



An AEP Company

BOUNDLESS ENERGY™

Indiana Michigan Power
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
indianamichiganpower.com

November 8, 2023

AEP-NRC-2023-54
10 CFR 21.21(d)(3)(ii)

Docket Nos.: 50-315
50-316

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

Donald C. Cook Nuclear Plant Unit 1 and Unit 2
Part 21 30-day Notification

Indiana Michigan Power Company, the licensee for Donald C. Cook Nuclear Plant Units 1 and 2 is providing, as the enclosure to this letter, the required written notification of a defect of a basic component in accordance with 10 CFR 21.21(d)(3)(ii). The enclosed notification pertains to a failed solder joint with an Emergency Diesel Generator Digital Reference Unit supplied by Engine Systems Incorporated.

There are no commitments included in this submittal. Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Director, at (269) 466-2649.

Sincerely,

Kelly J. Ferneau
Site Vice President

RAW/sjh

Enclosure:

Part 21 Notification of Engine Systems Emergency Diesel Generator Digital Reference Unit

c: EGLE – RMD/RPS
J.B. Giessner– NRC Region III
NRC Resident Inspector
N. Quilico – MPSC
R. M. Sistevaris – AEP Ft. Wayne
S. P. Wall, NRC Washington D.C.
A. J. Williamson – AEP Ft. Wayne

**Enclosure to AEP-NRC-2023-54
Part 21 Notification of Engine Systems
Emergency Diesel Generator Digital Reference Unit**

1. Name and address of the individual or individuals informing the Commission.

Kelly J. Ferneau
Site Vice President
Cook Nuclear Plant
Indiana Michigan Power Company
1 Cook Place
Bridgman, MI 49106

2. Identification of the facility, the activity, or the basic component supplied for such a facility or such activity within the United States which fails to comply or contains a defect.

Cook Nuclear Plant Unit 1
Docket No. 50-315
License No. DPR-58
Cook Nuclear Plant Unit 2
Docket No. 50-316
License No. DPR-74
Basic Component: Emergency Diesel Generator (EDG) Digital Reference Unit (DRU)

3. Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.

Engine Systems Inc.
175 Freight Road
Rocky Mount
North Carolina, 27804
Tel: 252-977-2720

4. Nature of the defect or failure to comply and safety hazard which is created or could be created by such defect or failure to comply.

Stress introduced during manufacture of the components, due to not adhering to IPC standards, led to creep fatigue cracking of the solder joints connecting the terminal strip to a printed circuit board causing the DRU to lose power intermittently.

Analysis was performed on similar components to that which failed. The analysis included inspections and destructive analysis. The inspection methods consisted of optical and metallurgical microscopic inspection, Computer Tomography (CT) Scanning, and X-Rays. The destructive testing sectioned out individual solder joints and analyzed them using Scanning Electron Microscopy and Energy Dispersive Spectroscopy.

Based on the analysis performed the cracking of the solder joints was determined to be due to creep fatigue. The creep of the solder joint is initiated by mechanical stress inherent in the solder joints along the length of the connector. The stress, which leads to crack formation and propagation over time, is introduced during the manufacturing process of the solder

joints and is influenced by various factors. The main three factors to the stress are connector and pin alignment deficiencies, lead to hole ratio deficiencies, and porosity and voiding in the solder joints. The issues identified in the failure analysis represent a lack of adherence to IPC 2221 Generic Standard on Printed Board Design and IPC 2222 Sectional Design Standard for Rigid Organic Printed boards.

Two contributing causes were also identified. The addition of Pomona Jacks to the terminal strips to facilitate system tuning and troubleshooting allow additional stress to be added to the solder joints. This additional stress from the use of the installed Pomona Jacks could contribute to crack propagation during engine tuning and/or troubleshooting activities. There was also a lack of vendor guidance on terminal screw torque specification. This allowed the potential for added stress to be applied to solder joints during termination activities.

5. The date on which the information of such defect or failure to comply was obtained.

The Unit 2 CD EDG failed its surveillance on 8/11/23 and the defect was identified on 8/13/2023.

6. In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for, being supplied for, or may be supplied for, manufactured, or being manufactured for one or more facilities or activities subject to the regulations in this part.

There are 8 DRUs supplied by Engine Systems Inc. located at DC Cook, 4 spare and 4 installed:

S/N: 14523852 has been reworked by the vendor and was installed in the U1 AB EDG on 10/21/23.

S/N: 13577892 has been reworked by the vendor and was installed in the U1 CD EDG on 10/29/23.

S/N: 14523851 is currently installed in the U2 AB EDG.

S/N: 14523850 is currently installed in the U2 CD EDG.

S/N: 14484581 is a spare.

S/N: 14523849 is a spare.

S/N: 13577159 is a spare.

S/N: 13576301 is a spare.

Basic components supplied to other licensees is unknown to Cook Nuclear Plant. Contact the vendor for additional information.

7. The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

Send all DRUs to the vendor for refurbishment including terminal strip resoldering then replace installed DRUs with DRUs that have been reworked by the vendor.

The Unit 1 AB EDG DRU was replaced on 10/21/23 under Work Order (WO) C10043000.

The Unit 1 CD EDG DRU was replaced on 10/29/23 under WO C10025942.

The Unit 2 AB EDG DRU is scheduled for replacement on 12/19/23 under WO C10056888.

The Unit 2 CD EDG DRU is scheduled for replacement on 11/29/23 under WO C10056889.

All installed and spare DRUs are planned to be replaced with units that adhere to IPC 2222 standards with a projected completion of 1/31/25.

Pomona Jacks were removed from the Unit 1 AB and CD EDGs during the DRU replacements. The Unit 2 AB and CD EDG Pomona Jacks are planned to be removed from DRUs coincident with DRU replacements.

Incorporate torque specifications supplied by the vendor into the plant procedure 12-IHP-6030-032-00 by 12/7/23.

All corrective actions referenced in this section will be taken by Cook Plant staff.

8. Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

Contact Engine Systems Incorporated regarding document IN-23-09 that was provided to licensees that had purchased this component.

9. In the case of an early site permit, the entities to whom an early site permit was transferred.

Not Applicable.