



U.S. Nuclear Regulatory Commission  
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LIMDOC-2021-008  
October 4, 2021

**Subject: 10 CFR Part 21 Notification for a Flowserve – Limitorque supplied DC Motor**

**Description of the Deviation**

Flowserve – Limitorque was notified by Framatome Nuclear Parts Center that TVA Browns Ferry Nuclear (BFN) plant reported that a Limitorque SMB actuator had failed to operate electrically. It was noted by TVA that the actuator failure was discovered following a recent steam leak in the vicinity of the actuator. Investigation at BFN identified the failed component as the DC electric motor. The motor was removed from the actuator and disassembled by BFN personnel. Subsequently the motor was returned to Flowserve – Limitorque for evaluation.

The subject motor is designated as a safety related basic component. Flowserve's investigation, in conjunction with the motor OEM, has concluded that during manufacture, the subject motor sustained mechanical damage to the stator assembly field coil which led to the failure. As the dedicating entity, Flowserve is reporting this deviation in the assembly of the motor as a defect per the requirements of 10CFR21. Flowserve's investigation has concluded that this manufacturing defect is an isolated occurrence. No other instances of similar mechanical damage to the stator field coil insulation of Peerless DC motors have been observed or reported.

10 CFR21.21 Interim Report Details

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

Tyler Thompson  
Director, Plant Manager  
Flowserve, Limitorque Actuation Systems  
Lynchburg VA, 24502

- (ii) *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.*

Limitorque part # P-140-B5I-18F0  
Description: Peerless 7.5 ft-lb, 250 volt DC motor  
Serial Number: E18-99091-2 manufactured in August 2018

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

Flowserve Corporation, Limitorque Actuation Systems  
Lynchburg VA, 24502

- (iv) *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.*

The motor failed to function due to an electrical short of the field coil to ground. The defect in the assembly of the motor was identified as a steel coil support rod integral to the motor that became bent such that the end of the rod penetrated the outer layer of insulating material protecting the end turns on the field coil. This damage to the field coil insulation was insufficient to render the motor inoperable initially but ultimately contributed to the motor failure resulting in the actuator failing to function in electric operation mode.

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

Flowserve, through discussions with the motor OEM, identified the deviation to the motor assembly on August 4, 2021.

- (v) *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 defect is specific to a quantity of one motor originally supplied to Framatome NPC on Limitorque Order Number 164879.001. This motor was subsequently supplied to TVA Browns Ferry Nuclear Plant.

- (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 motor OEM is implementing additional assembly controls and QC verification concerning the installation and final appearance of the coil support rod that damaged the stator field coil. This action, to be completed by October 15, 2021 will supplement the existing inspection checks on fully assembled motors which includes insulation resistance tests and high potential tests which verify the integrity of the motor insulation system. Flowserve Quality Assurance Manager Chris Shaffer has the responsibility for verifying the corrective action has been implemented at the motor OEM.



*Limitorque Actuation Systems*

- (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.*

There is no action required by the nuclear plants in response to this Part 21 notification.

- (ix) *In the case of an early site permit, the entities to whom an early site permit was transferred.*

N/A

Technical questions concerning this notification can be directed to:  
Kyle Ramsey, Engineering Specialist, Flowserve – Limitorque Actuation Systems  
[kramsey@flowserve.com](mailto:kramsey@flowserve.com)

A handwritten signature in blue ink, appearing to read "Tyler Thompson", written over a horizontal line.

Tyler Thompson  
Director, Plant Manager  
Flowserve. Limitorque Actuation Systems  
Email: [TyThompson@flowserve.com](mailto:TyThompson@flowserve.com)

Cc: Zachary Cox, Flowserve Limitorque Production Engineering Manager  
Christopher Shaffer, Flowserve Limitorque Quality Assurance Manager