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Vice President-Engineering & Construction-Nuclear  
821-5381

November 21, 1980

Mr. Boyce H. Grier  
Director, Region I  
U. S. Nuclear Regulatory Commission  
631 Park Avenue  
King of Prussia, Pennsylvania 19406

SUSQUEHANNA STEAM ELECTRIC STATION  
FINAL REPORT OF A DEFICIENCY RELATING TO  
LIMITORQUE CORPORATION TORQUE SWITCHES  
ERs 100450/100508                      FILE 840-4  
PLA-577

Dear Mr. Grier:

This letter serves to provide the Commission with a final report of a deficiency relating to defective torque switches associated with Limitorque valve motor operators. The condition was reported by telephone to NRC Region I Inspector Mr. J. Mattia on November 12, 1980 by Mr. A. R. Sabol of PP&L. During that conversation Mr. Mattia was advised that the condition was considered reportable under the provisions of 10CFR50.55(e).

The attachment to this letter contains our final report on the condition and includes the cause and safety complications along with our corrective action plan. We expect to complete action for Unit I by April, 1981. The condition is currently being controlled through Bechtel Nonconformance Report #6021.

We trust the Commission will find the information forwarded by this letter to be satisfactory.

Very truly yours,



N. W. Curtis  
Vice President-Engineering & Construction-Nuclear

Attachment  
FLW:mcb

*dupes 8012010326*

cc: Mr. Victor Stello (15)  
Director-Office of Inspection & Enforcement  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Mr. G. McDonald, Director  
Office of Management Information & Program Control  
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P. O. Box 52  
Shickshinny, Pennsylvania 18655

ATTACHMENT TO PLA-577

SUBJECT

Defective Limitorque Torque Switches

DESCRIPTION OF PROBLEM

A Consultant for the Company, in conjunction with the scope of work they were performing for PP&L at the Susquehanna Site, issued a report on Limitorque Torque Switches which stated as follows: "Adjustments and preoperational checks on both safety related and non-safety related motor operated valves, made prior to post-construction startup tests of Limitorque valve operator models SMB-00 SMB-000, revealed that the stationary electrical contacts on the 'close' side of the torque switch had loosened. The torque switches in question are of the leaf type. The electrical contacts are small machined hex-head cap screws (see page 4 of Attachment, piece #3). Locking devices for the cap screws were not installed.

In some cases the loose cap screws backed out sufficiently to prevent the contacts from breaking open when the valve seated."

Visual inspection of four valves (1F001A, 1F001B, type SMB-00; HV11314, HV15112, Type SMB-000) confirmed that the hex-head contact screws were loose.

CAUSE

One pair of cap screws on each torque switch has one or more fiber shims installed under a metal bridge plate. Limitorque stated that the fiber shims were used to make the height of both pairs of cap screws equal.

The screws have no locking device because the height of the screw is critical and lock-washers would raise the height.

These fiber shims under the proper torque value of six inch lbs. (Limitorque requirement, installed at factory) have a tendency to relax with time, thus relieving the preload on the screw.

ANALYSIS OF SAFETY IMPLICATIONS

The Field was requested to inspect 50 operators to report on the condition of the stationary contacts. The field actually inspected a total of sixty (60) SMB-00 and SMB-000 Limitorque operators, of which fifteen (15) were Q-listed and forty-five (45) were non-Q.

Inspection has shown that none of the #6 cap screws were loose enough on any of the sixty Limitorque torque switches inspected to have backed out sufficiently to prevent the contacts from breaking open when the valve seats. The amount of rotation to achieve 6 inch-pounds tightening torque for the screws ranged from 1/8 to 3/4 turns, with the exception of two valves (S/N 253336 and 225875), and the second of these had been previously tightened on July 2nd by the Limitorque representative. Another valve, S/N 203912, also tightened on July 2nd, required 1/4 turn. Also, S/N 233837 had a different design of torque switch with no contact screws. The number of shims observed under the contact screws was two for 58 of the valves. S/N 233837 had no shims because of this unique design and S/N 241655 had three shims. The screws without shims were found to be tight to the torqued requirements.

In view of the fact that two (2) #6 cap screws were earlier identified to have backed out, that Limitorque does not have any locking device in their procedure, and that the shims exhibit a varying amount of compressibility and reduce the thread engagement, Project engineering has determined that "Loctite" studlock, No. 7341, color red, manufactured by Loctite Corporation, should be used to fix the #6 contact screw in a set position. This application of "Loctite" 7341 will keep the contact screw in the same location under vibratory conditions.

In the consultant's description of the problem it was stated that loose cap screws had backed out sufficiently to prevent the contacts from breaking open when the valve seated. The field and project engineering were not able to verify that any of the inspected operators exhibited the condition. The screws would have to be completely backed out and no threads engaged if they were loosened to that degree.

There is, however, a problem with the use of fiber shims under contacts. Based on the fact that all contacts with fiber shims underneath exhibit looseness and that further loosening could cause the operator to fail to function, the problem is considered reportable under 10CFR50.55(e). The affected Limitorque operators are used in many systems required for safe shutdown. A typical example is valves FV-1F001 and 1F004 of the Reactor Water Cleanup (RWCU) system. The above valves are part of the containment isolation system and failure of the valves to operate would be a breach of the containment boundary.

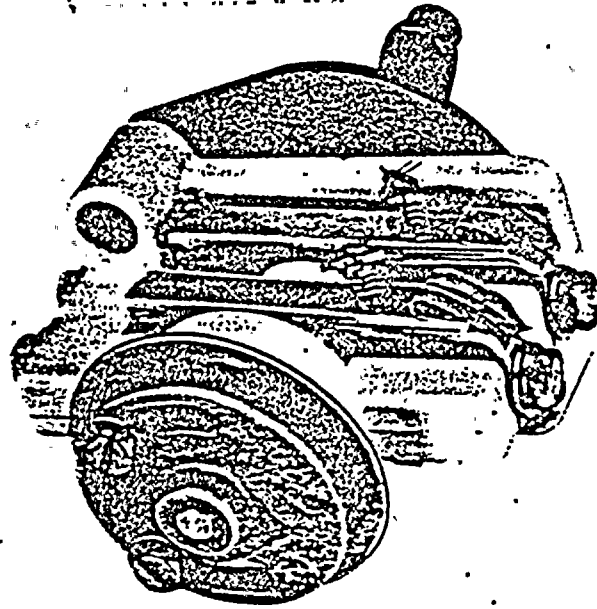
#### CORRECTIVE ACTION

Project engineering has directed the field to use "Loctite" on the threads of all the Limitorque torque switch no. 6 cap screws on the unit 1 and 2 motor operators. They will continue to maintain the same number of fiber shims under the metal bridge plate. They will also torque these screws to the manufacturers recommended torque requirements of 6 inch lbs.

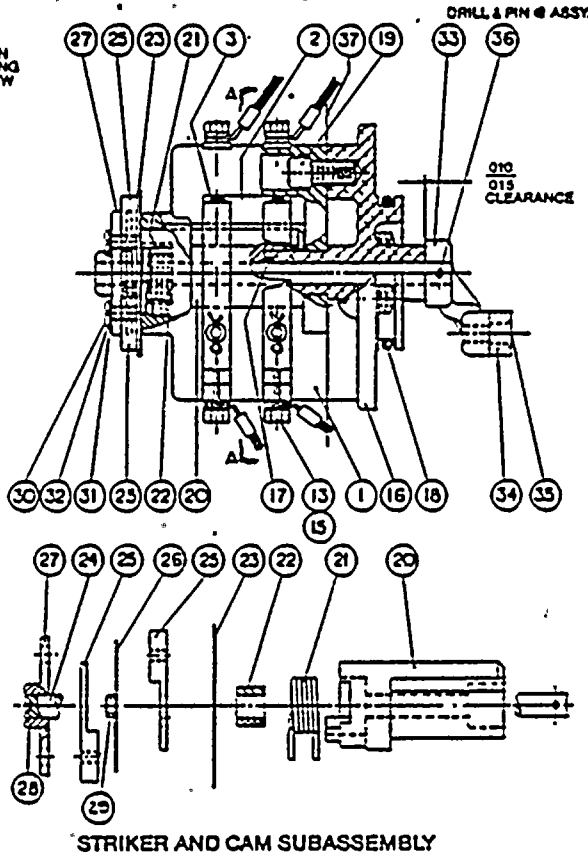
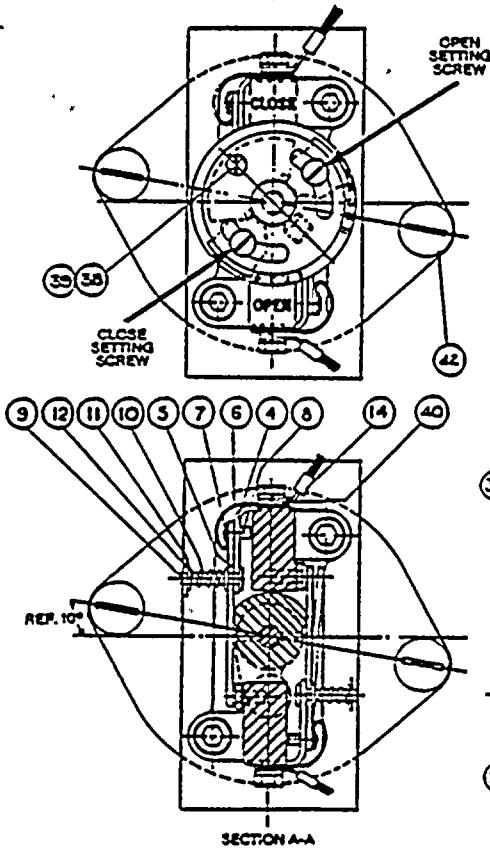
The documentation of the "Q" motor operators and the application of "Loctite" to the torque switches will be covered under Nonconformance Report No. 6021.

CONCLUSION

Once the application of "Loctite" has been applied to the contact screw and the screws retorqued to the manufacturers requirements, no loosening of screws will occur that could prevent Limitorque operators from performing their intended function.



PC NO.	NO.	DESCRIPTION
1	1	TERMINAL BLOCK
2	2	CONTACT BRIDGE
3	4	CONTACT SCREW
4	4	FINGER HOLDER
5	4	FINGER
6	4	SHUNT
7	4	SHUNT WASHER % O.D. 7/8 I.D. x 1/8 THK.
8	4	RIVET
9	4	FINGER SPRING STUD
10	4	COMPRESSION SPRING
11	8	SPRING CUP WASHER
12	4	COTTER PIN 7/16 x 1/2
13	4	HEC HD. MACH. SCR. #10-32 x 1/2
14	4	RING TORQUE CONNECTOR 18 #16 AWG TYPE T U-PIGTAIL
15	4	LOCKWASHER SHAKEPROOF
16	1	TORQUE SW MTG. BRACKET
17	1	O RING
18	1	O RING
19	2	SOC. HD. CAP SCR. #2-20 x 1/2 LG.
20	1	CAM
21	1	TORSION SPRING
22	1	SPRING MANDREL
23	1	DIAL
24	1	SHAFT
25	2	STRIKER
26	1	TORQUE LIMITING PLATE
27	1	STRIKER HUB
28	1	ROLL PIN 7/8 x 1/2
29	1	#4 SWAGENUT
30	2	PAN HD. SCREW #3-32 x 1/4 LG. SLOTTED
31	2	LOCKWASHER SHAKEPROOF
32	2	FLAT WASHER 7/8 O.D. x 1/8 O.D. x 1/32 THK.
33	1	ARM
34	1	ROLLER
35	1	ROLLER PIN
36	18	GROOVE PIN 7/8 DIA. x 1/2
37	1	ARC BARRIER
38	1	PAN HD. SCR. #4-40 x 1/2
39	1	LOCKWASHER EXTERNAL TOOTH
40	4	WASHER 7/8 O.D. x 1/8 I.D. x 1/32 THK.
42	2	RD. HD. MACH. SCR. #6-18 x 1/2



STRIKER AND CAM SUBASSEMBLY