

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station Dwight C. Mims Vice President Regulatory Affairs and Plant Improvement

Tel. 623-393-5403 Fax 623-393-6077 Mail Station 7605 P. O. Box 52034 Phoenix, Arizona 85072-2034

102-06177-DCM/DFH April 29, 2010

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 2008-001-01

Attached, please find Licensee Event Report (LER) 50-529/2008-001-01, which supplements a previously reported condition prohibited by technical specifications that could have prevented the fulfillment of a safety function because of an inoperable boron dilution alarm system.

In accordance with 10 CFR 50.4, copies of this LER supplement are being forwarded to the NRC Regional Office, NRC Region IV and the Senior Resident Inspector. If you have questions regarding this submittal, please contact Ray Buzard, Section Leader, Regulatory Affairs, at (623) 393-5317.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,

A.C. Mina

DCM/JAP/DFH/gat

Attachment

CC:

E. E. Collins Jr.
J. R. Hall
L. K. Gibson
R. I. Treadway
NRC Region IV Regional Administrator
NRC Region IV Regional Administrator
NRC Region IV Regional Administrator
NRC NRR Project Manager
NRC Senior Resident Inspector for PVNGS

A member of the **STARS** (Strategic Teaming and Resource Sharing) Alliance Callaway • Comanche Peak • Diablo Canyon • Palo Verde • San Onofre • South Texas • Wolf Creek

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U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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

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)(i)(B) as a condition prohibited by Technical Specifications (TS) and 10 CFR 50.73(a)(2)(v)(A) as a condition that could have prevented the fulfillment of a safety function required to maintain the reactor in a safe shutdown condition when plant operators failed to reset the Boron Dilution Alarm System (BDAS). When a BDAS channel is in an alarm condition, the channel loses its ability to alert the control room operators of an inadvertent boron dilution event until the channel is reset manually. Technical Specification (TS) 3.3.12 Actions A.1, B.1 and C.1 were not performed, and TS Limiting Conditions for Operation 3.0.4 was not met when the Operating Mode was changed from Mode 6 to Mode 5.

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

The Boron Dilution Alarm System (BDAS) (EIIS: IG) provides two independent and redundant channels (channels 1 and 2) to ensure detection and alarm of a boron dilution event while in hot standby, hot shutdown, cold shutdown, and refueling modes, Modes 3 through 6, respectively.

The BDAS is credited in the Updated Final Safety Analysis Report Chapter 15 safety analysis with alerting operators to an inadvertent boron dilution 15 minutes prior to achieving criticality assuming the maximum dilution rate while in modes 3, 4, and 5, and within 30 minutes in Mode 6. This allows the operator time to diagnose and terminate the boron dilution prior to criticality.

The BDAS receives and monitors two neutron flux signals (one per BDAS channel) from the startup channel nuclear instrumentation. When these neutron flux signals increase during shutdown to equal to or greater than the calculated alarm setpoint, alarm signals are generated. The BDAS provides two separate and independent alarm signals (one signal per BDAS channel) to the plant annunciation system upon determination of a boron dilution event. Each alarm signal will cause the annunciator window "Possible Inadvertent Boron Dilution" to alarm.

Each BDAS channel calculates the boron dilution alarm setpoint to one-third decade above the current neutron flux when the flux is not increasing. If the neutron flux signal increases to the setpoint, an alarm signal is generated. The current neutron flux indication and alarm setpoint (per channel) are displayed on the BDAS panel located behind the control room panel area. NRC FORM 366A (9-2007)

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

When a BDAS channel alarms, a reactor operator is required to evaluate the alarm, initialize the system to the current neutron flux and reset the alarm which reestablishes a setpoint value of one-third decade above the current flux level.

3. INITIAL PLANT CONDITIONS:

On May 8, 2008, Unit 2 was in Mode 6 (Refueling) following refueling activities with the reactor coolant system (RCS) (EIIS: AB) at atmospheric pressure and temperature between approximately 76 to 99 degrees Fahrenheit.

4. EVENT DESCRIPTION:

From May 8 through May 21, 2008, multiple instances occurred in which Control Room operators treated the BDAS alarm as a nuisance alarm and failed to reset the alarm for extended periods of time (1 hour). The alarm would often activate many times a shift at low power levels due to electronic noise in the circuit. Since the BDAS control panel is located in the control room back panel area an operator is required to turnover in progress activities to another qualified operator to reset the BDAS alarm.

5. ASSESSMENT OF SAFETY CONSEQUENCES:

The BDAS channels alarm to alert operators to take action to terminate inadvertent boron dilution and are required to be operable in Modes 3, 4, 5 and 6. Operability of the BDAS channels are necessary to meet the assumptions of the safety analyses to mitigate the consequences of an inadvertent boron dilution event as described in the Updated Final Safety Evaluation Report (UFSAR), Chapter 15. A review of plant data from May 8, 2008, to May 22, 2008, identified multiple occasions where both BDAS alarms were not reset for an extended period of time. Refueling (Mode 6) for Unit 2 commenced on May 8, 2008, at 11:26 and was completed on May 14, 2008, at 02:57 (Mode 5). During this timeframe, RCS boron concentration ranged from 4152 to 4184 ppm, well above the 3000 ppm required by TS LCO 3.9.1 and the Core Operating Limits Report Unit 2, Rev. 15.

Unit 2 entered Mode 5 on May 14, 2008, with both BDAS alarms actuated. In Mode 5, makeup from the Volume Control Tank (VCT) automatically cycles as required to maintain RCS inventory. This process resulted in diluting the boron concentration in the RCS to approximately 3753 ppm at its lowest concentration on May 16, 2008, at 15:17. The prior boron sample was 4230 ppm on May 15, 2008, at 08:55. Procedure 72ST-9RX14, Shutdown Margins - Modes 3, 4 and 5, was completed satisfactorily on May 16, 2008, at 20:20, concluding that shutdown margin was met.

No inadvertent dilution occurred from the time Unit 2 entered Mode 6 on May 8, 2008, to May 22, 2008, when the Operations Department issued a night order stating the importance of the

1. FACILITY NAME	2. DOCKET		6. LER NUMBE	R	3. PAGE
lo Verde Nuclear Generating Station	05000529	YEAR	SEQUENTAL NUMBER	REVISION NUMBER	4 OF 4
Unit 2		2008	- 001 ·	- 01	
NARRATIVE (If more space is required, use additional copil BDAS alarm and directing timely resets safety system functional failure as des reset the BDAS alarms could have pre- described did not result in any challen- release of radioactive materials. Ther implications as a result of this event and of the plant or the health and safety of	ies of NRC Form 30 t of the alarm scribed in 10 evented the figes to the fis efore, there will nd the event f the public.	66A) CFR 50. ulfillment sion pro- were no did not a	event was d 73(a)(2)(v)(/ of a safety duct barriers adverse safe dversely aff	etermined A), since th function. s or result i ety conseq ect the saf	to be a the failure to The event n the uences or the operation
6. CAUSE OF THE EVENT:					
The direct cause of the event was ope and failed to reset the alarm in a timel perform its technical specification func	erators treate ly manner wh ction of alertii	d the BE nich rend ng the or	AS alarm a ered the ala perators to a	s a nuisan rm unavail boron dilu	ce alarm able to ution event.
The root cause was the operators did they were preventing the alarm from f operators to an inadvertent dilution ev	not recogniz ulfilling its sa /ent.	e that by fety func	not resettin tion of alerti	ig the BDA ng the con	S alarms trol room
A contributing cause of the event was minimize nuisance alarms were not in	that previous nplemented.	sly ident	fied BDAS o	lesign cha	nges to
7. CORRECTIVE ACTIONS:					
Corrective action included the followir	ng:		•		
 A night order was issued on Manight order stated the important alarm. 	ay 22, 2008, ice of the BD	after the AS alarn	condition w n and directe	as identifie ad timely re	ed. The eset of the
 Additionally, procedure 40AL-9 include a note stating the alarn BDAS.)RK3A, "Pane n function is i	el BO3A necessa	Alarm Resp ry to maintai	onse," was n operabili	s revised to ity of the
 Training was conducted for pla (LOCT) and License Operator this event. 	Int operators Initial Trainin	in Licen g (LOIT)	se Operator on the inve	Continued stigation re	Training
 The BDAS discriminator voltag of nuisance alarms caused from 	je was optimi m electronic	ized in al noise.	I three Units	to reduce	the number

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