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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUESTS FOR RELIEF ASSOCIATED WITH

SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

COMMONWEALTH EDISON COMPANY

BRAIDWOOD STATION, UNITS 1 AND 2

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

1.0 INTRODUCTION

The Technical Specifications (TS) for Braidwood Station, Units 1 and 2, state that the inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (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)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service 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 first 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) twelve 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 Braidwood Station, Units 1 and 2, second 10-year ISI interval is the 1989 Edition.

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 alternative requirements that are determined to be authorized by law, will not endanger life,

ENCLOSURE

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.

2.0 EVALUATION

By letter dated April 17, 1998, the Commonwealth Edison Company (ComEd, or the licensee) submitted its second interval ISI inspection program plan and associated requests for relief for Braidwood Station, Units 1 and 2. As part of that submittal, ComEd requested that the staff expedite its review of Request for Relief Nos. I2R-05, I2R-07, I2R-11, I2R-12, I2R-13, I2R-14, I2R-15, Revision 2, I2R-17, I2R-25, I2R-26, I2R-27, I2R-30 and I2R-31, Revision 1, to support inspections to be performed during the Braidwood, Unit 1, fall 1998 refueling outage, which includes steam generator replacement. By letters dated August 3, 1998, and September 2, 1998, ComEd submitted Revisions 1 and 2 to the plan, revised several relief requests, and withdrew relief request I2R-27.

The staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), has evaluated the information provided by the licensee in support of the expedited Relief Request Nos. I2R-05, I2R-11, I2R-12, I2R-13, I2R-15, Revision 2, I2R-17, I2R-25, I2R-26 and I2R-31, Revision 1. Based on the results of the review, the staff adopts the contractor's conclusions and recommendations presented in the attached Technical Letter Report (TLR).

Request for Relief No. I2R-05: ASME Code, Section XI, Table IWA-4700(a) requires that a system hydrostatic test be performed in accordance with IWA-5000 after repairs by welding on the pressure-retaining boundary. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed to employ the rules in Code Case N-416-1 with the additional nondestructive examination (NDE) requirements stated below as an alternative to Section XI requirements (as stated):

> "As an alternate to the existing ASME Section XI requirements, Braidwood Station will adopt the provisions of Code Case N-416-1, as approved by the Board of Nuclear Codes and Standards, with additional NDE requirements. Listed below are the proposed alternate provisions to be performed, which is a summary of Code Case N-416-1 requirements with additional NDE requirements imposed by Braidwood Station.
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> "A VT-2 visual examination will be performed at nominal operating pressure and temperature in conjunction with a system leakage test in accordance with IWA-5000 of the 1992 Edition of Section XI. The examination will be performed prior to or immediately upon return of the component to service.
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> "Non-Destructive Examination will be performed on the repair/replacement welds or welded areas with the methods and acceptance criteria of the applicable Subsection of the 1992 Edition of Section XI. In addition, when NDE is required by ND-5222 for

Class 3 components, an additional surface examination will be performed on the root (pass) layer.

"The use of this relief request shall be documented on the applicable NIS-2 Form.

"If the previous version of Code Case N-416 were used to defer a Class 2 hydrostatic test, the deferred test may be eliminated when the requirements of this relief request are met. In addition, the NDE methods and acceptance criteria of the Code Edition and addenda used for the repair must be reconciled to those of the 1992 Edition of ASME Section III."

Section XI of the Code requires a system hydrostatic test to be performed in accordance with IWA-5000 after repairs by welding on the pressure-retaining boundary. The licensee proposes to implement the alternative to hydrostatic pressure tests contained in Code Case N-416-1 for Code Class 1, 2, and 3 repair/replacements. In addition, the licensee will supplement the pressure test with an additional surface examination on the root pass layer of Class 3 repair/ replacement welds or welded areas.

Code Case N-416-1 specifies that NDE of the welds be performed in accordance with the applicable subsection of the 1992 Edition of Section III. This Code Case also allows a VT-2 visual examination to be performed at nominal operating pressure and temperature in conjunction with a system leakage test, in accordance with paragraph IWA-5000 of the 1992 Edition of Section XI. Comparison of the system pressure test requirements of the 1992 Edition of Section XI to those of the 1989 Edition of Section XI, the latest Code edition referenced in 10 CFR 50.55a, shows that:

- The test frequencies and pressure conditions are unchanged;
- The hold times either remained the same or increased;
- The terminology associated with the system pressure test requirements for all three Code classes has been clarified and streamlined; and
- The NDE requirements for welded repairs remain the same.

Hydrostatic testing only subjects the piping components to a small increase in pressure over the design pressure and, therefore, does not present a significant challenge to pressure boundary integrity. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leak detection during the examination of components under pressure rather than as a measure of the structural integrity of the components.

Following welding, the Code requires volumetric examination (depending on wall thickness) of repairs or replacements in Code Class 1 and 2 piping components, but only requires a surface examination of the final weld pass in Code Class 3 piping. There are no ongoing NDE requirements for Code Class 3 components except for VT-2 visual examination for leaks in

conjunction with the 10-year hydrostatic tests and the periodic pressure tests. However, the INEEL staff believes that the examinations required by Code Case N-416-1 are commensurate for Class 3 systems when 1) a surface examination is performed on the root pass layer of butt and socket welds, and 2) a system pressure test at nominal operating pressure is performed.

Considering the previous acceptance of Code Case N-416 by the NRC for Class 2 components, and the supplemental surface examination on the root pass for Class 3 systems, it is concluded that the licensee's proposed alternative will provide an acceptable level of quality and safety. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i). The alternative is authorized for the second 10-year ISI interval or until such time as Code Case N-416-1 is published in a future revision of Regulatory Guide 1.147. At that time, if the licensee intends to continue to implement this Code Case, the licensee should follow all provisions in Code Case N-416-1 with limitations issued in Regulatory Guide 1.147, if any.

Request for Relief No. I2R-11: ASME Code, Section XI, Table IWC-2500-1, Examination Category C-H, Items C7.30, C7.40, C7.70, and C7.80, require a system leakage test at operating pressure for pressure retaining piping and valves. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed the following alternative to the code requirements (as stated):

> "Braidwood Station will perform 10 CFR 50, Appendix J leakage tests as an optional alternative to the Section XI required pressure test on the subject primary reactor containment penetration piping and associated valves. When implementing the Appendix J leakage test and invoking this relief request, peak design pressure and procedures for the detection and location of through-wall flaws will be used."

The Code requires that a VT-2 visual examination be performed during system pressure testing for Class 2 pressure-retaining piping. As an alternative, the licensee proposes to implement the requirements of 10 CFR 50, Appendix J, for the subject containment penetration piping. This alternative is contained in ASME Code Case N-522, "*Pressure Testing of Containment Penetration Piping*." The subject piping is classified as Class 2 because it penetrates primary reactor containment and is considered an extension of the containment vessel. Since the piping on either side of these penetrations is non-class, the requirements of Appendix J are more appropriate than those of Examination Category C-H. Appendix J pressure tests verify the leak-tight integrity of the primary reactor containment and of systems and components that penetrate containment by local leak rate and integrated leak rate tests. In Appendix J pressure tests, containment isolation valves and connecting pipe segments must withstand the peak calculated containment internal pressure related to the maximum design pressure. In addition, Appendix J test frequencies provide assurance that the containment pressure boundary is being maintained at an acceptable level while monitoring for deterioration of seals, valves, and piping.

The licensee has committed to perform the Appendix J testing at no less than the peak calculated containment pressure and will use procedures to detect and locate through-wall flaws. The staff determined that an acceptable level of quality and safety is provided by the

licensee's proposed alternative since it will test the subject penetrations for their intended function. Therefore, the licensee's proposed alternative pressure test is authorized, pursuant to 10 CFR 50.55a(a)(3)(i), for the second 10-year ISI interval.

Request for Relief No. I2R-12: ASME Code, Section XI, IWA-5242(a) requires that insulation shall be removed from pressure-retaining bolted connections for VT-2 visual examination in systems borated for the purpose of controlling reactivity. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed the following alternative to the Code requirement to remove insulation at bolted connections for VT-2 examination during system pressure testing (as stated):

> "For ASME Class 1 systems borated for the purpose of controlling reactivity, a system inservice leakage test shall be performed in accordance with the frequency required in Table IWB-2500 without removal of insulation from the bolted connections. The requirements for inservice leak tests shall be augmented with a minimum 4 hour hold time at system normal operating pressure prior to the VT-2 visual examination to allow for leakage propagation from the insulation. Additionally, the insulation shall be removed from Class I bolted connections and a VT-2 examination shall be conducted, with the system depressurized. The frequency for these depressurized VT-2 inspections shall be in accordance with the system examination frequencies specified in Table IWB-2500, Category B-P, each refueling outage (except for those components whose inspection frequency are modified per pending Relief Request I2R-30). The proposed alternative is consistent with the requirements of Code Case N-533. These inspections shall be implemented through application of the Braidwood Station predefined surveillance program to assure they are performed within the prescribed time periods.
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> "For ASME Class 2 and 3 systems borated for the purpose of controlling reactivity, a system pressure test shall be performed in accordance with the frequency required in Table IWC-2500 or IWD-2500, as applicable, without the removal of insulation from the bolted connections. The requirements for system pressure tests shall be augmented with a 4 hour hold time at system normal operating pressure prior to the VT-2 visual examination to allow for leakage propagation from the insulation. Additionally, the insulation shall be removed from individual insulated Class 2 and 3 bolted connections and a VT-2 examination shall be conducted, with the system depressurized on an increased frequency. VT-2 examinations on each component will be performed on approximately 36 month frequencies, which coincides with plant refueling outages, not allowing the period between inspections on individual components to exceed 45 months (except for those components whose inspection frequencies are modified per pending Relief Request I2R-30). This increased frequency for individual components is more restrictive than the "Periodic Frequency" allowed by ASME Section XI for Class 2 and 3 systems described in Tables IWC-2500 or IWD-2500. These inspections shall be implemented through application of the Braidwood Station predefined surveillance program to assure they are performed within the prescribed time period.

"Regardless of whether a component is scheduled for examination or not, any evidence of leakage will result in evaluations for corrective measures in accordance with IWA-5250 (as modified for Braidwood Station by pending Relief Request 12R-13)."

The Code requires the removal of all insulation from pressure-retaining bolted connections in systems borated for the purpose of controlling reactivity when performing VT-2 visual examinations during system pressure tests. As an alternative, the licensee has proposed to perform the VT-2 visual examination with the insulation in place after a minimum 4-hour hold time. In addition, the insulation will be removed for direct visual examination according to the frequency requirements (each refueling outage prior to start-up) specified in IWB-2500-1, Category B-P for Class 1, and at approximately 36-month intervals (which coincide with plant refueling outages) not allowing the period between inspections on individual components to exceed 45 months for Class 2 and 3 components.

The licensee's proposed alternative is essentially equivalent to Code Case N-533, *"Alternative Requirements for VT-2 Visual Examination of Class 1 Insulated Pressure-Retaining Bolted Connections, Section XI, Division 1,"* except the proposed alternative was extended to address Code Class 2 and 3 bolted connections.

For Class 1 systems, the licensee's proposed alternative provides a thorough approach to ensuring the leak-tight integrity of systems borated for the purpose of controlling reactivity. First, the 4-hour hold time allows any leakage to penetrate the insulation, thus provides a means of detecting any significant leakage with the insulation in place. Second, by removing the insulation each refueling outage for Class 1 components and at 36-month intervals for Class 2 and 3 components, the licensee will be able to detect minor leakage indicated by the presence of boric acid crystals or residue. This two-phase approach provides an acceptable level of quality and safety for bolted connections in borated systems. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for use on Class 1, 2 and 3 systems for the second 10-year ISI interval.

Request for Relief No. I2R-13: ASME Code, Section XI, IWA-5250(a)(2) requires that if leakage occurs at a bolted connection in ASME Section XI components, the bolting shall be removed, VT-3 examined for corrosion, and evaluated in accordance with IWA-3100. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed to use alternative requirements regarding corrective actions for leakage at bolted connections in lieu of the examination requirements defined in IWA-5250(a)(2). The licensee stated:

"Braidwood Station 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 condition at Class 1, 2, and 3 bolted connections.

"When leakage is identified at bolted connections by visual, VT-2 examination during system pressure testing, an evaluation will be performed to determine the susceptibility

of the bolting to corrosion and assess the potential for failure. The evaluation will, at a minimum, consider the following factors:

1) Bolting materials
2) Service age of the joint bolting materials
3) Leakage location
4) Leakage history at connection
5) Visual evidence of corrosion at connection (connection assembled)
6) Corrosiveness of process fluid
7) Plant/industry studies and history of similar bolting materials in a similar environment

"If any of the above parameters indicates a need for further examination, the bolt closest to the source of leakage shall be removed, receive a VT-1 examination, and be evaluated in accordance with IWA-3100(a). If the leakage is identified when the bolted connection is inservice, and the information in the evaluation is supportive, the removal of the bolt for VT- 1 examination may be deferred to the next refueling outage. When the removed bolt has evidence of degradation, all remaining bolting shall be removed, VT-I examined, and evaluated in accordance with IWA-3100(a)."

In accordance with IWA-5250(a)(2), if leakage occurs at a bolted connection, the bolting must be removed, VT-3 visually examined for corrosion, and evaluated in accordance with IWA-3100. In lieu of this requirement, the licensee has proposed to evaluate the bolting to determine its susceptibility to corrosion. The proposed evaluation will consider, as a minimum, bolting materials, the corrosive nature of the process fluid, the leakage location and history, the service age of the bolting materials, visual evidence of corrosion at the assembled connection and plant/industry studies of similar bolting materials in similar environments.

Based on the items included in the evaluation process, the staff determined that the evaluation proposed by the licensee presents a sound engineering approach and provides an acceptable level of quality and safety. In addition, if the initial evaluation indicates the need for a more detailed analysis, the bolt nearest to the source of leakage will be removed, visually examined, and evaluated in accordance with IWA-3100(a). Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year ISI interval.

Request for Relief No. I2R-15 Revision 2: The ASME Code requires examination of integrally welded attachments as specified for Examination Categories B-H, B-K, C-C, D-A, D-B, and D-C. The Code stipulates volumetric or surface examinations, as appropriate, and the extent of examinations. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed to use Code Case N-509, *"Alternate Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments, Section XI, Division 1,"* as an alternative to the Code requirements for Class 1, 2, and 3 integrally welded attachments. The licensee stated:

"The requirements of Code Case N-509 will be used to select and examine integrally welded attachments, with the exception to the requirement to inspect the integrally

> welded attachments associated with the component supports selected for examination under the 1990 Addenda, IWF-2510 (Reference footnote 5 of Category B-K and Category C-C Code Case N-509 tables). Braidwood is implementing Code Case N-491 for support selections and will inspect the integrally welded attachments associated with the component supports selected for examination under Code Case N-491. In addition to those conditions specified in Code Case N-509, a 10% minimum sample of integrally welded attachments for each item in each code class will be inspected. This minimum 10% sampling is consistent with Draft Regulatory Guide DG-1050, Revision 12 to Regulatory Guide 1.147, dated May 1997. The minimum 10% sample shall be distributed proportionally by system."

The licensee has proposed to apply the requirements of Code Case N-509 as an alternative to the Code requirements for the examination of integrally-welded attachments on Class 1, 2, and 3 piping and components. The licensee has also committed to supplement the Code Case with a minimum examination sample of 10% of integral attachments to non-exempt Class 1, 2, and 3 components. Considering that most of the Code examination requirements are based on sampling to ensure the detection of service-induced degradation, extending the sampling philosophy to the integral attachment welds will provide an equivalent level of quality and safety. Therefore, the alternative, to use Code Case N-509 with the minimum sample size of 10%, is authorized pursuant to 10 CFR 50.55a(a)(3)(i). The use of this alternative is authorized for the second 10-year ISI interval or until Code Case N-509 is approved for general use by reference in Regulatory Guide 1.147. After that time, the licensee must follow all provisions in Code Case N-509 with the conditions, if any, specified in the regulatory guide.

Request for Relief No. I2R-17: ASME Code, Section XI, Table IWC-2500-1, Examination Category C-F-1 and C-F-2, Items C5.12, and C5.52, require 100% surface and volumetric examination, as defined by Figure IWC-2500-7, for 2.5T of longitudinal piping welds from intersecting circumferential welds. Examination Category C-F-1 and C-F-2, Items C5.42, and C5.82, require 100% surface examination, as defined by Figure IWC-2500-12 and -13, for 2.5T of longitudinal piping welds from intersecting circumferential welds of pipe branch connections. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed, as an alternative, to implement the rules in Code Case N-524 for Class 2 piping. The licensee stated:

> "Surface and volumetric examinations shall be performed, as applicable, on the length of the longitudinal weld(s) that fall within the examination volume of the intersecting circumferential weld(s). The volumetric examination at the intersection of circumferential and longitudinal welds will include both transverse and parallel scans within the length of the longitudinal weld that falls within the circumferential weld examination boundary."

ASME Section XI requires the examination of one pipe diameter, but not more than 12 inches, of Class 1 longitudinal piping welds. For Class 2 piping welds, the length of longitudinal weld required to be examined is 2.5 times the pipe thickness. These lengths are measured from the intersection with the circumferential weld. The licensee's proposed alternative is to examine only the portions of longitudinal weld contained within the examination volume of the

intersecting circumferential weld. This alternative is contained in Code Case N-524, *"Alternative Examination Requirements for Longitudinal Welds in Class 1 and Class 2 Piping,"* which has previously been found acceptable for use at other facilities.

Longitudinal welds are produced during the manufacture of the piping, not in the field as circumferential welds are. Consequently, the welds are fabricated under the strict guidelines specified by the manufacturing standard, which provides assurance of structural integrity. These welds have also been subjected to the preservice and initial inservice examinations, which provide additional assurance of structural integrity. To date, no significant loading conditions or material degradation mechanisms have been identified that specifically relate to longitudinal seam welds in Class 1, 2 and 3 nuclear plant piping. The most critical region of the longitudinal weld is the portion that intersects the circumferential weld. Since this region will be examined during the examination of the circumferential weld, the licensee's alternative provides an acceptable level of quality and safety. Therefore, the licensee's proposed alternative is authorized for Class 2 piping pursuant to 10 CFR 50.55a(a)(3)(i). The alternative is authorized for the second 10-year ISI interval or until such time as Code Case N-524 is published in a future revision of Regulatory Guide 1.147. At that time, the licensee should follow all provisions in Code Case N-524 with limitations issued in Regulatory Guide 1.147, if any.

Request for Relief No. I2R-25: ASME Code, Section XI, 2200(g) of the 1992 Addenda of ASME Section XI requires that when paint or coatings are reapplied, the condition of the new paint or coating shall be documented in the preservice examination records. Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee proposed, as an alternative, to examine paint and coatings in containment in accordance with existing plant requirements. The licensee stated:

> "The paint and coatings in the containment will be examined in accordance with existing plant requirements. If degradation of the coating is identified, additional measures will be applied to determine if the containment pressure boundary is affected. Although repairs to paint or coatings are not subject to the repair/replacement rules of ASME Section XI (see Inquiry 9722), repairs to the primary containment boundary, if required, would be conducted in accordance with Section XI Code rules."

The licensee has proposed to perform paint and coating examinations in accordance with existing plant requirements rather than performing a preservice examination of new paint or coatings as required by IWE-2200(g).

The licensee states that the procedures associated with existing plant requirements are in compliance with ANSI N101.4, *"Quality Assurance for Protective Coatings Applied to Nuclear Facilities,"* as required by Regulatory Guide 1.54. ANSI N101.4 provides detailed requirements concerning the coating materials, surface preparation of substrates, application of coating systems, coating inspection, and quality assurance documentation. Section 6 of ANSI N101.4 requires stringent inspection of the entire completed coating work by qualified coating inspection personnel. Section 7 of ANSI N101.4 requires that sufficient quality-assurance records and documents shall be maintained to furnish evidence of compliance with the procedures utilized. The staff determined that the requirements specified in ANSI N101.4

provide a detailed and conservative approach to the inspection and documentation of new coatings. Therefore, the staff concluded that the Braidwood Station procedures, which are in compliance with ANSI N101.4, provides an acceptable level of quality and safety. Therefore, the licensees proposed alternative, for examination of paints and coatings, is acceptable for protecting the steel surfaces of the Braidwood containment structures and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year ISI interval.

Request for Relief No. I2R-26: ASME Code, Section XI, IWE-2500(b) of the 1992 Addenda of ASME XI requires that when paint or coatings are to be removed, the paint or coatings shall be visually examined in accordance with Table IWE-2500-1 prior to removal. The licensee, in accordance with 10 CFR 50.55a(a)(3)(ii), proposed as an alternative to examine the paint and coatings in accordance with existing plant requirements. The licensee stated:

> "The paint and coatings in the containment will be examined in accordance with existing plant requirements. If degradation of the coating is identified, additional measures will be applied to determine if the containment pressure boundary is affected. Although repairs to paint or coatings are not subject to the repair/replacement rules of ASME Section XI, repairs to the primary containment boundary, if required, would be conducted in accordance with Section XI Code rules."

The licensee has proposed to perform paint and coating examinations in accordance with existing plant requirements rather than performing a visual examination of paint or coatings prior to removal as required by IWE-2500(b).

The licensee states that the procedures associated with existing plant requirements are in compliance with ANSI N101.4, "*Quality Assurance for Protective Coatings Applied to Nuclear Facilities*," as required by Regulatory Guide 1.54. ANSI N101.4 provides detailed requirements concerning the Coating Materials, Surface Preparation of Substrates, Application of Coating Systems, Coating Inspection, and Quality Assurance Documentation. ANSI N101.4 requires stringent inspection of the substrate surface preparation prior to re-application of coating material as well as inspection of the entire completed coating work by qualified coating inspection personnel. Section 7 of ANSI N101.4 requires that sufficient quality-assurance records and documents shall be maintained to furnish evidence of compliance with the procedures utilized.

The staff determined that the requirements specified in ANSI N101.4 provide a detailed and conservative approach to the inspection and documentation of new coatings. The Braidwood Station procedures, which are in compliance with ANSI N101.4, provide an acceptable level of quality and safety. Therefore, the staff determined that the licensees proposed alternative, for examination of paints and coatings, provides an acceptable level of protection for the steel surfaces of the Braidwood containment structures. The licensee's proposed alternative provides an acceptable level of quality and safety and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year ISI interval.

Request for Relief No. I2R-31, Revision 1: ASME Code, Section XI, IWA-5242(a) requires that insulation shall be removed from pressure retaining bolted connections for VT-2 visual examination in systems borated for the purpose of controlling reactivity. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed the following alternative to the Code requirement to remove insulation at bolted connections for VT-2 examination during system pressure testing. Specifically, the bolted connections are:

1(2)RC01R (Reactor Vessel Closure Studs and Nuts)
1(2)RC01BA-D (Steam Generator Closure Bolting/Studs and Nuts)

The licensee stated:

> "For the reactor vessel closure head and steam generator primary man way studs/bolting and closure nuts, a VT-2 visual examination shall be performed in accordance with the frequency required in Table IB.-2500-1 without the removal of insulation from the bolted connections during the system leakage test. The hold time requirement for this system leakage test shall be increased to a 4 hour hold time at system nominal operating pressure prior to the VT-2 visual examination to allow for leakage propagation from the insulation.
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> "In addition to the above VT-2 visual examination, the following examination will be performed:
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> > When the subject bolted connection(s) is(are) disassembled for normal maintenance during a refuel outage, an inspection for corrosion/wastage due to boric acid attack shall be conducted by the Station maintenance organization on all exposed bolting surface areas. If degraded condition is observed on the bolting material, structural evaluation and /or repair/replacement will be conducted in accordance with the applicable rules of IWA-3100.
> >
> > OR
> >
> > When the subjected bolted connection(s) is(are) NOT disassembled for normal maintenance during a refuel outage, a VT-2 visual examination, with the bolted connection(s) assembled and with the insulation removed, will be conducted with the system depressurized. If necessary, corrective measures shall be performed in accordance with the requirements of IWA-5250 or approved alternative."

The Code requires the removal of all insulation from pressure-retaining bolted connections in systems borated for the purpose of controlling reactivity when performing VT-2 visual examinations during system pressure tests. As an alternative, the licensee has proposed to perform the VT-2 visual examination with the insulation in place after a minimum 4-hour hold time in accordance with the frequency required in table IB.-2500-1 (each refueling outage). In addition, during refueling outages that require these components to be disassembled as part of normal maintenance, the bolting, including closure nuts, will be visually inspected on all

exposed surfaces by the station maintenance organization. In refueling outages where disassembly of the components is not required, the insulation will be removed for direct visual examination VT-2 of the bolting with the system depressurized.

The licensee's proposed alternative is similar to Code Case N-533, *"Alternative Requirements for VT-2 Visual Examination of Class 1 Insulated Pressure-Retaining Bolted Connections, Section XI, Division 1."* Code Case N-533 requires that:

(a) A system pressure test and VT-2 visual examination shall be performed each refueling outage without removal of insulation.

(b) Each refueling outage the insulation shall be removed from the bolted connection, and a VT-2 visual examination shall be performed. The connection is not required to be pressurized. Any evidence of leakage shall be evaluated in accordance with IWA-5250.

The licensee's proposed alternative includes the use of non-VT certified maintenance personnel to perform a visual examination on the subject components when disassembled. As stated by the licensee, during normal refueling outages the Reactor Pressure Vessel and Steam Generator Closure Studs and Nuts are likely to be disassembled. In addition, the licensee's proposal includes the use of maintenance personnel to perform visual examinations when the connections are disassembled. Therefore, it is probable that the bolting materials on these components will be inservice for long periods of time without a certified individual performing the required VT-2 examinations in an uninsulated condition. Requirement (b), as stated in Code Case N-533, may not be satisfied. The staff concluded that the licensee's proposed alternative, which includes the use of non-VT certified individuals for visual examinations, does not provide an acceptable level of quality and safety. Therefore, the licensee's proposed alternative is denied.

3.0 CONCLUSION

The staff has reviewed the licensee's submittals and concludes that for Request for Relief Nos. I2R-05, I2R-11, I2R-12, I2R-13, I2R-15, Revision 2, I2R-17, I2R-25, and I2R-26, the licensee's proposed alternatives provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i), Request for Relief Nos. I2R-11, I2R-12, I2R-13, I2R-25, I2R-26 are authorized for the second 10-year ISI interval. In addition, Request for Relief Nos.12R-05, I2R-15, Revision 2, and 12R-17 are authorized for the second 10-year ISI interval or until Code Cases N-416-1, N-509, and N-524, respectively, are published in a future revision of Regulatory Guide 1.147. At that time, the licensee should follow all provisions in Code Cases N-416-1, N-509, and N-524 with the limitations issued in Regulatory Guide 1.147, if any.

For Request for Relief No. I2R-31, Revision 1, the licensee has not supplied alternative examinations providing an acceptable level of quality and safety. Therefore, Request for Relief No. I2R-31, Revision 1, is denied.

Attachment: Technical Letter Report

Dated: October 26, 1998

TECHNICAL LETTER REPORT
ON THE SECOND 10-YEAR INTERVAL IN SERVICE INSPECTION
EXPEDITED REQUESTS FOR RELIEF
FOR
COMMONWEALTH EDISON COMPANY
BRAIDWOOD NUCLEAR POWER STATION UNITS 1 AND 2
DOCKET NUMBER: 50-456 and 50-457

1. INTRODUCTION

By letter dated April 17, 1998, the licensee, Commonwealth Edison Company, submitted its second 10-year IN SERVICE inspection (ISI) program for Braidwood Nuclear Power Station, Units 1 and 2. The licensee requested that the review of specific requests for relief be expedited for implementation in an upcoming outage corresponding with steam generator replacement activities. By letter dated August 3, 1998, the licensee submitted revision 1 of the IN SERVICE inspection program. Revision 1 included revisions to Request for Relief Nos. I2R-15 and I2R-31, and withdrawal of I2R-27. In a letter dated September 2, 1998, the licensee submitted revision 2 of the IN SERVICE inspection program. Revision 2 included a second revision to Request for Relief I2R-15. The Idaho National Engineering and Environmental Laboratory (INEEL) staff's evaluations of the subject expedited requests for relief are in the following section.

2. EVALUATION

The information provided by Commonwealth Edison Company in support of the requests for relief from Code requirements has been evaluated and the bases for disposition are documented below. The Code of record for the Braidwood Nuclear Power Station, Units 1 and 2, second 10-year ISI interval, which began July 28, 1998 and October 17, 1998, respectively, is the 1989 Edition of Section XI of the ASME Boiler and Pressure Vessel Code. The Containment portion of the ISI program was developed in accordance with the requirements of the 1992 Edition, 1992 Addenda of Section XI.

ATTACHMENT

A. Request for Relief No. I2R-05, Use of Code Case N-416-1, *Alternate Testing for Class 1, Class 2, and Class 3 Welded Repaired/Replaced Components*

Code Requirement—Section XI, Table IWA-4700(a) requires that a system hydrostatic test be performed in accordance with IWA-5000 after repairs by welding on the pressure-retaining boundary.

Licensee's Proposed Alternative—Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed to employ the rules in Code Case N-416-1 with the additional NDE requirements stated below as an alternative to Section XI requirements (as stated):

"As an alternate to the existing ASME Section XI requirements, Braidwood, Station will adopt the provisions of Code Case N-416-1, as approved by the Board of Nuclear Codes and Standards, with additional NDE requirements. Listed below are the proposed alternate provisions to be performed, which is a summary of Code Case N-416-1 requirements with additional NDE requirements imposed by Braidwood Station.

- "A VT-2 visual examination will be performed at nominal operating pressure and temperature in conjunction with a system leakage test in accordance with IWA-5000 of the 1992 Edition of Section XI. The examination will be performed prior to or immediately upon return of the component to service.
- "Non-Destructive Examination will be performed on the repair/replacement welds or welded areas with the methods and acceptance criteria of the applicable Subsection of the 1992 Edition of Section XI. In addition, when NDE is required by ND-5222 for Class 3 components, an additional surface examination will be performed on the root (pass) layer.
- "The use of this relief request shall be documented on the applicable NIS-2 Form.
- "If the previous version of Code Case N-416 were used to defer a Class 2 hydrostatic test, the deferred test may be eliminated when the requirements of this relief request are met. In addition, the NDE methods and acceptance criteria of the Code Edition and addenda used for the repair must be reconciled to those of the 1992 Edition of ASME Section III."

Licensee's Basis for Proposed Alternative—

"Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested on the basis that the proposed alternatives provide an acceptable level of quality and safety.

"Elevated pressure hydrostatic tests are difficult to perform and often represent a true hardship. Some of the difficulties associated with hydrostatic testing include:

- Complicated or abnormal valve line-ups to provide system draining, filling, venting, and system/component isolation.

- Relief valves with set points lower than the hydrostatic test pressure must be blocked closed, or removed and blank flanged. This process requires draining, refilling of the system prior to the test and draining, valve restoration, and refilling once more for system restoration. Improper blocking or gagging can result in damage to the relief valve.

- Valves that are not normally used for isolation are often required to provide pressure isolation for a hydrostatic test. In order to provide proper isolation, time consuming valve maintenance would be required prior to a hydrostatic test.

- The radiation exposure required to setup and perform a hydrostatic test is quite high in comparison to an operational pressure test due to time required for valve manipulation, filling and venting, valve maintenance, etc.

"The difficulties encountered in performing a hydrostatic pressure test are prohibitive when weighed against the benefits. Industry experience, which is supported by ComEd experience, shows that most through wall leakage is detected during system operation as opposed to during the elevated pressure tests associated with the ten-year hydrostatic test.

"Little benefit is gained from the added challenge to the piping system provided by an elevated pressure hydrostatic test when compared to an operational test. The piping stress experienced by a hydrostatic test does not include the significant stresses associated with the thermal growth and dynamic loading during operation or a design basis event. Therefore, the system is more likely to leak at operating conditions, due to operational dynamic and thermal loading, than during the careful, slow pressurization associated with a hydrostatic test.

"The acceptability of performing nominal operating pressure tests in lieu of hydrostatic tests is also supported by the recent approval by the Board of Nuclear Codes and Standards of ASME Code Case N-416-1, 'Alternate Pressure Test Requirement for Welded Repairs or Installation of Replacement Items by Welding for Class 1, 2, and 3 Systems, Section XI, Division 1.' This Code Case allows a system leakage test at nominal operating pressure and temperature, in accordance with IWA-5000 of, the 1992 Edition of Section XI, to be performed in lieu of a hydrostatic test, provided that Non Destructive Examination (NDE) of the weld(s) is performed in accordance with the methods and acceptance criteria of the applicable subsection of the 1992 Edition of Section III.

"Based on the above, Braidwood Station requests relief from the ASME Section XI Class 1, 2, and 3 repair/replacement elevated pressure hydrostatic testing requirements."

Evaluation—Section XI of the Code requires a system hydrostatic test to be performed in accordance with IWA-5000 after repairs by welding on the pressure-retaining boundary. The licensee proposes to implement the alternative to hydrostatic pressure tests contained in Code Case N-416-1 for Code Class 1, 2, and 3 repairs/replacements. In addition, the licensee will supplement the pressure test with an additional surface examination on the root pass layer of Class 3 repair/replacement welds or welded areas.

Code Case N-416-1 specifies that nondestructive examination (NDE) of the welds be performed in accordance with the applicable subsection of the 1992 Edition of Section III. This Code Case also allows a VT-2 visual examination to be performed at nominal operating pressure and temperature in conjunction with a system leakage test, in accordance with paragraph IWA-5000 of the 1992 Edition of Section XI. Comparison of the system pressure test requirements of the 1992 Edition of Section XI to those of the 1989 Edition of Section XI, the latest Code edition referenced in 10 CFR 50.55a, shows that:

- The test frequencies and pressure conditions are unchanged;
- The hold times either remained the same or increased;
- The terminology associated with the system pressure test requirements for all three Code classes has been clarified and streamlined; and
- The NDE requirements for welded repairs remain the same.

Hydrostatic testing only subjects the piping components to a small increase in pressure over the design pressure and, therefore, does not present a significant challenge to pressure boundary integrity. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leak detection during the examination of components under pressure rather than as a measure of the structural integrity of the components.

Following welding, the Code requires volumetric examination (depending on wall thickness) of repairs or replacements in Code Class 1 and 2 piping components, but only requires a surface examination of the final weld pass in Code Class 3 piping. There are no ongoing NDE requirements for Code Class 3 components except for VT-2 visual examination for leaks in conjunction with the 10-year hydrostatic tests and the periodic pressure tests. However, the INEEL staff believes that the examinations required by Code Case N-416-1 are commensurate for Class 3 systems when 1) a surface examination is performed on the root pass layer of butt and socket welds, and 2) a system pressure test at nominal operating pressure is performed.

Considering the previous acceptance of Code Case N-416 by the NRC for Class 2 components, and the supplemental surface examination on the root pass for Class 3 systems, it is concluded that the licensee's proposed alternative will provide an acceptable level of quality and safety. Therefore, it is recommended that the licensee's proposed alternative, to use Code Case N-416-1 with a supplemental surface examination on the root pass layer of butt and socket welds for Class 3 components, be authorized pursuant to 10 CFR 50.55a(a)(3)(i). The use of the Code Case should be authorized for the current interval or until such time as the Code Case is published in a future revision of Regulatory Guide 1.147. At that time, if the licensee intends to continue to implement this Code Case, the licensee should follow all provisions in Code Case N-416-1 with limitations issued in Regulatory Guide 1.147, if any.

B. Request for Relief No. I2R-11, Examination Category C-H, Items C7.30, C7.40, C7.70, and C7.80, Pressure Testing of Containment Penetration Piping Attached to Non-class Piping

Code Requirement—Section XI, Table IWC-2500-1, Examination Category C-H, Items C7.30, C7.40, C7.70, and C7.80, require a system leakage test at operating pressure for pressure retaining piping and valves.

Licensee's Proposed Alternative—In accordance with 10 CFR 50.55a(a)(3)(i), relief is requested on the basis that the proposed alternative would provide an acceptable level of quality and safety. The licensee stated:

"Braidwood Station will perform 10 CFR 50, Appendix J leakage tests as an optional alternative to the Section XI required pressure test on the subject primary reactor containment penetration piping and associated valves. When implementing the Appendix J leakage test and invoking this relief request, peak design pressure and procedures for the detection and location of through-wall flaws will be used."

Licensee's Basis for Proposed Alternative—

"Specifically, Braidwood Station requests relief to perform 10 CFR 50 Appendix J leakage testing in lieu of the pressure test required by ASME Section XI, Table IWC-2500-1, Examination Category C-H on the Code Class 2 Containment Penetration piping with attached nonclassed piping.

"The applicable components are piping lines and valves which are portions of non-safety related systems that penetrate the primary reactor containment. At each containment penetration, the process pipe is classified Code Class 2 and provided with isolation valves that are either locked shut during normal operation, capable of automatic closure, or capable of remote closure to support the containment safety function. The balance of piping outside the isolation valves is non-code and therefore outside the scope of the ASME Boiler & Pressure Vessel Code, Section XI. These components perform no other safety function. The only reason that the penetration piping is classified as Class 2 is because of its function as part of the containment pressure boundary. The remaining portion of the system is non-nuclear related and the integrity of the system in relation to its primary function is not within the scope of Section XI. Since containment integrity is the only safety related function, it is logical to test the Class 2 penetration portion of the system to the Appendix J criteria.

"The primary reactor containment integrity, including all containment penetrations, is periodically verified by performing leakage tests in accordance with 10 CFR 50, Appendix J. The Appendix J test frequency provides assurances that the containment pressure boundary is being maintained at an acceptable level while monitoring for deterioration of seals, valves and piping. If a through-wall flaw existed in the piping, the isolation valves located on both sides of the containment wall would prevent any release outside containment. Multiple through-wall flaws or leakage paths occurring simultaneously inside and outside of containment between the isolation valves in a pipe segment is unlikely. Each of the Code Class 2 lines and their associated isolation valves are tested during an Appendix J leakage test at a pressure not less than 47.8 psig (Unit 1) and 44.4 psig (Unit 2), which is peak calculated containment pressure. The Appendix J leakage tests are performed at intervals in accordance with the requirements of the Braidwood Technical Specifications.

"Performance of these Appendix J leak tests will verify the integrity of the subject Code Class 2 lines and valves at the Containment penetrations. The performance o ASME Section XI, Examination Category C-H pressure tests on these same lines will provide little, if any, additional verification of primary reactor containment integrity and impose a burden of duplicate testing. Duplicate testing results in a significant increase in total amount of work force and radiological exposure without a compensating increase in the level of quality or safety.

"Based upon the preceding information, Braidwood Station requests relief to use the Appendix J test as an optional alternative to ASME Section XI requirements for pressure testing the Code Class 2 containment penetration components on the basis that the Proposed Alternate Provisions provide an acceptable level of quality and safety. The proposed alternative is consistent with the requirements of Code Case N-522."

Evaluation—The Code requires that a VT-2 visual examination be performed during system pressure testing for Class 2 pressure-retaining piping. As an alternative, the licensee proposes to implement the requirements of 10 CFR 50, Appendix J, for the subject containment penetration piping. This alternative is contained in ASME Code Case N-522, *Pressure Testing of Containment Penetration Piping*. The subject piping is classified as Class 2 because it penetrates primary reactor containment and is considered an extension of the containment vessel. Since the piping on either side of these penetrations is non-class, the requirements of Appendix J are more appropriate than those of Examination Category C-H. Appendix J pressure tests verify the leak-tight integrity of the primary reactor containment and of systems and components that penetrate containment by local leak rate and integrated leak rate tests. In Appendix J pressure tests, containment isolation valves and connecting pipe segments must withstand the peak calculated containment internal pressure related to the maximum design pressure. In addition, Appendix J test frequencies provide assurance that the containment pressure boundary is being maintained at an acceptable level while monitoring for deterioration of seals, valves, and piping.

The licensee has committed to perform the Appendix J testing at no less than the peak calculated containment pressure and will use procedures to detect and locate through-wall flaws. The INEEL staff believes that an acceptable level of quality and

safety will be provided by the licensee's proposed alternative since it will test the subject penetrations for their intended function. Therefore, it is recommended that the licensee's proposed alternative pressure test be authorized, pursuant to 10 CFR 50.55a(a)(3)(i).

C. Request for Relief No. I2R-12, Paragraph IWA-5242(a), VT-2 Visual Examination of Insulated Components

Code Requirement—For Examination Category B-P, C-H, and D-A, IWA-5242(a) requires that insulation shall be removed from pressure-retaining bolted connections for VT-2 visual examination in systems borated for the purpose of controlling reactivity.

Licensee's Proposed Alternative—Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed the following alternative to the Code requirement to remove insulation at bolted connections for VT-2 examination during system pressure testing (as stated):

"For ASME Class 1 systems borated for the purpose of controlling reactivity, a system IN SERVICE leakage test shall be performed in accordance with the frequency required in Table IWB-2500 without removal of insulation from the bolted connections. The requirements for IN SERVICE leak tests shall be augmented with a minimum 4 hour hold time at system normal operating pressure prior to the VT-2 visual examination to allow for leakage propagation form the insulation. Additionally, the insulation shall be removed from Class I bolted connections and a VT-2 examination shall be conducted, with the system depressurized. The frequency for these depressurized VT-2 inspections shall be in accordance with the system examination frequencies specified in Table IWB-2500, Category B-P, each refueling outage, (except for those components whose inspection frequency are modified per pending Relief Request I2R-30). The proposed alternative is consistent with the requirements of Code Case N-533. These inspections shall be implemented through application of the Braidwood Station predefined surveillance program to assure they are performed within the prescribed time period.

"For ASME Class 2 and 3 systems borated for the purpose of controlling reactivity, a system pressure test shall be performed in accordance with the frequency required in Table IWC-2500 or IWD-2500, as applicable, without the removal of insulation from the bolted connections. The requirements for system pressure tests shall be augmented with a 4 hour hold time at system normal operating pressure

prior to the VT-2 visual examination to allow for leakage propagation from the insulation. Additionally, the insulation shall be removed from individual insulated Class 2 and 3 bolted connections and a VT-2 examination shall be conducted, with the system depressurized on an increased frequency. VT-2 examinations on each component will be performed on approximately 36 month frequencies, which coincides with plant refueling outages, not allowing the period between inspections on individual components to exceed 45 months (except for those components whose inspection frequencies are modified per pending Relief Request I2R-30). This increased frequency for individual components is more restrictive than the "Periodic Frequency" allowed by ASME Section XI for Class 2 and 3 systems described in Tables IWC-2500 or IWD-2500. These inspections shall be implemented through application of the Braidwood Station predefined surveillance program to assure they are performed within the prescribed time period.

"Regardless of whether a component is scheduled for examination or not, any evidence of leakage will result in evaluations for corrective measures in accordance with IWA-5250 (as modified for Braidwood Station by pending Relief Request 12R-13)."

Licensee's Basis for Proposed Alternative—

"Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested on the basis that the proposed alternative would provide an acceptable level of quality and safety. Specifically, relief is requested from the requirement to remove insulation at bolted connections for VT-2 examination coincident with system pressure testing for the following reasons:

1. "Code Class 1, 2 and 3 systems borated for the purpose of controlling reactivity are large, extensive systems covering many areas and elevations. Scaffolding is required to access many of the bolted connections. In addition, many of the bolted connections are located in difficult to access areas and in medium to high radiation areas. Insulation removal combined with scaffolding requirements will increase refuel outage durations, personnel exposure, financial costs and generation of radwaste associated with performance of VT-2 visual examinations.

2. "The VT-2 examination of Class I systems, primarily the Reactor Coolant System (RCS) piping and components which are located inside containment, are performed at plant Mode 3. As required by IWB-5221, the RCS is at normal operating pressure (≈2235 psig) and the temperature (≈557 °F). A significant portion of the Class 2 and 3 piping systems is also located in the containment and is VT-2 examined coincident with the Class 1 piping systems at plant Mode 3. Removal/reinstallation of insulation for Class 1, 2 and 3 systems poses significant radiological considerations.

3. "Performance of a visual VT-2 examination, removal/reinstallation of insulation, and assembly/disassembly of scaffolding at bolted connections

under these operating conditions also presents significant personnel safety considerations. At Braidwood Station, the Class 1 VT-2 examination, coincident with Class 2 and 3 examinations, is a refuel outage critical path activity and has a duration in the refuel outage schedule of 4 hours. The activities associated with erecting scaffold to access the bolted connection components and inspecting at operating pressure and temperature can add 4 to 5 days to this critical path activity. Therefore, in addition to the personnel safety and radiological considerations, insulation removal/reinstallation and scaffolding assembly/disassembly will have considerable impact in the refuel outage duration and subsequent return to service of the unit.

"The following Braidwood Station bolting examination commitments and material control programs in conjunction with the Proposed Alternative Provisions provide an acceptable level of safety and quality for bolted connections in systems borated for the purpose of controlling reactivity.

- "In response to NRC Generic Letter 88-05, Braidwood Station has established a program for Engineering to inspect all boric acid leaks discovered in the containment building and to evaluate the impact of those leaks on carbon steel or low alloy steel components. Any evidence of leakage, including dry boric acid crystals or residue, is inspected and evaluated regardless of whether the leak was discovered at power or during an outage. Issues such as the following are considered in the inspection and evaluation.

  1) Evidence of corrosion or metal degradation,
  2) Effect the leak may have on the pressure boundary,
  3) Possibility of boric acid traveling along the inside of insulation on piping, and
  4) Possibility of dripping or spraying on other components. Based on this evaluation, Braidwood Engineering initiates appropriate corrective actions to prevent reoccurrence of the leak and to repair, if necessary, any degraded materials or components."

Evaluation—The Code requires the removal of all insulation from pressure-retaining bolted connections in systems borated for the purpose of controlling reactivity when performing VT-2 visual examinations during system pressure tests. As an alternative, the licensee has proposed to perform the VT-2 visual examination with the insulation in place after a minimum 4-hour hold time. In addition, the insulation will be removed for direct visual examination according to the frequency requirements (each refueling outage prior to start-up) specified in IWB-2500-1, Category B-P for Class 1, and at approximately 36 month intervals (which coincide

with plant refueling outages) not allowing the period between inspections on individual components to exceed 45 months for Class 2 and 3 components.

The licensee's proposed alternative is essentially equivalent to Code Case N-533, *Alternative Requirements for VT-2 Visual Examination of Class 1 Insulated Pressure-Retaining Bolted Connections, Section XI, Division 1*, except the proposed alternative was extended to address Code Class 2 and 3 bolted connections. Code Case N-533 is currently under review by the NRC staff and has not yet been approved for use by incorporation into Regulatory Guide 1.147, *IN SERVICE Inspection Code Case Acceptability*.

For Class 1 systems, the licensee's proposed alternative provides a thorough approach to ensuring the leak-tight integrity of systems borated for the purpose of controlling reactivity. First, the 4-hour hold time allows any leakage to penetrate the insulation, thus provides a means of detecting any significant leakage with the insulation in place. Second, by removing the insulation each refueling outage for Class 1 components and at 36 month intervals for Class 2 and 3 components, the licensee will be able to detect minor leakage indicated by the presence of boric acid crystals or residue. This two-phase approach will provide an acceptable level of quality and safety for bolted connections in borated systems. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i) for use on Class 1, 2, and 3 systems.

D. Request for Relief No. I2R-13, IWA-5250(a)(2), Corrective Actions for Bolted Connections

Code Requirement—Section XI, IWA-5250(a)(2) requires that if leakage occurs at a bolted connection in ASME Section XI components, the bolting shall be removed, VT-3 examined for corrosion, and evaluated in accordance with IWA-3100.

Licensee's Proposed Alternative—Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed to use alternative requirements regarding corrective actions for leakage at bolted connections in lieu of the examination requirements defined in

IWA-5250(a)(2). The licensee stated:

"Braidwood Station 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 condition at Class 1, 2, and 3 bolted connections.

"When leakage is identified at bolted connections by visual, VT-2 examination during system pressure testing, an evaluation will be performed to determine the susceptibility of the bolting to corrosion and assess the potential for failure. The evaluation will, at a minimum, consider the following factors:

1) Bolting materials
2) Service age of the joint bolting materials
3) Leakage location
4) Leakage history at connection
5) Visual evidence of corrosion at connection (connection assembled)
6) Corrosiveness of process fluid
7) Plant/industry studies and history of similar bolting materials in a similar environment

"If any of the above parameters indicates a need for further examination, the bolt closest to the source of leakage shall be removed, receive a VT-1 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- 1 examination may be deferred to the next refueling outage. When the removed bolt has evidence of degradation, all remaining bolting shall be removed, VT-I examined, and evaluated in accordance with IWA-3100(a)."

Licensee's Basis for Proposed Alternative—

"Removal of pressure retaining bolting at mechanical connections for visual, VT-3 examination and subsequent evaluation in locations where leakage has been identified is not always the most prudent course of action to determine 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 the Owner to consider other factors which may indicate the condition of mechanical joint bolting. Braidwood Station considers this requirement to be unnecessarily prescriptive and restrictive.

"Other factors which should be considered when evaluating bolting condition when leakage has been identified at a mechanical joint include, but should not be limited to:

1) Bolting materials
2) Service age of joint bolting materials
3) Leakage history at connection

4) Leakage location
5) Visual evidence of corrosion at connection (connection disassembled)
6) Corrosiveness of process fluid
7) Plant / Industry studies of similar bolting materials in a similar environment

"Unnecessary removal of bolting might not always be the most prudent course of action. Situations frequently encountered at commercial nuclear plants such as Braidwood Station is the complete replacement of bolting materials (studs, bolts, nuts, washers, etc) at mechanical joints during plant outages. When the associated system process piping is pressurized during plant start-up, leakage is identified at these joints. The root cause of this leakage is most often due to thermal expansion of the piping and bolting materials at the joint and subsequent process fluid seepage at the joint gasket. Proper retorquing of the joint bolting, in most cases, stops the leakage. Removal of any of the joint bolting. to evaluate for corrosion would be unwarranted in this situation due to new condition of the bolting materials. ASME Section XI Interpretation X-1-92-01 has recognized this situation exists, and has clarified that the requirements of IWA-5250(a)(2) do not apply."

Evaluation—In accordance with IWA-5250(a)(2), if leakage occurs at a bolted connection, the bolting must be removed, VT-3 visually examined for corrosion, and evaluated in accordance with IWA-3100. In lieu of this requirement, the licensee has proposed to evaluate the bolting to determine its susceptibility to corrosion. The proposed evaluation will consider, as a minimum, bolting materials, the corrosive nature of the process fluid, the leakage location and history, the service age of the bolting materials, visual evidence of corrosion at the assembled connection and plant/industry studies of similar bolting materials in similar environments.

Based on the items included in the evaluation process, the INEEL staff believes that the evaluation proposed by the licensee presents a sound engineering approach and will provide an acceptable level of quality and safety. In addition, if the initial evaluation indicates the need for a more detailed analysis, the bolt nearest to the source of leakage will be removed, visually examined, and evaluated in accordance with IWA-3100(a). Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

E. Request for Relief No. I2R-15 Revision 2, Use of Code Case N-509, Alternate Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments, Section XI, Division 1

Code Requirement—The Code requires examination of integrally welded attachments as specified for Examination Categories B-H, B-K, C-C, D-A, D-B, and D-C. The Code stipulates volumetric or surface examinations, as appropriate, and the extent of examinations.

Licensee's Proposed Alternative— Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed to use Code Case N-509, *Alternate Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments, Section XI, Division 1*, in lieu of the requirements of the Code for Class 1, 2, and 3 integrally welded attachments. The licensee stated:

"The requirements of Code Case N-509 will be used to select and examine integrally welded attachments, with the exception to the requirement to inspect the integrally welded attachments associated with the component supports selected for examination under the 1990 Addenda, IWF-2510 (Reference footnote 5 of Category B-K and Category C-C Code Case N-509 tables). Braidwood is implementing Code Case N-491 for support selections and will inspect the integrally welded attachments associated with the component supports selected for examination under Code Case N-491. In addition to those conditions specified in Code Case N-509, a 10% minimum sample of integrally welded attachments for each item in each code class will be inspected. This minimum 10% sampling is consistent with Draft Regulatory Guide DG-1050, Revision 12 to Regulatory Guide 1.147, dated May 1997. The minimum 10% sample shall be distributed proportionally by system."

Licensee's Basis for Proposed Alternative—

"Relief is being requested to allow the use of alternate requirements for the examination and selection of Class 1, 2 and 3 integral attachments detailed in Code Case N-509, with exception to the requirement to inspect the integrally welded attachments associated with the component support selected for examination under the 1990 Addenda, IWF-2510 (Reference footnote 5 of Category B-K and Category C-C Code Case N-509 tables). The basis for this request is as follows:

1) No IN SERVICE flaws which would affect the structural integrity of any component or piping system have been detected as a result of the integrally welded attachment exams performed during the first interval at Braidwood Station.

2) Integral attachment failures have been very rare within the commercial nuclear power industry. Failures and IN SERVICE defects that have been detected are usually associated with support damage caused by a system transient or other abnormal events during operational periods. Therefore, degradation is typically identified during inspections that are performed after a system transient or other abnormal events which have occurred. Code Case N-509 requires the examination of integral attachments when deformation of the associated component support members is identified. This requirement will ensure degraded integral attachments are identified and therefore increase the level of quality and safety provided by these alternatives rules, as compared to the rules of the 1989 Edition of Section XI.

3) Significant amount of man-rem exposure and cost associated with the scheduled examination of Class 1, 2, and 3 integral attachments would be saved.

4) Contrary to the requirements specified in ASME Section XI 1989 Edition, the alternate selection criteria of Code Case N-509 does not impose a minimum thickness requirement for the examination of an integral attachment. Therefore, a larger population of integral attachments will be available for examination because the selection population will not be limited to those above an arbitrary thickness. This provision improves the quality and safety level established by these examinations.

5) The alternate rules of Code Case N-509 provide an acceptable level of quality and safety."

Evaluation—The licensee has proposed to apply the requirements of Code Case N-509 as an alternative to the Code requirements for the examination of integrally-welded attachments on Class 1, 2, and 3 piping and components. The licensee has also committed to supplement the Code Case with a minimum examination sample of 10% of integral attachments to non-exempt Class 1, 2, and 3 components. Considering that most of the Code examination requirements are based on sampling to ensure the detection of service-induced degradation, extending the sampling philosophy to the integral attachment welds will provide an equivalent level of quality and safety. Therefore, it is recommended that the alternative, to use Code Case N-509 with the minimum sample size of 10%, be

authorized pursuant to 10 CFR 50.55a(a)(3)(i). The use of this alternative should be authorized for the second 10-year interval at Braidwood Units 1 and 2, or until Code Case N-509 is approved for general use by reference in Regulatory Guide 1.147. After that time, the licensee must follow the conditions, if any, specified in the regulatory guide.

F. Request for Relief No. I2R-17, Use of Code Case N-524, *Alternative Examination Requirements for Longitudinal Welds in Class 1 and 2 Piping Section XI, Division 1*

Code Requirement—Section XI, Table IWC-2500-1, Examination Category C-F-1 and C-F-2, Items C5.12, and C5.52, require 100% surface and volumetric examination, as defined by Figure IWC-2500-7, for 2.5T of longitudinal piping welds from intersecting circumferential welds. Examination Category C-F-1 and C-F-2, Items C5.42, and C5.82, require 100% surface examination, as defined by Figure IWC-2500-12 and -13, for 2.5T of longitudinal piping welds from intersecting circumferential welds of pipe branch connections.

Licensee's Proposed Alternative—In accordance with 10 CFR 50.55a(a)(3)(i), the licensee proposed to implement the rules in Code Case N-524 for Class 2 piping. The licensee stated:

"Surface and volumetric examinations shall be performed, as applicable, on the length of the longitudinal weld(s) that fall within the examination volume of the intersecting circumferential weld(s). The volumetric examination at the intersection of circumferential and longitudinal welds will include both transverse and parallel scans within the length of the longitudinal weld that falls within the circumferential weld examination boundary."

Licensee's Basis for Proposed Alternative—

"Based on the following discussion, the performance of surface and volumetric examination on longitudinal piping welds has a negligible compensating effect on the quality or safety of Class 2 piping. In addition, there is little, if any, technical benefit associated with the performance of these examinations, and they result in a substantial man-rem exposure and cost.

1) "Throughout the nuclear industry, there has been no evidence of rejectable service induced flaws being attributed to longitudinal piping welds.

2) "During the first IN SERVICE inspection interval at the Braidwood Station, no IN SERVICE flaws have been detected in longitudinal piping welds.

3) "There are distinct differences between the processes used in the manufacturing of longitudinal and circumferential welds which enhance the integrity of longitudinal welds. First, longitudinal welds are typically manufactured under controlled shop conditions whereas circumferential welds are produced in the field under less ideal conditions. Secondly, longitudinal welds usually undergo heat treatment in the shop which improves their material properties and relieves the residual stresses created by welding. Finally, shop manufacturing inspections can be performed under more favorable conditions which further increase the confidence level of the longitudinal weld quality.

4) "During field installation of piping, the ends of the longitudinal welds may be affected during welding of the intersecting, circumferential field welds. This small area falls within the circumferential weld inspection boundaries. Therefore, the ends of the longitudinal welds will still be subject to examination.

5) "From an industry standpoint, there has been no evidence of longitudinal weld defects compromising safety at nuclear generating facilities.

6) "No significant loading conditions or known material degradation mechanisms have become evident to date which specifically relate to longitudinal seam welds in nuclear plant piping.

7) "There is man-rem exposure and significant cost associated with the inspection of Class 2 longitudinal piping welds.

8) "The alternative examinations proposed below provide an acceptable level of quality and safety without causing undue hardship or difficulties."

Evaluation—ASME Section XI requires the examination of one pipe diameter, but not more than 12 inches, of Class 1 longitudinal piping welds. For Class 2 piping welds, the length of longitudinal weld required to be examined is 2.5 times the pipe thickness. These lengths are measured from the intersection with the circumferential weld. The licensee's proposed alternative is to examine only the portions of longitudinal weld contained within the examination volume of the intersecting circumferential weld. This alternative is contained in Code Case

N-524, *Alternative Examination Requirements for Longitudinal Welds in Class 1 and Class 2 Piping*, which has previously been found acceptable for use at other facilities.

Longitudinal welds are produced during the manufacture of the piping, not in the field as circumferential welds are. Consequently, the welds are fabricated under the strict guidelines specified by the manufacturing standard, which provides assurance of structural integrity. These welds have also been subjected to the preservice and initial IN SERVICE examinations, which provide additional assurance of structural integrity. To date, no significant loading conditions or material degradation mechanisms have been identified that specifically relate to longitudinal seam welds in Class 1, 2, and 3 nuclear plant piping. The most critical region of the longitudinal weld is the portion that intersects the circumferential weld. Since this region will be examined during the examination of the circumferential weld, the licensee's alternative provides an acceptable level of quality and safety. Therefore, it is recommended that the licensee's proposed alternative be authorized for Class 2 piping pursuant to 10 CFR 50.55a(a)(3)(i).

G. Request for Relief No. I2R-25, Alternative Requirements for Preservice Examination of Paint and Coatings

Code Requirement—IWE-2200(g) of the 1992 Addenda of ASME XI requires that when paint or coatings are reapplied, the condition of the new paint or coating shall be documented in the preservice examination records.

Licensee's Proposed Alternative—In accordance with 10 CFR 50.55a(a)(3)(ii)[1], the licensee proposes to examine paint and coatings in containment in accordance with existing plant requirements. The licensee stated:

"The paint and coatings in the containment will be examined in accordance with

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1 Based upon discussions with the licensee and Project Manager on 8/11/98 evaluation of Request for Relief will be to 10 CFR 50.55a(a)(3)(i).

existing plant requirements. If degradation of the coating is identified, additional measures will be applied to determine if the containment pressure boundary is affected. Although repairs to paint or coatings are not subject to the repair/replacement rules of ASME Section XI, (see Inquiry 9722), repairs to the primary containment boundary, if required, would be conducted in accordance with Section XI Code rules."

Licensee's Basis for Proposed Alternative—

"Paint and coatings are not part of the containment pressure boundary under current Code rules because they are not associated with the pressure retaining function of the component, see ASME Section III, NE-2110(b)(5). The interiors of the Braidwood containment are painted to prevent rusting. Neither paint nor coatings contribute to the structural integrity or leak tightness of the containment. Furthermore the paint and coatings on the containment pressure boundary were not subject to Code rules when they were originally applied and are not subject to ASME Section XI rules for repair or replacement per IWA-4111(b)(5). Degradation or discoloration of the paint or coating materials on containment would be an indicator of potential degradation of the containment pressure boundary. Additional measures would have to be employed to determine the nature and extent of any degradation, if present. Paint or coating degradation would be revealed by the visual examinations conducted in accordance with the licensee's coating program. If degraded paint or coatings are detected, corrective measures would be applied.

"The process of applying paint or coatings at Braidwood Station is performed and controlled under currently existing station procedures. Braidwood Station Specification L-2831 provides the requirements for paints and coatings in Level 1 areas (Primary Containment). BwSC 2200-1 (Field Coating Procedure), BwSC 2200-2 (Field Coating Repair), and BwSC 2200-3 (Field Coating Personnel Qualifications) provide the requirements for coating application, repair and certification of inspectors. These procedures are in compliance with ANSI N101.4, as, required per Regulatory Guide 1.54. The ComEd Level III Coating Specialist is responsible for directing inspection activities as outlined in the Braidwood Station procedures."

Evaluation—The licensee has proposed to perform paint and coating examinations in accordance with existing plant requirements rather than performing a preservice examination of new paint or coatings as required by IWE-2200(g).

The licensee states that the procedures associated with existing plant requirements are in compliance with ANSI N101.4, *Quality Assurance for Protective Coatings Applied to Nuclear Facilities*, as required by Regulatory Guide 1.54. ANSI N101.4 provides detailed requirements concerning the coating materials, surface

preparation of substrates, application of coating systems, coating inspection, and quality assurance documentation. Section 6 of ANSI N101.4 requires stringent inspection of the entire completed coating work by qualified coating inspection personnel. Section 7 of ANSI N101.4 requires that sufficient quality-assurance records and documents shall be maintained to furnish evidence of compliance with the procedures utilized. The INEEL staff believes that the requirements specified in ANSI N101.4 provide a detailed and conservative approach to the inspection and documentation of new coatings. Therefore the Braidwood Station procedures, which are in compliance with ANSI N101.4, will provide an acceptable level of quality and safety. Therefore, the licensees proposed alternative, for examination of paints and coatings, is acceptable for protecting the steel surfaces of the Braidwood containment structures and should be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

H. Request for Relief No. I2R-26, Alternative Requirements for Examination of Paints and Coatings Prior to Removal

Code Requirement—IWE-2500(b) of the 1992 Addenda of ASME XI requires that when paint or coatings are to be removed, the paint or coatings shall be visually examined in accordance with Table IWE-2500-1 prior to removal.

Licensee's Proposed Alternative—In accordance with 10 CFR 50.55a(a)(3)(ii)[2], the licensee proposed to examine the paint and coatings in accordance with existing plant requirements. The licensee stated:

"The paint and coatings in the containment will be examined in accordance with existing plant requirements. If degradation of the coating is identified, additional measures will be applied to determine if the containment pressure boundary is affected. Although repairs to paint or coatings are not subject to the repair/replacement rules of ASME Section XI, repairs to the primary containment boundary, if required, would be conducted in accordance with Section XI Code rules."

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2 Based upon discussions with the licensee and Project Manager on 8/11/98 evaluation of Request for Relief will be to 10 CFR 50.55a(a)(3)(i)

Licensee's Basis for Proposed Alternative---

"Paint and coatings are not part of the containment pressure boundary under current Code rules because they are not associated with the pressure retaining function of the component IWA-4111(b)(5). The interiors of the Braidwood containment are painted to prevent rusting. Neither paint nor coatings contribute to the structural integrity or leak tightness of the containment. Furthermore the paint and coatings on the containment pressure boundary were not subject to Code rules when they were originally applied and are not subject to ASME Section XI rules for repair or replacement per IWA-4111(b)(5). Degradation or discoloration of the paint or coating materials on containment would be an indicator of potential degradation of the containment pressure boundary. Additional measures would have to be employed to determine the nature and extent of any degradation, if present.

"The process of applying paint or coatings at Braidwood Station is performed and controlled under currently existing station procedures. Braidwood Station Specification L-2831 provides the requirements for paints and coatings in Level 1 areas (Primary Containment). BwSC 2200-1 (Field Coating Procedure), BwSC 2200-2 (Field Coating Repair), and BwSC 2200-3 (Field Coating Personnel Qualifications) provide the requirements for coating application, repair and certification of inspectors. These procedures are in compliance with ANSI N101.4, as required per Regulatory Guide 1.54. The ComEd Level III Coating Specialist is responsible for directing inspection activities as outlined in the Braidwood Station procedures.

"The application of ASME Section XI rules for removal of paint or coatings is a burden without a compensating increase in quality or safety."

Evaluation---The licensee has proposed to perform paint and coating examinations in accordance with existing plant requirements rather than performing a visual examination of paint or coatings prior to removal as required by IWE-2500(b).

The licensee states that the procedures associated with existing plant requirements are in compliance with ANSI N101.4 *Quality Assurance for Protective Coatings Applied to Nuclear Facilities*, as required by Regulatory Guide 1.54. ANSI N101.4 provides detailed requirements concerning the Coating Materials, Surface Preparation of Substrates, Application of Coating Systems, Coating Inspection, and Quality Assurance Documentation. ANSI N101.4 requires stringent inspection of the substrate surface preparation prior to re-application of coating material as well

as inspection of the entire completed coating work by qualified coating inspection personnel. Section 7 of ANSI N101.4 requires that sufficient quality-assurance records and documents shall be maintained to furnish evidence of compliance with the procedures utilized. The INEEL staff believes that the requirements specified in ANSI N101.4 provide a detailed and conservative approach to the inspection and documentation of new coatings. The Braidwood Station procedures, which are in compliance with ANSI N101.4, should provide an acceptable level of quality and safety. Therefore, the staff considers the licensees proposed alternative, for examination of paints and coatings acceptable for protecting the steel surfaces of the Braidwood containment structures. The proposed alternative provides an acceptable level of quality and safety and should be approved pursuant to 10 CFR 50.55a(a)(3)(i).

I. Request for Relief No. I2R-27, Alternative Requirements For VT-2 Examination of Class MC or CC Components

Note: Request for Relief No. I2R-27 was withdrawn by the licensee per letter dated August 3, 1998.

J. Request for Relief No. I2R-31, Revision 1, Alternative Requirements for Insulation Removal at Bolted Connections in Systems Borated for the Purpose of Controlling Reactivity

Code Requirement— IWA-5242(a) requires that insulation shall be removed from pressure retaining bolted connections for VT-2 visual examination in systems borated for the purpose of controlling reactivity.

Licensee's Proposed Alternative—Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed the following alternative to the Code requirement to remove insulation at bolted connections for VT-2 examination during system pressure

testing. Specifically, the bolted connections are:

1(2)RC01R (Reactor Vessel Closure Studs and Nuts)

1(2)RC01BA-D (Steam Generator Closure Bolting/Studs and Nuts)

The licensee stated:

"For the reactor vessel closure head and steam generator primary man way studs/bolting and closure nuts, a VT-2 visual examination shall be performed in accordance with the frequency required in table IWB-2500-1 without the removal of insulation from the bolted connections during the system leakage test. The hold time requirement for this system leakage test shall be increased to a 4 hour hold time at system nominal operating pressure prior to the VT-2 visual examination to allow for leakage propagation from the insulation.

"In addition to the above VT-2 visual examination, the following examination will be performed:

When the subject bolted connection(s) is(are) disassembled for normal maintenance during a refuel outage, an inspection for corrosion/wastage due to boric acid attack shall be conducted by the Station maintenance organization on all exposed bolting surface areas. If degraded condition is observed on the bolting material, structural evaluation and /or repair/replacement will be conducted in accordance with the applicable rules of IWA-3100.

OR

When the subjected bolted connection(s) is(are) NOT disassembled for normal maintenance during a refuel outage, a VT-2 visual examination, with the bolted connection(s) assembled and with the insulation removed, will be conducted with the system depressurized. If necessary, corrective measures shall be performed in accordance with the requirements of IWA-5250 or approved alternative."

Licensee's Basis for Proposed Alternative—

"As required by IWA-5242(a), the removal of insulation at operating pressure and temperature from the reactor vessel and steam generator primary side man ways creates a safety hazard and does not provide an increased level of safety commensurate with the required actions because:

- These components are located in high radiation areas, removal of insulation in these areas would be dose intensive.

- As required by IWB-5221, the RCS is at normal operating pressure (≈2235 psig) and temperature (≈557 °F), personnel safety concerns exist when inspecting components in this condition with the insulation removed.

- Removal of insulation on the reactor vessel closure head requires use of the overhead crane to remove the large panels of mirror insulation. Work of this nature around the reactor vessel head while in Mode 3 could result in an unsafe condition.

"The Staff has recognized that meeting the insulation removal requirement specified in IWA-5242(a) is a hardship to utilities. As an alternative to the requirements IWA-5242(a), the performance of a VT-2 visual examination at pressure and temperature with the insulation on . along with a VT-2 visual examination of the assembled connection depressurized in an uninsulated state has been an acceptable approach. This approach for ASME Class 1 components is consistent with the provisions of ASME Code Case N-533.

"At Braidwood Station, the subject bolted connections are typically disassembled during each refueling outage through normal maintenance practices. When the bolted connections are disassembled, critical bolting surface areas subject to accelerated corrosion due to boric acid attack become accessible for inspection to identify degradation or wastage on the bolting surfaces. Upon completion of the inspection, the bolting condition will be documented and evaluated under the existing Station Problem Identification process. Applicable Section XI Acceptance Standards (i.e., IWA-3100) will be used to evaluate for bolting structural integrity. Appropriate maintenance procedures will be revised and enhanced as necessary to assure the aforementioned inspection and evaluation criteria are included.

"The proposed inspection by the Station maintenance organization is a more informative assessment of the existing bolting condition compared to the VT-2 exams called for in IWA-5242(a) and Code Case N-533. It will allow a complete examination of bolting surfaces and will ensure that existing degradation is properly identified and evaluated, as required. In addition, performing the bolting inspection in the disassembled state is more consistent with current ALARA practices.

"Braidwood Station has also implemented bolting examination and material control programs which provide additional assurance of maintaining structural integrity of bolted connections in borated systems:

- In response to NRC Generic Letter 88-05, Braidwood Station has established a program for the periodic inspection of the containment building for boric acid leaks and to evaluate the impact of such leaks on carbon steel or low alloy steel components. Issues such as the following are considered in the inspection and evaluation:

    1. Evidence of corrosion or metal degradation.
    2. Effect the leak may have on the pressure boundary.

3. Possibility of boric acid traveling along the inside of insulation on piping, and
4. Possibility of dripping or spraying on other components.

"Based on this evaluation, Braidwood Engineering initiates appropriate corrective actions to repair any degraded materials or components, as required, and to prevent reoccurrence of the leak.

"The frequency of these inspections conducted by VT-2 qualified examiners are performed at the beginning and end of each refueling outage.

Evaluation--The Code requires the removal of all insulation from pressure-retaining bolted connections in systems borated for the purpose of controlling reactivity when performing VT-2 visual examinations during system pressure tests. As an alternative, the licensee has proposed to perform the VT-2 visual examination with the insulation in place after a minimum 4-hour hold time in accordance with the frequency required in table IWB-2500-1 (each refueling outage). In addition, during refueling outages that require these components to be disassembled as part of normal maintenance, the bolting, including closure nuts, will be visually inspected on all exposed surfaces by the station maintenance organization. In refueling outages where disassembly of the components is not required, the insulation will be removed for direct visual examination VT-2 of the bolting with the system depressurized.

The licensee's proposed alternative is similar to Code Case N-533, *Alternative Requirements for VT-2 Visual Examination of Class 1 Insulated Pressure-Retaining Bolted Connections, Section XI, Division 1*. Code Case N-533 requires that:

(a) A system pressure test and VT-2 visual examination shall be performed each refueling outage without removal of insulation.

(b) Each refueling outage the insulation shall be removed from the bolted connection, and a VT-2 visual examination shall be performed. The connection is not required to be pressurized. Any evidence of leakage shall be evaluated in accordance with IWA-5250.

The licensee's proposed alternative includes the use of non VT certified maintenance personnel to perform a visual examination on the subject components when disassembled. As stated by the licensee, during normal refueling outages the Reactor Pressure Vessel and Steam Generator Closure Studs and Nuts are likely to be disassembled. The licensee's proposal includes the use of maintenance personnel to perform visual examinations when the connections are disassembled. Therefore, it is probable that the bolting materials on these components will be IN SERVICE for long periods of time without a certified individual performing the required VT-2 examinations in an uninsulated condition. Requirement (b), as stated in Code Case N-533, may not be satisfied. The INEEL staff does not believe that the licensee's proposed alternative, which includes the use of non VT certified individuals for visual examinations, provides an acceptable level of quality and safety. Therefore it is recommended that the licensee's proposed alternative not be authorized.

3. CONCLUSION

The INEEL staff has reviewed the licensee's submittal and concludes that for Requests for Relief Nos. I2R-05, I2R-11, I2R-12, I2R-13, I2R-15, I2R-17, I2R-25, I2R-26, the licensee's proposed alternatives will provide an acceptable level of quality and safety. Therefore, it is recommended that these proposed alternatives be authorized for the second interval pursuant to 10 CFR 50.55a(a)(3)(i). For Request for Relief No. I2R-31 the licensee has not supplied alternative examinations providing an acceptable level of quality and safety. Therefore, it is recommended that this alternative not be authorized. Request for Relief I2R-27 was withdrawn by the licensee in letter dated August 3, 1998.