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SUBJECT: Forwards response to RAI re GL 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated."

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May 24,1999

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

Subject: Oconee Nuclear Station Units 1, 2, & 3
Docket Nos. 50 -269, 270, 287
TAC Nos. M97075, M97076, and M97077
Response to Request for Additional Information
Concerning Generic letter 96-05: Periodic
Verification of Design-Basis Capability of
Safety-Related Motor-Operated Valves

On February 16,1999, the NRC issued a Request for Additional Information (RAI) for Oconee Nuclear Station Units 1, 2 and 3 regarding their MOV Periodic Verification Program.

Oconee's response to the requested information is provided in Attachment 1. There were no new commitments made per this submittal.

I declare under penalty of perjury that these statements are true and correct to the best of my knowledge.

If you have questions or need additional information, please contact Allison Jones-Young at (704) 382-3154.

Very truly yours,

M.S. Tuckman

M.S. Tuckman

Attachment 1 - Oconee Response to RAI

A073

xc:
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Regional Administrator, Region II

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ATTACHMENT 1

OCONEE NUCLEAR STATION's RESPONSE TO THE RAI FOR GENERIC LETTER 96-05

QUESTION #1

In NRC Inspection Report No. 50-269, 50-270, & 50-287/95-25, the NRC staff closed its review of the motor-operated valve (MOV) program implemented at Oconee Nuclear Station, Units 1, 2, and 3 (Oconee) in response to Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." In the inspection report, the staff discussed certain aspects of the licensee's MOV program to be addressed over the long term. For example, the inspectors noted that (1) Duke Energy Corporation (DEC) had committed to improve the margins for eleven Unit 2 and Unit 3 valves by the end of 1996; (2) DEC would be expected to review applicable information following completion of the staff's evaluation of the Electric Power Research Institute (EPRI) MOV Performance Prediction Methodology (PPM) and to take appropriate action, as necessary; and (3) the PPM model needed to be validated for Powell gate valves with inverted-guides and Crane gate valves with non-stellite seating material. In addition, NRC Inspection Report No. 50-269, 50-270, & 50-287/97-05 (dated July 18, 1997) noted that the licensee planned to (1) replace or dynamically test butterfly valve 1CC-7; and (2) conduct a prototype flow test to justify the assumed valve factor applied to Velan gate valve 2FDW-104. DEC is requested to provide a summary status of the actions taken to address the specific long-term aspects of the MOV program at Oconee noted in the two NRC inspection reports.

Response:

(1) The margins for these eleven valves were addressed and satisfactorily closed in NRC Integrated Inspection Report 50-269, 50-270, & 50-287/97-05 dated July 18, 1997.

(2) ONS has reviewed the NRC's Safety Evaluation (SE) of the EPRI MOV Performance Prediction Methodology (PPM). In addition, ONS has reviewed the PPM Error notices (5), the PPM Information Notices (5), and the final Westinghouse gate valve methodology report (TR-103233). ONS personnel have also participated in the EPRI PPM Training Class (at MPR Associates) that emphasized the SE and Notices.

To further address this issue, ONS contracted MPR to review all PPM evaluations (in report MPR-1622) with respect to the SE, SE Supplement, the PPM Notices, and the final Westinghouse gate valve methodology. The review, effect on MPR-1622, and actions taken are documented in Oconee's Corrective Action Program.

(3a) Regarding the Powell gate valves with inverted guide arrangements, NRC Inspection Report No. 50-269, 50-270, & 50-287/95-25 states that the inspectors considered the determination of the thrust requirements for these valves to be adequate. However, the inspectors did note that Oconee should "as part of the Periodic Verification Program, confirm the assumptions regarding these valves."

ONS and another utility are working with MPR Associates to validate the PPM's use on Powell gate valves with inverted guide arrangements using test data from the JOG Program.

In addition, Oconee's Periodic Verification Program includes dynamically testing three Powell MOVs with the inverted guide design(1LP16, 2LP15, 3LP16). Two of these MOVs have already been dynamically tested and have exhibited relatively low required thrusts (valve factors <0.4).

(3b) Regarding the Crane gate valves with non-stellite seating material, ONS has dynamically tested one of these valves, 1MS-84. MPR ran the PPM on this valve modeling the in-situ test conditions. ONS calculated a valve factor from the PPM results and compared it with the in-situ test data. The PPM analysis resulted in a larger closing valve factor than the actual in-situ test. This was true even for the lowest disk to seat friction coefficient used in the PPM analysis. The results of the PPM bound the actual in-situ test results with respect to closing required thrust. Therefore, the use of the PPM results for 1MS-84 are conservative with respect to actual in-situ DP testing.

All of the Crane gate valves with non-stellite seating material (1,2,3 MS-17, 24, 26, 33, 35, 36, 76, 79, 82, & 84) had EPRI MOV PPM runs performed with the same approach taken on seating material. Based on the comparison of actual in-situ test data and PPM results for 1MS-84, the same conclusion can be drawn for the entire group. The PPM

results are considered valid and bounding for both opening and closing strokes. This evaluation is documented in an Oconee Calculation.

From NRC Inspection Report 50-269, 50-270, & 50-287/97-05:

(1) Butterfly valve 1CC-7 was replaced by a modification during RFO 1EOC17.

(2) A prototype flow test was performed on a 4" Velan Gate Valve to justify the assumed valve factor applied to 2FDW-104 as documented in Oconee's Corrective Action Program.

Question #2

In a letter dated May 13, 1998, DEC updated its commitment to implement the Joint Owners Group (JOG) Program on MOV Periodic Verification in response to GL 96-05. The JOG program specifies that the methodology and discrimination criteria for ranking MOVs according to their safety significance are the responsibility of each participating licensee. In a previous letter dated March 18, 1997, DEC stated that the ranking of MOVs at Oconee would be based on the Westinghouse Owners Group (WOG) Engineering Report V-EC-1658-A (Revision 0) and/or the Boiling Water Reactor Owners' Group (BWROG) methodology as described in BWROG Topical Report NEDC 32264, "Application of Probabilistic Safety Assessment of Generic Letter 89-10 Implementation." Since the Oconee units are pressurized water reactors (PWRs) designed by Babcock & Wilcox (B&W), DEC is requested to describe the application of the WOG or BWROG methodology to Oconee, including (1) the preparation of a sample list of high-risk MOVs from other B&W nuclear plants, and (2) consideration of the conditions and limitations discussed in the NRC safety evaluation dated April 14, 1998, on the WOG methodology, or the NRC safety evaluation dated February 27, 1996, on the BWROG methodology.

Response:

Oconee's MOV risk categorization will be consistent with the approach described in Westinghouse Report V-EC-1658 rev. 2 (Risk Ranking Approach for Motor-Operated Valves in Response to Generic Letter 96-05).

(1) ONS recognizes the value of a "sample list" as input to the Expert Panel review. To this end, a sample list of high-risk MOVs from two other B&W nuclear plants has recently

been compiled. Though somewhat limited, it represents 5 of the 7 U.S. B&W Units(when combined with Oconee's 3 Units). To supplement the "sample list", Oconee's Expert Panel will make an effort to compare the risk-significance of ONS MOVs with the list provided in the WOG Report. This is believed to be technically viable because Duke Power has System Engineers familiar with both Westinghouse and B&W designs.

(2) Oconee will comply with the conditions and limitations described in the NRC safety evaluation dated April 14, 1998, on the WOG Risk Ranking Methodology (V-EC-1658).

Question #3

DEC is requested to briefly describe its plans for the use of test data from the motor control center (MCC) including (1) correlation of new MCC test data to existing direct force measurements; (2) interpretation of changes in MCC test data to changes in MOV thrust and torque performance; (3) consideration of system accuracies and sensitivities to MOV degradation for both output and operating performance requirements; and (4) validation of MOV operability using MCC testing.

Response:

Rising-Stem Applications

Currently, Periodic Verification Tests are conducted and evaluated based on direct thrust and/or torque measurement. Motor control center (MCC) data is taken in parallel with direct measurements because it has proven to be an effective MOV diagnostic tool. Collecting MCC data is not a requirement of Oconee's Periodic Verification Program.

Oconee is considering using MCC data(alone) for Periodic Verification tests on certain high margin MOVs where static loads are representative of design basis loads. In these cases, a qualitative review of the MCC data would include a comparison to baseline data where direct thrust and MCC data were taken in parallel.

Quarter-turn (if valve torque is not directly measured)

For most quarter-turn MOVs, Actuator capability is determined by using Oconee's torque Benches (Kalsi Engineering's Operator Test Bench). Bench tests measure actuator output torque and motor data. Bench tests include capability verification at degraded

voltage. MCC test data is used to supplement these Periodic Verification Tests. Valve packing loads and seating loads are qualitatively reviewed using motor power data. This approach has proven to be an effective method for identifying valve and actuator problems including degradation.

Oconee is using MCC data(alone) for Periodic Verification tests on certain high margin (>25% margin) butterfly valves where static loads are representative of design basis loads. In these cases, a qualitative review of the MCC data includes a comparison to baseline data.

Question #4

The JOG program focuses on the potential age-related increase in the thrust or torque required to operate valves under their design-basis conditions. In the NRC safety evaluation dated October 30, 1997, on the JOG program, the NRC staff specified that licensees are responsible for addressing the thrust or torque delivered by the MOV motor actuator and its potential degradation. The licensee should describe the plan at Oconee for ensuring adequate ac and dc MOV motor actuator output capability, including consideration of recent guidance in Limitorque Technical Update 98-01 and its Supplement 1.

Response:

Potential actuator degradation will be addressed by:

(1) Preventive maintenance activities - including actuator re-lube, gearbox grease inspection, and exercising every refueling outage;
(2) Performing periodic instrumented static tests and detailed evaluation (as committed to in GL96-05 responses). "As found" and "as left" data will be evaluated;
(3) Performing periodic dynamic tests as prescribed by the JOG Program. These tests, along with others, will be evaluated to determine if load sensitive behavior (ROL) is changing over time;
(4) Trending MOV performance and failures and utilizing Duke Power's Operating Experience Program.
(5) Bench testing actuators (AC) as needed to verify output capability (using Kalsi Engineering's Operator Test Bench);
(6) Using MCC test data as a trending and diagnostic tool (when applicable and/or available);
(7) Participating in industry initiatives such as the JOG Programs, Westinghouse Owner's Group, Babcock & Wilcox

Owner's Group, Motor-operated Valve Users Group, EPRI, etc. Feedback from these groups will be used in Oconee's MOV Program.

AC Motor Actuator Capability

Oconee has implemented the guidance provided in Limitorque Update 98-01 and Supplement 1. Specifically, gearbox pull-out efficiency and an application factor of 0.9 are used when calculating actuator capability. Oconee also makes use of the ComEd AC Motor Test Program and its own actuator test data to address other issues raised in the Update such as;

(1) Actuator capability at voltages less than 70% of nominal motor voltage.
(2) Actuators with a 25 ft-lb, 3600 rpm motor in a 56 frame
(3) Actuators with a 60 ft-lb, 1800 rpm motor in a 56 frame

Oconee has bench tested and evaluated 24 Limitorque actuators at degraded voltage to reconcile the above issues. The evaluation is documented in a Duke Power Calculation.

DC Motor Actuator Capability

Currently, Oconee has nine DC MOVs in the GL 96-05 Program. All nine of these valves' normal operation is equivalent to design basis conditions (eight of which have negligible flow and differential pressure, the remaining MOV has considerable functional margin).

DC motor capability is calculated using current Limitorque guidance with pull-out gearbox efficiency. Oconee is aware of ongoing industry research in the area of DC Motor capability and expects to implement the methodology being developed by the BWR Owners Group (tentatively available in late 1999 or early 2000).