

January 4, 2000

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

SUBJECT: EVALUATION OF THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM REQUEST FOR RELIEF NOS. I2R-23, I2R-24, I2R-28, AND I2R-29 FOR BRAIDWOOD STATION, UNITS 1 AND 2 (TAC NOS. MA7267 AND MA7268)

Dear Mr. Kingsley:

By letter dated April 17, 1998, as supplemented by letters dated August 3 and September 2, 1998, Commonwealth Edison Company (ComEd) submitted the second 10-year interval inservice inspection program plan and 31 relief requests for Braidwood Station, Units 1 and 2.

The staff has reviewed and evaluated the information provided by ComEd related to Relief Requests I2R-23, I2R-24, I2R-28, and I2R-29. The alternatives proposed in Relief Requests I2R-23 and I2R-29 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that they provide an acceptable level of quality and safety. The alternatives proposed in Relief Requests I2R-24 and I2R-28 are authorized pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the code requirements would result in hardship without a compensating increase in the level of quality and safety.

The bases for authorizing these reliefs are stated in the enclosed Safety Evaluation (SE). Table 1 of the SE shows the status of all 31 relief requests.

Sincerely,

*/RA/*

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

Docket Nos. STN 50-456 and STN 50-457

Enclosure: Safety Evaluation

cc w/encl: See next page

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Braidwood Station  
Units 1 and 2

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION INTERVAL

REQUESTS FOR RELIEF

COMMONWEALTH EDISON COMPANY

BRAIDWOOD STATION, UNIT NOS. 1 AND 2

DOCKET NOS. STN 50-456 AND STN 50-457

1.0 INTRODUCTION

Inservice inspection of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code (Code) Class MC and CC components shall be performed in accordance with Section XI of the ASME 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 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)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME 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 ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose 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. The containment inservice inspection program relief requests for Braidwood, Units 1 and 2, were prepared to meet the requirements of Subsection IWE and IWL of the 1992 Edition, 1992 Addenda, of the ASME Code, Section XI.

Pursuant to 10 CFR 50.55a(g)(6)(ii)(B), for ASME Code Class MC and CC components (including integral attachments of MC and metallic liners of CC components), licensees shall expedite the inservice inspection requirements of Subsection IWE and Subsection IWL of the

ENCLOSURE

1992 Edition with the 1992 Addenda and complete the first inspection by September 9, 2001. 10 CFR 50.55a(g)(6)(ii)(B)(1) states that the inservice examinations specified for the first period of the first inspection interval in Subsection IWE of the 1992 Edition and addenda as modified in 10 CFR 50.55a(b)(2)(ix) shall serve the same purpose for operating plants as the preservice examination. 10 CFR 50.55a(g)(6)(ii)(B)(2) allows licensees to implement the inservice examinations which correspond to the number of years of operation which are specified in Subsection IWL of the 1992 Edition and addenda as modified in 10 CFR 50.55a(b)(2)(ix) and shall serve the same purpose for operating plants as the preservice examination specified for plants not yet in operation.

By letter dated April 17, 1998, as supplemented by letters dated August 3 and September 2, 1998, Commonwealth Edison Company (ComEd, the licensee) submitted to the NRC its alternatives to the Section XI requirements for IWE/IWL pursuant to 10 CFR 50.55a(a)(3)(ii). The NRC staff's evaluation of the licensee's proposed relief requests I2R-23, I2R-24, I2R-28, and I2R-29 for Braidwood, Units 1 and 2, are presented in Section 2 of this Safety Evaluation. Table 1 shows the review status of all relief requests submitted by ComEd for Braidwood Station, Units 1 and 2, regarding inservice inspection.

## 2.0 EVALUATION OF RELIEF REQUESTS

### A. Request for Relief I2R-23, Table IWE-2500-1, Examination Category E-D, Items E5.10 and E5.20, Seals, Gaskets, and Moisture Barriers

#### Code Requirement:

Examination Category E-D, Item E5.10 and E5.20, requires 100 percent visual examination (VT-3) during each inspection interval, for seals and gaskets on air locks, hatches, and other devices that are required to assure containment leak-tight integrity.

#### Licensee's Proposed Alternative:

The licensee proposed to test the subject seals and gaskets in accordance with 10 CFR Part 50, Appendix J. The licensee stated:

If the containment penetrations are disassembled, the gaskets and seals will be inspected per the requirements of table IWE-2500-1 category E-D, the joints need not be disassembled solely for the performance of examination. The leak testing currently performed in accordance with 10 CFR 50, Appendix J, provides adequate assurance that the pressure retaining capability of the subject seals and gaskets are intact on the joints that are not disassembled.

#### Licensee's Basis for Proposed Alternative (as stated):

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The 1993 Addenda to Section XI recognizes that disassembly of joints to perform examinations on seals and gaskets is not warranted. Note 1 in Examination Category E-D was modified in the 1993 Addenda to Section XI to state that sealed or gasket connections need not be disassembled solely for performance of examinations. However, without disassembly, most of the surface of the seals and gaskets would be inaccessible. Therefore, the examination would be meaningless.

Due to penetration configurations, visual examination of seals and gaskets in most cases would require the associated joints to be disassembled.

Electrical penetrations, which are qualified through the Braidwood Environmental Qualification Program, would need a pre-maintenance Appendix J test, determination of the electrical cables, if enough cable slack is not available, disassembly of the joint, removal and examination of the seals and gaskets, reassembly of the joint, re-termination of the cables, post maintenance testing of the cables, and a post maintenance Appendix J test of the penetration.

The work required for other containment penetrations would be similar except for the determination, re-termination, and testing of cables.

Currently Containment penetrations are tested in accordance with 10 CFR 50, Appendix J. Degradation of the seal or gasket material is revealed by an increase in the leakage rate. When leakage rates exceed the acceptance standards corrective measures are applied and the component is re-tested.

#### Staff Evaluation:

The Code requires that seals and gaskets on air locks, hatches, and other devices be VT-3 visually examined once each interval to assure containment leak-tight integrity. The licensee proposes to use the existing 10 CFR Part 50, Appendix J, testing as a verification of containment integrity, rather than disassembling the subject components for the sole purpose of examination. The 1993 Addenda to Section XI has recognized that disassembly of joints, for the sole purpose of performance of the visual examination, is unwarranted. The staff agrees that the functionality of the containment penetration seals and gaskets would be verified during the Type B testing as required by 10 CFR Part 50, Appendix J. Consequently, the proposed alternative provides an acceptable level of quality and safety. Although the licensee requested relief based on hardship (10 CFR 50.55a(a)(3)(ii)), the staff authorizes the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(i) for the current interval.

#### B. Request for Relief I2R-24, IWA-2210, Visual Examination Requirements for Minimum Illumination and Maximum Direct Distance of Class CC Components under IWL-2310

#### Code Requirement:

Section XI, Table IWL-2500-1, Item L1, requires a VT-1C and VT-3C examination for all concrete surfaces, and IWL-2310 defines the requirements for conducting the VT-3C

examination and invokes IWA-2210, requiring specific minimum illumination and maximum direct examination distance for all concrete surfaces.

Licensee's Proposed Alternative:

The licensee proposed extending the maximum direct examination distance and reducing the minimum illumination requirements of IWA-2210 as required by IWL-2310. The licensee stated:

When performing the visual examinations required per IWL-2510 remotely, the maximum direct examination distance specified in Table IWA-2210-1 may be extended and the minimum illumination requirements specified in Table IWA-2210-1 may be decreased provided that the conditions or indications for which the visual examination is performed can be detected at the chosen distance and illumination. A demonstration that the character height specified in Table IWA-2210-1, along with the proper illumination, can be clearly read at the required distance to simulate the distance of the actual inspection will be performed.

Licensee's Basis for Proposed Alternative (as stated):

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

In the Braidwood containments, the inaccessibility of higher areas such as the dome concrete surfaces make it very difficult to meet Section XI maximum direct examination distance and minimum illumination requirements. The installation of extensive temporary scaffold systems or a climbing scaffold system to access these portions of the containment would be necessary. These scaffolds would provide limited access due to containment geometric restrictions as well as structural and equipment interferences.

The installation and removal of these scaffolds would increase both worker radiation exposure and personnel safety in order to meet IWA-2210 requirements.

Staff Evaluation:

To comply with the expedited examination of containment required by 10 CFR 50.55a(g)(6)(ii)(B), licensees must perform visual examinations on Class MC and Metallic Liners of Class CC Concrete Components per the requirements of IWE, and visual examinations on Class CC Concrete Components per the requirements of IWL of the ASME Code, Section XI.

The licensee has proposed an alternative to the requirements for the measurement of illumination and examination distance for visual examinations. The visual examinations on containment are performed to determine if damage or degradation, including cracks, wear, corrosion, erosion or other physical damage, warrant additional evaluation or repair of the structure. In order for the visual examinations to be performed in such a way as to detect critical

flaws, proper lighting is essential. The licensee has provided an alternative to the Code requirements that uses a combination of character size(s) and workmanship-based samples to determine the resolution required to ensure that indications that might challenge containment integrity are detectable. Paragraph IWL-3111, Acceptance of Concrete, requires that the responsible engineer determine what surface conditions are acceptable and ensure there is no evidence of damage or degradation sufficient to warrant further evaluation or repair. Therefore, the licensee's responsible engineer will identify the minimum flaw size (indications of interest) required to be detected. For remote visual examinations, procedures and equipment used will be demonstrated to be capable of detecting and resolving these indications. The licensee will maintain a record of the demonstration performed.

While the use of the licensee's proposed alternative does not result in a quantitative evaluation of the illumination, it provides a method to verify that the indications of interest are visually detectable. The staff agrees that the samples representing these indications provide an appropriate representation of the conditions of the actual inspection, and concludes that visual verification, via direct or remote means, of such provides sufficient evidence of adequate illumination and distance.

Inaccessibility of higher portions of the containment structure make it a hardship for the licensee to comply with the requirements of IWL-2310. The need to install and remove temporary scaffolding to meet minimum illumination and maximize distance requirements increases radiation exposure for licensee personnel. Therefore the alternative to the minimum illumination and maximum direct examination distance requirements of IWA-2210 for Class CC components examined under IWL-2310 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii). Compliance with the requirements of IWL-2310 would result in a hardship without a compensating increase in the level of safety.

C. Request for Relief I2R-28, IWE-2420(b), After Repairs/Replacements are Completed in Accordance with IWE-3122.2 (Acceptance by Repair) and IWE-3122.3 (Acceptance by Replacement)

Code Requirement:

Paragraph IWE-2420(b), requires that when component examination results require evaluation of flaws, evaluation of areas of degradation, or repairs in accordance with IWE-3000, and the component is found to be acceptable for continued service, the areas containing such flaws, degradation, or repairs shall be performed in accordance with Examination Category E-C and at the schedule specified in the inspection requirements of IWE-2411 or IWE-2412.

Licensee's Proposed Alternative:

Successive examinations will be scheduled and performed when required, in accordance with the rules of IWE-3122.

Licensee's Basis for Proposed Alternative (as stated):

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested on the basis that compliance with the specified requirements section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The purpose of the repair is to restore the component to an acceptable condition for continued service in accordance with the acceptance standards of IWE-3000. When this repair is performed, IWA-4150 requires the owner to conduct an evaluation of the suitability of the repair including consideration of the cause of failure. If the repair has restored the component to an acceptable condition, as directed by the requirements of IWE-3122.2 (Acceptance by Repair) and IWE-3122.3 (Acceptance by Replacement), successive examinations are not warranted. If the repair was not suitable, then the repair does not meet code requirements and the component is not acceptable for continued service. Furthermore, if the repair area is subject to accelerated degradation, it would still require augmented examination in accordance with IWE-1240. Acceptance of the components for continued service per IWE-3122 is summarized below:

- IWE-3122.2 Specifies that a flaw shall be unacceptable unless it is removed by mechanical means or the component repaired to the extent necessary to meet the acceptance standards of IWE-3000. IWE-3122.2 does not specify that a successive examination is required. Furthermore, when this repair is performed, IWA-4150 requires the owner to conduct an evaluation of the suitability of the repair including consideration of the cause of failure. Subsequent inspections would be on an area that has been repaired and evaluated as acceptable.
- IWE-3122.3 Specifies that as an alternative to IWE-3122.2, the component or the portion of the component containing the flaw or degradation shall be replaced in accordance with IWE-7000. IWE-3122.3 does not specify that a successive examination is required. When a component has been replaced, successive examinations would not be performed on the original flawed component, but the replaced component.
- IWE-3122.4 Specifies that when a flaw or relevant condition is accepted by
  - (b) Engineering evaluation that the area containing the flaw or degradation shall be reexamined in accordance with IWE-2420(b) and (c).

The successive examination of repairs in accordance with IWE-2420(b), when these repairs (or replacements) are performed in accordance [with] IWE-3122.2 (Acceptance by Repair) and IWE-3122.3 (Acceptance by Replacement), would constitute a burden without a compensating increase in quality or safety. In addition, reexamination of a repaired or replaced component would be in violation of "ALARA" good practice without any substantial increase in safety.

Staff Evaluation:

Paragraph IWE-2420(b) requires that when examinations result in evaluation of flaws or areas of degradation (per IWE-3000), and the component is acceptable for continued service, or when examinations result in performance of a repair/replacement activity, the items containing such flaws, areas of degradation, or areas subjected to a repair/replacement, shall be re-examined during the next inspection period. The licensee is proposing not to perform any reexaminations during the next examination period when the component is restored, via repair or replacement activities, to an acceptable condition for continued service in accordance with IWE-3122. This approach is consistent with the successive examination requirements of Class 1, 2, and 3 components.

Since the proposed alternative will return components to Code compliance, the staff finds that successive examination performed in the next period is not warranted after repairs and that imposition of the requirements of IWE-2420(b) would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

D. Request for Relief I2R-29, Table IWE-2500-1, Examination Category E-G, Item E8.20, Pressure Retaining Bolting

Code Requirement:

Examination Category E-G, Item E8.20, requires a bolt torque or tension test of bolted connections each inspection interval.

Licensee's Proposed Alternative:

The licensee proposed to perform an alternative examination in lieu of the required bolt torque or tension test required by the Code. The licensee stated:

Perform an Appendix J Type B test in lieu of de-tensioning and re-tensioning.

Licensee's Basis for Proposed Alternative (as stated):

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Bolt torque or tensioning testing is required on bolted connections that have not been disassembled and reassembled during the inspection interval. Determination of the torque or tension value requires that the bolting be de-tensioned and then [or] re-tensioned. This activity is considered maintenance and therefore would require a 10 CFR 50 Appendix J, Type B test. The performance of the Type B test itself proves that the bolt torque or tension remains adequate to provide a leak rate that is within acceptable limits. The torque or tension value of bolting only becomes an issue if the leak rate is excessive. Once a bolt is torqued or tensioned, it is not subject to dynamic

loading that could cause it to experience significant change. The verification of torque or tension values on bolted joints that have been proven adequate through Appendix J testing and visual inspection is deemed a hardship because the additional resources required (for torque/tension testing and follow-up Appendix J testing) do not provide an increase in the level of quality and safety and because the de-tensioning and retensioning activities may damage the components. Experience has shown that penetrations, containment personnel hatches, and escape hatches have not exhibited excessive leakage due to inadequate bolt torque or tension.

Torque or tension testing is not required on any other ASME Section XI, Class 1, 2, or 3 bolted connections or their supports as part of the inservice inspection program.

#### Staff Evaluation:

The code requires that the pressure-retaining bolting that has not been disassembled and reassembled during the inspection interval be torque or tension tested. This examination is used to aid in the determination that a leak-tight seal exists and that the structural integrity of the subject bolted connection is maintained. The licensee proposed to use the 10 CFR Part 50, Appendix J, Type B test as an alternative to the Code requirement to verify the integrity of the penetrations with bolted connections.

The containment penetration integrity is verified mechanically by conducting a 10 CFR Part 50, Appendix J, Type B test and will provide an acceptable level of quality and safety. Although the licensee requested relief based on hardship (10 CFR 50.55a(a)(3)(ii)), the staff authorizes the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(i), for Examination Category E-G, Item E8.20, for the current interval.

### 3.0 CONCLUSION

The staff has evaluated the licensee's submittal of Relief Requests I2R-23, I2R-24, I2R-28, and I2R-29 for the Braidwood Station, Units 1 and 2. The authorizing of alternatives or granting of relief is based upon fulfillment of any commitments made by the licensee in its basis for each relief request and the alternatives proposed. The implementation of the ISI program and relief requests is subject to inspection by the NRC.

The alternatives proposed in relief requests I2R-23 and I2R-29 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that they provide an acceptable level of quality and safety.

The alternatives proposed in Relief Requests I2R-24 and I2R-28 are authorized pursuant to 10 CFR 50.55a(a)(3)(ii). Compliance with the code requirements would result in hardship without a compensating increase in the level of quality and safety. The proposed alternatives will provide reasonable assurance of containment pressure integrity.

Attachment: Table 1 - Status of Relief Request Reviews

Principal Contributor: G. Hatchett

Date: January 4, 2000

**Table 1**  
**Status of Relief Request Reviews**

Relief Request	Status	Reference Letter
I2R-01	Under review	
I2R-02	Under review	
I2R-03	Under review	
I2R-04	Under review	
I2R-05	Authorized	NRC letter of 10/26/98
I2R-06	Under review	
I2R-07	Authorized	NRC letter of 10/10/99
I2R-08	Under review	
I2R-09	Under review	
I2R-10	Under review	
I2R-11	Authorized	NRC letter of 10/26/98
I2R-12	Authorized	NRC letter of 10/26/98
I2R-13	Authorized	NRC letter of 10/26/98
I2R-14	Authorized	NRC letter of 08/31/98
I2R-15	Authorized	NRC letter of 10/26/98
I2R-16	Under review	
I2R-17	Authorized	NRC letter of 10/26/98
I2R-18	Under review	
I2R-19	Under review	
I2R-20	Under review	
I2R-21	Under review	
I2R-22	Under review	
I2R-23	Authorized	this safety evaluation
I2R-24	Authorized	this safety evaluation
I2R-25	Authorized	NRC letter of 10/26/98
I2R-26	Authorized	NRC letter of 10/26/98
I2R-27	Withdrawn	ComEd letter of 08/03/98
I2R-28	Authorized	this safety evaluation
I2R-29	Authorized	this safety evaluation
I2R-30	Authorized	NRC letter of 10/02/98
I2R-31	Denied	NRC letter of 10/26/98