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10 CFR 50.73

Palo Verde Nuclear
Generating Station

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102-06603-DCM/FJO
October 29, 2012

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

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station (PVNGS) Unit 1**
Docket No. STN 50-528
License No. NPF-41
Licensee Event Report 2012-004-00

Enclosed please find Licensee Event Report (LER) 50-528/2012-004-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports the automatic actuation of the Unit 1 train A and train B essential spray pond system pumps that occurred as a result of a control room essential filtration actuation signal.

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 Mark McGhee, Operation Support Manager, Regulatory Affairs, at (623) 393-4972.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,

DCM/FJO/hsc

Enclosure

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

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LICENSEE EVENT REPORT (LER)(See reverse for required number of
digits/characters for each block)

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, NEOF-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.

1. FACILITY NAME

Palo Verde Nuclear Generating Station (PVNGS) Unit 1

2. DOCKET NUMBER

05000528

3. PAGE

1 OF 5

4. TITLE

Essential Spray Pond Pump Actuation Due to a Control Room Essential Filtration Actuation Signal

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
08	29	2012	2012	- 004 -	00	10	29	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)			
1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
100	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

Mark McGhee, Operations Support Manager, Regulatory Affairs

TELEPHONE NUMBER (Include Area Code)

623-393-4972

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
X	IL	ECDB	K020	Y					

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)

On August 29, 2012, the Unit 1 control room received a fuel building ventilation exhaust radiation monitor 1JSQBRU0145 (RU-145) high radioactivity alarm. This resulted in actuation of the train A and B fuel building essential ventilation actuation signals (FBEVAS) and control room essential filtration actuation signals (CREFAS). The CREFAS started the train A and B control room essential air filtration units, essential chilled water systems, essential cooling water systems and essential spray pond systems. Alternate sampling and radiation monitor comparisons determined the RU-145 high radioactivity alarm to be invalid.

An investigation determined the RU-145 high radioactivity alarm was caused by failure of a power supply zener diode and resultant loss of the 24 VDC low voltage power supply. Loss of the 24 VDC supply activated the check source feature which raised the radiation monitor output to above the high alarm set-point value. The faulty power supply was replaced. No additional actions were determined to be necessary because existing preventive maintenance requirements replace the power supply board every 7.5 years and zener diodes are reliable in voltage regulation applications for the radiation monitoring system at PVNGS. This was the first failure of this type at PVNGS with greater than 25 years of operation.

In the past three years, PVNGS has not reported a similar event to the NRC.

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CONTINUATION SHEET**

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NARRATIVE

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

1. REPORTING REQUIREMENT(S):

This Licensee Event Report (LER) is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A) to report a valid system actuation. Specifically, on August 29, 2012, an automatic actuation of the Palo Verde Nuclear Generating Station (PVNGS) Unit 1 train A and train B essential spray pond system pumps occurred as a result of a control room essential filtration actuation signal. The two trains of the essential spray pond system are emergency cooling water systems that do not normally run and serve as the ultimate heat sink as described in 10 CFR 50.73(a)(2)(iv)(B)(9).

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

The fuel building heating, ventilation and air conditioning (HVAC) (EIS Code: VG) system consists of the normal supply and exhaust and the essential exhaust filtration subsystems. These subsystems provide the required ventilation to ensure the availability of fuel building equipment and to maintain the level of airborne radioactivity below permissible limits. The normal supply and exhaust system operates during all modes of plant operation while the essential exhaust filtration system automatically starts due to either a fuel building essential ventilation actuation signal (FBEVAS) or a safety injection actuation signal (SIAS). The essential exhaust filtration system is used to exhaust and filter air from either the fuel building, for a FBEVAS, or from the lower auxiliary building rooms, for a SIAS.

Fuel building HVAC exhaust radioactivity is monitored by ventilation exhaust radiation monitors 1JSQBRU0145 (RU-145) (EIS Code: IL) and 1JSQBRU0146 (RU-146) which each consist of a particulate and iodine sampler, and a noble gas detector. RU-145 is the fuel building ventilation exhaust low range monitor which assesses releases during normal and post accident conditions. When RU-145 reaches its maximum upper radioactivity limit, RU-146, the fuel building ventilation exhaust high range monitor, automatically starts to continue monitoring of ventilation exhaust radioactivity during post accident conditions.

When fuel building HVAC exhaust radioactivity values reach the RU-145 high alarm set-point, a control room alarm is received and a FBEVAS is generated by the balance of plant engineered safety features actuation system (BOP-ESFAS) (EIS Code: JE). The BOP-ESFAS serves to monitor inputs from various systems and provides the logic and outputs to actuate essential plant equipment. The FBEVAS stops the fuel building normal supply and exhaust subsystem and starts the two fuel building essential exhaust air filtration units (AFUs). The spent fuel pool area radiation monitor, RU-31, also provides a redundant channel for generation of a FBEVAS in the event of a fuel handling accident. In response to a FBEVAS, BOP-ESFAS also generates a control room essential filtration actuation signal

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(CREFAS) to limit radiation exposure to control room personnel following a fuel handling accident.

The CREFAS actuation isolates normal ventilation to the control room and starts the train A and train B control room essential air filtration units (AFU) which provide cooled and filtered air to the control room. The CREFAS also starts both train A and train B essential chilled water (EC) systems (EIS Code: KM), essential cooling water (EW) systems (EIS Code: BI) and essential spray pond (SP) systems (EIS Code: BS) to support the control room essential ventilation system functions. The SP system removes heat from the EW system which in turn removes heat from the EC system. The EC system provides chilled water to the control room essential AFU cooling coils to maintain controlled temperatures in the control room during post accident conditions. The SP system is also the ultimate heat sink.

3. INITIAL PLANT CONDITIONS:

On August 29, 2012, Palo Verde Unit 1 was in Mode 1 (Power Operation), at 100 percent power and at normal operating temperature and normal operating pressure. There were no structures, systems, or components inoperable at the time of the event that contributed to the event.

4. EVENT DESCRIPTION:

On August 29, 2012, the Unit 1 control room received a RU-145 high radioactivity alarm. This resulted in a train A and B FBEVAS actuation and a train A and B CREFAS actuation. The CREFAS actuations started both trains of the EC, EW and SP systems in support of the control room essential ventilation system functions. Plant equipment that was required to start for the FBEVAS and CREFAS actuations was verified by operations to start and operate as expected. Radiation protection personnel performed alternate sampling of the fuel building ventilation exhaust and evaluated other radiation monitor readings and determined the RU-145 alarm condition was invalid. Operations personnel then performed procedures to bypass the BOP-ESFAS input from RU-145 and restore the actuated plant equipment to normal alignments.

On August 31, 2012, troubleshooting determined the RU-145 high alarm was caused by the loss of the monitor's 24 VDC low voltage power supply. The loss of the 24 VDC resulted in two relays activating at the RU-145 equipment skid, located in the fuel building. Relay K201 turned on the monitor check source which is intended to raise the monitor's output 3 to 4 decades to confirm that the detector is capable of detecting radiation. During the normal check source activation sequence, the monitor's software first inhibits any trip functions and then activates the check source. However, when relay K201 activated due to the loss of 24 VDC, the software, which was functioning normally, was bypassed so that no software

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based trip inhibit function was activated and the increased monitor output caused a high alarm trip which initiated a FBEVAS and CREFAS. Relay K205 also activated, which turned off the monitor's sample pump and caused a low flow/equipment failure alarm. This condition resulted in RU-145 no longer performing its function of monitoring the fuel building ventilation exhaust for radioactivity. The fuel building ventilation exhaust high range monitor, RU-146, remained available to monitor the fuel building ventilation exhaust.

The RU-145 low voltage power supply was replaced and the monitor was returned to service.

5. ASSESSMENT OF SAFETY CONSEQUENCES:

RU-145 is the low range portion of the fuel building ventilation exhaust post accident monitor. The primary function of this monitor is to provide the FBEVAS engineered safety feature actuation on high alarm. The other purpose of this monitor is to assess releases through the fuel building ventilation exhaust under both normal and post accident conditions.

With RU-145 failed, the high range monitor, RU-146, remained available to monitor the fuel building ventilation exhaust. The spent fuel pool area radiation monitor, RU-31, and the new fuel storage area monitor, RU-19, were available to alert operators to a high radiation level condition in the fuel building, and RU-31 provides a redundant and diverse actuation of FBEVAS. No fuel handling was in progress during the event or following the event while RU-145 was out of service. The action requirements of the PVNGS Offsite Dose Calculation Manual for failure of RU-145 were met during this event. No Technical Specification or Technical Requirements Manual requirements were affected by this event.

Actuation of the fuel building essential ventilation, control room essential ventilation, EC, EW, and SP systems did not affect the capability of these systems to perform their safety functions.

There were no inoperable structures, systems, or components at the time of the event that contributed to this event. The 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. The condition did not result in a safety system functional failure as described by 10 CFR 50.73 (a)(2)(v).

6. CAUSE OF THE EVENT:

The direct cause of the RU-145 high alarm was loss of the monitor's 24 VDC low voltage power supply voltage which caused the monitor check source feature to activate.

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The event investigation team determined that a random failure of a zener diode in the RU-145 low voltage power supply caused the loss of the 24 VDC low voltage source.

7. CORRECTIVE ACTIONS:

The following immediate actions were performed:

- Plant equipment that was required to start for the FBEVAS and CREFAS actuation signals was verified by operations to start and operate as expected.
- Radiation protection personnel performed alternate sampling of the fuel building ventilation exhaust and evaluated other radiation monitor readings and determined the RU-145 alarm condition was invalid.
- Operations placed the BOP-ESFAS input from RU-145 in bypass which disabled the FBEVAS actuation function of the monitor and allowed reset of all actuations.
- Operations personnel restored plant equipment to normal alignments.

The investigation team determined that zener diodes have no known wear-out mechanisms and are reliable components in low voltage power supply applications. Existing preventive maintenance requirements for the radiation monitoring system replace the power supply boards at a 7.5 year interval. This failure was the first of this type in the radiation monitoring system at PVNGS with greater than 25 years of operation. Therefore, no additional preventive maintenance or other corrective actions were determined to be necessary to minimize the potential for recurrence of this event.

Any additional corrective actions taken as a result of this event will be implemented in accordance with the PVNGS corrective action program. If information is subsequently developed that would significantly affect a reader's understanding or perception of this event, a supplement to this LER will be submitted.

8. PREVIOUS SIMILAR EVENTS:

PVNGS has not reported a similar event of a system actuation that resulted in the actuation of the SP in the past three years.