

10 CFR 50.46

RS-09-059

May 7, 2009

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

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," Annual Report

Reference: Letter from Jeffery L. Hansen (Exelon Generation Company, LLC) to U. S. NRC, "10 CFR 50.46, 'Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors,' Annual Report," dated May 7, 2008

This letter provides the annual report required by 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," for Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2. The attachments describe the changes in accumulated Peak Cladding Temperature (PCT) since the previous annual submittal (Reference).

Should you have any questions concerning this letter, please contact Mr. John Schrage at (630) 657-2821.

Respectfully,



Jeffrey L. Hansen
Manager – Licensing

Attachments:

- Attachment 1: Quad Cities Nuclear Power Station Unit 1, 10 CFR 50.46 Report (GE Fuel)
- Attachment 2: Quad Cities Nuclear Power Station Unit 2, 10 CFR 50.46 Report (GE Fuel)
- Attachment 3: Quad Cities Nuclear Power Station Unit 1, 10 CFR 50.46 Report (Westinghouse Fuel)
- Attachment 4: Quad Cities Nuclear Power Station Unit 2, 10 CFR 50.46 Report (Westinghouse Fuel)
- Attachment 5: Quad Cities Nuclear Power Station Units 1 and 2, 10 CFR 50.46 Report Assessment Notes

Attachment 1
Quad Cities Nuclear Power Station Unit 1
10 CFR 50.46 Report (GE Fuel)

PLANT NAME: Quad Cities Unit 1
 ECCS EVALUATION MODEL: SAFER/GESTR-LOCA
 REPORT REVISION DATE: 04/07/09
 CURRENT OPERATING CYCLE: 20

ANALYSIS OF RECORD

Evaluation Model:

The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology, NEDE-23785-1-PA, General Electric Company, Revision 1, October 1984.

Calculations:

"SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis for Dresden Nuclear Station 2 and 3 and Quad Cities Nuclear Station Units 1 and 2," NEDC-32990P, Revision 2, GE Nuclear Energy, September 2003.

Fuel Analyzed in Calculation: GE9/10, ATRIUM-9B and GE14

Limiting Fuel Type: GE14

Limiting Single Failure: Diesel Generator

Limiting Break Size and Location: 1.0 Double-Ended Guillotine in a Recirculation Suction Pipe

Reference Peak Cladding Temperature (PCT)

PCT = 2110°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 Report dated December 6, 2002 (See Note 2)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 8, 2003 (See Note 4)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 5, 2004 (See Note 5)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 5, 2005 (See Note 6)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 5, 2006 (See Note 7)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 7, 2007 (See Note 8)	$\Delta PCT = 0^{\circ}F$
Net PCT	2110 °F

B. CURRENT LOCA MODEL ASSESSMENTS

None	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Net PCT	2110 °F

Attachment 2
Quad Cities Nuclear Power Station Unit 2
10 CFR 50.46 Report (GE Fuel)

PLANT NAME: Quad Cities Unit 2
ECCS EVALUATION MODEL: SAFER/GESTR-LOCA
REPORT REVISION DATE: 04/07/09
CURRENT OPERATING CYCLE: 20

ANALYSIS OF RECORD

Evaluation Model:

The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology, NEDE-23785-1-PA, General Electric Company, Revision 1, October 1984.

Calculations:

"SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis for Dresden Nuclear Station 2 and 3 and Quad Cities Nuclear Station Units 1 and 2," NEDC-32990P, Revision 2, GE Nuclear Energy, September 2003.

Fuel Analyzed in Calculation: GE9/10, ATRIUM-9B and GE14

Limiting Fuel Type: GE14

Limiting Single Failure: Diesel Generator

Limiting Break Size and Location: 1.0 Double-Ended Guillotine in a Recirculation Suction Pipe

Reference Peak Cladding Temperature (PCT) PCT = 2110°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 Report dated March 28, 2002 (See Note 1)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 9, 2002 (See Note 3)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 8, 2003 (See Note 4)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 5, 2004 (See Note 5)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 5, 2005 (See Note 6)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 5, 2006 (See Note 7)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 Report dated May 7, 2007 (See Note 8)	$\Delta PCT = 0^{\circ}F$
Net PCT	2110°F

B. CURRENT LOCA MODEL ASSESSMENTS

None	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Net PCT	2110°F

Attachment 3
Quad Cities Nuclear Power Station Unit 1
10 CFR 50.46 Report (Westinghouse Fuel)

PLANT NAME: Quad Cities Unit 1
ECCS EVALUATION MODEL: USA5
REPORT REVISION DATE: 04/07/09
CURRENT OPERATING CYCLE: 20

ANALYSIS OF RECORD

Evaluation Model:

"Westinghouse BWR ECCS Evaluation Model: Supplement 3 to Code Description, Qualification and Application to SVEA-96 Optima2 Fuel," WCAP-16078-P-A, November 2004.

Calculations:

"Quad Cities 1 & 2 LOCA Analysis for SVEA-96 Optima2 Fuel," OPTIMA2-TR021QC-LOCA, Revision 4, Westinghouse Electric Company, LLC., June 2008.

Fuel Analyzed in Calculation: SVEA-96 Optima2

Limiting Fuel Type: SVEA-96 Optima2

Limiting Single Failure: LPCI injection valve

Limiting Break Size and Location: 1.0 double-ended guillotine break in the recirculation pump suction line

Reference Peak Cladding Temperature (PCT) PCT = 2150°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 Report dated May 7, 2008 (See Note 9)	$\Delta PCT = 0^{\circ}F$
Net PCT	2150°F

B. CURRENT LOCA MODEL ASSESSMENTS

Revised LOCA Analysis report (See Note 10)	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Net PCT	2150°F

Attachment 4
Quad Cities Nuclear Power Station Unit 2
10 CFR 50.46 Report (Westinghouse Fuel)

PLANT NAME: Quad Cities Unit 2
ECCS EVALUATION MODEL: USA5
REPORT REVISION DATE: 03/28/08
CURRENT OPERATING CYCLE: 20

ANALYSIS OF RECORD

Evaluation Model:

"Westinghouse BWR ECCS Evaluation Model: Supplement 3 to Code Description, Qualification and Application to SVEA-96 Optima2 Fuel," WCAP-16078-P-A, November 2004.

Calculations:

"Quad Cities 1 & 2 LOCA Analysis for SVEA-96 Optima2 Fuel," OPTIMA2-TR021QC-LOCA, Revision 4, Westinghouse Electric Company, LLC., June 2008.

Fuel Analyzed in Calculation: SVEA-96 Optima2

Limiting Fuel Type: SVEA-96 Optima2

Limiting Single Failure: LPCI injection valve

Limiting Break Size and Location: 1.0 double-ended guillotine break in the recirculation pump suction line

Reference Peak Cladding Temperature (PCT) PCT = 2150°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 Report dated May 7, 2008 (See Note 9)	$\Delta PCT = 0^{\circ}F$
Net PCT	2150°F

B. CURRENT LOCA MODEL ASSESSMENTS

Revised LOCA Analysis report (See Note 10)	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Net PCT	2150°F

Attachment 5
Quad Cities Nuclear Power Station Units 1 and 2
10 CFR 50.46 Report Assessment Notes

1. Prior LOCA Model Assessment

The 50.46 letter dated March 28, 2002 reported a new LOCA analysis to support extended power uprate (EPU) and transition to GE14 fuel for Quad Cities Nuclear Power Station (QCNPS) Unit 2.

[Reference: Letter from Timothy J. Tulon (Exelon) to U.S. NRC, "10 CFR 50.46, 30-Day Report for Quad Cities Unit 2," SVP-02-025, dated March 28, 2002.]

2. Prior LOCA Assessment

A new LOCA analysis was performed to support EPU and transition to GE14 fuel for QCNPS Unit 1. In the referenced letter, the impact of CS and LPCI leakage, GE LOCA error in the WEVOL code and change in DG start time requirement were reported. There is no assessment penalty.

[Reference: Letter from Timothy J. Tulon (Exelon) to U.S. NRC, "10 CFR 50.46, 30-Day Report for Quad Cities Nuclear Power Station, Unit 1," SVP-02-104, dated December 6, 2002.]

3. Prior LOCA Assessment

In the referenced letter, no LOCA model assessment was reported for QCNPS Unit 2 PCT.

[Reference: Letter from Timothy J. Tulon (Exelon) to U.S. NRC, "Transmittal of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors," Annual Report for Quad Cities Units 1 and 2," SVP-02-039, dated May 9, 2002.]

4. Prior LOCA Assessment

The referenced letter provided the annual 50.46 report for QCNPS Units 1 and 2. This letter reported no LOCA model assessment for Unit 1 whereas it reported the impact of GE LOCA error in the WEVOL code and change in DG start time requirement for Unit 2. The PCT impact for these errors was determined to be 0°F.

[Reference: Letter from Timothy J. Tulon (Exelon) to U.S. NRC, "Transmittal of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors," Annual Report for Quad Cities Nuclear Power Station, Units 1 and 2," SVP-03-063, dated May 8, 2003.]

5. Prior LOCA Assessment

The referenced letter provided the annual 50.46 report for QCNPS Units 1 and 2. This letter reported GE LOCA errors related to SAFER level/volume table and Steam Separator pressure drop and mid-cycle reload of GE14 fuel for Unit 1

Attachment 5
Quad Cities Nuclear Power Station Units 1 and 2
10 CFR 50.46 Report Assessment Notes

(Cycle 18A). For Unit 2, this letter reported the same GE LOCA errors and second reload of GE14 fuel in Cycle 18 core. The PCT impact for these errors and reloads of GE14 fuel was determined to be 0°F.

[Reference: Letter from Patrick R. Simpson (Exelon) to U.S. NRC, Transmittal of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors," Annual Report for Quad Cities Nuclear Power Station, Units 1 and 2, RS-04-066, dated May 5, 2004.]

6. Prior LOCA Assessment

The referenced letter provided the annual 50.46 report for QCNPS Units 1 and 2. This letter reported GE LOCA error due to new heat source for QCNPS Units 1 & 2 and QCNPS Unit 1 Cycle 19 with a new reload of GE14 fuel.

[Reference: Letter from Patrick R. Simpson (Exelon) to U.S. NRC, Transmittal of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors," Annual Report for Quad Cities Nuclear Power Station, Units 1 and 2, RS-05-056, dated May 5, 2005.]

7. Prior LOCA Assessment

The referenced letter provided the annual 50.46 report for QCNPS Units 1 and 2. This letter reported LOCA evaluations for installation of new steam dryers during mid-cycle outages for Q1C19 and Q2C18, respectively. Also, the letter reported Q2C19 startup in April 2006 with the first reload of Westinghouse Optima2 fuel and implementation of the Westinghouse LOCA analysis. Additionally, LOCA evaluations by both GE and Westinghouse were reported for the QCNPS Unit 2 modification to the inlet configuration of the 6" inlet standpipe of eight main steam safety valves and four Electromatic relief valves, which replaced the previously installed inlet pipe and flange with a 6" Tee, flange and an Acoustic Side Branch (ASB). The PCT impact due to the plant modifications was determined to be 0°F.

[Reference: Letter from Patrick R. Simpson (Exelon) to U.S. NRC, Transmittal of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors," Annual Report for Quad Cities Nuclear Power Station, Units 1 and 2, RS-06-064, dated May 5, 2006.]

8. Prior LOCA Assessment

The referenced letter provided the annual 50.46 report for QCNPS Units 1 and 2. This letter reported GE LOCA evaluation for installation of a modification to the inlet configuration of the 6" inlet standpipe of eight main steam safety valves and four Electromatic relief valves for QCNPS Unit 1. Also, this letter reported evaluation of a change in the GE small break analysis assumption for axial power shape and Westinghouse LOCA analysis Hgap correlation input error. The PCT impact due to these changes was determined to be 0°F.

Attachment 5
Quad Cities Nuclear Power Station Units 1 and 2
10 CFR 50.46 Report Assessment Notes

[Reference: Letter from Patrick R. Simpson (Exelon) to U.S. NRC, Transmittal of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors," Annual Report for Quad Cities Nuclear Power Station, Units 1 and 2, RS-07-070, dated May 7, 2007.]

9. Prior LOCA Assessment

Westinghouse performed a new plant-specific LOCA Analysis for QCNPS. This new analysis applies to operation of the Westinghouse Optima2 fuel in the QCNPS Unit 1 and 2 reactors. This analysis applies specific inputs and assumptions in the LOCA calculation approved in the licensed Westinghouse methodology. Also, a second reload of SVEA-96 Optima2 fuel was implemented with the QCNPS Unit 2 Cycle 20 core. The limiting PCT for Optima2 as analyzed under the Westinghouse LOCA method is 2150 °F whereas the limiting PCT for GE14 as analyzed under GE LOCA method is 2110 °F.

[Reference: Letter from Jeff Hansen (Exelon) to U.S. NRC, Transmittal of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," Annual Report for Quad Cities Nuclear Power Station, Units 1 and 2, RS-08-064, dated May 7, 2008.]

10. Current LOCA Assessment

Westinghouse revised the QCNPS Units 1 & 2 LOCA report to address a non-conservative low-pressure core spray (LPCS) flow error identified for Dresden Nuclear Power Station (DNPS) Unit 2 in the DNPS LOCA analysis. The changes in Revision 4 of the DNPS report are required to be added to the QCNPS report to clarify the LPCS flow and leakage model for the QCNPS LOCA analysis. The QCNPS LOCA analysis is not affected by the non-conservative DNPS LPCS flow error.

[Reference: "Quad Cities 1 & 2 LOCA Analysis for SVEA-96 Optima2 Fuel," OPTIMA2-TR021QC-LOCA, Revision 4, Westinghouse Electric Company, LLC. June 2008.]