PAUL-MUNROE
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November 15, 1984

Dr. Thomas E. Murley, Director
United States Nuclear Regulatory Commission
Office of Inspection and Enforcement, Region I
631 Park Avenue
King of Prussia, PA 19406

Reference: Possible 10CFR21 Report, Valve Operators Manufactured by Paul-Munroe Hydraulics. Dated August 30, 1984.

Dear Dr. Murley:

This letter summarizes the results of Paul-Munroe studies of components which comprise the Valve Operators installed in the Limerick Generating Station, Unit 1, for Philadelphia Electric Company. The components in question are:

1. Solenoid operated, directional control valves.

2. Valve Actuators and

3. Accumulators

The purpose of the control valve investigation is to define the mechanism of excessive valve leakage and to recommend material, design or operational changes, if required, to improve valve performance. A special test bench was designed to exercise control valves in a hydraulic circuit that simulates the valve operator application and allows measurement of critical performance paramenters during accelerated life cycle testing. These life cycle tests are on-going and, as they are extensive and time consuming, have not been completed to date. It is expected that this effort will continue over the next four weeks. An analysis of results and recommendations will follow with a final report submitted by January 15, 1985.

Since the time of the August 30, 1984 letter, no excessive valve leakage has been reported from operations at the Limerick Station.

The purpose of the Valve Actuator study was to verify that the design modifications implemented by Paul-Munroe were a satisfactory, long term solution to the high piston seal wear experienced during testing and operating. A design review meeting was held at the actuator manufacturer's facility.

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A letter from the manufacturer, stating his general concurrence with the suggested improvements with some exceptions is enclosed for review. The qualification test program suggested by the manufacturer is agreeable to Paul-Munroe but has not been accomplished because of the availability of units to test. We are now in receipt of Flotork units of original configuration. They will be modified in accordance with the recommendations and life cycle tested under load to prove performance. The results of this test program will be included in the January 15 submittal.

The purpose of the accumulator study was to determine the cause and solution for gas leakage. A meeting was held with the manufacturer at Paul-Munroe facilities in Orange, California. At this meeting, the manufacturer agreed that the problems were related to material selection and futher agreed to supply new accumulators using an improved design which incorporates welded end cap construction and eliminates the present end cap retainer where gas leakage occurred.

Please be advised that Paul-Munroe is continuing our efforts to reach a successful conclusion to the study programs outlined above. We regret the unanticipated delays we have experienced, however we are confident that a final report will be available on January 15, 1985 as noted.

Very truly yours,

PAUL-MUNROE
Energy Products

Frank U. Erlach
Vice President/General Manager

FUE/kcd

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**FLO-TORK, INC.**

1701 NORTH MAIN STREET ORRVILLE, OHIO 44667 TEL. 216-682-0010 TELEX 98-6402

October 18, 1984

Ron Beaufort
Paul Munroe Hydraulics
1701 W. Sequoia Avenue
Orange, CA 92668

SUBJECT: Paul Munroe Hydraulics Drawings, PB18930, PB18931 PB18932

Dear Ron:

In response to your questions on FLO-TORK Valve Mate hydraulic rotary actuators, we offer the following comments:

FLO-TORK has reviewed the design modifications as shown on PMH drawings, PB18930, PB18931, PB18932, and in general finds no objection to the specifications outlined, however, we do have some concerns. We prefer the chrome plated cylinder tubes in conjunction with the bronze plated pistons, new seal material, and closer fits. Considering the piston, seal, and clearance changes, we recommend that methods 6B and 6C not be used. Several material call outs should be corrected as follows: the pilot ring should have an alternate material of bar or plate (sometimes used for small quantities), and piece 9 is known as the Stem Mate.

FLO-TORK is willing to manufacture spare Valve Mate Actuators in accordance with the above PMH drawings. It may be necessary for PMH to supply the Nylatron back up rings as well as the Unirex N-3 lubricant. However, FLO-TORK can not guarantee the units unless complete qualification tests are performed under load. FLO-TORK can perform the tests or extablish test criteria for an outside firm to do the testing.

FLO-TORK can supply standard catalog sizes of rack and pinion hydraulic rotary actuators which would produce similar torques at the same operating pressures, however, the rack and pinion actuators would not have the same package sizes as the Valve Mates for exact interchangeability.

Regarding rotation adjustment of the Valve Mate actuators, some movement of the cylinder barrel will exist regardless of the adjustment. This is acceptable as long as the cylinder is not backed out beyond the dimension A of FS-238 Sheet 3. After this point the

thread engagement and the cylinder tube O-ring seal engagement become inadequate. In addition, when the cylinder barrel thread engagement is reduced, lateral movement of the cylinder barrel increases.

As an acceptance criteria for Valve Mate actuators which have been refurbished in accordance with the subject PMH drawings, we recommend that each unit be tested for low pressure breakaway at 50 PSI, for proof at 2200 PSI and for smooth operation under load. The breakaway and load tests recommended will indicate whether binding between the piston and the cylinders exists as a result of the reduced piston OD/cylinder ID clearances.

In summary, FLO-TORK concurs with Paul Munroe Hydraulics that the design modifications to the FLO-TORK Valve Mate actuators are acceptable with the few minor exceptions outlined.

If you should have any further questions or need additional information, please feel free to contact us.

Sincerely,

FLO-TORK, INC.

Don Barlow

Don Barlow
Sales Administrator

DB/mey