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SUBJECT: Submits 90 day response to NRC 930628 GL 89-10, Suppl 5 re accuracy of MOV diagnostic equipment. Util currently using Series 3500 Valve Analysis Sys.

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 TITLE: Response to Generic Ltr 89-10, "Safety-Related MOV Testing & Surveillance"

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September 30, 1993

U.S. Nuclear Regulatory Commission
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Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Response to Generic Letter 89-10 Supplement 5

- Reference:
- 1) Generic Letter 89-10 Supplement 5, dated June 28, 1993
 - 2) NRC Information Notice 93-54 dated July 20, 1993
 - 3) ITI Movats Engineering Report 5.0, Revision 5
 - 4) ITI Movats Engineering Report 5.1, Revision 0

In Generic Letter (GL) 89-10, Supplement 5 (reference 1), the Nuclear Regulatory Commission (NRC) provided information on the accuracy of Motor-Operated Valve (MOV) diagnostic equipment. The information applies to diagnostic equipment that relies on spring pack displacement to estimate stem thrust and of diagnostic equipment that relies on valve yoke strain to estimate thrust. Licensees were requested to re-examine their MOV programs and to identify measures taken or planned to account for uncertainties in properly setting valve operating thrust to ensure operability. The GL directed that the licensee's evaluations should include any information reasonably available to them regarding the inaccuracy of their diagnostic equipment.

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In accordance with the reporting requirements of reference 1, this letter is Wisconsin Public Service Corporation's (WPSC) 90 day response informing the NRC of:

- (1) the diagnostic equipment used to confirm the proper size, or to establish settings, for MOVs within the scope of GL 89-10,
- (2) the actions taken and the future planned actions (including schedule and summary of actions taken or planned) to address the information on the accuracy of MOV diagnostic equipment.

The most common MOV at the Kewaunee Nuclear Power Plant (KNPP) is a rising stem valve driven by a torque producing actuator. These actuators produce torque that is converted to thrust by an internal Acme type screw and are controlled by a torque switch. The two force parameters of interest in rising stem MOVs are the output torque of the actuator and the resulting stem thrust. Torque is normally the controlled value, while the actual output is a thrust value. WPSC is currently using the ITI Movats Series 3500 Valve Analysis System with the Torque Thrust Cell (TTC) to set the torque switches and measure the resulting stem thrust. This system will also be used on the small number of remaining valves in the GL 89-10 program which are 1/4 turn valves. The use of the TTC transducer with the analysis system is currently being evaluated for this application.

The data acquisition and analysis portion of the Series 3500 system is comprised of a 386 laptop computer processor and a 12 bit high speed analog-to-digital converter. The system uses a signal conditioner at the valve to connect the sensors to the rest of the system. The signal conditioner collects the sensor information, and conditions, amplifies and transports the information to the data collection computer. The signal conditioner provides the necessary power and signal conditioning to the TTC.

The TTC is a sensor mounted at the yoke-to-actuator interface. It is used to set the torque switches and measure the resulting stem thrust of the valves by measuring the torque and thrust values simultaneously. The outputs are measured directly in pounds of thrust and foot-pounds of torque eliminating potential conversion factor errors. The TTC can also improve data quality in design basis (differential pressure) testing by performing in-situ measurement of stem factor and full stroke force variation under operating conditions.

WPSC has followed current industry and manufacturer standards to account for inaccuracies of the diagnostic testing equipment. The following inaccuracies are factored into the engineering calculations which determine the required thrust needed to open and close a specific valve:

Torque Switch Repeatability: Using the torque switch setting and the torque output, torque switch repeatability is calculated according to the Limitorque Maintenance Update 92-2, Section 4.

Instrument Error: ITI Movats Engineering Reports 5.0 (reference 3) and 5.1 (reference 4) are followed to account for all independent and random equipment errors. ITI Movats Special Test Report 6.0 "Actuator Repositioning Effects Test Report," dated August 6, 1993, is also used as a guideline to account for the TTC repositioning error as identified in NRC Information Notice 93-054.

Rate of Loading: The rate of loading margin is calculated according to ITI Movats Engineering Report 5.0 (reference 3) using the actuator size of the MOV.

Stem Lubrication Degradation: Due to recent information identified in the ITI Movats White Paper "The Effect of Stem Lubrication on MOV Thrust Output," dated January of 1993, WPSC has included a margin to account for potential stem lubrication degradation.

WPSC will be using the Series 3500 Valve Analysis System with the TTC to test valves within the scope of GL 89-10 to the extent practicable. This system was previously used with two different methodologies to establish torque switch settings. These methodologies did not include the TTC. Any valves tested with the previous methodologies will be retested with the TTC. To meet in part the reporting requirements of reference 1, the two previous methodologies and the actions taken to account for their inaccuracies are summarized below.

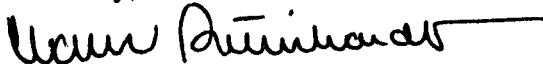
The Stem Load Sensor (SLS) was developed to directly measure stem thrust in the closing direction and the corresponding MOV running load. It is a compact transducer that mounts directly around the valve stem between the actuator and the valve. The device measures the diametric deformation (thinning and thickening) of the valve stem caused by the stress (thrust) acting on it. The stress (thrust) can then be calculated by the measured deformation (strain). WPSC used this methodology to statically test valves at KNPP primarily in 1991. Due to the inaccuracies recognized by ITI Movats in Engineering Report 7.0, Revision 0, WPSC discontinued use of the SLS and will be retesting these valves with the TTC.

The Thrust Measuring Device (TMD), which was used by WPSC in the 1988-1991 timeframe, estimates stem thrust on the basis of spring pack displacement. This correlation was obtained by stroking the valve open into a load cell while simultaneously monitoring spring pack compression. This correlation was then used to set both the open and close torque switches. The method was based on the assumption that the delivered thrust for a given spring pack displacement is equal regardless of the direction of valve travel. Recent testing by ITI Movats, however, has shown that there may be differences in delivered thrust between the opening and closing stroke.

Since the valves were tested in the open direction and assumed to operate with equal thrust in the closed direction, WPSC decided to retest those valves tested using the TMD methodology and which have a safety function to close. WPSC identified a total of ten valves that needed to be retested. Eight of these valves have been retested with the TTC methodology. WPSC has evaluated the remaining two valves using plant specific conditions and has concluded that the valves will perform their intended safety function. One of the two remaining valves is scheduled to be tested during the 1994 outage. Due to the conditions needed to conduct a viable test of the remaining valve and to ensure the safety of the plant, the test has been scheduled to be conducted during a time when the core is unloaded. The next core unload is scheduled for the 1995 outage. This schedule will not meet the 1994 completion schedule but will assure the safety of the plant and strict controls on test conditions for repeatability for future tests. We are currently evaluating the remaining test schedule and will be requesting an extension for any valves which will not be tested by June, 1994, as required by GL 89-10.

In conclusion, WPSC is currently using the Series 3500 Valve Analysis System with the Torque Thrust Cell testing methodology to test, where practicable, the MOV's in the scope of the 89-10 program. Any valves tested with previous methodologies will be retested with the TTC methodology. The inaccuracies associated with the Series 3500 analysis system are accounted for in the test results to ensure the operability of the safety related MOVs. If you desire any additional information, please contact a member of my staff.

Sincerely,



C. R. Steinhardt
Senior Vice President - Nuclear Power

RLF/cjt

cc - US NRC Region III
US NRC Senior Resident Inspector

Subscribed and Sworn to
Before Me This 30th Day
of September 1993



Jeanne M. Ferris
Notary Public, State of Wisconsin

My Commission Expires:
June 18, 1995