



May 7, 2013

NG-13-0201  
10 CFR 50.73

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

Duane Arnold Energy Center  
Docket 50-331  
Renewed Op. License No. DPR-49

Licensee Event Report #2013-001

Please find attached the subject report submitted in accordance with 10 CFR 50.73. This letter makes no new commitments or changes to any existing commitments.

A handwritten signature in black ink, appearing to read "R. Anderson (For)".

Richard L. Anderson  
Vice President, Duane Arnold Energy Center  
NextEra Energy Duane Arnold, LLC

## 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, NEOF-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

Duane Arnold Energy Center

## 2. DOCKET NUMBER

05000331

## 3. PAGE

1 OF 3

## 4. TITLE

Emergency Diesel Generator Inoperability Results in Safety System Functional Failure

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
03	08	13	2013	001	0	05	07	13	N/A	05000
									N/A	05000

## 9. OPERATING MODE

1

## 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

- |   |   |   |   |
|---|---|---|---|
| <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) | VOLUNTARY LER                                 |

## 10. POWER LEVEL

100%

## 12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Robert J. Murrell, Engineering Analyst	(319) 851-7900

## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

## 14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO

## 15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On March 8, 2013, while operating at 100% power, the 'A' Emergency Diesel Generator (EDG) was in day 2 of 7 of Technical Specification (TS) Limiting Condition for Operation (LCO) in support of embedded conduit inspections. As part of post maintenance testing, the 'A' EDG was operated and a small lube oil leak was discovered on the lube oil cooler heat exchanger. After maintenance activities to verify the heat exchanger channel head bolts were properly tight, a second run of the 'A' EDG occurred. During this run, the lube oil leak increased to an excessive amount and the 'A' EDG was manually tripped. The direct cause of the lube oil leak was inadequate gasket crush from maintenance activities that occurred during October 2012. The root cause of the failure was determined to be misalignment or flaws between the heat exchanger flange mating surfaces. The 'A' EDG lube oil heat exchanger was repaired on March 9, 2013 and the EDG was declared operable. A past operability evaluation concluded that the 'A' EDG was inoperable from February 16, 2013 to March 8, 2013. Since the 'A' EDG was inoperable longer than it's allowed TS seven day LCO, the event is reportable as a Condition Prohibited by TS. In addition, since the 'B' EDG was inoperable on three occasions while the 'A' EDG was inoperable, this event is reportable as an Event or Condition Alone That Could Prevent Fulfillment of a Safety Function.

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

1. FACILITY NAME Duane Arnold Energy Center	2. DOCKET 05000 - 331	6. LER NUMBER			3. PAGE 2 OF 4
		YEAR 2013	SEQUENTIAL NUMBER 001	REV NO. 0	

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

**I. Description of Event:**

On March 8, 2013, while operating at 100% power, the 'A' Emergency Diesel Generator (EDG) was in day 2 of 7 of Technical Specification (TS) Limiting Condition for Operation (LCO) in support of embedded conduit inspections. As part of post maintenance testing, the 'A' EDG was operated and a small lube oil leak was discovered on the lube oil cooler heat exchanger. After maintenance activities to verify the heat exchanger channel head bolts were properly tight, a second run of the 'A' EDG occurred. During this run, the lube oil leak increased to an excessive amount and the 'A' EDG was manually tripped. The direct cause of the lube oil leak was inadequate gasket crush from maintenance activities that occurred during October 2012.

There were no other structures, systems or components inoperable at the start of this event that contributed to the event.

**II. Assessment of Safety Consequences:**

The EDG lubricating system is made up of an engine driven pump, heat exchanger, filter, reservoir, and other accessories, devices, controls, and piping required to form a complete and independent system. The purpose of the lube oil system is to deliver clean oil at proper temperature and pressure to the engine. Emergency service water (ESW) passes through the tube side of the tube bundle to provide the cooling source for the engine's lube oil system during engine operation.

The EDG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated EDG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. The EDG Lube Oil System is designed to provide automatic lube oil makeup to the EDG crankcase for a minimum of 7 days of operation per the UFSAR.

In October 2012, during Refueling Outage 23 the 'A' EDG lube oil heat exchanger tube bundle was replaced. During post maintenance testing (PMT) a leak was observed at the joint between the heat exchanger shell and channel head. The bolt torque at the joint was increased and the leak stopped. The EDG was run (8) eight successful times between October 12, 2013 and March 8, 2013 before a leak reappeared (maintenance runs and surveillance tests).

On March 8, 2013 an oil leak of 60 drops per minute (dpm) was identified at the tube sheet flange to heat exchanger shell flange. Subsequently, a work order was written to check torque values with the engine shutdown. Torque values were verified to be no less than 22 ft-lbs. After this, a work order was written to increase torque on flange bolting. The EDG was started again to support the effort to increase torque. One to two minutes into the run the gasket failed and allowed oil to escape. Approximately 20-25 gallons of oil was discharged from the area where the gasket failed. The engine was tripped prior to overheating the EDG or the loss of a significant amount of lube oil. With the rate at which lube oil was discharged from the EDG, the engine would not have had sufficient supply to meet the 7 day unassisted operational time

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

1. FACILITY NAME Duane Arnold Energy Center	2. DOCKET 05000 - 331	6. LER NUMBER			3. PAGE 3 OF 4
		YEAR 2013	SEQUENTIAL NUMBER 001	REV NO. 0	

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

requirement.

Independent reviews determined that the 'A' EDG was not capable of performing its TS functions on March 8, 2013, when the gasket developed a 5 dpm lube oil leak. The failure of the gasket was a result of cyclic loading during engine starts, which means a start with no lube oil leakage would not have led to a gasket failure. Based on no lube oil leakage identified during the February 16, 2013 engine run, (last surveillance test conducted prior to the failure on March 8, 2013), it can be concluded that the 'A' EDG would not have developed a leak during an extended run at that time or at any time prior. The next start of the 'A' EDG on March 8, 2013 did exhibit a leak. Therefore, 'A' EDG was no longer reliable based on the leakage.

An extent of condition evaluation was completed to determine if there were any operability issues with the other 'A' EDG heat exchangers or the 'B' EDG heat exchangers. This evaluation determined that there were no operability concerns with either any of the other heat exchangers.

Therefore, the 'A' EDG was inoperable from February 16, 2013 to March 8, 2013. Technical Specification Section 3.8.1, AC Sources - Operating, B.5, One EDG Inoperable, requires the inoperable EDG to be restored to operable status in 7 days. This condition resulted in a Condition Prohibited by TS and is reportable to the NRC pursuant to 10CFR50.73(a)(2)(i)(B). In addition, the 'B' EDG was inoperable on three occasions during the period of time the 'A' EDG was inoperable. This occurred on February 26, 27, and 28 when the 'B' EDG was removed from service for conduit inspections. This resulted in an Event or Condition That Could Have Prevented Fulfillment of a Safety Function (Safety System Functional Failure) and is reportable to the NRC pursuant of 10CFR50.73(a)(2)(v)(D).

This event did result in a safety system functional failure.

### III. Cause of Event:

A Root Cause Evaluation was completed. The evaluation identified the following root cause of this event.

Root Cause - Misalignment or flaws between flange mating surfaces of the 'A' EDG Lube Oil Heat Exchanger led to uneven compression of a gasket, leakage, and failure of the lube oil channel head connection, specifically at the 10-11 o'clock position.

### IV. Corrective Actions:

On March 9, 2013, the 'A' EDG lube oil heat exchanger was repaired and the 'A' EDG was returned to operable status.

In order to address the root cause of this event, the following corrective actions will occur.

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

1. FACILITY NAME Duane Arnold Energy Center	2. DOCKET 05000 - 331	6. LER NUMBER			3. PAGE 4 OF 4
		YEAR 2013	SEQUENTIAL NUMBER 001	REV NO. 0	

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

Corrective Action to Prevent Occurrence - Remove the 'A' EDG lube oil cooler tube bundle and perform the following checks to determine condition of sealing surfaces:

- Perform visual inspection of flange surfaces.
- Perform Blue-Check of stationary channel head to heat exchanger shell sealing surfaces.
- Measure clearances between shell and tube bundle flange without gasket installed.
- Measure flatness of shell flanges and re-machine flange surfaces if not within tolerance (specified on the plant HX drawing or specified by ASME Engineer).
- Measure and record vertical and horizontal alignment between the lube oil and jacket water channel heads.

**V. Additional Information:**

Previous Similar Occurrences:

A review of License Event Reports from the past 5 years did not identify any similar occurrence.

EIIS System and Component Codes:

EK - Emergency Onsite Power Supply System.

Reporting Requirements:

This event is being reported as an Operation or Condition Prohibited by TS, 10CFR50.73(a)(2)(i)(B) and an Event or Condition That Could Have Prevented Fulfillment of a Safety Function, 10CFR50.73(a)(2)(v)(D).