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10 CFR 50.46

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

Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket Nos. 50-325 and 50-324

Catawba Nuclear Station, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. NPF-35 and NPF-52
Docket Nos. 50-413 and 50-414

Shearon Harris Nuclear Power Plant, Unit 1
Renewed Facility Operating License No. NPF-63
Docket No. 50-400

McGuire Nuclear Station, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. NPF-9 and NPF-17
Docket Nos. 50-369 and 50-370

Oconee Nuclear Station, Unit Nos. 1, 2 and 3
Renewed Facility Operating License Nos. DPR-38, DPR-47 and DPR-55
Docket Nos. 50-269, 50-270 and 50-287

H. B. Robinson Steam Electric Plant, Unit 2
Renewed Facility Operating License No. DPR-23
Docket No. 50-261

SUBJECT: Annual Report of Changes Pursuant to 10 CFR 50.46

Ladies and Gentlemen:

Pursuant to 10 CFR 50.46(a)(3)(ii), Duke Energy hereby submits the enclosed annual reports of changes to, or errors in, Emergency Core Cooling System (ECCS) evaluation models. These reports cover the period from January 1, 2021 to December 31, 2021 for the Brunswick Steam Electric Plant (BNP), Catawba Nuclear Station (CNS), Shearon Harris Nuclear Power Plant (HNP), McGuire Nuclear Station (MNS), Oconee Nuclear Station (ONS), and H.B. Robinson Steam Electric Plant (RNP) are provided in Enclosures 1 through 6 respectively.

U.S. Nuclear Regulatory Commission

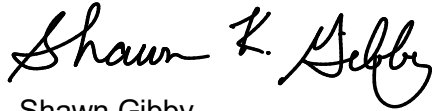
RA-22-0028

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No regulatory commitments are contained in this submittal.

Should you have any questions concerning this letter and its enclosures, please contact Lee Grzeck, Manager - Nuclear Fleet Licensing at (980) 373-1530.

Sincerely,

A handwritten signature in black ink that reads "Shawn K. Gibby". The signature is written in a cursive style with a large, stylized 'S' and 'G'.

Shawn Gibby
Vice President, Nuclear Engineering

Enclosures:

1. [BNP 10 CFR 50.46 Annual Report](#)
2. [CNS 10 CFR 50.46 Annual Report](#)
3. [HNP 10 CFR 50.46 Annual Report](#)
4. [MNS 10 CFR 50.46 Annual Report](#)
5. [ONS 10 CFR 50.46 Annual Report](#)
6. [RNP 10 CFR 50.46 Annual Report](#)

cc:

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ENCLOSURE 1: [BNP 10 CFR 50.46 Annual Report](#)

**Brunswick Steam Electric Plant, Units 1 and 2
Docket Nos. 50-325 and 50-324 / Renewed License Nos. DPR-71 and DPR-62**

Summary of Errors Reported

10 CFR 50.46 Report for Brunswick Steam Electric Plant Units 1 and 2

During this reporting period there was one error report on the EXEM BWR-2000 evaluation model for ATRIUM 10XM, four error reports on the AURORA-B evaluation model for ATRIUM 11, and no error reports on the ATRIUM 11 LUAs.

Two of the four error reports on the AURORA-B evaluation model for ATRIUM 11 were previously reported as described below:

- 1) Error report Reference 1 was received in January 2021 and was reported to the NRC per Reference 2.
- 2) Error report Reference 3 was received in April 2021 and was reported to the NRC per Reference 4.

The third AURORA-B error report, FS1-0052486 Revision 4.0 (Reference 5), was received in September 2021 documenting an error in the AURORA-B evaluation model automation code AUTOSR5BDK that specified incorrect S-RELAP5 trip input values for the hot wall effect resulting in a +3°F PCT change in the AURORA-B methodology results for ATRIUM 11 fuel.

Reference 4 established the ATRIUM 11 Licensing Basis PCT at 1875°F so with the third report (Reference 5), the ATRIUM 11 Licensing Basis PCT changed to 1878°F.

Finally, the fourth AURORA-B error report, FS1-0060612 Revision 2.0 (Reference 6), was received in February 2022 documenting three errors in the AURORA-B evaluation model applicable this reporting period: (1) an S-RELAP5 code error in the calculation of the cladding thermal conductivity resulting in a 0°F PCT change; (2) a non-zero value for the initial cladding manufactured hydrogen content should have been used in RODEX4 or a justification for the use of a 0 value, which resulted in a 0°F PCT change; (3) a non-zero value for the initial manufactured oxide thickness should have been used in RODEX4 or a justification for the use of a 0 value, which resulted in a 0°F PCT change. The net effect of these three errors results in the new Licensing PCT value of 1878°F (established above from Reference 5).

The one ATRIUM 10XM EXEM BWR-2000 evaluation model error report, FS1-0040060 Revision 3.0 (Reference 7), was received in December 2021 which documents corrections to the EXEM BWR-2000 evaluation model automation code RDX2_2_RDX4 that calculates thermal-conductivity degradation (TCD) factors resulting in a +0°F PCT change in the EXEM BWR-2000 methodology results for ATRIUM 10XM fuel.

Reference 8 established the ATRIUM 10XM Licensing Basis PCT at 1925°F so with the single ATRIUM 10XM EXEM BWR-2000 evaluation model error report (Reference 8), the ATRIUM 10XM Licensing Basis PCT remains at 1925°F.

References:

- 1) FS1-0052486 Revision 2.0, "10 CFR 50.46 PCT Error Report for Brunswick Units 1 and 2 ATRIUM 11 Fuel," Framatome Inc., January 2021.
- 2) Duke Letter RA-21-0021, "30-Day Report Pursuant to 10 CFR 50.46, Changes to or Errors in an Acceptable Loss of Coolant Evaluation Model," Steve Snider to U.S. Nuclear Regulatory Commission, February 9, 2021, NRC Accession Number ML21040A383.
- 3) FS1-0052486 Revision 3.0, "10 CFR 50.46 PCT Error Report for Brunswick Units 1 and 2 ATRIUM 11 Fuel," Framatome Inc., April 2021.
- 4) Duke Letter RA-21-0154, "30-Day Report Pursuant to 10 CFR 50.46, Changes to or Errors in an Acceptable Loss of Coolant Evaluation Model", John Krakuszeski to U.S. Nuclear Regulatory Commission, May 26, 2021, NRC Accession Number ML21146A259.
- 5) FS1-0052486 Revision 4.0, "10 CFR 50.46 PCT Error Report for Brunswick Units 1 and 2 ATRIUM 11 Fuel," Framatome Inc., September 2021.
- 6) FS1-0060612 Revision 2.0, "10 CFR 50.46 PCT Error Report for Brunswick Units 1 and 2 ATRIUM 11 Fuel," Framatome Inc., February 2022
- 7) FS1-0040060 Revision 3.0, "10 CFR 50.46 PCT Error Report for Brunswick Units 1 and 2 for MELLA+ Operation", Framatome Inc., December 2021.
- 8) Duke Letter RA-21-0051, "Annual Report of Changes Pursuant to 10 CFR 50.46," Steve Snider to U.S. Nuclear Regulatory Commission, April 5, 2021, NRC Accession Number ML21096A005.

A10XM Summary

10 CFR 50.46 Report for Brunswick Steam Electric Plant Units 1 and 2

Plant:	Brunswick Steam Electric Plant, Units 1 and 2	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):		
Evaluation Model:	EMF-2361(P)(A), Revision 0 EXEM BWR-2000 ECCS Evaluation Model, May 2001	
Fuel:	ATRIUM 10XM (A10XM)	
A. Analysis of Record PCT	1923 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +2 °F	Absolute PCT Effect 2 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1925 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. CR 2021-2025 corrections to RDX2_2_RDX4	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + net E)	1925 °F	

ATRIUM 11 LUA Summary

10 CFR 50.46 Report for Brunswick Steam Electric Plant Units 1 and 2

Plant:	Brunswick Steam Electric Plant, Unit 2	
Reporting Period:	January 1, 2021 – March 31, 2021 ^(NOTE)	
LOCA Analysis Type (if applicable):		
Evaluation Model:	EMF-2361(P)(A), Revision 0 EXEM BWR-2000 ECCS Evaluation Model, May 2001	
Fuel:	ATRIUM 11 (A11) Lead Use Assemblies (LUA)	
A. Analysis of Record PCT	1762 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +2 °F	Absolute PCT Effect 2 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1764 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	-	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect 0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + net E)	1764 °F	

NOTE: ATRIUM 11 LUAs were no longer in use after March 31, 2021.

ATRIUM 11 Summary

10 CFR 50.46 Report for Brunswick Steam Electric Plant Units 1 and 2

Plant:	Brunswick Steam Electric Plant, Units 1 and 2	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):		
Evaluation Model:	ANP-10332P-A, Revision 0 AURORA-B LOCA Evaluation Model, March 2019	
Fuel:	ATRIUM 11 (A11)	
A. Analysis of Record PCT	1957 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect -82 °F	Absolute PCT Effect 92 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1875 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period		
1. AUTOSR5BDK incorrect hot wall effect temperature	+3 °F	
2. S-RELAP5 cladding thermal conductivity	+0 °F	
3. Cladding Hydrogen content	+0 °F	
4. Cladding oxide thickness	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +3 °F	Absolute PCT Effect 3 °F
F. Licensing Basis PCT (C + net E)	1878 °F	

ENCLOSURE 2: [CNS 10 CFR 50.46 Annual Report](#)

**Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414 / Renewed License Nos. NPF-35 and NPF-52**

Summary of Errors Reported

10 CFR 50.46 Report for Catawba Units 1 and 2

General Code Maintenance

Affected Evaluation Model: 1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP
Various changes have been made to enhance the usability of codes and to streamline future analyses. Examples of these changes include improving the input diagnostic checks; enhancing the code output; optimizing active coding; and eliminating inactive coding. These changes represent Discretionary Changes that will be implemented on a forward-fit basis in accordance with Section 4.1.1 of WCAP-13451.

The nature of these changes leads to an estimated peak cladding temperature impact of 0°F.

Catawba Units 1 and 2 Reduction in Flow Area to the Bottom of the Barrel/Baffle Region

Affected Evaluation Model: 1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

For plants without holes in the edge of the lower core plate, the flow area from the bottom of the core to the barrel/baffle region has historically been modeled as the gap between the baffle plate and the lower core plate, and this flow area did not consider the reduced flow area due to the presence of the bottom nozzle flow skirt. The impact of reducing the flow area between the core and barrel baffle region due to including the bottom nozzle flow skirt has been qualitatively evaluated. This item represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

The evaluation determined that considering a reduced flow area from the bottom of the core to the barrel/baffle region when considering the bottom nozzle flow skirt has a negligible effect on the SBLOCA analysis results, leading to an estimated peak cladding temperature impact of 0°F for Catawba Units 1 and 2.

10 CFR 50.46 Report for Catawba Unit 1 – Large Break LOCA

Plant:	Catawba Nuclear Station, Unit 1	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Large Break	
Evaluation Model:	WCAP-12945-P-A, Revision 0 Code Qualification Document for Best Estimate LOCA Analysis	
Fuel:	17x17 RFA	
A. Analysis of Record PCT	2028 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +58 °F	Absolute PCT Effect 378 °F
C. Baseline PCT for assessing new changes for significance (A + B)	2086 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect 0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	2086 °F	

10 CFR 50.46 Report for Catawba Unit 1 – Small Break LOCA

Plant:	Catawba Nuclear Station, Unit 1	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Small Break	
Evaluation Model:	WCAP-10054-P-A, Revision 0 NOTRUMP	
Fuel:	17x17 RFA	
A. Analysis of Record PCT	1323 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect	Absolute PCT Effect
	+0 °F	0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1323 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. Reduction in Flow Area to the Bottom of the Barrel/Baffle Region	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect	Absolute PCT Effect
	+0 °F	0 °F
F. Licensing Basis PCT (C + E)	1323 °F	

10 CFR 50.46 Report for Catawba Unit 2 – Large Break LOCA

Plant:	Catawba Nuclear Station, Unit 2	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Large Break	
Evaluation Model:	WCAP-12945-P-A, Revision 0 Code Qualification Document for Best Estimate LOCA Analysis	
Fuel:	17x17 RFA	
A. Analysis of Record PCT	2028 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +42 °F	Absolute PCT Effect 362 °F
C. Baseline PCT for assessing new changes for significance (A + B)	2070 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	2070 °F	

10 CFR 50.46 Report for Catawba Unit 2 – Small Break LOCA

Plant:	Catawba Nuclear Station, Unit 2	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Small Break	
Evaluation Model:	WCAP-10054-P-A, Revision 0 NOTRUMP	
Fuel:	17x17 RFA	
A. Analysis of Record PCT	1243 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect	Absolute PCT Effect
	+0 °F	0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1243 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. Reduction in Flow Area to the Bottom of the Barrel/Baffle Region	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect	Absolute PCT Effect
	+0 °F	0 °F
F. Licensing Basis PCT (C + E)	1243 °F	

ENCLOSURE 3: [HNP 10 CFR 50.46 Annual Report](#)

**Shearon Harris Nuclear Power Plant, Unit 1
Docket No. 50-400 / Renewed License No. NPF-63**

Summary of Errors Reported

10 CFR 50.46 Report for Shearon Harris Unit 1

The results of the HNP LOCA reanalysis for GAIA fuel were reported to NRC in June 2021 via 30-Day 10 CFR 50.46 report per Reference 1. The HNP PCT changes due to implementation of the Cycle 24 LOCA analysis for GAIA fuel are carried over for the full 2021 calendar year. There are no new SBLOCA or LBLOCA analysis errors or changes applicable to HNP for the 2021 calendar year.

As of December 31, 2021, HNP was operating Cycle 24, which contains fresh GAIA fuel and once-burned 17x17 HTP fuel. Therefore the +50 °F PCT evaluation for once-burned HTP fuel in mixed cores of GAIA and HTP fuel using EMF-2103, Rev. 3 methodology will be retained on the PCT reporting sheet for the 2021 calendar year.

Reference

1. Duke Energy Letter RA-21-0164, Kim E. Maza to USNRC, 30-Day Report Pursuant to 10 CFR 50.46, Changes to or Errors in an Acceptable Loss of Coolant Evaluation Model, June 7, 2021 [NRC ADAMS Accession No. ML21158A091].

10 CFR 50.46 Report for Shearon Harris Unit 1 – Large Break LOCA – GAIA Fuel

Plant:	Shearon Harris, Unit 1	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Large Break	
Evaluation Model:	EMF-2103(P)(A), Revision 3 Realistic Large Break LOCA for PWRs	
Fuel:	17x17 GAIA	
A. Analysis of Record PCT	1820 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported None	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1820 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1820 °F	

10 CFR 50.46 Report for Shearon Harris Unit 1 – Large Break LOCA – HTP Fuel

Plant:	Shearon Harris, Unit 1	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Large Break	
Evaluation Model:	EMF-2103(P)(A), Revision 3 Realistic Large Break LOCA for PWRs	
Fuel:	17x17 HTP	
A. Analysis of Record PCT	1820 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +50 °F	Absolute PCT Effect 50 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1870 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1870 °F	

10 CFR 50.46 Report for Shearon Harris Unit 1 – Small Break LOCA

Plant:	Shearon Harris, Unit 1	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Small Break	
Evaluation Model:	EMF-2328(P)(A), Rev. 0, and EMF-2328(P)(A), Rev. 0, Supplement 1, Rev. 0 PWR Small Break LOCA Evaluation Model	
Fuel:	17x17 GAIA and HTP	
A. Analysis of Record PCT	1832 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1832 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1832 °F	

ENCLOSURE 4: [MNS 10 CFR 50.46 Annual Report](#)

**McGuire Nuclear Station, Units 1 and 2
Docket Nos. 50-369 and 50-370 / Renewed License Nos. NPF-9 and NPF-17**

Summary of Errors Reported

10 CFR 50.46 Report for McGuire Units 1 and 2

There are no new errors or changes that affect the McGuire SBLOCA or LBLOCA analyses of record for the 2021 calendar year.

General Code Maintenance

Affected Evaluation Model: 1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP
Various changes have been made to enhance the usability of codes and to streamline future analyses. Examples of these changes include improving the input diagnostic checks; enhancing the code output; optimizing active coding; and eliminating inactive coding. These changes represent Discretionary Changes that will be implemented on a forward-fit basis in accordance with Section 4.1.1 of WCAP-13451.

The nature of these changes leads to an estimated peak cladding temperature impact of 0°F.

10 CFR 50.46 Report for McGuire Units 1 & 2 – Large Break LOCA

Plant:	McGuire Nuclear Station, Units 1 & 2	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Large Break	
Evaluation Model:	WCAP-12945-P-A, Revision 0 Code Qualification Document for Best Estimate LOCA Analysis	
Fuel:	17x17 RFA	
A. Analysis of Record PCT	2028 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +58 °F	Absolute PCT Effect 378 °F
C. Baseline PCT for assessing new changes for significance (A + B)	2086 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	2086 °F	

10 CFR 50.46 Report for McGuire Units 1 & 2 – Small Break LOCA

Plant:	McGuire Nuclear Station, Units 1 & 2	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Small Break	
Evaluation Model:	WCAP-10054-P-A, Revision 0 NOTRUMP	
Fuel:	17x17 RFA	
A. Analysis of Record PCT	1323 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1323 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1323 °F	

ENCLOSURE 5: [ONS 10 CFR 50.46 Annual Report](#)

**Oconee Nuclear Station, Units 1, 2 and 3
Docket Nos. 50-269, 50-270 and 50-287
Renewed License Nos. DPR-38, DPR-47 and DPR-55**

Summary of Errors Reported

10 CFR 50.46 Report for Oconee Units 1, 2, & 3

The ONS Large Break LOCA PCT changes due to implementation of the LBLOCA reanalysis for the impacts of fuel pellet thermal conductivity degradation (TCD) reported to the NRC in April 2021 via Reference 1, are carried over for the full 2021 calendar year.

Reference

1. Duke Energy Letter RA-21-0094, (S. Snider) to USNRC "30-Day Report Pursuant to 10 CFR 50.46, Changes to or Errors in an Acceptable Loss of Coolant Evaluation Model," April 5, 2021. [ADAMS Accession No. ML21096A007]

10 CFR 50.46 Report for Oconee Units 1, 2, & 3 – Large Break LOCA

Plant:	Oconee Nuclear Station, Units 1, 2, & 3	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Large Break	
Evaluation Model:	BAW-10192P-A, Revision 0, BWNT LOCA Evaluation Model for Once-Through Steam Generator Plants and BAW-10192PA, Revision 0, Supplement 1P-A, Revision 0	
Fuel:	15x15 Mark-B-HTP	
A. Analysis of Record PCT; Reanalysis to fully incorporate fuel TCD, reported via ML21096A007	1988 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect N/A	Absolute PCT Effect N/A
C. Baseline PCT for assessing new changes for significance (A + B)	1988 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1988 °F	

10 CFR 50.46 Report for Oconee Units 1, 2, & 3 – Small Break LOCA

Plant:	Oconee Nuclear Station, Units 1, 2, & 3	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Small Break	
Evaluation Model:	BAW-10192P-A, Revision 0, BWNT LOCA Evaluation Model for Once-Through Steam Generator Plants	
Fuel:	15x15 Mark-B-HTP	
A. Analysis of Record PCT Full Power – 100% FP	1598 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1598 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1598 °F	
A. Analysis of Record PCT Reduced Power – 50% FP	1480 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1480 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1480 °F	

ENCLOSURE 6: [RNP 10 CFR 50.46 Annual Report](#)

**H. B. Robinson Steam Electric Plant, Unit 2
Docket No. 50-261 / Renewed License No. DPR-23**

Summary of Errors Reported

10 CFR 50.46 Report for H.B. Robinson Unit 2

There are no new errors or changes that affect the Robinson SBLOCA or LBLOCA analyses of record for the 2021 calendar year.

As of December 31, 2021, RNP was operating Cycle 33, which contains fresh W15-LC fuel and once-burned W15 HTP fuel. Therefore the +0 °F PCT evaluation for once burned HTP fuel in mixed cores of W15-LC and W15 HTP fuel using EMF-2103, Rev. 3 methodology will be retained for the 2021 reporting calendar year.

10 CFR 50.46 Report for H.B. Robinson Unit 2 – Large Break LOCA

Plant:	H.B. Robinson, Unit 2	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Large Break	
Evaluation Model:	EMF-2103(P)(A), Revision 3 Realistic Large Break LOCA for PWRs	
Fuel:	W15-LC, W15 HTP	
A. Analysis of Record PCT	1771 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1771 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1771 °F	

10 CFR 50.46 Report for H.B. Robinson Unit 2 – Small Break LOCA

Plant:	H.B. Robinson, Unit 2	
Reporting Period:	January 1, 2021 – December 31, 2021	
LOCA Analysis Type (if applicable):	Small Break	
Evaluation Model:	EMF-2328(P)(A), Rev. 0 and EMF-2328(P)(A), Rev. 0, Supplement 1, Rev. 0 PWR Small Break LOCA Evaluation Model	
Fuel:	W15-LC, W15 HTP	
A. Analysis of Record PCT	1538 °F	
B. Net Cumulative 10 CFR 50.46 Changes and Error Corrections - Previously Reported	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
C. Baseline PCT for assessing new changes for significance (A + B)	1538 °F	
D. Cumulative 10 CFR 50.46 Changes and Error Corrections – This Reporting Period 1. None	+0 °F	
E. Sum of 10 CFR 50.46 Changes and Error Corrections against Baseline PCT	Net PCT Effect +0 °F	Absolute PCT Effect 0 °F
F. Licensing Basis PCT (C + E)	1538 °F	