Duke Power
A Duke Energy Company

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February 22, 2000

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Subject: Oconee Nuclear Site
Docket No. 50-269, 50-270, 50-287
Core Operating Limits Report (COLR)

Gentlemen:

Attached, pursuant to Oconee Technical Specifications 5.6.5, is an information copy of a revision to the Core Operating Limits Report for Oconee Unit 1 Cycle 19, rev. 13, Oconee Unit 2, cycle 18, rev. 14, Oconee Unit 3, cycle 18, rev. 12.

Very truly yours,

W. R. McCollum, Jr., Site Vice President
Oconee Nuclear Site

Attachment

A001

xc w/att: Mr. L. A. Reyes, Regional Administrator
U. S. Nuclear Regulatory Commission, Region II

Mr. D. E. LaBarge, Project Manager
Office of Nuclear Reactor Regulation

Mr. M. C. Shannon
Senior Resident Inspector
Oconee Nuclear Site

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2) 06358 ONS REGUL COMPLIANCE ON03RC
3) 06700 ONS MANUAL MASTER FILE ON03DM

# Duke Power Company
# DOCUMENT TRANSMITTAL FORM

**REFERENCE**

OCONEE NUCLEAR STATION

PART # M.4

RESP.GROUP: NE

Page 1 of 1

Date: **02/01/00**

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**QA CONDITION** ■ Yes ☐ No

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| ONEI-0400-051 | 1 | 014 02/01/00 | | | | | | | | | | | | | | | | | | | | |
| ONEI-0400-070 | 1 | 012 02/01/00 | | | | | | | | | | | | | | | | | | | | |

**REMARKS:** AS-BUILT
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NUCLEAR ENGINEERING

**FOR INFORMATION ONLY**

**BY:**
J.W.SIMMONS JWS/MEG EC08H

# Duke Power Company

## Oconee 1 Cycle 19

## Core Operating Limits Report

## QA Condition 1

~~Not Reviewed or Approved by CFAM 3.13~~ cmb

REVIEWED AND APPROVED BY CFAM 3.13

Prepared By : T. P. Phelps T. P. Phelps Date : 26 JAN 2000

Checked By : D. W. Harris David W Harris Date : Jan 31, 2000

CDR By : J. S. Muransky Date : 2/1/2000

Approved By : R. R. St. Clair R. R. St. Clair Date : Feb. 1, 2000

# Oconee 1 Cycle 19

# Core Operating Limits Report

## Insertion Sheet for Revision 13

This revision is effective after the implementation of TSC 99-06, February 2000.

| Remove these revision 12 pages | Insert these revision 13 pages |
|---|---|
| 1 - 3 | 1 - 3 |
| Remove this revision 11 page | |
| 4 | 4 |

## Revision Log

| Revision | Effective Date | Pages Revised | Pages Added | Pages Deleted | Total Effective Pages |
|---|---|---|---|---|---|
| Oconee 1 Cycle 19 revisions below | | | | | |
| 13 | Feb-00 | 1,2,3,4 | - | - | 31 |
| 12 | Jul-99 | 1, 2, 3, 8, 10, 13, 31 | - | - | 31 |
| 11 | May-99 | 1 - 31 | - | 1-31 | 31 |
| Oconee 1 Cycle 18 revisions below | | | | | |
| 10 | Mar-99 | 1 - 31 | - | 32-38 | 31 |
| 9 | Feb-98 | 1,2,3,5,13, 16,17,32,36 | - | - | 38 |
| 8 | Nov-97 | 1,2,3,5,10, 32 | 37 | - | 38 |
| 7 | Aug-97 | 1 - 38 | - | - | 38 |
| Oconee 1 Cycle 17 revisions below | | | | | |
| 6 | Nov-95 | 1-33 | 34 - 38 | - | 38 |

# Oconee 1 Cycle 19

## 1.0 Error Adjusted Core Operating Limits

The Core Operating Limits Report for O1C19 has been prepared in accordance with the requirements of ITS 5.6.5. The core operating limits within this report have been developed using NRC approved methodology identified in references 1, 2, 3, 4, 5, 6, and 7. The RPS protective limits and maximum allowable setpoints are documented in references 8 and 9. These limits are validated for use in O1C19 by references 10, 11, and 12. The O1C19 analyses assume a design flow of 107.5% of 88,000 gpm per RCS pump, radial local peaking ($F\Delta h$) of 1.714, and axial peaking factor ($Fz$) of 1.5.

The error adjusted core operating limits included in section 1 of the report incorporate all necessary uncertainties and margins required for operation of the O1C19 reload core.

## 1.1 References

1. Nuclear Design Methodology Using CASMO-3 / SIMULATE-3P, DPC-NE-1004A, Revision 0, SER dated November 23, 1992.

2. Oconee Nuclear Station Reload Design Methodology II, DPC-NE-1002A, Revision 1, SER dated October 1, 1985.

3. Oconee Nuclear Station Reload Design Methodology, NFS-1001A, Revision 4, SER dated July 29, 1981.

4. ONS Core Thermal Hydraulic Methodology Using VIPRE-01, DPC-NE-2003A, SER dated July 19, 1989.

5. Thermal Hydraulic Statistical Core Design Methodology, DPC-NE-2005P-A, Revision 1, SER dated November 7, 1996.

6. Fuel Mechanical Reload Analysis Methodology Using TACO3, DPC-NE-2008P-A, SER dated April 3, 1995.

7. UFSAR Chapter 15 Transient Analysis Methodology, DPC-NE-3005-PA, Revision 1, SER dated May 25, 1999.

8. Variable Low Pressure Safety Limit, OSC-4048, Revision 3, July 1998.

9. Power Imbalance Safety Limits and Tech Spec Setpoints Using Error Adjusted Flux-Flow Ratio of 1.094, OSC-5604, Revision 1, November 1998.

10. O1C19 Maneuvering Analysis, OSC-7295, Revision 2, February 2000.

11. O1C19 Specific DNB Analysis, OSC-7302, Revision 1, March 1999.

12. O1C19 Reload Safety Evaluation and 50.59, OSC-7402, Revision 1, October 1999.

# Oconee 1 Cycle 19

## Miscellaneous Setpoints

BWST boron concentration shall be greater than 2220 ppm and less than 3000 ppm.
Referred to by ITS 3.5.4.

Spent fuel pool boron concentration shall be greater than 2220 ppm and less than 3000 ppm.
Referred to by ITS 3.7.12.

The equivalent of at least 1100 cubic feet of 11,000 ppm boron shall be maintained in the CBAST.
Referred to by ITS SLC 16.5.13.

CFT boron concentration shall be greater than 1835 ppm. The average boron concentration in the CFT's shall be less than 4000 ppm. Referred to by ITS 3.5.1.

RCS and Refueling canal boron concentration shall be greater than 2220 ppm.
Referred to by ITS 3.9.1.

Shutdown Margin (SDM) shall be greater than 1% Δk/k.
Referred to by ITS 3.1.1.

Moderator Temperature Coefficient (MTC) shall be less than :
Linear interpolation is valid within table provided.
Referred to by ITS 3.1.3.

| MTC x 10-4 Δρ / °F | % FP |
|---|---|
| 0.700 | 0 |
| 0.030 | 15 |
| -0.281 | 95 |
| -0.300 | 100 |
| -0.375 | 120 |

Departure from Nucleate Boiling (DNB) parameter for RCS loop pressure shall be
Referred to by ITS 3.4.1.
4 RCP: measured hot leg pressure ≥ 2125 psig
3 RCP: measured hot leg pressure ≥ 2125 psig

DNB parameter for RCS loop average temperature shall be:
Referred to by ITS 3.4.1.

| Max Loop Tavg Incl 2°F unc | ΔTc, °F |
|---|---|
| 581.00 | 0 |

The measured Tavg must be less than the temperature specified by an amount equal to the uncertainty corresponding to the instrument from which it is read.
ΔTc is the setpoint value selected by the operators.

DNB parameter for RCS loop total flow shall be:
Referred to by ITS 3.4.1.
4 RCP: Measured ≥ 108.5 %df
3 RCP: Measured ≥ 74.7 % of 4 RCP min flow

Regulating rod groups shall be withdrawn in sequence starting with group 5, group 6, and finally group 7.
Referred to by ITS 3.2.1.

Regulating rod group overlap shall be 25% ± 5% between two sequential groups.
Referred to by ITS 3.2.1.

# Duke Power Company

## Oconee 2 Cycle 18

## Core Operating Limits Report

## QA Condition 1

## NOT REVIEWED OR APPROVED BY CFAM 3.13

Prepared By : T. P. Phelps T. P. Phelps Date : 26JAN2000

Checked By : D. W. Harris Date : Jan 31, 2000

CDR By : J. M. Sawyer Date : 1/31/00

Approved By : R. R. St. Clair Date : Feb. 1, 2000

# Oconee 2 Cycle 18

# Core Operating Limits Report

## Insertion Sheet for Revision 14

**This revision is effective after the implementation of TSC 99-06, February 2000.**

| Remove these revision 13 pages | Insert these revision 14 pages |
|---|---|
| 1-4 | 1-4 |

## Revision Log

| Revision | Effective Date | Pages Revised | Pages Added | Pages Deleted | Total Effective Pages |
|---|---|---|---|---|---|
| Oconee 2 Cycle 18 revisions below | | | | | |
| 14 | Feb-00 | 1-4 | - | - | 31 |
| 13 | Nov-99 | 1-31 | - | - | 31 |
| 12 | Sep-99 | 1-31 | - | - | 31 |
| 11 | Apr-99 | 1-4, 6 | - | - | 0 |
| 10 | Mar-99 | 1 - 31 | - | - | 0 |
| Oconee 2 Cycle 17 revisions below | | | | | |
| 9A | Jul-99 | 1-4 | - | - | 31 |
| 9 | Jul-99 | 1-31 | - | - | 31 |
| 9 | Mar-99 | 1 - 31 | - | 32 - 38 | 31 |
| 8 | May-98 | 1-3,5,11,32,35 | | - | 38 |
| 7 | Mar-98 | 1 - 38 | - | - | 38 |
| Oconee 2 Cycle 16 revisions below | | | | | |
| 6 | Oct-96 | 1-3, 18 | - | - | 38 |
| 5 | Mar-96 | 1 - 34 | 35 - 38 | - | 38 |

# Oconee 2 Cycle 18

## 1.0 Error Adjusted Core Operating Limits

The Core Operating Limits Report for O2C18 has been prepared in accordance with the requirements of ITS 5.6.5. The core operating limits within this report have been developed using NRC approved methodology identified in references 1, 2, 3, 4, 5, 6, and 7. The RPS protective limits and maximum allowable setpoints are documented in references 8 and 9. These limits are validated for use in O2C18 by references 10, 11, and 12. The O2C18 analyses assume a design flow of 107.5% of 88,000 gpm per RCS pump, radial local peaking (Fdh) of 1.714, and axial peaking factor (Fz) of 1.5.

The error adjusted core operating limits included in section 1 of the report incorporate all necessary uncertainties and margins required for operation of the O2C18 reload core.

## 1.1 References

1. Nuclear Design Methodology Using CASMO-3 / SIMULATE-3P, DPC-NE-1004A, Revision 0, (SER dated November 23, 1992).

2. Oconee Nuclear Station Reload Design Methodology II, DPC-NE-1002A, Revision 1, (SER dated October 1, 1985).

3. Oconee Nuclear Station Reload Design Methodology, NFS-1001A, Revision 4, (SER dated July 29, 1981).

4. ONS Core Thermal Hydraulic Methodology Using VIPRE-01, DPC-NE-2003P-A, (SER dated July 19, 1989).

5. Thermal Hydraulic Statistical Core Design Methodology, DPC-NE-2005P-A, Revision 1, (SER dated November 7, 1996).

6. Fuel Mechanical Reload Analysis Methodology Using TACO3, DPC-NE-2008P-A, (SER dated April 3, 1995).

7. UFSAR Chapter 15 Transient Analysis Methodology, DPC-NE-3005-PA, Revision 1, (SER dated May 25, 1999).

8. Variable Low Pressure Safety Limit, OSC-4048, Revision 3, July 1998.

9. Power Imbalance Safety Limits and Tech Spec Setpoints Using Error Adjusted Flux-Flow Ratio of 1.094, OSC-5604, Revision 1, November 1998.

10. O2C18 Maneuvering Analysis, OSC-7273, Revision 5, February 2000.

11. O2C18 Specific DNB Analysis, OSC-7333, Revision 0, January 1999.

12. O2C18 Reload Safety Evaluation , OSC-7361, Revision 0, October 1999.

# Oconee 2 Cycle 18

## Miscellaneous Setpoints

BWST boron concentration shall be greater than 2220 ppm and less than 3000 ppm.
Referred to by ITS 3.5.4.

Spent fuel pool boron concentration shall be greater than 2220 ppm and less than 3000 ppm.
Referred to by ITS 3.7.12.

The equivalent of at least 1100 cubic feet of 11,000 ppm boron shall be maintained in the CBAST.
Referred to by ITS SLC 16.5.13.

CFT boron concentration shall be greater than 1835 ppm. The average boron concentration in the CFT's shall be less than 4000 ppm. Referred to by ITS 3.5.1.

RCS and Refueling canal boron concentration shall be greater than 2220 ppm.
Referred to by ITS 3.9.1.

Shutdown Margin (SDM) shall be greater than 1% $\Delta k/k$.
Referred to by ITS 3.1.1.

Moderator Temperature Coefficient (MTC) shall be less than :
Linear interpolation is valid within table provided.
Referred to by ITS 3.1.3.

| MTC x 10-4 $\Delta\rho$ / °F | % FP |
|---|---|
| 0.700 | 0 |
| 0.030 | 15 |
| -0.281 | 95 |
| -0.300 | 100 |
| -0.375 | 120 |

Departure from Nucleate Boiling (DNB) parameter for RCS loop pressure shall be
Referred to by ITS 3.4.1.
4 RCP: measured hot leg pressure $\geq$ 2125 psig
3 RCP: measured hot leg pressure $\geq$ 2125 psig

DNB parameter for RCS loop average temperature shall be:
Referred to by ITS 3.4.1.

| Max Loop Tavg Incl 2°F unc | $\Delta$Tc, °F |
|---|---|
| 581.00 | 0 |

The measured Tavg must be less than the temperature specified by an amount equal to the uncertainty corresponding to the instrument from which it is read.
$\Delta$Tc is the setpoint value selected by the operators.

DNB parameter for RCS loop total flow shall be:
Referred to by ITS 3.4.1.
4 RCP: Measured $\geq$ 107.5 %df
3 RCP: Measured $\geq$ 74.7 % of 4 RCP min flow

Regulating rod groups shall be withdrawn in sequence starting with group 5, group 6, and finally group 7.
Referred to by ITS 3.2.1.

Regulating rod group overlap shall be 25% ± 5% between two sequential groups.
Referred to by ITS 3.2.1.

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## Oconee 3 Cycle 18

## Core Operating Limits Report

## QA Condition 1

Prepared By : D. W. Harris _____ Date : Jan 31, 2000

Checked By : T. P. Phelps _____ Date : 31JAN2000

CDR By : G. J. Byers _____ Date : 1/31/00

Approved By : R. R. St. Clair _____ Date : Feb. 1, 2000

# Oconee 3 Cycle 18

# Core Operating Limits Report

## Insertion Sheet for Revision 12

**This revision is effective after the implementation of TSC 99-06, February 2000.**

| Remove these revision 11 pages | Insert these revision 12 pages |
|---|---|
| 1 - 3 | 1 - 3 |
| Remove this revision 10 page | Insert this revision 12 page |
| 4 | 4 |

## Revision Log

| Revision | Effective Date | Pages Revised | Pages Added | Pages Deleted | Total Effective Pages |
|---|---|---|---|---|---|
| Oconee 3 cycle 18 revisions below | | | | | |
| 12 | Feb-00 | 1 - 4 | - | - | 31 |
| 11 | Jun-99 | 1 - 3, 31 | - | - | 31 |
| 10 | Mar-99 | 1 - 31 | - | 32 - 38 | 31 |
| 9 | Oct-98 | 1 - 38 | - | - | 38 |
| Oconee 3 cycle 17 revisions below | | | | | |
| 8 | Mar-98 | 1, 2, 3, 5, 13 16, 17, 32, 36 | | | 38 |
| 7 | Dec-96 | 1 - 38 | - | - | 38 |
| Oconee 3 cycle 16 revisions below | | | | | |
| 6 | Sep-95 | 1, 2, 3, 9, 28, 29, 30 31 | - | - | 38 |
| 5 | Jun-95 | 1, 2, 3, 7 | - | - | 38 |
| 4 | May-95 | 1 - 33 | 34 - 38 | - | 38 |

# Oconee 3 Cycle 18

## 1.0 Error Adjusted Core Operating Limits

The Core Operating Limits Report for O3C18 has been prepared in accordance with the requirements of ITS 5.6.5 The core operating limits within this report have been developed using NRC approved methodology identified in references 1, 2, 3, 4, 5, 6 and 7. The RPS protective limits and maximum allowable setpoints are documented in references 8 and 9. These limits are validated for use in O3C18 by references 10, 11 and 12. The O3C18 analyses assume a design flow of 107.5% of 88,000 gpm per RCS pump, radial local peaking ($F\Delta h$) of 1.714, and axial peaking factor ($F_z$) of 1.5.

The error adjusted core operating limits included in section 1 of the report incorporate all necessary uncertainties and margins required for operation of the O3C18 reload core.

## 1.1 References

1. Nuclear Design Methodology Using CASMO-3 / SIMULATE-3P, DPC-NE-1004A, Revision 0, (SER dated November 23, 1992).

2. Oconee Nuclear Station Reload Design Methodology II, DPC-NE-1002A, Revision 1, (SER dated October 1, 1985).

3. Oconee Nuclear Station Reload Design Methodology, NFS-1001A, Revision 4, (SER dated July 29, 1981).

4. ONS Core Thermal Hydraulic Methodology Using VIPRE-01, DPC-NE-2003A, (SER dated July 19, 1989).

5. Thermal Hydraulic Statistical Core Design Methodology, DPC-NE-2005P-A, Revision 1, (SER dated November 7, 1996).

6. Fuel Mechanical Reload Analysis Methodology Using TACO3, DPC-NE-2008P-A, (SER dated April 3, 1995).

7. UFSAR Chapter 15 Transient Analysis Methodology, DPC-NE-3005-PA, Revision 1, (SER May 25, 1999).

8. Variable Low Pressure Safety Limit, OSC-4048, Revision 3, July 1998.

9. Power Imbalance Safety Limits and Tech Spec Setpoints Using Error Adjusted Flux-Flow Ratio of 1.094, OSC-5604, Revision 1, November 1998.

10. O3C18 Maneuvering Analysis, OSC-7091, Revision 4, February 2000.

11. O3C18 Specific DNB Analysis, OSC-7138, Revision 1, August 1998.

12. O3C18 Reload Safety Evaluation and 50.59, OSC-7235, Revision 2, October 1999.

# Oconee 3 Cycle 18

## Miscellaneous Setpoints

BWST boron concentration shall be greater than 2220 ppm and less than 3000 ppm.
Referred to by ITS 3.5.4.

Spent fuel pool boron concentration shall be greater than 2220 ppm and less than 3000 ppm.
Referred to by ITS 3.7.12. This revision is effective after the ITS implementation.

The equivalent of at least 1100 cubic feet of 11,000 ppm boron shall be maintained in the CBAST.
Referred to by ITS SLC 16.5.13.

CFT boron concentration shall be greater than 1835 ppm. The average boron concentration in the CFT's shall be less than 4000 ppm. Referred to by ITS 3.5.1.

RCS and Refueling canal boron concentration shall be greater than 2220 ppm.
Referred to by ITS 3.9.1.

Shutdown Margin (SDM) shall be greater than 1% Δk/k.
Referred to by ITS 3.1.1.

Moderator Temperature Coefficient (MTC) shall be less than :
Linear interpolation is valid within table provided.
Referred to by ITS 3.1.3.

| MTC x 10-4 Δρ / °F | % FP |
|---|---|
| 0.700 | 0 |
| 0.030 | 15 |
| -0.281 | 95 |
| -0.300 | 100 |
| -0.375 | 120 |

Departure from Nucleate Boiling (DNB) parameter for RCS loop pressure shall be
Referred to by ITS 3.4.1.
4 RCP: measured hot leg pressure ≥ 2125 psig
3 RCP: measured hot leg pressure ≥ 2125 psig

DNB parameter for RCS loop average temperature shall be:
Referred to by ITS 3.4.1.

| Max Loop Tavg Incl 2°F unc | ΔTc, °F |
|---|---|
| 581.00 | 0 |

The measured Tavg must be less than the temperature specified by an amount equal to the uncertainty corresponding to the instrument from which it is read.
ΔTc is the setpoint value selected by the operators.

DNB parameter for RCS loop total flow shall be:
Referred to by ITS 3.4.1.
4 RCP: measured ≥ 107.5 %df
3 RCP: measured ≥ 74.7 % of the 4 RCP minimum flows

Regulating rod groups shall be withdrawn in sequence starting with Group 5, then Group 6, and finally Group 7.
Referred to by ITS 3.2.1.

Regulating rod group overlap shall be 25% ± 5% between two sequential groups.
Referred to by ITS 3.2.1.