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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO PROPOSED INSERVICE TESTING LEAKAGE TEST FOR CONTAINMENT ISOLATION VALVES FOR DUQUESNE LIGHT COMPANY OHIO EDISON COMPANY PENNSYLVANIA POWER COMPANY THE CLEVELAND ELECTRIC ILLUMINATING COMPANY THE TOLEDO EDISON COMPANY BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 DOCKET NOS. 50-334 AND 50-412

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 Sections (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. Additionally, paragraph (f)(4)(iv) of Section 50.55a provides that IST of pumps and valves may meet the requirements set forth in subsequent editions and addenda of the Code that are incorporated by reference in paragraph (b) of Section 50.55a, subject to the limitations and modifications listed therein, and subject to Commission approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met. 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 1 issued April 4, 1995. Also see NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

The 1989 Edition of the ASME Code is the latest edition incorporated by reference in paragraph (b) of Section 50.55a. Subsection IWV, which gives the requirements for IST of valves, references Part 10 of the American National Standards Institute/ASME *Operations and Maintenance Standards* (OM-10) as the rules for IST. OM-10 replaces specific requirements in previous editions of Section XI, Subsection IWV, of the ASME Code.

2.0 BACKGROUND

The NRC published a final rule change to 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," in the *Federal Register* on September 26, 1995 (60 *FR* 49495). The final rule became effective October 26, 1995. The revised regulations provide a performance-based option for leakage-rate testing of containments ("Option B"). Licensees may voluntarily adopt the option in lieu of compliance with the prescriptive requirements in the regulation ("Option A"). The NRC issued the change as part of an effort to improve the focus of regulations by eliminating prescriptive requirements that are marginal to safety. The final rule allows leakage test intervals to be based on system component performance. Thus, licensees have greater flexibility for cost-effective implementation methods in satisfying regulatory safety objectives.

The NRC issued License Amendment Nos. 197 and 80 for the Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1 and BVPS-2), respectively, on March 19, 1996. The amendments allow Duquesne Light Company (DLC or the licensee) to implement Option B of Appendix J and to establish a performance-based leakage-rate test interval for the containment isolation valves subject to leakage testing.

3.0 REQUEST RELATED TO IST LEAKAGE TEST FOR CONTAINMENT ISOLATION VALVES

By letter dated March 28, 1996, DLC requested an alternative to the valve leakage testing requirements of the 1983 Edition, with addenda through Summer 1983 Addenda, of the ASME Code. The alternative applies to the IST program for BVPS-1 and BVPS-2 and would allow DLC to use a later edition of the ASME Code for leakage testing containment isolation valves. Effectively, it would allow DLC to implement Option B as now allowed by the technical specifications. In the alternative request, DLC proposes to use the requirements of OM-10 related to leakage testing of containment isolation valves. DLC makes the request pursuant to the provisions of paragraph (f)(4)(iv) of Section 50.55a for the use of portions of later editions of the ASME Code. DLC proposes to meet all related requirements.

3.1 Discussion

The 1983 Edition, with addenda through the Summer 1983 Addenda, of Section XI of the ASME Code, includes requirements for valve leak rate testing in paragraph IWV-3420. These rules are applicable to all Category A valves (i.e., valves for which seat leakage is limited to a specific maximum amount

in the closed position for fulfillment of their function). Position 10 of GL 89-04 indicated that all containment isolation valves included in the Appendix J program should be included in the IST program as Category A valves (or Category A/C for check valves that have a leaktight function for containment isolation). In Position 10, the NRC said that the valve leakage-rate testing requirements of Appendix J were considered equivalent to the requirements of IWV-3421 through IWV-3425, but that licensees must comply with the analysis of leakage rates and corrective action requirements of IWV-3426 and IWV-3427(a).

The requirements of IWV-3421 through IWV-3425 apply to the scope, frequency, differential test pressure, seat leakage measurement, and test medium. Paragraph IWV-3422 requires a frequency of at least once every 2 years. The leakage-rate testing of valves in Appendix J at the time GL 89-04 was issued (and the current Option A of Appendix J) requires tests shall be performed during each reactor shutdown for refueling but in no case at intervals greater than 2 years. The performance-based interval in the new Option B of Appendix J cannot be considered equivalent to the frequency required by IWV-3422.

Paragraph 4.2.2.1 of OM-10 specifies the scope of valve seat leakage-rate tests as follows:

> Category A valves shall be leakage tested, except that valves which function in the course of plant operation in a manner that demonstrates functionally adequate seat leak-tightness need not be additionally leakage tested. In such cases, the valve record shall provide the bases for the conclusion that operational observations constitute satisfactory demonstration.

Paragraph 4.2.2.2 of OM-10 specifies the requirements for containment isolation valves as follows:

> Category A valves, which are containment isolation valves, shall be tested in accordance with Federal Regulation 10 CFR 50, Appendix J. Containment isolation valves which also provide a reactor coolant system pressure isolation function shall additionally be tested in accordance with para. 4.2.2.3.

Paragraph 4.2.2.3 of OM-10 gives the requirements for leakage-rate testing for valves other than containment isolation valves, including frequency, differential test pressure, test medium, analysis of leakage rates, and corrective action. The frequency requirements for containment isolation valves would be specified by Appendix J. Paragraph (b)(2)(vii) of Section 50.55a modified the requirements of OM-10 for IST of containment isolation valves. Specifically, paragraph (b)(2)(vii) requires that, when

using OM-10 for IST, leakage rates for Category A containment isolation valves that do not provide a reactor coolant system pressure isolation function must be analyzed in accordance with paragraph 4.2.2.3(e) of OM-10 and corrective actions for these valves must be made in accordance with paragraph 4.2.2.3(f) of OM-10. The regulations take no other exceptions to the provisions of OM-10. Therefore, conducting IST in accordance with OM-10 does not preclude the use of Option B of Appendix J for establishing a performance-based leakage monitoring schedule for leak testing containment isolation valves.

Containment isolation valves that have another leaktight safety function (e.g., pressure isolation valves, or train separation where flow diversion could be a critical parameter) may also be subject to paragraph 4.2.2.3 provisions for testing the second function. This additional function is not deferred to Appendix J requirements by paragraph 4.2.2.2 of OM-10. Tests for verification of a check valve's capability to close are required as part of an IST program. Tests to exercise check valves are often deferred from quarterly to cold shutdowns or refueling outages because of impractical conditions. Many licensees use the local leak-rate test performed to meet the requirements of Appendix J to verify that a check valve is capable of closing, as discussed in Section 4.1.4 of NUREG-1482. Closure verification does not require the rigor of a local leak-rate test. Where the test is currently used to verify closure during each refueling outage, a licensee may determine that a less rigorous leak-rate test is capable of verifying that a check valve is capable of closing, or may determine another means of exercising the valve. For BVPS-1 and BVPS-2, where closure of check valves is verified by the Appendix J leak test, and no other test method is currently available, testing must be performed each refueling outage. This is mentioned here because DLC did not request an extension for closure verification of check valves; therefore, the exercising requirements for such valves, if any, must continue to be met on a refueling outage schedule. The review herein relates only to the leakage rate test requirements.

3.2 Request for Use of Portions of OM-10

DLC currently uses the testing requirements of Appendix J in accordance with the guidance of Position 10 of GL 89-04 for containment isolation valve leakage-rate monitoring (reference Valve Relief Request 1 for each unit). The requirements of IWV-3426 and IWV-3427(a) for the analysis of leakage rates and corrective action are also imposed for the IST of these valves. A test frequency of at least once every 2 years (typically during refueling outages) is currently required for the valves that are "Type C" tested per Appendix J (i.e., tests intended to measure containment isolation valve leakage rates). The containment isolation valves installed as part of the personnel and emergency air locking systems are leak-rate tested in accordance with the "Type B" leakage testing requirements of Appendix J (i.e., tests intended to

detect local leaks and to measure leakage across each pressure-containing or leakage-limiting boundary for containment penetrations designed with seals or gaskets, air lock door seals, doors with seals or gaskets, and certain other components) at six-month intervals.

DLC proposes to use paragraphs 4.2.2.2, 4.2.2.3(e), and 4.2.2.3(f) of OM-10 for leakage testing of containment isolation valves at BVPS-1 and BVPS-2. DLC will conduct leakage-rate testing according to the provisions of Appendix J, including Option B as allowed by technical specifications and where applicable. DLC will implement the analysis of leakage rates and corrective action requirements imposed by the regulations for containment isolation valves. NRC approval of DLC's proposal will enable testing the air locks on BVPS-2, currently scheduled for completion by April 24, 1996, to be conducted during the sixth refueling outage scheduled for September 1996. NRC approval will also allow the use of Option B in the current ongoing refueling outage for BVPS-1 Type B and Type C testing. As part of the implementation of Option B of Appendix J, DLC will implement the guidance of Regulatory Guide 1.163, "Performance-Based Containment Leak Test Program," issued September 1995.

3.3 Evaluation

The 1989 Edition of the ASME Code was incorporated by reference in rulemaking effective September 8, 1992 (57 *FR* 34666). The NRC recommended that licensees update their IST program to the OM Standards referenced in the 1989 Edition of the Code (see NUREG-1482) as alternative requirements to those in earlier editions of the Code. Accordingly, several plants are conducting valve IST programs according to the provisions of OM-10, including plants that revised their program to meet the updating provisions of Section 50.55a (i.e., at each 120-month interval) and plants that voluntarily implemented the requirements pursuant to paragraph (f)(4)(iv) of Section 50.55a as recommended in NUREG-1482.

For plants using OM-10 for IST of valves, no conflict exists between Appendix J and OM-10 for leakage testing of containment isolation valves. For plants that have not yet updated to the requirements of OM-10, there is a conflict in the test frequency that would preclude the use of Option B of Appendix J if no alternative is available. In issuing the Appendix J rule change, the NRC did not intend to create a conflict for the plants continuing to use earlier editions of the Code.

Option B specifies that the periodic schedule for Type B and Type C testing be based on the safety significance and historical performance of each boundary and isolation valve to ensure the integrity of the overall containment system as a barrier to fission product release to reduce the risk from reactor

accidents. Performance criteria are given in the regulations. A similar scheduling scheme based on risk-assessment and performance-based criteria is under development for IST, but rules have not yet been promulgated in the IST regulations, Section 50.55a.

Because the requirements of Appendix J are acceptable for leakage-rate testing of containment isolation valves, and because DLC has already received a technical specification for implementing Option B, it would be inconsistent to preclude the licensee from applying the performance-based criteria to the valves by continuing to impose requirements in an earlier edition of the Code. The Appendix J rule change assessed safety concerns with the extended test intervals and determined that the extended intervals are acceptable. Therefore, the licensee may use the portions of OM-10 that relate to leakage testing of containment isolation valves to remove the inconsistence in the requirements. Those related portions of OM-10 are:

Paragraph Number	Title
4.2.2.2	Containment Isolation Valves
4.2.2.3(e)	Analysis of Leakage Rates
4.2.2.3(f)	Corrective Action

These paragraphs apply whether the licensee uses Option A (current rules) or Option B of Appendix J. The testing method, frequency, acceptance criteria, test medium, and leakage measurements must meet the requirements in Appendix J. The analysis of leakage rates and corrective action must meet the requirements of both Appendix J and OM-10, as applicable. There are no other related requirements in OM-10 applicable to the portions listed above. Approval of the proposal supersedes Valve Relief Request 1 for each unit.

3.4 Conclusion

DLC's proposal to use portions of the latest edition of the ASME Code incorporated by reference in paragraph (b) of Section 50.55a is acceptable for leakage-rate testing of containment isolation valves. All related requirements applicable to the testing are included in DLC's implementation of the portions of OM-10 as required by the regulations. Approval applies only to the leakage-rate testing for the containment isolation function of the applicable valves. Approval is pursuant to the provisions in 10 CFR 50.55a(f)(4)(iv) that allow that IST of pumps and valves may meet later editions and addenda incorporated by reference in paragraph (b) of Section 50.55a, subject to Commission approval, and provided that all related requirements are met.

Principal Contributor: P. Campbell

Date: April 19, 1996