March 28, 2000

Mr. Oliver D. Kingsley, President
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Commonwealth Edison Company
Executive Towers West III
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Downers Grove, IL 60515

SUBJECT: BRAIDWOOD - EVALUATION OF INSERVICE INSPECTION PROGRAM REQUEST FOR RELIEF I2R-32 (TAC NOS. MA6951 AND MA6952)

Dear Mr. Kingsley:

By letter dated October 21, 1999, Commonwealth Edison Company (ComEd) submitted inservice inspection (ISI) relief request I2R-32 for Braidwood, Unit 2, regarding reexamination of an indication first detected in October 1997. Specifically, ComEd proposed to use Code Case N-526 as an alternative to the successive reexamination requirements of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code). Code Case N-526 does not require the periodic reexaminations of an indication, provided all conditions of the code case are met.

The relief request was requested for Braidwood, Unit 2, only, but was submitted by ComEd on the Unit 1 and Unit 2 dockets because the inservice inspection program is common to both units.

The staff has reviewed relief request I2R-32 and concludes that the alternative is acceptable since all of the following conditions of Code Case N-526 have been met. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii) relief is granted for the first and second periods of the second 10-year inspection interval for Braidwood, Unit 2, on the basis that compliance with the code requirements would result in hardship without a compensating increase in the level of quality and safety.

The basis for authorizing the relief is stated in the enclosed Safety Evaluation.

Sincerely,

/RA/

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

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

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE SECOND 10-YEAR INSERVICE INSPECTION INTERVAL

REQUEST FOR RELIEF (I2R-32)

COMMONWEALTH EDISON COMPANY

BRAIDWOOD STATION, UNIT 2

DOCKET NO. STN 50-457

1.0 INTRODUCTION

Inservice inspection 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 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). Section 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

By letter dated October 21, 1999, Commonwealth Edison Company (ComEd, the licensee) submitted inservice inspection (ISI) relief request (RR) I2R-32 for Braidwood Unit 2 regarding reexamination of an indication first detected in October 1997. Specifically, the licensee proposed to use Code ASME Case N-526 as an alternative to the successive reexamination requirements of Section XI of the ASME Boiler and Pressure Vessel Code (IWB-2420(b)). Code Case N-526 does not require the periodic reexaminations of an indication, provided all of the following conditions are met:

- The flaw is characterized as subsurface by the Surface Proximity Rule figure (Figure 1) of Code Case N-526.
- The nondestructive examination (NDE) technique and evaluation that detected and characterized the flaw with respect to both sizing and location, are documented in a flaw evaluation report.
- The vessel containing the flaw is acceptable for continued service in accordance with IWB-3600, and the flaw is demonstrated acceptable for the intended service life of the vessel.

During the ISI of the Braidwood Unit 2 reactor vessel conducted in October 1997, an indication was detected in the nozzle shell to intermediate shell weld. The indication exceeded the

ASME Section XI acceptance standards in IWB-3510, but was evaluated using the analytical techniques in IWB-3600. By letter dated April 20, 1998, the NRC staff documented its review and evaluation in which it was determined that the shell weld was acceptable, without repair, for continued operation for the service life of the vessel.

The 1989 Edition, no addenda, of the ASME Code is the applicable edition for the second interval ISI program for Braidwood Unit 2. The 1989 Edition requires that the indication in the vessel shell be reexamined during the next three inspection periods. Relief is requested for the first and second periods of the second 10-year inspection interval for Braidwood Unit 2. The required volumetric examination of the shell weld which includes this indication area will be performed in the third period of this inspection interval.

The relief request was requested for Braidwood Unit 2 only, but was submitted by the licensee on the Unit 1 and Unit 2 dockets because the ISI program is common to both units.

2.0 BASIS FOR THE RELIEF REQUEST

2.1 Component for Which Relief is Requested

The component for which relief is requested is the reactor vessel nozzle shell to intermediate shell weld (weld number 2RV-01-004).

2.2 Code Requirement

1989 Edition, no Addenda, of the ASME Code:

> ASME Section XI, Table IWB-2500-1, Category B-A, “Pressure Retaining Welds in Reactor Vessel,” requires a volumetric examination on circumferential shell welds once per 10-year inspection interval. The deferral of this examination to the end of the interval is permissible.
>
> In addition, ASME Section XI, Subarticle IWB-2420, “Successive Inspections,” paragraph (b) states:
>
>> If flaw indications or relevant conditions are evaluated in accordance with IWB-3132.4 or IWB-3142.4, respectively, and the component qualifies as acceptable for continued service, the areas containing such flaw indications or relevant conditions shall be reexamined during the next three inspection periods listed in the schedules of the inspection programs of IWB-2410.

2.3 Content of the Relief Request

Relief is requested from performing reexaminations required by subarticle IWB-2420, paragraph (b), of Section XI of the ASME Boiler and Pressure Vessel Code. Specifically, relief is requested from performing the reexaminations in the first and second periods of this interval.

2.4 Basis for Relief

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested on the basis that conformance with the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The reactor must be defueled and the lower internals and the core barrel must be removed in order to examine the area containing the indication in the Unit 2 reactor vessel nozzle shell to intermediate shell weld.

The schedule time for these activities prior to the examination is approximately 2½ days. The vendor cost (not including site training, plant support, or potential critical path time) to perform the examination with automated tooling would be significantly higher for the first and second period than it would be for the third period. The major expense associated with the first and second inspection period reexaminations is the added equipment and personnel mobilization costs, and equipment assembly and disassembly costs.

Approximately one man-rem exposure is currently expended for automated equipment assembly and disassembly in the reactor cavity area. In addition to exposure, there are approximately 2 to 3 cubic feet of solid radwaste generated during performance of automated examinations in the reactor vessel. Under current Code rules, this personnel exposure and radwaste would be incurred three times (first, second, and third periods).

Therefore, in spite of the small scope, the performance of this examination requires a significant expenditure of costs and dose without a compensating increase in the level of quality and safety for this subsurface, non-service-induced indication.

2.5 Proposed Alternative Program

The licensee proposed the alternative provisions of Code Case N-526, which does not require the periodic reexaminations of IWB-2420(b) for this reactor vessel indication because all conditions stipulated in ASME Code Case N-526 are met:

- The flaw is characterized as subsurface by the Surface Proximity Rule figure (Figure 1) of Code Case N-526.
- The NDE technique and evaluation that detected and characterized the flaw with respect to both sizing and location, are documented in a flaw evaluation report.
- The vessel containing the flaw is acceptable for continued service in accordance with IWB-3600, and the flaw is demonstrated acceptable for the intended service life of the vessel.

Also, the licensee will be performing the examination required by ASME, Section XI, including this indication area, in the third period of the second 10-year inspection interval.

2.6 Applicable Time Period

Relief is requested for the first and second periods of the second 10-year inspection interval of the ISI program for Braidwood Unit 2. The required volumetric examination of the reactor

vessel nozzle shell to intermediate shell weld (weld number 2RV-01-004), including this indication area, will be performed in the third period of this interval.

3.0 EVALUATION

The staff evaluated the information provided by the licensee in its submittal for RR I2R-32 for Braidwood Unit 2, which included the basis for relief from the ASME Code reexamination requirements for an indication first found in October 1997. During the 1997 evaluation, the licensee used a handbook by Westinghouse, WCAP-12046, to determine the acceptability of the indication. This handbook provided a brief description of the methodology and flaw evaluation charts for various welds in the main coolant system and components of Braidwood Units 1 and 2. Fatigue crack growth was also considered. Since there was no evaluation chart for the subsurface flaw at the subject location, the licensee conservatively used the evaluation chart for a surface flaw. The staff assessed the licensee's designation of the detected flaw as subsurface, reviewed the flaw evaluation, and determined that the licensee applied the charts adequately in its flaw evaluation. By letter dated April 20, 1998, the NRC staff documented its review of the flaw evaluation in which it determined that the shell weld was acceptable, without repair, for continued operation for the service life of the vessel.

In RR I2R-32, the licensee proposed Code Case N-526 as an alternative to the ASME Code requirements for reexamination. All conditions stipulated in Code Case N-526 were made as detailed below:

- The flaw is characterized as subsurface by the Surface Proximity Rule figure (Figure 1) of Code Case N-526:

  With a distance from the (outer) surface of 0.46 inches and a flaw half depth of 0.305 inches, the indication in weld 2RV-01-004 is characterized as subsurface per the criteria of ASME Section XI, IWA-300, as well as by the more conservative surface proximity rule figure of Code Case N-526.

- The NDE technique and evaluation that detected and characterized the indication in weld 2RV-01-004 are documented in a flaw evaluation report.

  The report was originally submitted to the NRC in a letter dated October 15, 1997 from T. J. Tulon (Commonwealth Edison Company) to the USNRC Document Control Desk, subject: “Braidwood Nuclear Power Station, Unit 2, Reactor Vessel Inspection Shell Weld Indication Evaluation.”

- The vessel containing the flaw is acceptable for continued service in accordance with IWB-3600, and the flaw is demonstrated acceptable for the intended service life of the vessel.

  The results of the ASME Section XI, IWB-3600 evaluation for the indication in weld 2RV-01-004 showed that the Braidwood Unit 2 reactor vessel is acceptable, without repair, for the current 40-year license term of the plant. In its letter dated April 20, 1998, the staff also determined that the shell weld was acceptable, without repair, for continued operation for the service life of the vessel.

4.0 CONCLUSION

The staff concluded that conformance with the ASME Code requirements to reexamine weld 2RV-01-004 for the first and second period of this interval would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The staff also concluded that the licensee's proposed alternative to use Code Case N-526 provides reasonable assurance of the structural integrity of the reactor vessel. The licensee will be performing the examination required by ASME, Section XI, including the weld 2RV-01-004 indication area, in the third period of the second 10-year inspection interval. Therefore, the staff concludes that the alternative contained in RR I2R-32 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the code requirements would result in hardship without a compensating increase in the level of quality and safety.

5.0 REFERENCES

1. ME Boiler and Pressure Vessel Code, Section XI, Rules for In-Service Inspection of Nuclear Power Plant Components, American Society of Mechanical Engineers, 1989 Edition, Table IWB-2500-1, and subarticle IWB-2420.

2. Letter to USNRC Document Control Desk from T. J. Tulon (ComEd) Subject: "Braidwood Station Interval 2 Inservice Inspection Program: Relief Request I2R-32, Alternative Requirements for Successive Inspections of Unit 2 Reactor Vessel Weld," October 21, 1999.

3. Letter to the USNRC Document Control Desk from S. N. Bailey (USNRC) to O. D. Kingsley (ComEd), Subject: "Braidwood Unit 2 Reactor Vessel Inspection Shell Weld Indication Evaluation," April 20, 1998.

Principal Contributor: A. Lee

Date: March 28, 2000