



Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-3093
Tel 504 739 6032
Fax 504 739 6698
Jsigno1@entergy.com

John V. Signorelli
Manager – Regulatory Assurance
(Acting)
Waterford 3

W3F1-2019-0014

February 14, 2019

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

Subject: Core Operating Limits Report – Cycle 23 Revision 0
(Reload design for Modes 5 and 6 only)
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

Waterford 3 Technical Specification 6.9.1.11.3 requires submittal of the Core Operating Limits Report for each reload cycle including any mid-cycle revisions or supplements thereto. Attached is Waterford 3 Core Operating Limits Report for reload Cycle 23 (Change for Modes 5 and 6 only) Revision 0.

If you have any questions concerning this submittal, please contact John V. Signorelli, Regulatory Assurance Manager, (acting) at (504) 739-6032.

There are no new commitments contained in this submittal.

Sincerely,

A handwritten signature in blue ink that reads "John V. Signorelli".

JVS/llb

Attachment: Waterford 3 Core Operating Limits Report Cycle 23 Revision 0 (Reload design for Modes 5 and 6 only).

cc: Mr. Scott Morris
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
RidsRgn4MailCenter@nrc.gov

NRC Senior Resident Inspector
Waterford Steam Electric Station Unit 3
Frances.Ramirez@nrc.gov
Chris.Speer@nrc.gov

NRC/NRR Project Manager for Waterford 3
April.Pulvirenti@nrc.gov

Attachment to

W3F1-2019-0014

Waterford 3 Core Operating Limits Report
Cycle 23 Revision 0

(Attachment contains 17 pages)

ENERGY OPERATIONS

WATERFORD 3

CORE OPERATING LIMITS REPORT

FOR CYCLE 23

MODES 5 AND 6 ONLY

REVISION 0

WATERFORD 3
CORE OPERATING LIMITS REPORT
CYCLE 23
MODES 5 AND 6 ONLY
REVISION 0

	<u>INDEX</u>	<u>PAGE</u>
I.	INTRODUCTION	5
II.	AFFECTED TECHNICAL SPECIFICATIONS	6
3.1.1.1	Shutdown Margin - Any CEA Withdrawn	COLR 3/4 1-1
3.1.1.2	Shutdown Margin - All CEAs Fully Inserted	COLR 3/4 1-3
3.1.2.9	Boron Dilution	COLR 3/4 1-15
3.9.1	Boron Concentration	COLR 3/4 9-1
III.	METHODOLOGIES	17

LIST OF EFFECTIVE PAGES	
Revision 0	Pages 1-6, COLR 3/4 1-1, 1-3, 1-15, 9-1, and Page 17

LIST OF FIGURES

PAGE

COLR Figure 1 Shutdown Margin Versus Cold Leg Temperature COLR 3/4 1-3A

LIST OF EFFECTIVE FIGURE PAGES	
Revision 0	COLR 3/4 1-3A

LIST OF TABLES

PAGE

COLR Table 1 Required Monitoring Frequencies for Backup Boron Dilution Detection as a Function of Operating Charging Pumps and Plant Operational Modes for K_{eff} Greater Than 0.98.	COLR 3/4 1-15A
COLR Table 2 Required Monitoring Frequencies for Backup Boron Dilution Detection as a Function of Operating Charging Pumps and Plant Operational Modes for K_{eff} Greater Than 0.97 and Less Than or Equal to 0.98.	COLR 3/4 1-15B
COLR Table 3 Required Monitoring Frequencies for Backup Boron Dilution Detection as a Function of Operating Charging Pumps and Plant Operational Modes for K_{eff} Greater Than 0.96 and Less Than or Equal to 0.97.	COLR 3/4 1-15C
COLR Table 4 Required Monitoring Frequencies for Backup Boron Dilution Detection as a Function of Operating Charging Pumps and Plant Operational Modes for K_{eff} Greater Than 0.95 and Less Than or Equal to 0.96.	COLR 3/4 1-15D
COLR Table 5 Required Monitoring Frequencies for Backup Boron Dilution Detection as a Function of Operating Charging Pumps and Plant Operational Modes for K_{eff} Greater Than or Equal to 0.95.	COLR 3/4 1-15E

LIST OF EFFECTIVE TABLE PAGES	
Revision 0	COLR 3/4 1-15A through COLR 3/4 1-15E

WATERFORD 3
CORE OPERATING LIMITS REPORT
CYCLE 23
FOR MODES 5 AND 6 ONLY
REVISION 0

I. INTRODUCTION

This CORE OPERATING LIMITS REPORT (COLR) has been prepared in accordance with the requirements of Waterford 3 Technical Specification 6.9.1.11 for Technical Specifications 3.1.1.1 and 3.1.1.2, "Shutdown Margin", 3.1.2.9, "Boron Dilution", and 3.9.1, "Boron Concentration" only for Waterford 3 Cycle 23. This revision of the COLR is applicable for Modes 5 and 6 only. This document will be revised to address the remaining parameters listed in Technical Specification 6.9.1.11 prior to entering Mode 4. The core operating limits have been developed using the NRC approved methodologies specified in Section III. This is Revision 0 of the Cycle 23 COLR.

There were no major changes between the Cycle 23, Revision 0, COLR and the Cycle 22, Revision 0, COLR. This is the initial issuance of the Cycle 23 COLR. It is applicable to operations in Modes 5 and 6 only. There are no changes to the values for the required Shutdown Margin in Mode 5 from the latest revision to the Cycle 22 COLR. There are no changes to the values for the required RCS boron concentration monitoring frequencies and Charging Pump operation limits in Modes 5 and 6 from the latest revision to the Cycle 22 COLR. There are no changes to the values for the required RCS boron concentration in Mode 6 from the latest revision to the Cycle 22 COLR.

II. AFFECTED TECHNICAL SPECIFICATIONS

CORE OPERATING LIMITS REPORT

SHUTDOWN MARGIN - ANY CEA WITHDRAWN

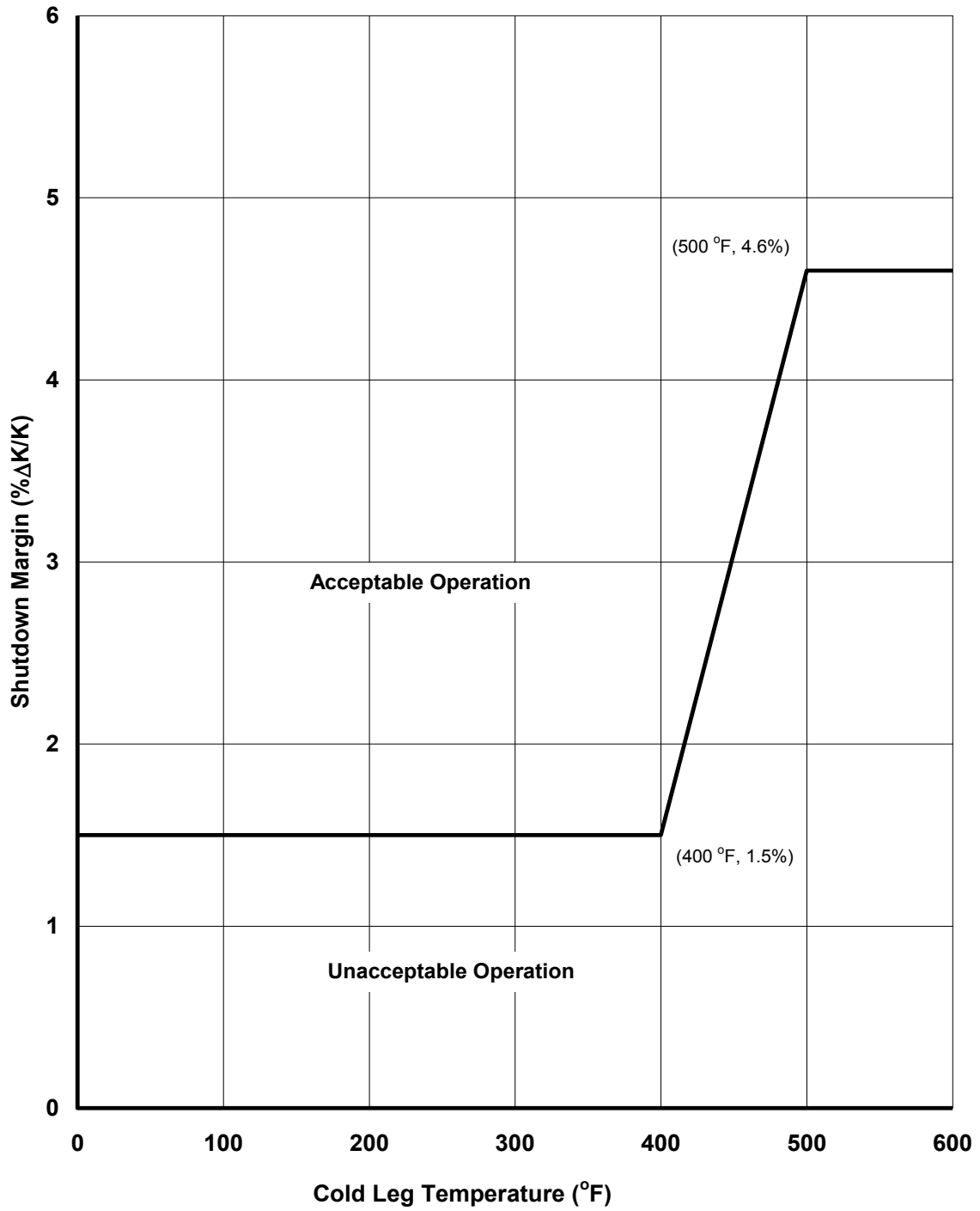
- 3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 5.15% $\Delta k/k$ when T_{avg} is greater than 200 °F or 2.0% $\Delta k/k$ when T_{avg} is less than or equal to 200 °F.

CORE OPERATING LIMITS REPORT

SHUTDOWN MARGIN - ALL CEAs FULLY INSERTED

3.1.1.2 The SHUTDOWN MARGIN shall be maintained within the region of acceptable operation of COLR Figure 1.

**Shutdown Margin Versus Cold Leg Temperature
(All CEAs Fully Inserted)**



COLR Figure 1

CORE OPERATING LIMITS REPORT

BORON DILUTION

3.1.2.9 See COLR Tables 1 through 5 for required RCS boron concentration monitoring frequencies and Charging Pump operation limits.

SURVEILLANCE REQUIREMENTS

Each required boron dilution alarm shall be adjusted to less than or equal to 1.75 times (1.75x) the existing neutron flux (cps) at the following frequencies:

- a. No sooner than one half hour after shutdown and no later than 1 hour after shutdown.
- b. At least once per one-half (1/2) hour if the reactor has been shut down ≥ 0.5 hour but < 2 hours
- c. At least once per hour if the reactor has been shutdown ≥ 2 hours but < 10 hours.
- d. At least once per 5 hours if the reactor has been shut down ≥ 10 hours but < 25 hours.
- e. At least once per 24 hours if the reactor has been shut down ≥ 25 hours but < 21 days.
- f. At least once per 7 days, if the reactor has been shutdown ≥ 21 days.

COLR TABLE 1

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON
DILUTION DETECTION AS A FUNCTION OF OPERATING
CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR
 K_{eff} GREATER THAN 0.98

$K_{eff} > 0.98$

OPERATIONAL MODE	<u>Number of Operating Charging Pumps</u> [*]			
	0	1	2	3
5 RCS filled	8 hours	Operation not allowed ^{**}		
5 RCS partially drained	8 hours	Operation not allowed ^{**}		
6	Operation not allowed ^{**}			

* Charging pump OPERABILITY for any period of time shall constitute OPERABILITY for the entire monitoring frequency.

** Charging pumps shall be verified to be inoperable by removing power to the required number.

COLR TABLE 2

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON
DILUTION DETECTION AS A FUNCTION OF OPERATING
CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR
 K_{eff} GREATER THAN 0.97 AND LESS THAN OR EQUAL TO 0.98

$0.98 \geq K_{eff} > 0.97$

OPERATIONAL MODE	<u>Number of Operating Charging Pumps*</u>			
	0	1	2	3
5 RCS filled	8 hours	0.75 hours	Operation not allowed**	
5 RCS partially drained	8 hours	0.5 hours	Operation not allowed**	
6	Operation not allowed**			

* Charging pump OPERABILITY for any period of time shall constitute OPERABILITY for the entire monitoring frequency.

** Charging pumps shall be verified to be inoperable by removing power to the required number.

COLR TABLE 3

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON
DILUTION DETECTION AS A FUNCTION OF OPERATING
CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR
 K_{eff} GREATER THAN 0.96 AND LESS THAN OR EQUAL TO 0.97

$$0.97 \geq K_{eff} > 0.96$$

OPERATIONAL MODE	<u>Number of Operating Charging Pumps</u> *			
	0	1	2	3
5 RCS filled	8 hours	1.5 hours	Operation not allowed**	
5 RCS partially drained	8 hours	0.75 hours	Operation not allowed**	
6	Operation not allowed**			

* Charging pump OPERABILITY for any period of time shall constitute OPERABILITY for the entire monitoring frequency.

** Charging pumps shall be verified to be inoperable by removing power to the required number.

COLR TABLE 4

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON
DILUTION DETECTION AS A FUNCTION OF OPERATING
CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR
 K_{eff} GREATER THAN 0.95 AND LESS THAN OR EQUAL TO 0.96

$$0.96 \geq K_{eff} > 0.95$$

OPERATIONAL MODE	<u>Number of Operating Charging Pumps*</u>			
	0	1	2	3
5 RCS filled	8 hours	2.0 hours	0.75 hours	Operation not allowed**
5 RCS partially drained	8 hours	2.0 hours	0.5 hours	Operation not allowed**
6	Operation not allowed**			

* Charging pump OPERABILITY for any period of time shall constitute OPERABILITY for the entire monitoring frequency.

** Charging pumps shall be verified to be inoperable by removing power to the required number.

COLR TABLE 5

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON
DILUTION DETECTION AS A FUNCTION OF OPERATING
CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR
 K_{eff} LESS THAN OR EQUAL TO 0.95

$K_{eff} \leq 0.95$

OPERATIONAL MODE	<u>Number of Operating Charging Pumps*</u>			
	0	1	2	3
5 RCS filled	8 hours	3.0 hours	1.0 hours	0.5 hours
5 RCS partially drained	8 hours	2.5 hours	0.75 hours	Operation not allowed**
6	24 hours	2.25 hours	0.5 hours	Operation not allowed**

* Charging pump OPERABILITY for any period of time shall constitute OPERABILITY for the entire monitoring frequency.

** Charging pumps shall be verified to be inoperable by removing power to the required number.

CORE OPERATING LIMITS REPORT
BORON CONCENTRATION

- 3.9.1 While in Mode 6, the RCS boron concentration shall be maintained sufficiently to ensure that the more restrictive of the following reactivity conditions is met:
- a. Either K_{eff} of 0.95 or less, or
 - b. A boron concentration of greater than or equal to 2050 ppm.

III. METHODOLOGIES

The analytical methods used to determine the core operating limits listed above are those previously reviewed and approved by the NRC in:

1. “Qualification of the PHOENIX-P/ANC Nuclear Design System for Pressurized Water Reactor Cores,” WCAP-11596-P-A, June 1988; “ANC: A Westinghouse Advanced Nodal Computer Code,” WCAP-10965-P-A, September 1986; and “ANC: A Westinghouse Advanced Nodal Computer Code: Enhancements to ANC Rod Power Recovery,” WCAP-10965-P-A Addendum 1, April 1989. (Methodology for Specifications 3.1.1.1 and 3.1.1.2 for Shutdown Margins, 3.1.1.3 for MTC, 3.1.3.6 for Regulating and Group P CEA Insertion Limits, 3.1.2.9 Boron Dilution (Calculation of CBC and IBW), and 3.9.1 Boron Concentration).
2. “Technical Description Manual for the CENTS Code,” WCAP-15996-P-A, Revision 1, March 2005. (Methodology for Specification 3.1.1.1 and 3.1.1.2 for Shutdown Margins, 3.1.1.3 for MTC, 3.1.3.1 for Movable Control Assemblies – CEA Position, 3.1.3.6 for Regulating and Group P CEA Insertion Limits, and 3.2.4.b for DNBR Margin)
3. “Qualification of the Two-Dimensional Transport Code PARAGON,” WCAP-16045-P-A, August 2004. (Methodology for Specifications 3.1.1.1 and 3.1.1.2 for Shutdown Margins, 3.1.1.3 for MTC, 3.1.3.6 for Regulating and Group P CEA Insertion Limits, 3.1.2.9 Boron Dilution (Calculation of CBC & IBW), 3.2.4.b for DNBR Margin and 3.9.1 Boron Concentration).