



**MARIA L. LACAL**  
Senior Vice President  
Nuclear Regulatory and Oversight

**Palo Verde**  
**Nuclear Generating Station**  
P.O. Box 52034  
Phoenix, AZ 85072  
Mail Station 7605  
**Tel** 623 393 6491

102-07930-MLL/MMD  
July 3, 2019

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

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station (PVNGS) Unit 1 and 3  
Docket No. STN 50-528 and 530 / License No. NPF 41 and 74  
Licensee Event Report 2017-002-00**

Enclosed please find Licensee Event Report (LER) 50-528/2017-002-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER addresses two events that could have prevented the fulfillment of a safety function due to two trains of Emergency Diesel Generators being INOPERABLE as a result of the performance of a test to validate that no common cause failure exists in order to comply with PVNGS' Technical Specifications.

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,

**Lacal, Maria**  
**L(Z06149)**

Digitally signed by Lacal, Maria  
L(Z06149)  
DN: cn=Lacal, Maria L(Z06149)  
Date: 2019.07.03 12:57:52 -07'00'

MLL/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



**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/nureqs/staff/sr1022/r3/>)

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-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@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.

<b>1. Facility Name</b> Palo Verde Nuclear Generating Station (PVNGS) Unit 1	<b>2. Docket Number</b> 05000528	<b>3. Page</b> 1 OF 4
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**4. Title**  
Emergency Diesel Generator INOPERABLE due to Fuel Oil Transfer Pump Testing

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
11	13	2017	2017	- 002	- 00	07	03	2019	PVNGS Unit 3	05000530
									Facility Name	Docket Number
										05000

<b>9. Operating Mode</b>  1	<b>11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)</b>											
	<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
	<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(B)			<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
	<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input type="checkbox"/> 50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
<b>10. Power Level</b>  100	<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(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)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(A)			<input type="checkbox"/> 73.71(a)(4)		
	<input type="checkbox"/> 20.2203(a)(2)(iii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(v)(B)			<input type="checkbox"/> 73.71(a)(5)		
	<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(v)(C)			<input type="checkbox"/> 73.77(a)(1)		
	<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)			<input type="checkbox"/> 73.77(a)(2)(ii)		
	<input type="checkbox"/> 20.2203(a)(2)(vi)			<input type="checkbox"/> 50.73(a)(2)(i)(B)			<input type="checkbox"/> 50.73(a)(2)(vii)			<input type="checkbox"/> 73.77(a)(2)(iii)		
			<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A						

**12. Licensee Contact for this LER**

Licensee Contact Matthew Kura, Department Leader, Nuclear Regulatory Affairs	Telephone Number (Include Area Code) 623-393-5379
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**13. Complete One Line for each Component Failure Described in this Report**

Cause	System	Component	Manufacturer	Reportable To ICES	Cause	System	Component	Manufacturer	Reportable To ICES
A	DC	P	G080	Y					

<b>14. Supplemental Report Expected</b> <input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) <input checked="" type="checkbox"/> No	<b>15. Expected Submission Date</b> Month: _____ Day: _____ Year: _____
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Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

This LER addresses two events in which both emergency diesel generator (EDG) trains became INOPERABLE, once in Unit 1 on November 13, 2017, and once in Unit 3 on February 21, 2019. In each event, one EDG train became INOPERABLE due to a diesel fuel oil transfer pump (DFOTP) trip. A test was conducted on the opposite OPERABLE EDG train DFOTP to comply with the plant's Technical Specification to determine the OPERABLE EDG was not INOPERABLE due to a common cause failure.

The diesel fuel oil transfer system (DF) operating procedure used for the common cause failure validation contained a test sequence which inadvertently rendered the affected EDG INOPERABLE. This resulted in both EDG trains being INOPERABLE concurrently, which corresponds to an event that could have prevented the fulfillment of the safety function of a system needed to mitigate the consequences of an accident (10 CFR 50.73(a)(2)(v)(D)).

The preliminary cause was a failure to adhere to procedural guidance for the creation of a procedure change when the test sequence was added to the operating procedure. Specifically the procedure change did not address the impacts of all steps that affect operability. The procedure has been revised to eliminate the common cause testing method.



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

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-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto:Infocollects.Resource@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.

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Palo Verde Nuclear Generating Station (PVNGS) Unit 1	05000-528	2017	- 002	- 00

**NARRATIVE**

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)(v)(D) corresponding to two events that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

The events were discovered on May 9, 2019, when an evaluation of the diesel fuel oil transfer pump (DFOTP) (EIIS Code: DC) common cause testing concluded that the test rendered the affected EDG INOPERABLE. The affected EDG is the OPERABLE EDG following the failure of the DFOTP on the opposite EDG. The evaluation was conducted to address questions on whether the affected EDG remained OPERABLE during the common cause test.

In these events, both emergency diesel generator (EDG) (EIIS Code: EK) trains became INOPERABLE, once in Unit 1 on November 13, 2017, and once in Unit 3 on February 21, 2019.

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

Each of the station's units are provided with two seismically-qualified Class 1E EDGs rated at 5500 kW. Each EDG is able to supply power to a single 4.16 kV Class 1E bus. Each EDG is served by a seismically-qualified diesel fuel oil transfer system (DF), which consists of one diesel fuel oil storage tank (DFOST) and DFOTP, which provides fuel to the diesel fuel oil day tank.

The DFOST capacity (84,000 gallons) is based on providing sufficient storage of diesel fuel oil for 7 days of continuous operation at 100% rated output power levels. The tanks are protected inside seismically-qualified concrete underground vaults.

A DFOTP is submerged in, and takes suction from the DFOST. It discharges into the day tank and is automatically started and stopped by a signal from the day tank level instruments. The pump is started at the low level signal regardless of whether the diesel engine is running or not. If the pump fails to start, a low-pressure condition in the pump discharge is annunciated in the main control room. The DFOTP is powered and controlled by cables via underground duct banks to the DFOST.

The day tank has a capacity of 1100 gallons. This capacity minimizes the fire protection requirements and is adequate to permit 2-1/2 hours of operation of the associated EDG at full load. The day tank is located in a separate enclosure, near and above the EDG, to provide a positive feed of fuel oil. Each day tank is equipped with a seismically-qualified level instrument, a normally isolated non-seismic level gauge, and an overflow and drain connection routed to the DFOST.

The day tank level gauge is not seismically-qualified; consequently, opening the level gauge isolation valve results in the loss of the day tank seismic qualification. Additionally, the day tank drain valve is required to be closed to maintain EDG operability. Therefore, the opening of the day tank level gauge isolation and/or the day tank drain valves renders the affected EDG INOPERABLE. The Technical Specifications (TS) allow selected valves including the containment isolation valves and the emergency core cooling systems valves to be opened under administrative controls. However the TS do not allow the day tank valves to be opened in such a manner.

The DF operating procedure contained a test to validate that a DFOTP common cause failure mechanism does not exist on a DFOTP after the redundant EDG DFOTP fails. The common cause test was added as a temporary procedure change to permit its use on November 13, 2017, the day after the Unit 1 'A' DFOTP failed. The temporary procedure change was subsequently incorporated into the procedure on June 21, 2018.



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The common cause test instructions directed the following sequence:

- Establish communication (control room, EDG control room, and day tank room)
- Un-isolate the day tank level gauge in service
- Throttle open the day tank drain valve two turns to lower day tank level
- Verify that the DFOTP auto starts (3.4 – 2.9 feet)
- Close the day tank drain valve
- Verify that day tank level restores (4.3 – 4.9 feet)
- Isolate day tank level gauge
- Perform independent verification of manipulated components (day tank level gauge isolation, and drain valves)

The timeframe that these valves are open for this test is between 30 and 90 minutes.

The EDGs are governed by TS 3.8.1, AC Sources - Operating. Limiting Condition for Operation (LCO) 3.8.1 Condition B, for one INOPERABLE EDG, requires restoration of the EDG to an OPERABLE status within 10 days (Required Action B.4). Required Actions for Condition B also include a 24 hour limit to either determine whether the OPERABLE EDG is not INOPERABLE due to common cause failure or verify that the OPERABLE EDG starts in accordance with surveillance requirement 3.8.1.2 (Required Actions B.3.1 and B.3.2). Condition E for two EDGs INOPERABLE requires restoration of one EDG to an OPERABLE status within 2 hours. If the plant is unable to restore one EDG within the given time, Required Action H.1 is entered to be in MODE 3 in 6 hours.

**3. INITIAL PLANT CONDITIONS:**

The Unit 1 'A' EDG was declared INOPERABLE on November 12, 2017 at 10:53 AM during performance of a surveillance test when the Unit 1 'A' DFOTP breaker tripped. The trip was due to a high resistance secondary stab connection in the Class 1E motor control center cubicle from which the DFOTP receives its power. On November 13, 2017, a DFOTP common cause test was performed on the Unit 1 'B' DFOTP.

The Unit 3 'B' EDG was declared INOPERABLE on February 20, 2019 at 11:43 AM during performance of a surveillance test when the Unit 3 'B' DFOTP breaker tripped. The trip was due to an electrical short resulting from water intrusion into the DFOT vault. On February 21, 2019, a DFOTP common cause test was completed on the Unit 3 'A' DFOTP.

In both cases, the Units were in Mode 1 (Power Operation) at 100 percent power with the reactor coolant system at normal operating temperature and normal operating pressure and there were no other structures, systems, or components out of service that contributed to the events.



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

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**4. EVENT DESCRIPTION:**

On November 13, 2017, at 8:07 AM, a DFOTP common cause test was performed on the Unit 1 'B' DFOTP; the test opened the day tank drain valve and un-isolated its level gauge rendering the Unit 1 'B' EDG INOPERABLE (concurrently with the already INOPERABLE Unit 1 'A' EDG) for an estimated 30 to 90 minutes. The Unit 1 'A' EDG was restored to OPERABLE status on November 14, 2017 at 10:17 PM after being INOPERABLE for approximately 47.5 hours.

On February 21, 2019, at 11:40 AM, a DFOTP common cause test was completed on the Unit 3 'A' DFOTP; the test opened the day tank drain valve and un-isolated its level gauge rendering the Unit 3 'A' EDG INOPERABLE (concurrently with the already INOPERABLE Unit 3 'B' EDG) for an estimated 30 to 90 minutes. The Unit 3 'B' EDG was restored to OPERABLE status on February 22, 2019 at 3:47 PM after being INOPERABLE for approximately 53 hours.

On May 9, 2019, an evaluation concluded that the use of the DF operating procedure common cause test rendered the affected OPERABLE EDG INOPERABLE as described above. The common cause test had been used on the two occasions described to verify that the OPERABLE EDG DFOTP did not exhibit a common cause failure mode after the redundant DFOTP had failed.

**5. ASSESSMENT OF SAFETY CONSEQUENCES:**

The events during which both Unit 1 and Unit 3 EDGs were INOPERABLE could have prevented fulfillment of the EDG safety function to mitigate the consequences of an accident, and meet the reporting criteria of 10CFR 50.73(a)(2)(v)(D).

This condition did not result in a transient more severe than those analyzed in chapters 6 and 15 of the UFSAR or result in the release of radioactive materials to the environment. There were no actual safety consequences as a result of this event and it did not adversely affect the health and safety of the public.

While the common cause test rendered the EDG INOPERABLE, in an analyzed seismic event, the stationed operator in communication with the control room would be expected to recognize the need to isolate the day tank level gauge and shut the drain valve in a timely manner to prevent an actual loss of that EDG's function. The valves are immediately near one another and the restoration steps are provided in the DF operating procedure.

An engineering evaluation was performed on a fuel oil loss and consumption rate from the day tank due to non-seismic level gauge damage as the result of a seismic event at minimum day tank level. The postulated fuel oil loss rate would permit approximately 40 minutes of continued EDG operation. Therefore, it would be expected that the configuration of the day tank would be restored to prevent a loss of the EDG function during analyzed events.

**6. CAUSE OF THE EVENT:**

The preliminary cause was a failure to adhere to procedural guidance for the creation of a procedure change when the test sequence was added to the operating procedure. Specifically, the procedure change did not address the impacts of all steps that affect operability.

The cause evaluation is still in progress; if additional causes are identified that will substantially change the reader's understanding, a supplement to this LER will be submitted.

**7. CORRECTIVE ACTIONS:**

The procedure has been revised to eliminate the common cause testing method. Other alternatives to permit common-cause testing of the DFOTP function while maintaining operability are being considered.

If additional corrective actions are identified that will substantially change the reader's understanding, a supplement to this LER will be submitted.



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CONTINUATION SHEET**

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8. PREVIOUS SIMILAR EVENTS:

LER 2009-001-00 [ML092160403] & LER 2010-002-01 [ML12031A192]

LERs were submitted in 2009 and 2010 to address two Unit 2 FOTP failure events, which occurred during performance of a surveillance test. In these events, the affected DFOTP breaker tripped from an electrical short due to water intrusion into the DFOT. Water had wicked into the DFOTP motor terminations via the motor power cable that had become submerged in standing water trapped in the underground conduits between the DFOT vaults and the EDG building.

The events were reported pursuant to 10 CFR 50.73 (a)(2)(i)(B) as conditions prohibited by TS 3.8.1, "AC Sources - Operating," and 3.8.2, "AC Sources - Shutdown," for exceeding the LCO of an INOPERABLE EDG following the failure of its DFOTP and 10 CFR 50.73 (a)(2)(v) for conditions that could have prevented the fulfillment of a safety function. This is because the wetted conditions had existed for extended periods during which the redundant EDGs had also been INOPERABLE for maintenance.

The corrective action for these events was a design change to the underground duct banks that installed a manhole in the duct bank between the Auxiliary Building and the DFOT vaults for each EDG. This was intended to prevent failure of the DFOTP from water intrusion. The corrective action did not involve the common-cause testing method and would not have prevented the incorporation of the test method in the operating procedures in 2017.