



Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

August 8, 1994

Mr. William Russell, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington D.C. 20555

Attention: Document Control Desk

Subject: GL 92-01, "Reactor Vessel Structural Integrity" Data Update

Braidwood Station Units 1 and 2
(NPF-72/77; NRC Docket Nos. 50-456/457)

- Reference:
- 1) J. Bauer letter to W. Russell dated July 22, 1994, transmitting update on GL 92-01
 - 2) R. R. Assa letter to D. L. Farrar dated June 24, 1994, requesting verification of data pertaining to GL 92-01, "Reactor Vessel Structural Integrity"

Dear Mr. Russell:

By letter dated July 2, 1992 and November 19, 1993, Commonwealth Edison Company (Com Ed) provided its response to GL 92-01, Revision 1. In the referenced letter 2, the Nuclear Regulatory Commission (NRC) Staff requested the ComEd verify the previously supplied information, as this data will be entered into a Reactor Vessel Integrity Database.

In reference 1, ComEd requested that the Braidwood data verification/update be delayed until August 8, 1994, to allow for a complete and accurate verification of the subject data.

The attachment includes Braidwood's response to the reference 2 correspondence. In the summary tables, the changes from the data transmitted in reference 2 are clearly indicated.

Please address any comments or questions regarding this matter to this office.

Sincerely,

Denise M. Saccomando

Nuclear Licensing Administrator

cc: R. R. Assa, Braidwood Project Manager, NRR
S. G. Dupont, Senior Resident Inspector - Braidwood
B. Clayton, Branch Chief - Region III
Office of Nuclear Facility Safety - IDNS

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Attachment

Braidwood Units 1 and 2
Response to NRC Generic Letter 92-01, Revision 1

Introduction

This report provides a response to the Generic Letter 92-01, Revision 1, closure letter recently issued by the NRC for Commonwealth Edison Company's Braidwood Units 1 and 2. The following is the full Data Summary Tables for Pressurized Thermal Shock and Upper-Shelf Energy. Those values that are unchanged are shown in the shaded boxes. Revised values are indicated in the unshaded boxes.

Table 2-1. Braidwood Unit 1 -- Data Summary for Pressurized Thermal Shock Calculation

Beltline Material	Heat No.	IS Neutron Fluence at 32 EFPY	IRT _{NET} F	Method of Determin. IRT _{NET}	Chemistry Factor	Method of Determin. CF	%Cu	%Ni
Lower Nozzle Belt Forging	5P-7016	6.82E+18 ^(a)	+10 ^(b)	Plant Specific	26	RG1.99 Table 2	0.04 ^(b)	0.71 ^(b)
Upper Shell Forging	49C344-1-1/ 49D383-1-1	3.03E+19 ^(a)	-30 ^(b)	Plant Specific	31	RG1.99 Table 2	0.05 ^(b)	0.73 ^(b)
Lower Shell Forging	49D867-1-1/ 49C813-1-1	3.03E+19 ^(a)	-20 ^(b)	Plant Specific	20	RG1.99 Table 2	0.03 ^(b)	0.73 ^(b)
WF-645 Upper Circ. Weld	H4498	6.82E+18 ^(a)	-30 ^(b)	Plant Specific	41	RG1.99 Table 1	0.03 ^(b)	0.50 ^(b)
WF-562 Middle Circ. Weld	442011	3.03E+19 ^(a)	+40 ^(b)	Plant Specific	41	RG1.99 Table 1	0.03 ^(b)	0.65 ^(b)
WF-653 Lower Circ. Weld	31401	<1.00E+17 ^(a)	-40 ^(b)	Plant Specific	150.8	RG1.99 Table 1	0.19 ^(b)	0.56 ^(b)

NOTES:

- a. Fluence data are from WCAP-12685, "Analysis of Capsule U from the Commonwealth Edison Company Braidwood Unit 1 Reactor Vessel Surveillance Program," August 1990.
- b. Chemical compositions and initial RT_{NET} data for all materials are from the July 2, 1992 letter from M. A. Jackson to T. E. Murley, Subject: Braidwood Station, Units 1 and 2.

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Table 2-2. Braidwood Unit 1 -- Data Summary for Upper-Shelf Energy Calculation

Beltline Material	Heat No.	Material Type	1/4T USE at 32 EFPY	1/4T Neutron Fluence at 32 EFPY	Unirrad. USE	Method of Determin. Unirrad. USE
Lower Nozzle Belt Forging	5P-7016	A 508-2	137 ^(a)	4.09E+18 ^(d)	162 ^(e)	Direct
Upper Shell Forging	49C344-1-1/ 49D383-1-1	A 508-3	93 ^(a)	1.66E+19 ^(d)	118 ^(f)	Direct
Lower Shell Forging	49D867-1-1/ 49C813-1-1	A 508-3	107 ^(a)	1.66E+19 ^(d)	136 ^(e)	Direct
WF-645 Upper Circ. Weld	H4498	Linde 80, SAW	75 ^(b)	4.09E+18 ^(d)	87 ^(e)	Direct
WF-562 Middle Circ. Weld	442011	Linde 80, SAW	55 ^(b)	1.66E+19 ^(d)	70 ^(e)	Direct
WF-653 Lower Circ. Weld	31401	Linde 80, SAW	--- ^(c)	<1.00E+17 ^(d)	79 ^(e)	Direct

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NOTES FOR TABLE 2-2:

- a. EOL USE values for the forgings were calculated using Regulatory Guide 1.99, Revision 2, Figure 2, assuming the lower limiting value of 0.1% copper for base metal.
- b. EOL USE values for the welds were calculated using Regulatory Guide 1.99, Revision 2, Figure 2, assuming the lower limiting value of 0.05% copper for welds.
- c. EOL fluence is below the limits of the Figure 2 curves defined in Regulatory Guide 1.99, Revision 2.
- d. Fluence data are from WCAP-12685, "Analysis of Capsule U from the Commonwealth Edison Company Braidwood Unit 1 Reactor Vessel Surveillance Program," August 1990.
- e. UUSE data are from the November 19, 1993 letter from T. W. Simpkin to T. E. Murley, Braidwood Station Units 1 and 2, Response to Request for Additional Information Regarding NRC Generic Letter 92-01.
- f. UUSE data for forging 49C344-1-1/49D383-1-1 is from the July 2, 1992 letter from M. A. Jackson to T. E. Murley, Subject: Braidwood Station, Units 1 and 2.

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Table 2-3. Braidwood Unit 2 -- Data Summary for Pressurized Thermal Shock Calculation

Beltline Material	Heat No.	IS Neutron Fluence at 32 EFPY	IRT _{NDT} F	Method of Determin. IRT _{NDT}	Chemistry Factor	Method of Determin. CF	%Cu	%Ni
Lower Nozzle Belt Forging	5P-7056	6.82E+18 ^(a)	+30 ^(b)	Plant Specific	26	RG1.99 Table 2	0.04 ^(b)	0.90 ^(b)
Upper Shell Forging	49D963-1-1/ 49C904-1-1	3.03E+19 ^(a)	-30 ^(b)	Plant Specific	20	RG1.99 Table 2	0.03 ^(b)	0.71 ^(b)
Lower Shell Forging	50D102-1-1/ 50C97-1-1	3.03E+19 ^(a)	-30 ^(b)	Plant Specific	37	RG1.99 Table 2	0.06 ^(b)	0.75 ^(b)
WF-645 Upper Circ. Weld	H4498	6.82E+18 ^(a)	-30 ^(b)	Plant Specific	41	RG1.99 Table 1	0.03 ^(b)	0.50 ^(b)
WF-562 Middle Circ. Weld	442011	3.03E+19 ^(a)	+40 ^(b)	Plant Specific	41	RG1.99 Table 1	0.03 ^(b)	0.65 ^(b)
WF-696 Lower Circ. Weld	1084-18	<1.00E+17 ^(a)	-16 ^(b)	Plant Specific	54	RG1.99 Table 1	0.04 ^(b)	0.60 ^(b)

NOTES:

- a. Fluence data are from WCAP-12845, "Analysis of Capsule U from the Commonwealth Edison Company Braidwood Unit 2 Reactor Vessel Surveillance Program," March 1991.
- b. Chemical compositions and initial RT_{NDT} data for all materials are from the July 2, 1992 letter from M. A. Jackson to T. E. Murley, Subject: Braidwood Station, Units 1 and 2.

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Table 2-4. Braidwood Unit 2 -- Data Summary for Upper-Shelf Energy Calculation

Beltline Material	Heat No.	Material Type	1/4T USE at 32 EFPY	1/4T Neutron Fluence at 32 EFPY	Unirrad. USE	Method of Determin. Unirrad. USE
Lower Nozzle Belt Forging	5P-7056	A 508-2	109 ^(a)	4.09E+18 ^(d)	128 ^(e)	Direct
Upper Shell Forging	49D963-1-1/ 49C904-1-1	A 508-3	94 ^(a)	1.66E+19 ^(d)	119 ^(f)	Direct
Lower Shell Forging	50D102-1-1/ 50C97-1-1	A 508-3	118 ^(a)	1.66E+19 ^(d)	150 ^(e)	Direct
WF-645 Upper Circ. Weld	H4498	Linde 80, SAW	75 ^(b)	4.09E+18 ^(d)	87 ^(e)	Direct
WF-562 Middle Circ. Weld	442011	Linde 80, SAW	55 ^(b)	1.66E+19 ^(d)	70 ^(e)	Direct
WF-696 Lower Circ. Weld	1084-18	Linde 80, SAW	--- ^(c)	<1.00E+17 ^(d)	78 ^(e)	Direct

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NOTES FOR TABLE 2-4:

- a. EOL USE values for the forgings were calculated using Regulatory Guide 1.99, Revision 2, Figure 2, assuming the lower limiting value of 0.1% copper for base metal.
- b. EOL USE values for the welds were calculated using Regulatory Guide 1.99, Revision 2, Figure 2, assuming the lower limiting value of 0.05% copper for welds.
- c. EOL fluence is below the limits of the Figure 2 curves defined in Regulatory Guide 1.99, Revision 2.
- d. Fluence data are from WCAP-12845, "Analysis of Capsule U from the Commonwealth Edison Company Braidwood Unit 2 Reactor Vessel Surveillance Program," March 1991.
- e. UUSE data are from the November 19, 1993 letter from T. W. Simpkin to T. E. Murley, Braidwood Station Units 1 and 2, Response to Request for Additional Information Regarding NRC Generic Letter 92-01.
- f. UUSE data for forging 49D963-1-1/49C904-1-1 is from the July 2, 1992 letter from M. A. Jackson to T. E. Murley, Subject: Braidwood Station, Units 1 and 2.

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PRESSURIZED THERMAL SHOCK AND USE TABLES FOR ALL PWR PLANTS

NOMENCLATURE

Pressurized Thermal Shock Table

- Column 1: Beltline material location identification.
- Column 2: Beltline material heat number; some welds that a single-wire or tandem-wire process has been reported, (s) indicates single wire was used in the SAW process, (T) indicates tandem wire was used in the SAW process.
- Column 3: End-of-life (EOL) neutron fluence at vessel inner wall; cited directly from inner diameter (ID) value reported in the latest submittal (GL 92-01, PTS, or P/T limits submittals).
- Column 4: Unirradiated reference temperature.
- Column 5: Method of determining unirradiated reference temperature (IRT).

Plant-Specific

This indicates that the IRT was determined from tests on material removed from the same heat of the beltline material.

Generic

This indicates that the unirradiated reference temperature was determined from the mean value of tests on material of similar types.

- Column 6: Chemistry factor for irradiated reference temperature evaluation.
- Column 7: Method of determining chemistry factor.

RG1.99 Table 1 or 2

This indicates that the chemistry factor was determined from the chemistry factor tables in Regulatory Guide 1.99, Revision 2.

Calculated

This indicates that the chemistry factor was determined from surveillance data via procedures described in Regulatory Guide 1.99, Revision 2.

- Column 8: Copper content; cited directly from licensee value except when more than one value was reported. (Staff used the average value in the latter case.)
- Column 9: Nickel content; cited directly from licensee value except when more than one value was reported. (Staff used the average value in the latter case.)

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Upper-Shelf Energy Table

- Column 1: Beltline material location identification.
- Column 2: Beltline material heat number; some welds that a single-wire or tandem-wire process has been reported, (s) indicates single wire was used in the SAW process, (T) indicates tandem wire was used in the SAW process.
- Column 3: Material type; plate types include A 533B-1, A 302B, A 302B Mod.; forging types include A 508-2 and A508-3; weld types include SAW welds using Linde 80, 0091, 124, 1092, ARCOS-B5 flux, Rotterdam welds using Grau Lo, SMIT 89, LW 320, and SAF 89 flux, and SMAW welds using no flux.
- Column 4: EOL upper-shelf energy (USE) at T/4; calculated by using the EOL fluence and either the copper value or the surveillance data. (Both methods are described in Regulatory Guide 1.99, Revision 2.)
- Column 5: EOL neutron fluence at T/4 from vessel inner wall; cited directly from T/4 value or calculated by using Regulatory Guide 1.99, Revision 2, neutron fluence attenuation methodology from the ID value reported in the latest submittal (GL 92-01, PTS, or P/T limits submittals).
- Column 6: Unirradiated USE
- Column 7: Method of determining unirradiated USE.

Direct

For forgings, this indicates that the unirradiated USE was from specimens oriented in the weak direction. For welds, this indicates that the unirradiated USE was from test data.

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