10 CFR 50.73

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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102-06462-DCM/DCE
January 23, 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 2011-005-00

Enclosed please find Licensee Event Report (LER) 50-528/2011-005-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports a manual actuation of the reactor protective system in response to a control element assembly subgroup that slipped during post-refueling low power physics testing.

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, Department Leader, Regulatory Affairs, at (623) 393-4972.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,

FOR D.C. MIMS

DCM/TNW/DCE/gat

Enclosure

cc:
E. E. Collins Jr.	NRC Region IV Regional Administrator
B. K. Singal	NRC NRR Project Manager for PVNGS (electronic / paper)
L. K. Gibson	NRC NRR Project Manager for PVNGS (electronic)
J. R. Hall	NRC NRR Senior Project Manager (electronic)
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
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4. TITLE

Unit 1 Manual Reactor Trip due to Slipped Control Element Assemblies

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
11	22	2011	2011	- 005 -	00	01	23	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

2

10. POWER LEVEL

0

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

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Mark McGhee, Operations Department Leader, Regulatory Affairs	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

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
03	30	2012

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

On November 22, 2011, at approximately 1925 Mountain Standard Time, during the performance of post-refueling low power physics testing, the reactor was manually tripped as required by the control element assembly (CEA) malfunction abnormal operating procedure after a subgroup of four CEAs slipped approximately 11 to 14 inches. An intermittent failure of a power switch assembly which provides electrical power to the control element drive mechanisms resulted in the CEA slippage. After troubleshooting was completed, the power switch assembly was replaced. Retesting was completed on November 24, 2011.

The root cause investigation is in progress. Actions to prevent recurrence will be identified in the completed investigation report.

LER 50-528/2011-004-00 reported a similar event: An automatic trip of the Unit 1 reactor occurred on August 6, 2011, which resulted from a dropped CEA caused by a loose terminal lug on a CEA power switch assembly.

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NARRATIVE

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

1. REPORTING REQUIREMENT(S):

This LER is being submitted pursuant to 10 CFR 50.73 (a)(2)(iv)(A) to report a manual actuation of the reactor protective system (RPS)(EIIS: JC) that occurred while the reactor was critical.

This event was reported to the Nuclear Regulatory Commission (NRC) on November 22, 2011, via the event notification system (EN 47472).

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

The control element drive mechanism control system (CEDMCS) (EIIS: AA) provides control signals and motive power to the coils of the magnetic jacks in the 89 Control Element Drive Mechanisms (CEDMs) (EIIS: AA) which move, hold, and release the reactor's control element assembly (CEAs) (EIIS: AA). The CEAs absorb neutrons to control reactivity.

Two motor/generator sets are connected in parallel to supply 240 VAC, 3 phase power through the reactor trip switchgear (RTSG) (EIIS: AA). The output from the RTSG is directed through power switch assemblies. The power switch assemblies contain silicon controlled rectifiers (SCRs) which convert the 3 phase, AC input voltage to a stepped DC output voltage. The conversion is controlled by electronic circuits in the power switch assembly and in the CEDMCS subgroup logic housing. These control circuits determine the sequence to supply power to the CEDM coils.

The RPS provides a rapid and reliable shutdown of the reactor to protect the core and the reactor coolant system pressure boundary from potentially hazardous operating conditions. Shutdown is accomplished by either manual or automatic generation of reactor trip signals. The trip signals open the RTSG breakers, which de-energize the CEDM coils and allow all CEAs to drop into the core by the force of gravity.

The core protection calculator/control element assembly calculator (CPC/CEAC)(EIIS: JC) system monitors reactor core conditions to provide CEA withdrawal prohibit signals to the CEDMCS and provides an accurate, reliable means of initiating a reactor trip. The CPC/CEAC system is an integral part of the plant protective system in that it provides low departure from nucleate boiling ratio (Lo DNBR) and high local power density (Hi LPD) trip signals to the RPS. Trip signals are provided to the RPS whenever the calculated value of DNBR or Hi LPD exceeds the related setpoint during reactor operation.

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Each CEAC receives reed switch position transmitter inputs for all CEAs. The CEACs compare the positions of all CEAs within each CEA subgroup and determine penalty factors based upon CEA deviations within a subgroup. The CPCs also compute penalties for CEA group out-of-sequence and subgroup deviation conditions.

Low power physics testing is conducted during Mode 2 following refueling outages to verify reactor core operating characteristics are consistent with design predictions and to provide assurance the core can be operated as designed. The low power physics testing procedure provides direction to invoke the low power physics testing special test exceptions under Technical Specification (TS) 3.1.10 that suspends certain limiting conditions for operation (LCOs), including LCO 3.3.3 which normally requires two channels of CEACs to be OPERABLE and LCO 3.1.5, CEA Alignment. Both channels of CEACs are inoperable during low power physics testing. The CPCs will not generate reactor trips based on CEA alignment deviations while CEACs are inoperable.

3. INITIAL PLANT CONDITIONS:

On November 22, 2011, Palo Verde Unit 1 was in Mode 2 (Start-up), at less than 1 percent power and at normal operating temperature and normal operating pressure. The reactor was critical and post-refueling low power physics testing was in progress. CEACs were inoperable at the time of the event as directed by the low power physics testing procedure. There were no other structures, systems, or components inoperable at the time of the event that contributed to the event.

4. EVENT DESCRIPTION:

On November 22, 2011, at 1921, CEA regulating group (RG) #2 was being inserted into the reactor while performing post-refueling low power physics testing during the plant start-up following refueling outage 1R16. At that time, the control room staff noted that the four CEAs in RG #2, subgroup #17, slipped approximately 11 to14 inches below subgroup #18 CEAs, also in RG #2.

In response to the deviation between the RG #2 subgroups, the control room staff manually tripped the reactor as directed by the abnormal operating procedure, CEA Malfunctions, for deviations of CEA subgroups of more than 6.6 inches. An automatic trip was not generated by the CPCs because CEACs were inoperable for performance of the testing.

All CEAs fully inserted and the plant responded to the trip as designed. No other actuations of plant engineered safety features systems occurred or were required.

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5. ASSESSMENT OF SAFETY CONSEQUENCES:

This event did not result in a transient more severe than those already analyzed in the PVNGS Updated Final Safety Analysis Report Chapter 15. The transient did not cause a violation of safety limits or the specified acceptable fuel design limits. Because the primary and secondary system pressures stayed below the respective safety valve opening setpoints, design pressures were not challenged.

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 condition. The condition does not represent a reportable safety system functional failure under 10 CFR 50.73 (a)(2)(v).

6. CAUSE OF THE EVENT:

An intermittent failure of a power switch assembly which provides electrical power to the control element drive mechanisms resulted in the CEA slippage.

The root cause investigation is in progress. A supplement to this LER will provide the results of the investigation.

7. CORRECTIVE ACTIONS:

After troubleshooting was completed, the power switch assembly was replaced. Retesting was completed on November 24, 2011. The unit was subsequently restarted and entered Mode 1 on November 27, 2011.

A supplement to this LER will discuss the corresponding corrective actions to prevent recurrence prescribed by the root cause investigation.

8. PREVIOUS SIMILAR EVENTS:

The root cause investigation is in progress. A complete discussion of previous similar events will be provided in a supplement to this LER based on the investigation results. Preliminarily, the following events related to failures of power switch assemblies were identified. The relationship of these previous events to the event in this LER has not been determined.

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LER 50-528/2011-004-00 reported an automatic trip of the Unit 1 reactor that occurred on August 6, 2011, which resulted from a dropped CEA (#37) caused by a loose terminal lug on the corresponding CEA power switch assembly.

On March 4, 2011, Unit 3 CEA #1 dropped into the core because of an age related failure of an electrolytic capacitor on the zero crossing detector card installed in the corresponding power switch assembly. This did not require an automatic or manual trip of the reactor and was not reportable.

On December 4, 2009, during a Unit 3 reactor startup while subcritical, subgroup #15 part-strength CEAs dropped into the core because of an age related failure of an electrolytic capacitor on the zero crossing detector card installed in the corresponding power switch assembly. The decision was made to terminate the start-up by manually tripping the reactor. This condition was not reportable.

Replacements of the electrolytic capacitors on the zero crossing detector cards have been completed in Unit 1 and are scheduled for upcoming refueling outages in Units 2 and 3.