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Exelon Nuclear

RS-11-052

10 CFR 50.46

April 6, 2011

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

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

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Annual 10 CFR 50.46 Report of the Emergency Core Cooling System Evaluation Model Changes and Errors

Reference: 1. Letter from J. L. Hansen (Exelon Generation Company, LLC) to U. S. NRC, "ECCS Evaluation Model Error – 10 CFR 50.46 Reports," dated March 15, 2011.

In accordance with 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," paragraph (a)(3)(ii), Exelon Generation Company, LLC, (EGC) is submitting the attached information to fulfill the annual reporting requirements for the Braidwood and Byron Stations, Units 1 and 2.

In Reference 1, EGC submitted a report to fulfill the 30-day reporting requirement in accordance with 10 CFR 50.46 for the new large break Best-Estimate LOCA (BELOCA) Automated Statistical Treatment of Uncertainty Method (ASTRUM) analysis in support of Braidwood and Byron Stations, Units 1 and 2. Updated assessment notes were provided with the PCT values for the limiting large break loss-of-coolant accident (LBLOCA) evaluations regarding the new BELOCA ASTRUM analysis. The small break loss-of-coolant accident (SBLOCA) analyses were not affected.

Attachment 1 provides peak cladding temperature (PCT) information for the limiting loss-of-coolant accident (LOCA) evaluations for the Braidwood and Byron Stations. Attachment 2 contains the assessment notes, which provides a detailed description for each change reported. The Attachments indicate that there has been no net PCT change for the Braidwood and Byron Stations, Units 1 and 2.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Ms. Lisa A. Schofield at (630) 657-2815.

Respectfully,

Jeffrey L. Hansen
Manager – Licensing
Exelon Generation Company, LLC

Attachments:
1: Braidwood and Byron Stations, Units 1 and 2 – 10 CFR 50.46 Report
2: Braidwood and Byron Stations, Units 1 and 2 – 10 CFR 50.46 Report Assessment Notes

cc:
NRC Regional Administrator, Region III
NRC Senior Resident Inspector, Braidwood Station
NRC Senior Resident Inspector, Byron Station
NRR Project Manager, Braidwood and Byron Stations
Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT 1
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report

PLANT NAME:	Braidwood Station, Unit 1
ECCS EVALUATION MODEL:	Small Break Loss-of-Coolant Accident (SBLOCA)
REPORT REVISION DATE:	January 24, 2011
CURRENT OPERATING CYCLE:	A1C16

ANALYSIS OF RECORD

Evaluation Model:	NOTRUMP
Calculation:	Westinghouse CN-LIS-00-208, December 2000
Fuel:	VANTAGE+ 17 x 17
Limiting Fuel Type:	VANTAGE+ 17 x 17
Limiting Single Failure:	Loss of one train of ECCS flow
Limiting Break Size and Location:	2" break in the bottom of the Cold Leg
Reference Peak Cladding Temperature (PCT):	**1624.0 °F**

MARGIN ALLOCATION

A. PRIOR LOSS-OF-COOLANT ACCIDENT (LOCA) MODEL ASSESSMENTS

10 CFR 50.46 report dated June 11, 2001 (see note 1)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 18, 2002 (see note 2)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2003 (see note 3)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2004 (see note 4)	ΔPCT = 35 °F
10 CFR 50.46 report dated April 14, 2005 (see note 5)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2006 (see note 6)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 13, 2007 (see note 7)	ΔPCT = 0 °F
10 CFR 50.46 report dated June 22, 2007 (see note 9)	ΔPCT = 0 °F
10 CFR 50.46 report dated November 19, 2007 (see note 10)	ΔPCT = 90 °F
10 CFR 50.46 report dated April 11, 2008 (see note 11)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 9, 2009 (see note 12)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 8, 2010 (see note 13)	ΔPCT = 0 °F

Net PCT **PCT = 1749.0 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

Urania-Gadolinia Pellet Thermal Conductivity Calculation (see note 15)	ΔPCT = 0 °F
Pellet Crack and Dish Volume Calculation (see note 16)	ΔPCT = 0 °F
Treatment of Vessel Average Temperature Uncertainty (see note 17)	ΔPCT = 0 °F
General Code Maintenance (see note 18)	ΔPCT = 0 °F
Total PCT change from current assessments	$\sum$ ΔPCT = 0 °F
Cumulative PCT change from current assessments	$\sum \lvert$ ΔPCT $\rvert$ = 0 °F

Net PCT **PCT = 1749.0 °F**

ATTACHMENT 1
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report

PLANT NAME:	Braidwood Station, Unit 1
ECCS EVALUATION MODEL:	Large Break Loss-of-Coolant Accident (LBLOCA)
REPORT REVISION DATE:	January 24, 2011
CURRENT OPERATING CYCLE:	A1C16

ANALYSIS OF RECORD

Evaluation Model:	ASTRUM (2004)
Calculation:	Westinghouse WCAP-16841-P, November 2007
Fuel:	VANTAGE+ 17 x 17
Limiting Fuel Type:	VANTAGE+ 17 x 17
Limiting Single Failure:	Loss of one train of ECCS flow
Limiting Break Size and Location:	Guillotine break in the Cold Leg
Reference PCT:	**1913.0 °F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated March 15, 2011 (see note 14)	ΔPCT = 0 °F

Net PCT **PCT = 1913.0 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

No 2010 model changes, corrections, or enhancements	ΔPCT = 0 °F
Total PCT change from current assessments	Σ ΔPCT = 0 °F
Cumulative PCT change from current assessments	Σ |ΔPCT| = 0 °F

Net PCT **PCT = 1913.0 °F**

ATTACHMENT 1
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report

PLANT NAME:	Braidwood Station, Unit 2
ECCS EVALUATION MODEL:	SBLOCA
REPORT REVISION DATE:	January 24, 2011
CURRENT OPERATING CYCLE:	A2C15

ANALYSIS OF RECORD

Evaluation Model:	NOTRUMP
Calculation:	Westinghouse CN-LIS-00-208, December 2000
Fuel:	VANTAGE+ 17 x 17
Limiting Fuel Type:	VANTAGE+ 17 x 17
Limiting Single Failure:	Loss of one train of ECCS flow
Limiting Break Size and Location:	2" break in the bottom of the Cold Leg
Reference PCT:	**1627.0 °F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated June 11, 2001 (see note 1)	ΔPCT = 3 °F
10 CFR 50.46 report dated April 18, 2002 (see note 2)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2003 (see note 3)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2004 (see note 4)	ΔPCT = 35 °F
10 CFR 50.46 report dated April 14, 2005 (see note 5)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2006 (see note 6)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 13, 2007 (see note 7)	ΔPCT = 0 °F
10 CFR 50.46 report dated June 22, 2007 (see note 9)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 11, 2008 (see note 11)	ΔPCT = 90 °F
10 CFR 50.46 report dated April 9, 2009 (see note 12)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 8, 2010 (see note 13)	ΔPCT = 0 °F

Net PCT **PCT = 1755.0 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

Pellet Crack and Dish Volume Calculation (see note 16)	ΔPCT = 0 °F
Treatment of Vessel Average Temperature Uncertainty (see note 17)	ΔPCT = 0 °F
General Code Maintenance (see note 18)	ΔPCT = 0 °F
Total PCT change from current assessments	Σ ΔPCT = 0 °F
Cumulative PCT change from current assessments	$\Sigma \lvert$ ΔPCT $\rvert$ = 0 °F

Net PCT **PCT = 1755.0 °F**

ATTACHMENT 1
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report

PLANT NAME:	Braidwood Station, Unit 2
ECCS EVALUATION MODEL:	LBLOCA
REPORT REVISION DATE:	January 24, 2011
CURRENT OPERATING CYCLE:	A2C15

ANALYSIS OF RECORD

Evaluation Model:	ASTRUM (2004)
Calculation:	Westinghouse WCAP-16841-P, November 2007
Fuel:	VANTAGE+ 17 x 17
Limiting Fuel Type:	VANTAGE+ 17 x 17
Limiting Single Failure:	Loss of one train of ECCS flow
Limiting Break Size and Location:	Guillotine break in the Cold Leg
Reference PCT:	**2041.0 °F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated March 15, 2011 (see note 14)	ΔPCT = 0 °F

Net PCT **PCT = 2041.0 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

No 2010 model changes, corrections, or enhancements	ΔPCT = 0 °F
Total PCT change from current assessments	Σ ΔPCT = 0 °F
Cumulative PCT change from current assessments	Σ |ΔPCT| = 0 °F

Net PCT **PCT = 2041.0 °F**

ATTACHMENT 1
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report

PLANT NAME:	Byron Station, Unit 1
ECCS EVALUATION MODEL:	SBLOCA
REPORT REVISION DATE:	January 24, 2011
CURRENT OPERATING CYCLE:	B1C18*

*Cycle 18 scheduled to start April 2011

ANALYSIS OF RECORD

Evaluation Model:	NOTRUMP
Calculation:	Westinghouse CN-LIS-00-208, December 2000
Fuel:	VANTAGE+ 17 x 17
Limiting Fuel Type:	VANTAGE+ 17 x 17
Limiting Single Failure:	Loss of one train of ECCS flow
Limiting Break Size and Location:	2" break in the bottom of the Cold Leg
Reference PCT:	**1624.0 °F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated June 11, 2001 (see note 1)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 18, 2002 (see note 2)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2003 (see note 3)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2004 (see note 4)	ΔPCT = 35 °F
10 CFR 50.46 report dated April 14, 2005 (see note 5)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2006 (see note 6)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 13, 2007 (see note 7)	ΔPCT = 0 °F
10 CFR 50.46 report dated June 22, 2007 (see note 9)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 11, 2008 (see note 11)	ΔPCT = 90 °F
10 CFR 50.46 report dated April 9, 2009 (see note 12)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 8, 2010 (see note 13)	ΔPCT = 0 °F

Net PCT **PCT = 1749.0 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

Pellet Crack and Dish Volume Calculation (see note 16)	ΔPCT = 0 °F
Treatment of Vessel Average Temperature Uncertainty (see note 17)	ΔPCT = 0 °F
General Code Maintenance (see note 18)	ΔPCT = 0 °F
Total PCT change from current assessments	$\sum$ ΔPCT = 0 °F
Cumulative PCT change from current assessments	$\sum \lvert \Delta PCT \rvert$ = 0 °F

Net PCT **PCT = 1749.0 °F**

ATTACHMENT 1
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report

PLANT NAME:	Byron Station, Unit 1
ECCS EVALUATION MODEL:	LBLOCA
REPORT REVISION DATE:	January 24, 2011
CURRENT OPERATING CYCLE:	B1C18*

*Cycle 18 scheduled to start April 2011

ANALYSIS OF RECORD

Evaluation Model:	ASTRUM (2004)
Calculation:	Westinghouse WCAP-16841, November 2007
Fuel:	VANTAGE+ 17 x 17
Limiting Fuel Type:	VANTAGE+ 17 x 17
Limiting Single Failure:	Loss of one train of ECCS flow
Limiting Break Size and Location:	Guillotine break in the Cold Leg
Reference PCT:	**1913.0 °F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated March 15, 2011 (see note 14)	ΔPCT = 0 °F

Net PCT **PCT = 1913.0 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

No 2010 model changes, corrections, or enhancements	ΔPCT = 0 °F
Total PCT change from current assessments	$\sum$ ΔPCT = 0 °F
Cumulative PCT change from current assessments	$\sum \lvert$ ΔPCT $\rvert$ = 0 °F

Net PCT **PCT = 1913.0 °F**

ATTACHMENT 1
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report

PLANT NAME:	Byron Station, Unit 2
ECCS EVALUATION MODEL:	SBLOCA
REPORT REVISION DATE:	January 24, 2011
CURRENT OPERATING CYCLE:	B2C16

ANALYSIS OF RECORD

Evaluation Model:	NOTRUMP
Calculation:	Westinghouse CN-LIS-00-208, December 2000
Fuel:	VANTAGE+ 17 x 17
Limiting Fuel Type:	VANTAGE+ 17 x 17
Limiting Single Failure:	Loss of one train of ECCS flow
Limiting Break Size and Location:	2" break in the bottom of the Cold Leg
Reference PCT:	**1627.0 °F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated June 11, 2001 (see note 1)	ΔPCT = 3 °F
10 CFR 50.46 report dated April 18, 2002 (see note 2)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2003 (see note 3)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2004 (see note 4)	ΔPCT = 35 °F
10 CFR 50.46 report dated April 14, 2005 (see note 5)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 14, 2006 (see note 6)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 13, 2007 (see note 7)	ΔPCT = 0 °F
10 CFR 50.46 report dated May 10, 2007 (see note 8)	ΔPCT = 90 °F
10 CFR 50.46 report dated June 22, 2007 (see note 9)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 11, 2008 (see note 11)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 9, 2009 (see note 12)	ΔPCT = 0 °F
10 CFR 50.46 report dated April 8, 2010 (see note 13)	ΔPCT = 0 °F

Net PCT **PCT = 1755.0 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

Pellet Crack and Dish Volume Calculation (see note 16)	ΔPCT = 0 °F
Treatment of Vessel Average Temperature Uncertainty (see note 17)	ΔPCT = 0 °F
General Code Maintenance (see note 18)	ΔPCT = 0 °F
Total PCT change from current assessments	Σ ΔPCT = 0 °F
Cumulative PCT change from current assessments	Σ |ΔPCT| = 0 °F

Net PCT **PCT = 1755.0 °F**

ATTACHMENT 1
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report

PLANT NAME:	Byron Station, Unit 2
ECCS EVALUATION MODEL:	LBLOCA
REPORT REVISION DATE:	January 24, 2011
CURRENT OPERATING CYCLE:	B2C16

ANALYSIS OF RECORD

Evaluation Model:	ASTRUM (2004)
Calculation:	Westinghouse WCAP-16841-P, November 2007
Fuel:	VANTAGE+ 17 x 17
Limiting Fuel Type:	VANTAGE+ 17 x 17
Limiting Single Failure:	Loss of one train of ECCS flow
Limiting Break Size and Location:	Guillotine break in the Cold Leg
Reference PCT:	**2041.0 °F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated March 15, 2011 (see note 14)	ΔPCT = 0 °F

Net PCT **PCT = 2041.0 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

No 2010 model changes, corrections, or enhancements	ΔPCT = 0 °F
Total PCT change from current assessments	Σ ΔPCT = 0 °F
Cumulative PCT change from current assessments	Σ $\lvert\Delta$PCT$\rvert$ = 0 °F

Net PCT **PCT = 2041.0 °F**

ATTACHMENT 2
Braidwood and Byron Stations, Units 1 and 2
10 CFR 50.46 Report Assessment Notes

1. Prior Loss-of-Coolant Accident (LOCA) Model Assessment

   The 10 CFR 50.46 report dated June 11, 2001, reported a new small break loss-of-coolant accident (SBLOCA) analysis to support operations at uprated power conditions. The same report assessed the impact from annular axial blankets on SBLOCA analysis, which determined a 0 °F PCT penalty each for Braidwood Unit 1 and Byron Unit 1 and resulted in a 3 °F PCT penalty each for Braidwood Unit 2 and Byron Unit 2. Evaluations for plant conditions and SBLOCA model changes that resulted in 0 °F PCT change were reported.

2. Prior LOCA Model Assessment

   The 10 CFR 50.46 report dated April 18, 2002, reported evaluations for SBLOCA model changes, which resulted in 0 °F PCT change.

3. Prior LOCA Model Assessment

   The 10 CFR 50.46 report dated April 14, 2003, reported evaluations for SBLOCA model changes, which resulted in 0 °F PCT change.

4. Prior LOCA Model Assessment

   The 10 CFR 50.46 report dated April 14, 2004, reported evaluations for an SBLOCA assessment related to NOTRUMP bubble rise/drift flux model inconsistency corrections, which resulted in 35 °F PCT assessment.

5. Prior LOCA Model Assessment

   The 10 CFR 50.46 report dated April 14, 2005, reported evaluations for SBLOCA model changes, which resulted in a 0 °F PCT change. Assembly N10S was reconstituted with two stainless steel filler rods during Braidwood Unit 1 Refueling Outage 11. This assembly was reloaded into the core and was used during Braidwood Unit 1 Cycle 12 operation. The introduction of up to five stainless steel filler rods was evaluated and shown to have no impact on SBLOCA analysis. The estimated PCT effect was 0 °F. This assembly was discharged during Reload 12.

6. Prior LOCA Model Assessment

   The 10 CFR 50.46 report dated April 14, 2006, reported evaluations for SBLOCA NOTRUMP General Code Maintenance, which resulted in 0 °F PCT change.

7. Prior LOCA Model Assessment

   The 10 CFR 50.46 report dated April 13, 2007, reported evaluations for SBLOCA model changes and errors. The report documented general code maintenance for NOTRUMP, AXIOM lead test assembly evaluation and NOTRUMP refined break spectrum, which resulted in 0° F PCT impact.

8. Prior LOCA Model Assessment

   The 30-day 10 CFR 50.46 report dated May 10, 2007, applicable to Byron Unit 2 reported an assessment of the Emergency Core Cooling System (ECCS), which evaluated changes in ECCS flow during the recirculation phase due to Generic Safety Issue (GSI) 191 related safety injection (SI) throttle valve replacements. The evaluation of recirculation phase ECCS flow changes relative to impact on the current Analysis of Record was performed for the SBLOCA. Based on the NOTRUMP and SBLOCA calculations performed for Byron Unit 2, a conservative, bounding PCT assessment of +90 °F was applied to the current Byron Unit 2 SBLOCA PCT.

9. Prior LOCA Model Assessment

   A 30-day report was submitted to the NRC dated June 22, 2007, to report an error in the HOT SPOT Code, which did not impact the SBLOCA analysis. The 30-day report also reported minor errors with the reactor vessel data collections that potentially affected the vessel inlet and outlet fluid volume, metal mass, and surface area. The corrected values were evaluated for impact, and a 0 °F penalty was assessed for the SBLOCA analysis for the Braidwood and Byron Stations, Units 1 and 2.

10. Prior LOCA Model Assessment

    The 30-day 10 CFR 50.46 report dated November 19, 2007, applicable to Braidwood Unit 1 reported an assessment of the ECCS, which evaluated changes in ECCS flow during the recirculation phase due to GSI-191 related SI throttle valve replacements. The evaluation of recirculation phase ECCS flow changes relative to impact on the current Analysis of Record was performed for the SBLOCA. Based on the NOTRUMP and SBLOCA calculations performed for Braidwood Unit 1, a conservative, bounding PCT assessment of +90 °F was applied to the Braidwood Unit 1 SBLOCA PCT.

11. Prior LOCA Model Assessment

    The 10 CFR 50.46 report dated April 11, 2008, reported evaluations for LOCA model changes and errors. Applicable to Braidwood Unit 2 and Byron Unit 1, the ECCS assessment evaluated changes in ECCS flow during the recirculation phase due to GSI-191 related SI throttle valve replacements. A conservative, bounding PCT assessment of +90 °F was applied to the Braidwood Unit 2 and Byron Unit 1 SBLOCA PCTs. The report also documented general code maintenance for SBLOCA and evaluation for pump weir resistance modeling for SBLOCA analysis, which resulted in 0 °F PCT impact.

12. Prior LOCA Model Assessment

    The 10 CFR 50.46 report dated April 9, 2009, reported evaluations for LOCA model changes and errors. The report documents general code maintenance for SBLOCA, errors in reactor vessel lower plenum surface area calculations, discrepancies in metal mass from drawings, and an evaluation of Areva Lead Use Assemblies (LUA). All have a 0 °F PCT penalty associated with them.

13. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 8, 2010, reported no evaluations for SBLOCA model changes, which resulted in 0 °F PCT change.

14. Prior LOCA Model Assessment

The 30-day 10 CFR 50.46 report dated March 15, 2011, reported a new large break BELOCA (ASTRUM) analysis to support operations for the Braidwood and Byron Stations, Units 1 and 2. The same report assessed the impact from several errors, issues, and code enhancements. Each of these errors / issues / code enhancements resulted in 0 °F PCT impact with a net 0 °F PCT impact.

15. Urania-Gadolinia Pellet Thermal Conductivity Calculation (SBLOCA)

Two errors were discovered in the pellet thermal conductivity calculation for urania-gadolinia pellets in the SBLOCA code. First, the calculation did not include the terms required to adjust for pellet densities other than 95% of the theoretical density. Second, the conversion from Fahrenheit to Rankine used an adder of 459 instead of 459.67. These errors have been corrected and were evaluated for impact on SBLOCA analysis for Braidwood Station, Unit 1; a PCT assessment of 0 °F was applied to the Braidwood Station, Unit 1.

16. Pellet Crack and Dish Volume Calculation (SBLOCA)

Two errors were discovered in the calculation of the normalized pellet crack and dish volumes in the SBLOCA code. First, an incorrect operator was used to select between two tables of normalized volume vs. linear heat generation rate. Second, the normalized volume at 18 kW/ft was incorrectly programmed in one of the tables as 1.58 instead of 1.59. These errors were evaluated for impact on existing SBLOCA analysis; based on a combination of SBLOCA sensitivity calculations and engineering judgment, a 0 °F PCT penalty was assessed for the Braidwood and Byron Stations, Units 1 and 2.

17. Treatment of Vessel Average Temperature Uncertainty (SBLOCA)

Historically, the overall vessel average temperature uncertainty calculated by Westinghouse considered only "-" instrument uncertainties, corresponding to the indicated temperature being lower than the actual temperature. This uncertainty was then applied as a "+/-" uncertainty in some LOCA analyses, rather than using specific "+" and "-" uncertainties. This discrepancy was evaluated for impact on the SBLOCA analysis results, and a 0 °F PCT penalty was assessed for the Braidwood and Byron Stations, Units 1 and 2.

18. General Code Maintenance (SBLOCA)

Various changes have been made to enhance the usability of the codes and to help preclude errors in analyses. This includes items such as modifying input variable definitions, units, and defaults; improving the input diagnostic checks; enhancing the code output; optimizing active coding; and eliminating inactive coding. These changes resulted in 0 °F PCT impact with a net 0 °F PCT impact.