10 CFR 50.73

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

Dwight C. Mims
Senior Vice President
Nuclear Regulatory Affairs and Oversight

Tel. 623-393-5403
Fax 623-393-6077

Mail Station 7605
P. O. Box 52034
Phoenix, Arizona 85072-2034

102-06366-DCM/DCE
June 07, 2011

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS) Unit 2
Docket No. STN 50-529
License No. NPF- 51
Licensee Event Report 2011-001-00

Enclosed please find Licensee Event Report (LER) 50-529/2011-001-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports a condition prohibited by Technical Specifications that occurred as a result of continued irradiated fuel movement while the Control Room air intake radiation monitors were inoperable with the Control Room Essential Filtration System not in the essential filtration mode required for post-accident emergency alignment.

In accordance with 10 CFR 50.4, copies of this LER are being forwarded to the Nuclear Regulatory Commission (NRC) Regional Office, NRC Region IV and the Senior Resident Inspector. If you have questions regarding this submittal, please contact Marianne Webb, Section Leader, Regulatory Affairs, at (623) 393-5730.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,

D.C. Mims

DCM/TNW/MNW/DCE/gat

Enclosure

cc: E. E. Collins Jr. NRC Region IV Regional Administrator
L. K. Gibson NRC NRR Project Manager for PVNGS (electronic / paper)
J. R. Hall NRC NRR Senior Project Manager (electronic / paper)
M. A. Brown NRC Senior Resident Inspector for PVNGS

IE22
NRR

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Palo Verde Nuclear Generating Station (PVNGS) Unit 2	05000529	1 OF 8

4. TITLE

Irradiated Fuel Movement with Misaligned Control Room Essential Filtration System

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	08	2011	2011	- 001 -	00	06	07	2011	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

6

10. POWER LEVEL

0

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Marianne Webb, Section Leader, Regulatory Affairs	623-393-5730

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

At 1803 on April 8, 2011, during reactor core offload for the 16th Unit 2 refueling outage, Unit 2 entered Technical Specification Limiting Condition for Operation (TS LCO) 3.3.9 when the Control Room Essential Filtration Actuation Signal (CREFAS) was declared inoperable due to both Control Room intake radiation monitors being out of service. Irradiated fuel movement was allowed to continue due to an incorrect understanding that the already in-service Control Room Essential Filtration System (CREFS) "B" train air handling unit fulfilled the required action of the LCO. At 2140, the Outage Shift Manager entered the Control Room and noted that the Control Room was not fully pressurized and questioned whether the required actions of LCO 3.3.9 were met. At that time, the Control Room staff recognized that required dampers had not been closed. Re-alignment of the dampers was completed at 2146 to comply with the required actions of the LCO. The root cause was imprecise terminology in LCO 3.3.9 Required Action C.1, which did not specify that CREFS shall be placed in the essential filtration mode required for post-accident emergency alignment. A License Amendment Request will be submitted to provide more specific direction in LCO 3.3.9 regarding alignment of CREFS. The station has not reported any other TS 3.3.9 violations in the past three years.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2011	-- 001	-- 00	2 OF 8

NARRATIVE

All times are Mountain Standard Time and approximate unless otherwise indicated.

1. REPORTING REQUIREMENT(S):

This event is reportable as a condition prohibited by Technical Specifications (TSs) per 10 CFR 50.73(a)(2)(i)(B).

2. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):

The Control Room Essential Filtration Actuation Signal (CREFAS)(EIIS: JE) automatically actuates the Control Room Essential Filtration System (CREFS) (EIIS: VI). The CREFAS is initiated by a control room air intake high airborne radioactivity signal from either of two radiation monitors (EIIS: IL) RU-29 and RU-30, a Fuel Building Essential Ventilation Actuation Signal (FBEVAS) (EIIS: VI), or a Containment Purge Isolation Actuation Signal (CPIAS) (EIIS: VI). A manual actuation feature is also provided for the CREFAS.

The CREFS consists of two separate, seismically qualified, redundant essential flow trains "A" and "B". Each flow train consists of an essential air handling unit (AHU) with high efficiency filters and charcoal adsorbers to process intake airflow and recirculate air flow to the Control Room envelope. Low leakage ductwork and dampers are provided to minimize unfiltered air in-leakage. The Control Room post-accident habitability requirements are met by either CREFS train.

The "B" train CREFS shares ductwork with the Control Room Normal (non-essential) Ventilation system and both serve the inverter room and communication room on the 120 foot level during non-emergency conditions. The normal AHU ductwork, inverter room, and communication room are automatically isolated from the train "B" CREFS upon a CREFAS actuation.

The "A" train CREFS does not share ductwork with the normal ventilation or "B" train CREFS except for final control room outlet ducts. The "A" train CREFS does not supply the inverter room or the communication equipment room.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2011	-- 001	-- 00	3 OF 8

NARRATIVE

Separate ductwork, exhaust fans, and exhaust dampers are provided for the kitchen and restroom facilities inside the Control Room ventilation envelope. The kitchen and restroom exhaust dampers close when actuated by CREFAS.

Upon actuation by a CREFAS, dampers close to isolate the Control Room normal AHU, the communication and inverter rooms and the Control Room kitchen and Control Room restrooms. Air returning from the Control Room is drawn into the Essential AHUs which filter the air and discharge it to the essential supply distribution ducts. This post-CREFAS alignment (essential filtration mode) ensures a positive pressure exists inside the Control Room to prevent in-leakage from outside air.

TS Limiting Condition for Operation (LCO) 3.3.9 requires only one of the two CREFAS channels to be OPERABLE during Mode 6 or irradiated fuel movement.

An OPERABLE CREFAS channel consists of a CREFAS manual trip, actuation logic, and a Control Room air intake radiation monitor. If any of those three components are inoperable, LCO 3.3.9 Condition C Required Actions are to either:

Place one CREFS train in operation, immediately (C.1), or

Suspend movement of irradiated fuel assemblies, positive reactivity additions, and core alterations, immediately (C.2.1, C.2.2, and C.2.3).

The safety function of a CREFAS is to actuate CREFS to mitigate the consequences of analyzed accidents, including a fuel handling accident, to ensure Control Room habitability is maintained in accordance with General Design Criterion 19 of 10 CFR 50 Appendix A.

3. INITIAL PLANT CONDITIONS:

On April 8, 2011, Palo Verde Unit 2 was in Mode 6 (Refueling). The 120 VAC Class 1E bus D25 had been deenergized since 0956 that day, which rendered train "A" Control Room air intake radiation monitor RU-29 and its associated CREFAS channel inoperable. Deenergized bus D25 similarly affected the "A" channels of CPIAS and FBEVAS, which were rendered inoperable. The opposite "B" train channels of CREFAS, CPIAS, and FBEVAS remained OPERABLE. Reactor core offload was in progress with irradiated fuel

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2011	-- 001	-- 00	4 OF 8

NARRATIVE

movement occurring in the Fuel Building. The essential AHU for Train "B" CREFS was in service and isolated from normal Control Room ventilation, providing filtered air to the Control Room. The isolation dampers for the communication and inverter rooms and the Control Room kitchen and Control Room restrooms were open. In this condition, the Control Room does not have the positive pressure associated with the CREFS essential filtration mode required for post-accident emergency alignment.

4. EVENT DESCRIPTION:

On April 8, 2011, at 1803, during shift turnover, the train "B" Control Room air intake radiation monitor RU-30 was declared INOPERABLE upon notification of a communication failure between the radiation monitor and the Radiation Monitoring System Remote Indication and Control unit. This communication failure resulted in RU-30 being unable to initiate a CREFAS. The Control Room Supervisor (CRS) (utility, licensed) directed the Reactor Engineer (utility, non-licensed) to stop fuel movement and gave permission to continue movement of the irradiated fuel assembly on the Spent Fuel Handling Machine to place it in a safe location, consistent with the bases for LCO 3.7.11.

The CRS informed the Shift Manager (SM) (utility, licensed), who was engaged in shift turnover, of the loss of RU-30 and the direction provided to the Reactor Engineer to cease irradiated fuel movement. The SM and the CRS reviewed TS LCO 3.3.9 and concluded that the condition of Required Action C.1 (one train of CREFS in operation) was met since the Train "B" Control Room Essential AHU, was running. The TS Basis for LCO 3.3.9 was not referenced by either the SM or CRS.

The SM authorized recommencement of irradiated fuel movement since the Unit was understood (incorrectly) to be in compliance with LCO 3.3.9 Required Action C.1. The CRS, at 1808 notified the Reactor Engineer that irradiated fuel movement could recommence. Following the completion of turnover a Control Room log entry was made to document that the Unit was in compliance with LCO 3.3.9 Required Action C.1 and that CREFS train "B" was in service.

At 2140, the Outage Shift Manager (utility, licensed) entered the Control Room and noted that the Control Room envelope was not pressurized to the extent expected. The Outage Shift Manager questioned the actions that were taken to comply with LCO 3.3.9 Required Action C.1. At this time, Control Room staff determined that Control Room ventilation had not been

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2011	-- 001	-- 00	5 OF 8

NARRATIVE

realigned to the CREFS essential filtration mode required for post-accident emergency alignment, as stipulated in the LCO 3.3.9 Technical Specification Basis. The wording in the basis document states:

> *"Condition C applies to the failure of two channels of CREFAS Manual Trip, Actuation Logic, and Radiation Monitor channel in MODE 5 or 6, or when moving irradiated fuel assemblies. The required actions are immediately taken to place one OPERABLE CREFS train in the emergency mode of operation (i.e., fan running, valves/dampers aligned to the post CREFAS mode, etc.) or to suspend CORE ALTERATIONS, positive reactivity additions, and movement of irradiated fuel assemblies. The* [Immediate] *Completion Time recognizes the fact that FBEVAS, or CPIAS are available to initiate Control Room filtration in the event of a fuel handling accident."*

At 2146, the Control Room ventilation dampers were re-aligned to comply with LCO 3.3.9, Required Action C.1. Irradiated fuel movement was not suspended at this time because re-alignment of CREFS occurred immediately. The Completion Time for this LCO Required Action was exceeded by approximately three hours and forty-five minutes.

4. ASSESSMENT OF SAFETY CONSEQUENCES:

The safety analysis of record for a fuel handling accident credits the CPIAS or FBEVAS to provide the safety function to actuate CREFAS. Those two signals are actuated by corresponding radiation monitors in the containment and fuel buildings should a fuel handling accident occur. The CREFAS actuation automatically places CREFS in the essential filtration mode required for post-accident emergency alignment to ensure the corresponding control room habitability safety function is maintained.

The required "B" train channels for CPIAS and FBEVAS were OPERABLE at the time the condition occurred. Therefore, the inoperable control room air intake radiation monitors RU-29 and RU-30 would not have prevented the fulfillment of the CREFAS safety function to mitigate the consequences of a fuel handling accident.

This event did not result in any challenges to the fission product barriers or result in the release of radioactive materials. There were no actual safety consequences as a result of this event. This event did not prevent the fulfillment of a safety function nor did it result in a safety system functional failure as described by 10 CFR 50.73 (a)(2)(v).

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2011	-- 001	-- 00	6 OF 8

NARRATIVE

5. CAUSE OF THE EVENT:

The direct cause of the failure to comply with TS LCO 3.3.9 was the decision to allow irradiated fuel movement to recommence with Control Room ventilation not in the essential filtration mode required for post-accident emergency alignment.

The root cause was imprecise terminology in LCO 3.3.9 Required Action C.1, in that it failed to specify that CREFS shall be placed in the essential filtration mode required for post-accident emergency alignment.

Contributing causes included:

- A latent organizational weakness existed in the reinforcement of Operations expectations for Technical Specification Decision Making, which allowed the Technical Specification decision to be made without consulting the Technical Specification Bases for LCO 3.3.9 Required Action C.1.

- Inadequate guidance to facilitate meeting the requirements of LCO 3.3.9, Required Action C.1 in that there is inconsistent terminology relative to Control Room ventilation modes of operation among the LCO, LCO bases, and procedures.

- An operator knowledge deficiency exists in the area of the Control Room ventilation system and related Technical Specifications.

6. CORRECTIVE ACTIONS:

The Control Room ventilation dampers were re-aligned to be in compliance with the requirements of LCO 3.3.9, Required Action C.1 at 2146 on April 8, 2011.

To prevent recurrence, a License Amendment Request (LAR) will be submitted to the NRC to revise LCO 3.3.9 Required Actions A.1 and C.1 to ensure more specific direction is provided regarding the alignment of CREFS when LCO 3.3.9 Conditions A or C are entered. The LAR will also request similar revision to related LCO 3.7.11 (CREFS) which contains similar imprecise required actions. Following implementation of revised LCOs 3.3.9 and 3.7.11, a

simulator scenario in Licensed Operator Continued Training will be included that requires crews to exercise the amended Required Actions of these LCOs.

The following additional corrective actions will be taken to address the contributing causes:

- Change the Technical Specification Decision Making process expectations and procedures to emphasize that Technical Specifications and Bases must be used together to understand and comply with the license.

- Revise Control Building ventilation procedures to support compliance with LCO 3.3.9 and 3.7.11 Required Actions.

- Incorporate additional training into Licensed Operator initial and continuing training programs to correct the identified knowledge deficiency.

The above and any additional corrective actions taken as a result of the investigation of this event will be implemented in accordance with the requirements of the Palo Verde corrective action program. If information is subsequently developed which would significantly affect a reader's understanding or perception of this event, a supplement to this LER will be submitted.

7. PREVIOUS SIMILAR EVENTS:

The station has not identified prior TS violations related to CREFS not being placed in the essential filtration mode required for post-accident emergency alignment while irradiated fuel movement was in progress.

Although not related to irradiated fuel movement in Mode 6, an adverse condition report identified a similar event. The adverse condition report, generated on June 18, 2007, addressed Control Room log entries that incorrectly identified affected LCOs for inoperable, bypassed Engineered Safety Features Actuation System functions, including CREFAS. For example, one of the log entries cited the following:

> *"LCO 3.7.11 Required Action D.1 was met due to "B" CR ESS* ["B" Train Control Room Essential] *AHU Fan running. However the Bases identifies that the train must be in "emergency mode of operation (i.e., fan running, valves/dampers aligned to the post-CREFAS mode, etc.)." At 0826 on 6/18/07 it was identified*

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2011	-- 001 --	00	8 OF 8

NARRATIVE

that the smoke exhaust and communication equipment room isolation dampers were not aligned to the 'post CREFAS' mode."

The corrective actions of the condition report focused on correcting the log entries and did not evaluate the causes for the incorrect log entries regarding Required Actions and bases for LCO 3.7.11 with respect to system alignments. Therefore, the corrective actions of that condition report would not have prevented this event.