

RS-07-079

10 CFR 50.46

May 10, 2007

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

Byron Station, Unit 2
Facility Operating License No. NPF-66
NRC Docket No. STN 50-455

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

Reference: 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

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 Byron Station Unit 2.

In the referenced letter, EGC reported the Byron Station Unit 2 fuel peak cladding temperatures (PCTs), calculated based on an acceptable evaluation model, were 1665.0 °F and 2113.0 °F for the small break and large break loss-of-coolant accidents, respectively. On April 16, 2007, Westinghouse notified EGC of a significant change in the application of the Emergency Core Cooling System (ECCS) evaluation model that results in a 90 °F increase to the calculated PCT for a small break loss-of-coolant accident (SBLOCA).

Specifically, a PCT increase of 90 °F has been evaluated for the SBLOCA as a result of generic safety issue (GSI)-191 modifications that were made during the recent Byron Station Unit 2 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 Byron Station Unit 2 SBLOCA is now 1755.0 °F, which 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 Byron Station Unit 2. Attachment 2 contains a detailed description for each change or error reported. Note 8 of

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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. Kenneth M. Nicely at (630) 657-2803.

Respectfully,

A handwritten signature in dark ink, appearing to read 'D. Gullott', with a long horizontal flourish extending to the right.

David Gullott
Manager – Licensing

Attachments:

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

ATTACHMENT 1
Byron Unit 2 10 CFR 50.46 Report
Peak Cladding Temperature Rack-up Sheets

PLANT NAME: Byron Station Unit 2
ECCS EVALUATION MODEL: Small Break Loss of Coolant Accident (SBLOCA)
REPORT REVISION DATE: 04/16/07
CURRENT OPERATING CYCLE: 14

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
Heat Flux Hot Channel Factor (FQ) = 2.60
Nuclear Enthalpy Rise Hot Channel Factor (FN Δ H) = 1.70
Steam Generator Tube Plugging (SGTP) = 10%
Limiting Break: 2" Low Tavg
Limiting Break Location: Bottom of the Cold Leg

Notes: Zr-4/ZIRLO Clad Fuel

Reference Peak Cladding Temperature (PCT)

PCT = 1627.0 °F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated June 11, 2001 (see note 1)	Δ PCT = 3 °F
10 CFR 50.46 report dated April 18, 2002 (see note 2)	Δ PCT = 0 °F
10 CFR 50.46 report dated April 14, 2003 (see note 3)	Δ PCT = 0 °F
10 CFR 50.46 report dated April 14, 2004 (see note 4)	Δ PCT = 35 °F
10 CFR 50.46 report dated April 14, 2005 (see note 5)	Δ PCT = 0 °F
10 CFR 50.46 report dated April 14, 2006 (see note 6)	Δ PCT = 0 °F
10 CFR 50.46 report dated April 13, 2007 (see note 7)	Δ PCT = 0 °F

NET PCT

PCT = 1665.0 °F

B. CURRENT LOCA MODEL ASSESSMENTS

ECCS Flow Change Evaluation (see note 8)	Δ PCT = 90 °F
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NET PCT

PCT = 1755.0 °F

ATTACHMENT 1
Byron Unit 2 10 CFR 50.46 Report
Peak Cladding Temperature Rack-up Sheets

PLANT NAME: Byron Station Unit 2
ECCS EVALUATION MODEL: Large Break Loss of Coolant Accident
REPORT REVISION DATE: 04/16/07
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) = 10%
Limiting Break Size: Guillotine
Limiting Break Location: Cold Leg Break

Notes: Zr-4/ZIRLO Clad Fuel

Reference PCT

PCT = 2088.0 °F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated June 11, 2001 (see note 1)	Δ PCT = 12 °F
10 CFR 50.46 report dated April 18, 2002 (see note 2)	Δ PCT = 0 °F
10 CFR 50.46 report dated April 14, 2003 (see note 3)	Δ PCT = 0 °F
10 CFR 50.46 report dated April 14, 2004 (see note 4)	Δ PCT = 0 °F
10 CFR 50.46 report dated April 14, 2005 (see note 5)	Δ PCT = 5 °F
10 CFR 50.46 report dated April 14, 2006 (see note 6)	Δ PCT = 0 °F
10 CFR 50.46 report dated April 13, 2007 (see note 7)	Δ PCT = 8 °F

NET PCT

PCT = 2113.0 °F

B. CURRENT LOCA MODEL ASSESSMENTS

None	Δ PCT = 0 °F
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NET PCT

PCT = 2113.0 °F

ATTACHMENT 2
Byron Unit 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 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 peak cladding temperature (PCT) change were reported. Cycle specific evaluations related to axial power shape distribution envelope violation was reported for the applicable operating cycles.

2. Prior LOCA Model Assessment

The 10 CFR 50.46 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 was reported for the applicable operating cycles.

3. Prior LOCA Model Assessment

The 10 CFR 50.46 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 was reported for the applicable operating cycles.

4. Prior LOCA Model Assessment

The 10 CFR 50.46 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 10 CFR 50.46 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.

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Byron Unit 2 10 CFR 50.46 Report
Assessment Notes

6. Prior LOCA Model Assessment

The 10 CFR 50.46 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. 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 10 CFR 50.46 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. Emergency Core Cooling System (ECCS) Flow Change Evaluation

Applicable to Byron Unit 2, the ECCS assessment 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 following areas: SBLOCA and LBLOCA.

LBLOCA 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 Byron Unit 2; 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 Byron Unit 2, a conservative, bounding PCT assessment of +90 °F was applied to the current Byron Unit 2 SBLOCA PCT.