UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM RELIEF REQUEST 1.4.2

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION

By letters dated May 15, 1996, and March 30, 1997, Duke Power Company (the licensee) submitted revised Relief Request 1.4.2 in response to NRC concerns related to Inservice Testing (IST) of the Diesel Generator Fuel Oil System (FD) pumps. The concerns related to these pumps were identified NRC's safety evaluations dated May 22, 1995, and October 21, 1994. The relief request applies to FD pumps 1FDPU0054 and 1FDPU0055 in McGuire Unit 1, and pumps 2FDPU0054 and 2FDPU0055 in Unit 2. The revisions to the IST program were also discussed with the licensee's staff in a teleconference on January 16, 1997.

The regulatory requirements for an IST program are given in Title 10 of the Code of Federal Regulations (10 CFR), Section 50.55a, which incorporates by reference the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code). Section 50.55a requires that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME Code and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to Sections (a)(3)(i), (a)(3)(ii), or (f)(6)(i). In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives or to grant relief from ASME Code requirements upon making the necessary findings. Guidance related to the development and implementation of IST programs is given in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," issued April 3, 1989, and its supplement issued April 4, 1995. Further guidance is provided in NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

The second 10-year IST interval for the McGuire IST programs began March 1, 1994, and ends February 29, 2004. Section 50.55a requires that the McGuire IST programs comply with the 1989 Edition of Section XI, which, by reference, incorporates Part 6, "Inservice Testing of Pumps in Light-Water Reactor Power Plants," and Part 10, "Inservice Testing of Valves in Light-Water Reactor Power Plants," of ASME Operations and Maintenance Standard OMa-1988.

2.0 BACKGROND

The portion of the originally submitted Relief Request 1.4.2, which related to the alternative method of measuring pump flowrate by monitoring the rate of change of diesel fuel level in the storage tank, was authorized pursuant to 10 CFR 50.55a(a)(3)(i) in the October 21, 1994, Safety Evaluation. The portion of the request related to alternative testing of pump vibration and discharge pressure was authorized pursuant to 10 CFR 50.55a(a)(3)(i) for an interim period of 1 year from the date of the May 22, 1995, Safety Evaluation while the licensee investigated other options.

Since the May 22, 1995, evaluation, the calibration standards used by the licensee have been upgraded such that the instrument accuracy of the vibration measurement tools meet the Code-required +/- 5% accuracy. Therefore, the portion of the relief request related to vibration measurement accuracy is no longer needed.

Section OMa-1988, Part 6, paragraph 5.2(d) of the ASME Code requires inservice testing of pump discharge pressures and comparing them to reference values. The licensee stated in the March 30, 1997, submittal that this requirement is not meaningful in this case because the FD pumps are positive displacement pumps that discharge into a nonpressurized tank. The pressure developed at the discharge of the pump is due only to system resistance. The capacity of positive diplacement pumps is independent of the discharge pressure in the design operating range when the pumps are operating as specified. Downstream of the pump is a backpressure control valve that is set at a minimum of 10 psig. This setting ensures that the valve will close to prevent gravity feed from the main storage tank to the day tank. This setting, rather than pump performance, determines the discharge pressure.

Section OMa-1988, Part 6, paragraph 4.6.5 of the ASME Code requires the measurement of pump flowrate and its documentation, so that it may be trended to provide an indication of possible pump degradation. In the revised Relief Request 1.4.2, the licensee proposes to perform alternative inservice testing of pump flowrate and discharge pressure under the Supplemental Test Program. The licensee explains this testing as follows.

The alternate testing will be performed under the Supplemental Test Program (Appendix B Program). The FD pumps will be tested pursuant to NUREG-1482, Section 3.4.

1. Flowrate from the pump will be calculated by measuring the level rise in the day tank over time and converting the results to a flow in gallons per minute. Since the stopwatch and level measurement device used for this test will meet the calibration requirements of the Code, the overall requirements of +/- 2% will be met. At a 6-month frequency, FD pump performance will be monitored to ensure that the flow does not decrease to less than 200% of flow required (approximately 12.5 gpm). This test will be done during diesel operation.

2. Pump discharge pressure will be monitored during the pump run, and recorded in the record of test. The reading obtained will be verified to be greater than 10 psig to meet the requirements described above (in the licensee's submittal); however, discharge pressure will not be compared to an acceptance criteria developed from OMa-1988, Table 3b. Flowrate measurements and vibrations will be recorded.

Following the teleconference with the NRC staff on January 16, 1997, the licensee deleted the proposal in its May 15, 1996, letter on IST concerns to remove the FD pumps from the McGuire IST program. In the licensee's letter dated March 30, 1997, which provides the latest revision of Relief Request 1.4.2, the FD pumps are retained in the IST Program pump tables.

3.0 EVALUATION

As previously discussed in Section 2.0, most of the issues in the originally submitted Relief Request 1.4.2 have been resolved. The issues remaining to be evaluated are the retention of the FD pumps in the IST Program and the adequacy of the proposed Supplemental Test Program in meeting the ASME Code requirements for inservice testing of the FD pump flowrate and discharge pressure during pump operation.

The licensee lists the FD pumps as ASME Code Class 3 in the relief request. Section 50.55a requires inservice testing for Class 3 reactor components. Therefore, the continued listing of the FD pumps in the IST Program, as specified in the licensee's letter of March 30, 1997, meets the regulations and is acceptable.

The method for measuring flowrate in the Supplemental Test Program, i.e., measuring the rate of change of level in the fuel oil day tank, is the same method that was authorized pursuant to 10 CFR 50.55a(a)(3)(i) in the October 21, 1994, Safety Evaluation, as previously discussed in Section 2.0. Therefore, this method of measuring flowrate is acceptable.

In its March 30, 1997, letter, the licensee repeated its arguments that the measurement of pump discharge pressure is meaningless for a positive displacement pump which discharges into a nonpressurized tank. In the case of the FD pumps, the discharge pressure is controlled by the 10 psig setting of the backpressure control valve. As previously stated in Section 2.0, the Supplemental Test Program provides for the monitoring and recording of pump discharge pressures during the pump run. The pressure readings will be verified to be greater than the backpressure setting of 10 psig. Flowrate and vibration measurements will be recorded to provide an indication of pump performance.

In the May 22, 1995, Safety Evaluation, the staff authorized this alternative inservice testing for an interim period of 1 year to provide time for the licensee to investigate other possible options for meeting the ASME Code requirement for comparison of pump discharge pressures to an acceptance criterion. However, because of the difficulty in defining a meaningful criterion in this case, the licensee's investigation did not produce a satisfactory option. Therefore, the licensee requested relief from the requirement in OMa-1988, Part 6, Table 3b, to compare the pressure readings to a pressure acceptance criterion.

The requirement in the Supplemental Test Program to verify that the pump discharge pressure is greater than 10 psig provides at least the lower limit of an accepable pressure range. Because the fuel oil discharges from the backpressure valve into a nonpressurized tank, the pressure will not rise appreciably above the backpressure valve setting. Therefore, the acceptable pressure range is a small range just above 10 psig. The recorded pressure readings are compared to the 10 psig value, thus, essentially meeting the ASME Code requirement to compare the pressure readings to an acceptance criterion. Therefore, the provisions of the Supplemental Test Program with respect to the FD pump discharge pressure are acceptable.

4.0 CONCLUSION

As previously noted, all portions of Relief Request 1.4.2 have either been authorized in previous safety evaluations or found to be acceptable in the Supplemental Test Program. Therefore, the requested alternative to use the provisions of the Supplemental Test Program for inservice testing is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

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