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November 28, 2017

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

Subject: 10CFR21 Reporting of Defects and Non-Compliance -
Engine Systems, Inc. Report No. 10CFR21-0119, Rev. 0

Power Supply, P/N 2938604

Dear Sir:

The enclosed report addresses a reportable notification on a power supply, P/N 2938604.

A copy of the report has been mailed to our affected nuclear customers.

Please sign below, acknowledging receipt of this report, and return a copy to the attention of Document Control at the address above (or, fax to number 252/446-1134) within 10 working days after receipt.

Yours very truly,

ENGINE SYSTEMS, INC.

Susan Woolard

Susan Woolard
Document Control

Please let us know if ANY of your mailing information changes - name of recipient, name of company/facility, address, etc. Mark the changes on this acknowledgment form and send to us by mail or FAX to the number above.

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Report No. 10CFR21-0119
Rev. 0: 11/21/17

10CFR21 REPORTING OF DEFECTS AND NON-COMPLIANCE

COMPONENT: Power Supply
Part Number 2938604

SYSTEM: Emergency Steam Turbine

CONCLUSION: Reportable in Accordance With 10CFR21

Prepared By: _____ Date: 11/21/17
Engineering Manager

Reviewed By: _____ Date: 11-21-17
Quality Manager

REV	DATE	PAGE	DESCRIPTION
0	11/21/17		Initial issue.

Component:

Power supply P/N 2938604.

Summary:

Engine Systems Inc. (ESI) began a 10CFR21 evaluation on October 17, 2017 upon notification of a potential issue with power supply P/N 2938604 supplied to Vogtle Nuclear Plant. The power supply is installed in a safety-related control panel for the Terry Turbine driven auxiliary feedwater pump. Analysis determined the power supply failure was due to an internal rectifier diode failure which resulted in a short circuit on the power supply output.

The evaluation was concluded on November 20, 2017 and it was determined that this issue is a reportable defect as defined by 10CFR Part 21. The power supply failure will adversely affect speed control of the turbine driven auxiliary feedwater pump and therefore may prevent safe shutdown of the nuclear reactor.

Discussion:

The failed power supply, Phoenix Contact part number 2938604, is a QUINT series with 24 VDC, 10A output. In a typical application, such as with the Vogtle control panel, the device is used to convert 125 VDC to 24 VDC. The serial number of the failed device is 366020 with a date code of 0705. The power supply was provided by ESI in June 2007 as a safety-related replacement component for the Terry Turbine control panel upgrade previously supplied in 2005. The power supply remained in Vogtle inventory until 2017 when the previously installed power supply was replaced. After less than 4 weeks in service, the power supply failed on October 4, 2017. The method of failure was a short circuit on the output.

Vogtle contacted Phoenix Contact and was informed that there is a potential issue with power supplies manufactured between December 2006 and October 2007. Specifically, there is a possibility that the secondary rectifier diodes (designated D20 and D21) on the output of the supply may be prone to premature failure. The supplier of the diodes changed the diode technology from wire bond to copper clip and this process change contributed to an unusual silver migration effect. The power supply date code range affected by this issue is 0648 through 0723.

The failed power supply was sent to Exelon PowerLabs for analysis and it was confirmed that the power supply output was shorted. As part of the analysis, the D20 and D21 diodes were tested and found to be shorted. This confirmed the failure mode was the same as suspected by Phoenix Contact. PowerLabs issued their report on October 27, 2017.

On October 16, 2017, a second power supply failed at Vogtle (S/N 366019). This was the replacement for the first failed power supply and was installed on October 4, 2017. Investigation revealed that the second power supply exhibited the same failure mode, shorted diode, as the first failure. Both the first and second failed power supplies were provided by ESI in June 2007 and both were the same 0705 date code.

Impact on Operability:

In the case of the Vogtle control panel, the power supply provides 24 VDC to the PGPL Driver. The Driver receives a proportional control signal from the 505 control and, in conjunction with the feedback signal from a remote servo, provides a position control signal to the PGPL actuator to position the steam control valve. Loss of the power supply, and thus the PGPL Driver, would adversely affect operation of the steam valve which would prevent control of the turbine driven auxiliary feedwater pump. Since the feedwater pump is a safety system within the nuclear plant, failure of the power supply could adversely affect safe shutdown of the nuclear reactor.

Root cause evaluation:

The root cause of the failure is a premature failure of the D20/D21 rectifier diodes.

Evaluation of previous shipments:

This issue applies to all customers that have power supply P/N 2938604 within the date code range 0648 through 0723. ESI has supplied power supplies within the suspect date code range to the following sites:

ESI Sales Order	End User	End User P.O.	Qty	C-of-C Date	Mfg Serial Numbers	Mfg Date Code
3003318	Southern Nuclear- Vogtle Plant	7077729	2	06/01/2007	366019 & 366020	0705
8000969	Southern Nuclear - Farley Plant[1] (supplied through Dresser-Rand)	QP070019/003 131013 (D-R)	2	01/31/2008	392902 & 392904	0720

Table 1: Listing of Sites with Suspect Power Supply P/N 2938604

Note (1): The units for Farley were installed in control panel assemblies P/N 8000969-01 (qty 1 per panel).

Corrective Action:

For Vogtle: Both power supplies provided by ESI have failed and been removed from service. No further action is required.

For Farley: If the power supplies are currently installed they should be removed from service and replaced with newer power supplies from a different date code. Phoenix Contact has indicated that determining when a power supply from the suspect date code range will fail is difficult. Therefore, it is recommended that replacement be performed as soon as possible.