



A unit of American Electric Power

Indiana Michigan Power
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February 09, 2017

AEP-NRC-2017-05
10 CFR 50.73

Docket No.: 50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
4934 Boiling Brook Parkway
Rockville, MD 20852

Donald C. Cook Nuclear Plant Unit 2
LICENSEE EVENT REPORT 316/2016-002-00
Emergency Diesel Generators Declared Inoperable Due to a Manufacturing Design Issue

In accordance with 10 CFR 50.73, Licensee Event Report (LER) System, Indiana Michigan Power Company, the licensee for Donald C. Cook Nuclear Plant Unit 2, is submitting as an enclosure to this letter the following report:

LER 316/2016-002-00: Emergency Diesel Generators Declared Inoperable Due to a Manufacturing Design Issue

There are no commitments contained in this submittal.

Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Manager, at (269) 466-2649.

Sincerely,

Q. Shane Lies
Site Vice President

RAW/ml

Enclosure: Licensee Event Report 316/2016-002-00: Emergency Diesel Generators Declared Inoperable Due to a Manufacturing Design Issue

IEZZ
NRR

c: R. J. Ancona – MPSC
A. W. Dietrich – NRC Washington, DC
MDEQ – RMD/RPS
NRC Resident Inspector
C. D. Pederson – NRC Region III
A. J. Williamson – AEP Ft. Wayne

Enclosure to AEP-NRC-2017-05

Licensee Event Report 316/2016-002-00

Emergency Diesel Generators Declared Inoperable Due to a Manufacturing Design Issue



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/>)

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 e-mail to Infocollcts.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.

1. FACILITY NAME Donald C. Cook Nuclear Plant Unit 2	2. DOCKET NUMBER 05000316	3. PAGE 1 OF 4
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4. TITLE
Emergency Diesel Generators Declared Inoperable Due to a Manufacturing Design Issue

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
12	13	2016	2016	- 002	- 00	02	09	2017	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)								
4	<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)		
	<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)		
0	<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)(i)		
	<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)(ii)		
				<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 Michael K. Scarpello, Regulatory Affairs Manager	TELEPHONE NUMBER (Include Area Code) (269)-466-2649
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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
B	EK	DG	W315	Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
<input checked="" type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO		04	14	2017

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

On December 13, 2016, the Unit 1 AB Emergency Diesel Generator (EDG) developed a fuel oil leak from a fuel injector pump Delivery Valve Holder (DVH) during a maintenance run of the diesel. On December 21, 2016, with Unit 1 in Mode 1 at 100 percent power and Unit 2 in Mode 4 during a refueling outage, it was determined that the failed DVH on the Unit 1 AB EDG was due to a design and manufacturing issue. Subsequently the Unit 1 CD EDG, Unit 2 AB EDG, and Unit 2 CD EDG were conservatively declared inoperable due to multiple affected diesel fuel pump DVHs being installed on each EDG.

The Root Cause was determined to be due to insufficient Corrective Action Program oversight by Engineering to ensure product quality and issue resolution in relation to a previous EDG DVH failure in 2013. Testing is being conducted to determine the resulting impact to associated EDGs. The affected DVHs have been replaced.

A Loss of Safety Function was reported via Event Notification 52456 for Unit 2 in accordance with 10 CFR 50.72(b)(3)(v)(D). The Loss of Safety Function is required to be reported in a Licensee Event Report in accordance with "50.73(a)(2)(v)(D) Event or Condition that Could Have Prevented Fulfillment of a Safety Function."



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

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Donald C. Cook Nuclear Plant Unit 2	05000-316	2016	- 002	- 00

NARRATIVE

INTRODUCTION

On December 21, 2016 with Unit 1 in Mode 1 at 100 percent power and Unit 2 in Mode 4 during a refueling outage, the Unit 1 CD Emergency Diesel Generator (EDG)[EK][DG], Unit 2 AB EDG, and Unit 2 CD EDG were declared inoperable due to a discovered design and manufacturing issue involving multiple diesel fuel injector pump [P] delivery valve holders (DVH)[INV] installed on each EDG. Unit 1 entered into Technical Specification (TS) 3.8.1, AC Sources – Operating, Condition B, for one required EDG inoperable. Unit 2 entered into TS 3.8.1, AC Sources – Operating, and descended to mode 5 in accordance with Condition G for Condition F not being met with two required EDGs inoperable.

EVENT DESCRIPTION

On December 13, 2016, the Unit 1 AB EDG developed a fuel oil leak from a fuel injector pump DVH during a surveillance run of the diesel. The failed DVH was replaced and the Unit 1 AB EDG was restored to operable status. The investigation conducted following the initial failure identified that nineteen additional suspect DVHs were installed in the Unit 1 AB EDG, Unit 1 CD EDG, Unit 2 AB EDG, and Unit 2 CD EDG.

On December 21, 2016, the investigation determined that the failure was attributed to a previously identified condition for a design and manufacturing flaw and the suspect DVHs were susceptible to a similar failure. The Unit 1 AB EDG had two suspect DVHs installed. An engineering evaluation determined that the Unit 1 AB EDG remained operable with the two affected DVHs.

The Unit 1 CD EDG, Unit 2 AB EDG, and the Unit 2 CD EDG were declared inoperable as follows:

At 1047 on December 21, 2016, the Unit 2 AB EDG was declared inoperable for the identified condition. Operations entered TS 3.8.1, Condition B; restore the EDG to operable status within 72 hours, in Unit 2.

Following the declaration of the Unit 2 AB EDG being inoperable, the extent of condition revealed additional affected DVHs installed on the Unit 1 CD EDG and the Unit 2 CD EDG.

At 2300 on December 21, 2016, the Unit 1 CD EDG was declared inoperable for the identified condition. Operations entered TS 3.8.1, Condition B; restore the affected EDG to operable status within 72 hours, in Unit 1.

At 2300 on December 21, 2016, the Unit 2 CD EDG was declared inoperable for the identified condition. Due to having both of the Unit 2 EDGs inoperable for greater than 2 hours per TS 3.8.1 condition F, operations entered TS 3.8.1, Condition G; be in Mode 3 in 6 hours and be in mode 5 in 36 hours.

At 1435 on December 22, 2016, Unit 2 entered Mode 5 and exited TS 3.8.1, Conditions B, C, F, and G.

At 1558 on December 22, 2016, replacement of the suspect DVHs installed on the Unit 1 CD EDG was completed and it was returned to operable status and Unit 1 exited TS 3.8.1, Condition B.

The remaining suspect DVHs were replaced on the Unit 2 AB EDG and Unit 2 CD EDG. Both EDGs were restored to operable status prior to mode ascension.



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EVENT ANALYSIS

Having both EDGs in Unit 2 declared inoperable concurrently while in Mode 4 met the reporting requirements for an Event or Condition that Could Have Prevented Fulfillment of a Safety Function. Testing is being conducted to understand the impact of the manufacturing issue on the capability to perform the required safety function for the affected EDGs. The results of the testing will allow the site to determine the past operability of the affected EDGs. If as a result of the testing additional 10 CFR 50.73 reporting is required, it and supporting information will be provided in a supplement to this LER.

ASSESSMENT OF SAFETY CONSEQUENCES

NUCLEAR SAFETY

The failure of the Unit 1 AB EDG injection pump during the monthly surveillance run resulted in no actual nuclear safety impacts. The EDG was declared inoperable and the pump was subsequently replaced within the requirements of the Unit 1 TSs. All normal and reserve offsite power sources and the supplemental emergency diesel generators were available and administratively controlled.

The extent of condition of the degraded fuel injection pump resulted in multiple fuel injection pump replacements on the Unit 2 EDGs. Unit 2 was in Mode 4 at the time of the discovery of the condition and was subsequently required to be taken to Mode 5 per Unit 2 TSs. The actual significance and impact on EDG safety function resulting from the condition will be determined once engineering testing is complete.

INDUSTRIAL SAFETY

There was no actual impact on industrial safety as a result of the fuel injection pump failure. The potential risk for an industrial safety event in response to the repair and recovery was increased due to emergent repairs to both the operating and shutdown units' EDGs.

RADIOLOGICAL SAFETY

There was no actual or potential radiological safety hazard resulting from the inoperability of both Unit 2 EDGs. The EDGs are located outside the radiological controlled area and were not being relied on to supply emergency power to safety related or radiological equipment at the time of the event. This condition did not result in any unplanned radiological exposure, release, or contamination.

PROBABILISTIC RISK ASSESSMENT (PRA)

The PRA will be provided in a supplement to this LER following the completion of testing and determination of actual impact on the EDG function.

ROOT CAUSE

Insufficient Corrective Action Program (CAP) oversight by Engineering to ensure product quality and issue resolution in relation to a previous Emergency Diesel Generator DVH failure in 2013. As a result, affected DVHs were placed back into inventory and subsequently installed on the EDGs.



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CORRECTIVE ACTIONS

Immediate Corrective Actions Taken

Suspect DVHs have been replaced.

Unit 2 was moved from Mode 4 to Mode 5 to comply with TS 3.8.1 action statements.

Planned Corrective Actions

Corrective Actions to Preclude Repetition

Revise applicable procedures to require corrective actions that are changed following Corrective Action Review Board (CARB) approval to be taken back to CARB for review and concurrence.

Revise applicable procedures to require a verification of corrective actions entered into CAP for evaluation products.

Additional Corrective Actions

Revise applicable procedures to require Engineering Apparent Cause Evaluations and In-depth Apparent Cause Evaluations to be reviewed by CARB.

PREVIOUS SIMILAR EVENTS

In January 2013, a DVH developed a crack that resulted in a fuel oil leak on the Unit 1 CD EDG during a test run. Forensic analysis revealed a circumferential crack around the main body of the DVH. Failure analysis determined that the cracking was due to a corner inside the DVH that was machined with too sharp of a radius, which created a region of higher stress during operation that allowed a crack to start and propagate. The vendor concluded that the problem occurred due to a tooling issue with a particular lot of DVHs. Additionally, the radius had not been included as a critical characteristic nor had it received 100 percent inspection during manufacture. Engineering evaluation concluded that all of the affected EDGs maintained the capability to perform their required safety function.