

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9408230102      DOC. DATE: 94/08/08      NOTARIZED: NO      DOCKET #  
 FACIL: STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi      05000528  
 AUTH. NAME      AUTHOR AFFILIATION  
 GRABO, B.      Arizona Public Service Co. (formerly Arizona Nuclear Power  
 LEVINE, J.M.      Arizona Public Service Co. (formerly Arizona Nuclear Power  
 RECIP. NAME      RECIPIENT AFFILIATION

SUBJECT: LER 94-002-01: on 940422, determined that TS 3.1.1.1, 3.3.1 &  
 3.9.1 LCO may not ensure that plant operation is maintained  
 within safety analysis. Caused by groundrules adjunct to TS.  
 TS change request is being prepared. W/940808 ltr.

DISTRIBUTION CODE: IE22T      COPIES RECEIVED: LTR 1 ENCL 1      SIZE: 11  
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: STANDARDIZED PLANT

05000528

	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL
	PD4-2 PD	1 1	HOLIAN, B	1 1
	TRAN, L	1 1		
INTERNAL:	ACRS	1 1	AEOD/DSP/TPAB	1 1
	AEOD/ROAB/DSP	2 2	NRR/DE/EELB	1 1
	NRR/DE/EMEB	1 1	NRR/DORS/OEAB	1 1
	NRR/DRCH/HHFB	1 1	NRR/DRCH/HICB	1 1
	NRR/DRCH/HOLB	1 1	NRR/DRSS/PRPB	2 2
	NRR/DSSA/SPLB	1 1	NRR/DSSA/SRXB	1 1
	NRR/PMAS/IRCB-E	1 1	REG FILE 02	1 1
	RES/DSIR/EIB	1 1	RGN4 FILE 01	1 1
EXTERNAL:	EG&G BRYCE, J.H	2 2	L ST LOBBY WARD	1 1
	NOAC MURPHY, G.A	1 1	NOAC POORE, W.	1 1
	NRC PDR	1 1	NUDOCS FULL TXT	1 1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL  
 DESK, ROOM P1-37 (EXT. 504-2083) TO ELIMINATE YOUR NAME FROM  
 DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

FULL TEXT CONVERSION REQUIRED  
 TOTAL NUMBER OF COPIES REQUIRED: LTTR 28 ENCL 28

P  
R  
I  
O  
R  
I  
T  
Y  
  
1  
  
D  
O  
C  
U  
M  
E  
N  
T



Arizona Public Service Company  
PALO VERDE NUCLEAR GENERATING STATION  
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

JAMES M. LEVINE  
VICE PRESIDENT  
NUCLEAR PRODUCTION

192-00901-JML/BAG/RJR  
August 8, 1994

U. S. Nuclear Regulatory Commission  
ATT: Document Control Desk  
Mail Station P1-37  
Washington, DC 20555

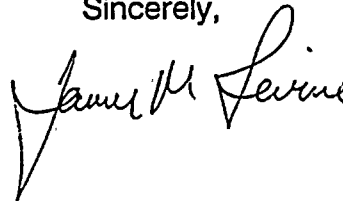
Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2 and 3  
Docket No. STN 50-528/ 529/ 530 (License No. NPF-41/51/74)  
Licensee Event Report 94-002-01  
File: 94-020-404

Attached please find supplement 01 to Licensee Event Report (LER) 94-002 prepared and submitted pursuant to 10CFR50.73. This supplement reports the identification of an additional Technical Specifications' Limiting Condition for Operation that would not ensure Plant operation was maintained within the assumptions of the safety analysis as required by 10CFR50.36. In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region IV.

If you have any questions, please contact Burton. A. Grabo, Supervisor, Nuclear Regulatory Affairs, at (602) 393-6492.

Sincerely,



JML/BAG/RR/rv

Attachment

cc: W. L. Stewart (all with attachment)  
L. J. Callan  
K. E. Perkins  
K. E. Johnston  
INPO Records Center

220020  
9408230102 940808  
PDR ADDCK 05000528  
S PDR

1822  
11



# LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <b>Palo Verde Unit 1</b>										DOCKET NUMBER (2) <b>0 5 0 0 0 5 2 8</b>				PAGE (3) <b>1 OF 1 0</b>			
TITLE (4) <b>Technical Specification Limiting Condition for Operation Not Supported by Safety Analysis</b>																	
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)							
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES				DOCKET NUMBER(S)				
									<b>Palo Verde Unit 2</b>				<b>0 5 0 0 0 5 2 9</b>				
<b>0 4</b>	<b>2 2</b>	<b>9 4</b>	<b>9 4</b>	<b>0 0 2</b>	<b>0 1</b>	<b>0 8</b>	<b>0 8</b>	<b>9 4</b>	<b>Palo Verde Unit 3</b>				<b>0 5 0 0 0 5 3 0</b>				
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)															
<b>1</b>		20.402(b)				20.405(c)				50.73(a)(2)(iv)				73.71(b)			
POWER LEVEL (10)		20.405(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)			
<b>8 6</b>		20.405(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(vii)				OTHER (Specify in Abstract below and in Text, NRC Form 366A)			
		20.405(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)							
		20.405(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)							
		20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(x)							
LICENSEE CONTACT FOR THIS LER (12)																	
NAME										TELEPHONE NUMBER							
<b>Burton Grabo, Supervisor, Nuclear Regulatory Affairs</b>										<b>6 0 2 3 9 3 - 6 4 9 2</b>							
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																	
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS							
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH		DAY		YEAR	
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO												<b>1 0</b>		<b>0 4</b>		<b>9 4</b>	

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

At approximately 1300 MST on April 22, 1994, Palo Verde Units 1 and 2 were in Mode 1 (POWER OPERATIONS) and Unit 3 was in a refueling outage with the core off loaded to the spent fuel pool when APS Nuclear Fuel Management personnel determined that Technical Specifications (TS) 3.1.1.1, 3.3.1, and 3.9.1 Limiting Conditions for Operation (LCO) may not ensure that plant operation is maintained within the assumptions used in the associated safety analysis as required by 10CFR50.36. On June 7, 1994, while continuing to investigate the original condition, TS Table 4.3-1 was identified as having a similar condition. An investigation into the consequences and implications of these conditions is continuing to be conducted. A supplement to this LER will be submitted providing this determination based on actual plant operations.

There have been no previous similar events.

# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
	0   5   0   0   0   5   2   8	9   4	-   0   0   2	-   0   1	0   2	OF	1   0

TEXT

## I. DESCRIPTION OF WHAT OCCURRED:

### A. Initial Conditions:

At approximately 1300 MST on April 22, 1994, Palo Verde Units 1 and 2 were in Mode 1 (POWER OPERATIONS) and Unit 3 was in its 4th refueling outage (3R4) with the core (AC) off loaded to the spent fuel pool (ND).

### B. Reportable Event Description:

Event Classification: A condition that resulted in the plant being in an unanalyzed condition.

A condition that resulted in the plant being in a condition not covered by the plant's operating procedures.

APS has recently completed a Technology Transfer Program with the fuel vendor to allow increased involvement in the reload analysis process. As a result, on March 18, 1994, while performing the reload analysis for Unit 3, Cycle 5 and reviewing associated Operating Procedures, APS Engineering personnel (utility, nonlicensed) identified that Technical Specification (TS) Limiting Conditions for Operation (LCO) 3.1.1.1, 3.3.1, and 3.9.1 may not ensure that plant operation is maintained within the assumptions used in the current safety analysis as required by 10CFR50.36.

On April 22, 1994, APS Engineering personnel completed an initial investigation of TSs 3.1.1.1, 3.3.1, and 3.9.1 Basis, associated safety analysis, and in-place administrative controls. This investigation determined that these TSs did not correctly reflect the current reload analysis and that administrative controls may not have been effective in maintaining Plant operations within safety analysis assumptions. At approximately 1354 MST, PVNGS informed the USNRC Operations Center of the potential condition.

TSs 3.1.1.1, 3.3.1, and Subcritical CEA Withdrawal Analysis

TS 3.1.1.1 requires a 1 percent shutdown margin in Modes 3, 4, and 5 with all Control Element Assemblies (CEA)(RCT) inserted. However, the operating procedures and current safety analysis



# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
	05000528	94	002	01	03	OF	10

TEXT

require that the boron concentration be maintained > Hot Full Power (HFP) All Rods Out (ARO) Equilibrium Xenon Boron Concentration (EXBC) while subcritical (Modes 3, 4, and 5) with the trip breakers (BRK) closed.

TS 3.3.1 requires the Core Protection Calculators (CPC) to be operable in Modes 1 and 2. However, the operating procedures and current safety analysis require that the CPC Bypass be functional during any subcritical operation (Modes 3, 4, and 5) with the trip breakers closed.

When the discrepancy between TS and the Safety Analysis was identified, the Subcritical CEA Bank Withdrawal Safety Analysis assumed protection was provided by the High Log Power Trip (HLPT) at 1.0 E-2 percent power (except in cases where less than four Reactor Coolant Pumps (RCP)(RCT)(P) are running). When less than four RCPs are running, the analysis assumed protection was provided by the automatic removal of the CPC Bypass at 1.0 E-4 percent power prior to reaching the HLPT setpoint.

In June 1991, ABB-Combustion Engineering (ABB-CE) informed APS of an error in the source term used in the Subcritical CEA Bank Withdrawal Safety Analysis. Based on plant procedures, ABB-CE determined that there was no immediate safety concern since the RCS boron concentration would be maintained at or above HFP ARO EXBC. This boron concentration would prevent criticality on any CEA bank withdrawal with all other CEAs completely inserted. ABB-CE also stated that either the boron restriction or operation of the CPCs was sufficient to correct for the source term error. Based on this statement, APS changed the Operating Procedures to require the boron restriction or operable CPCs. However, the need for the CPCs to be operable during Modes 3, 4, and 5 with < 4 RCPs running was not addressed in the TS.

In 1992, the reload groundrule concerning subcritical CEA withdrawal was changed such that the required RCS boron concentration was assumed to prevent criticality on a CEA Shutdown Bank withdrawal. The HLPT was assumed to protect against a CEA Regulating Bank withdrawal condition. The CPCs continued to generate a trip in any condition above 1.0 E-4 percent power where < 4 RCPs are running (see Section V, Additional Information for a definition/explanation of groundrule). At this point, the





# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		94	002	01	04	OF	10

TEXT

previously described Administrative Controls (which required one or the other of the above requirements) no longer assured operation within the safety analysis since both the boron restriction and CPCs would be required. The need to change the Operating Procedures was not identified during review of the groundrules.

In February 1994, Nuclear Fuel Management (NFM) identified that the subject groundrule required both the boron restriction and operable CPCs to cover the analysis assumptions. Corrected Operating Procedures became effective on March 4, 1994.

## TS 3.9.1 and Mode 6 Boron Dilution Analysis

TS 3.9.1 requires either a K-effective of  $\leq 0.95$  or a boron concentration of  $\geq 2150$  ppm, whichever is more restrictive, when in Mode 6. The Mode 6 boron dilution analysis (prior to Unit 3 Cycle 5) assumed an initial boron concentration of 4000 ppm. ABB-CE performed previous boron dilution analysis using the Refueling Water Tank (RWT) limits of  $> 4000$  ppm and  $< 4400$  ppm as specified in TS 3.1.2.5. This analysis assumed that when the refueling cavity was flooded, the RWT would be the source of make-up. APS Engineering personnel performing the reload analysis for Unit 3 determined that procedures do not limit the source of make-up to the RWT.

The Unit 3 Boron Dilution Analysis for Mode 6 was analyzed prior to entry into Mode 6 using an initial boron concentration set at the calculated refueling boron concentration. This boron concentration is more restrictive than a 0.95 K-effective and complies with TS 3.9.1. The analysis verified that the Source Range Monitoring (SRM) Setpoint Ratio of 2.2 remained valid. The COLR Table 5 "Required Monitoring Frequencies for Backup Boron Dilution Detection as a Function of Operating Charging Pumps" for Mode 6 required revision.

Reanalysis for the current Unit 1 Core 5 and Unit 2 Core 5 were performed. This verified that the Mode 6 SRM Setpoint ratio of 2.2 remained valid, but COLR Table 5 required changes. The required monitoring frequencies for backup boron dilution detection in Table 5 of the COLR, for Units 1, 2, and 3 were revised.



# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE	
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		94	002	01	05	OF 10

TEXT

On June 7, 1994, APS NFM personnel (utility, nonlicensed) identified an additional condition where the safety analysis used more restrictive requirements than the requirement described in the TS. TS Table 4.3-1 requires adjustments to linear power level, CPC Delta T Power and CPC nuclear power signals if they differ from the calorimetric by an absolute difference of > 2 percent. The ABB-CE letter that transmitted the final CPC/CEAC addressable constants for Unit 3 Cycle 5 requires the calibration tolerance to be administratively restricted below 30 percent power.

This restriction is based on implementation of the interim approach to the CPC power calibration that was first identified by ABB-CE in 1988. Currently the difference between CPC neutron power, CPC Delta T Power, and COLSS primary calorimetric power is between the range of -0.5 percent to +2.0 percent. These requirements are currently administratively controlled.

- C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

Not applicable - no structures, systems, or components were inoperable at the start of the event which contributed to this event.

- D. Cause of each component or system failure, if known:

Not applicable - no component or system failures were involved.

- E. Failure mode, mechanism, and effect of each failed component, if known:

Not applicable - no component failures were involved.

- F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - no failures of components with multiple functions were involved.



# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		94	002	01	06	OF	10

**TEXT**

- G. For a failure that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the train was returned to service:

Not applicable - no failures that rendered a train of a safety system inoperable were involved.

- H. Method of discovery of each component or system failure or procedural error:

As discussed in Section I.B, the discrepancies between TS and the current safety analysis were identified as part of the Unit 3 Core 5 Reload Analysis and during a review of an Operating Procedures.

- I. Cause of event:

In previous reload analysis, the nuclear fuel reload groundrules have been treated as an adjunct to the TS. When groundrules were more restrictive than the current TS, Administrative Controls were used to implement the groundrule restrictions and allow operation of the Plant. The limits defined in the TS were not always revised to reflect the reload analysis if the Administrative Controls were more restrictive. Because of this, analysis assumptions in the groundrules were not completely consistent with the TS.

Secondly, NFM depends upon the cross discipline review of the groundrules to target Operating Procedure changes. These cross discipline reviews did not always identify the impacts that the groundrule changes had on Operating Procedures. This is likely related to the complexity of the analyses (SALP Cause Code A: Personnel Error).

An investigation of this event is continuing to be conducted in accordance with the APS Incident Investigation Program. As part of the investigation, a determination of the cause(s) will continue. If the evaluation results differ from the determinations already identified in this LER, a supplement to this report will be submitted.



# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
	05000528	94	- 002	- 01	07	OF	10

TEXT

J. Safety System Response:

Not applicable - there were no safety system responses and none were necessary.

K. Failed Component Information:

Not applicable - no component failures were involved.

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

- TS 3.1.1.1 and 3.3.1 Control Element Assembly (CEA) Withdrawal from Subcritical Conditions

The RCS boron concentration was to be administratively controlled at such a level that the shutdown margin requirement would be met and a subcritical CEA withdrawal would not result in criticality. Even though the administrative control was incorrect, allowing use of the CPCs rather than maintaining the boron restriction, the CPC Bypass removal at 1.0 E-4 percent power would provide a trip for subcritical CEA withdrawal with < 4 RCPs operating. There have been no rod withdrawal events during the time the Administrative Controls were incomplete.

- TS 3.9.1 - Mode 6 Boron Dilution

The Boron Dilution analysis for Mode 6 was recalculated using the minimum boron concentration required by TS 3.9.1 for each Unit. When this was done, it was determined that the Mode 6 Source Range Monitoring (SRM) setpoint ratio of 2.2 remained valid for all three Units.

- TS Table 4.3-1 - CPC Power Calculations

The more restrictive requirements for adjustments to linear power level, CPC Delta T power, and CPC neutron power have been administratively controlled since they were first identified by ABB-CE in 1988 and at no time have the safety analysis results been compromised.





# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE	
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		94	002	01	08	OF 10

## TEXT

Based on the above, the conditions identified in this LER did not result in any challenges to the fission product barriers or result in any releases of radioactive materials. An investigation into the consequences and implications of these conditions is continuing to be conducted. A supplement to this LER will be submitted providing this determination based on actual plant operations.

### III. CORRECTIVE ACTION:

#### A. Immediate:

##### TS 3.1.1.1 and 3.3.1

Operating Procedures became effective on March 4, 1994, which required HFP ARO EXBC and operable CPCs during subcritical operations when the CEAs are capable of being withdrawn.

A TS change request is being prepared which will define shutdown margin requirements based on CEA Trip Breaker position rather than CEA position. To eliminate the need for the CPC Bypass in Modes 3, 4, and 5, the TS change will lower the HLPT setpoint to match the removal of the CPC Bypass setpoint. A reference to the minimum boron requirement will also be incorporated into the COLR. These changes are expected to be submitted to the NRC by August 31, 1994.

##### TS 3.9.1

The assumption of 4000 ppm for the initial boron concentration in the Mode 6 Boron Dilution analysis has been changed to the boron concentration required to comply with TS 3.9.1 and the Boron Dilution Analysis for Mode 6 was reanalyzed.

Table 5 of the COLRs, Frequencies for Backup Boron Dilution Detection as a Function of Operating Charging Pumps for Mode 6, has been changed to explicitly include conditions when boron concentrations are < 4000 ppm.



# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		94	002	01	09	OF	10

TEXT

## B. Action to Prevent Recurrence:

The process for reviewing groundrule changes for impact on Operating Procedures will be reviewed to determine if changes are required to enhance the process. This review is expected to be completed by August 12, 1994.

APS NFM personnel are continuing to review the issues identified and the reload analysis process to determine if additional corrective actions that may be required. This review is expected to be completed by August 31, 1994. If information is developed which would affect the safety consequences, root cause, or the reader's understanding or perception of this event, a supplement will be submitted.

An investigation into the consequences and implications of these conditions is continuing to be conducted. A supplement to this LER will be submitted providing this determination based on actual plant operations. This investigation is expected to be completed by August 31, 1994.

## IV. PREVIOUS SIMILAR EVENTS:

There have been no previous similar events.

## V. ADDITIONAL INFORMATION:

### Groundrule Definition:

The groundrule document provides a singular reference and method for communicating detailed assumptions used in the reload analysis that are not captured in other analysis inputs, such as: Performance Objectives, Technical Specifications, Updated Final Safety Analysis Report, Code of Federal Regulations, etc.

### Groundrule prior to March 4, 1994

"Subcritical CEA Withdrawal - The Reload Analysis Report (RAR) analysis for subcritical CEA Bank Withdrawal shall assume that Reactor Coolant System (RCS) boron concentration shall be maintained such that K-effective will be less than 1.0 upon withdrawal of shutdown Full Length (FL) CEAs when the trip breakers



# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE	
Palo Verde Unit 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		94	002	01	10	OF 10

TEXT

are closed with all other FL CEAs fully inserted."

Groundrule after March 4, 1994

"Subcritical CEA Withdrawal - The CPCs will be operable when the RTSG is closed. The RCS boron concentration will be maintained at or above the boron concentration required for HFP ARO EX conditions until the shutdown groups are fully withdrawn."

