



A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear
Generating Station

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102-06159-DCM/JR
March 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 2010-001-00**

Enclosed please find Licensee Event Report (LER) 50-529/2010-001-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports an operation prohibited by technical specifications and a condition that could have prevented fulfillment of a safety function due to an incorrectly positioned essential chiller bypass valve.

In accordance with 10 CFR 50.4, copies of this LER 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 Marianne Webb, Section Leader, Regulatory Affairs, at (623) 393-5730.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,
D.C. Mims

DCM/RAB/TNW/JR

Enclosure

cc: E. E. Collins Jr. NRC Region IV Regional Administrator
J. R. Hall NRC NRR Project Manager - (send electronic and paper)
L. K. Gibson NRC NRR Project Manager - (send electronic and paper)
R. I. Treadway NRC Senior Resident Inspector for PVNGS

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NRR

LICENSEE EVENT REPORT (LER)

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

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 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.

1. FACILITY NAME Palo Verde Nuclear Generating Station (PVNGS) Unit 2	2. DOCKET NUMBER 05000529	3. PAGE 1 OF 7
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4. TITLE
Essential Chiller B Inoperable Due to Incorrectly Positioned Head Pressure Control Bypass Valve

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
01	26	2010	2010	- 001 -	00	03	29	2010		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)									
10. POWER LEVEL 100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)							
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER							
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME Marianne Webb, Section Leader, Regulatory Affairs	TELEPHONE NUMBER (Include Area Code) 623-393-5730
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

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

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

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

On January 26, 2010, at approximately 1:17 p.m., Mountain Standard Time, the Essential Chilled Water System Chiller B (EC B) was declared inoperable due to low condenser pressure. The cause was the refrigerant head pressure control bypass valve was in the locked-open position instead of the required locked-closed position. The bypass valve had been left in the open position following Essential Cooling Water System (EW) B pump testing on December 24, 2009. In that configuration, EC B could have tripped on low chiller condenser pressure during low EC B heat loads. Operations restored EC B operability by repositioning the valve to the locked-closed position. During that 33-day inoperable period (a condition prohibited by Technical Specifications), the redundant train EC A chiller was also inoperable (a condition that could prevent the fulfillment of a safety function) for one hour and 40 minutes during a similar EW A pump test on January 7, 2010, while the respective refrigerant head pressure control bypass valve was open. No actual component failures occurred.

The root cause was independent verification practices allowed verification of component positions without briefings and without use of verification signoff pages in the field. To prevent recurrence, verification practices will be revised to require use of those error prevention tools.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 7
		2010	-- 001	-- 00	

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 Licensee Event Report (LER) is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(B) as an operation prohibited by Technical Specifications (TSs). Essential Chiller B (EC B) was inoperable and not functional for 33 days which exceeded TS Limited Condition of Operation (LCO) 3.7.10 action completion time requirements. The LCO permits one train to be inoperable for 72 hours and requires a plant shutdown into Mode 3 (Hot Standby) in 6 hours and Mode 5 (Cold Shutdown) in 36 hours if the train is not returned to an OPERABLE status. Additionally, the TS LCOs for safety-related equipment supported by EC B were not met during the 33 day period.

This LER is also submitted pursuant to 10 CFR 50.73(a)(2)(v)(D) as a condition that could have prevented fulfillment of a safety function. Essential Chiller A (EC A) was inoperable and not functional on one occasion for one hour and 40 minutes during the 33 day period that EC B was inoperable.

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

The Essential Chilled Water System (EC) (EIS: KM) consists of two 100% capacity, redundant safety-related chilled water trains. Each train is a closed-loop system which circulates chilled water to the following Engineered Safety Feature (ESF) air handling units that provide room cooling to the corresponding safety-related equipment:

- Control Room Complex essential air handling units
- D.C. Equipment Room essential air handling units
- ESF Switchgear Room essential air handling units
- High Pressure Safety Injection pump room essential air handling units
- Low Pressure Safety Injection pump room essential air handling units
- Containment Spray pump room essential air handling units
- Auxiliary Feedwater (AF) (EIS: BA) pump room essential air handling units
- Essential Cooling Water (EW) (EIS: BI) pump room essential air handling units
- Electrical Penetration room air handling units

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 7
		2010	-- 001	-- 00	

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

The key components in each of the system's two trains include a 100% capacity chiller (refrigeration unit), a 100% capacity chilled water circulation pump, and related piping, tanks, valves, instrumentation and controls. The refrigeration unit consists of a compressor, evaporator, refrigerant condenser/receiver unit, controls and instrumentation.

The EC System does not function during normal plant operation. The system is automatically started by one of the following ESF actuation signals:

1. Safety Injection Actuation Signal (SIAS)
2. Containment Spray Actuation Signal (CSAS)
3. Loss of Power (LOP)
4. Control Room Essential Filtration Actuation Signal (CREFAS)
5. Control Room Ventilation Isolation Actuation Signal (CRVIAS)
6. Auxiliary Feed Water Actuation Signal (AFAS)

Cooling water for the essential chiller condenser is supplied by the respective train's EW System, a closed loop cooling water system that provides cooling water to ESF systems, including EC. Circulation from EW flows through the chiller condenser and is modulated by the refrigerant head pressure control valve to maintain a minimum pressure in the chillers' condenser at 18 psig which prevents the essential chiller unit from tripping on a low cooler refrigerant pressure or temperature during cold weather conditions.

A second valve, the refrigerant head pressure control bypass valve (bypass valve), is normally required to be in the locked-closed position. It may be opened to obtain the required flow through the chiller when the Spent Fuel Pool Heat Exchangers are lined up to be cooled via the EW System. The bypass valve is also unlocked and opened during performance of EW pump surveillance testing, during which the affected train's EC is considered inoperable and not functional until the valve is restored to its required locked-closed position.

During a low load condition (EC heat load less than 20%) with EW temperatures less than 55 degrees Fahrenheit, an open bypass could result in a chiller low condenser pressure or temperature trip. This low load condition could exist during an event in which only an AFAS

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 7
		2010	-- 001	-- 00	

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

occurs since EC would have greater than 20% heat load during other events, such as a SIAS.

3. INITIAL PLANT CONDITIONS:

Palo Verde Unit 2 was in Operating Mode 1 (Power Operations) at approximately 100 percent thermal power at the initiation of this event. There were no other major structures, systems, or components that were inoperable at the start of the event that contributed to the event.

4. EVENT DESCRIPTION:

On January 26, 2010, at 12:51 p.m., Unit 2 control room operators started EC B for testing. The chiller condenser pressure was found to have a reading of 7 to 13 psig which was outside of its required band of 15 to 45 psig. At 1:17 p.m., the control room declared EC B inoperable and entered technical specification LCO 3.7.10, Essential Chilled Water (EC) System. Upon investigation, the refrigerant head pressure control bypass valve was found in the locked-open position instead of the required locked-closed position. The bypass valve was restored to the required locked-closed position, condenser pressure stabilized at 18 psig and EC B was declared OPERABLE at 2:15 p.m.

The root cause investigation determined the last manipulation of the bypass valve was on December 24, 2009, during the performance of the EW B pump surveillance testing.

During the period when EC B was not functional because of the incorrectly positioned bypass valve (December 24, 2009, through January 26, 2010), the redundant EC A train was inoperable and not functional on January 7, 2010, between 10:23 a.m. and 12:03 p.m. The bypass valve was opened on that date during EW A pump testing and restored to the required locked-closed position upon completion of the testing.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 7
		2010	-- 001	-- 00	

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

5. ASSESSMENT OF SAFETY CONSEQUENCES:

There was no actual impact to the health and safety of the public during the time when EC B was inoperable. The condition did not result in any challenges to the fission product barriers or result in the release of radioactive materials. The 10 CFR 100 offsite dose criteria were never challenged or exceeded.

Essential Chiller B was considered inoperable for 33 days. Since EC B was inoperable, Auxiliary Feedwater (AF) train B was inoperable per TS LCO 3.7.5, Auxiliary Feedwater System, during the same 33-day period while EC B was unable to provide the room cooling supporting function. If AF B actuated without EC B providing room cooling, the temperatures in the room would rise, but would remain below environmental qualification limits for the equipment during the 13 hour and 20 minute auxiliary feed pump mission time. Therefore, though degraded, AF B would have been able to provide the residual heat removal safety function for its mission time during the period EC B was inoperable.

Other affected ESF B train components that are supported by EC B for room cooling were functional during the 33-day period EC B was considered inoperable. An event that required additional ESF actuations (in addition to or other than an AFAS), would have resulted in higher heat load on EC B train and the chiller would not have been at risk of tripping on low condenser pressure even with the bypass valve in the incorrect locked-open position. Room cooling provided by EC B was available to affected ESF B components; therefore, they remained functional.

Additionally, during the period EC B was inoperable, EC A was removed from service and not functional for 1 hour and 40 minutes on January 7, 2010, during EW A pump testing. Therefore, the safety system function of EC to mitigate the consequences of an accident was not available during that period on January 7. On a separate occasion, January 5, 2010, EC A was also inoperable but determined to be functional during EW A Pump Room Air Cooling Unit (ACU) maintenance.

While EC A was inoperable on January 7, AF A was also inoperable per LCO 3.7.5, because the required room cooling function provided by EC A was not available. If AF A actuated without EC A providing room cooling, the temperatures in the room would rise, but would

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 7
		2010	-- 001	-- 00	

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

remain below environmental qualification limits for the equipment during the 1 hour and 40 minutes EC A was inoperable. Therefore, AF A remained available to provide its safety function during this short period. Other affected engineered safety feature system A trains were similarly inoperable as required by Technical Specifications but functional during this period.

The station reviewed the risk for the 33 day period EC B was inoperable and the short duration when EC A was inoperable with EC B inoperable. The event would have contributed a negligible increase to either core damage frequency or large early release fraction. Therefore, the event had very low risk significance.

6. CAUSE OF THE EVENT:

The direct cause of this event was the bypass valve was locked open instead of locked closed on December 24, 2009, during restoration steps following EW pump testing.

The root cause was Operations' work practices for independent verification allowed independent verification of the position of a safety related locked component without a briefing and a place-keeper sign-off in the field.

7. CORRECTIVE ACTIONS:

Immediately following the discovery of the bypass valve's incorrect position, the valve was placed in the required locked-closed position and its position was independently verified. The position of the redundant train EC A refrigerant head pressure control bypass valve was also verified to be in the required locked-closed position. Similarly, the EC A and EC B bypass valves in Units 1 and 3 were verified to be in the required locked-closed position.

An Operations' night order was issued as an interim action for operators to complete a briefing prior to performing independent verifications and to have the paperwork with the place-keeper sign-off in the field while performing the verifications.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	7 OF 7
		2010	-- 001	-- 00	

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

The corrective action to prevent recurrence is to revise the Operations Department Practice #1, entitled *Operations Principles and Standards* to incorporate the following:

- Personnel performing independent verifications will be required to attend a briefing for the task for which they will be performing an independent verification.
- Area operators performing independent verifications in the field will be required to have a copy of the procedure in hand if the independent verification sign-offs are embedded in the procedure. For procedures without embedded sign-offs, operators will have working copies of the component change records for the valves to be independently verified. This will enable the operators to validate the components, the required positions, and the use of place-keeping signatures.

8. PREVIOUS SIMILAR EVENTS:

Although Palo Verde Nuclear Generating Station experienced similar events in the past in which valves have been left incorrectly positioned, none had specific corrective actions which would have prevented this event. None of the events were required to be reported by 10 CFR 50.72 or 50.73.