10 CFR 50.73

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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102-05612-CE/SAB/DJS
December 18, 2006

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 2006-006-00

Attached please find Licensee Event Report (LER) 50-528/2006-006-00 prepared and submitted pursuant to 10 CFR 50.73. This LER is being submitted to report a reactor protection system (RPS) initiated reactor trip which occurred on October 21, 2006 at approximately 15:49 Mountain Standard Time (MST).

In accordance with 10 CFR 50.73(d), copies of this LER are being forwarded to the NRC Regional Office, NRC Region IV and the PVNGS Senior Resident Inspector. If you have questions regarding this submittal, please contact James A. Proctor, Section Leader, Regulatory Affairs, at (623) 393-5730. Arizona Public Service Company makes no commitments in this letter.

Sincerely,

CE/SAB/DJS/gt

Attachment

cc: B. S. Mallett — NRC Region IV Regional Administrator
M. B. Fields — NRC NRR Project Manager
G. G. Warnick — NRC Senior Resident Inspector for PVNGS

IE22

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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 1	05000528	1 OF 5

4. TITLE
Reactor trip due to Core Protection Calculator generated Low Departure from Nuclear Boiling Ratio (DNBR) trip 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
										05000
10	21	2006	2006	- 006 -	00	12	18	2006	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE
1

10. POWER LEVEL
100

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)
James A. Proctor, 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
X	SB	CPU	S204	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)*

All times listed in this event report are approximate and Mountain Standard Time (MST) unless otherwise indicated.

At 15:49 hours on October 21, 2006, the PVNGS Unit 1 Reactor automatically tripped from 100% power due to Core Protection Calculator (CPC) generated Low DNBR trips. Prior to the reactor trip, Control Element Assembly (CEA) #29 position indication on Reed Switch Position Transmitter (RSPT) 'A' was observed fluctuating approximately between 142 – 150 inches withdrawn, resulting in numerous Control Element Assembly Calculator (CEAC) #1 deviation alarms from 14:40 hours until the time of trip. Following Operations Computer Systems (OCS) confirmation of the fluctuating field input signal for CEA #29, the Control Room staff was preparing to remove CEAC #1 from service. The automatic reactor trip occurred before the CEAC #1 inoperable (INOP) codes were placed into the CPCs.

The Direct Cause of this event was fluctuations in the CEA #29 position indication signal sent from RSPT "A" to CEAC #1 due to excessive circuit resistance at a cable connector.

In the past three years, Palo Verde experienced one similar trip event due to a fluctuating CEA position input signal

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 1	05000528	2006	-- 006	-- 00	2 OF 5

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

NOTE: All times listed in this event report are approximate and Mountain Standard Time (MST) unless otherwise indicated.

1. REPORTING REQUIREMENT(S):

This LER (50-528/2006-006-00) is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A) to report a reactor protection system (RPS) (EIIS: JC) initiated reactor trip which occurred on October 21, 2006 at approximately 15:49 Mountain Standard Time (MST).

(Reference: ENS call # 42925)

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

The core protection calculator/control element assembly calculator (CPC/CEAC)(EIIS: JC) system monitors pertinent reactor core conditions to provide control element assembly (CEA) withdrawal prohibit (CWP) signals to the control element drive mechanism control system (CEDMCS) (EIIS: AA) 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 departure from nucleate boiling ratio (DNBR) and local power density (LPD) trip signals to the reactor protection system (RPS) (EIIS: JC). Trip signals are provided to the reactor protection system whenever the minimum DNBR or fuel design limit LPD is approached during reactor operation.

Each CEAC receives reed switch assembly inputs for all control element assemblies (CEAs) (EIIS: AA). The CEACs compare the positions of all CEAs within each CEA subgroup and determine penalty factors based upon CEA deviations within a subgroup. A penalty factor is transmitted via four fiber-optic data links to the CPCs. The CPCs also compute penalties for CEA group out-of-sequence and deviations between subgroup conditions.

The reactor protection system (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 the generation of reactor trip signals. The trip signals open the reactor trip switchgear (RTSG) breakers (EIIS: AA), de-

energizing the control element drive mechanism (CEDM) coils (EIIS: AA), allowing all CEAs to drop into the core by the force of gravity.

3. INITIAL PLANT CONDITIONS:

On October 21, 2006 Palo Verde Unit 1 was in Mode 1 (Power Operations), operating at approximately 100 percent power. No other major structures, systems, or components were inoperable at the start of the event that contributed to the event.

4. EVENT DESCRIPTION:

At 15:49 on October 21, 2006, the PVNGS Unit 1 Reactor automatically tripped from approximately 100% power due to a CPC-generated Low DNBR trip signal. Prior to the reactor trip, CEA #29 position indication on Reed Switch Position Transmitter (RSPT) #1 was observed to be fluctuating approximately between 142– 150 inches withdrawn. Multiple CEAC/ CPC related alarms were received from approximately 14:40 until the time of the reactor trip. The applicable alarm response procedures were entered by the control room staff. Following positive identification that the cause of the alarms was due to a bad field input to CEAC #1 for CEA #29, the Control Room staff prepared to remove CEAC #1 from service. An automatic reactor trip occurred at 15:49 before the CEAC #1 inoperable codes could be placed into the CPCs.

The control room staff entered the emergency operations procedures and diagnosed a Reactor trip. The event was classified by the Shift Manager as an uncomplicated reactor trip and no Emergency Plan event classification was required. The plant was stabilized in Mode 3 with the Feedwater Control (FWCS) and Steam Bypass Control (SBCS) Systems responding as expected to maintain secondary heat removal.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 1	05000528	2006	-- 006	-- 00	4 OF 5

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

5. ASSESSMENT OF SAFETY CONSEQUENCES:

The event did not result in any challenges to the fission product barriers or result in the release of radioactive materials. The plant remained within safety limits throughout the event. The primary system and secondary pressure boundary limits were not approached and no violations of the specified acceptable fuel design limits (SAFDL) occurred. No Engineered Safety Feature actuations occurred and none were required. Therefore, there were no adverse nuclear safety consequences as a result of this event and the event did not adversely affect the safe operation of the plant or health and safety of the public. The event did not result in a transient more severe than those analyzed in the updated Final Safety Evaluation Report Chapters 6 and 15.

The condition would not have prevented the fulfillment of the safety function, and the condition did not result in a safety system functional failure as defined by 10 CFR50.73 (a)(2)(v).

6. CAUSE OF THE EVENT:

The causal factors are preliminary and subject to change because the equipment root cause of failure analysis (ERCFA) investigation is not yet complete. 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.

The direct cause (Failure Mechanism) in this event was fluctuations in the CEA #29 position indication signal sent from RSPT "A" to CEAC #1 due to excessive circuit resistance at a cable connector.

A probable cause of the excessive electrical resistance in the signal circuit was contamination (oxide build-up) on conductor contact surfaces due to weak crimps at the pin connector. The probable cause was determined using historical evidence and root cause methodologies.

A contributing cause of the event was the failure to remove the affected CEAC from service prior to the reactor trip caused by a lack of detailed guidance in the Alarm Response

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 1	05000528	2006	-- 006	-- 00	5 OF 5

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

Procedure (ARP) in use by the control room (CR) staff. The section for response to the Cross Channel Comparison Failure was very limited in its guidance, directing the CR staff to seek assistance from the Operations Computer Systems (OCS) technicians when an invalid alarm was identified. The section for response to a CEA deviation contained insufficient guidance for action to take for an invalid CEA deviation. The CR staff then waited for OCS to validate the alarm indication before taking action to remove the affected CEAC from service.

7. CORRECTIVE ACTIONS:

A CEA #29 cable connector was disconnected, visually inspected and re-connected. The problem cleared.

A night order was written for licensed operators to ensure that they are familiar with the guidance of the procedures required to facilitate prompt removal of a CEAC from service when a faulty input is identified.

The plant procedure (72AO-9SB01 CEAC INOPERABLE) was revised to provide guidance for Units with the upgraded CPCs, Palo Verde Units 1 and 2.

Any additional corrective actions taken as a result of this event will be implemented in accordance with Palo Verde's corrective action program.

8. PREVIOUS SIMILAR EVENTS:

In the past three years, Palo Verde reported one similar trip event.

Licensee Event Report (LER) 50-530/2006-002-00 reported an automatic Unit 3 Reactor Protection System (RPS) actuation (Reactor Trip) on Low DNBR due to Control Element Assembly Calculator (CEAC) # 1 penalty factor receiving an invalid input signal. The direct cause of the reactor trip was an erroneous position indication signal for CEA #60 as sensed by CEAC #1 due to a faulty CEA Positional Isolation Amplifier (CPIA) board. The probable cause of the CPIA board failure was a "random electronic failure" of the U6 operational amplifier. Corrective actions for this Unit 3 event would not have prevented the reactor trip in Unit 1.