UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE TESTING PROGRAM RELIEF REQUEST

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION, UNITS 1 AND 2

DOCKET NOS. 50-352 AND 50-353

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 inservice testing (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.

The Limerick Generating Station, Units 1 and 2, first 120-month IST Program was developed to the requirements of the 1986 Edition of Section XI of the ASME Code. The initial 120-month intervals began on the commercial operation date of each unit: Unit 1 - February 1, 1986, and Unit 2 - January 8, 1990.

By letter dated January 23, 1996, the NRC approved extension of the Unit 1 interval to coincide with the second 120-month interval for Unit 2 beginning in the year 2000. For IST, the tests would continue during the extended period at the same frequency required under the 1986 Edition 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* 186, p. 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 and component performance. Thus, licensees have greater flexibility for cost-effective implementation methods in satisfying regulatory safety objectives.

3.0 REVISION RELATED TO IST LEAKAGE TESTING OF VALVES

By letter dated July 25, 1996, Philadelphia Electric Company (PECO), licensee for the Limerick Generating Station, Units 1 and 2, submitted a revised relief request for the Limerick IST Program, GVRR-1, Revision 2. PECO requested NRC approval of an alternative to the valve leakage testing requirements of the 1986 Edition of the ASME Code (NOTE: Four other revised relief requests, related to extending the quarterly exercise test for certain check valves, were submitted in the July 25, 1996, letter but were later withdrawn by PECO's letter dated September 24, 1996). The alternative would allow PECO to use a later edition of the ASME Code for leakage testing of containment isolation valves. Approval of the request would also allow PECO to implement Option B of 10 CFR Part 50, Appendix J, once it has received any other necessary approvals (e.g., changes to technical specifications). In the revision to Relief Request GVRR-1, PECO proposes the following alternative testing:

> Containment isolation valves will be leak rate tested in accordance with the 10CFR50 Appendix J Option B Type C testing program. The frequency will be as defined in the Primary Containment Leakage Rate Testing Program. In addition, a maximum permissible leakage criterion will be established for each individual local leak rate test. If the local leak rate test leakage criterion is exceeded, corrective action will be taken to restore the leakage rate to within the acceptable value.

3.1 Discussion

The 1986 Edition 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 test 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 leakage rate testing 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. As to the four relief requests that were withdrawn by PECO's letter dated September 24, 1996, 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. If there are any cases where a local leakage rate test is currently used to verify closure during each refueling outage, PECO 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, and adjust the IST Program accordingly.

3.2 Use of Portions of OM-10

PECO 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. 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).

According to the provisions of 10 CFR 50.55a(f)(4)(iv), PECO may use OM-10, Section 4.2.2, "Valve Seat Leakage Rate Test," for IST leakage testing of containment isolation valves, provided all related requirements are also used. Specifically, for containment isolation valves, the applicable related requirements include paragraphs 4.2.2.2, 4.2.2.3(e), and 4.2.2.3(f) of Section 4.2.2. PECO may conduct leakage-rate testing of containment isolation valves according to the provisions of Appendix J, including Option B, according to

revised technical specifications, where applicable (PECO submitted a technical specification change related to Option B in its letter dated June 28, 1996). PECO must implement the analysis of leakage rates and corrective action requirements imposed by the regulations for containment isolation valves.

3.3 Evaluation

The 1989 Edition of the ASME Code was incorporated by reference in rulemaking effective September 8, 1992 (57 *FR* 152, p. 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. 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 valves subject to seat leakage-rate testing, other than containment isolation valves, the requirements of OM-10 are considered essentially equivalent to the requirements of IWV-3421 through IWV-3427 of earlier editions of the Code.

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, 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 based on the historical data on valve leakage rates and containment leakage test results. The ASME OM Committee also reviewed the historical test data for leakage of containment isolation valves and determined that Appendix J leakage rate testing was adequate and that imposition of additional IST requirements

was not necessary. 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.

3.4 Conclusion

PECO's use of portions of the latest edition of the ASME Code incorporated by reference in paragraph (b) of Section 50.55a is acceptable for IST leakage-rate testing of containment isolation valves. All related requirements applicable to the testing are included in PECO's proposed alternative. Approval is pursuant to the provisions in 10 CFR 50.55a(f)(4)(iv) which 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.

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