

February 3, 2000

Mr. Oliver D. Kingsley, President  
Nuclear Generation Group  
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Executive Towers West III  
1400 Opus Place, Suite 500  
Downers Grove, IL 60515

SUBJECT: QUAD CITIES - RELIEF REQUESTS FOR THIRD 10-YEAR INSERVICE  
INSPECTION INTERVAL (TAC NOS. MA6300 AND MA6301)

Dear Mr. Kingsley:

By letter dated August 13, 1999, Commonwealth Edison Company (ComEd) submitted eight requests for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, for Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). Five of the relief requests, CR-25, CR-26, CR-27, CR-30 and PR-12, were identified as being needed for the refueling outage scheduled to start on January 20, 2000. Of these five, CR-27 and PR-12 are related to the third 10-year inservice inspection (ISI) interval, and CR-25, CR-26 and CR-30 relate to the first 10-year containment ISI interval. The remaining three relief requests, CR-28, PR-11 and PR-13, relate to the third 10-year ISI interval and were identified by ComEd as not being needed to support the refueling outage.

The staff has reviewed and evaluated the information provided by ComEd concerning CR-27 and PR-12. These relief requests are authorized pursuant to 10 CFR 50.55a(a)(3)(i) because the proposed alternatives would provide an acceptable level of quality and safety. The staff's safety evaluation (SE) is enclosed.

The staff's review of CR-25, CR-26 and CR-30, related to the containment inservice inspection, will be provided under a separate cover. The staff's review of CR-28, PR-11 and PR-13 is still ongoing and will be completed after the Quad Cities refueling outage. This completes the staff's activities under TAC Nos. MA6300 and MA6301.

O. Kingsley

- 2 -

If you have any questions about this review, please contact Stewart Bailey at (301) 415-1321 or by e-mail at [snb@nrc.gov](mailto:snb@nrc.gov).

Sincerely,

***/RA/***

Anthony J. Mendiola, Chief, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-254 and 50-265

Enclosure: Safety Evaluation

cc: See next page

O. Kingsley

- 2 -

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO REQUESTS FOR RELIEF FOR  
THIRD 10-YEAR INSERVICE INSPECTION INTERVAL  
COMMONWEALTH EDISON COMPANY  
AND  
MIDAMERICAN ENERGY COMPANY  
QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2  
DOCKET NOS. 50-254 AND 50-265

1.0 INTRODUCTION

The inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Class 1, 2, and 3 components shall be performed in accordance with Section XI of the Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states, in part, that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the second 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable edition of Section XI of the ASME Code for the Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities), during the third 10-year ISI interval is the 1989 Edition. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

By letter dated August 13, 1999, Commonwealth Edison Company (ComEd, or the licensee) requested, in part, approval of relief requests CR-27, "Alternative Rules for Determining Additional Examinations," and PR-12, "Alternative Rules for Corrective Measures if Leakage Occurs at Bolted Connections," for the third 10-year ISI interval for Quad Cities. The staff has reviewed and evaluated the licensee's requests and their supporting information as an alternative to the Code requirements, pursuant to 10 CFR 50.55a(a)(3)(i), as described below.

## 2.0 EVALUATION OF RELIEF REQUESTS

### A. Relief Request CR-27, "Alternative Rules for Determining Additional Examinations"

#### Component Identification:

Code Class: 1, 2, and 3

References: ASME Code, Section XI, Subsections IWB-2430, IWC-2430 and IWD-2430

#### Code Requirement From Which Relief Is Requested:

Quad Cities requests relief to use the "Additional Examination" criteria stated in IWB-2430, IWC-2430, and IWD-2430 of the 1998 Edition of ASME Code, Section XI, in lieu of the requirements of the 1989 Edition of the Code for determining expansion samples.

#### Licensee's Basis for Relief:

Paragraphs IWB-2430 and IWC-2430 require additional examinations to be performed when examinations reveal indications exceeding the applicable acceptance standards of Table IWB-3410-1 for Class 1 and of Article IWC-3000 for Class 2. The criteria for expansion of the examination sample as stated in IWB-2430 and IWC-2430 of the applicable ASME Code, Section XI, 1989 Edition, are not clear in regard to the number and the type of components. On the contrary, the 1998 Edition of the Code addresses the additional examination requirement under the same paragraphs based on the number of examinations scheduled during the inspection period. Further, the 1998 Code specifies that the additional examinations be selected from welds, areas, or parts of similar material and service and may require inclusion of piping systems other than the one containing the flaws or relevant conditions. The 1989 Edition of Section XI does not address additional examinations of Class 3 components in IWD-2000, whereas, the 1998 Edition of the Code under paragraph IWD-2430 requires additional examination based on 20 percent of the number of examinations scheduled for the inspection interval with selection criteria similar to Class 2.

Licensee's Proposed Alternative Provisions:

As an alternative to the requirements of the 1989 Edition of ASME Section XI, Quad Cities will utilize the expansion criteria detailed in paragraphs IWB-2430, IWC-2430, and IWD-2430 (Additional Examinations) of the 1998 Edition of ASME Section XI for Class 1, Class 2, and Class 3 components, as appropriate, using the schedule quantities detailed in the station Selection Document, when examinations reveal indications exceeding the applicable acceptance standards.

Staff Evaluation

The staff has reviewed the licensee's basis for the requested relief to use criteria for "Additional Examinations" of the 1998 ASME Section XI Code in lieu of that of the 1989 Code. The staff performed a line-by-line comparison of paragraphs IWB-2430 and IWC-2430 of both codes to evaluate their criteria for sample expansion when examinations detect indications that exceed acceptance standards of the Code. The staff noted that the 1998 Code provides more detailed expansion criteria than the 1989 Code in regard to the number and type of components to be examined following detection of an unacceptable indication. The expansion methodology in the 1998 Code further incorporates considerations such as the material, service, flaw type, and the relevant conditions detected, unlike the 1989 Code. It is further noted that the 1989 Code does not address additional examinations of Class 3 components during examinations performed in accordance with IWD-2500-1, except for Examination Category D-B, that reveal flaws or relevant conditions exceeding the acceptance standards. The staff has reviewed these new rules and concluded that they are acceptable because they identify technically appropriate conditions for performing additional examinations. Therefore, the staff considers it prudent to adopt paragraphs IWB-2430, IWC-2430, and IWD-2430 of the 1998 Code in lieu of the 1989 Code in regard to "Additional Examinations" of Class 1, 2 and 3 components, respectively, and thus the proposed alternative would provide an acceptable level of quality and safety.

The staff concludes, based on the line-by-line comparison described above, that the use of paragraphs IWB-2430, IWC-2430 and IWD-2430 of the 1998 ASME Code, Section XI, would provide an acceptable level of quality and safety. Therefore, the alternative proposed in CR-27 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for Quad Cities for the third 10-year ISI interval.

B. Relief Request PR-12, "Alternative Rules for Corrective Measures if Leakage Occurs at Bolted Connections"

Component Identification:

Code Class: 1, 2, and 3

References: ASME Code, Section XI, 1989 Edition, Subsection IWA-5250(a)(2)

1989 ASME Code Section XI Requirement:

Subsection IWA-5250(a)(2) states that the source(s) of leakage detected during the conduct of a system pressure test shall be located and evaluated by the owner for corrective action. For

leakage occurring at a bolted connection, the bolting shall be removed, VT-3 visually examined for corrosion, and evaluated in accordance with IWA-3100.

Licensee's Code Relief Request:

In lieu of the requirements of IWA-5250(a)(2), the licensee requests to implement an alternative methodology of systematic evaluation prior to removal of bolting.

Licensee's Basis for Requesting Relief:

Removal of pressure retaining bolting at mechanical connections for VT-3 visual examination and subsequent evaluation in locations where leakage has been identified is not always the most prudent course of action to determine the condition of the bolting and/or the root cause of the leak. The Code requirement to remove, examine and evaluate bolting in this situation does not allow consideration of other factors, which may indicate the condition of mechanical joint bolting. Quad Cities considers this requirement to be unnecessarily restrictive. Other factors which should be considered in an evaluation of bolting condition when leakage has been identified at a mechanical joint include, but should not be limited to:

- bolting materials,
- service age of joint bolting materials,
- leakage history at connection,
- leakage location,
- visual evidence of corrosion at connection (connection disassembled),
- corrosiveness of process fluid,
- plant/industry studies of similar bolting materials in a similar environment, and
- leakage monitoring.

Licensee's Proposed Alternative Provisions:

Quad Cities proposes the following alternative methodology to the requirements of IWA-5250(a)(2) which will provide an equivalent level of quality and safety when evaluating leakage and bolting material conditions at Class 1, 2, and 3 bolted connections. As an alternative to the requirements of IWA-5250(a)(2), one of the following requirements shall be met for leakage at bolted connections:

- (A) The leakage shall be stopped, and the bolting and component material shall be reviewed for joint integrity.
- (B) If the leakage is not stopped, the joint shall be evaluated in accordance with IWB-3142.4 for joint integrity. This evaluation should include bolting materials, service age of joint bolting materials, leakage history at connection, leakage location, visual evidence of corrosion at connection, corrosiveness of processing fluid, plant/industry studies of similar bolting materials in a similar environment and leakage monitoring as detailed in the basis for this relief.

If any of the above parameters indicates a need for further examination, a bolt closest to the source of leakage shall be removed, receive a VT-3 examination, and be evaluated in accordance with IWA-3100(a). If the leakage is identified when the bolted connection is in service, and the information in the evaluation is supportive, the removal of the bolt for VT-3 examination may be deferred to the next refueling outage. When the removed bolt has evidence of degradation, all remaining bolting shall be removed, VT-3 examined, and evaluated in accordance with IWA-3100(a).

### Staff Evaluation

In accordance with the 1989 Edition of the ASME Code, Section XI, when leakage occurs at bolted connections, all bolting is required to be removed for VT-3 visual examination. In lieu of the Code-required removal of bolting to perform a VT-3 visual examination, the licensee has proposed to perform an evaluation of the bolted connection to determine the susceptibility of the bolting to corrosion and the potential for failure. If the initial evaluation indicates the need for a more in-depth evaluation, the bolt closest to the source of leakage will be removed, VT-3 examined, and evaluated in accordance with IWA-3100(a). This alternative allows the licensee to utilize a systematic approach and sound engineering judgement provided that, as a minimum, all of the eight evaluation factors listed in the licensee's proposed alternative are considered. As a result, the licensee's alternative to the Code-required removal of bolting at a joint when leakage occurs will provide an acceptable level of quality and safety, as the integrity of the joint will be maintained. Therefore, the alternative proposed in PR-12 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for Quad Cities for the third 10-year ISI interval.

The staff also notes that the only acceptance criteria for visual examinations of bolting contained in Section XI are provided in paragraph IWB-3517. The criteria apply to VT-1 examinations conducted in accordance with IWA-2211. The staff recommends that the licensee apply these criteria to any bolting removed and evaluated in accordance with IWA-3100(a).

### 3.0 CONCLUSION

The staff has reviewed and evaluated the information provided by ComEd concerning relief requests CR-27 and PR-12. These relief requests may be granted pursuant to 10 CFR 50.55a(a)(3)(i) because the proposed alternatives would provide an acceptable level of quality and safety.

Principal Contributor: P. Patnaik

Date: February 3, 2000