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ComEd

June 16, 2000
BW000068

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

SUBJECT: Supplement to Reactor Vessel Material Surveillance Capsule W Test Results

REFERENCES:

(1) Letter from T.J. Tulon (ComEd) to U.S. NRC, "Reactor Vessel Material Surveillance Capsule W Test Results and Schedule for Completing Assessment of Reactor Vessel Materials Data," dated October 22, 1999.

(2) Letter from T.J. Tulon (ComEd) to U.S. NRC, "Reactor Vessel Material Surveillance Capsule W Test Results and Information Related to Assessments of Reactor Vessel Materials Data," dated April 26, 2000.

(3) WCAP-15316, "Analysis of Capsule W from Commonwealth Edison Company Braidwood Unit 1 Reactor Vessel Radiation Surveillance Program," Revision 1, October 1999.

(4) WCAP-15369, "Analysis of Capsule W from Commonwealth Edison Company Braidwood Unit 2 Reactor Vessel Radiation Surveillance Program," Revision 0, March 2000.

Pursuant to Appendix H to 10 CFR 50, "Reactor Vessel Material Surveillance Program Requirements," reactor vessel material surveillance capsule W was withdrawn from the Braidwood Unit 1 reactor vessel on October 22, 1998, and from the Braidwood Unit 2 reactor vessel on May 1, 1999, and tested in accordance with American Society for Testing

A008

and Materials (ASTM) E 185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels." Appendix H requires a summary technical report of the capsule test results to be submitted within one year of the date of capsule withdrawal. Reference 1 submitted the summary technical report for Braidwood Station, Unit 1, as documented in Reference 3 as an attachment to the letter. Reference 2 submitted the summary technical report for Braidwood Station, Unit 2, as documented in Reference 4 as an attachment to the letter.

As a result of a subsequent teleconference with NRC and Commonwealth Edison Company representatives on May 3, 2000, we are providing a supplement to Reference 1 and Reference 2 in the Attachment to this letter.

Should you have any questions concerning this letter, please contact Mr. T. W. Simpkin at (815) 458-2801, extension 2980.

Respectfully,

Timothy J. Tulon
Site Vice President
Braidwood Station

Attachment: Supplement to Reactor Vessel Material Surveillance Capsule W Test Results

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - Braidwood Station

ATTACHMENT 1

Supplement to Reactor Vessel Material Surveillance Capsule W Test Results

Pursuant to Appendix H to 10 CFR 50, "Reactor Vessel Material Surveillance Program Requirements," reactor vessel material surveillance capsule W was withdrawn from the Braidwood Unit 1 reactor vessel on October 22, 1998, and from the Braidwood Unit 2 reactor vessel on May 1, 1999. Appendix H requires a summary technical report of the capsule test results to be submitted within one year of the date of capsule withdrawal. Reference 1 submitted the summary technical report for Braidwood Station, Unit 1, as documented in Reference 3, and Reference 2 submitted the summary technical report for Braidwood Station, Unit 2, as documented in Reference 4.

As a result of a subsequent teleconference with NRC and Commonwealth Edison Company representatives on May 3, 2000, we are providing the following supplemental information to Reference 1 and Reference 2.

1. **Lead factor between the specimen fluence and the 1/4 T reactor pressure vessel location.**

   Braidwood Unit 1:

   U - 7.27
   X - 7.05
   W - 7.00
   V - 6.53
   Y - 6.53
   Z - 7.00

   Braidwood Unit 2:

   U - 7.41
   X - 6.41
   W - 6.94
   V - 6.51
   Y - 6.51
   Z - 6.94

2. **Descriptions of all beltline materials (chemical analysis, fabrication history, Charpy data, tensile data, drop-weight data and initial RT_{NDT}) and the basis for selection of the surveillance materials.**

<u>Braidwood Unit 1</u>:

A description of all beltline materials (i.e., chemical analysis, fabrication history, Charpy data, tensile data, drop-weight data and initial RT_{NDT}) is contained in the following documents.

- In Reference 3, Table 4-1, Heat Treatment History of the Braidwood Unit 1 Reactor Vessel Forgings and Weld Seam," provides the reactor vessel and surveillance material fabrication history.
- In Reference 3, Table 4-5, "Calculation of Best Estimate Cu and Ni Weight Percent Values for the Braidwood Unit 1 Weld Material Heat # 442011 (Using All Available Data)," and Table 4-6, " Calculation of Best Estimate Cu and Ni Weight Percent Values for the Braidwood Unit 1 Forging Material 49D867-1/49C813-1," provide the current chemical analysis for the surveillance materials.
- Letter from R. M. Krich (Commonwealth Edison Company) to U. S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding Reactor Pressure Vessel," dated September 3, 1998, provides the chemical analysis and the initial RT_{NDT} for the vessel beltline materials and demonstrates that the surveillance capsule materials are the limiting materials in the vessel for radiation embrittlement.
- WCAP-9807, "Commonwealth Edison Company Braidwood Station Unit No. 1 Reactor Vessel Radiation Surveillance Program," dated February 1981, provides the unirradiated Charpy and tensile data for the surveillance materials. This document also provides drop-weight test results from the reactor vessel Certified Material Test Reports (CMTRs) for the limiting material.

The basis for the materials selection is in the original document that defined the Braidwood Station Unit 1 Reactor Vessel Radiation Surveillance Program, i.e., WCAP-9807.

<u>Braidwood Unit 2</u>:

A description of all beltline materials (i.e., chemical analysis, fabrication history, Charpy data, tensile data, drop-weight data and initial RT_{NDT}) is contained in the following documents.

- In Reference 4, Table 4-1, Heat Treatment History of the Braidwood Unit 2 Reactor Vessel Forgings and Weld Seam," provides the reactor vessel and surveillance material fabrication history.
- In Reference 4, Table 4-5, "Calculation of Best Estimate Cu and Ni Weight Percent Values for the Braidwood Units 1 & 2 Weld Material Heat # 442011 (Using All Available Data)," and Table 4-6, " Calculation of Best Estimate Cu and Ni Weight Percent Values for the Braidwood Unit 2 Forging Material 50D102-1/50C97-1," provide the current chemical analysis for the surveillance materials.

- Letter from R. M. Krich (Commonwealth Edison Company) to U. S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding Reactor Pressure Vessel," dated September 3, 1998, provides the chemical analysis and the initial RT_{NDT} for the vessel beltline materials and demonstrates that the surveillance capsule materials are the limiting materials in the vessel for radiation embrittlement.
- WCAP-11188, "Commonwealth Edison Company Braidwood Station Unit No. 2 Reactor Vessel Radiation Surveillance Program," dated December 1986, provides the unirradiated Charpy and tensile data for the surveillance materials. This document also provides drop-weight test results from the reactor vessel CMTRs for the limiting material.

The basis for the materials selection is in the original document that defined the Braidwood Station Unit 2 Reactor Vessel Radiation Surveillance Program, i.e., WCAP-11188.

3. Differences between the fabrication history of the surveillance material and that of the reactor vessel material.

Braidwood Unit 1:

Any differences between the fabrication history of the surveillance material and that of the reactor vessel material is contained in Table 4-1 in Reference 3. Specifically, the difference between the surveillance material and the vessel material is the heat treatment. The post weld stress relief of the surveillance material closely simulated that of the vessel.

Braidwood Unit 2:

Any differences between the fabrication history of the surveillance material and that of the reactor vessel material is contained in Table 4-1 in Reference 4. Specifically, the difference between the surveillance material and the vessel material is the heat treatment. The post weld stress relief of the surveillance material closely simulated that of the vessel.

4. Discussion concerning certification of calibration of all equipment and instruments used in conducting the tests.

Braidwood Unit 1and Braidwood Unit 2:

All of the testing machines are calibrated to the requirements of American Society for Testing and Materials (ASTM) Standards. Records of the calibration and test procedures are retained by Westinghouse Electric Corp.

5. Trade name and model of the recording devices in the tensile tests.

Braidwood Unit 1:

The xy recorders used were Hewlett-Packard HP7035B and HP7046A recorders. In addition, the last three paragraphs on page 5-2 and the first paragraph on page 5-3 of Reference 3 also provide information on the tensile testing machine.

Braidwood Unit 2:

The xy recorders used were Hewlett Packard HP7035B and HP7046A recorders. In addition, the last four paragraphs on page 5-2 of Reference 4 also provide information on the tensile testing machine.

6. **Striking velocity, temperature conditioning and measuring devices, and a description of the procedure used in the inspection and calibration of the Charpy testing machine.**

Braidwood Unit 1 and Braidwood Unit 2:

Charpy testing was performed with a remotely actuated device. The remotely actuated device was used to remove the specimen from the bath and place it into the specimen fixture and is tested in less than five seconds as required by the applicable ASTM Standards. The maximum striking velocity of the tup was 16.8 ft/sec.

7. **Initial reference temperature and adjusted reference temperatures for the surveillance materials.**

Braidwood Unit 1:

The initial reference temperatures for the surveillance materials were not determined in accordance with American Society of Mechanical Engineers (ASME) Section III, Article NB-2300, since they were not required by ASTM E 185-73, "Standard Recommended Practice for Surveillance Tests for Nuclear Reactor Vessels." More specifically, drop weight tests required by ASME Section III, Article NB-2300, were not performed on the surveillance materials. However, complete Charpy transition curves were generated from the unirradiated Charpy specimens of the surveillance material. These Charpy transition curves are provided in Appendix C of Reference 3, and are used to determine the initial reference temperatures.

Table 5-9 of Reference 3 presents the unirradiated and irradiated 30 ft-lb transition temperatures, which are used as the initial and adjusted reference temperatures, respectively, for the surveillance materials.

Braidwood Unit 2:

The initial reference temperatures for the surveillance materials were not determined in accordance with ASME Section III, Article NB-2300, since they were not required by ASTM E 185-73. More specifically, drop weight tests required by ASME Section III, Article NB-2300, were not performed on the surveillance materials. However, complete Charpy transition curves were generated from the unirradiated Charpy specimens of the surveillance material. These Charpy transition curves are provided in Appendix C of Reference 4, and are used to determine the initial reference temperatures.

Table 5-9 of Reference 4 presents the unirradiated and irradiated 30 ft-lb transition temperatures, which are used as the initial and adjusted reference temperatures, respectively, for the surveillance materials.

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(4) WCAP-15369, "Analysis of Capsule W from Commonwealth Edison Company Braidwood Unit 2 Reactor Vessel Radiation Surveillance Program," Revision 0, March 2000.