December 5, 2000

Mr. Robert P. Powers, Senior Vice President
Indiana Michigan Power Company
Nuclear Generation Group
500 Circle Drive
Buchanan, MI 49107

SUBJECT: DONALD C. COOK NUCLEAR POWER PLANT, UNIT 1 - SAFETY EVALUATION FOR PROPOSED ALTERNATIVE IN ACCORDANCE WITH 10 CFR 50.55a(a)(3)(ii) FOR AUTOMATIC VALVES IN THE TURBINE-DRIVEN AUXILIARY FEEDWATER PUMP FLOW PATHS (TAC NO. MB0692)

Dear Mr. Powers:

By letter dated December 1, 2000, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Unit 1, requested the Nuclear Regulatory Commission (NRC) approval of an alternative to the inservice testing (IST) requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code*, which references the 1987 *Operation and Maintenance Standard,* OM-10, paragraph 3.4, "Effect of Valve or Actuator Replacement, Repair, and Maintenance on Reference Values" for the automatic valves in the turbine-driven auxiliary feedwater (TDAFW) pump flow paths pursuant to the provisions of 10 CFR 50.55a(a)(3)(ii). Instead of testing the turbine-driven auxiliary feedwater pump discharge valves prior to returning them to service following maintenance, the licensee proposes a one-time alternative to delay the IST until operating conditions support testing.

The NRC staff has reviewed the licensee's request and concluded that complying with ASME OM-10, paragraph 3.4 would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The NRC staff concluded that the alternative proposal provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the NRC authorizes the licensee's proposed alternative IST testing requirements of ASME OM-10, paragraph 3.4 for the automatic valves in the TDAFW pump flow paths. The proposed alternative IST testing is authorized until such time that operating conditions support steady state testing of the valves.

Further details regarding the staff's evaluation and conclusions are enclosed. This memorandum completes the NRC staff's effort for this relief request (TAC No. MB0692).

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and the enclosures will be available for public inspection at the NRC's Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records are accessible electronically from the ADAMS Public Library component on the NRC Web site http://www.nrc.gov (the Electronic Reading Room).

If you have any questions regarding this matter, please contact me at 301-415-1389.

Sincerely,

/RA by Beth A. Wetzel for/

Claudia M. Craig, Section Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-315

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM

INDIANA MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-315

1.0 INTRODUCTION

The *Code of Federal Regulations*, 10 CFR 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (the 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 paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. 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 and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME code requirements upon making the necessary findings. The Nuclear Regulatory Commission (NRC) guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

In a letter dated December 1, 2000, Indiana Michigan Power Company (I&M), licensee for the Donald C. Cook Nuclear Plant (CNP) Unit 1, submitted a one-time alternative to the IST requirements of the *Operation and Maintenance Standard*, OM-10 paragraph 3.4. Instead of testing the turbine-driven auxiliary feedwater pump discharge valves prior to returning them to service following maintenance, the licensee proposes a one-time alternative to delay the IST until operating conditions support testing.

2.0 RELIEF REQUEST

2.1 Licensee's Basis for Requesting Relief

The licensee states:

> The code of reference for the CNP pump and valve testing program is the ASME Boiler and Pressure Vessel Code, Section XI, 1989, which endorses the 1987 ASME/ANSI OM

ENCLOSURE

(Part 10), 1987 and 1988a addenda. The specific test requirement reference is OM-10, Paragraph 3.4 "Effects of Valve or Actuator Replacement, Repair, and Maintenance on Reference Values." This paragraph states, in part:

> When a valve or its control system has been replaced, repaired, or has undergone maintenance that could affect the valve's performance, a new reference value shall be determined or the previous value reconfirmed by an inservice test run prior to the time it is returned to service or immediately if not removed from service, to demonstrate that performance parameters which could be affected by the replacement, repair, or maintenance are within acceptable limits.

I&M has made a change to the required initial position of the turbine-driven auxillary feedwater (TDAFW) pump discharge control valves to the steam generators (SGs). The change is from the fully open position to a throttled position. It is appropriate to demonstrate the flow capability of the valves when the valves are in the throttled position, although this demonstration is not specifically related to a required reference value that will be used as a measure of component degradation. The TDAFW pump discharge control valves are ASME Section III, Code Class 3, Category B valves. The valves are normally throttled, motor-operated globe valves and have a safety function in the closed position to provide SG level control and isolation capability. Upon identification of a faulted or ruptured SG loop, the operator must have the capability to remotely close the associated auxiliary feedwater valve to conserve auxiliary feedwater inventory or control SG fill. The valves have an open (throttled) safety function to provide a supply flow path for auxiliary feedwater to the SGs when the main feedwater system is unavailable and during a loss of offsite power, following a feedwater or steam line break and following a loss-of-coolant accident. The throttled initial position of these valves also assists in ensuring that a SG tube rupture does not result in overfilling of the affected SG.

Basis that Compliance with Code Requirements Represents a Hardship

Compliance with the Code requirement would involve performance of an inservice test when the reactor coolant system (RCS) temperature has exceeded 350 ^{o}F, but prior to reactor operation. A hardship results because extensive temporary modifications would be necessary to minimize the transient effect of the testing on the RCS if testing were performed when the reactor is not in operation. The transient occurs for the reasons described below.

The valves subject to the required testing are located in the flowpath from the TDAFW pump to each of the four SGs. Performance of the Code testing requires operation of the TDAFW pump to add water from the condensate storage tank (CST), through the throttled valves, to the SGs. These valves are downstream of the full flow test line returning to the CST so this flow path is not available for the required test. The motive power for the TDAFW pump is steam produced in two of the four SGs. When the reactor is not in operation, RCS temperature can be maintained above 350 ^{o}F by a combination of heat input from reactor coolant pump (RCP) work and decay heat from previous reactor operation. The decay heat rate is negligible because the reactor has not been operated for over three years. The amount of heat generated by the RCPs is

insufficient to generate the steam necessary to permit sustained operation of the TDAFW pump. This is because the steam demand and addition of cold CST water to the SGs would create an unacceptable decrease in RCS temperature or SG pressure. The decrease in RCS temperature or SG pressure would be unacceptable because the safety injection (SI) system, which is required to be operable when RCS temperature is above 350 ^{o}F, could actuate and further challenge control of RCS temperature and pressure.

The modifications necessary to avoid the transient caused by test performance prior to returning the valves to service and without reactor operation would entail provisions for a temporary alternate steam supply to the TDAFW pump and an alternate flow path downstream of the throttle valves and back to the CST. Installation of these temporary modifications would result in a significant hardship.

Basis that Alternative Testing Yields Acceptable Levels of Quality and Safety

The proposed alternative to the required testing yields acceptable levels of quality and safety because:

- That the valves can be placed in the correct throttled position as result of:

  (1) previous experience and testing of valve settings necessary to preclude pump run-out,

  (2) calculations to establish the correct throttled position to prevent overfill, and

  (3) component tests performed during design change implementation;

- an approximate, but reasonable, indication of proper flow will be obtained from other required Code testing performed above an RCS temperature of 350 ^{o}F and prior to reactor operation;

- the quality of the proposed alternative test is improved compared to the required test because reactor power can maintain stable conditions during the test; and

- the proposed alternative test is no different than the Code required test in that it is performed at a single test point.

The change to the valve positions was conducted under I&M's design change process. This process is subject to the quality requirements of 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," Criterion III, "Design Control." Criterion III requires design control measures for verifying or checking the adequacy of design such as performance of design reviews by the use of alternate or simplified calculational methods or performance of suitable testing. The quality requirements of Criterion III have been met for the change to the valve positions by performance of design reviews. Therefore, the required testing and the proposed alterative testing are confirmatory in nature as they relate to the design change process quality requirements. Component level testing performed during the design change

process ensures that proper indication of the correct throttled position is established and that the indicated valve position corresponds to both the required calculated position and the actual valve position. I&M concludes that there is reasonable assurance that the valves will perform their safety function in the revised throttled position without reliance on testing.

Other required Code testing involves forward flow verification of check valves in the same flow paths as the throttled valves. The check valve testing will be performed prior to reactor operation and also involves operation of the TDAFW pump and injection of cold water to the SGs. This test also results in a plant transient, but the impact is lessened due to the short duration of the test. Consequently, an acceptable margin to a SI actuation can be maintained. During this test, flow rates through the throttled valves will be observed to provide an indication that the throttled valves are properly set. The check valve flow test will specify a range of acceptable values. Engineering will review the test results prior to reactor operation.

The quality level of the proposed alternative testing is expected to exceed that achievable by the Code required testing. The improvement in quality is derived from the steady state test conditions that can be maintained using the reactor instead of RCP pump work to supply the steam required for TDAFW pump operation. This results in a more controlled test with better test data because recording of the data during decreasing RCS temperature and SG pressures would introduce errors due to instrument response time.

The proposed alternative test and the Code required test are satisfied by testing at a single point, i.e., testing over a full range of conditions, is not required in either instance. This is true because testing at a single point is sufficient to demonstrate that the valve flow coefficients used for the design work are consistent with the flow observed during the test. This is analogous to ASME pump testing at a single point, which is sufficient to demonstrate that the pump is “on-the-curve.”

In summary, based on the actions described above, the proposed alternative testing provides an acceptable level of quality and safety.

2.2 Proposed Alternative

The licensee proposes:

I&M’s proposed alternative is to perform the testing after the valves are returned to service when reactor operation can supply the necessary steam to the TDAFW pump and the impact of the cold water addition to the SGs is negligible.

2.3 Evaluation

The TDAFW pump discharge control valves are Code Class 3, Category B valves which are normally throttled, motor-operated globe valves. The valves have a safety function in the closed position to provide steam generator level control and isolation capability. The valves have an open safety function to provide a supply flow path for auxiliary feedwater to the steam generators when the main feedwater system is unavailable.

The licensee modified these valves to change the required initial position from fully open to throttled. The Code, OM-10 paragraph 3.4, states that when a valve or its control system has undergone maintenance that could affect the valve's performance, a new reference value shall be determined, or the previous value reconfirmed, by an IST run prior to the time it is returned to service. The purpose of this test is to demonstrate that performance parameters which could be affected by the replacement, repair, or maintenance are within acceptable limits.

The licensee is currently in the process of starting up the plant from an extended shutdown and, in accordance with the Code, must demonstrate that the TDAFW pump performance parameters are within acceptable limits. Instead of performing an IST prior to returning these valves to service, the licensee proposes an alternative to perform the testing after the RCS is in a condition to allow testing to be performed at steady state. At this time, the licensee states that reactor operation can supply the necessary steam to the TDAFW pump and the impact of the cold water addition to the steam generators is negligible.

Prior to reactor operation, other Code-required testing will be performed on check valves in the same flow path at the throttle valves. Although the check valve testing does not provide positive indication that the throttle valves are in the correct position, it does provide reasonable assurance of proper flow through all valves in the flow path. This provides reasonable assurance of operational readiness until the time at which the throttle valve IST can be performed.

In its submittal, the licensee describes the hardship of performing the IST prior to returning these valves to service. Performance of the test requires operation of the TDAFW pumps to add cold water from the CST, through the throttle valves, to the SGs. The steam to drive the TDAFW pump is produced in the SGs. When the reactor is not in operation, removing steam to drive the TDAFW pump, as well as the addition of cold water to the SGs, can create an unacceptable decrease in RCS temperature and SG pressure. This decrease is unacceptable because it may actuate the SI system which would further challenge control of the RCS temperature and pressure. Extensive temporary modifications would be necessary to minimize the transient effect on the RCS if this testing were performed when the reactor is not in operation. Therefore, compliance with the Code requirements would result in hardship without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

The licensee's proposed one-time alternative to the requirements of OM-10 paragraph 3.4 for testing of the TDAFW pump discharge control valves after maintenance is authorized pursuant to 10 CFR 50.55a(a)(3)(ii). Compliance with the Code requirements results in hardship without a compensating increase in the level of quality and safety. This one-time alternative is authorized until such time that operating conditions support steady state testing of the valves.

Principal Contributor: M. Kotzalas

Date: December 5, 2000

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