

July 22, 2020

Docket No.: 50-424  
50-425

NL-20-0851

U.S. Nuclear Regulatory Commission  
Attn: NRC Operations Center  
Washington, DC 20555-0001

**30-Day 10 CFR 21 Notification – Continuously Energized Eaton D26 Relays  
Could Fail to Deenergize Because of an Organic C3 Insulating Material**

In accordance with 10 CFR 21.21(d)(3)(ii), Southern Nuclear Operating Company (SNC) is hereby submitting the enclosed written notification of a manufacturing defect associated with the Eaton D26 relays operating the PORV Block Valves at Vogtle Electric Generating Station Units 1&2. This information was initially reported to the Nuclear Regulatory Commission on June 24, 2020 (ML20176A321). The information provided in Enclosure 1 of this letter meets the reporting requirements of 10 CFR 21.21(d)(4).

The NRC Senior Resident Inspector at Vogtle Electric Generating Station Units 1&2 has been notified.

This letter contains no NRC commitments. If you have any questions, please contact Matt Euten at 205.992.7573.

  
Cheryl A. Gayheart  
Regulatory Affairs Director

CAG/kmo/scm

Enclosures: 1) SNC Form Containing Information Required by 10 CFR 21.21(d)(4)  
2) Framatome Letter LTR19061 to Customers, "10CFR21.21(b) Notification of Licensee to Perform Defect Determination Related to Supply of Various Eaton Contactors and Relays," Dated October 2, 2019.

cc: Regional Administrator, USNRC, Region II  
SNC Document Services - RType: AA1.003

**30-Day 10 CFR 21 Notification – Continuously Energized Eaton D26 Relays  
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**Enclosure 1**

**SNC Form Containing Information Required by 10 CFR 21.21(d)(4)**

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<i>NOTE: This form shall be submitted to the NRC within 30 days of the initial notification of a reportable condition made by the Responsible Officer, <u>OR</u> included in an LER report, if applicable.</i>	
<b>(i)</b>	<b>Name and address of the individual or individuals informing the Commission.</b>
	Mr. Michael Meier Southern Nuclear – Regulatory Affairs Vice President  Ms. Cheryl Gayheart Southern Nuclear – Director of Regulatory Affairs 3535 Colonnade Parkway Birmingham, AL 35243
<b>(ii)</b>	<b>Identification of the facility, the activity, or the basic component supplied for such facility or such activity within the United States which fails to comply or contains a defect.</b>
	Vogtle Electric Generating Station (VEGP) Units 1&2 7821 River Road Waynesboro, GA 30830  Eaton D26 relays operating the Block Valves for the Pressurizer Power Operated Relief Valves (PORVs).
<b>(iii)</b>	<b>Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.</b>
	The Eaton manufactured D26 relays installed at VEGP 1&2 were supplied by Framatome. <u>Supplier:</u> Framatome <u>Manufacturer:</u> Eaton
<b>(iv)</b>	<b>Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.</b>
	Per Framatome transfer notice LTR19061 (enclosed) dated October 2, 2019, the failure to deenergize only occurs on continuously energized relays. The cause of the problem is the coating on each of the steel laminations in the cores of these devices.  On June 19, 2020, SNC concluded its impact assessment at VEGP 1&2 and determined that a substantial safety hazard could be created if the D26 relays installed in the control circuits of the pressurizer PORV block valves were to fail when needed to mitigate the consequences of an accident. Specifically, the PORV block valves are used to mitigate a small break LOCA when there is excessive leak by or a stuck open pressurizer PORV.
<b>(v)</b>	<b>The date on which the information of such defect or failure to comply was obtained.</b>
	The manufacturing defect associated with the substantial safety hazard was identified on June 19, 2020.

<b>(vi) 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.</b>
There are a total of four (4) installed D26 relays at plant VEGP 1&2. Those relays are installed in the control circuit of both pressurizer PORV block valves on each unit.
<b>(vii) 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.</b>
<p>At this time, SNC Engineering is still evaluating the appropriate corrective actions for the D26 relays associated with the pressurizer PORV block valves. While these components are currently on hold by Supply Chain, the final corrective actions will take into account both the operating history of these relays since the date they were installed and the recommendations provided by Framatome.</p> <p>In the notice Framatome indicated that Eaton is working on a new enhanced design using a C5 inorganic laminate coating which is capable of withstanding higher temperatures (<math>&gt; 230^{\circ}\text{C}</math>) and has not exhibited this same failure mode under test. However, a timeline and path forward in obtaining these new components has not yet been established.</p>
<b>(viii) 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.</b>
Contact Framatome for additional information.

**30-Day 10 CFR 21 Notification – Continuously Energized Eaton D26 Relays  
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**Enclosure 2**

**Framatome Letter LTR19061 to Customers, “10CFR21.21(b) Notification of Licensee to  
Perform Defect Determination Related to Supply of Various Eaton Contactors and  
Relays,” Dated October 2, 2019.**



Framatome Letter LTR19061  
October 2, 2019

Attention: Customer Representative

**Subject: 10CFR21.21(b) Notification of Licensee to Perform Defect Determination  
Related to Supply of Various Eaton Contactors and Relays:**

**Beaver Valley, Callaway, Calvert Cliffs, Catawba, Davis-Besse, DC Cook,  
Ginna, Hatch, Hope Creek, Indian Point, McGuire, North Anna, Oconee,  
Point Beach, H.B. Robinson, Salem, Sequoyah, Surry, Susquehanna,  
Three Mile Island, VC Summer, Vogtle, Watts Bar**

To Whom It May Concern:

On July 23, 2019, Eaton Corporation released a letter, "Update on Reports of Size 1 & 2 AC Contactors that Failed to Open When Deenergized". This letter described a condition observed on AC contactors after being energized for a long period of time without being "cycled". Eaton also stated that this would occur in only a few isolated cases in continuously energized applications.

The cause of the problem is the coating on each of the steel laminations in the cores of these devices. This steel is coated with an organic insulating varnish classified as C3. This coating, when heated for a long time period, can migrate from the lamination surfaces to the edges at the area between the separate core pieces (referred to as armatures and magnets). This substance is sticky and can potentially hold the core pieces together with enough strength to overcome the forces of the device's return springs.

While only contactor tests were identified in the letter, Eaton acknowledged that other products using the C3 coating may be affected. These Eaton components may include the following devices:

- Freedom contactors NEMA Size 00 through 5
- A200 contactors NEMA Size 00 through 4
- D15 Relays
- D26 Relays
- AR Relays (AC Only)
- BF Relays (AC Only and including NBF relays)
- Vacuum contactors NEMA Size 4

In devices such as relays and contactors, the core is magnetized by an energized coil placed around it. The magnet portion of the core pulls the armature portion toward it until the flat faces of the magnet and armature make contact. In devices using DC coils, the core may be made of a solid steel construction. When used with an AC source, the core is constructed of multiple steel laminations instead of a solid steel core. This prevents eddy currents from circulating through the entire cross-section of the core. In order to keep the steel laminations isolated, to minimize the eddy currents, an insulated coating must be applied to the surfaces between the laminations. At the time of the original design of these contactors and relays, the C3 lamination coating was the standard and conformed to ASTM A 976-03, and EN 10342. The C3 coating has a working temperature of approximately 180°C.

All of the specified contactors and relays, under the correct conditions, have the potential to fail in the manner described above due to the C3 coating applied to the core steel. Per Eaton documentation, only the A200 contactors were tested and observed to fail when energized for long periods of time without being cycled. The list of devices specified in the Eaton letter goes beyond the A200 contactors and includes additional contactors as well as several relay styles because the additional devices use the C3 coating. Although Framatome has not received reports of any Framatome supplied contactors experiencing this de-energizing failure, Framatome has included the relays in this notification because relays with C3 coatings have previously been returned from one customer and have been observed to

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exhibit this behavior when installed in similar conditions. Framatome conducted failure analysis on the affected relay and was unable, to reproduce this failure.

When asked how often the contactors or relays should be cycled to prevent the substance from binding the surfaces together, Eaton conservatively estimated that a monthly operation would be sufficient. Eaton could not provide testing data regarding time to failure or its acceleration due to temperature, humidity, or type/concentration of contaminants but did confirm that these conditions would contribute to the migration. Higher core temperatures can result from higher ambient temperatures or if control power applied to the coil is above its voltage rating.

Since all of the individual plant applications of these products provided by Framatome are not known, it cannot be determined by Framatome whether the specific use of each device will result in failure. However, if the application does include a device being energized for long periods of time without being cycled, the steel coating may migrate and cause the core components to stick together. Any failure to open, even an unintentional delay in opening, constitutes a failure of a basic component to perform its safety function. It will be necessary for the customer to identify any of the listed devices installed in the plant and evaluate the application of each device in accordance with 10 CFR 21.21(a).

A 10CFR Part 21 had previously been issued for A200 contactors manufactured between the dates of May 1, 2008 and December 31, 2012 (Reference 1). Some of the contactors manufactured between these dates contained silicone residue used during the mold release process. This issue was originally identified in NRC Event Report 51611. The issue described is the failure of the contactor to be released upon de-energization which is the same as that occurring due to the C3 coating migration. While the failure mode is the same, the failure mechanism is different. It should be noted that A200 contactors manufactured during this time period still contained the C3 coating and may be vulnerable to this condition as well. Similar failures outside of this date range are more likely due to the C3 coating (Reference 2).

Eaton has provided very little information regarding the failure process, products tested, test conditions, testing methods or results. As a result, there isn't enough information on which to provide a sound recommendation based on scientific analysis. It should be noted, however, that there is a large installed base upon which a performance history may be derived, since these products have been produced for several decades with the C3 coating.

As stated previously, only certain conditions allow the migration process to occur. It is reasonable to expect, since the coating has not changed, that an application with a given environment that produced a previous failure would be more likely to produce a failure in the future. Conversely, if a device is installed in an application with a given environment that has not produced a failure of this type, it would be reasonable to expect that a future failure is less likely.

Therefore, based on the plant's performance history of the device and the manufacturer's description of the process leading to the failure mode, it is Framatome's recommendation that contactors and relays that are most susceptible to the failure should be included in a sampling plan to determine if more immediate replacements are necessary. The suggested sampling methodology is described in the military specification MIL-STD-105. The customer should determine the acceptable quality level and the lot size. The initial lot from which to sample is not limited to but should include all devices that are continuously energized.

Results of this sampling will allow the customer to determine the rate at which replacements should be installed. Any devices that are deemed to be at risk should eventually be replaced with upgraded devices using the pending new C5 inorganic laminate coating which is capable of withstanding higher temperatures ( $> 230^{\circ}\text{C}$ ) and has NOT exhibited this same failure mode under test. Framatome is in discussion with Eaton to ensure that new Framatome orders for these devices incorporate the enhanced design as directed and that priority scheduling is accommodated.

Eaton has stated that any device that is cycled every month will not fail in this manner. Framatome recommends no immediate actions for devices installed in a non-continuously energized state, but these devices should be evaluated by the customer to determine the need for future maintenance actions.

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## References

1. Part 21 Report #2015-81-00, "Notification of 10CFR Part 21 on Eaton/Cutler Hammer A200 Series Starters (& Contactors)" (ML15357A042)
2. Part 21 Report #2019-05-02, "Initial Notification of potential 10CFR Part 21, Eaton A200 Series Starters/Contactors" (ML19253A053)

Framatome personnel are available to discuss this issue in more detail. Please do not hesitate to contact Erik Eller (Erik.Eller@framatome.com / 724-591-7009) for any technical questions or the undersigned regarding this announcement.

Thank you for your attention.

Sincerely,



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