

NUREG 1021 / 10 CFR 55



102-07040-MAM/DJH  
April 24, 2015

**Palo Verde**  
**Nuclear Generating Station**  
P.O. Box 52034  
Phoenix, AZ 85072  
Mail Station 7636  
Tel 623 393 4972

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

Dear Sir:

Subject: **Palo Verde Nuclear Generating Station (PVNGS)**  
**Units 1, 2, and 3**  
**Docket No. STN 50-528, 50-529, 50-530**  
**2015 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 April 13, 2015 thru April 21, 2015. Per NUREG 1021, Rev 9, Supplement 1, Section ES-501 (C.1.a), this letter provides the required post examination documents. There were no substantive comments made by the applicants following the written examination. The following examination documents are enclosed:

- Graded written examinations including each applicant's original answer sheet and exam cover sheet
- Two (2) clean copies of each applicant's answer sheet (made prior to grading)
- Master examination(s) and answer key(s), annotated to indicate any changes made while administering and grading the examination(s)
- Any questions asked by and answers given to the applicants during administration of the written exam
- Written examination seating chart
- Completed ES-403-1, Written Examination Grading Quality Checklist, signed by facility supervisor or manager
- Results of any written exam performance analysis that was performed, with recommended substantive changes
- Justification for any recommended exam changes
- Copies of conditions reports written or to be written as a means to improve exam processes, procedure quality, training quality, exam security, simulator fidelity, and any other general topics that relate to the exam process

As discussed with the Chief Examiner, APS will obtain post-exam signatures from individuals who had detailed knowledge of any part of the operating tests or written examination and electronically forward completed Form(s) ES-201-3, "Examination Security Agreement," with the appropriate pre- and post-examination signatures.

**Withhold from Public Disclosure Under 10 CFR 2.390 - Exam Security**  
**This page is decontrolled upon separation from the enclosures.**

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APS requests that the NRC Region IV office delay public release of the proposed and final written examinations and answer keys for a period of 24 months from the date of the examination completion.

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

Please call Joe Allison, Nuclear Training Section Leader, at (623) 393-6335 if you have questions or require additional information.

Sincerely,



Mark A. McGhee  
Regulatory Affairs Department Leader

MAM/FJO/hsc

**Enclosures:**  
**Hard Copy**

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9. Copies of conditions reports written or to be written as a means to improve exam processes, procedure quality, training quality, exam security, simulator fidelity, and any other general topics that relate to the exam process

cc: (w/o enclosures)

M. L. Dapas	NRC Region IV Regional Administrator
V. G. Gaddy	NRC Region IV, Chief, Operations Branch
C. A. Peabody	NRC Senior Resident Inspector for PVNGS
L. A. Hurley	NRC Region IV, Licensing Assistant, Operations Branch

## **ENCLOSURES**

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# 2015 NRC Initial License Written Exam Analysis

(Questions exceeding 50% failure rate)

Question	Failure Rate %	Analysis
4 Q44198	57	<b>Question is verified correct.</b> Associated LP NKASMC040703 addresses knowledge requirement. Every examinee who missed question answered that all requirements to verify natural circulation were met. If the examinee used That instead of the required CET temperature then the requirements did appear to be met. This appears to be knowledge issue that will be addressed in the exam review and gap training. No substantive changes are recommended.
8 Q44275	52	<b>Question is verified correct.</b> Associated LP NKASYC014306 addresses only the status of the BU heaters for the given conditions. Every examinee correctly identified that the Class backup heaters would be de-energized. There appears to be weakness in pressurizer pressure response for the given conditions. This appears to be fundamentals knowledge issue that will be addressed in the exam review and gap training. No substantive changes are recommended.
74 Q44298	91	<b>Question is verified correct.</b> Associated LP NKASMC040703 addresses the knowledge requirement. Every examinee that missed the question chose "A", the correct answer for a Unit 1 event. The question stated Unit 2 making "B" the correct answer. This is an attention to detail issue. No substantive changes are recommended.

## 2015 NRC Initial License Written Exam Change Justification

The following 2015 NRC license exam questions required changes based on the exam analysis conducted following administration of the exam conducted 4/21/2015 at PVNGS:

Q29 Q44311	<p><b>Changed correct answer from "D" to "C" which "C" is the <u>only</u> correct answer.</b></p> <ul style="list-style-type: none"><li>• 23 of 24 (96%) examinees chose "C".</li><li>• Both C and D were correct in part (1) in that RCS temperature will lower when placing an isolated IX in service. (2) However in response to a lower RCS temperature the crew would "dilute" not borate making "C" the correct answer.</li><li>• The question validation results did not reveal the correct answer.</li><li>• Correct answer has been verified with both Training and Operations staff.</li><li>• The validation process failed to identify "C" as the correct answer.</li><li>• PVAR 4647769 has been generated to evaluate this condition.</li></ul>
Q84 Q44177	<p><b>Changed correct answer from "D" to "C" which "C" is the <u>only</u> correct answer.</b></p> <ul style="list-style-type: none"><li>• 24 of 24 (100%) examinees chose "C".</li><li>• Correct answer has been verified with both Training and Operations staff.</li><li>• The original version of this question identified EAL RA2.2 as the correct answer. Following the initial validation of the question, it was identified that the question required modification to ensure no overlap issues. This revision change to the question stem made the previous correct answer incorrect. The correct answer was not properly updated on the answer key.</li><li>• The validation process failed to identify "C" as the correct answer.</li><li>• PVAR 4647769 has been generated to evaluate this condition.</li></ul>

Given the following conditions:

- Unit 1 is operating at 100% power

(1) What is the predicted effect on the RCS if a Purification ion exchanger that has been isolated for 5 days is placed in service without performing any pre-service flushes?

(2) What actions should be taken to offset the reactivity change?

- A. (1) RCS temperature will rise (2) RCS dilution
- B. (1) RCS temperature will rise (2) RCS boration
- C. (1) RCS temperature will lower (2) RCS dilution
- D. (1) RCS temperature will lower (2) RCS boration

Answer: D

Correct answer was changed to "C".

After reviewing the as given conditions with Operations and Training personnel the following determinations have been made: Even though an isolated and cooled down IX placed in service would have an affinity to absorb boron the over-riding effect would be the 10-15 ppm RCS dilution that would have occurred over those 5 days due to fuel depletion. Therefore placing the IX back in service without pre-service flushes would have caused a small boration and subsequent lowering of RCS temperature. To maintain 100% reactor power and RCS T-cold on program the operators would dilute to offset the negative reactivity and raise RCS T-cold to the program value.

# Reactivity Control Worksheet

IC20 - U1C19

## CURRENT DATA:

DATE	Today	EFPD	250	POWER	100%
BORON	814	XENON	-2659		

## CORE DATA BOOK: Interpolated Data

Power Coefficient	-19.65	pcm/1% power change
ITC	-22.05	pcm/oF(T-cold change)
Boron Worth	-7.49	pcm/ppm(RCS Boron change)
Grp 5 Rod Worth	-2.19	pcm/inch CEA motion

## CALCULATED REACTIVITY WORTHS:

Power changes holding T-cold on-program/No Xenon change

9 inch Grp 5 motion/1% power change

60 gal boration/1% power reduction

250 gal dilution/1% power rise

Δppm per % power change

2.6

T-cold changes holding Power (Steam Demand) constant

10 inch Grp 5 motion/1oF T-cold change

67 gal boration/1oF T-cold reduction

281 gal dilution/1oF T-cold rise

Δppm per deg Tc change

2.9

Boration Required to Meet SDM @ 500F with Xe Credit during Normal C/D

17 ppm which is approximately

427 gallons boration

Boron Req'd to meet SDM FOR AN EOP EVENT assuming all FSCEA's fully insert (3.1.X)

Target [B] @ 500 oF:

1145 ppm

Credited [B] @ 500 oF:

1128 ppm(eq)

Predicted [B] @ 500 oF:

1064 ppm

Predicted [B] @ 500 oF with Xe credit:

1377 ppm(eq)

Boration required prior to cooldown:

0 ppm which is approximately

0 gallons boration

(Final Boron Concentration must be verified by sampling before SDM is satisfied.)

Boron Req'd to maintain 1% subcritical during EOP EVENT cooldown with one or more stuck CEAs

Boron req'd to maintain 1% subcritical with 1 Stuck CEA

438 ppm

Additional Boron req'd for each additional Stuck CEA

310 ppm

All makeup must be from a borated source during the cooldown!

Prepared by: STA

Date/Time: Today / NOW

Reviewed by: SM

Date/Time: Today / NOW