

RS-11-030

10 CFR 50.46

March 15, 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: ECCS Evaluation Model Error – 10 CFR 50.46 Reports

- References:
1. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. NRC, "Annual 10 CFR 50.46 Report of the Emergency Core Cooling System Evaluation Model Changes and Errors," dated April 8, 2010.
 2. Letter from N. J. DiFrancesco (U. S. NRC) to M. J. Pacilio (Exelon Nuclear), "Issuance of Amendments re: Large Break Loss-of-Coolant Accident Analysis using the Automated Statistical Treatment of Uncertainty Method (TAC Nos. ME2941, ME2942, ME2943, and ME2944)," December 21, 2010.

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 30-day reporting requirement for Braidwood and Byron Stations, Units 1 and 2.

In Reference 1, EGC reported the Braidwood and Byron Stations, Units 1 and 2 peak cladding temperatures (PCTs), calculated based on an acceptable evaluation model. A new best-estimate large break loss-of-coolant accident (LBLOCA) methodology was approved for Braidwood and Byron Stations, Units 1 and 2 in Reference 2, known as Automated Statistical Treatment of Uncertainty Method (ASTRUM). The Technical Specification Amendments were implemented at Braidwood and Byron Stations, Units 1 and 2 on February 18, 2011. The new analysis resulted in changes of greater than 50 °F in the peak clad temperature (PCT) from those previously reported to the NRC in the last 10 CFR 50.46 report, dated April 8, 2010. The

calculated PCT for the Braidwood and Byron Stations, Units 1 and 2 LBLOCA remain within the acceptance criteria set forth in 10 CFR 50.46. Additional reanalysis is not required.

Attachment 1 provides updated information regarding the PCT values for the limiting LBLOCA evaluations for Braidwood and Byron Stations, Units 1 and 2. The small break loss-of-coolant accident (SBLOCA) analyses were not affected. Attachment 2 contains the Assessment Notes.

There are no regulatory commitments contained in this letter. If you have any questions concerning this letter, please contact Mr. Richard W. McIntosh (630) 657-2816.

Respectfully,



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

Attachments:

1. Peak Cladding Temperature Rack-Up Sheets
2. Assessment Notes

**ATTACHMENT 1
Peak Cladding Temperature Rack-Up Sheets**

PLANT NAME: Braidwood Station Unit 1
 ECCS EVALUATION MODEL: Large Break Loss of Coolant Accident (LBLOCA)
 REPORT REVISION DATE: 01/14/11
 CURRENT OPERATING CYCLE: 16

ANALYSIS OF RECORD (AOR)

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 Peak Cladding Temperature (PCT) PCT = 1913.0°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

New Analysis (Note 1)	$\Delta PCT = 0 \text{ }^\circ\text{F}$
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NET PCT **PCT = 1913.0°F**

B. CURRENT LOCA MODEL ASSESSMENTS

2008-2010 Assessments and Evaluations (Note 2)	$\Delta PCT = 0 \text{ }^\circ\text{F}$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0 \text{ }^\circ\text{F}$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0 \text{ }^\circ\text{F}$

NET PCT **PCT = 1913.0°F**

**ATTACHMENT 1
Peak Cladding Temperature Rack-Up Sheets**

PLANT NAME: Braidwood Station Unit 2
 ECCS EVALUATION MODEL: Large Break Loss of Coolant Accident (LBLOCA)
 REPORT REVISION DATE: 01/14/11
 CURRENT OPERATING CYCLE: 15

AOR

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 PCT = 2041.0°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

New Analysis (Note 1)	$\Delta PCT = 0 \text{ }^\circ\text{F}$
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NET PCT PCT = 2041.0°F

B. CURRENT LOCA MODEL ASSESSMENTS

2008-2010 Assessments and Evaluations (Note 2)	$\Delta PCT = 0 \text{ }^\circ\text{F}$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0 \text{ }^\circ\text{F}$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0 \text{ }^\circ\text{F}$

NET PCT PCT = 2041.0°F

**ATTACHMENT 1
Peak Cladding Temperature Rack-Up Sheets**

PLANT NAME: Byron Station Unit 1
 ECCS EVALUATION MODEL: Large Break Loss of Coolant Accident (LBLOCA)
 REPORT REVISION DATE: 01/14/11
 CURRENT OPERATING CYCLE: 17

AOR

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 PCT = 1913.0°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

New Analysis (Note 1)	$\Delta PCT = 0 \text{ }^\circ\text{F}$
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NET PCT **PCT = 1913.0°F**

B. CURRENT LOCA MODEL ASSESSMENTS

2008-2010 Assessments and Evaluations (Note 2)	$\Delta PCT = 0 \text{ }^\circ\text{F}$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0 \text{ }^\circ\text{F}$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0 \text{ }^\circ\text{F}$

NET PCT **PCT = 1913.0°F**

**ATTACHMENT 1
Peak Cladding Temperature Rack-Up Sheets**

PLANT NAME: Byron Station Unit 2
 ECCS EVALUATION MODEL: Large Break Loss of Coolant Accident (LBLOCA)
 REPORT REVISION DATE: 01/14/11
 CURRENT OPERATING CYCLE: 16

AOR

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 PCT = 2041.0°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

New Analysis (Note 1)	$\Delta PCT = 0 \text{ }^\circ\text{F}$
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NET PCT **PCT = 2041.0°F**

B. CURRENT LOCA MODEL ASSESSMENTS

2008-2010 Assessments and Evaluations (Note 2)	$\Delta PCT = 0 \text{ }^\circ\text{F}$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0 \text{ }^\circ\text{F}$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0 \text{ }^\circ\text{F}$

NET PCT **PCT = 2041.0°F**

ATTACHMENT 2 Assessment Notes

1. Current Loss-of-Coolant (LOCA) Model Assessment

A new large break Best-Estimate LOCA (BELOCA) Automated Statistical Treatment of Uncertainty Method (ASTRUM) analysis (Reference 1) was performed by Westinghouse in November 2007 in support of Byron and Braidwood Stations Units 1 and 2. The results of this new analysis were submitted to the NRC for approval in Reference 2 and the analysis was approved by the NRC in Reference 3.

References:

1. WCAP 16841-P, Revision 0, "Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for Byron/Braidwood Nuclear Plant Using the ASTRUM Methodology", November 2007.
2. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. NRC, "License Amendment Request Regarding Large Break Loss-of-Coolant Accident Analysis Methodology," dated December 16, 2009.
3. Letter from N. J. DiFancesco (U. S. NRC) to M. J. Pacilio (Exelon Nuclear), "Issuance of Amendments re: Large Break Loss-of-Coolant Accident Analysis using the Automated Statistical Treatment of Uncertainty Method (TAC Nos. ME2941, ME2942, ME2943, and ME2944)," December 21, 2010.

2. 2008 to 2010 Assessments and Evaluations

Subsequent to the analysis of record performed in 2007, stated above in Note 1, several 10 CFR 50.46 assessments were identified by Westinghouse. They included;

- (a) General Code Maintenance (2008);
- (b) HOTSPOT Burst Temperature Logic Errors;
- (c) CCFL Global Volume Error;
- (d) General Code Maintenance (2009);
- (e) Error in ASTRUM Processing of Average Rod Burnup and Rod Internal Pressure;
- (f) Discrepancy in Metal Masses Used From Drawings;
- (g) HOTSPOT Gap Heat Transfer Logic; and,
- (h) Treatment of Vessel Average Temperature Uncertainty.

Each of these errors / issues / code enhancements had a PCT impact of zero degree with a net PCT impact of zero degree (Reference 1).

Additionally, Westinghouse performed an evaluation (Reference 2) to determine the impact of the presence of nitrogen/non-condensable in the space between the two check valves in the accumulator lines. The evaluation determined that the impact of trapped Nitrogen/non-condensable in the accumulator lines had a zero degree PCT impact.

Reference:

1. NF-CB-11-22, "Exelon Nuclear Byron/Braidwood Nuclear Power Plants Summary of 10 CFR 50.46 Assessments Applicable to the Byron/Braidwood ASTRUM BELOCA Analyses," February 7, 2011.
2. CAE-11-22 / CCE-11-20, "Exelon Nuclear Byron/Braidwood Unit 1 and 2 Byron/Braidwood ASTRUM Implementation: ECCS Line Void Evaluation," February 14, 2011.