



102-06796-TNW/FJO  
November 14, 2013

**Palo Verde  
Nuclear Generating Station**  
P.O. Box 52034  
Phoenix, AZ 85072  
Mail Station 7602  
Tel 623 393 6116

Mr. K. D. Clayton  
Chief Examiner, Region IV  
U.S. Nuclear Regulatory Commission  
1600 E. Lamar Blvd.  
Arlington, TX 76011-4511

Dear Mr. Clayton:

Subject: **Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2 and 3  
Docket Nos. STN 50-528/529/530  
2013 Reactor Operator and Senior Reactor Operator  
Examination Results**

Arizona Public Service Company (APS) management has completed its review of the initial operator licensing examination conducted November 1, 2013 thru November 9, 2013. As required by NUREG 1021, Rev 9, Supplement 1, Section ES-501 (C.1.a), the following examination documents were provided to the chief examiner:

- Graded written examinations and clean copy of each applicant's answer sheet
- Master examination(s) and answer key(s) with any necessary annotations
- Any questions asked by and answers given to applicants
- Any substantive comments made by applicants following the written examination with an explanation of why it was accepted or rejected
- Written examination seating chart
- Completed Form ES-403-1, "Written Examination Grading Quality Checklist"
- Results of any written examination performance analysis performed and recommended substantive changes

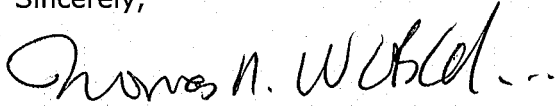
APS will forward the original Form(s) ES-201-3, "Examination Security Agreement," with the appropriate pre- and post-examination signatures by December 10, 2013. This will allow time for APS to obtain signatures from the individuals who had detailed knowledge of any part of the operating tests or written examination.

There are no commitments made to the NRC by this letter.

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November 14, 2013  
Mr. K. D. Clayton  
USNRC, Region IV  
2013 RO and SRO Written Exam Results  
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Please call Warren Potter, Nuclear Training, at (623) 393-6165, if you have questions or require additional information.

Sincerely,



Thomas N. Weber  
Department Leader, Regulatory Affairs

TNW/FJO/hsc

cc:	M. L. Dapas	NRC Region IV Regional Administrator
	V. G. Gaddy	NRC Region IV, Chief, Operations Branch
	L. A. Hurley	NRC Region IV, Licensing Assistant
	J. K. Rankin	NRC NRR Project Manager for PVNGS
	M. A. Brown	NRC Senior Resident Inspector for PVNGS

**PVNGS 2013 LOIT Exam Analysis**  
( > 50% failure Rate)

Q35	<p>During the exam review there was a short discussion of surveillance testing of valves. The majority of those who missed the question chose distracter B, green light on. It was pointed out that during stroke testing; valve indication goes from a single light to dual indication to single light representing valve position. Everyone agreed that the question is correct, fair and relevant.</p> <p>No issues were identified with applicant knowledge or testing.</p> <p>The question will remain as written.</p>
Q91 (SRO 16)	<p>During the exam review there was a discussion about this question, the majority who missed the question chose distracter D, Trip the Reactor. This would have been the correct answer if countrate doubled 4 times (stated in stem) at Hold Point 1 or 2. Many of the applicants assumed that CR had doubled 4 times prior to Hold Point 3 and therefore chose D. Some also stated that they were reluctant to pick an answer that indicated nothing was wrong, continue the startup. The question appears to be somewhat confusing but it was agreed that for the conditions given "B" was in fact the correct answer. Based on the discussions we are going to make the following revisions:</p> <ol style="list-style-type: none"><li>1. Change the question stem such that the two ACPs are outside of the minus 500 pcm position making D the correct answer.</li><li>2. Create a new question with the correct answer being that the Startup may continue but use actual plant data provided by Reactor Engineering to create the stem.</li></ol> <p>No issues were identified with applicant knowledge or testing.</p>

With regards to the (EW) Essential Cooling Water system in mode 1, which of the following is the correct application of Tech Specs?

- (1) When cross connected to the Nuclear Cooling Water (NCW) system, EW is INOPERABLE...  
 (2) When cross connected to the Fuel Pool Cooling, EW is INOPERABLE...

- A. (1) and remains inoperable while cross connected.  
 (2) and remains inoperable while cross connected.
- B. (1) and remains inoperable while cross connected.  
 (2) but operability can be restored if a flow balance is performed because the EW system is sized to supply the SDC heat exchanger, Essential Chiller and the SFP heat exchanger.
- C. (1) but operability can be restored if a flow balance is performed because the EW system is sized to supply the NCW priority loads and the SDC heat exchanger.  
 (2) and remains inoperable while cross connected.
- D. (1) but operability can be restored if a flow balance is performed because the EW system is sized to supply the NCW priority loads and the SDC heat exchanger.  
 (2) but operability can be restored if a flow balance is performed because the EW system is sized to supply the SDC heat exchanger, Essential Chiller and the SFP heat exchanger.

Answer: B

<b>Justification:</b>		
A	Wrong	Operability is not restored for EW when cross tied to NC even if a flow balance is completed. EW is not sized to supply both NC priority loads and the SDC heat exchanger. EW is sized to carry the SFP heat exchanger, Essential chiller and the SDC heat exchanger. Operability is restored if a flow balance is completed after cross ting to Fuel Pool Cooling. Distracters A and D are plausible because one part of the answer is correct. Distracter C is plausible because the answers are true for the opposite condition
B	<b>Correct</b>	
C	Wrong	
D	Wrong	
<p><b>Proposed reference to be provided:</b> None</p> <p><b>Technical Reference:</b> 40OP-9EW01, Essential Cooling Water</p> <p><b>K&amp;A:</b> Ability to explain and apply system limits and precautions. Loss of Nuclear Service Water</p>		

<b>Question 80 Info</b>	
Points:	1.00
Time to Complete:	3
Difficulty:	3.00
System ID:	44048
User-Defined ID:	Q44048
Topic:	Q44153 explanation of notes and cautions in the EW procedure
RO	3.8
SRO	4.0
KA#	2.1.32
<b>Revision</b>	<b>09/24/2013 rev; 0 Replaces Q44048</b>

### **Question 80 Table-Item Links**

#### Q - 10CFR Sections

55.43 (2) Facility operating limitations in the technical specifications and their bases.

#### Q - Cognitive Level

Memory

#### Q - Question Source

New

#### Q - SRO Exam

SRO Exam 2013

#### O - SRO Tier Group Designation

Tier 1 Group 1

#### **Associated objective(s):**

describe how flow to the RCPs is increased after EW has been cross tied

With regards to the (EW) Essential Cooling Water system in mode 1, which of the following is the correct application of Tech Specs?

- (1) When cross connected to the Nuclear Cooling Water (NCW) system, EW is INOPERABLE...  
 (2) When cross connected to the Fuel Pool Cooling, EW is INOPERABLE...

- A. (1) and remains inoperable while cross connected.  
 (2) and remains inoperable while cross connected.
- B. (1) and remains inoperable while cross connected.  
 (2) but operability can be restored if a flow balance is performed because the EW system is sized to supply the SDC heat exchanger, Essential Chiller and the SFP heat exchanger.
- C. (1) but operability can be restored if a flow balance is performed because the EW system is sized to supply the NCW priority loads and the SDC heat exchanger.  
 (2) and remains inoperable while cross connected.
- D. (1) but operability can be restored if a flow balance is performed because the EW system is sized to supply the NCW priority loads and the SDC heat exchanger.  
 (2) but operability can be restored if a flow balance is performed because the EW system is sized to supply the SDC heat exchanger, Essential Chiller and the SFP heat exchanger.

Answer: A & B

<b>Justification:</b>	
A	<b>Correct</b>
B	<b>Correct</b>
C	Wrong
D	Wrong
<p>Originally B was identified as the only correct answer but after review it has been determined that A is also correct.</p> <p>Given only conditions stated in the stem, 'A' and 'B' are correct answers.</p> <p>EW is INOPERABLE when cross connected to either the NC or SFP cooling systems. EW may be restored to OPERABLE when connected to SFP cooling if a flow balance is performed. The stem makes no reference to a flow balance being performed.</p> <p>'A' would have been wrong if the statement read (1) and remains inoperable when cross connected <u>regardless of performing a flow balance</u>.</p> <p>'B' is still correct (1) is correct and (2) is correct in stating that operability is restored if a flow balance is performed.</p> <p>'C &amp; D' are both still wrong because (1) is a wrong statement for both.</p> <p>Operability is not restored for EW when cross tied to NC even if a flow balance is completed. EW is not sized to supply both NC priority loads and the SDC heat exchanger. EW is sized to carry the SFP heat exchanger, Essential chiller and the SDC heat exchanger. Operability is restored if a flow balance is completed after cross tying to Fuel Pool Cooling.</p> <p>Distracter D are plausible because one part of the answer is correct.</p> <p>Distracter C is plausible because the answers are true for the opposite condition</p>	

**Proposed reference to be provided:** None

**Technical Reference:** 40OP-9EW01, Essential Cooling Water

**K&A:** Ability to explain and apply system limits and precautions. Loss of Nuclear Service Water

Question 80 Info	
Points:	1.00
Time to Complete:	3
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System ID:	44048
User-Defined ID:	Q44048
Topic:	Q44153 explanation of notes and cautions in the EW procedure
RO	3.8
SRO	4.0
KA#	4.2 062 2.1.32
<b>Revision</b>	<b>09/24/2013 rev; 0 - Replaces Q44048</b> <b>11/04/2013 rev: 1 – identifies two correct answers</b>

### Question 80 Table-Item Links

#### Q - 10CFR Sections

55.43 (2) Facility operating limitations in the technical specifications and their bases.

#### Q - Cognitive Level

Memory

#### Q - Question Source

New

#### Q - SRO Exam

SRO Exam 2013

#### O - SRO Tier Group Designation

Tier 1 Group 1

#### **Associated objective(s):**

describe how flow to the RCPs is increased after EW has been cross tied

Essential Cooling Water System (EW) Train A

40OP-9EW01

Revision  
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**NOTE**

\_\_\_ Cross tying Essential Cooling Water to Spent Fuel Pool Cooling impacts **OPERABILITY of Essential Cooling Water until a flow balance has been completed.**

- \_\_\_ 6.6.9 Open EWA-HCV-67, "A" Essential Cooling Water Isol Valve From SFP Heat Exchanger.
- \_\_\_ 6.6.10 Open EWA-HCV-133, "A" ECW Isolation Valve To Spent Fuel Pool Heat Exchanger.
- \_\_\_ 6.6.11 Monitor EWN-LG-0089, "A" ECW Surge Tank Level Sightglass, for a stable level between 20 and 50 inches during venting.  
(120' Aux Bldg, West)
- \_\_\_ 6.6.12 Perform the following to vent from NCA-V203, Vent Vlv on Fuel Pool HT EX A Inlet Line:  
(100' Aux Bldg South of ECW HX A)
  - \_\_\_ 6.6.12.1 Install a vent hose at NCA-V203, Vent Vlv on Fuel Pool HT EX A Inlet Line.
  - \_\_\_ 6.6.12.2 Vent from NCA-V203, Vent Vlv on Fuel Pool HT EX A Inlet Line.
  - \_\_\_ 6.6.12.3 **WHEN** venting from NCA-V203, Vent Vlv on Fuel Pool HT EX A Inlet Line, is complete,  
**THEN** close NCA-V203, Vent Vlv on Fuel Pool HT EX A Inlet Line.
  - \_\_\_ 6.6.12.4 Remove vent hose from NCA-V203, Vent Vlv on Fuel Pool HT EX A Inlet Line.
  - \_\_\_ 6.6.12.5 Install a pipe cap at NCA-V203, Vent Vlv on Fuel Pool HT EX A Inlet Line.
- \_\_\_ 6.6.13 Perform the following to vent from NCA-V205, Vent Vlv on Fuel Pool HX A Dischg Line:  
(100' Aux Bldg South of ECW HX A)
  - \_\_\_ 6.6.13.1 Install a vent hose at NCA-V205, Vent Vlv on Fuel Pool HX A Dischg Line.
  - \_\_\_ 6.6.13.2 Vent from NCA-V205, Vent Vlv on Fuel Pool HX A Dischg Line.
  - \_\_\_ 6.6.13.3 **WHEN** venting from NCA-V205, Vent Vlv on Fuel Pool HX A Dischg Line, is complete,  
**THEN** close NCA-V205, Vent Vlv on Fuel Pool HX A Dischg Line.



Essential Cooling Water System (EW) Train A

40OP-9EW01

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Number	Name	Location	Required Position	Positioned By	Verified By
NA	NCN-FI-256, equalizing valve	100' Fuel Bldg FPHX A	Open		
NA	NCN-FI-256, local low side isolation valve	100' Fuel Bldg FPHX A	Closed		
NCA-V109	NCN-FI-256 Root Isolation	100' Fuel Bldg FPHX A	Closed		
NCA-V110	NCN-FI-256 Root Isolation	100' Fuel Bldg FPHX A	Closed		
N/A (component) NOT manipulated					
<b>Date Completed:</b>					

- \_\_\_ 6.7.17 Ensure restoration of components controlled by 40AC-0ZZ06, Locked Valve, Breaker, and Component Control, is documented per 40DP-9OP19, Locked Valve, Breaker and Component Tracking.
- \_\_\_ 6.7.18 Notify the SM/CRS of BOTH of the following:
  - Train A EW flow is balanced
  - **Train A EW may be evaluated for OPERABILITY**

**End of Section 6.7**

Essential Cooling Water System (EW) Train A

40OP-9EW01

Revision  
22

**6.9 Placing EW Train A In Service On Nuclear Cooling Water System**

6.9.1 Purpose: EW system may be lined up to supply ALL of the following Nuclear Cooling Water (NC) loads:

- Reactor Coolant Pumps
- Control Element Drive Motor Air Cooling Units (CEDM ACUs)
- Normal Chillers
- Nuclear Sample Coolers

\_\_\_ 6.9.2 The following Prerequisites are met:

\_\_\_ 6.9.2.1 Nuclear Cooling Water pump handswitches are in pull-to-lock per 40OP-9NC01, Nuclear Cooling Water (NC)

\_\_\_ 6.9.2.2 Train A Essential Spray Pond is in operation per 40OP-9SP01, Essential Spray Pond (SP) Train A

\_\_\_ 6.9.2.3 Train A EW System is aligned per ONE of the following:

- Section 6.1, Placing EW Train A In Standby Operation
- Section 6.3, Manual Operation of EW Train A
- Section 6.4, Returning EW Train A to Standby After Running

\_\_\_ 6.9.3 Initial Condition: REP has been issued if required.

\_\_\_ 6.9.4 Check Train B Safety Equipment is OPERABLE.

**CAUTION**

\_\_\_ Cross-connecting EW and NC impacts OPERABILITY of Train A EW and supported systems.

\_\_\_ 6.9.5 Close NCN-UV-99 using handswitch NCN-~~HS~~-99, Nuclear Clg Wtr Cntmt Hdr Return Vlv UV-99.

\_\_\_ 6.9.6 **IF** EW A System is NOT in operation, **THEN** perform the following to start Essential Cooling Water

There are no recovery steps if EW is aligned to support the NC system



Standard Appendices Technical Guideline

40DP-9AP17

**Revision**  
25

**Appendix 63 Cross-connect EW to NC**

This appendix will be used during an event where the Nuclear Cooling Water Pumps are lost and Essential Cooling Water is required to supply cooling water to the Nuclear Cooling Water priority loads.

Essential Cooling Water flow will be throttled down at the SDHX outlet in order to force flow through the NC piping. Prior to throttling flow, the normal chiller NC outlet valves for the B, C and E02 chillers are closed or checked closed to maximize flow through the RCP seals. This is based on the assumption that this appendix is being used during a Loss of Offsite Power and the A Normal Chiller will be started.

Flow should be throttled until the RCP seal cooler alarms are clear with the NC outlet valve for the A Normal Chiller open. Total EW system flow as read on B02 should not be allowed to go below 8500 gpm.

Attachment 63-A directs actions to align Train A Essential Cooling Water to the Train A Spent Fuel Pool Heat Exchanger.

Attachment 63-B directs actions to align Train B Essential Cooling Water to the Train B Spent Fuel Pool Heat Exchanger.

Reasons for Operability/Inop when EX is cross connected to NCW or SFP cooling

**Appendix 64 Align EW to SFP**

The NC system is the normal cooling medium for the normal fuel pool heat exchangers. On a LOOP, the NC system is lost and will cause the spent fuel pool temperature to rise. Essential cooling water is the alternate cooling water for the fuel pool heat exchangers.

The design of the EW system is such that one train of EW is sized to supply the SDCHX, the essential chiller and one SFP heat exchanger. The train of EW that supplies nuclear cooling priority loads is sized to supply only these loads.

Attachment 64-A directs actions to align Train A Essential Cooling Water to the Train A Spent Fuel Pool Heat Exchanger. Direction is also given to throttle EW System flow and Essential Chiller EW flow.

Attachment 64-B directs actions to align Train B Essential Cooling Water to the Train B Spent Fuel Pool Heat Exchanger. Direction is also given to throttle EW System flow and Essential Chiller EW flow.

Values for EW flow settings are based on EW flows directed by the Essential Cooling Water System Normal Operating Procedures 40OP-9EW01 and 40OP-9EW02 which satisfy requirements of the EW Design Basis Manual and account for instrument uncertainties.

EW flow to the Essential Chillers is normally controlled by the Refrigerant Head Pressure Control Valve, However, when Spray Pond Temperature is 65 °F or more, manual adjustment of EW flow is needed to ensure design flow requirements are satisfied.

Note for the exam file:

The staff at Palo Verde did not include the post exam comments for Question 80 in the post exam comments file. It was sent via e-mail and the body of their discussion on the recommended change to accept both distracter "A" and original answer "B" as correct answers for this question is contained in the pedigree section of the modified Q80 worksheet. Both the original question worksheet as administered (rev 0) and the proposed Q80 worksheet (rev 1) with this explanation on why the staff at PV believe both answers are correct are contained in this document for clarity and also included in the exam report as required by NUREG-1021.

Kelly Clayton  
Chief Examiner