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RECIP.NAME RECIPIENT AFFILIATION  
MURLEY,T.E. Office of Nuclear Reactor Regulation, Director (Post 870411 D

SUBJECT: Forwards response to Suppl 5 to GL 89-10, "Inaccuracy of  
Motor-Operated Valve Diagnostic Equipment." S

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AEP:NRC:0966R

Donald C. Cook Nuclear Plant Units 1 and 2  
Docket Nos. 50-315 and 50-316  
License Nos. DPR-58 and DPR-74  
GENERIC LETTER 89-10, SUPPLEMENT 5,  
"INACCURACY OF MOTOR-OPERATED VALVE DIAGNOSTIC EQUIPMENT"

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Attn: T. E. Murley

September 28, 1993

Dear Dr. Murley:

The attachment to this letter contains our response to Generic Letter 89-10, Supplement 5, "Inaccuracy of Motor-Operated Valve Diagnostic Equipment".

This response is submitted in accordance with 10 CFR 50.54(f), and as such, an oath of affirmation is attached.

Sincerely,

E. E. Fitzpatrick  
Vice President

dr

Attachments

cc: A. A. Blind  
G. Charnoff  
J. B. Martin - Region III  
NFEM Section Chief  
NRC Resident Inspector  
J. R. Padgett

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STATE OF OHIO)  
COUNTY OF FRANKLIN)

E. E. Fitzpatrick, being duly sworn, deposes and says that he is the Vice President of licensee Indiana Michigan Power Company, that he has read the forgoing response to GENERIC LETTER 89-10, SUPPLEMENT 5 and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

E E Fitzpatrick

Subscribed and sworn to before me this 28th  
day of September, 19 93.

Diann L. Eads

NOTARY PUBLIC

State of Ohio

Commission expires 2/24/95

ATTACHMENT TO AEP:NRC:0966R

RESPONSE TO GENERIC LETTER 89-10, SUPPLEMENT 5

This attachment constitutes our response to the individual items of Generic Letter (GL) 89-10, Supplement 5.

- (1) Within ninety days of receipt of this letter, all licensees are required to notify the NRC staff of the diagnostic equipment used to confirm the proper size, or to establish settings, for MOVs within the scope of GL 89-10.

Response - The diagnostic equipment used at the Donald C. Cook Nuclear Plant to confirm the proper size, or to establish settings, for motor-operated valves (MOVs) within the scope of GL 89-10 is ABB Impell Corporation's Operations Analysis & Testing Interpretive Systems (OATIS, Version 3B) and Liberty Technologies' Valve Operation Test & Evaluation System (VOTES, Revision 2.31).

- (2) Within ninety days of receipt of this letter, licensees are required to report whether they have taken actions or plan to take actions (including schedule and summary of actions taken or planned) to address the information on the accuracy of MOV diagnostic equipment.

Response - Donald C. Cook Nuclear Plant used OATIS exclusively for the first of the three refueling outages (RFOs) in the GL 89-10 Program schedule to confirm the proper size and establish settings for MOVs. Both VOTES and OATIS were used during the second of the three RFOs in the program schedule. Due to the need to verify calculation factors and assumptions, the use of VOTES will be increased until it is the predominantly used diagnostic equipment at Donald C. Cook Nuclear Plant. OATIS will continue to be used on a small population of valves which have a configuration that does not allow for calibration with currently available calibrators and may be used on butterfly and high margin gate and globe valves on a contingency basis.

OATIS employs calibration in the open direction and spring pack displacement methodology. Calibration is performed by driving the MOV's stem in the open direction into a load cell. The amount of force exerted upon the load cell by the stem is used in the calibration of the spring pack coefficient. The load cell and spring pack displacement values provide a correlation of spring pack compression to stem thrust. This correlation is used to convert from inches of spring pack movement into pounds of stem thrust during the valve stroke (open or close). The linear displacement of the spring pack is measured by a device that mounts at the spring cartridge cap. The device is called a

thrust measuring device (TMD) because the spring pack displacement is correlated to stem thrust. The TMD uses a linear variable differential transducer (LVDT) to measure displacement.

Accuracies for OATIS are derived using Idaho National Engineering Laboratories (INEL) test data as stated in the "Final Report - MUG Validation Testing as Performed at INEL." The derivation of OATIS accuracies was a statistical analysis performed by ABB Impell under their nuclear QA program, and due to the INEL test methodology provide for the parameters which can affect open calibration. The accuracies account for open versus closed thrust differences and rate of loading/dynamic effects and include an LVDT term (which is dependent on the stiffness of the spring pack), a load cell term (used in opening calibration) and manufacturer's torque switch repeatability. As an additional conservatism, we have added a term to account for other general inaccuracies in the test methodology or data interpretation.

VOTES employs a force sensor which is affixed to the MOV's yoke. The VOTES force sensor is a specialized strain gage type extensometer that measures valve yoke strain. The measurement of strain in the yoke is correlated to the deformation of the valve stem. The correlation is made by temporarily affixing a calibration clamp (strain gage or proximity type diametral expansion sensor) to the valve stem. The valve is then part-stroked to the seated condition so the calibration clamp can measure the diametral deformation of the valve stem. The correlation is determined by the computer software from the simultaneous outputs of the VOTES force sensor and calibration clamp along with the stem dimensions and stem material properties and a torque correction factor if required. This correlation is used to convert valve yoke strain into a stem thrust in pounds throughout the valve stroke. The calibration clamps are calibrated in accordance with National Institute of Standards and Testing (NIST) requirements.

VOTES testing at Donald C. Cook Nuclear Plant also employs an LVDT (as an auxiliary sensor input) to measure spring pack linear displacement. This input, along with spring pack calibration data collected via an ITI-MOVATS "Pack Mate" spring pack tester, will be used to validate calculation factors and assumptions.

Accuracies for VOTES were validated by testing performed at INEL as stated in the "Final Report - MUG Validation Testing as Performed at INEL." These accuracies are used to account



for testing loop (includes force sensor, calibration clamp, computer and cables as discussed in Liberty Technologies' VOTES User Manual, Addendum 4) and rate of loading/dynamic effects. At Donald C. Cook Nuclear Plant, accuracy terms are also included for torque switch repeatability and for other general inaccuracies in the test methodology or data interpretations.

The Donald C. Cook Nuclear Plant recently received an announced Part 2 inspection of the implementation of its GL 89-10 MOV Program by the NRC. The inspection resulted in an inspection follow-up item to justify the assumptions for valve factors, stem friction factors, load sensitive behavior and MOV degradation used in calculating MOV thrust/torque requirements. Another issue brought up in the NRC's inspection is the justification of diagnostic equipment accuracy assumptions.

As a result of the inspection, an MOV accuracy/factor validation plan has been established. The validation of the aforementioned factors, degradations and accuracies will be ongoing continuously as data is generated from the EPRI MOV Performance Prediction Program, INEL's findings, industry sharing of MOV information and Donald C. Cook Nuclear Plant MOV testing. Our plan is to make preliminary conclusions based on available 1992 RFO VOTES test data, 1993 at power VOTES test data and industry MOV information for use during the 1994 RFOs scheduled to start in February. The preliminary conclusions will be refined using 1994 RFO data and any industry data which may become available.

As part of the validation plan, testing will be conducted and results analyzed to confirm OATIS accuracy terms currently applied are conservative. The goal is to provide sufficient technical justification to validate previously performed OATIS differential pressure tests. The plan is based on instrumenting MOVs simultaneously with OATIS and VOTES during both static and dynamic tests during the 1994 RFOs.



