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VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

November 19, 1999

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 99-452A
NL&OS/ETS R1
Docket Nos. 50-338
50-339
50-280
50-281
License Nos. NPF-4
NPF-7
DPR-32
DPR-37

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
SURRY POWER STATION UNITS 1 AND 2
EVALUATION OF REACTOR VESSEL MATERIALS SURVEILLANCE DATA

In a September 10, 1999 letter (Serial No. 99-452), Virginia Electric and Power Company (Virginia Power) provided a vendor report documenting the results of the North Anna Unit 1 Capsule W analysis. The vendor report included a preliminary evaluation of the analysis results. Virginia Power committed to provide a detailed evaluation of available reactor vessel materials surveillance data, including that obtained from North Anna Unit 1 Capsule W, by November 30, 1999. The attached evaluation fulfills this commitment.

At the time of the September 10, 1999 letter, Virginia Power anticipated no change to the Technical Specification for reactor coolant system (RCS) pressure/temperature (P/T) operating limits or Low Temperature Overpressure Protection System (LTOPS) setpoints based on a preliminary assessment of North Anna Unit 1 Capsule W results. However, as the attached detailed evaluation demonstrates, a change to the Technical Specifications RCS P/T limits and LTOPS setpoints is required. Under existing regulatory analytical requirements, the limiting North Anna Unit 1 reactor vessel beltline material is predicted to exceed the design basis RT_{NDT} value in May 2001. Therefore, pursuant to 10 CFR 50 Appendix G, Virginia Power will provide a licensing submittal with revised North Anna Unit 1 Technical Specification RCS P/T limits and LTOPS setpoints by June 30, 2000.

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Attached for your review is a detailed evaluation of available surveillance data applicable to North Anna Units 1 and 2 and Surry Units 1 and 2, including that obtained from North Anna 1 Capsule W and the B&W Owners Group (BWOG) Master Integrated Reactor Vessel Surveillance Program (MIRVSP) Capsule W-1. It is anticipated that this submittal will be used to update the NRC's Reactor Vessel Integrity Database (RVID).

If you have further questions or require additional information, please contact us.

Very truly yours,

Leslie N. Hartz
Vice President - Nuclear Engineering and Services

Commitments made in this letter:

Virginia Power will provide a licensing submittal with revised North Anna Unit 1 Technical Specifications P/T limits and LTOPS setpoints by June 30, 2000.

Attachment with Appendix

cc: U. S. Nuclear Regulatory Commission
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EVALUATION OF NORTH ANNA UNIT 1 CAPSULE W AND BWOG MASTER INTEGRATED REACTOR VESSEL SURVEILLANCE PROGRAM (MIRVSP) CAPSULE W-1 NORTH ANNA AND SURRY UNITS 1 AND 2

Virginia Electric and Power Company

Appendix A
SURVEILLANCE PROGRAM (MIRVSP) CAPSULE W-1
NORTH ANNA AND SURRY UNITS 1 AND 2

Virginia Electric and Power Company

BACKGROUND

By letter dated September 10, 1999 (1), Virginia Power committed to provide a detailed evaluation of the North Anna Unit 1 Capsule W results (2) to the NRC. This evaluation fulfills this commitment. The evaluation considers the impact of the North Anna 1 Capsule W results on (a) the licensing basis reactor coolant system (RCS) pressure/temperature (P/T) limit curves, (b) the associated Low Temperature Overpressure Protection System (LTOPS) setpoint and enabling temperature, and (c) 10 CFR 50.61 Pressurized Thermal Shock (PTS) screening calculations. A similar evaluation of the B&W Owners Group (BWOG) Master Integrated Reactor Vessel Surveillance Program (MIRVSP) Capsule W-1 analysis results (3) is provided herein. It is anticipated that the results of these detailed evaluations will be used to update the NRC's Reactor Vessel Integrity Database (RVID). Revised RVID data tables for North Anna Units 1 and 2 and Surry Units 1 and 2, and a discussion of changes relative to RVID Version 2.0.5 (Data Update on 6/9/99) are presented herein. The tables presented in Appendix A include the proposed RVID modifications identified in Reference (14).

DISCUSSION

10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events" (4), requires that licensees "consider plant specific information that could affect the level of embrittlement. This information includes but is not limited to the reactor vessel operating temperature and any related surveillance program results." A footnote to this requirement clarifies that "Surveillance program results means any data that demonstrates the embrittlement trends for the limiting beltline material, including but not limited to data from test reactors or from surveillance programs at other plants with or without surveillance programs integrated per 10 CFR 50, Appendix H." Surveillance program results have been obtained recently from the North Anna Unit 1 plant-specific surveillance program (Capsule W) and from the BWOG MIRVSP (Capsule W-1). The purpose of this evaluation is to integrate this recently obtained data into the analyses that demonstrate compliance with 10 CFR 50 Appendix G, "Fracture Toughness Requirements," and 10 CFR 50.61. Analyses that consider reactor vessel surveillance data include (a) RCS P/T limit curves, (b) the LTOPS setpoint and enabling temperature, and (c) 10 CFR 50.61 PTS screening calculations.

The evaluation documented herein considers the impact of the newly acquired surveillance data on licensing basis analyses in a manner consistent with applicable regulatory guidance. Specifically, the calculation of the Reference Temperature for the Nil Ductility Transition (RT_{NDT}) is performed in accordance with Regulatory Guide 1.99 Revision 2 (5), and the regulatory guidance provided in the meeting minutes from the November 12, 1997 NRC/Industry meeting on reactor vessel integrity (6). PTS screening calculations were performed in accordance with 10 CFR 50.61 (4). Evaluation results are presented in a format consistent with the data requirements of the NRC's Reactor Vessel Integrity Database (RVID).

DISCUSSION OF CHANGES TO PREVIOUSLY REPORTED INFORMATION

NORTH ANNA UNITS 1 AND 2

Revised RVID data tables for North Anna Units 1 and 2 are presented in Appendix A. Shaded cells indicate a changed value relative to the RVID Version 2.0.5 (data update on 6/9/99). The following changes have been incorporated into the revised tables:

North Anna Unit 1 Lower Shell Forging, Heat No. 990400/292332

- The RG 1.99 Revision 2 Position 2.1 chemistry factor (CF) calculation includes the North Anna Unit 1 Capsule W analysis results (2).
- The CF calculation combines the 30 ft-lb transition temperature shift results from axially and tangentially oriented Charpy specimens.
- The calculated copper and nickel composition of the surveillance materials includes the North Anna Unit 1 Capsule W analysis results (2).
- Plant-specific irradiation temperature values are presented for each surveillance capsule.
- The CF calculation uses surveillance capsule fluence values from WCAP-14044 (8).
- The CF calculation uses measured values of 30 ft-lb transition temperature shift determined by hyperbolic tangent curve-fit, as documented in the North Anna Unit 1 Capsule W analysis report (2).
- Because the surveillance data were obtained from the North Anna Unit 1 plant-specific surveillance program, and because the surveillance material in question is base metal, temperature and chemistry corrections are not applied in the credibility determination or in the application of surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).
- The surveillance data were determined to be non-credible. However, the data were within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve based on a CF for the average surveillance material chemical composition. Therefore, the lesser of the Position 1.1 and Position 2.1 CF values is applied to the beltline material with a full margin term. This is consistent with the guidance presented in Reference (9).

North Anna Unit 1 Nozzle to Intermediate Shell Weld 05A (OD 94%), Heat No. 25295

- Sequoyah Unit 1 surveillance program data are applied to the North Anna Unit 1 nozzle to intermediate shell weld 05A (OD 94%). The Sequoyah Unit 1 data are documented in Reference (2).
- The CF calculation uses surveillance capsule fluence values from WCAP-14044 (8).
- The CF calculation uses measured values of 30 ft-lb transition temperature shift determined by hyperbolic tangent curve-fit, as documented in the North Anna Unit 1 Capsule W analysis report (2).
- Because the surveillance capsules were irradiated in a single reactor and the surveillance material was derived from a single source, irradiation temperature and chemistry corrections are not applied in the credibility determination. However, because the surveillance capsules were not irradiated in the reactor that is being evaluated, and

because the beltline and surveillance material chemical compositions are not essentially identical, irradiation temperature and chemistry corrections are performed for the application of surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).

- The surveillance data were determined to be credible. Therefore, the CF to be applied to the beltline material was determined based on the surveillance data, and σ_Δ was cut in half. This is consistent with the guidance presented in RG 1.99 Rev. 2 (5).

North Anna Unit 1 Nozzle to Intermediate Shell Weld 05B (ID 6%), Heat No. 4278

- Sequoyah Unit 2 surveillance program data are applied to the North Anna Unit 1 nozzle to intermediate shell weld 05B (ID 6%). The Sequoyah Unit 1 data are documented in Reference (2).
- The CF calculation uses surveillance capsule fluence values from WCAP-14044 (8).
- The CF calculation uses measured values of 30 ft-lb transition temperature shift determined by hyperbolic tangent curve-fit, as documented in the North Anna Unit 1 Capsule W analysis report (2).
- Because the surveillance capsules were irradiated in a single reactor and the surveillance material was derived from a single source, irradiation temperature and chemistry corrections are not applied in the credibility determination. However, because the surveillance capsules were not irradiated in the reactor that is being evaluated, and because the beltline and surveillance material chemical compositions are not essentially identical, irradiation temperature and chemistry corrections are performed for the application of surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).
- The surveillance data were determined to be non-credible. Moreover, the surveillance data were determined to be not within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve based on a CF for the average surveillance material chemical composition. Therefore, the greater of the Position 1.1 and Position 2.1 CF values is applied to the beltline material with a full margin term.

North Anna Unit 1 Intermediate to Lower Shell Circumferential Weld 04, Heat No. 25531

- The RG 1.99 Revision 2 Position 2.1 chemistry factor (CF) calculation includes the North Anna Unit 1 Capsule W analysis results (2).
- The calculated copper and nickel composition of the surveillance materials includes the North Anna Unit 1 Capsule W analysis results (2).
- Plant-specific irradiation temperature values are presented for each surveillance capsule.
- The CF calculation uses surveillance capsule fluence values from WCAP-14044 (8).
- The CF calculation uses measured values of 30 ft-lb transition temperature shift determined by hyperbolic tangent curve-fit, as documented in the North Anna Unit 1 Capsule W analysis report (2).
- Because the surveillance capsules were irradiated in a single reactor and the surveillance material was derived from a single source, irradiation temperature and chemistry corrections are not applied in the credibility determination. Further, because the

surveillance capsules were irradiated in the reactor that is being evaluated, and because the beltline and surveillance material chemical compositions are essentially identical, irradiation temperature and chemistry corrections are not performed for application of the surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).

- The surveillance data were determined to be non-credible. However, the data were within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve based on a CF for the average surveillance material chemical composition. Therefore, the lesser of the Position 1.1 and Position 2.1 CF values is applied to the beltline material with a full margin term. This is consistent with the guidance presented in Reference (9).

North Anna Unit 2 Intermediate Shell Forging, Heat No. 990496/292424

- Revised copper and nickel concentrations for the beltline material are presented. The data that support the revised beltline material chemistry values are presented in Reference (17).
- The CF calculation combines the 30 ft-lb transition temperature shift results from axially and tangentially oriented Charpy specimens.
- Plant-specific irradiation temperature values are presented for each surveillance capsule.
- The CF calculation uses surveillance capsule fluence values from WCAP-14044 (8).
- Because the surveillance data were obtained from the North Anna Unit 2 plant-specific surveillance program, and because the surveillance material in question is base metal, temperature and chemistry corrections are not applied in the credibility determination or in the application of surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).
- The surveillance data were determined to be non-credible. However, the data were within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve based on a CF for the average surveillance material chemical composition. Therefore, the lesser of the Position 1.1 and Position 2.1 CF values is applied to the beltline material with a full margin term. This is consistent with the guidance presented in Reference (9).

North Anna Unit 2 Intermediate to Lower Shell Circumferential Weld, Heat No. 716126

- Plant-specific irradiation temperature values are presented for each surveillance capsule.
- The CF calculation uses surveillance capsule fluence values from WCAP-14044 (8).
- Because the surveillance capsules were irradiated in a single reactor and the surveillance material was derived from a single source, irradiation temperature and chemistry corrections are not applied in the credibility determination. Further, because the surveillance capsules were irradiated in the reactor that is being evaluated, and because the beltline and surveillance material chemical compositions are essentially identical, irradiation temperature and chemistry corrections are not performed for application of the surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).

- The surveillance data were determined to be credible. Therefore, the CF to be applied to the beltline material was determined based on the surveillance data, and σ_Δ was cut in half. This is consistent with the guidance presented in RG 1.99 Rev. 2 (5).

North Anna Units 1 and 2 Summary Table

- RT_{PTS} and RT_{NDT} calculations utilize end-of-license fluence values determined in accordance with the approved Virginia Power Reactor Vessel Fluence Analysis Methodology (7).
- Margin terms are determined in accordance with RG 1.99 Revision 2. When surveillance data are demonstrated to be non-credible, the RG 1.99 Revision 2 Position 1.1 margin term (i.e., a "full margin term") is applied.
- All calculated RT_{PTS} values for North Anna Units 1 and 2 meet the 10 CFR 50.61 screening criteria at end-of-license. However, the limiting 1/4-T RT_{NDT} value for North Anna Unit 1 exceeds the current licensing basis value of 1/4-T RT_{NDT} used in the determination of P/T limits and LTOPS setpoints. A detailed discussion of this matter is presented below.

SURRY UNITS 1 AND 2

Surry Unit 1 Lower Shell Plate Material C4415-1

- Revised copper and nickel concentrations for the surveillance material are presented. The values are based on the Surry 1 Capsule V and Capsule X analysis results.
- Revised copper and nickel concentrations for the beltline material are presented. The values are based on the Surry 1 Capsule V and Capsule X analysis results, and the baseline chemistry for the surveillance program (15).

Surry Units 1 and 2 Weld Material SA-1585 and SA-1650, Heat No. 72445 (Unit 1 Intermediate to Lower Shell Circ Weld; Unit 2 Intermediate Shell Longitudinal Welds L3 and L4 (OD 50%))

- The RG 1.99 Revision 2 Position 2.1 chemistry factor (CF) calculations for welds fabricated with weld wire heat No. 72445 include the MIRVSP Capsule W-1 analysis results (3). Two groupings of surveillance data are considered: Point Beach Unit 1 Surveillance Program Data Only, and All Available Data. These groupings are consistent with guidance provided in Reference (6).
- The Point Beach Unit 1 surveillance capsules were irradiated in a single reactor and the surveillance material was derived from a single source, so irradiation temperature and chemistry corrections are not applied in the credibility determination. However, because the surveillance capsules were not irradiated in the reactor that is being evaluated, and because the beltline and surveillance material chemical compositions differ, irradiation temperature and chemistry corrections are performed for application of the surveillance

results to the beltline material. This is consistent with the guidance presented in Reference (6).

- The Point Beach Unit 1 surveillance data were determined to be non-credible. However, the data were within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve based on a CF for the average surveillance material chemical composition.
- The set of "All Available Data" was irradiated in different reactors, and the surveillance material was derived from multiple sources, so irradiation temperature and chemistry corrections are applied in the credibility determination. Further, because surveillance capsules were not irradiated in the reactor that is being evaluated, and because the beltline and surveillance material chemical compositions differ, irradiation temperature and chemistry corrections are performed for application of the surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).
- The set of "All Available Data" was determined to be non-credible. However, the data were within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve based on a CF for the average surveillance material chemical composition.
- The Point Beach Unit 1 surveillance data are most applicable to Surry, because these data require the least amount of correction (6). Because the data fall within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve, the lesser of the Position 1.1 and Position 2.1 CF values is applied to the beltline material with a full margin term. This is consistent with the guidance presented in Reference (9).

Surry Unit 1 Weld Material SA-1526, Heat No. 299L44 (Lower Shell Longitudinal Weld L2)

- The RG 1.99 Revision 2 Position 2.1 chemistry factor (CF) calculations for welds fabricated with weld wire heat No. 299L44 include the MIRVSP Capsule W-1 analysis results (3). Two groupings of surveillance data are considered: Surry Unit 1 Surveillance Program Data Only, and All Available Data. These groupings are consistent with guidance provided in Reference (6).
- The Surry Unit 1 surveillance capsules were irradiated in a single reactor and the surveillance material was derived from a single source, so irradiation temperature and chemistry corrections are not applied in the credibility determination. The surveillance capsules were irradiated in the reactor that is being evaluated, so an irradiation temperature correction is not performed for application of the surveillance results to the beltline material. However, the beltline and surveillance material chemical compositions differ, so a chemistry correction is performed for application of the surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).
- The Surry Unit 1 surveillance data were determined to be non-credible. However, the data were within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve based on a CF for the average surveillance material chemical composition.
- The set of "All Available Data" was irradiated in different reactors, and the surveillance material was derived from multiple sources, so irradiation temperature and chemistry corrections are applied in the credibility determination. Further, because surveillance capsules were not irradiated in the reactor that is being evaluated, and because the beltline and surveillance material chemical compositions differ, irradiation temperature

and chemistry corrections are performed for application of the surveillance results to the beltline material. This is consistent with the guidance presented in Reference (6).

- The set of "All Available Data" was determined to be non-credible. However, the data were within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve based on a CF for the average surveillance material chemical composition.
- The Surry Unit 1 surveillance data are most applicable to Surry, because these data require the least amount of correction (6). Because the data fall within 2σ of the RG 1.99 Rev. 2 Position 1.1 curve, the lesser of the Position 1.1 and Position 2.1 CF values is applied to the beltline material with a full margin term. This is consistent with the guidance presented in Reference (9).

Surry Unit 2 Lower Shell Plate Material C4339-1 and Intermediate to Lower Shell Circumferential Weld Material R3008

- Revised copper and nickel concentrations for the surveillance materials are presented. The values are based on the Surry 2 Capsule V analysis results.
- Revised copper and nickel concentrations for the beltline materials are presented. The values are based on the Surry 2 Capsule V analysis results, and the baseline chemistry for the surveillance program (16).

EVALUATION OF EXISTING P/T LIMITS AND LTOPS SETPOINTS

North Anna Unit 1

The existing North Anna Unit 1 P/T limits and LTOPS setpoints (10)(11) are based on a limiting 1/4-thickness (1/4-T) RT_{NDT} of 162.9°F. When the P/T limits and LTOPS setpoints were developed, this value of RT_{NDT} was determined to bound all North Anna Unit 1 reactor vessel beltline materials at end-of-license (EOL) fluences corresponding to 30.7 EFPY (10)(11). After consideration of the aforementioned changes to previously reported information, the most limiting 1/4-T RT_{NDT} value for North Anna Unit 1 is 174.9°F, which exceeds the 1/4-T RT_{NDT} value assumed in the existing Unit 1 P/T limits and LTOPS setpoints (10)(11). The 174.9°F value of RT_{NDT} was determined on the basis of fluence values corresponding to an end-of-license cumulative core burnup of 32.3 EFPY (7). Virginia Power calculations demonstrate that the limiting North Anna Unit 1 reactor vessel beltline material (Lower Shell Forging) will exceed the design basis RT_{NDT} value of 162.9°F at 17.2 EFPY, which is predicted to be reached in May 2001.

North Anna Unit 2

The existing North Anna Unit 2 P/T limits and LTOPS setpoints (10)(11) are based on a limiting 1/4-thickness (1/4-T) RT_{NDT} of 196.5°F. When the P/T limits and LTOPS setpoints were developed, this value of RT_{NDT} was determined to bound all North Anna Unit 2 reactor vessel beltline materials at fluences corresponding to 17.0 EFPY (10)(11). After consideration of the aforementioned changes to previously reported information, the most limiting 1/4-T

RT_{NDT} value for North Anna Unit 2 is 209.4°F at a fluence corresponding to an end-of-license cumulative core burnup of 34.3 EFPY (7). Virginia Power calculations demonstrate that RT_{NDT} for the limiting North Anna Unit 2 reactor vessel beltline material (Lower Shell Forging) at a fluence corresponding to 17.0 EFPY (7) is 193.1°F. Therefore, the existing North Anna Unit 2 RCS P/T limits and LTOPS setpoints (10)(11) remain valid and conservative.

Surry Units 1 and 2

The existing Surry Units 1 and 2 P/T limits and LTOPS setpoints (12)(13) are based on a limiting 1/4-thickness (1/4-T) RT_{NDT} of 228.4°F. When the P/T limits and LTOPS setpoints were developed, this value of RT_{NDT} was determined to bound all Surry Units 1 and 2 reactor vessel beltline materials at end-of-license (EOL) fluences corresponding to 28.8 EFPY and 29.4 EFPY for Surry Units 1 and 2, respectively (12)(13). After consideration of the aforementioned changes to previously reported information, the most limiting 1/4-T RT_{NDT} value for Surry Units 1 and 2 is 218.9°F. This value of RT_{NDT} was determined on the basis of fluence values corresponding to 29.6 EFPY and 30.1 EFPY for Surry Units 1 and 2, respectively (7). On the basis of the results for Surry Units 1 and 2 presented in Appendix A, it is concluded that the existing RCS P/T limits and LTOPS setpoints (12)(13) remain valid and conservative.

EVALUATION OF PTS SCREENING CALCULATIONS

North Anna Units 1 and 2

PTS screening calculations have been performed for all North Anna Units 1 and 2 reactor vessel beltline materials at end-of-license neutron fluence values corresponding to 32.3 EFPY and 34.3 EFPY for Units 1 and 2, respectively (7). The results of these calculations are presented in Appendix A. After consideration of the aforementioned changes to previously reported information, it is concluded that all North Anna Units 1 and 2 beltline materials continue to meet the 10 CFR 50.61 screening criteria.

Surry Units 1 and 2

PTS screening calculations have been performed for all Surry Units 1 and 2 reactor vessel beltline materials at end-of-license neutron fluence values corresponding to 29.6 EFPY and 30.1 EFPY for Units 1 and 2, respectively (7). The results of these calculations are presented in Appendix A. After consideration of the aforementioned changes to previously reported information, it is concluded that all Surry Units 1 and 2 beltline materials continue to meet the 10 CFR 50.61 screening criteria.

CONCLUSIONS

North Anna Unit 1

The limiting North Anna Unit 1 reactor vessel beltline material (Lower Shell Forging) will exceed the design basis RT_{NDT} value of 162.9°F at 17.2 EFPY, which is predicted to be reached in May 2001. Therefore, by June 30, 2000, Virginia Power will provide a licensing submittal with revised North Anna Unit 1 Technical Specification P/T limits and LTOPS setpoints. It is anticipated that the licensing package will convert the existing North Anna Unit 2 P/T limits and LTOPS setpoints for use on Unit 1. The Unit 2 P/T limits and LTOPS setpoints are based on a limiting RT_{NDT} value of 196.5°F (10)(11), which will not be reached by the limiting Unit 1 beltline material until after end-of-license. This strategy will greatly reduce the effort associated with preparation, review, and implementation of the revised Technical Specification P/T limits and LTOPS setpoints.

All North Anna Unit 1 reactor vessel beltline materials continue to meet the 10 CFR 50.61 PTS screening criteria for cumulative core burnups up to 32.3 EFPY (end-of-license).

North Anna Unit 2

The existing North Anna Unit 2 RCS P/T limits and LTOPS setpoints are valid to 17.0 EFPY. After consideration of the aforementioned changes to previously reported information, the limiting value of RT_{NDT} for the North Anna Unit 2 reactor vessel beltline materials at 17.0 EFPY remains bounded by the RT_{NDT} value assumed in the current licensing basis P/T limits and LTOPS setpoints. Therefore, the existing North Anna Unit 2 RCS P/T limits and LTOPS setpoints remain valid and conservative. Unit 2 is predicted to reach 17.0 EFPY in September 2001. Virginia Power presently plans to submit North Anna Unit 2 surveillance Capsule W results to the NRC by September 20, 2000, as required by 10 CFR 50 Appendix G. A data evaluation report (input to RVID), revised P/T limits, LTOPS setpoints, and PTS screening calculations that consider the Unit 2 Capsule W results are presently scheduled to be transmitted to the NRC shortly thereafter.

All North Anna Unit 2 reactor vessel beltline materials continue to meet the 10 CFR 50.61 PTS screening criteria for cumulative core burnups up to 34.3 EFPY (end-of-license).

Surry Units 1 and 2

After consideration of the aforementioned changes to previously reported information, it is concluded that the existing Surry Units 1 and 2 P/T limits and LTOPS setpoints remain valid for cumulative core burnups up to 29.6 EFPY and 30.1 EFPY for Surry Units 1 and 2, respectively. Further, all Surry Units 1 and 2 beltline materials continue to meet the 10 CFR 50.61 screening criteria for cumulative core burnups up to 29.6 EFPY and 30.1 EFPY for Surry Units 1 and 2, respectively.

NRC Reactor Vessel Integrity Database Update

Virginia Power requests that information presented herein be used to update the NRC Reactor Vessel Integrity Database (RVID).

References

(1) Letter from J. H. McCarthy to USNRC, "Virginia Electric and Power Company, North Anna Power Station Unit 1, Analysis of Reactor Vessel Materials Surveillance Capsule W," Serial No. 99-452, September 10, 1999.

(2) BAW-2356, "Analysis of Capsule W, Virginia Power North Anna Unit No. 1 Nuclear Power Plant, Reactor Vessel Material Surveillance Program," dated September 1999.

(3) BAW-2350, "Test Results of W1 Capsule, Master Integrated Reactor Vessel Surveillance Program," dated April 1999, submitted to USNRC by B&W Owners Group Letter OG-1751, "B&W Owners Group Reactor Vessel Integrity Program - Test Results for Capsule W-1," dated April 27, 1999.

(4) Title 10, Code of Federal Regulations, Part 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events."

(5) Regulatory Guide 1.99 Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," dated May, 1988.

(6) Memorandum from K. R. Wichman to E. J. Sullivan, "Meeting Summary for November 12, 1997 Meeting with Owners Group Representatives and NEI Regarding Review of Responses to Generic Letter 92-01, Revision 1, Supplement 1 Responses," dated November 19, 1997.

(7) Letter from N. Kalyanam (USNRC) to J. P. O'Hanlon (Virginia Power), "North Anna Power Station, Units 1 and 2, and Surry Power Station, Units 1 and 2 – Reactor Vessel Fluence Analysis Methodology (Generic Letter 92-01, Revision 1, Supplement 1) (TAC Nos. MA0555, MA0556, MA0576, and MA0577)," dated April 13, 1999 (Virginia Power Serial No. 99-242; Safety Evaluation Report for Virginia Power Topical Report VEP-NAF-3, "Reactor Vessel Fluence Analysis Methodology," dated November, 1997).

(8) WCAP-14044, "Westinghouse Surveillance Capsule Neutron Fluence Reevaluation," dated April 1994.

(9) Letter from N. Kalyanam (USNRC) to J. P. O'Hanlon, "Closure of the Review of the Response to Generic Letter 92-01, Revision 1, Supplement 1, "Reactor Vessel Structural Integrity," The North Anna Nuclear Power Plant, Units 1 and 2 (TAC Nos. MA0555 and MA0556)," dated June 23, 1999 (Virginia Power Serial No. 99-361).

(10) Letter from J. P. O'Hanlon (Virginia Power) to USNRC, "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, Proposed Technical Specifications Change," dated April 15, 1994 (Virginia Power Serial No. 94-238).

(11) Letter from L. B. Engle (USNRC) to J. P. O'Hanlon, "North Anna Units 1 and 2 – Issuance of Amendments Re: Pressure/Temperature Operating Limits/Low Temperature Overpressure Protection System Pressure Setpoints/Limiting Conditions for Operation, Action Statements, and Surveillance Requirements for PORVs and Block Valves to Address Generic Letter 90-06 (TAC Nos. M77363, M77364, M77433, M77434, M89312, and M89313)," dated October 5, 1994 (Virginia Power Serial No. 94-607).

(12) Letter from R. F. Saunders to USNRC, "Virginia Electric and Power Company, Surry Power Station Units 1 and 2, Request for Exemption - ASME Code Case N-514, Proposed Technical Specifications Change, Revised Pressure/Temperature Limits and LTOPS Setpoint," Serial No. 95-197, June 8, 1995.

(13) Letter from B. C. Buckley to J. P. O'Hanlon, "Surry Units 1 and 2 - Issuance of Amendments Re: Surry Units 1 and 2 Reactor Vessel Heatup and Cooldown Curves (TAC Nos. M92537 and M92538)," Serial No. 96-020, dated December 28, 1995.

(14) Letter from L. N. Hartz (Virginia Power) to USNRC, "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, Response to NRC Request for Comments, Generic Letter 92-01, Revision 1, Supplement 1," Serial No. 99-361, dated September 1, 1999.

(15) WCAP-7723, "Virginia Electric and Power Company, Surry Unit No. 1 Reactor Vessel Radiation Surveillance Program," dated July 1971.

(16) WCAP-8085, "Virginia Electric and Power Company, Surry Unit No. 2 Reactor Vessel Radiation Surveillance Program," dated June 1973.

(17) BAW-2260, "Response to Generic Letter 92-01, Revision 1, Supplement 1, for Virginia Power's North Anna Units 1 and 2 Beltline Materials and Surry Units 1 and 2 Rotterdam Beltline Weld Metals," dated October 1995.

Appendix A
SURVEILLANCE PROGRAM (MIRVSP) CAPSULE W-1
NORTH ANNA AND SURRY UNITS 1 AND 2

Virginia Electric and Power Company

Facility: North Anna Unit 1
Vessel Manufacturer: Rotterdam Dockyard

RPV Weld Wire Heat or Material ID	Location	Best-Estimate Copper (wt%)	Best-Estimate Nickel (wt%)	EOL ID Fluence (x1E19)	Assigned Material Chemistry Factor	Method of Determining CF	Initial RT(NDT)	Sigma(I)	Sigma(delta)	Margin	Inner Surf. ART or RT(PTS) at EOL	1/4-T ART	Current Licensing Bass 1/4-T ART *
990286/295213	Nozzle Shell Forging	0.160	0.740	0.136	121.5	Tables	6	30.0	17.0	69.0	133.4	121.7	140.3
990311/298244	Intermediate Shell Forging	0.120	0.820	3.920	86.0	Tables	17	0.0	17.0	34.0	167.3	157.7	158 1
990400/292332	Lower Shell Forging	0.156	0.817	3.920	82.9	Surv. Data	38	0.0	17.0	34.0	184.1	174.9	146 6
25295	Nozzle to Int. Shell Circ Weld (OD 94%)	0.352	0.125	0.136	144.2	Surv. Data	0	20.0	14.0	48.8	118.2	104.3	143 2
4278	Nozzle to Int. Shell Circ Weld (ID 6%)	0.120	0.110	0.136	92.4	Surv. Data	0	20.0	22.2	59.8	104.2	95.3	86 6
25531	Int. to Lower Shell Circ Weld	0.098	0.124	3.920	56.2	Tables	19	0.0	28.0	56.0	151.0	144.8	162 9 *

* 1/4-T ART value of 162.9 F was used in the determination of P/T limits

Note: Shaded cells indicate a changed value relative to the NRC's Reactor Vessel Integrity Database (RVID) Version 2.0.5 (Data Update on 6/9/99).

Facility: North Anna Unit 2
Vessel Manufacturer: Rotterdam Dockyard

RPV Weld Wire Heat or Material ID	Location	Best-Estimate Copper (wt%)	Best-Estimate Nickel (wt%)	EOL ID Fluence (x1E19)	Assigned Material Chemistry Factor	Method of Determining CF	Initial RT(NDT)	Sigma(I)	Sigma(delta)	Margin	Inner Surf. ART or RT(PTS) at EOL	1/4-T ART	Current Licensing Basis 1/4-T ART *
990598/291396	Nozzle Shell Forging	0.080	0.770	0.148	51.0	Tables	9	30.0	12.7	65.2	99.7	94.6	96 3
990496/292424	Intermediate Shell Forging	0.100	0.845	3.960	34.8	Surv. Data	75	0.0	17.0	34.0	156.2	152.3	173 3
990533/297355	Lower Shell Forging	0.130	0.830	3.960	96.0	Tables	56	0.0	17.0	34.0	220.0	209.4	196 5*
4278	Nozzle to Int. Shell Circ Weld (OD 94%)	0.120	0.110	0.148	63.0	Tables	0	20.0	15.7	50.9	82.4	76.2	97 6
801	Nozzle to Int. Shell Circ Weld (ID 6%)	0.180	0.110	0.148	87.8	Tables	0	20.0	21.9	59.4	103.3	94.6	75 2
716126	Int. to Lower Shell Circ Weld	0.069	0.051	3.960	10.3	Surv. Data	-48	0.0	7.0	14.0	-20.1	-21.2	61 4

* 1/4-T ART value of 196.5 F was used in the determination of P/T limits

Note: Shaded cells indicate a changed value relative to the NRC's Reactor Vessel Integrity Database (RVID) Version 2.0.5 (Data Update on 6/9/99).

Table 2: **North Anna 1 Lower Shell Forging, Heat No. 990400/292332 (Combined Tang. And Axial))**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
North Anna Unit 1 Cap. V (Tang.)	0.158	0.823	549.6	0.263	51	Yes
North Anna Unit 1 Cap. V (Axial)	0.158	0.823	549.6	0.263	29	Yes
North Anna Unit 1 Cap. U (Tang.)	0.158	0.823	552.9	0.872	116	Yes
North Anna Unit 1 Cap. U (Axial)	0.158	0.823	552.9	0.872	72	Yes
North Anna Unit 1 Cap. W (Tang.)	0.158	0.823	551.6	2.052	93	Yes
North Anna Unit 1 Cap. W (Axial)	0.158	0.823	551.6	2.052	96	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **North Anna 1 Lower Shell Forging, Heat No. 990400/292332 (Combined Tang. And Axial))**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
North Anna Unit 1 Cap. V (Tang.)	0.158	0.823	549.6	0.8367	51	51	-2
North Anna Unit 1 Cap. V (Axial)	0.158	0.823	549.6	0.8367	29	29	-24
North Anna Unit 1 Cap. U (Tang.)	0.158	0.823	552.9	0.9816	116	116	36
North Anna Unit 1 Cap. U (Axial)	0.158	0.823	552.9	0.9816	72	72	-8
North Anna Unit 1 Cap. W (Tang.)	0.158	0.823	551.6	1.1958	93	93	-6
North Anna Unit 1 Cap. W (Axial)	0.158	0.823	551.6	1.1958	96	96	-3
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **North Anna 1 Lower Shell Forging, Heat No. 990400/292332 (Combined Tang. and Axial))**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
990400/292332	0.156	0.817	551.6	119.8	82.9	Non-Credible	0.0	82.9

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
North Anna Unit 1 Cap. V (Tang.)	No	No	Credible	No	No	51	-26	Conservative
North Anna Unit 1 Cap. V (Axial)	No	No	Non-Credible	No	No	29	-48	Conservative
North Anna Unit 1 Cap. U (Tang.)	No	No	Non-Credible	No	No	116	-1	Conservative
North Anna Unit 1 Cap. U (Axial)	No	No	Credible	No	No	72	-45	Conservative
North Anna Unit 1 Cap. W (Tang.)	No	No	Credible	No	No	83	-52	Conservative
North Anna Unit 1 Cap. W (Axial)	No	No	Credible	No	No	98	-49	Conservative
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (Low. Sh. Forging)

Table 2: **North Anna 1 Nozzle-to-Intermediate Shell Weld 05A (OD 94%), Heat No. 25295**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
Sequoyah Unit 1 Capsule T	0.375	0.125	545.0	0.288	128	Yes
Sequoyah Unit 1 Capsule U	0.375	0.125	545.0	0.955	145	Yes
Sequoyah Unit 1 Capsule X	0.375	0.125	545.0	1.390	157	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **North Anna 1 Nozzle-to-Intermediate Shell Weld 05A (OD 94%), Heat No. 25295**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
Sequoyah Unit 1 Capsule T	0.375	0.125	545.0	0.6598	128	128	27
Sequoyah Unit 1 Capsule U	0.375	0.125	545.0	0.9871	145	145	-6
Sequoyah Unit 1 Capsule X	0.375	0.125	545.0	1.0914	157	157	-10
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **North Anna 1 Nozzle-to-Inte. ..iate Shell Weld 05A (OD 94%), Heat No. 2.**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
25295	0.352	0.125	551.6	183.3	144.2	Credible	-	144.2

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Sequoyah Unit 1 Capsule T	No	No	Credible	Yes	Yes	-	-	-
Sequoyah Unit 1 Capsule U	No	No	Credible	Yes	Yes	-	-	-
Sequoyah Unit 1 Capsule X	No	No	Credible	Yes	Yes	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (Noz. Sh. Weld 05A)

Table 2: **North Anna 1 Nozzle-to-Intermediate Shell Weld 05B (ID 6%), Heat No. 4278**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
Sequoyah Unit 2 Capsule T	0.130	0.110	545.0	0.242	81	Yes
Sequoyah Unit 2 Capsule U	0.130	0.110	545.0	0.608	154	Yes
Sequoyah Unit 2 Capsule X	0.130	0.110	545.0	1.030	30	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **North Anna 1 Nozzle-to-Intermediate Shell Weld 05B (ID 6%), Heat No. 4278**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
Sequoyah Unit 2 Capsule T	0.130	0.110	545.0	0.6159	81	81	20
Sequoyah Unit 2 Capsule U	0.130	0.110	545.0	0.8606	154	154	68
Sequoyah Unit 2 Capsule X	0.130	0.110	545.0	1.0083	30	30	-70
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: North Anna 1 Nozzle-to-Inter. .diate Shell Weld 05B (ID 6%), Heat No. 427.

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
4278	0.120	0.110	551.6	63.0	92.4	Non-Credible	0.0	92.4

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Sequoyah Unit 2 Capsule T	No	No	Credible	Yes	Yes	81	39	Conservative
Sequoyah Unit 2 Capsule U	No	No	Non-Credible	Yes	Yes	154	96	Non-Conservative
Sequoyah Unit 2 Capsule X	No	No	Non-Credible	Yes	Yes	30	-38	Conservative
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (Noz. Sh. Weld 05B)

Table 2: **North Anna Unit 1 Int. to Lower Shell Circ. Weld 04, Heat No. 25531**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
North Anna Unit 1 Capsule V	0.098	0.124	549.6	0.263	88	Yes
North Anna Unit 1 Capsule U	0.098	0.124	552.9	0.872	30	Yes
North Anna Unit 1 Capsule W	0.098	0.124	551.6	2.052	86	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **North Anna Unit 1 Int. to Lower Shell Circ. Weld 04, Heat No. 25531**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
North Anna Unit 1 Capsule V	0.098	0.124	549.6	0.6367	88	88	45
North Anna Unit 1 Capsule U	0.098	0.124	552.9	0.9816	30	30	-35
North Anna Unit 1 Capsule W	0.098	0.124	551.6	1.1958	86	86	5
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **North Anna Unit 1 Int. to Low. Shell Circ. Weld 04, Heat No. 25531**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credibe or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
Weld 04/25531	0.098	0.124	551.6	58.2	68.0	Non-Credible	0.0	58.2

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
North Anna Unit 1 Capsule V	No	No	Non-Credible	No	No	88	52	Conservative
North Anna Unit 1 Capsule U	No	No	Non-Credible	No	No	30	-24	Conservative
North Anna Unit 1 Capsule W	No	No	Credible	No	No	88	19	Conservative
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (Low Sh Circ. Weld)

Table 2: **North Anna 2 Int. Shell Forging, Heat No. 990496/292424 (Combined Tang. And Axial Data)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
North Anna Unit 2 Cap. V (Tang.)	0.110	0.860	549.6	0.246	9	Yes
North Anna Unit 2 Cap. U (Tang.)	0.110	0.860	553.1	0.980	25	Yes
North Anna Unit 2 Cap. V (Axial)	0.110	0.860	549.6	0.246	9	Yes
North Anna Unit 2 Cap. U (Axial)	0.110	0.860	553.1	0.980	60	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **North Anna 2 Int. Shell Forging, Heat No. 990496/292424 (Combined Tang. And Axial Data)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
North Anna Unit 2 Cap. V (Tang.)	0.110	0.860	549.6	0.6200	9	9	-13
North Anna Unit 2 Cap. U (Tang.)	0.110	0.860	553.1	0.9943	25	25	-10
North Anna Unit 2 Cap. V (Axial)	0.110	0.860	549.6	0.6200	9	9	-13
North Anna Unit 2 Cap. U (Axial)	0.110	0.860	553.1	0.9943	60	60	25
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **North Anna 2 Int. Shell Forg. _, Heat No. 990496/292424 (Combined Tang. _ Axial Data)**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nicke (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
990496/292424	0.100	0.845	550.3	67.0	34.8	Non-Credible	0.0	34.8

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
North Anna Unit 2 Cap. V (Tang.)	No	No	Credible	No	No	9	-39	Conservative
North Anna Unit 2 Cap. U (Tang.)	No	No	Credible	No	No	25	-52	Conservative
North Anna Unit 2 Cap. V (Axial)	No	No	Credible	No	No	9	-39	Conservative
North Anna Unit 2 Cap. U (Axial)	No	No	Non-Credible	No	No	80	-17	Conservative
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transiton temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (Int. Sh. Forg.)

Table 2: **North Anna Unit 2 Int. to Lower Shell Circ. Weld, Heat No. 716126**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
North Anna Unit 2 Capsule V	0.088	0.084	549.6	0.248	2	Yes
North Anna Unit 2 Capsule U	0.088	0.084	553.1	0.980	13	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **North Anna Unit 2 Int. to Lower Shell Circ. Weld, Heat No. 716126**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
North Anna Unit 2 Capsule V	0.088	0.084	549.6	0.6200	2	2	-4
North Anna Unit 2 Capsule U	0.088	0.084	553.1	0.9943	13	13	3
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **North Anna Unit 2 Int. to Lo\ ...shell Circ. Weld, Heat No. 716126**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
716126	0.069	0.051	550.3	37.6	10.3	Credible	-	10.3

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*
If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
North Anna Unit 2 Capsule V	No	No	Credible	No	No	-	-	-
North Anna Unit 2 Capsule U	No	No	Credible	No	No	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (Lower Circ. Weld)

Facility: Surry Unit 1
Vessel Manufacturer: B&W and Rotterdam Dockyard

RPV Weld Wire Heat or Material ID	Location	Best-Estimate Copper (wt%)	Best-Estimate Nickel (wt%)	EOL ID Fluence (x1E19)	Assigned Material Chemistry Factor	Method of Determining CF	Initial RT(NDT)	Sigma(I)	Sigma(delta)	Margin	Inner Surf. ART or RT(PTS) at EOL	1/4-T ART	Current Licensing Basis 1/4-T ART *
122V109VA1	Nozzle Shell Forging	0.110	0.740	0.307	76.1	Tables	40	0.0	17.0	34.0	125.5	116.1	112.5
C4326-1	Intermediate Shell	0.110	0.550	3.530	73.5	Tables	10	0.0	17.0	34.0	141.6	132.8	135.2
C4326-2	Intermediate Shell	0.110	0.550	3.530	73.5	Tables	0	0.0	17.0	34.0	131.6	122.8	125.2
4415-1	Lower Shell	0.102	0.493	3.530	85.0	Surv. Data	20	0.0	8.5	17.0	149.9	139.7	147.6
4415-2	Lower Shell	0.110	0.500	3.530	73.0	Tables	0	0.0	17.0	34.0	131.0	122.2	124.6
J726/25017	Nozzle to Int Shell Circ Weld	0.330	0.100	0.307	152.0	Tables	0	20.0	28.0	68.8	171.6	153.0	169.8
SA-1585/72445	Int. to Low Sh. Circ (ID 40%)	0.220	0.540	3.200	131.4	Surv. Data	-5	19.7	28.0	68.5	235.1	218.9	228.4 *
SA-1650/72445	Int. to Low Sh. Circ (OD 60%)	0.220	0.540	3.200	131.4	Surv. Data	-5	19.7	28.0	68.5	235.1	218.9	228.4 *
SA-1494/8T1554	Int Shell Long. Welds L3 & L4	0.160	0.570	0.600	143.9	Tables	-5	19.7	28.0	68.5	186.8	167.4	181.4
SA-1494/8T1554	Lower Shell Long. Weld L1	0.160	0.570	0.540	143.9	Tables	-5	19.7	28.0	68.5	182.6	163.4	181.4
SA-1526/299L44	Lower Shell Long. Weld L2	0.340	0.680	0.540	220.6	Tables	-7	20.6	28.0	69.5	245.1	215.7	207.0

* 1/4-T ART value of 228.4 F was used in the determination of P/T limits

Note: Shaded cells indicate a changed value relative to the NRC's Reactor Vessel Integrity Database (RVID) Version 2.0.5 (Data Update on 6/9/99).

Facility: Surry Unit 2
Vessel Manufacturer: B&W and Rotterdam Dockyard

RPV Weld Wire Heat or Material ID	Location	Best-Estimate Copper (wt%)	Best-Estimate Nickel (wt%)	EOL ID Fluence (x1E19)	Assigned Material Chemistry Factor	Method of Determining CF	Initial RT(NDT)	Sigma(I)	Sigma(delta)	Margin	Inner Surf. ART or RT(PTS) at EOL	1/4-T ART	Current Licensing Basis 1/4-T ART *
123V303VA1	Nozzle Shell Forging	0.110	0.720	0.298	75.8	Tables	30	0.0	17.0	34.0	114.7	105.5	100.4
C4331-2	Intermediate Shell	0.120	0.600	3.520	83.0	Tables	-10	0.0	17.0	34.0	134.2	124.2	123.9
C4339-2	Intermediate Shell	0.110	0.540	3.520	73.4	Tables	-20	0.0	17.0	34.0	111.5	102.6	102.4
C4208-2	Lower Shell	0.150	0.550	3.520	107.3	Tables	-30	0.0	17.0	34.0	146.4	133.5	133.1
C4339-1	Lower Shell	0.107	0.530	3.520	86.5	Surv. Data	-10	0.0	8.5	17.0	95.3	87.3	89.3
L737/4275	Nozzle to Int Shell Circ Weld	0.350	0.100	0.298	160.5	Tables	0	20.0	28.0	68.8	176.1	156.6	169.6
R3008/0227	Int. to Lower Shell Circ Weld	0.187	0.545	3.520	125.2	Surv. Data	0	20.0	14.0	48.8	215.0	200.0	202.9
WF-4/8T1762	Int. Shell Long. L4 (ID 50%)	0.190	0.570	0.697	152.4	Tables	-5	19.7	28.0	68.5	200.4	179.6	181.0
SA-1585/72445	Int. Sh. L3 (100%), L4 (OD 50)	0.220	0.540	0.697	131.4	Surv. Data	-5	19.7	28.0	68.5	181.6	163.7	158.5
WF-4/8T1762	LS L2 (ID 63%), L1 (100)	0.190	0.570	0.697	152.4	Tables	-5	19.7	28.0	68.5	200.4	179.6	181.0
WF-8/8T1762	LS Long. Weld L2 (OD 37%)	0.190	0.570	0.697	152.4	Tables	-5	19.7	28.0	68.5	200.4	179.6	181.0

* 1/4-T ART value of 228.4 F was used in the determination of P/T limits

Note: Shaded cells indicate a changed value relative to the NRC's Reactor Vessel Integrity Database (RVID) Version 2.0.5 (Data Update on 6/9/99)

Table 2: **Surry Unit 1 Plate Material C4415-1**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used in Assessing Vessel? (Yes or No)
Surry Unit 1 Capsule T	0.098	0.490	533.9	0.281	50	Yes
Surry Unit 1 Capsule V	0.098	0.490	538.8	1.940	113	Yes
Surry Unit 1 Capsule X	0.098	0.490	542.0	1.599	86	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **Surry Unit 1 Plate Material C4415-1**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
Surry Unit 1 Capsule T	0.098	0.490	533.9	0.6535	50	50	-6
Surry Unit 1 Capsule V	0.098	0.490	538.8	1.1811	113	113	13
Surry Unit 1 Capsule X	0.098	0.490	542.0	1.1296	86	86	-10
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **Surry Unit 1 Plate Material C 3-1**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
Forging C4415-1	0.102	0.493	542.0	66.3	85.0	Credible	-	85.0

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Surry Unit 1 Capsule T	No	No	Credible	No	No	-	-	-
Surry Unit 1 Capsule V	No	No	Credible	No	No	-	-	-
Surry Unit 1 Capsule X	No	No	Credible	No	No	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (Plate 4415-1)

Table 2: **Surry Unit 1 and 2 Weld Material SA-1585 (Point Beach 1 Data Only)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
Point Beach Unit 1 Capsule T	0.230	0.615	533.4	2.230	181	Yes
Point Beach Unit 1 Capsule R	0.230	0.615	541.6	2.190	155	Yes
Point Beach Unit 1 Capsule S	0.230	0.615	542.0	0.829	165	Yes
Point Beach Unit 1 Capsule V	0.230	0.615	542.0	0.634	107	Yes
Capsule CR3-LG2 (BWOG CR-3 Irrad.)	0.220	0.590	556.0	1.670	164	No
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	0.220	0.590	556.0	0.510	139	No
Capsule W-1 (ANO-1 NBD)	0.220	0.590	546.3	0.660	138	No
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **Surry Unit 1 and 2 Weld Material SA-1585 (Point Beach 1 Data Only)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
Point Beach Unit 1 Capsule T	0.230	0.615	533.4	1.2173	181	181	7
Point Beach Unit 1 Capsule R	0.230	0.615	541.6	1.2126	155	155	-18
Point Beach Unit 1 Capsule S	0.230	0.615	542.0	0.9474	165	165	30
Point Beach Unit 1 Capsule V	0.230	0.615	542.0	0.8723	107	107	-17
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **Surry Unit 1 and 2 Weld Mate... SA-1585 (Point Beach 1 Data Only)**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
SA-1585/72445	0.220	0.540	542.0	158.0	131.4	Non-Credible	0.0	131.4

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Point Beach Unit 1 Capsule T	No	No	Credible	Yes	Yes	181	-28	Conservative
Point Beach Unit 1 Capsule R	No	No	Credible	Yes	Yes	155	-53	Conservative
Point Beach Unit 1 Capsule S	No	No	Non-Credible	Yes	Yes	165	2	Conservative
Point Beach Unit 1 Capsule V	No	No	Credible	Yes	Yes	107	-43	Conservative
Capsule CR3-LG2 (BWOG CR-3 Irrad.)	-	-	-	-	-	-	-	-
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	-	-	-	-	-	-	-	-
Capsule W-1 (ANO-1 NBD)	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (SA-1585)

Table 2: **Surry Unit 1 and 2 Weld Material SA-1585 (All Available Data)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
Point Beach Unit 1 Capsule T	0.230	0.615	533.4	2.230	181	Yes
Point Beach Unit 1 Capsule R	0.230	0.615	541.6	2.190	155	Yes
Point Beach Unit 1 Capsule S	0.230	0.615	542.0	0.829	165	Yes
Point Beach Unit 1 Capsule V	0.230	0.615	542.0	0.634	107	Yes
Capsule CR3-LG2 (BWOG CR-3 Irrad.)	0.220	0.590	556.0	1.670	164	Yes
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	0.220	0.590	556.0	0.510	139	Yes
Capsule W-1 (ANO-1 NBD)	**0.220**	**0.590**	**546.3**	**0.660**	**138**	**Yes**
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **Surry Unit 1 and 2 Weld Material SA-1585 (All Available Data)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
Point Beach Unit 1 Capsule T	0.230	0.615	533.4	1.2173	181	166	-12
Point Beach Unit 1 Capsule R	0.230	0.615	541.6	1.2126	155	149	-29
Point Beach Unit 1 Capsule S	0.230	0.615	542.0	0.9474	165	159	21
Point Beach Unit 1 Capsule V	0.230	0.615	542.0	0.8723	107	102	-26
Capsule CR3-LG2 (BWOG CR-3 Irrad.)	0.220	0.590	556.0	1.1413	164	178	11
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	0.220	0.590	556.0	0.8120	139	153	34
Capsule W-1 (ANO-1 NBD)	**0.220**	**0.590**	**546.3**	**0.8835**	**138**	**142**	**13**
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **Surry Unit 1 and 2 Weld Ma. . SA-1585 (All Available Data)**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
SA-1585/72445	0.220	0.540	542.0	158.0	141.2	Non-Credible	0.0	141.2

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Point Beach Unit 1 Capsule T	Yes	Yes	Credible	Yes	Yes	166	-39	Conservative
Point Beach Unit 1 Capsule R	Yes	Yes	Non-Credible	Yes	Yes	149	-56	Conservative
Point Beach Unit 1 Capsule S	Yes	Yes	Credible	Yes	Yes	159	-1	Conservative
Point Beach Unit 1 Capsule V	Yes	Yes	Credible	Yes	Yes	102	-45	Conservative
Capsule CR3-LG2 (BWOG CR-3 Irrad.)	Yes	Yes	Credible	Yes	Yes	178	-14	Conservative
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	Yes	Yes	Non-Credible	Yes	Yes	153	16	Conservative
Capsule W-1 (ANO-1 NBD)	**Yes**	**Yes**	**Credible**	**Yes**	**Yes**	**142**	**-7**	**Conservative**
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (SA-1585, Alt 1)

Table 2: **Surry Unit 1 Weld Material SA-1526 (Surry Unit 1 Data Only)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
Capsule TMI2-LG1 (BWOG CR-3 Irrad.)	0.370	0.700	556.0	0.830	216	No
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	0.360	0.700	556.0	0.779	202	No
Capsule TMI2-LG1 (BWOG CR-3 Irrad.)	0.330	0.670	556.0	0.968	226	No
Three Mile Island Unit 1 Capsule C	0.330	0.670	556.0	0.866	166	No
Three Mile Island Unit 1 Capsule E	0.330	0.670	556.0	0.107	74	No
Capsule W-1 (CR-3 NBD)	0.360	0.700	546.3	0.669	262	No
Surry Unit 1 Capsule T	0.230	0.640	533.9	0.281	171	Yes
Surry Unit 1 Capsule V	0.230	0.640	538.8	1.940	250	Yes
Surry Unit 1 Capsule X	0.230	0.640	542.0	1.599	234	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **Surry Unit 1 Weld Material SA-1526 (Surry Unit 1 Data Only)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
Surry Unit 1 Capsule T	0.230	0.640	533.9	0.6535	171	171	29
Surry Unit 1 Capsule V	0.230	0.640	538.8	1.1811	250	250	-6
Surry Unit 1 Capsule X	0.230	0.640	542.0	1.1296	234	234	-11
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **Surry Unit 1 Weld Material SA-1526 (Surry Unit 1 Data Only)**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
SA-1526/299L44	0.340	0.680	542.0	220.6	271.9	Non-Credible	0.0	220.6

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RTNDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Capsule TMI2-LG1 (BWOG CR-3 Irrad.)	-	-	-	-	-	-	-	-
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	-	-	-	-	-	-	-	-
Capsule TMI2-LG1 (BWOG CR-3 Irrad.)	-	-	-	-	-	-	-	-
Three Mile Island Unit 1 Capsule C	-	-	-	-	-	-	-	-
Three Mile Island Unit 1 Capsule E	-	-	-	-	-	-	-	-
Capsule W-1 (CR-3 NBD)	-	-	-	-	-	-	-	-
Surry Unit 1 Capsule T	No	No	Non-Credible	No	Yes	171	56	Conservative
Surry Unit 1 Capsule V	No	No	Credible	No	Yes	250	42	Conservative
Surry Unit 1 Capsule X	No	No	Credible	No	Yes	234	35	Conservative
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (SA-1526)

Table 2: **Surry Unit 1 Weld Material SA-1526 (All Available Data)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
Capsule TMI2-LG1 (BWOG CR-3 Irrad.)	0.370	0.700	556.0	0.830	216	Yes
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	0.360	0.700	556.0	0.779	202	Yes
Capsule TMI2-LG1 (BWOG CR-3 Irrad.)	0.330	0.670	556.0	0.968	226	Yes
Three Mile Island Unit 1 Capsule C	0.330	0.670	556.0	0.866	166	Yes
Three Mile Island Unit 1 Capsule E	0.330	0.670	556.0	0.107	74	Yes
Capsule W-1 (CR-3 NBD)	**0.360**	**0.700**	**546.3**	**0.669**	**262**	**Yes**
Surry Unit 1 Capsule T	0.230	0.640	533.9	0.281	171	Yes
Surry Unit 1 Capsule V	0.230	0.640	538.8	1.940	250	Yes
Surry Unit 1 Capsule X	0.230	0.640	542.0	1.599	234	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **Surry Unit 1 Weld Material SA-1526 (All Available Data)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
Capsule TMI2-LG1 (BWOG CR-3 Irrad.)	0.370	0.700	556.0	0.9477	216	198	-16
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	0.360	0.700	556.0	0.9299	202	188	-21
Capsule TMI2-LG1 (BWOG CR-3 Irrad.)	0.330	0.670	556.0	0.9909	226	225	1
Three Mile Island Unit 1 Capsule C	0.330	0.670	556.0	0.9597	166	167	-49
Three Mile Island Unit 1 Capsule E	0.330	0.670	556.0	0.4305	74	78	-19
Capsule W-1 (CR-3 NBD)	**0.360**	**0.700**	**546.3**	**0.6873**	**262**	**234**	**34**
Surry Unit 1 Capsule T	0.230	0.640	533.9	0.6535	171	184	37
Surry Unit 1 Capsule V	0.230	0.640	538.8	1.1811	250	283	17
Surry Unit 1 Capsule X	0.230	0.640	542.0	1.1296	234	268	13
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **Surry Unit 1 Weld Material S. . .526 (All Available Data)**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
SA-1526/299L44	0.340	0680	542.0	220.6	249.0	Non-Credible	0.0	220.6

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*

If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Capsule TM2-LG1 (BWOG CR-3 Irrad.)	Yes	Yes	Credible	Yes	Yes	198	1	Conservative
Capsule CR3-LG1 (BWOG CR-3 Irrad.)	Yes	Yes	Credible	Yes	Yes	188	-5	Conservative
Capsule TM2-LG1 (BWOG CR-3 Irrad.)	Yes	Yes	Credible	Yes	Yes	225	19	Conservative
Three Mile Island Unit 1 Capsule C	Yes	Yes	Non-Credible	Yes	Yes	167	-32	Conservative
Three Mile Island Unit 1 Capsule E	Yes	Yes	Credible	Yes	Yes	78	-11	Conservative
Capsule W-1 (CR-3 NBD)	Yes	Yes	Non-Credible	Yes	Yes	234	49	Conservative
Surry Unit 1 Capsule T	Yes	Yes	Non-Credible	Yes	Yes	184	48	Conservative
Surry Unit 1 Capsule V	Yes	Yes	Credible	Yes	Yes	283	38	Conservative
Surry Unit 1 Capsule X	Yes	Yes	Credible	Yes	Yes	268	34	Conservative
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (SA-1526, Alt. 1)

Table 2: **Surry Unit 2 Plate Material C4339-1 (Combined Longitudinal and Transverse Data)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
Surry Unit 2 Capsule X (Long)	0.104	0.520	534.9	0.302	55	Yes
Surry Unit 2 Capsule V (Long)	0.104	0.520	540.1	1.880	75	Yes
Surry Unit 2 Capsule X (Trans)	0.104	0.520	534.9	0.302	45	Yes
Surry Unit 2 Capsule V (Trans)	0.104	0.520	540.1	1.880	75	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **Surry Unit 2 Plate Material C4339-1 (Combined Longitudinal and Transverse Data)**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
Surry Unit 2 Capsule X (Long)	0.104	0.520	534.9	0.6720	55	55	10
Surry Unit 2 Capsule V (Long)	0.104	0.520	540.1	1.1729	75	75	-3
Surry Unit 2 Capsule X (Trans)	0.104	0.520	534.9	0.6720	45	45	0
Surry Unit 2 Capsule V (Trans)	0.104	0.520	540.1	1.1729	75	75	-3
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **Surry Unit 2 Plate Material C 3-1 (Combined Longitudinal and Transver ata)**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
Plate C4339-1	0.107	0.530	543.1	70.8	66.5	Credible	-	66.5

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*
If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (Including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Surry Unit 2 Capsule X (Long)	No	No	Credible	No	No	-	-	-
Surry Unit 2 Capsule V (Long)	No	No	Credible	No	No	-	-	-
Surry Unit 2 Capsule X (Trans)	No	No	Credible	No	No	-	-	-
Surry Unit 2 Capsule V (Trans)	No	No	Credible	No	No	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

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Table 2: **Surry Unit 2 Weld Material R3008**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence (x1E19)	Measured Delta-RT(NDT) (F)	Data Used In Assessing Vessel? (Yes or No)
Surry Unit 2 Capsule X	0.187	0.545	534.9	0.302	96	Yes
Surry Unit 2 Capsule V	0.187	0.545	540.1	1.880	140	Yes
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Table 3: **Surry Unit 2 Weld Material R3008**

Capsule ID (Including Source)	Copper (wt%)	Nickel (wt%)	Irradiation Temperature (F)	Fluence Factor	Measured Delta-RT(NDT) (F)	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *
Surry Unit 2 Capsule X	0.187	0.545	534.9	0.6720	96	96	12
Surry Unit 2 Capsule V	0.187	0.545	540.1	1.1729	140	140	-7
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

** For credibility check, measured shift values are adjusted to average surveillance material chemistry and irradiation temperature as required. See Table 4.*

Table 4: **Surry Unit 2 Weld Material**

CF Determination

Beltline Material ID	Beltline Material Copper (wt%)	Beltline Material Nickel (wt%)	Irradiation Temperature (F)	Position 1.1 Chemistry Factor	Position 2.1 Chemistry Factor	Surveillance Data Credible or Non-Credible?	If Surv. Data Non-Credible, Verify Conservatism of Position 1.1 CF *	Chemistry Factor Applied to Beltline Material **
R3008	0.187	0.545	543.1	147.5	125.2	Credible	-	125.2

** Measured shift values are adjusted to the average surveillance material chemistry and irradiation temperature, and are verified to be within 2 sigma of the trend curve based on RG 1.99 Rev. 2 Position 1.1.*

*** If surveillance data are non-credible but the Pos. 1.1 CF is shown to be conservative, the lower of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.*
If surveillance data are non-credible and the Pos. 1.1 CF is shown to be non-conservative, the greater of the Pos. 1.1 and Pos. 2.1 chemistry factors is applied to the beltline material with a full margin term.

Credibility Assessment

						Conservatism Check for Pos. 1.1 CF when Surv. Data Non-Credible		
Capsule ID (including Source)	(1) Temperature Correction Applied for Credibility?	(2) Chemistry Correction Applied for Credibility?	Surveillance Data Credible or Non-Credible?	(3) Temperature Correction Applied to Surv. Data for Application to Beltline Material?	(4) Chemistry Correction Applied to Surv. Data for Application to Beltline Material?	Adjusted Delta-RT(NDT) (F) *	Adjusted - Predicted Delta-RT(NDT) (F) *	Are adjusted surveillance data within 2 sigma of the applied CF trend curve? *
Surry Unit 2 Capsule X	No	No	Credible	No	No	-	-	-
Surry Unit 2 Capsule V	No	No	Credible	No	No	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

(1) For the credibility determination, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in a single reactor (i.e., were irradiated at a similar temperature).

(2) For the credibility determination, a chemistry correction is not applied to measured values of transition temperature shift if applicable surveillance data were obtained from a single source (i.e., were machined from the same block of material).

(3) For determination of the beltline material chemistry factor, a temperature correction is not applied to measured values of transition temperature shift if applicable surveillance data were irradiated in the reactor vessel which is being evaluated (i.e., were irradiated at a similar temperature). A temperature correction is applied only in the conservative direction.

(4) For determination of the beltline material chemistry factor, a chemistry correction (i.e., ratio procedure) is not applied to measured values of transition temperature shift if the chemical composition of applicable surveillance data is essentially identical to the best-estimate chemical composition of the beltline material being evaluated.

Pos. 2.1 (R3008)