



10CFR50.73

Palo Verde Nuclear  
Generating Station

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August 8, 2003

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

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Unit 3  
Docket No. STN 50-530  
License No. NPF-74  
Licensee Event Report 2003-003-00**

Attached please find Licensee Event Report (LER) 50-530/2003-003-00 that has been prepared and submitted pursuant to 10 CFR50.73 (a) (2) (i) (B). This LER reports a condition prohibited by the plant's technical specifications when reactor power instrumentation was not calibrated.

In accordance with 10 CFR 50.4, a copy of this LER is being forwarded to the NRC Regional Office, NRC Region IV and the Resident Inspector. If you have questions regarding this submittal, please contact Daniel G. Marks, Section Leader, Regulatory Affairs, at (623) 393-6492.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,

GRO/SAB/REB/kg

Attachment

cc: Regional Administrator, NRC Region IV (all with attachment)  
N. L. Salgado  
J. N. Donohew

JE22

**LICENSEE EVENT REPORT (LER)**

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

Estimated burden per response to comply with this mandatory information 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 Management Branch (T-8 E8), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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.

<b>FACILITY NAME (1)</b> Palo Verde Nuclear Generating Station Unit 3	<b>DOCKET NUMBER (2)</b> 05000530	<b>PAGE (3)</b> 1 OF 5
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**TITLE (4)**  
Technical Specification Violation for Failure to Calibrate Nuclear Instrumentation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
06	14	2003	2003	003	00	08	08	2003	FACILITY NAME	DOCKET NUMBER
										05000
									FACILITY NAME	DOCKET NUMBER
										05000

<b>OPERATING MODE (9)</b> 1	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)</b>									
<b>POWER LEVEL (10)</b> 040	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)						
	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)						
	20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)						
	20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)						
	20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A						
	20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)							
	20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)							
	20.2203(a)(2)(v)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(vii)							
	20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)							
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)								

**LICENSEE CONTACT FOR THIS LER (12)**

<b>NAME</b> Daniel G. Marks, Section Leader, Regulatory Affairs	<b>TELEPHONE NUMBER (Include Area Code)</b> 623-393-6492
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**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

<b>SUPPLEMENTAL REPORT EXPECTED (14)</b>	<b>EXPECTED SUBMISSION DATE (15)</b>	<b>MONTH</b>	<b>DAY</b>	<b>YEAR</b>
YES (If yes, complete EXPECTED SUBMISSION DATE) X NO				

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

On June 14, 2003 with Unit 3 operating in Mode 1, Power Operation, at approximately 40 percent rated thermal power a technical specification violation occurred when required reactor power instrumentation was not calibrated as required by surveillance requirements. The unit had reduced power from approximately 98 percent power on June 13 in response to a condenser in-leakage problem. The technical specification surveillance criteria, for when calibration of nuclear power instrumentation is required, changes when power is below 80 percent, from +/- 2 percent of the heat balance calorimetric to -0.5 to 10 percent of the heat balance calorimetric. During the first performance of the surveillance following the reduction in power several channels of nuclear power indication were more than -0.5 percent (but within -2 percent) below the heat balance calorimetric however a calibration of these channels was not performed.

The cause of the event was human performance error by control room licensed operators who did not recognize the change in acceptance criteria when power was reduced below 80 percent. Corrective action was taken to require that personnel performing the surveillance select the applicable acceptance criteria.

No other similar events have been reported by Palo Verde in the past three years.

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Palo Verde Nuclear Generating Station Unit 3	05000530	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**1. REPORTING REQUIREMENT(S):**

This LER 530/2003-003-00 is submitted to report events that resulted in an operation or condition prohibited by the plant's Technical Specifications (TS) as specified in 10CFR50.73(a)(2)(i)(B).

Specifically, on June 14, 2003 with Unit 3 in MODE 1 (POWER OPERATION) at approximately 40 percent power one channel of the core protection calculator (CPC) (JC) delta T power, two channels of CPC calibrated neutron flux power, and three channels of calibrated excore linear power indication were not calibrated to within the TS required -0.5 percent of Rated Thermal Power (RTP).

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

The excore nuclear instrumentation and the CPC power calculations are components in the measurement channels of the Variable Over Power, Logarithmic Power Level High, Departure from Nucleate Boiling (DNBR), and Local Power Density (LPD) trips.

Four measurement channels are provided for each parameter used in the generation of trip signals and provides input to the reactor protective system (RPS)(JC). When a channel exceeds a predetermined setpoint, that channel will trip. The tripping of bistables for the same parameter in two or more channels will result in a reactor trip.

A daily calibration (heat balance) is required by the technical specifications when THERMAL POWER is  $\geq 20$  percent. The Linear Power Level signal and the CPC addressable constant multipliers are adjusted to make the power indications agree with the calorimetric calculation if the absolute difference is  $\geq 2$  percent when THERMAL POWER is  $\geq 80$  percent of RTP. When THERMAL POWER is between 20 percent and 80 percent, the power indication must be within -0.5 to 10 percent of the calorimetric calculation. These checks (and, if necessary, the adjustment of the Linear Power Level signal and the CPC addressable constant coefficients) are adequate to ensure that the accuracy of these CPC calculations is maintained within the analyzed error margins.

The tolerance between 20 percent and 80 percent RTP is +10 percent to reduce the number of adjustments required as the power level increases. The -0.5 percent tolerance between 20 percent and 80 percent RTP is based on the reduced accuracy of the calorimetric data inputs at low power levels. Performing a calorimetric calibration with a -0.5 percent tolerance at low power levels ensures the difference will remain within -2.0 percent when power is increased above 80 percent RTP.

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**3. INITIAL PLANT CONDITIONS and EVENT DESCRIPTION:**

On June 14, 2003 Unit 3 was operating in Mode 1, Power Operation, at approximately 40 percent rated thermal power. The unit had reduced power from approximately 98 percent power, on June 13, in response to a condenser in-leakage problem.

The required daily calorimetric was completed at approximately 2135 MST on June 14, 2003 however, adjustment of the channels that were outside the acceptable band was not performed. The error was discovered during the next performance of the heat balance calibration completed at approximately 2218 MST on June 15. While reviewing the data taken for this performance of the surveillance, the operators noted the change in the acceptance band and that all channels met the criteria. The operators then decided to review the previous day's data and discovered the error.

The data taken on June 14 demonstrated that a total of six channels of power indication had not met the low limit of -0.5 percent of the calorimetric, ranging from -0.56 to -1.22 percent below the calorimetric power.

There were no inoperable systems at the start of the event that contributed to the event.

**4. ASSESSMENT OF SAFETY CONSEQUENCES:**

The Transient Analysis Section of Nuclear Fuel Management completed an assessment of the condition and concluded there was no effect on the consequences of UFSAR Chapter 15 events and other safety analyses due to the non-conservative power calibrations.

Actual reactor power, based on the Secondary Power (JSCALOR), was 39.90 percent. With the lower tolerance of -0.5 percent power, the associated acceptance criterion was 39.4 percent.

The following calibration data was recorded in the test procedure:

CPC Calibrated Neutron Flux Power: two of the four channels with readings of 39.25 percent and 39.11 percent (channels B and D, respectively) were outside the allowable lower tolerance of 39.40 percent.

CPC Total Thermal Power: one of the four channels with a reading of 39.26 percent (channel B) was outside the allowable lower tolerance of 39.40 percent.

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

Calibrated Excore Linear Power: three of the four channels with readings of 39.34 percent, 39.06 percent and 38.68 percent were outside the allowable lower tolerance of 39.40 percent power (channels A, B, and D, respectively).

CPC Calibrated Neutron Flux Power and CPC Total Thermal Power are used in the calculation of CPC variable over power trip (VOPT) and low DNBR trip function. Both of these trip functions are credited in the mitigation of several UFSAR Chapter 15 Design Base Events (DBE) and Anticipated Operational Occurrences (AOO).

CPC VOPT uses the following four power signals for inputs: Calibrated neutron flux power, calibrated total thermal power, temperature corrected neutron flux power and raw neutron flux power. The first of the two powers are calibrated, and the latter two are un-calibrated. The VOPT trip function logic uses the maximum of the above four powers as inputs. The calibration data presented above indicates that only channel B of both the CPC calibrated neutron flux power and the CPC total thermal power did not have at least one signal within -0.5 percent of the calorimetric. Therefore, the non-compliance of the CPC VOPT power signals resulted in a single channel (B) of CPC power being low. This does not have an impact on the safety analysis because the plant protection system (PPS) uses 2 out of 4 selection logic to determine the trip function. Furthermore the sensitivity of VOPT function for reactor power at approximately 40 percent would be primarily dependent on the rate of power increase as opposed to the actual power, since the trip ceiling is at 110 percent power.

The CPC Low DNBR trip function calculation algorithm uses both the calibrated static thermal power and calibrated neutron flux power as an input. The DNBR calculation algorithm accounts for power dependent uncertainty biases for both thermal and neutron flux power. A transient offset penalty is also applied to adjust the calibrated thermal power and neutron flux power. The final compensated core average power that is an input to the DNBR calculation and other ancillary function (Pseudo Hot Pin ASI) is obtained from a maximum selection of the calibrated Neutron and Thermal power. At 40 percent power level, sufficient conservatism built in to both the power dependent bias and the transient offset penalties in CPC would compensate for the maximum non-conservatism due to mis-calibration as documented above.

Thus the UFSAR events, which credit CPC VOPT and low DNBR trip function, would not be affected by the calibration issue.

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Excure linear power is an input to the PPS VOPT. The only Design Bases Event taking credit for PPS VOPT is the Hot Zero Power (HZP) CEA withdrawal event. In this analysis, the VOPT function results from an increase in a rate of power change rather than the actual power. Since the cited out of tolerance condition of the excure linear channels was experienced at approximately 40 percent power, there was no impact to the functionality of PPS VOPT credited in the HZP CEAW event.

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

The event did not result in any challenges to the fission product barriers or result in the release of radioactive materials. Therefore, there were no adverse safety consequences or implications 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.

#### 5. CAUSE OF THE EVENT:

The root cause of the event is under investigation. However, preliminary indications are that the cause of the event is human error in that control room licensed operators did not recognize the change in the acceptance criteria when operating below 80 percent power. The test procedure used to document the completion of the surveillance correctly identified that there were two different acceptable bands of operation depending on the power level.

#### 6. CORRECTIVE ACTIONS:

Corrective action taken is to require personnel performing the surveillance to select and document, in the test procedure, the applicable acceptance criteria.

#### 7. PREVIOUS SIMILAR EVENTS:

There has been no similar event reported to the NRC by the Palo Verde Nuclear Station in the past three years.