ENCLOSURES 5 and 7 CONTAIN PROPRIETARY INFORMATION
WITHHOLD FROM PUBLIC DISCLOSURE IN ACCORDANCE WITH 10 CFR 2.390

Xcel Energy®

Monticello Nuclear Generating Plant
2807 W County Rd 75
Monticello, MN 55362

September 29, 2015

L-MT-15-065
10 CFR 50.90

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

Monticello Nuclear Generating Plant
Docket 50-263
Renewed License No. DPR-22

License Amendment Request for AREVA Extended Flow Window Supplement to Respond to NRC Staff Questions (TAC No. MF5002)

References:

1) Letter from Karen D. Fili (NSPM), to Document Control Desk (NRC), "License Amendment Request for AREVA Extended Flow Window," L-MT-14-044, dated October 3, 2014. (ADAMS Accession No. ML14283A125)
2) Email T. Beltz (NRC) to G. Adams (NSPM), "Monticello Nuclear Generating Plant – DRAFT Requests for Additional Information (EICB) re: AREVA Extended Flow Window License Amendment Request (TAC No. MF5002)," dated June 30, 2015.
3) Email T. Beltz (NRC) to G. Adams (NSPM), "Monticello Nuclear Generating Plant – Requests for Additional Information (SRXB/SNPB) re: AREVA Extended Flow Window License Amendment Request (TAC No. MF5002)," dated August 5, 2015.
4) Letter from Peter A. Gardner (NSPM) to Document Control Desk (NRC), "License Amendment Request for AREVA Extended Flow Window Supplement to Respond to NRC Staff Questions (TAC No. MF5002)," dated August 26, 2015.

In Reference 1, Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, requested approval of an amendment to the Monticello Nuclear Generating Plant (MNGP) Renewed Operating License (OL) and Technical Specifications (TS). The proposed change would revise MNGP TS and would approve certain analytical methods that together would support operation in the expanded power-flow operating domain described as the Extended Flow Window (EFW). The purpose of the requested amendment is to transition from the General Electric methodology called Maximum Extended Load Line Limit Analysis Plus (MELLLA+) to the AREVA methodology called EFW.

A001
NRR

In Reference 2, NRC Instrument and Controls Branch (EICB) Staff requested additional information to support their review. EICB and NSPM participated in a teleconference on July 21, 2015 to clarify NRC Staff questions and expectations. Replies to EICB RAI questions EICB-2, 3 and 5 are provided in Enclosure 1. The balance of EICB RAI replies were provided in Reference 4.

In Reference 3, NRC Reactor Systems Branch and Nuclear Performance and Code Review Branch (SRXB/SNPB) Staff requested additional information to support their review. SRXB/SNPB and NSPM participated in a public meeting on July 7, 2015 and a teleconference on July 21, 2015 to clarify NRC Staff questions and expectations. Reply to SRXB/SNPB question RAI-3 is provided in Enclosure 1. Replies to RAI-8 and RAI-32 are provided in Enclosure 5. The balance of SRXB/SNPB RAI replies were provided in Reference 4.

Enclosure 1 provides a response to RAI EICB-2, 3, and 5, and SRXB/SNPB RAI-3, and includes justification for the TS changes proposed thereby.

Enclosure 2 provides a markup of the MNGP TS section 5.6.3 to support the RAI responses provided in Enclosure 1.

Enclosure 3 provides (for information only), a markup that provides a new section of the MNGP Technical Requirements Manual (TRM) and associated bases to support the RAI responses provided in Enclosure 1.

Enclosure 4 provides a copy of NSPM Engineering Evaluation EC 25987 to establish the "calculational framework" of the setpoint methodology for the EFW Stability protection setpoints. This document supports the response to SRXB/SNPB RAI-3 that is provided in Enclosure 1.

Enclosure 5 provides AREVA Report ANP-3435P, Revision 0, which provides replies to SRXB/SNPB RAI-8 and RAI-32 that were provided in Reference 3. Enclosure 5 is proprietary to AREVA. Enclosure 6 provides the non-proprietary AREVA Report ANP-3435NP, Revision 0. As discussed with NRC Staff (on September 28, 2015), the results of AREVA Reports ANP-3435P and ANP-3435NP (collectively referred to as ANP-3435P/NP) may be affected by a developing condition report associated with the AREVA core depletion code (MICROBURN-B2) that generated certain inputs for ANP-3435P/NP. Specifically, the decay ratios and peak cladding temperatures for the Two Recirculation Pump Trip cases reported in Section 2.2 will be increased. Figures 32-1 through 32-3 may have to be revised. AREVA has confirmed that this condition has no bearing on the methodology described in ANP-3435P/NP, but it may adversely affect the results. Therefore, to be responsive to the NRC RAIs, Enclosures 5 and 6 are provided to illustrate the methodology and the magnitude of margin to acceptance criteria, with the understanding that a revision to ANP-3435P/NP will be issued when the condition report is resolved and revised analyses are completed.

Enclosure 7 provides AREVA Report ANP-3424P, Revision 1 to correct a typographical error that was contained in Revision 0 of that report which was transmitted to NRC by Reference 4. Enclosure 7 is proprietary to AREVA. Enclosure 8 provides the non-proprietary AREVA Report ANP-3424NP, Revision 1.

Enclosure 9 provides two affidavits executed to support withholding Enclosures 5 and 7 from public disclosure. These Enclosures contain proprietary information as defined by 10 CFR 2.390. The affidavits set forth the basis on which the information may be withheld from public disclosure by the NRC and address with specificity the considerations listed in 10 CFR 2.390(b)(4). Accordingly, NSPM respectfully requests that the AREVA proprietary information in Enclosures 5 and 7 be withheld from public disclosure in accordance with 10 CFR 2.390(a)4, as authorized by 10 CFR 9.17(a)4. Correspondence with respect to the copyright or proprietary aspects of the AREVA information in Enclosures 5 and 7 or the supporting AREVA affidavits in Enclosure 9 should be addressed to Mr. Alan Meginnis, Manager – Product Licensing, AREVA Inc., 2101 Horn Rapids Road, Richland, Washington 99354.

The information offered herein does not affect the conclusions of the Significant Hazards Consideration and the Environmental Consideration evaluations provided in the Reference 1 LAR.

In accordance with 10 CFR 50.91(b), a copy of this application supplement is being provided to the designated Minnesota Official without enclosures.

If there are any questions or if additional information is needed, please contact Glenn Adams at 612-330-6777.

<u>Summary of Commitments</u>
This letter makes no new commitments and no revisions to existing commitments.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: September 29, 2015

Peter A. Gardner
Site Vice President
Monticello Nuclear Generating Plant
Northern States Power Company-Minnesota

Enclosures (9)

cc: Administrator, Region III, USNRC
Project Manager, Monticello Nuclear Generating Plant, USNRC
Resident Inspector, Monticello Nuclear Generating Plant, USNRC
Minnesota Department of Commerce (w/o enclosures)

Response to

Requests for Additional Information

Instrumentation and Control Systems Branch
EICB-2, 3, 5

Reactor Systems Branch / Nuclear Performance and Code Review Branch
SRXB/SNPB RAI-3

This enclosure provides responses from the Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, to particular requests for additional information (RAIs) provided by the Nuclear Regulatory Commission (NRC) on June 30, 2015 (EICB-2, 3, and 5) and August 5, 2015 (SRXB/SNPB RAI-3).

The NRC questions are provided below in *italic font* and the NSPM response is provided in the normal font.

EICB-2

Condition I of TS 3.3.1.1 replaces the action to initiate the manual Backup Stability Protection function with an action to initiate an alternate method to detect and suppress thermal hydraulic instability oscillations. It is presumed that the alternate method references the new EFWS scram function, but this is not explicitly stated. As written, this could lead to a misinterpretation that the required action could be satisfied through some other means than the automatic EFWS scram function.

Please provide an explanation of the term alternate method within the context of Condition I, and explain if any method other than EFWS Scram Function initiation could be used as a means of satisfying this required action.

NSPM Response

In the markup to Technical Specification (TS) 5.6.3 that was submitted in the License Amendment Request (LAR) (ADAMS Accession No. ML14283A125), the description of methodology for developing manual backup stability regions was inadvertently stricken. Thus, NSPM is proposing to restore that methodology in the revised TS markup provided as Enclosure 2 to this LAR supplement.

Consistent with previous (prior to Maximum Extended Load Line Limit Plus – MELLLA+) operating procedures at MNGP, NSPM will operate with the manual backup stability regions in effect regardless of the operability status of the OPRMs. The manual backup actions to be taken in the event of OPRM inoperability are described in OG 02-0119-260, "Backup Stability Protection (BSP) for Inoperable Option III Solution[1]."

The TS Limiting Condition for Operation (LCO) 3.3.1.1.I markup submitted in the LAR represents the standard approach to Technical Specifications for Long Term Stability Solution Option III plants. That LCO, in combination with LCOs 3.3.1.1.J and .K use the Extended Flow Window Stability (EFWS) protection in combination with the Oscillation Power Range Monitors (OPRMs) to effect long term stability protection for various conditions of protection system operability. As discussed below, the EFWS protection will provide an effective means of backup to the OPRMs; however, the prescribed "alternate method to detect and suppress thermal-hydraulic instability oscillations" is that method described in OG 02-0119-260 and previously deployed at MNGP (pre-MELLLA+).

The "alternate method to detect and suppress thermal-hydraulic instability oscillations" in TS 3.3.1.1.I is the suite of manual backup methods described in OG 02-0119-260. While the EFWS trip will function as an automatic backup when the EFWS trip function is enabled, LCO 3.3.1.1.I requires manual backup regardless of EFWS trip function operability when one or more OPRM channels are inoperable. No specific reference to the EFWS automatic backup is required because operability of EFWS is managed through TS LCO 3.3.1.1.J, which requires that plant operation be within the MELLLA-only portion of the power-flow map if EFWS is not operable in its mode of applicability.

<u>EICB-3</u>

For Conditions I and J of TS 3.3.1.1, the action for implementing Manual BSP is being removed; however, no equivalent replacement manual action is being introduced. This results in a situation whereby the plant could potentially operate for up to 12 hours with no identified means of providing stability protection. Under the current TS, the Manual BSP actions are used to provide protection during this period of time.

Please provide justification for elimination of this protection manual action, as well as an explanation of how the plant would remain protected from conditions of core instabilities during the 12-hour LCO period.

<u>NSPM Response</u>

As described in the response to EICB-2, the manual backup stability regions will be in effect regardless of OPRM operability, so an LCO action to implement the manual backup stability regions would not be necessary. During the 12-hour period starting when TS LCO 3.3.1.1.I is entered, plant stability protections are the manual backup

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[1] BWR Owners Group guidance OG 02-0119-260, "Backup Stability Protection (BSP) for Inoperable Option III Solution", dated April 24, 2002.

stability regions. If the EFWS trip is operable and enabled during this time, the EFWS trip also provides automatic backup stability protection.

EICB-5

As discussed in Section 3.3 of the NRC staff's safety evaluation for MNGP operation in the Maximum Extended Load Line Limit Plus (MELLLA+) region using the DSS-CD safety function, as further described in Attachment 2 of the licensee's October 3, 2014, application, the following is stated: If the OPRM system is inoperable, and the ABSP function performed by the Average Power Range Monitoring (APRM) system cannot be implemented or is inoperable, the licensed stability solution becomes the Manual Backup Stability Protection (BSP) Regions with the BSP Boundary, which is manually implemented through administrative actions.

Therefore, with removal of the Manual BSP functions from TS 3.3.1.1, it is unclear how the licensee would ensure manual stability protection when the automatic primary (OPRM Upscale Trip) and backup (EFWS Trip) functions become inoperable.

Please provide confirmation that some manual action based means of protection from core instabilities can be performed upon replacement of the DSS-CD functions with the EFWS trip functions.

NSPM Response

As described in the response to EICB-2, the manual backup stability regions will be in effect regardless of OPRM operability. If the EFWS trip becomes inoperable, the plant would be required to reduce power below the MELLLA boundary within 12 hours per the TS LCO 3.3.1.1.J proposed in the LAR.

SRXB/SNPB RAI-3, EO-III Solution

a) *Provide a roadmap and explanation of how the Extended Flow Window Stability (EFWS) trip is defined and implemented in technical specifications and COLR.*

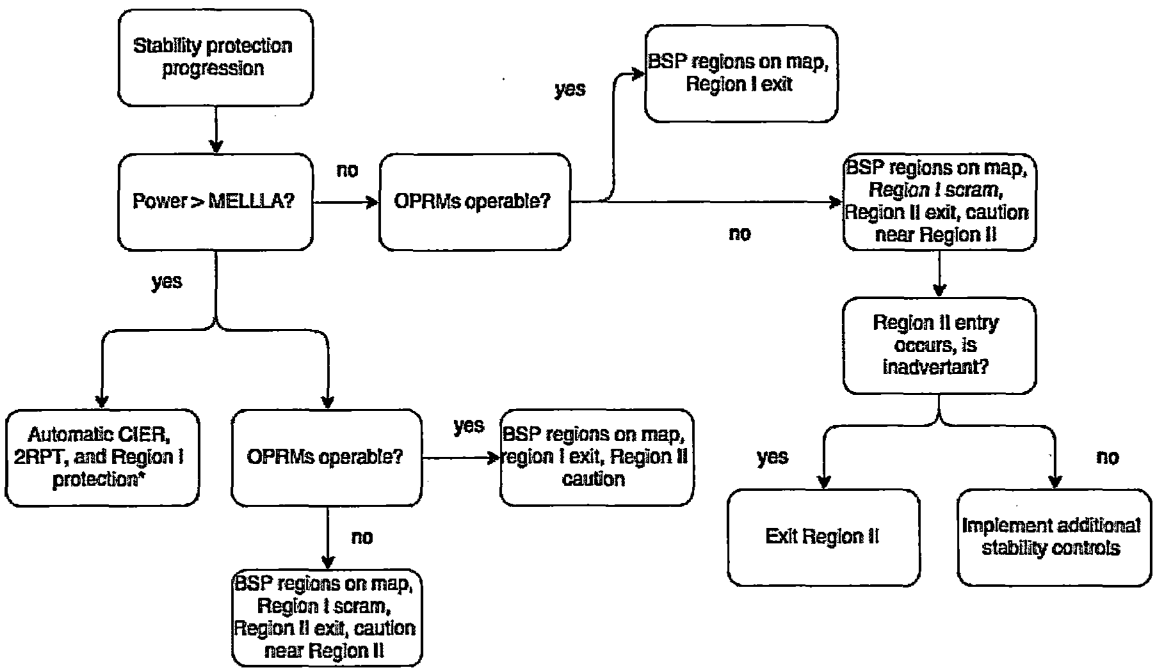
b) *Define the methodology/process to calculate the EFWS trip on cycle specific basis.*

c) *Provide a justification for the removal of manual Backup Stability Protection (BSP) from section 5.6.3 of Technical Specifications.*

NSPM Response

a) The EFWS trip is defined in Xcel Energy Engineering Evaluation (EE) EC 25987, in accordance with AREVA Topical Report ANP-10262(P), Enhanced Option III Long Term Stability Analysis, Revision 0, January 2006 and NRC requirements. This EE, which describes the use of uncertainties, flow mapping, and the use of setpoint methodology, is a method used to develop a cycle-specific value provided in the COLR per TS 5.6.3. The EFWS trip setpoint may vary on a cycle-specific basis because it is based on Region I; so the setpoint is reported in the COLR. The EFWS rod block setpoints are calculated along with the EFWS trip setpoints (in the fuel cycle design process), but the rod block setpoints are reported in the TRM to be consistent with other rod blocks associated with TS trip functions.

The progression of stability protection, per TS LCOs 3.3.1.1.I, 3.3.1.1.J, and 3.3.1.1.K are described on the flow chart below.



*EFWS enabled at 70% power if OPRMs operable, and at the intersection of Region I and the NCL if OPRMs inoperable

Operator actions in response to a thermal-hydraulic stability monitoring LCO are described by a flow chart used in conjunction with the Power-Flow Map. The states of equipment operability that determine applicable Power-Flow Map governing features include (1) OPRMs inoperable, (2) EFWS trip inoperable.

OPRMs Inoperable: The impact of OPRMs inoperable remains fundamentally the same under EFW operation as it is under Option III operation: Entry into Region I requires a manual scam, and entry into Region II operation is to be avoided. If Region II is inadvertently entered, it is to be immediately exited. If Region II is to be deliberately entered, at least one of several additional stability controls is to be implemented. The governing Power-Flow Map in the COLR includes the boundaries of Regions I and II and would be implemented immediately.

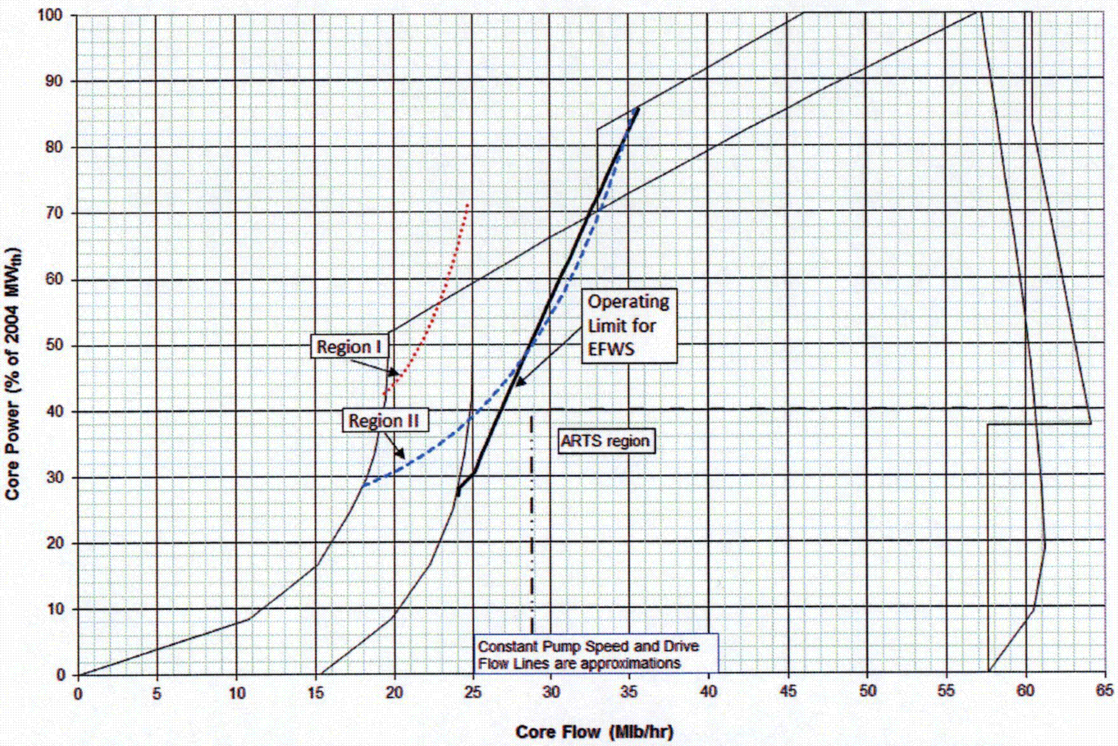
EFWS Trip Inoperable: The impact of an inoperable EFWS trip is that the Channel Instability Exclusion Region (CIER) and Region I are no longer automatically protected. The proposed TS allows 12 hours to accomplish this reactivity change. In the event that the re-positioning to below the MELLLA line cannot be accomplished within 12 hours, then a power reduction to <20% RTP within the next 4 hours is required in accordance with the Option III precedent. The MELLLA line is shown on the governing Power-Flow Map.

When at least three (3) OPRM Upscale trip channels are operable, EFWS will be enabled above 70% power to provide CIER protection. Since the CIER can only be reached as a result of Anticipated Operational Occurrences (AOOs) initiating from the EFW domain, when EFWS is only providing CIER protection the enable setpoint is chosen to ensure that CIER protection exists in the EFW domain. The value of 70% Rated Thermal Power (RTP) is chosen as the enable setpoint for two reasons: (1) many downpowers are to minimum power levels greater than 70%, and (2) the intersection of the EFW line with the MELLLA line is at 70.2% power so enabling the scram at 70% power ensures that the scram is enabled prior to any entry into the EFW region. Furthermore, the selection of 70% power value provides a round number value that is easy for Reactor Operators to monitor and verify.

EFWS will be enabled at the power at which Region I intersects the Natural Circulation Line - NCL (~43% power for the licensing analysis) to provide backup stability protection if two or more OPRMs are inoperable. If two or more OPRMs are inoperable, the automatic trip is required to preventively scram the reactor prior to the onset of severe thermal-hydraulic oscillations when the event is initiated from the EFW domain. While this level of stability protection is not required when operating below the MELLLA line (as evidenced by both long term stability Options 1-D and III previously used at MNGP), it has been conservatively determined that use of EFWS will preclude reactor operation in Region I as a result of core flow reduction regardless of power and flow operating conditions prior to the event.

EFWS is enabled at different reactor conditions based on operability of the OPRMs because the EFWS setpoint is restrictive at low reactor power and flow conditions, such as a plant startup or shutdown. The graphic below shows the initial EFWS rod block setpoint and other power-flow map features. Of particular note is the ARTS (Average Power Range Monitor, Rod Block Monitor, and Technical Specification Improvement) region, a region in which significant thermal limit penalties are applied. It is not unusual for thermal limits in the ARTS region to exceed their TS limits, thereby prohibiting operation in the ARTS region. It can be seen that if the EFWS trip and rod block were enabled at 42.6% power, a very small maneuvering window would exist. Additionally, it is NSPM practice to enable protective features sooner than required by TS, so the trip and rod block would be enabled at a lower power level and be even more restrictive (i.e., potentially enabled on the 30% pump speed line). When EFWS acts as a backup to inoperable OPRMs, the rod block will restrict plant operation; due to the low probability of stability events and the less restrictive nature of the EFWS setpoints as compared to the Automatic Backup Stability Protection (ABSP) currently in place at MNGP, this restriction is acceptable for the plant. The enable setpoints for EFWS for both potential OPRM statuses is managed by TLCO 3.3.6.1, Extended Flow Window Stability (EFWS) – High Instrumentation, see Enclosure 3.

Representative Monticello Power/Flow Map



b) The methodology for calculating the EFWS-High trip on a cycle-specific basis was originally described in Enclosure 1, Attachment 1 of the LAR. However, the original LAR did not list that methodology in the proposed TS markup. To better integrate this core operating limit methodology into the licensing basis consistent with the guidance of NRC Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," NSPM has specifically summarized the calculational framework of the setpoint methodology in an Engineering Evaluation (provided in Enclosure 4 of this supplement) and listed that Engineering Evaluation in the proposed markup to TS Section 5.6.3.b (provided in Enclosure 2 of this supplement). As is the case for all operating limits, the EFWS-High trip setpoints will be validated each operating cycle, and any changes will be reported in the Core Operating Limits Report (COLR) in accordance with TS 5.6.3.d.

c) As described in the response to RAI EICB-2, description of methodology for developing the manual backup stability regions was inadvertently stricken in the TS markup submitted in the original LAR. Please refer to the response to EICB-2 for further explanation.

Enclosure 2

TS Markup

Note: The enclosed markups are made to MNGP Amendment 188. They include the original markups of the LAR, plus the incremental markup to 5.6.3.a and 5.6.3.b that are described and justified in Enclosure 1.

Pages

5.6-2
5.6-3
insert

3 pages follow

Reactor Protection System Instrumentation Period Based Detection Algorithm OPRM Upscale trip setpoints associated with Table 3.3.1.1-1 Function 2.f, and the EFWS - High setpoints associated with Table 3.3.1.1-1 Function 2.g.

5.6 Reporting Requirements

5.6.3 CORE OPERATING LIMITS REPORT (COLR) (continued)

4. Control Rod Block Instrumentation Allowable Value for the Table 3.3.2.1-1 Rod Block Monitor Functions 1.a, 1.b, and 1.c and associated Applicability RTP levels;

5. Reactor Protection System Instrumentation Delta W value for Table 3.3.1.1-1, Function 2.b, APRM Simulated Thermal Power – High, Note b; and

6. The Manual Backup Stability Protection (BSP) Scram Region (Region I), the Manual BSP Controlled Entry Region (Region II), the ~~modified APRM Simulated Thermal Power - High setpoints used in the OPRM (Function 2.f), Automated BSP Scram Region, and the BSP Boundary~~ for Specification 3.3.1.1.

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

See insert for new documents listed 2, 3, and 4

1. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel"~~; and~~

2. ~~(Not Used.)~~

3. ~~(Not Used.)~~

4. ~~NEDO-33075-A, Revision 6, "General Electric Boiling Water Reactor Detect and Suppress Solution - Confirmation Density," January 2008~~

5. XN-NF-81-58(P)(A) Revision 2 and Supplements 1 and 2, "RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model," March 1984

6. EMF-85-74(P) Revision 0 Supplement 1(P)(A) and Supplement 2(P)(A), "RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model," February 1998

7. ANF-89-98(P)(A) Revision 1 and Supplement 1, "Generic Mechanical Design Criteria for BWR Fuel Designs," May 1995

8. XN-NF-80-19(P)(A) Volume 1 and Supplements 1 and 2, "Exxon Nuclear Methodology for Boiling Water Reactors - Neutronic Methods for Design and Analysis," March 1983

9. XN-NF-80-19(P)(A) Volume 4 Revision 1, "Exxon Nuclear Methodology for Boiling Water Reactors: Application of the ENC Methodology to BWR Reloads," June 1986

5.6 Reporting Requirements

5.6.3 CORE OPERATING LIMITS REPORT (COLR) (continued)

10. EMF-2158(P)(A) Revision 0, "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2," October 1999

11. XN-NF-80-19(P)(A) Volume 3 Revision 2, "Exxon Nuclear Methodology for Boiling Water Reactors, THERMEX: Thermal Limits Methodology Summary Description," January 1987

12. XN-NF-84-105(P)(A) Volume 1 and Volume 1 Supplements 1 and 2, "XCOBRA-T: A Computer Code for BWR Transient Thermal-Hydraulic Core Analysis," February 1987

13. ANF-913(P)(A) Volume 1 Revision 1 and Volume 1 Supplements 2, 3, and 4, "COTRANSA2: A Computer Program for Boiling Water Reactor Transient Analyses," August 1990

14. EMF-2209(P)(A) Revision 3, "SPCB Critical Power Correlation," September 2009

15. EMF-2245(P)(A) Revision 0, "Application of Siemens Power Corporation's Critical Power Correlations to Co-Resident Fuel," August 2000

16. EMF-2361(P)(A) Revision 0, "EXEM BWR-2000 ECCS Evaluation Model," May 2001

17. EMF-2292(P)(A) Revision 0, "ATRIUM™-10: Appendix K Spray Heat Transfer Coefficients," September 2000

18. EMF-CC-074(P)(A) Volume 4 Revision 0, "BWR Stability Analysis: Assessment of STAIF with Input from MICROBURN-B2," August 2000

19. BAW-10247P-A Revision 0, "Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors," February 2008

20. ANP-10298P-A Revision 1, "ACE/ATRIUM 10XM Critical Power Correlation," March 2014

21. ANP-10307P-A Revision 0, "AREVA MCPR Safety Limit Methodology for Boiling Water Reactors," June 2011

22. BAW-10255P-A Revision 2, "Cycle-Specific DIVOM Methodology Using the RAMONA5-FA Code," May 2008

See insert on following page for two additional analytical methods numbered 23, 24.

The COLR will contain the complete identification for each of the Technical Specification referenced topical reports used to prepare the COLR (i.e., report number, title, revision, date, and any supplements).

Insert for TS Section 5.6.3.b

2. NEDO-31960-A, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology", with Supplement 1, dated November 1995

3. NEDO-32465-A, "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology and Reload Applications," August 1996

4. Engineering Evaluation EC 25987, "Calculation Framework for the Extended Flow Window Stability (EFWS) Setpoints", as docketed in Xcel Energy letter to NRC L-MT-15-065, dated September 29, 2015

23. ANP-10262PA, Enhanced Option III Long Term Stability Solution, Revision 0, May 2008

24. BAW-10255(P)(A) Rev. 2, "Cycle-Specific DIVOM Methodology Using the RAMONA5-FA Code," AREVA NP Inc., May 2008

Enclosure 3

Technical Requirements Manual (TRM)

Markup

New Section 3.3.6 Inserts

(for information only)

6 pages follow

3.3.6-1
3.3.6-2
B 3.3.6-1
B 3.3.6-2
B 3.3.6-3
B 3.3.6-4

3.3 INSTRUMENTATION

3.3.6.1 Extended Flow Window Stability (EFWS) - High Instrumentation

TLCO 3.3.6.1 Three channels of the EFWS – High Trip shall be OPERABLE.

APPLICABILITY: MODE 1 with ≥ 3 OPRM Upscale channels OPERABLE and reactor rated thermal power ≥ 70 percent, or
MODE 1 with < 3 OPRM Upscale channels OPERABLE and reactor rated thermal power ≥ the intersection of Backup Scram Protection Region 1 and the Natural Circulation Line specified in the COLR.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each Channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required channels inoperable.	A.1 Restore Channels to OPERABLE status.	6 hours
B. Required Action and associated Completion Time not met.	B.1 Enter TLCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.3.6.1	Perform CHANNEL CHECK.	24 hours

B 3.3 INSTRUMENTATION

B 3.3.6.1 Extended Flow Window Stability (EFWS) – High Instrumentation

BASES

BACKGROUND

The EFWS – High function uses the APRM simulated thermal power trip to provide a programmed set of reactor stability protection from reactor core operation initiated from the EFW domain defined in the COLR. This set of reactor stability protections is derived from the licensing requirements of the Enhanced Option III (EO-III) long term stability protections described by Reference 1. The elements of this protection are described by References 1 and 2, and include:

1. Protection of the Channel Instability Exclusion Region, and
2. Protection of the Natural Circulation Line (NCL)
3. Automatic protection of the Manual Backup Scram Protection (BSP) Region I.

The OPERABILITY of EFWS is established in TS Table 3.3.1.1-1, Function g, and the TS Bases are described in Reference 2. TS require that EFWS be OPERABLE in the EFW domain ("above the MELLLA line" that is "defined in the COLR").

The purpose for the EFWS instrumentation TLCO 3.3.6.1 requirements in the TRM is to establish the power level above which the EFWS-High Trip must be enabled. These requirements were prompted by NRC Staff during review of MNGP License Amendment [xxx] (Reference 3). These enable points provide redundant assurance that EFWS is enabled prior to entering the operating domain at which the instruments are required to ensure adequate stability protection.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The safety analyses for reactor instability events and the bases for the reactor protection provided by EFWS-High are described in TS Bases B 3.3.1.1(2.g), and the corresponding rod block protections (by EFWS-High) are described by TRM Bases B 3.3.2.1.

Insofar as the EFWS-High TLCO relates only to the power level at which the EFWS-High trip is enabled preparatory to reaching the Technical Specification Operability requirement ("Within EFW

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Boundary defined by COLR"), there are no safety analyses uniquely applicable to TLCO 3.3.6.1. Rather, there is only a discussion (below) to explain that the established enable points (reflected in the Applicability section) were chosen at appropriate values:

- low enough to provide reasonable assurance that the EFWS-High trip is enabled (i.e., OPERABLE) prior to the TS requirement,
- low enough to preclude disabling/re-enabling EFWS-High trip for routine downpowers, and
- high enough to allow plant startup and low power maneuvering.

As described in the TLCO, when at least three (3) Oscillation Power Range Monitor (OPRM) Upscale trip channels are OPERABLE, EFWS will be enabled prior to exceeding 70% Rated Thermal Power (RTP) to provide Channel Instability Exclusion Region (CIER) protection. Since the CIER can only be reached as a result of Anticipated Operational Occurrences (AOOs) initiated from the EFW domain, when EFWS is providing only CIER protection, the enable setpoint is chosen to ensure that CIER protection exists in the EFW domain. The value of 70% power is chosen as the enable setpoint for two reasons: (1) many downpowers are to minimum power levels greater than 70%, and (2) the intersection of the EFW line with the MELLLA line is at 70.2% power, so enabling the scram at 70% power ensures that the scram is enabled prior to any entry into the EFW region. Furthermore, the selection of 70% power value provides a round number value that is convenient for Reactor Operators to monitor and verify.

EFWS will be enabled below the RTP value at which Region I intersects the NCL (a point determined from the COLR, historically ~43% RTP) to provide backup stability protection if two or more OPRMs are inoperable. If two or more OPRM Upscale trip channels are inoperable, the automatic trip is required to preventively scram the reactor prior to the onset of severe thermal-hydraulic oscillations when an event is initiated from the EFW domain. While this level of stability protection is not required while operating below the MELLLA line, it has been conservatively determined that EFWS will be used to preclude reactor operation in Region I as a result of core flow reduction

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

regardless of power and flow operating conditions prior to the event.

EFWS is enabled at different reactor conditions based on operability of the OPRMs because the EFWS setpoint is restrictive at low reactor power and flow conditions, such as a plant startup or shutdown.

ACTIONS

A.1

When one or more required channels of EFWS-High are inoperable (i.e., not enabled) above 70% RTP, the potential for inadvertently crossing into the EFW domain without OPERABLE EFWS-High trip protection will be increased. Thus, the time in this condition should be minimized to the 6-hour Completion Time or less. The Completion Time of 6 hours is reasonable based on operational experience, and is justified based on the very low probability of a thermal-hydraulic instability event occurring during that period.

B.1

If the Required Action or Completion Time is not met to restore the required quantity of operable EFWS channels, TLCO 3.0.3 shall be entered immediately. While evaluating the condition, TLCO 3.0.3 requires that the associated Technical Specification (TS Table 3.3.1.1-1, item g) be considered when determining whether the plant is in an unanalyzed condition.

SURVEILLANCE REQUIREMENTS

TSR 3.3.6.1

During MODE 1 operation, the CHANNEL CHECK conducted every 24 hours ensures that the required number of EFWS-High trip channels are OPERABLE. This CHANNEL CHECK may be conducted in conjunction with TS SR 3.3.1.1.1 which ensures that a gross failure of instrumentation has not occurred. The CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. For the purpose of TSR 3.3.6.1, this CHANNEL CHECK will also include verification in the APRM display that the EFWS-High trip is enabled.

REFERENCES

1. ANP-10262PA, Enhanced Option III Long Term Stability Solution, Revision 0, May 2008
2. TS Bases B3.3.1.1
3. MNGP Amendment xxx
4. USAR *Section* 14.6