



Entergy Nuclear Operations, Inc.  
Pilgrim Nuclear Power Station  
600 Rocky Hill Road  
Plymouth, MA 02360

December 9, 2016

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

SUBJECT: Licensee Event Report 2016-008-00, Emergency Diesel Generator 'A' Past Inoperability  
Pilgrim Nuclear Power Station  
Docket No. 50-293  
Renewed License No. DPR-35

LETTER NUMBER: 2.16.075

Dear Sir or Madam:

The enclosed Licensee Event Report 2016-008-00, Emergency Diesel Generator 'A' Past Inoperability, is submitted in accordance with 10 Code of Federal Regulations 50.73. The date the condition was discovered was September 28, 2016. As such, this 60-day 10 CFR 50.73 Licensee Event Report was due to the NRC Staff on November 27, 2016. This LER is being submitted late and Pilgrim Nuclear Power Station is addressing this through the Corrective Action Program.

If you have any questions or require additional information please contact me at (508) 830-8323.

There are no regulatory commitments contained in this letter.

Sincerely,

A handwritten signature in black ink, appearing to read "Everett P. Perkins, Jr." with a stylized flourish at the end.

Everett P. Perkins, Jr.  
Manager, Regulatory Assurance

EPP/sc

Attachment: Licensee Event Report 2016-008-00, Emergency Diesel Generator 'A' Past Inoperability (4 pages)

IEZZ  
NRR

cc: Mr. Daniel H. Dorman  
Regional Administrator, Region I  
U.S. Nuclear Regulatory Commission  
2100 Renaissance Blvd., Suite 100  
King of Prussia, PA 19406-2713

Ms. Booma Venkataraman, Project Manager  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Mail Stop O-8C2A  
Washington, DC 20555

NRC Senior Resident Inspector  
Pilgrim Nuclear Power Station

**Attachment**

Letter Number 2.16.075

Licensee Event Report 2016-008-00

Emergency Diesel Generator 'A' Past Inoperability

(4 Pages)



**LICENSEE EVENT REPORT (LER)**

(See Page 2 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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet 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> Pilgrim Nuclear Power Station	<b>2. DOCKET NUMBER</b> 05000293	<b>3. PAGE</b> 1 OF 4
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**4. TITLE** Emergency Diesel Generator 'A' Past Inoperability

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
09	28	2016	2016	- 008	- 00	12	09	2016	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

<b>9. OPERATING MODE</b>	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)			
N	<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)
10. POWER LEVEL	<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 checked="" 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 checked="" 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**

LICENSEE CONTACT Mr. Everett P. Perkins, Jr. - Regulatory Assurance Manager	TELEPHONE NUMBER (Include Area Code) 508-830-8323
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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
X	EK	RV	C099	Y					

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

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

On September 28, 2016, while performing the pre-start checks prior to running the Emergency Diesel Generator (EDG)-A for the monthly Technical Specification (TS) surveillance, the oil level in the EDG radiator fan right angle gearbox was found to be low and additional checks found the gearbox oil pressure relief valve in a loose state which provided a pathway for gear oil to be pumped out of the gear box while the EDG was operating. EDG-A was declared inoperable, the relief valve was repaired, pressure tested and the pressure adjusting threaded union was staked to eliminate any risk from vibration induced motion in the future, the gearbox oil was replaced and the EDG run for a post-maintenance test.

A Functional Failure Determination completed on October 11, 2016 determined that the EDG would not have been able to run for its stated mission time of 30 days. This condition existed for a period of 28 days since the last surveillance test on August 31, 2016 which is greater than the TS Allowed Out of Service Time (AOT) of 72 hours. However, the Station Black Out Diesel Generator was available during this time frame. This issue is reportable under 10 CFR 50.73(a)(2)(i)(B) as an Operation or Condition which was Prohibited by the plant's TSs.

On September 15, 2016 EDG-B was made inoperable to perform its monthly operability run. This created a situation where for a brief period of time both EDGs were inoperable which is a condition that could have prevented the fulfillment of the safety function of a system needed to shut down the reactor and maintain it in a safe condition, remove residual heat, and mitigate the consequences of an accident which is reportable in accordance with 50.73(a)(2)(v)(A), 50.73(a)(2)(v)(B), and 50.73(a)(2)(v)(D). EDG-B remained available and could quickly have been restored by manual action to an operable condition if needed during the operability run.

There was no impact to public health and safety from this condition.



**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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet 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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**BACKGROUND**

The safety objective of the emergency diesel generators (EDGs) is to provide a source of on-site AC power adequate for the safe shutdown of the reactor following abnormal operational transients and postulated accidents assuming a complete loss of off-site power, as described in Pilgrim Nuclear Power Station (PNPS) Updated Final Safety Analysis Report (UFSAR). Two EDGs and their associated fuel supply systems provide a single failure proof source of standby AC power. Pilgrim EDGs are 2600 KW ALCO 251-F type diesel generators. These EDGs are designed to automatically start upon receiving a valid signal, and come to operating speed ready to assume load. Each generator is sufficient to power all loads on its emergency bus upon failure of all off-site power. Each generator has the ability to pick up loads in sequence within a specified time period. The two EDGs at PNPS are cooled by a self-contained system consisting of radiators and a fan that is driven through a right angle gearbox.

The standby AC power source provides two independent diesel generators as the onsite sources of AC power to the emergency service portions of the station Auxiliary Power Distribution System. Each onsite source provides AC power to safely shut down the reactor, maintain the safe shut down condition, and operate all auxiliaries necessary for station safety.

Historical review revealed that this fan drive gearbox was replaced on the EDG-A in the May 2000 time frame. At that time, the original gearbox, Cotta Transmission Model Number J1327-2 was replaced with an upgraded Model Number J1327-3. Correspondence with the OEM vendor indicated the inside of the cases were identical with the only major physical change on the outside which was the addition of a relief valve in the oil circuit. Changes to the gearbox inspections were not updated to include any inspections or preventive maintenance for the relief valve.

**EVENT DESCRIPTION**

On September 28, 2016, while performing the pre-start checks prior to running the Emergency Diesel Generator (EDG)-A monthly Technical Specification (TS) surveillance, the oil level in the EDG radiator fan right angle gearbox was found low and additional checks found the gearbox oil pressure relief valve was loose.

The two EDGs at PNPS are each cooled by self-contained systems consisting of radiators and fans that rotate through a right angle gearbox. At the time of discovery, even though the oil level was low, the EDG would have started on a valid start signal. However, it would have been losing gearbox oil and we conservatively assumed it would have overheated due to failure of the cooling fan from gearbox damage.

A Functional Failure Determination completed on October 11, 2016 conservatively determined that the EDG would not have been able to run for its stated mission time of 30 days. This condition existed for a period of 28 days, which is greater than the TS Allowed Out of Service Time (AOT) of 72 hours. However, the Station Black Out Diesel Generator was available during this time frame.

**CAUSE OF THE EVENT**

The failure was determined to be low oil level found in the EDG-A radiator fan right angle gearbox due to the external relief valve pressure setting screw and the cap which goes over it being disconnected from the valve body. This allowed a pathway for oil to escape the gearbox when the EDG was running.

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**NARRATIVE**

The radiator fan right angle gearbox oil level is checked prior to every monthly EDG run and the last time it was performed was August 31, 2016 with no problem identified during the pre-start checks. The last maintenance performed on the EDG radiator fan right angle gearbox was part of the routine examination and checks during the 2 year Preventive Maintenance (PM), which was completed on March 7, 2015. The inspection includes draining and changing the oil, performing internal inspection of the drive gears and bearings and performing backlash measurements of the drive and driven gears. However, the two (2) year PM does not perform any maintenance on the gearbox oil pressure relief valve. The relief pressure of 15 psig was set at the time of installation in 2000. Changes to the gearbox inspections were not updated to include any inspections or preventive maintenance for the relief valve.

The failure is attributed to minimal engagement of the pressure adjusting threaded union for the relief valve setting of 15 psig, and there is some contribution from either engine vibration or possibly human error which makes the cause indeterminate.

**CORRECTIVE ACTIONS**

EDG-A was declared inoperable, the relief valve was repaired, pressure tested and the pressure adjusting threaded union was staked to eliminate any risk from vibration induced motion in the future, the gearbox oil was replaced and the EDG run for a post-maintenance test.

PNPS conducted an extent of condition review for EDG-B by performing an inspection to ensure that a common mode failure did not exist.

The following are additional corrective actions to address this issue which are being processed through the PNPS Corrective Action Program:

1. Update station procedure 8.9.1, "Emergency Diesel Generator and Associated Emergency Bus Surveillance," to identify the plug that is used to check the oil level and visually inspect the relief valve to ensure the cap is appropriately aligned before and after each EDG run.
2. Incorporate a vendor manual change to capture the upgraded EDG's Cotta Transmission gear box. The gear box was updated in the 2000 time frame but the drawings/vendor manual was never updated.
3. Establish PM's for both EDG radiator fan right angle gearbox relief valves.

**SAFETY CONSEQUENCES**

There were no consequences to the safety of the general public, nuclear safety, industrial safety, and radiological safety due to this event.

The safety objective of the EDGs is to provide a source of on-site AC power adequate for the safe shutdown of the reactor following abnormal operational transients and postulated accidents assuming a complete loss of off-site power, as described in PNPS UFSAR.

At the time of the event, the preferred AC and the secondary AC power sources were Operable and available to perform their intended safety function. In addition, the Station Blackout AC Power Source was Functional and available as the onsite source of AC power to the emergency service portions of the Auxiliary Power Distribution System.

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**NARRATIVE****REPORTABILITY**

In a determination completed on October 11, 2016 it was conservatively determined that EDG-A would not have been able to run for its stated mission time of 30 days. This condition existed for a period of 28 days, which is greater than the TS Allowed Out of Service Time (AOT) of 72 hours. However, the Station Black Out Diesel Generator was available during this time frame. This issue is reportable under 10 CFR 50.73(a)(2)(i)(B) as an Operation or Condition which was Prohibited by the plant's Technical Specifications.

In addition, on September 15, 2016 EDG-B was made inoperable to perform its monthly operability run. This created a condition that could have prevented the fulfillment of the safety function of a system needed to shut down the reactor and maintain it in a safe condition, remove residual heat, and mitigate the consequences of an accident which is reportable in accordance with 10 CFR 50.73(a)(2)(v)(A), 50.73(a)(2)(v)(B), and 50.73(a)(2)(v)(D).

The date the condition was discovered was September 28, 2016. As such, this 60-day 10 CFR 50.73 Licensee Event Report was due to the NRC Staff on November 27, 2016. This LER is being submitted late, and PNPS is addressing this through the Corrective Action Program.

**PREVIOUS EVENTS**

Events involving LERs where both EDGs were inoperable were reviewed. One related LER was identified and is summarized as follows:

LER 2016-001, "Both Emergency Diesel Generators Inoperable," dated June 9, 2016 stated while EDG-B was out for maintenance, EDG-A was declared inoperable due to a 130 dpm leak from the jacket water pressure boundary.

There were no other LERs involving EDG inoperability at PNPS identified in a search of the past five (5) years.

**REFERENCES:**

CR-PNP-2016-7443

CR-PNP-2016-9552

CR-PNP-2016-9653

CR-PNP-2016-9831