



Date: 6/29/2021

To: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555
Fax Number (301)816-5151

10CFR Part 21 Notification: P21-03302021, Rev. 2

Subject: Failures of Size 1 and 2 Freedom Series Full Voltage Reversing Starters

Pursuant to 10CFR 21.21, Paragon Energy Solutions, LLC is providing written notification of the identification of a defect.

The following information is required per 10CFR 21.21 (d) (4).

(i) Name and address of the individual or individuals informing the Commission.

Tracy Bolt, Chief Nuclear Officer
Paragon Energy Solutions, LLC
7410 Pebble Drive
Ft. Worth, TX 76118

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

Dominion - North Anna Station has identified instances where Size 1 and 2 starters have failed to function as expected in assemblies that were originally supplied by NLI. The Mechanical Interlock exhibited binding that prevented the contactor to close when energized.

The specific part which fails to comply or contains a defect:

Eaton Starter Model AN56DN*, AN56GN*, CN55DN*, CN55GN* style Starters and Contactors.

The identified failed starters are utilized in an application of operating MOVs. This is an intermittent duty application.

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(iii) Identification of the firm constructing or supplying the basic component which fails to comply or contains a defect.

Components were originally supplied by
Nuclear Logistics, LLC
7410 Pebble Drive, Fort Worth Texas 76118

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

Binding of the mechanical interlock preventing the contactor from closing on demand.

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

Date of Discovery: 3/29/2021

(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.

The issue was identified on supplied Size 1, 73262-025-00028 (Date Code: T4515), Size 2, 73262-028-00001 (Date Code: T4215).

T4215 = 42nd week of 2015

T4515 = 45th week of 2015

Starters have been supplied to the identified plants below within the following date range September 2014 through October 2018. Paragon has identified the date codes of the supplied starters and contactors to provide the specific information to the identified plants. This information has been provided directly to the specific plant.

Plant
Beaver Valley
Columbia
Ergytech/Cofrentes
Harris
NEK KRSKO
North Anna
Prairie Island

(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.

The component design that exhibited the failure was revised by the original equipment manufacturer (EATON) in September of 2014. The failed units were from Date Codes T4215 and T4515 which are in the 42nd and 45th weeks of 2015. In September 2018 the drawing was revised again. In discussions with the OEM the revision of the drawing was due to a change in material type and was not a result of binding issues.

Samples of mechanical interlocks from within the September 2014 and September 2018 timeframe were analyzed. Dimensions were compared to the manufacturer's drawing and were found to be out of tolerance for several dimensions. It is possible that the out of tolerance dimensions contributed to the binding issue.

The manufacturer, EATON, provided the following information:

The Rev. 001 drawing was created in September 2014 due to the following reasons:

1. The original plastic raw material was discontinued by their supplier and had to be replaced.
2. Dimension 0.682±.004" was changed to 0.702" ±.004 due to a potential issue with the DC coils due to higher pull-in force, the mechanical interlock did not prevent the outside pole of the reverse contactor from closing (this issue was not present on AC coils).
3. Both of these changes were implemented in late September 2014.

Revision 2 of the interlock drawing was due to an additional material change, as a result of the new material, additional dimension tolerances were revised.

During the evaluation of the binding issue of the failed starters, it was verified that the interlock was able to be placed into a position where the starter would consistently bind. When the interlock was properly installed and placed all the way down in the slot, the starter would not bind. However, if manually pulled up in the slot, the starter was able to be bound repeatedly. The starters when originally supplied were fully tested and verified to not bind and they properly functioned at the plant when installed for greater than 50 and 100 times respectively. It is clear based on the repeated successful operation for greater than four years in service that the interlocks were properly installed when supplied. The units did not fail immediately after being installed. The only conclusion would be that the interlocks were able to slowly creep from their original installed position to a higher placement within the slot in which they were originally installed. This led to the binding of the starter when the failure occurred.

It is believed that the changes that EATON incorporated to fix the lack of interlocking ability for the DC coil application negatively impacted the starter in creating the potential for binding.

The issue is believed to be a condition caused by a tolerance stack up of the non-metallic components, whereas if the interlock dimensions are not within tolerance and there is enough play/movement in the slot area for the interlock to creep up in the slot, there is a potential for the starter to bind, preventing the starter to operate properly on demand.

This condition has not been identified on assemblies manufactured after September 2018.

(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.

Due to the number of starters that have been installed and in service without issue, it is highly unlikely that there is a defect within all the supplied starters in the date range of September 2014 through September 2018. To date, Paragon has been unable to obtain any conclusive information from EATON regarding the potential cause of the binding issue. One of the failed starters along with samples of binding and non-binding interlocks have been provided to EATON for them to perform their own analysis on the potential causes of the binding issue. Until more information is gathered from the OEM (EATON) Paragon recommends the following:

The reversing starters and reversing contactors are typically wired in a configuration that will electrically lock out one of the contactors when the other one is being energized to prevent both contactors from being energized at the same time. Therefore, the mechanical interlock is not required to prevent both contactors from being closed at the same time when the electrical interlock configuration is being implemented. In this scenario, the mechanical interlocks are not required and can be removed at the plant's discretion.

Replacement mechanical interlocks may be ordered to replace the existing interlocks from the affected date code range if the plant application will not allow for removal.

The motor control center cubicles or starter assemblies with date codes within the September 2014 through September 2018 range should be monitored to ensure that there is no binding during operation. It is possible that if the starter is found to bind during operation, the bound condition could be released by cycling the power to the starter. This action may release the bound condition and will allow the starter to operate.

Please contact me with any questions or comments.

Sincerely,



Tracy Bolt
Chief Nuclear Officer
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Note:

Revision 1 was to correct the identified date code and to add the size of the starter and serial numbers of the units that failed.

Revision 2 for completion of the evaluation, removed Millstone from the list of affected plants.