

RS-07-154

10 CFR 50.46

November 19, 2007

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

Braidwood Station, Unit 1
Facility Operating License No. NPF-72
NRC Docket No. STN 50-456

Subject: Plant Specific ECCS Evaluation Change – 10 CFR 50.46 Report

- References:
1. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. NRC, "Annual Report of the Emergency Core Cooling System Evaluation Model Changes and Errors Required by 10 CFR 50.46, 'Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors,'" dated April 13, 2007
 2. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. NRC, "ECCS Evaluation Model Error – 10 CFR 50.46 Report " dated June 22, 2007

In accordance with 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," Exelon Generation Company, LLC (EGC) is submitting the attached information to fulfill the 30-day reporting requirement for Braidwood Station Unit 1.

In the Reference 1 letter, EGC reported the Braidwood Station Unit 1 fuel peak cladding temperatures (PCTs), calculated based on an acceptable evaluation model, were 1659.0°F and 2141.0°F for the small break (SBLOCA) and large break loss-of-coolant accidents (LBLOCA), respectively.

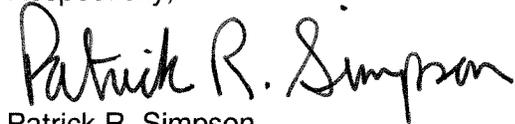
The Reference 2 letter reported an error in the Emergency Core Cooling System (ECCS) evaluation model (i.e., the HOTSPOT computer code) for LBLOCA that resulted in an increase to the calculated PCT for Braidwood Station Unit 1 and 2 and Byron Station Unit 1 and 2. This change resulted in an increase in PCT of 20°F establishing a new Braidwood Station Unit 1 LBLOCA PCT value of 2161.0°F. The SBLOCA PCT remained at 1659.0°F.

Subsequent to the Reference 2 submittal, EGC evaluated the PCT changes for the SBLOCA as a result of Generic Safety Issue 191, "Assessment of Debris Accumulation on PWR Sump Performance," modifications that were made during the recent Fall 2007 Braidwood Station Unit 1 refueling outage. The modifications involved replacement of Safety Injection throttle valves, which caused ECCS flow changes. As a result of these modifications, the calculated PCT for the Braidwood Station Unit 1 SBLOCA increased 90°F and is now 1749.0°F. However, this value remains within the acceptance criteria set forth in 10 CFR 50.46. Therefore, additional reanalysis is not required.

Attachment 1 provides updated information regarding the PCT values for the limiting small break and large break loss-of-coolant accident evaluations for Braidwood Station Unit 1. Attachment 2 contains a detailed description for each change or error reported. Note 9 of Attachment 2 describes the change that was made in support of the GSI-191 modifications discussed above.

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

Respectfully,



Patrick R. Simpson
Manager – Licensing

Attachments:

1. Braidwood Station Unit 1 10 CFR 50.46 Report – Peak Cladding Temperature Rack-up Sheets
2. Braidwood Station Unit 1 10 CFR 50.46 Report – Assessment Notes

**Attachment 1
Braidwood Unit 1 10CFR50.46 Report
Peak Cladding Temperature Rack-up Sheets**

PLANT NAME: Braidwood Station Unit 1
 ECCS EVALUATION MODEL: Small Break Loss of Coolant Accident (SBLOCA)
 REPORT REVISION DATE: 10/08/07
 CURRENT OPERATING CYCLE: 14

ANALYSIS OF RECORD (AOR)

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
 Heat Flux Hot Channel Factor (FQ) = 2.60
 Nuclear Enthalpy Rise Hot Channel Factor (FN Δ H) = 1.70
 Steam Generator Tube Plugging (SGTP) = 5%
 Limiting Break Size and Location: 2" Low Tavg in the Bottom of the Cold Leg

Notes: Zr-4/ZIRLO Clad Fuel

Reference Peak Cladding Temperature (PCT) PCT = 1624.0°F

MARGIN ALLOCATION

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

10CFR50.46 report dated June 11, 2001 (see note 1)	Δ PCT = 0°F
10CFR50.46 report dated April 18, 2002 (see note 2)	Δ PCT = 0°F
10CFR50.46 report dated April 14, 2003 (see note 3)	Δ PCT = 0°F
10CFR50.46 report dated April 14, 2004 (see note 4)	Δ PCT = 35°F
10CFR50.46 report dated April 14, 2005 (see note 5)	Δ PCT = 0°F
10CFR50.46 report dated April 14, 2006 (see note 6)	Δ PCT = 0°F
10CFR50.46 report dated April 13, 2007 (see note 7)	Δ PCT = 0°F
10CFR50.46 report dated June 22, 2007 (see note 8)	Δ PCT = 0°F

NET PCT **PCT = 1659.0°F**

B. CURRENT LOCA MODEL ASSESSMENTS

ECCS Flow Change Evaluation (see note 9)	Δ PCT = 90°F
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NET PCT **PCT = 1749.0°F**

**Attachment 1
Braidwood Unit 1 10CFR50.46 Report
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: 10/08/07
 CURRENT OPERATING CYCLE: 14

ANALYSIS OF RECORD

Evaluation Model: CQD (1996)
 Calculation: Westinghouse CN-LIS-00-7, September 2000
 Fuel: VANTAGE+ 17 x 17
 Limiting Fuel Type: VANTAGE+ 17 x 17
 Limiting Single Failure: Loss of one train of ECCS flow
 Heat Flux Hot Channel Factor (FQ) = 2.60
 Nuclear Enthalpy Rise Hot Channel Factor (FN Δ H) = 1.70
 Steam Generator Tube Plugging (SGTP) = 5%
 Limiting Break Size and Location: Guillotine break in the Cold Leg Break

Notes: Zr-4/ZIRLO Clad Fuel

Reference PCT PCT = 2044.0°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10CFR50.46 report dated June 11, 2001 (see note 1)	Δ PCT = 12°F
10CFR50.46 report dated April 18, 2002 (see note 2)	Δ PCT = 0°F
10CFR50.46 report dated April 14, 2003 (see note 3)	Δ PCT = 0°F
10CFR50.46 report dated April 14, 2004 (see note 4)	Δ PCT = 0°F
10CFR50.46 report dated April 14, 2005 (see note 5)	Δ PCT = 5°F
10CFR50.46 report dated April 14, 2006 (see note 6)	Δ PCT = 0°F
10CFR50.46 report dated April 13, 2007 (see note 7)	Δ PCT = 80°F
10CFR50.46 report dated June 22, 2007 (see note 8)	Δ PCT = 20°F

NET PCT **PCT = 2161.0°F**

B. CURRENT LOCA MODEL ASSESSMENTS

None	Δ PCT = 0°F
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NET PCT **PCT = 2161.0°F**

Attachment 2
Braidwood Unit 1 10CFR50.46 Report
Assessment Notes

1. Prior LOCA Model Assessment

The 10CFR50.46 report dated June 11, 2001 reported new large break loss of coolant accident (LBLOCA) and small break loss of coolant accident (SBLOCA) analyses to support operations at uprated power conditions. The same report assessed the impact from decay heat uncertainty error in Monte Carlo calculations on LBLOCA analysis and the impact from annular axial blankets on SBLOCA analysis. Evaluations for plant conditions and LBLOCA and SBLOCA model changes which resulted in 0°F PCT change were reported. Cycle specific evaluations related to axial power shape distribution envelope violation were reported for the applicable operating cycles.

2. Prior LOCA Model Assessment

The 10CFR50.46 report dated April 18, 2002 reported evaluations for LBLOCA and SBLOCA model changes which resulted in 0°F PCT change. Cycle specific evaluations related to axial power shape distribution envelope violation were reported for the applicable operating cycles.

3. Prior LOCA Model Assessment

The 10CFR50.46 report dated April 14, 2003 reported evaluations for LBLOCA and SBLOCA model changes which resulted in 0°F PCT change. Cycle specific evaluations related to axial power shape distribution envelope violation were reported for the applicable operating cycles.

4. Prior LOCA Model Assessment

The 10CFR50.46 report dated April 14, 2004 reported evaluations for LBLOCA model changes which resulted in 0°F PCT change. A SBLOCA assessment related to NOTRUMP bubble rise/drift flux model inconsistency corrections, which resulted in 35°F PCT assessment, was reported. Cycle specific evaluations related to axial power shape distribution envelope violation were reported for the applicable operating cycles.

5. Prior LOCA Model Assessment

The 10CFR50.46 report dated April 14, 2005 reported evaluations for LBLOCA model changes, which resulted in a 5°F PCT change due to the Revised Blowdown Heatup Uncertainty Calculation. Assembly N10S was reconstituted with two stainless steel filler rods during Braidwood Unit 1 Refueling Outage 11. This assembly is reloaded into the core and is in use during Braidwood Unit 1 Cycle 12 operation. The introduction of up to five stainless steel filler rods has been evaluated and shown to have no impact on LBLOCA and SBLOCA analyses. The estimated PCT effect is 0°F. This assembly will be discharged during Reload 12 and will not be resident in the core for Braidwood Unit 1 Cycle 13. Cycle specific evaluations related to axial power shape distribution envelope violation were reported for the applicable operating cycles.

6. Prior LOCA Model Assessment

The 10CFR50.46 report dated April 14, 2006 reported evaluations for LBLOCA model changes, which resulted in a 0°F PCT change due to the Revised Iteration Algorithm for Calculating the Average Fuel Temperature, Pellet Radial Profile, Improved Automation of End of Blowdown Time, Thermodynamic Properties from THERMO, Vessel Unheated Conductor Noding and Containment Relative Humidity Assumption.

Attachment 2
Braidwood Unit 1 10CFR50.46 Report
Assessment Notes

NOTRUMP General Code Maintenance resulted in 0°F change for SBLOCA. Cycle specific evaluations related to axial power shape distribution envelope violation were reported for the applicable operating cycles.

7. Prior LOCA Model Assessment

The 10CFR50.46 report dated April 13, 2007 reported evaluations LOCA model changes and errors. The report documented general code maintenance for NOTRUMP, containment heat sink addition evaluation and NOTRUMP refined break spectrum, which resulted in 0°F PCT impact. Cycle specific evaluations related to axial power shape distribution envelope violation were reported for the applicable operating cycles.

8. Prior LOCA Model Assessment

A 30-day report was submitted to the NRC dated June 22, 2007, to report an error in the HOTSPOT code which resulted in an increase of 55°F in the LBLOCA PCT for Braidwood Unit 2 and Byron Unit 2 and an 20°F LBLOCA PCT increase for Braidwood Unit 1 and Byron Unit 1. In addition, the 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 Byron Units 1 and 2, and Braidwood Units 1 and 2, SBLOCA analysis. The LBLOCA analyses were not affected by these minor errors.

9. ECCS Flow Change Evaluation

Applicable to Braidwood Unit 1, the ECCS assessment evaluated changes in ECCS flow during the recirculation phase due to 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 (AOR) was performed for the following areas: SBLOCA and LBLOCA.

Large break loss of coolant accident analyses consider a fuel rod temperature transient that is over long before the transfer to ECCS sump recirculation. Therefore, there is no impact on the LBLOCA PCT calculations.

NOTRUMP and SBLOCTA calculations were performed for Braidwood Unit 1; the only input changes consisted of the revised ECCS flows during recirculation. Additional refined break sizes, including non-integer breaks, were selected and evaluated based on PCT results for each initial case in order to capture the worst PCT. Since beginning-of-life (BOL) PCT results approximately equal to or greater than 1700°F were calculated, burnup studies were performed for the limiting BOL break size. Based on the NOTRUMP and SBLOCTA calculations performed for Braidwood Unit 1, a conservative, bounding PCT assessment of +90°F was applied to the current Braidwood Unit 1 SBLOCA PCT.