**D**	**C**	**A**	**B**
	90.91%	54.55%	100.00%	18.18%	18.18%	81.82%	100.00%	72.73%	90.91%	90.91%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	51	52	53	54	55	56	57	58	59	60
CANDIDATE										
1	X	X	X	B	X	X	X	X	X	B
2	X	X	X	A	A	X	X	X	D	X
3	X	X	X	X	C	X	X	X	X	X
4	X	X	D	X	X	X	X	X	X	B
5	X	X	X	X	X	X	X	X	X	C
6	X	X	X	X	X	X	X	X	X	C
7	X	X	B	A	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	B
9	X	X	X	X	X	X	X	X	X	X
10	X	X	X	A	X	X	X	X	X	B
11	X	X	X	X	X	X	X	X	X	X
ANSWER	**B**	**B**	**C**	**C**	**D**	**B**	**C**	**A**	**A**	**D**
	100.00%	100.00%	81.82%	63.64%	81.82%	100.00%	100.00%	100.00%	90.91%	45.45%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	61	62	63	64	65	66	67	68	69	70
CANDIDATE										
1	X	X	X	X	X	X	X	X	A	X
2	X	X	X	X	X	X	X	X	X	X
3	X	X	X	X	X	X	X	X	A	X
4	X	X	X	X	X	X	X	X	A	X
5	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	A	X
7	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X
9	X	X	X	X	X	X	X	X	X	B
10	X	X	X	B	X	X	X	X	C	X
11	X	X	X	X	X	X	X	X	X	X
ANSWER	**A**	**C**	**A**	**C**	**A**	**A**	**D**	**C**	**B**	**C**
	100.00%	100.00%	100.00%	90.91%	100.00%	100.00%	100.00%	100.00%	54.55%	90.91%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	71	72	73	74	75	76	77	78	79	80
CANDIDATE										
1	X	X	X	X	X					
2	X	X	X	X	X					
3	X	X	X	X	X					
4	X	X	X	X	X					
5	X	X	X	X	X					
6	X	X	X	X	X					
7	X	X	C	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X
9	X	X	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X	X	X
11	X	X	X	X	X	X	X	X	X	X
ANSWER	**A**	**B**	**A**	**C**	**C**	**C**	**B**	**D**	**C**	**D**
	100.00%	100.00%	90.91%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	81	82	83	84	85	86	87	88	89	90
CANDIDATE										
1										
2										
3										
4										
5										
6										
7	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X
9	X	D	X	X	C	X	X	X	D	X
10	X	X	X	X	X	X	X	X	D	X
11	X	X	X	X	X	X	X	X	C	X
ANSWER	**B**	**A**	**D**	**C**	**D**	**C**	**B**	**D**	**A**	**A**
	100.00%	80.00%	100.00%	100.00%	80.00%	100.00%	100.00%	100.00%	40.00%	100.00%

2007 DCPP NRC EXAM
QUESTION SUMMARY

	91	92	93	94	95	96	97	98	99	100
CANDIDATE										
1										
2										
3										
4										
5										
6										
7	X	X	X	X	X	B	X	C	A	B
8	X	X	X	X	X	B	X	X	D	X
9	X	X	C	X	X	X	X	X	A	X
10	X	X	C	X	X	C	C	X	X	X
11	X	X	X	X	X	X	X	X	D	X
ANSWER	**B**	**D**	**A**	**C**	**A**	**A**	**D**	**A**	**B**	**A**
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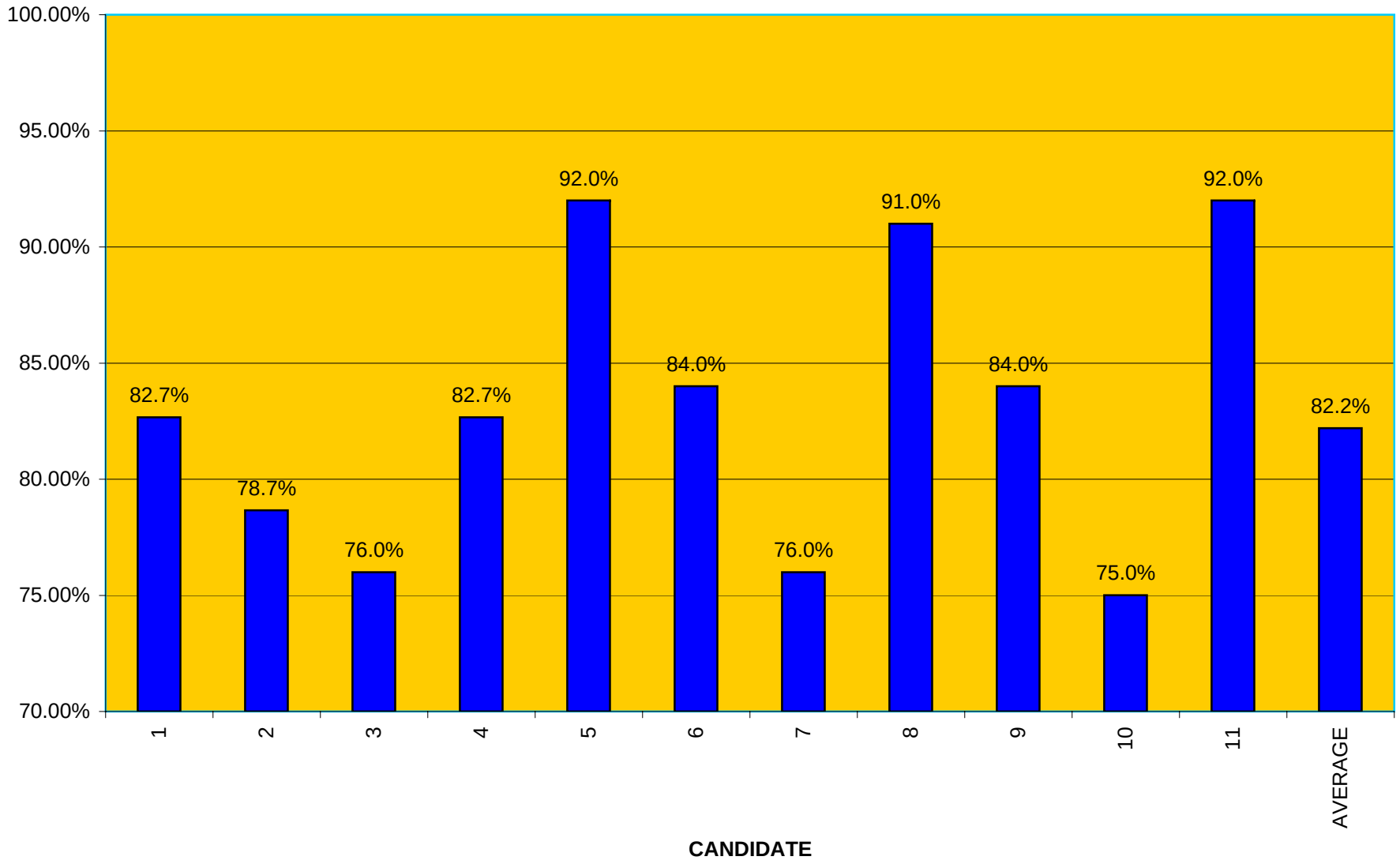
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91.0%
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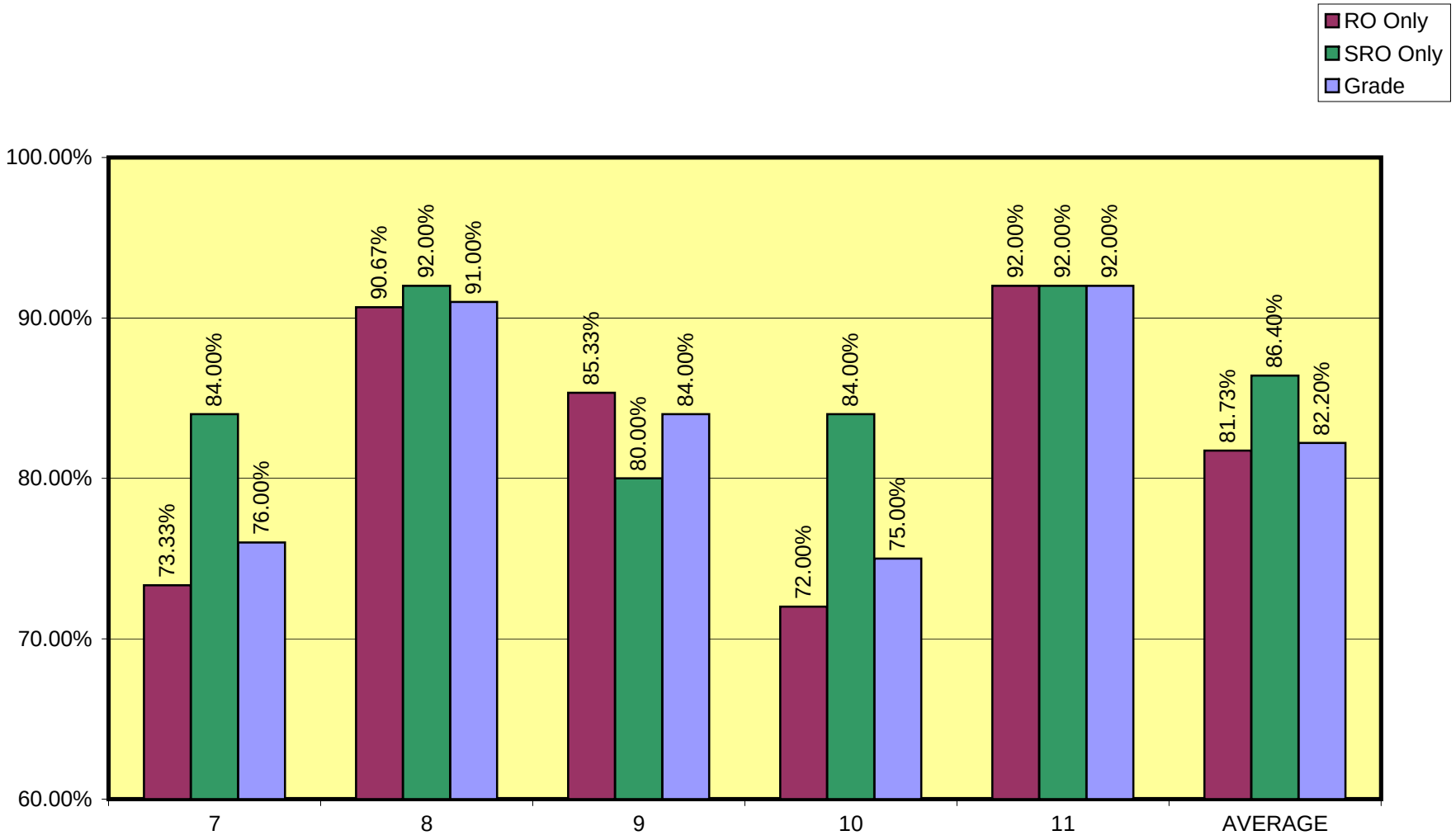
AVERAGE
CANDIDATE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SRO Only
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92.00%
91.00%
85.33%
80.00%
84.00%
72.00%
84.00%
75.00%
92.00%
92.00%
92.00%
81.73%
86.40%
82.20%
7
8
9
10
11
AVERAGE