

Limitorque®

Limitorque Corporation

Automated Valve Actuators and Jacks for Industry

5114 Woodall Road • P.O. Box 11318 • Lynchburg, VA 24506-1318
Telephone (804) 528-4400 • FAX (804) 845-9736

April 11, 1994

U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Document Control Desk

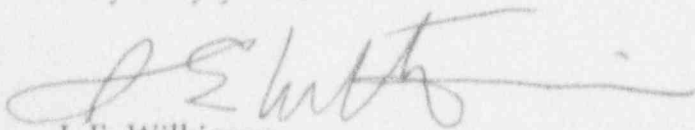
SUBJECT: Final Report
Limitorque Corporation 10 CFR 21 Evaluation #44
Worm Shaft Clutch #50-501-0012-1

REFERENCE: Previous Interim Reports
7-19-93 & 8-18-93

Limitorque Corporation Maintenance update 93-1 (dated 8/31/93) requested all U. S. nuclear utilities to advise Limitorque Corporation of any similar failures of subject worm shaft clutch. To date no failure data has been reported to Limitorque Corporation.

Limitorque Corporation is closing this issue as non-reportable per the requirements of 10 CFR 21.

Very truly yours,



I. E. Wilkinson
Vice President - Engineering

LIMITORQUE CORPORATION

PM/lab

Attachments: Interim Report dated 7-19-93
Interim Report date 8-18-93
Limitorque Corporation Maintenance Update, Pages 11 & 12
FAX (Final Report) date 4-8-94

cc: 10 CFR 21 Evaluation #44 File

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Limitorque

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Automated Valve Actuators and Jacks for Industry

5114 Woodall Road • P.O. Box 11318 • Lynchburg, VA 24506-1318
Telephone (804) 528-4400 • FAX (804) 845-9736

April 8, 1994

NRC Operations Center
FAX: (301) 492-8187

SUBJECT: Final Report
Limitorque Corporation 10 CFR 21 Evaluation #44
Worm Shaft Clutch #60-501-0012-1

REFERENCE: Previous Interim Reports
7-19-93 & 8-18-83 93 *wjm*
4-11-94

Limitorque Corporation Maintenance update 93-1 (dated 8/31/93) requested all U. S. nuclear utilities to advise Limitorque Corporation of any similar failures of subject worm shaft clutch. To date no failure data has been reported to Limitorque Corporation

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Very truly yours,

I. E. Wilkinson
Vice President - Engineering

LIMITORQUE CORPORATION

PM/lab

cc: T. Mignogna
J. Brennan
P. McQuillan
W. Miluszusky
10 CFR 21 Evaluation #44 File

Limitorque Corporation

5114 Woodall Road • P.O. Box 11318 • Lynchburg, VA 24506-1318
Telephone (804) 523-4400 • FAX (804) 545-9736



July 19, 1993

NRC Operations Center
FAX 301-492-8187

SUBJECT: Interim Report
Limitorque Corporation 10 CFR21 Evaluation #44

REFERENCE: Worm Shaft Clutch #60-501-0012-1

Limitorque is submitting an interim report relative to the subject evaluation. Houston Lighting and Power, South Texas Project, returned an SMB/SB/SBD, Size 1, worm shaft clutch to Limitorque that had one of the two motor-driven lugs separated from the component.

The component was metallurgically analyzed and it was determined that the base material was higher in carbon content than required for the heat treatment process utilized. This resulted in a brittle failure mechanism.

Limitorque requested samples from Houston Lighting and Power to determine the potential of additional occurrences. A quantity of five additional components have been received and will be metallurgically analyzed.

Limitorque will report the results of the additional analysis no later than August 18, 1993.

The following pertinent data is applicable to this evaluation:

Identification of the basis component

SMB/SB/SBD, Size 1, Worm Shaft Clutch #60-501-0012-1

Nature of the defect

The clutch has two lugs that transmit motor horsepower to the actuator worm gear set providing actuator output horsepower that will operate safety-related devices, e.g. a valve. Loss of both lugs will render the driven device inoperable.

Date of discovery

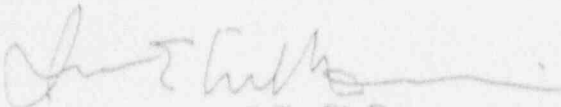
Limitorque 10 CFR21 meeting of May 20, 1993, identifying Evaluation #44

Limitorque technical contact:

P. G. McQuillan
Nuclear/Special Project Manager
Phone: 804-528-4400 Ext. 714
Fax: 804-845-9736

Very truly yours,

LIMITORQUE CORPORATION


I. E. Wilkinson, P.E., Ph.D.
Vice President, Engineering

jh

pc: T. S. Mignogna
P. G. McQuillan

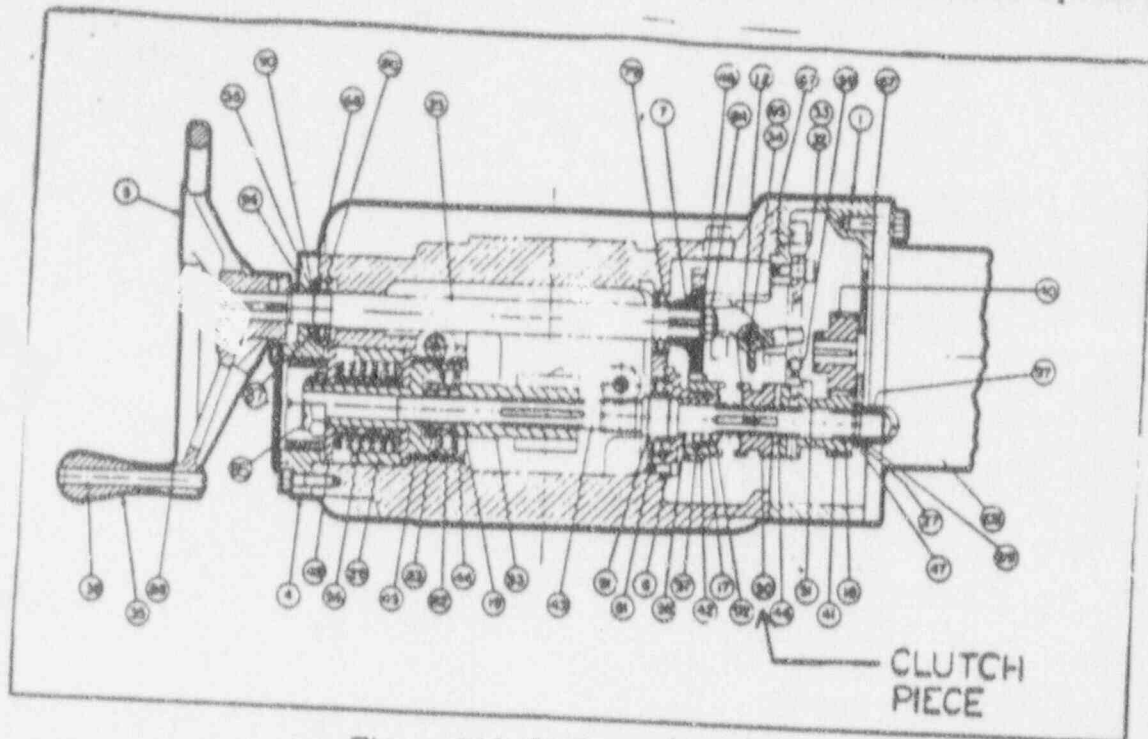


Figure #10--SMB-1 Assembly

Any data should be sent to

Limitorque Corporation
 5114 Woodall Road
 Lynchburg, VA 24506-1318
 Attn: P.G. McQuillan, Nuclear Special Projects Manager
 FAX: 804-845-9736

Past Maintenance Letter and Technical Update Topics

Maintenance Letter 88-1 (Notes From the Field)

1. Nuclear Qualified Limit and Torque Switches
2. Torque Spring Assembly Relaxation (Initial Report)
3. Improper Use of the Declutch Mechanism (SMB-00)
4. DC Motors (Starting Resistors, Cable Sizing, Discharge Resistors)
5. Gasket Material (Announcement of New Material)

Maintenance Letter 88-2

1. Hydraulic Lock (Spring Modifications and Grease Relief Kits)

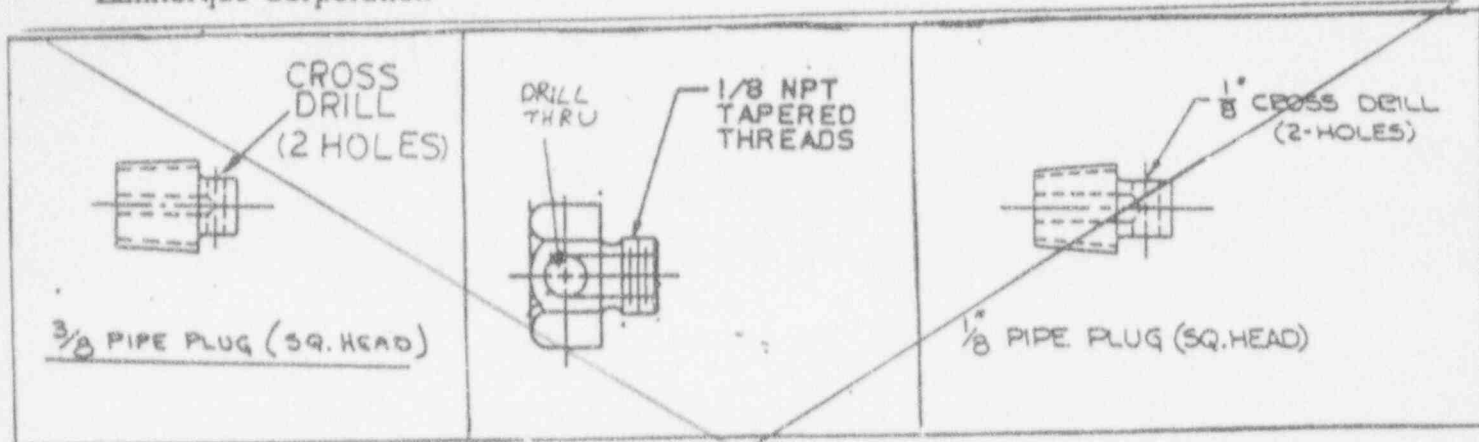


Figure #7
AC RH Motor T-Drain

Figure #8
AC LR Motor T-Drain

Figure #9
DC RH Motor T-Drain

should be energized when the valve moves in the close direction).

Operation and Maintenance

- If motor does not operate: proper power supply should be checked; a check should be made for loose or incorrect wiring; a check should be made that the limit switches are set properly and the torque switch is not open inadvertently.
- The motor should not be lubricated--it is lubricated for life.
- Defective or damaged motors should be returned to Limitorque for repair or rework.

6. Broken Worm Shaft Clutch

Relevant Units: SMB/SB/SBD-1

A utility discovered a broken worm shaft clutch (part #60-501-0012-1) while performing routine maintenance on an SB-1 actuator. The failure consisted of a separated lug which engages with the motor driven worm shaft gear drive lug. The actuator was still operable since the remaining worm shaft clutch lug was intact.

The worm shaft clutch was installed in an SB-1 actuator (order number 3B5991B, serial number 273065) which was furnished in mid-1978. Limitorque is requesting any additional information regarding similar failures of this component. This data will be evaluated per the requirements of 10CFR21. Please provide the serial number of any actuators that the defective component has been located and whether the component was originally supplied with the actuator. The worm shaft clutch is piece #50 shown in Figure #10--SMB-1 Assembly.

Limitorque Corporation

AUG 18 1993

5114 Woodall Road • P.O. Box 11318 • Lynchburg, VA 24506-1318
Telephone (804) 528-4400 • FAX (804) 845-9736

August 18, 1993

NRC Operations Center

FAX: 301-492-8187

SUBJECT: Interim Report
Limitorque Corporation 10 CFR21 Evaluation #44
Worm Shaft Clutch #60-501-0012-1

REFERENCE: July 19, 1993 Interim Report (attached)

Limitorque metallurgically analyzed the five component samples submitted by Houston Lighting and Power. The analysis verified that all five components were of proper material and heat treatment process.

The component that had failed was installed in an SB-1 actuator assembled in May, 1978. This actuator is identified as Limitorque Order No. 3B5991-B w/S/N 273065. Three of the five component samples returned from Houston Lighting and Power were supplied in the May, 1978 time frame and were installed in SB-1 actuators identified as:

Limitorque Order No. 3B5991-B, S/N 273066
Limitorque Order No. 3B5991-B, S/N 273069
Limitorque Order No. 3B5991-B, S/N 273070

The remaining two components were installed in SB-1 actuators supplied in 1985 identified as:

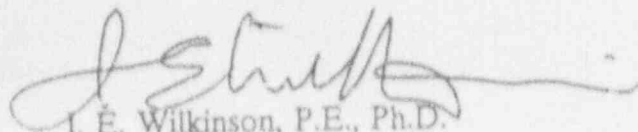
Limitorque Order No. 3K8941-A, S/N L376578
Limitorque Order No. 3M5830-B, S/N L381055

This incident is considered an isolated event. However, recognizing the need for a larger database, Limitorque will advise all utilities of this occurrence and request that any similar failures that have occurred be reported to Limitorque with the identifying actuator serial number. This information will be transmitted via Limitorque Maintenance Update 93-1 scheduled for August 27, 1993, distribution. Limitorque will review all reported data and

advise NRC as appropriate. An interim report will be submitted no later than February 18, 1994 (approximately 6 months).

Very truly yours,

LIMITORQUE CORPORATION

A handwritten signature in cursive script, appearing to read 'I. E. Wilkinson', written in dark ink.

I. E. Wilkinson, P.E., Ph.D.
Vice President, Engineering

jh

pc: T. S. Mignogna
P. G. McQuillan