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102-08077-BR/MMD April 29, 2020

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 2020-001-00

Enclosed please find Licensee Event Report (LER) 50-529/2020-001-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports a Unit 2 reactor trip and other specified system actuations that occurred on March 3, 2020.

In accordance with 10 CFR 50.4, copies of this LER are being forwarded to the Nuclear Regulatory Commission (NRC) Regional Office, NRC Region IV, and the Senior Resident Inspector.

Arizona Public Service Company makes no commitments in this letter. If you have questions regarding this submittal, please contact Matthew Kura, Department Leader, Nuclear Regulatory Affairs, at (623) 393-5379.

Sincerely,

BR/MMD

Enclosure

cc:	S. A. Morris	NRC Region IV Regional Administrator
	S. P. Lingam	NRC NRR Project Manager for PVNGS
	C. A. Peabody	NRC Senior Resident Inspector PVNGS



NRC FO	RM 366			U.S. NUCI	EAR RE	GULATOR	Y COMM	ISSION	APPROVED BY	OMB: NO. 3150)-0104 E	EXPIRE	S: 04/30/2020
(04-2020) LICENSEE EVENT REPORT (LER) (See Page 2 for required number of digits/characters for each block) (See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/) http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)								n request: 80 hours. fed back to industry. Branch (T-6 A10M), , or by e-mail to of Information and ory Commission, 725 <u>reop.qov</u> . The NRC d to, a collection of lays a currently valid					
1. Facili	1. Facility Name 2. Docket Number 3. Page												
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Unit 2	Reacto	or Trip or	n Low S	Steam Ge	enerato	or Level Si	ignal						
5.	Event D	Date	6.	LER Numl	per	7.	Report D	ate		8. Othe	r Facilities I	nvolved	
Month	Dav	Year	Year	Sequential	Rev	Month	Dav	Year	Facility Name			Docket	Number
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9. Operating Mode 11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)													
	1		20.2201(b) 20.2203(a)(3)(i)				50.73(a)(2)	50.7	☐ 50.73(a)(2)(viii)(A)				
			20.2	2201(d)	d) 20.2203(a)(3)(ii)				50.73(a)(2)	50.7	☐ 50.73(a)(2)(viii)(B)		
			20.2	20.2203(a)(1)				50.73(a)(2)	□ 50.73(a)(2)(ix)(A)				
			20.2	2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)		⊠ 50.73(a)(2)(iv)(A)		50.7	50.73(a)(2)(x)		
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	100		$\Box 20.2203(a)(2)(iv) \qquad \Box 50.46(a)(3)(ii) \\ \Box 20.2203(a)(2)(iv) \qquad \Box 50.72(a)(2)(iv) \\ \Box 50.72(a)(1)(iv) \\ $				□ 50.73(a)(2))(v)(C)	73.7	7(a)(1)			
			$\Box 20.2203(a)(2)(v) \qquad \Box 50.73(a)(2)(i)(A)$				$ \Box 50.73(a)(2)(V(D) \qquad \Box 73.7 \\ \Box 50.73(a)(2)(V(ii) \qquad \Box 73.7 \\ \Box 50.73(a)(2)(V(ii)) \qquad \Box 73.7 \\ \Box 73.7$			7(a)(2)(i	i) 		
			\Box 20.2203(a)(2)(VI) \Box 50.73(a)(2)(I)(B)				$\Box 50.73(a)(2)(VII) \qquad \Box 73.77(a)(2)(III)$						
50.73(a)(2)(i)(C) Other (Specify in Abstract below or in NRC Form 366A								366A					
Licensee Co	ontact					12. LIC	ensee Co			Telephone	Number (Include	Area Code	3)
Matthe	ew Kura	a, Depart	ment L	eader, N	luclear	Regulato	ry Affair	rs	623-393-5379				,
				13. 0	Complete	One Line for	each Con	nponent Fa	ilure Described in	this Report			
Cau	use	System	Compo	onent M	anufacture	er Reportabl	e To ICES	Cause	System	Component	Manufactu	rer Re	portable To ICES
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	14.	Suppleme	ental Rep	oort Expec	ted			Month Day			Year		
Yes (If yes, complete 15. Expected Submission Date)					No	15.	Expected Subm	ission Date	7	31	2020		
Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)													
This Licensee Event Report addresses an event on March 3, 2020, when the Unit 2 Reactor automatically tripped on a low Steam Generator (SG) 1 level signal.													
The low SG levels occurred because of a trip of both of the Main Feedwater Pumps (MFWPs), which tripped during restoration of power to the MFWPs Lube Oil (LO) control panels. A Reactor Power Cutback (RPC) signal was initiated upon loss of the MFWPs, followed by the reactor trip on low SG level. Auxiliary Feedwater Actuation Signals (AFAS) were then received and the Auxiliary Feedwater pumps, the Essential Spray Pond (ESP) pumps and the Emergency Diesel Generators (DGs) actuated as a result. This event is reportable under 10CFR 50.73(a)(2)(iv)(A) due to the Reactor Protection System (RPS), AFAS, and ESP/DGs actuations per NUREG 1022 Revision 3.													

The cause evaluation is still in progress; a supplement will be submitted to incorporate the result of the evaluation.

NRC FORM 366A U.S. NUCLEAR REGULA	NRC FORM 366A U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB: NO. 3150-0104 EXPIRES: 4/30/2020				
(04-2020) LICENSEE EVENT RE CONTINUATION S (See NUREG-1022, R.3 for instruction and guidance f http://www.nrc.gov/reading-rm/doc-collections/nure	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 Information Services Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; e-mail: oira_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.							
1. FACILITY NAME	2. DOCKET N	UMBER	3. LER NUMBER					
Palo Verde Nuclear Generating Station	05000-529		YEAR	SEQUENTIAL NUMBER	REV NO.			
(PVNGS) Unit 2			2020	- 001	- 00			
 REPORTING REQUIREMENT(S): This Licensee Event Report (LER) is being submitted pursuant to 10CFR 50.73(a)(2)(iv)(A) as an actuation of the Reactor Protection System (RPS), which resulted in an Auxiliary Feedwater System actuation, which led to the start of the Auxiliary Feedwater pumps, Essential Spray Pond pumps and both Emergency Diesel Generators. 								
50.72(b)(3)(iv)(A) Specified System Actuation.								
2. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):								
Steam Generator (SG) (EIIS Code: AB): During normal operation, reactor coolant leaving the core of the reactor vessel enters two "hot legs", one per loop, and flows to the steam generators. The hot reactor coolant enters the steam generator through the inlet nozzle in the steam generator primary head. The steam generator is a shell and U-tube heat exchanger with an integral economizer. It operates with reactor coolant on the tube side and secondary feedwater on the shell side. Primary (reactor) coolant flows through the U-tubes giving up its heat to the secondary feedwater in the shell side of the steam generator.								

The heat added by the reactor coolant causes the feedwater (secondary coolant) to boil thus generating steam for turbine operation. The primary (reactor coolant) and secondary (feedwater and steam) systems are separated and do not come in contact with each other. This design prevents radioactive contamination of the secondary system. Reactor coolant leaves the steam generator through two outlet nozzles. A vertical divider plate separates the inlet and outlet plenums of the primary head. Each outlet supplies the suction leg piping of the reactor coolant pumps.

Reactor Protection System (RPS) (EIIS Code: JC): The system consists of sensors, calculators, logic, and other equipment necessary to monitor selected parameters to effect reliable and rapid reactor shutdown (reactor trip). The system's functions are to protect the core Specified Acceptable Fuel Design Limits and Reactor Coolant System (RCS) (EIIS Code: AB) pressure boundary for incidents of moderate frequency, and to provide assistance in limiting conditions for certain infrequent events and limiting faults. Among other automatic trips, the RPS trips the reactor upon receipt of a low steam generator water level signal (44.2 percent wide range water level).

Main feedwater (MFW) (EIIS Code: SJ): The system consists of piping, main feedwater pumps (MFWPs) (EIIS Code: JK), high pressure heaters, valves, controls, instrumentation, and associated equipment which supply feedwater to the SG. Each MFWP is a turbine-driven pump capable of supplying 65 percent of main feedwater system capacity. There are two MFWPs which serve both SGs.

The MFWPs are each provided with a Lube Oil (LO) (EIIS Code: SJ) control panel. The function of the LO control panel protective relays is to monitor MFWP and turbine bearings LO and control oil pressure, and to take protective actions when a low-pressure condition is detected. Those protective actions include the trip of the affected MFWP. A loss of feed pump initiates a Reactor Power Cutback (RPC), which drops pre-selected Control Element Assemblies (CEAs) (EIIS Code: AA) and reduces main turbine load to rapidly reduce reactor power. This allows the plant to remain on-line during these events and significantly reduces the requirements for steam bypass valve and MFWP capacity.

Engineered Safety Features Actuation Systems (ESFAS) (EIIS Code: JE): The system provides initiating signals to components requiring automatic actuation. These actuating signals are generated when monitored variables reach

NRC FORM 366A (04-2020)	U.S. NUCLEAR REGULA	TORY COMMISSION	APPROVED BY OMB: NO. 3150-010)4	EXPIRES: 4	4 /30/2020
(See NUREG-10)	LICENSEE EVENT RE CONTINUATION S 22, R.3 for instruction and guidance f c.gov/reading-rm/doc-collections/nure	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 Information Services Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; e-mail: oira submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information nulless the document requesting or requiring the collection displays a currently valid OMB control number.				
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Palo Verde Nuclear Generating Station 05		05000-529		YEAR	SEQUENTIAL NUMBER	REV NO.
(PVNGS) Unit	2			2020	- 001	- 00

levels that require protective action. The system performs its function by initiating ESFAS equipment if selected abnormal conditions are detected. The setpoints for the actuation signals are selected to minimize the consequences of design basis accidents, which include the fuel handling accident, fire/smoke, and loss of power.

Auxiliary Feedwater Actuation Signal (AFAS) (EIIS Code: BA). During normal power generation, the two essential pumps are placed in a standby condition. The system is provided with two channels of AFAS (AFAS-1 or -2) corresponding to each SG. An AFAS will automatically start and align the essential pumps to feed the affected SG upon receipt of a low steam generator water level signal (25.8 percent wide range water level). As long as the affected SG is intact, as evidenced by the existing SG differential pressure (relative to the other SG), the auxiliary feed system will automatically maintain SG level within a prescribed band of 25.8 percent wide range to 40.8 percent wide range indication.

Essential Spray Pond (ESP) (EIIS Code: BS): The system consists of two independent, redundant safety related flow trains. Each train takes suction from, and returns water to, its associated spray pond. One flow train supplies the cooling water required for plant shutdown to Train A Essential Cooling Water (EW) (EIIS Code: BI) heat exchanger and Train A DG cooling water heat exchangers (EIIS Code: LB). The other flow train supplies cooling water to the same items in Train B. Heat is rejected to the ESP system, which provides the unit with its Ultimate Heat Sink. The spray pond pumps start automatically in response to engineered ESFAS signals such as an AFAS. Either flow train can supply sufficient cooling water to allow a safe plant shutdown independent of the other flow train for analyzed accidents. The ESP system is normally in standby during normal power generation and is operated manually to recirculate the system to maintain its chemistry. It is also operated during plant shutdowns or when the emergency DG are in service.

Diesel Generator (DG) (EIIS Code: EK): The system is a Class 1E standby generation system that functions as a standby source of alternating current (AC) power for safe plant shutdown in the event of loss of preferred (off-site) power. This system includes all necessary auxiliaries to maintain the diesel engine in a readiness condition. Each DG is an independent unit capable of providing power to safety equipment in the event of the loss of the preferred (off-site) power to safely shutdown the plant or mitigate the consequences of a loss of coolant accident (LOCA).

3. INITIAL PLANT CONDITIONS:

On March 3, 2020, PVNGS Unit 2 was in Mode 1 (Power Operation) at 100 percent power at normal operating temperature and normal operating pressure. There were no inoperable structures, systems, or components at the time that contributed to this event.

4. EVENT DESCRIPTION:

On March 3, 2020 during dayshift, an auxiliary operator removing a crane from service inadvertently opened the wrong breaker. This de-energized the panel that supplies power to both MFWP A and B LO control cabinets; and resulted in the auto-start of the emergency bearing oil pumps for both MFWP.

During the restoration of power to the LO control cabinets at 20:49, the trip system entered a 10-second diagnostic and energized the digital trip relay inside the cabinets. By design, the digital relays default to the tripped condition upon loss of power, whereas the auxiliary relays default to the non-tripped state. Because the auxiliary relay does not have an initialization delay, it immediately actuated in response to the digital relay being tripped. This sent a loss of LO pressure signal to trip the MFWPs, and initiated the loss of feed pump RPC. Within 27 seconds, at 20:50, an automatic reactor trip occurred due to low SG #1 water level followed closely by low SG #2 water level trip. The lowering SG levels resulted in AFAS-1 and AFAS-2 actuations within 35 seconds of the reactor trip. This resulted in a start of the Auxiliary Feedwater pumps, ESP pumps and the DGs. Once the 10-second diagnostic timed out and the trip relay contact opened, clearing the LO low pressure signal, the MFWPs were available to be reset and restarted at that point.

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(04-2020) (See NUREG-102 http://www.nrc	LICENSEE EVENT R CONTINUATION 22, R.3 for instruction and guidance .gov/reading-rm/doc-collections/nur	EPORT (LER) SHEET for completing this form egs/staff/sr1022/r3/)	Estimated burden per response to comp Reported lessons learned are incorporate Send comments regarding burden estimate Nuclear Regulatory Commission, W Infocollects.Resource@nrc.gov, and the Regulatory Affairs, (3150-0104), Attn: D 725 17th Street NW, Washington, DC 205 may not conduct or sponsor, and a person i unless the document requesting or requirin number.	ly with this mad d into the license to the Informat ashington, DC OMB reviewer besk Officer for i03; e-mail: <u>oira</u> s not required to g the collection	ndatory collection require ing process and fed bac ion Services Branch (T-6 2 20555-0001, or by at: OMB Office of Inf the Nuclear Regulatory <u>submission@omb.cop.c</u> respond to, a collection of displays a currently valid	est: 80 hours. k to industry. o A10M), U.S. / e-mail to 'ormation and Commission, goy. The NRC of information OMB control	
1. FACILITY NAME 2. DOCKET N			UMBER	3. LER NUMBER			
Palo Vordo Nu	clear Concrating Station	05000 520		YEAR	SEQUENTIAL NUMBER	REV NO.	

5. ASSESSMENT OF SAFETY CONSEQUENCES:

Palo Verde Nuclear Generating Station

(PVNGS) Unit 2

This event did not result in a challenge to fission product barriers or result in the release of radioactive materials. The event did not adversely affect the safe operation of the plant or health and safety of the public.

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The RPS functioned as designed and initiated an automatic reactor trip that placed the plant in a safe condition. All required plant systems responded as expected and all CEAs fully inserted into the reactor core. The AFAS, the ESP pumps and the DGs actuated due to the of the low SG level. No safety related components failed to actuate. In addition, the MFWPs were available immediately following their trip to provide the heat removal function, if required.

The Unit 2 reactor trip did not result in a transient more severe than those already analyzed in the Updated Final Safety Analysis Report. The primary system and secondary pressure boundary limits were not approached.

The event would not have prevented the fulfillment of any safety function of structures or systems as defined by 10CFR 50.73(a)(2)(v).

6. CAUSE OF THE EVENT:

The cause evaluation is still in progress; a supplement will be submitted to incorporate the result of the evaluation.

7. CORRECTIVE ACTIONS:

The cause evaluation is still in progress; a supplement will be submitted to incorporate the result of the evaluation.

8. PREVIOUS SIMILAR EVENTS:

The cause evaluation is still in progress; a supplement will be submitted to incorporate the result of the evaluation.

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