Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

November 11, 1994

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn.: Document Control Desk

Subject: ComEd 10 CFR Part 21 Interim Report (File 94-12)
Limitorque Actuator Potential Motor Pinion Key Failure

The purpose of this letter is to notify the NRC Staff of concerns by ComEd toward the Limitorque motor operated valve actuator AISI type 1018 motor pinion keys. All nuclear utilities have been informed of motor pinion key failures via NRC Information Notice 94-10.

Failures of AISI type 1018 keys have occurred, which have been attributed to insufficient material strength for certain Limitorque actuators. Limitorque had previously notified the industry in 1983 that 4140 keys are required in SMB-3, 4, and 5 actuators with 150 ft-lb. or larger motors. ComEd, along with KALSI Engineering, is evaluating AISI type 1018 motor pinion key failures in SMB-0 and 2 actuators. Early results from this evaluation indicate that key failure may occur at torque levels below the published Limitorque actuator torque ratings (MATR).

ComEd nuclear stations have not reported any incidents of failure of a SMB-0 actuator resulting from a sheared motor pinion key. One SMB-2 actuator failure was reported. ComEd's evaluation has not yet established the motor pinion key failure mechanism. Further technical evaluation is required to identify which, if any, installed actuators may be affected.

ComEd has issued guidelines to its six nuclear stations on the methods for properly installing motor pinion keys. In addition, the stations have initiated replacement of AISI type 1018 keys in those SMB-0 and larger actuators in which the motor pinion gear is being repaired or replaced, as a precautionary measure. Removed AISI type 1018 keys are being inspected. Inspections completed to date have found no failed keys.

Com Ed will further evaluate this issue. These actions are:

1) Complete additional KALSI testing to identify the failure mechanism and applicability to installed actuators. The KALSI testing is expected to be completed by the end of the fourth quarter, 1994.

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2) Establish a model for identifying susceptible actuators. The KALSI testing will help identify the appropriate model. The final model must account for differences between the KALSI test stand and an installed actuator. The final model should fit the industry failure data. The revised model is expected to be completed during the first quarter, 1995.

3) Validation testing of the model is expected to be completed at the end of the first quarter, 1995.

Provided as an attachment to this letter is ComEd's notification in accordance with the requirements of 10 CFR Part 21.

If there are any questions regarding this notification, please direct them to Karen Chromizky at (708) 663-3753.

Respectfully,

for Irene M. Johnson
Licensing Operations Director

Attachment: 10 CFR Part 21 Interim Report

cc: W. Russell, Director, Office of Nuclear Reactor Regulation
J.B. Martin, Regional Administrator - RIII
R, Capra, Directorate III-2 Director, NRR
R. Assa, Braidwood Project Manager, NRR
G. Dick, Byron Project Manager, NRR
C. Shiraki, Zion Project Manager, NRR
J. Stang, Dresden Project Manager, NRR
R. Pulsifer, Quad Cities Project Manager, NRR
W. Reckley, LaSalle County Project Manager, NRR
S. DuPont, Senior Resident Inspector - Braidwood
H. Peterson, Senior Resident Inspector - Byron
J. Roton, Senior Resident Inspector - Zion
M. Leach, Senior Resident Inspector - Dresden
C. Miller, Senior Resident Inspector - Quad Cities
P. Brochman, Senior Resident Inspector - LaSalle County
Office of Nuclear Facility Safety - IDNS

Attachment
10 CFR Part 21 Interim Notification
Limitorque Actuator Potential Motor Pinion Key Failure
10 CFR Part 21 File No. 9412

Applicability

This notification is submitted in accordance with the requirements of 10 CFR 21, sections 21.1(b), 21.3a(3), and 21.3.d(4).

Identification of Facility and Component

This notification concerns potential AISI type 1018 motor pinion key failures for use in Limitorque actuators on motor operated valves installed in safety-related applications at all six ComEd nuclear stations.

Identification of Component Manufacturer

Limitorque Corporation
5114 Woodall Road
Lynchburg, Virginia 24506
Phone: (804) 845-9705

Nature of Defect

Failures of AISI type 1018 keys have occurred, which have been attributed to insufficient material strength for certain Limitorque actuators. Limitorque had previously notified the industry in 1983 that 4140 keys are required in SMB-3, 4, and 5 actuators with 150 ft-lb. or larger motors. ComEd, along with KALSI Engineering, is evaluating AISI type 1018 motor pinion key failures in SMB-0 and 2 actuators. Early results from this evaluation indicate that key failure may occur at torque levels below the published Limitorque actuator torque ratings (MATR). During laboratory testing, KALSI failed 1018 keys three times consecutively at approximately 200 cycles in a SMB-0 actuator with a 61.7 to 1 gear ratio and a 1800 rpm 40ft-lb. motor. This appears to be inconsistent with industry failure data which involved higher speed actuators (for example, higher key loads).

ComEd nuclear stations have not reported any incidents of failure of a SMB-0 actuator resulting from a sheared motor pinion key. One SMB-2 actuator failure was reported. Dresden, Quad Cities, and Zion Nuclear Stations all have SMB-0 actuators which have been operated in excess of 200 cycles, which is the reported failure cycles at KALSI, without incident. This information and new data from KALSI indicate that the relationship of the KALSI testing motor pinion key failures to installed actuators is not fully understood. ComEd's evaluation has not yet established the motor pinion key failure mechanism. Further technical evaluation is required to identify which, if any, installed actuators may be affected.

Time of Discovery

On September 13, 1994, an evaluation of this issue was initiated for Part 21 reportability.

Corrective Actions

ComEd has issued guidelines to its six nuclear stations on the methods for properly installing motor pinion keys. In addition, the stations have initiated replacement of AISI type 1018 keys in those SMB-0 and larger actuators in which the motor pinion gear is being repaired or replaced, as a precautionary measure. Removed AISI type 1018 keys are being inspected. Inspections completed to date have found no failed keys.

Com Ed will further evaluate this issue. These actions are:

1) Complete additional KALSI testing to identify the failure mechanism and applicability to installed actuators. The KALSI testing is expected to be completed by the end of the fourth quarter, 1994.

2) Establish a model for identifying susceptible actuators. The KALSI testing will help identify the appropriate model. The final model must account for differences between the KALSI test stand and an installed actuator. The final model should fit the industry failure data. The revised model is expected to be completed during the first quarter, 1995.

3) Validation testing of the model is expected to be completed at the end of the first quarter, 1995.

Number and Location of Potentially Defective Components

Each of ComEd's six nuclear stations have between 50-100 safety-related SMB-0, 1, and 2 actuators which may be affected by this evaluation.

Contacts

Questions pertaining to this notification should be addressed to:
Karen Chromizky
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Nuclear Engineering and Technology Services
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Downers Grove, IL 60515.
(708) 663-3753