ENCLOSURE 1 CONTAINS 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

July 8, 2013

L-MT-13-053
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

Monticello Extended Power Uprate and Maximum Extended Load Line Limit Analysis Plus License Amendment Requests: Supplement for Analytical Methods Used to Address Thermal Conductivity Degradation and Analytical Methods Limitations (TAC Nos. MD9990 and ME3145)

References:

1) Letter from T J O'Connor (NSPM) to Document Control Desk (NRC), "License Amendment Request: Extended Power Uprate (TAC MD9990)," L-MT-08-052, dated November 5, 2008. (ADAMS Accession No. ML083230111)
2) Letter from T J O'Connor (NSPM) to Document Control Desk (NRC), "License Amendment Request: Maximum Extended Load Line Limit Analysis Plus," TAC ME3145, L-MT-10-003, dated January 21, 2010. (ADAMS Accession No. ML100280558)
3) Letter from J G Giitter (NRC) to T J O'Connor (NSPM), "Subject: Monticello Nuclear Generating Plant - Linking of the Proposed Extended Power Uprate Amendment and the MELLLA+ Amendment (TAC NOS. MD9990 AND ME2449)," dated November 23, 2009. (ADAMS Accession No. ML093160816)
4) Email from T Beltz (NRC) to J Fields (NSPM), "Monticello Nuclear Generating Plant – Draft Requests for Additional Information (SRXB) re: Review of Extended Power Uprate (MD9990)," dated March 28, 2013. (ADAMS Accession No. ML13137A103)

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5) Email from T Beltz (NRC) to J Fields (NSPM), "Monticello – MELLLA+ Review – Draft Requests for Additional Information (TAC No. ME3145)," dated April 9, 2013.
6) Letter from T J O'Connor (NSPM) to Document Control Desk (NRC), "Monticello Extended Power Uprate: Updates to Docketed Information (TAC MD9990)," L-MT-10-072, dated December 21, 2010. (ADAMS Accession No. ML103570026)
7) Letter from M A Schimmel (NSPM) to Document Control Desk (NRC), "Monticello Extended Power Uprate: Supplement to Revise Technical Specification Setpoint for the Automatic Depressurization System Bypass Timer (TAC MD9990)," L-MT-12-091, dated October 30, 2012. (ADAMS Accession No. ML12307A036)

Pursuant to 10 CFR 50.90, the Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, requested in Reference 1 an amendment to the Monticello Nuclear Generating Plant (MNGP) Renewed Operating License (OL) and Technical Specifications (TS) to increase the maximum authorized power level from 1775 megawatts thermal (MWt) to 2004 MWt. This is also known as an extended power uprate (EPU).

Also pursuant to 10 CFR 50.90, NSPM requested in Reference 2 an amendment to the MNGP Renewed OL and TS to allow operation within the Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating domain.

The Nuclear Regulatory Commission (NRC) permitted these two license amendment requests to be linked in Reference 3.

In References 4 and 5, the NRC provided requests for additional information (RAIs) related to the analytical methods used to address Thermal Conductivity Degradation (TCD) in the MNGP analyses for EPU and MELLLA+. This letter addresses Reference 4, RAI No. 6 and Reference 5, RAI No. 4.

Enclosure 1 provides a report from General Electric-Hitachi (GEH) letter, GE-MNGP-AEP-3295, "GEH Combined Response to TCD RAIs," as the response to the applicable RAIs in References 4 and 5. This report also contains supplemental information that the NRC requested during a phone call on June 28, 2013. In that call the NRC requested clarification regarding the limitations and conditions (identified in Reference 1, Enclosure 5, Appendix A) as they relate to updated analytical methods used for MNGP cycle specific analyses. Enclosure 1 contains proprietary information.

Enclosure 2 provides a report from GEH letter GE-MNGP-AEP-3295 "GEH Combined Response to TCD RAIs." This is a non-proprietary version of Enclosure 1. The non-proprietary report is being provided based on the NRC's expectation that the submitter

of the proprietary information should provide, if possible, a nonproprietary version of the document with brackets showing where the proprietary information has been deleted.

Enclosure 3 contains the MNGP Cycle 27 Supplemental Reload Licensing Report (SRLR). This report is referenced in Enclosure 1 as a basis for the disposition of certain methodology limitations. This SRLR is applicable to the current cycle of operation of MNGP.

Enclosure 4 contains an affidavit executed to support withholding Enclosure 1 from public disclosure. Information in Enclosure 1 contains proprietary information as defined by 10 CFR 2.390. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the NRC and addresses with specificity the considerations listed in 10 CFR 2.390(b)(4). Accordingly, NSPM respectfully requests that the proprietary information which is proprietary to GEH in Enclosure 1 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 GEH information or the supporting GEH affidavit in Enclosure 4 should be addressed to James F. Harrison, Vice President Fuel Licensing, GE-Hitachi Nuclear Energy Americas LLC, 3901 Castle Hayne Road, Wilmington, NC 28401.

The supplemental information provided herein does not change the conclusions of the No Significant Hazards Consideration and the Environmental Consideration evaluations provided in Reference 1 as revised by References 6 and 7 for the Extended Power Uprate LAR. Further, the supplemental information provided herein does not change the conclusions of the No Significant Hazards Consideration and the Environmental Consideration evaluations provided in Reference 2 for the MELLLA+ LAR.

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

Summary of Commitments

This letter makes no new commitments or revisions to existing commitments.

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

Executed on: July 8, 2013

Mark A. Schimmel
Site Vice-President
Monticello Nuclear Generating Plant
Northern States Power Company-Minnesota

Enclosures (4)

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

ENCLOSURE 2

GENERAL ELECTRIC-HITACHI LETTER GE-MNGP-AEP-3295, ENCLOSURE 2
NON-PROPRIETARY

GEH COMBINED RESPONSE TO TCD RAIS

17 pages follow

ENCLOSURE 2

GE-MNGP-AEP-3295

GEH Combined Response to TCD RAIs

Non-Proprietary - Class I (Public)

NON-PROPRIETARY NOTICE

This is a non-proprietary version of the Enclosure 1 of GE-MNGP-AEP-3295 letter final which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed bracket as shown here [[ ]].

A similar Request for Additional Information has been received for both the EPU and the MELLLA+ Projects for Monticello with regard to the use of the GESTR-M code for fuel rod characteristics as used in the ECCS-LOCA Analyses. Because of this similarity, each is addressed by this unified response, which can be applied in both records.

Request for Additional Information:

EPU SRXB RAI-6:

6. *Page 49 of Enclosure 1 to the January 21, 2013, letter discusses Item 21 of the EPU Gap Analysis, concerning reported errors and changes in the ECCS evaluation. The section states the following:*

   Notification 2012-01 [reported to the NRC by letter dated December 26, 2012 (ML12363A073)], which is related to implementation of the GEH PRIME thermal-mechanical model, is not considered an Evaluation Model Error, but rather a Change.

Note that, as the implementation of PRIME-based analytical methods addresses an issue where the prior, GESTR-M-based ECCS evaluation model calculated peak cladding temperatures that were less conservative than previously understood due to the inability of GESTR-M to account for the degradation of fuel thermal conductivity with increasing exposure, the NRC staff disagrees with this characterization. Refer to Information Notice 2011-21, "Realistic Emergency Core Cooling System Evaluation Model Effects Resulting from Nuclear Fuel Thermal Conductivity Degradation," for a similar characterization offered by a fuel vendor, with which the NRC staff also disagreed. The NRC staff does not, as a matter of general practice, approve ECCS evaluations that are known to contain errors.

Please submit an updated ECCS evaluation that incorporates the PRIME-based model.

MELLLA+ SRXB RAI-4:

4. *Thermal Conductivity Degradation (TCD) and MELLLA+*

a. *On December 13, 2011, the NRC staff issued Information Notice (IN) 2011-21, "Realistic Emergency Core Cooling System Evaluation Model Effects Resulting from Nuclear Fuel Thermal Conductivity Degradation" (ADAMS Accession No. ML113430785). This IN addressed the potential for a phenomenon called thermal conductivity degradation (TCD) to cause errors (specifically higher peak cladding temperatures) in realistic ECCS evaluation models.*

   The NRC staff issued IN 2009-23, "Nuclear Fuel Thermal Conductivity Degradation," dated October 9, 2009 (ADAMS Accession No. ML091550527). IN 2009-23 states that pre-1999 methods may misrepresent fuel thermal conductivity and that calculated

margins to specified acceptable fuel design limits and other limits may be less conservative than previously understood.

The NRC staff issued IN 2009-23, Supplement 1, "Nuclear Fuel Thermal Conductivity Degradation," on October 26, 2012 (ADAMS Accession No. ML113430785). This IN states that safety analyses performed for reactors using methods that do not model TCD as a function of burnup may be less conservative than previously understood.

The Thermal-Mechanical evaluation performed in support of the Monticello MELLLA+ license amendment request was performed using GESTR, which does not account for the burnup-dependent effects of nuclear fuel thermal conductivity degradation.

Please provide MELLLA+ safety analyses that include fuel thermal-mechanical analyses that account for the effects of TCD. PRIME is an example of a model that accounts for TCD.

Response:

This RAI response is divided into several parts to address PRIME implementation effects on LOCA, Thermal Hydraulic Stability, Fuel Thermal-Mechanical Design, Transient and ATWS Analysis.

Effect of PRIME Implementation on ECCS LOCA

Prior to Information Notice 2011-21 (Reference 1), cited in the RAI, efforts were underway to incorporate new research findings with respect to fuel rod effects, including observations on Thermal Conductivity Degradation (TCD). GE-Hitachi developed the PRIME code (Reference 2) as a replacement model to GESTR-M, which accounts for TCD as well as resolving other model issues. This was noted in NEDC-33173P-A, Revision 1 (Reference 3 - the Interim Methods LTR (IMLTR)).

GEH issued Supplement 4 to the IMLTR (Reference 4) which described the implementation of the PRIME code models and inputs into the downstream safety analysis codes. Approval of that implementation plan was received via Reference 5. Supplement 4 included a method for estimating the effect of PRIME on the ECCS-LOCA peak cladding temperature (PCT).

This RAI response includes the following three sections:

- Section I describes the effect, or sensitivity, of the PRIME vs. GESTR-M change which forms the basis for approval of the Supplement 4 process.
- Section II illustrates the method used to calculate the conservative estimate of the peak cladding temperature (PCT) effect for Monticello that was reported in 10 CFR 50.46 Notification Letter 2012-01.
- Section III includes a Monticello plant specific result of the estimated change for Licensing Basis PCT using PRIME T-M inputs. The conclusion supports the compliance to Acceptance Criteria of 10CFR50.46 as reported to Monticello, and the viability of this demonstration as a means to account for the model change.

I. Effect of PRIME vs. GESTR-M on the ECCS-LOCA Analysis

The PRIME code was developed to address a number of concerns, including Thermal Conductivity Degradation. PRIME replaces the GESTR-M code. During the review of PRIME (Reference 2), the effect on the ECCS-LOCA analysis was investigated. PRIME RAI 39 provided results for the effects of PRIME vs. GESTR-M for fuel rod characteristics. In supplemental requests to RAI 39, the comparison was specifically requested to be demonstrated for the first peak LOCA PCT and oxidation. GEH provided information to demonstrate that the change to the PRIME model would principally be seen by the ECCS-LOCA analysis in terms of changes of pellet thermal conductivity and changes in conductivity of the gas in the gap. The documented effect is that initial fuel temperature on average will be slightly higher by using the PRIME model compared to GESTR-M. As regards ECCS-LOCA analysis, this is characterized as a small increase in stored energy in the fuel as an initial condition. Calculations presented in response to that RAI are documented in Table 39-1 of Reference 2.5. With PRIME, the calculations showed a PCT increase for a DBA event of [[

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Licensing basis PCT is calculated at the limiting point in core lifetime which is consistent with Appendix K to Part 50, section I.A. [[

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For a small break LOCA event, nucleate boiling which occurs in the early time periods immediately following the accident, before vessel depressurization, has the effect of allowing removal of the (increased) core stored energy before the core is uncovered. Subsequently, when pressure is relieved due to ADS action, the depth and duration of the uncovered core is essentially unchanged. These factors are determined by ECCS system performance. For the small break event with PRIME modeling, the outcome is a PCT result comparable with PCT results using GESTR-M modeling. Supplemental information (RAI 39, Supplement 3 (A)) affirmed this observation. In the response, a calculation reported a [[ ]] The response substantiated the expectation of negligible effect for small breaks.

II. Developing Conservative Estimates for the Notification Letter.

The process identified in Appendix A of the Safety Evaluation for the PRIME LTR, and summarized in Reference 8, was utilized to provide a 10 CFR 50.46 notification letter to Monticello to address the PRIME effect on the ECCS LOCA analysis. The process was to assess a PCT impact per the reporting requirements of 10 CFR 50.46. The process also allowed for an

explicit calculation with PRIME to be performed and reported later, when a plant or fuel change would provide a need for re-analysis of the ECCS system performance.

The provisions of Reference 5 were used to determine a conservative, bounding effect on peak cladding temperature and determine if the change was significant and if the plant/analysis remained in compliance to the 10 CFR 50.46 Acceptance Criteria. This process was followed for the Monticello analyses that support EPU and MELLLA+, as well as for the current operation analysis of record.

As noted above (per Reference 5), the effect of the GESTR-M to PRIME change is seen as an increase in fuel temperature, characterized as a small increase in initial stored energy in the core. Stored energy is identified as one of the terms of uncertainty which contribute to the overall uncertainty of the PCT result for Upper Bound PCT (UBPCT) in the approved SAFER Evaluation Model application. The effect of this change for PRIME is approximated by examining a postulated PCT change due to the change in stored energy, as it would be represented by volumetric average fuel temperature for the hot rod. The resulting sensitivity term is then compared to the stored energy increase seen from the GESTR-M to PRIME change over and used to project an estimated ΔPCT. [[

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For Monticello the details of the EPU analysis of Reference 6 was used as the basis. [[

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As a procedural practice, to ensure conservatism in making the statement of continued compliance for changes or errors reported via 10 CFR 50.46, GEH [[
]] For Monticello, making the change from GESTR-M to PRIME as the basis for the Evaluation Model, the reported estimate of PCT change was reported [[ ]]

III. Confirmation of Conservatism to Monticello

Subsequent to this RAI and discussion on the pending Monticello LARs, a single, plant specific calculation of the limiting Large Break case from the EPU and MELLLA+ submittals (References 6 and 7) has been performed to further demonstrate the conservative nature of the 10CFR 50.46 reporting process. In a single effect sensitivity, comparing the reported limiting case with GESTR-M with the same case calculated with the PRIME model input as an explicit replacement, the resulting PCT [[

]] remains below the 2200 °F Acceptance Criterion for maximum PCT.

The PCT change of [[ ]] calculated for Monticello directly by application of the SAFER ECCS LOCA methodology upgraded with PRIME fuel performance parameters, confirms the conservative nature of the estimate reported in 10 CFR 50.46 Notification Letter 2012-01. With these results, a revised 10 CFR 50.46 Notification letter will be issued to Monticello to reduce the PCT change from [[ ]] for the purposes of Monticello reporting requirements.

References:

1. USNRC, Information Notice (IN) 2011-21, "Realistic Emergency Core Cooling System Evaluation Model Effects Resulting from Nuclear Fuel Thermal Conductivity Degradation" (ADAMS Accession No. ML113430785)
2. PRIME Documentation and Approval:
   2.1. GE Nuclear Energy, "The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance Part 1 – Technical Bases," NEDC-33256P, dated January 2007. (ADAMS Accession No. ML070250414)
   2.2. GE Nuclear Energy, "The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance Part 2 – Qualification," NEDC-33257P, dated January 2007. (ADAMS Accession No. ML070250414)
   2.3. GE Nuclear Energy, "The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance Part 3 – Application Methodology," NEDC-33258P, dated January 2007. (ADAMS Accession No. ML070250414)
   2.4. Final Safety Evaluation of NEDC-33256P, NEDC-33257P, and NEDC-33258P, "The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance," dated January 22, 2010. (ADAMS Accession No. ML100210284)
   2.5. The PRIME Model for Analysis of Fuel Rod Thermal–Mechanical Performance, Technical Bases - NEDC-33256P-A, Qualification - NEDC-33257P-A, and Application Methodology - NEDC-33258P-A, September 2010.
3. GE Nuclear Energy, "Applicability of GE Methods to Expanded Operating Domains," NEDC-33173P-A, Revision 1 (IMLTR), dated September 2010. (ADAMS Accession No. ML102920129)
4. Letter from GEH to NRC, MFN 09-466, "Implementation of PRIME Models and Data in Downstream Methods, NEDO-33173, Supplement 4, July 2009," dated July 10, 2009. (ADAMS Accession No. ML091910492)
5. Final Safety Evaluation of NEDO-33173, Supplement 4, "Implementation Of Prime Models And Data In Downstream Methods," September 9, 2011, (TAC No. ME1704); also, NEDO-33173, Supplement 4, Revision 1, October 22, 2011.
6. GE Hitachi Nuclear Energy, "Safety Analysis Report for Monticello Constant Pressure Power Uprate," NEDC-33322P, Revision 3, October 2008.
7. GE Hitachi Nuclear Energy, "Safety Analysis Report for Monticello Maximum Extended Load Line Limit Analysis Plus," NEDC- 33435P, Revision 1, October 2009.
8. Letter from GEH to NRC, MFN 12-033, "Response to NRC Letter Re: Nuclear Fuel Thermal Conductivity Degradation Evaluation for Light Water Reactors using GE-Hitachi Nuclear Energy Codes and Methods," dated May 8, 2012. (TAC No. ME6598)

Effect of PRIME Implementation on Thermal Hydraulic Stability (M+SAR section 2.4)

Sensitivity studies documented in the response to RAI 39 of Reference 1 have shown that there is no significant impact on TRACG stability analyses when using PRIME properties.

Effect of PRIME Implementation on Fuel Thermal-Mechanical Design Analysis

The GESTR-M fuel thermal-mechanical design analysis that supports the Monticello MELLLA+ Safety Analysis Report (Reference 2) resulted in GESTR-M based LHGR limits as well as Thermal Overpower (TOP) and Mechanical Overpower (MOP) screening criterion, which for convenience may be referred to as TOP and MOP limits. These LHGR limits have been confirmed to be supportable using a PRIME thermal-mechanical basis and thus are considered fully PRIME-based LHGR limits. Additionally, the transient evaluations that form the basis of the license amendment request have been confirmed to meet PRIME-based MOP and TOP screening criteria. Since the LHGR limits and the TOP and MOP results comply with a PRIME thermal-mechanical basis, the Monticello MELLLA+ safety analysis report (Reference 2) is fully consistent with a PRIME basis for fuel thermal-mechanical design.

Effect of PRIME Implementation on Transient Analysis (M+SAR section 9.1) and ATWS ((M+SAR section 9.3.1)

Tables 1 and 2 below contain comparisons of representative GESTR-M versus PRIME based fast transient results, where changes to the fuel thermal conductivity model affects results.

Given the margins in the Monticello MELLLA+ safety analysis report (Reference 2) to design limits [[ ]] seen in these comparisons, the Abnormal Operating Occurrence (AOO) and Anticipated Transient Without SCRAM (ATWS) results contained in the Monticello MELLLA+ safety analysis report Sections 9.1 and 9.3.1 are [[ ]].

Table 1 - Comparison of GESTR-M-based versus PRIME-based Transient AOO Analyses (Based on ODYNM10/TASC03, BWR/4 AOO)

Description	GESTR-M Baseline	PRIME03	Delta	Monticello M+SAR Margin
[[				
				]]

(1) [[ ]].

Table 2 - Comparison of GESTR-M-based versus PRIME-based ATWS Analysis Results (Based on ODYNV09/TASC03, BWR/5 ATWS)

Description	GESTR-M Baseline	PRIME03	Delta	Monticello M+SAR Margin
[[				
				]]

(1) [[
(2)]]

For ATWS with Instability (ATWSI) initial MELLLA+ work was done using the best-estimate code TRACG with the PRIME TCD model and GESTR-M fuel file inputs. To respond to other MELLLA+ ATWSI RAIs updated calculations will use the best-estimate code TRACG with the PRIME TCD model and PRIME fuel file inputs.

Table 3 – Summary of TCD/PRIME effects to GESTRM

	Technical Area	Fuel Property Basis	PRIME Sensitivity Discussion	Justification for Monticello EPU/M+
1	Fuel Thermal Mechanical Design	GESTR-M	NRC studies performed by contractor PNNL during Method LTR review established a penalty.	350 psi penalty on fuel rod critical pressure in the fuel rod internal pressure design ratio was used for Monticello.
			Subsequent GE14 re-design studies with PRIME have supported the original GE14 LHGR limits (without penalty).	The TOP and MOP limits used in the Monticello EPU/ M+ LARs are based on GESTR-M. The transient evaluations contained in the Monticello EPU/ M+ LARs have been confirmed to meet PRIME-based TOP and MOP limits.
2	Core and Fuel Performance	GESTR-M	The Safety Limit Minimum Critical Power Ratio (SLMCPR) impact is below Monte Carlo variability (±0.005).	The differences between PRIME and GESTR-M SLMCPR results are insignificant.
			PRIME decreases the hot eigenvalue by a nearly constant value (approximately 0.0012 Δk).	Design basis target eigenvalues will be adjusted accordingly
3	Thermal Hydraulic Stability	GESTR-M with ODYSY and TRACG	There is no significant impact on TRACG stability analyses when using PRIME properties.	Sensitivity studies documented in the response to Supplement 4, RAI 39.

	Technical Area	Fuel Property Basis	PRIME Sensitivity Discussion	Justification for Monticello EPU/M+
4	ECCS-LOCA	GESTR-M	1) Impact of PRIME has been evaluated based on NEDO-33173 Supplement 4. Predicted PRIME impact: Small Break LOCA [[ ]]; Large Break LOCA [[ ]].	1) Fuel thermal conductivity degradation (TCD) primarily impacts ECCS-LOCA analyses through increased fuel stored energy at event initiation. Peak Cladding Temperatures (PCTs) for BWRs occur at early exposures, even when accounting for TCD. At these exposures, there is only a small increase in fuel stored energy with PRIME, which explicitly accounts for TCD, relative to GESTR, which does not. As a result, PCT impacts are small. 2) Monticello is Large Break LOCA limited with respect to PCT. A 10 CFR 50.46 notification was released for Monticello indicating the effect of the stored energy increase associated with the use of PRIME would project an estimated [[ ]]. 3) 10 CFR 50.46 notification above will be revised for [[ ]] based on the Prime limiting break evaluation.

	Technical Area	Fuel Property Basis	PRIME Sensitivity Discussion	Justification for Monticello EPU/M+
5	Transient Analyses	GESTR-M	Transient Analysis (Anticipated Operational Occurrences-AOO) impact on transient delta-CPR and Operating Limit Minimum Critical Power Ratio (OLMCPR) predictions is insignificant for analyzed AOOs.	The TOP and MOP limits used in the Monticello LARs are based on GESTR-M. The transient evaluations contained in the Monticello LARs have been confirmed to meet PRIME-based TOP and MOP limits.
6	ATWS	GESTR-M	ODYN/TASC03 sensitivity study in response to 2012 PRIME audit.	[[ ]] Max Vessel Pressure – No change Max Bulk Suppression Pool Temp [[ ]].
	ATWSI	TRACG04 w/ PRIME		Initial M+ work was done using the PRIME TCD model with GESTR-M fuel file inputs. M+ work in progress to respond to other RAIs will be using the PRIME TCD model with PRIME fuel file inputs.

References:

1. Global Nuclear Fuel, "The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance," NEDC-33256P-A, NEDC-33257P-A and NEDC-33258P-A, Revision 1, September 2010.
2. GE Hitachi Nuclear Energy, "Safety Analysis Report for Monticello Maximum Extended Load Line Limit Analysis Plus," NEDC 33435P, Revision 1, December 2009.

In separate communications with NRC staff, there were questions about how Limitations and Conditions for reload compare to basis of submittal. Table 4 identifies limitations and conditions that are satisfied with a different basis than was submitted in the EPU LAR.

Table 4 - Limitations and Conditions with a Different Basis than EPU LAR

NEDC-33173P Condition	Comments
11. Transient LHGR 3 (Section 3.2.6.5.2) To account for the impact of the void history bias, plant-specific EPU and MELLLA+ applications using either TRACG or ODYN will demonstrate an equivalent to 10 percent margin to the fuel centerline melt and the 1 percent cladding circumferential plastic strain acceptance criteria due to pellet-cladding mechanical interaction for all of limiting AOO transient events, including equipment out-of-service. Limiting transients in this case, refers to transients where the void reactivity coefficient plays a significant role (such as pressurization events). If the void history bias is incorporated into the transient model within the code, then the additional 10 percent margin to the fuel centerline melt and the 1 percent cladding circumferential plastic strain is no longer required.	The Limitation/Condition 11 Transient LHGR 3 limitation specified in Reference 1 requires that in order to account for the impact of the void history bias, plant-specific EPU and MELLLA+ applications using either TRACG04 or ODYN will demonstrate an equivalent to 10 percent margin to the fuel centerline melt and the 1 percent cladding circumferential plastic strain acceptance criteria due to pellet-cladding mechanical interaction for all of the limiting AOO transient events, including equipment out-of-service. Limiting transients in this case, refers to transients where the void reactivity coefficient plays a significant role (such as pressurization events). However, the void history bias was incorporated into the transient model within the TRACG04 code during the period of the Reference 2 review, and therefore the 10 percent margin to the fuel centerline melt and the 1 percent cladding circumferential plastic strain acceptance criteria is no longer required when applying TRACG04 to AOOs. This is true for both EPU and M+ operating domains. The EPU and M+ analyses for Monticello Cycle 27 meet the conditions of the Void Reactivity Coefficient Correction Model Condition (Limitation 21 of Reference 2) and the Void Reactivity Coefficient Correction Model Basis Condition (Limitation 22 of Reference 2); and therefore per Limitation 23 of Reference 2, the pressurization transient events are not required to demonstrate 10 percent margin to the fuel centerline melt and the 1 percent cladding circumferential plastic strain acceptance criteria. 1. *Applicability of GE Methods to Expanded Operating Domains*, NEDC-33173P-A, Revision 4, November 2012. 2. *Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS Overpressure Transients*, NEDE-32906P, Supplement 3-A, Revision 1, April 2010.

NEDC-33173P Condition	Comments
12. LHGR and Exposure Qualification (Section 3.2.6.5.5) In MFN 06-481, GE committed to submit plenum fission gas and fuel exposure gamma scans as part of the revision to the T-M licensing process. The conclusions of the plenum fission gas and fuel exposure gamma scans of GE 10x10 fuel designs as operated will be submitted for NRC staff review and approval. This revision will be accomplished through Amendment to GESTAR II or in a T-M licensing LTR. PRIME (a newly developed T-M code) has been submitted to the NRC staff for review (Reference 58). Once the PRIME LTR and its application are approved, future license applications for EPU and MELLLA+ referencing LTR NEDC-33173P must utilize the PRIME T-M methods.	Statements from Draft EPU SE: *At the time of the EPU application submittal, the PRIME topical report was under review by the NRC staff. Therefore, the MNGP EPU application is based on the GSTRM T-M methodology. The staff finds that this is consistent with the condition based on the state of its review of the PRIME T-M methods.* *RAI SNPB-12 requested that the licensee describe how conditions 12 and 14 of the SER for the IMLTR will be met in subsequent cycle analyses. Limitation 12 involves the use of updated T-M analysis methods for future EPU and MELLLA+ license applications. The response states that the updated T-M methods (PRIME) are currently under NRC review, however, GEH has committed to submit a supplement to the IMLTR describing the implementation of the updated T-M models into the safety analysis codes; the transmittal letter to this supplement will provide the schedule for the upgrade (see the licensee's July 23, 2009, letter). The IMLTR supplement was submitted by GEH by letter dated July 10, 2009 (letter from J. F. Harrison to the NRC dated July 10, 2009 (Reference 29). Therefore, the NRC staff has reasonable assurance that if the NRC staff approves the updated T-M models, the code upgrade approach taken through the IMLTR will ensure that the condition is met for future cycle reload analyses through the approved GESTAR II process. For the current MNGP EPU application, compliance with Condition 14 (see below) is sufficient to address adequacy of the current licensing analysis methodology.* PRIME was not generally used for the Monticello EPU and M+ LAR applications. A single limiting LOCA case was performed with PRIME fuel properties to demonstrate the conservatism in the 10 CFR 50.46 notification 2012-01. The Monticello ATWSI cases submitted with the MELLLA+ LAR used the TRACG04 - PRIME based fuel conductivity model, which includes the PRIME exposure dependence for fuel conductivity. The ATWSI cases in progress for the response to RAIs for MELLLA+ will include PRIME gap conductivity in addition to the PRIME fuel conductivity model. Therefore, the statements in the Draft EPU SE are accurate and adequate to reflect the status of the LAR(s) and the use of PRIME for future reloads. The EPU and M+ Cycle 27 analyses were not required to use PRIME because the reload design began before the implementation of PRIME in downstream codes was complete. However, the timing of some tasks for EPU and M+ Cycle 27 allowed the use of PRIME fuel properties. The pressurization transient analyses with TRACG04 for EPU and M+ used PRIME fuel properties. The slow transients (RWE and LFWH) are analyzed with steady state nuclear methods which used GSTRM fuel properties but with limits that are conservative relative to PRIME. The TRACG04 stability analyses for EPU used PRIME fuel properties, while the Backup Stability Protection analysis using ODYSY did not. However, the Backup Stability Protection analysis for the M+ SRLR used PRIME properties. There is no cycle specific TRACG analysis performed for the DSS-CD stability solution used in the M+ domain.

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14. Part 21 Evaluation of GESTR-M Fuel Temperature Calculation (Section 3.2.6.5.8) Any conclusions drawn from the NRC staff evaluation of the GE's Part 21 report will be applicable to the GESTR-M T-M assessment of this SE for future license application. GE submitted the T-M Part 21 evaluation, which is currently under NRC staff review. Upon completion of its review, NRC staff will inform GE of its conclusions.	Excerpts from Draft EPU SE: *Appendix A of the PUSAR states that Condition 14 is not applicable. The disposition of Condition 14 from the NRC SER for the IMLTR is not consistent with the SER. This SER incorporates Appendix F, which discusses the findings of the NRC staff review of GE's Part 21 evaluation of non-conservatisms in the GSTRM thermal mechanical (T-M) methodology. The NRC staff concludes in Appendix F that an additional margin of 350 psi is required in the critical pressure analysis.* ..... *RAI SNPB-10 requested that the PUSAR be updated to incorporate the 350 psi. The licensee's July 23, 2009, response states that the penalty has been included in the generic thermal-mechanical operating limit (TMOL) for GE14 as reported in the revised GESTAR II compliance document (Reference 31). The response further states that the current core design accommodates the revised TMOL and that future cycle designs with GE14 fuel will adopt the generic TMOL. The NRC staff finds that this approach is acceptable to incorporate the 350 psi margin.* The SE statements are correct and accurate for Monticello EPU and M+. Because of the GSTRM T-M basis, the fuel T-M Operating Limit (LHGR limit) for the GE14 fuel includes the 350 psi penalty. The GE14 T-M Operating Limit applied to Monticello Cycle 27 EPU/MELLLA+ incorporated the 350 psi penalty on fuel rod critical pressure in the fuel rod internal pressure design ratio. These limits comply with the NRC's conclusions regarding this subject (Applicability of GE Methods to Expanded Operating Domains, NEDC-33173P-A, Revision 4, November 2012.). There is no PRIME relationship to the GE14 T-M Operating Limit to be addressed for the LAR or the SRLR.

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15. Void Reactivity 1 (Section 4.4): The void reactivity coefficient bias and uncertainties in TRACG for EPU and MELLLA+ must be representative of the lattice designs of the fuel loaded in the core. 16. Void Reactivity 2 (Section 4.4): A supplement to TRACG /PANAC11 for AOO is under NRC staff review (Reference 40). TRACG internally models the response surface for the void coefficient biases and uncertainties for known dependencies due to the relative moderator density and exposure on nodal basis. Therefore, the void history bias determined through the methods review can be incorporated into the response surface "known" bias or through changes in lattice physics/core simulator methods for establishing the instantaneous cross-sections. Including the bias in the calculations negates the need for ensuring that plant-specific applications show sufficient margin. For application of TRACG to EPU and MELLLA+ applications, the TRACG methodology must incorporate the void history bias. The manner in which this void history bias is accounted for will be established by the NRC staff SE approving NEDE-32906P, Supplement 3, "Migration to TRACG04/PANAC11 from TRACG02/PANAC10," May 2006 (Reference 40). This limitation applies until the new TRACG/PANAC methodology is approved by the NRC staff. 20. Void-Quality Correlation 2 (Section 7.2.8) The NRC staff is currently reviewing Supplement 3 to NEDE-32906P, "Migration to TRACG04/PANAC11 from TRACG02/PANAC10," dated May 2006 (Reference 40). The adequacy of the TRACG interfacial shear model qualification for application to EPU and MELLLA+ will be addressed under this review. Any conclusions specified in the NRC staff SE approving Supplement 3 to LTR NEDC-32906P (Reference 40) will be applicable as approved.	Excerpt from Draft EPU SE: *Appendix A of the PUSAR states that TRACG methods are not utilized in the current application. Therefore, the NRC staff concurs with the disposition that this condition does not apply to the MNGP EPU LAR.* While TRACG for AOO is not the basis for the Monticello license amendment, TRACG methods are used in the first cycle of EPU and M+ operation, Cycle 27. This is an acceptable application in that TRACG is an approved method for the analysis of AOOs and there are no submittal or approval conditions associated with the SE for NEDE-32906P, Supplement 3-A. The Cycle 27 SRLR gives proper consideration to the Reference 1 Limitations and Conditions. Because NEDE-32906P Supplement 3 has been approved, NEDC-33173P L&Cs 16 and 20 are deferred to the L&C specifications of the Supplement 3 SE. This is addressed in the Cycle 27 EPU and M+ SRLRs. L&C 22 of NEDE-32906P Supplement 3-A is the same as L&C 15 of NEDC-33173P. The Cycle 27 EPU and M+ SRLRs state that L&C 22 of NEDE-32906P Supplement 3-A is met for the GE14 fuel loaded in the Cycle 27 core. Therefore, L&C 15 of NEDC-33173 is also met. Specific applicability to Monticello Cycle 27 of the TRACG model (described more fully in the response to RAI 30 to NEDE-32906P Supplement 3-A) is assured because the model has characterized the void coefficient biases and uncertainties for the GE14 and GNF-2 lattice types over an encompassing domain of operational conditions as a function of instantaneous voids, void history, and exposure. During the TRACG evaluations these three transient inputs to the model are calculated and provided locally for the plant and cycle specific analysis conditions to determine the local biases and uncertainties to be applied during the course of the transient calculation. References: 1 *Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS Overpressure Transients*, NEDE-32906P, Supplement 3-A, Revision 1, April 2010

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19. Void-Quality Correlation 1 (Section 7.2.7) For applications involving PANCEA/ODYN/ISCOR/TASC for operation at EPU and MELLLA+, an additional 0.01 will be added to the OLMCPR, until such time that GE expands the experimental database supporting the Findlay-Dix void-quality correlation to demonstrate the accuracy and performance of the void-quality correlation based on experimental data representative of the current fuel designs and operating conditions during steady-state, transient, and accident conditions.	Statement from Draft EPU SE: *Pending the GEH resolution of Condition 19, Appendix A of the PUSAR states that the 0.01 OLMCPR adder will be applied. The NRC staff finds this acceptable.* This limitation is directed to the determination of the OLMCPR when PANCEA/ODYN/ISCOR/TASC is used. Because TRACG is being used for the EPU and M+ Cycle 27 analysis, this limitation is not applicable and the 0.01 adder is not included in the determination of the OLMCPR for the EPU or M+ Cycle 27.

ENCLOSURE 4

GENERAL ELECTRIC- HITACHI AFFIDAVIT FOR WITHHOLDING PROPRIETARY INFORMATION

3 pages follow

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, James F. Harrison, state as follows:

(1) I am the Vice President Fuel Licensing of GE-Hitachi Nuclear Energy Americas LLC (GEH), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GEH letter, GE-MNGP-AEP-3295, "GEH Combined Response to TCD Requests for Additional Information," dated July 2, 2013. The GEH proprietary information in Enclosure 1, which is entitled "GEH Combined Response to TCD RAIs," is identified by a dark red dotted underline inside double square brackets. [[This sentence is an example.{3}]]. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit that provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the *Freedom of Information Act* (FOIA), 5 U.S.C. Sec. 552(b)(4), and the Trade Secrets Act, 18 U.S.C. Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for trade secrets (Exemption 4). The material for which exemption from disclosure is here sought also qualifies under the narrower definition of trade secret, within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975 F.2.d 871 (D.C. Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F.2.d 1280 (D.C. Cir. 1983).

(4) The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. Some examples of categories of information that fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over GEH or other companies.

b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.

c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, that may include potential products of GEH.

d. Information that discloses trade secret or potentially patentable subject matter for which it may be desirable to obtain patent protection.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to the NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, not been disclosed publicly, and not been made available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary or confidentiality agreements that provide for maintaining the information in confidence. The initial designation of this information as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure are as set forth in the following paragraphs (6) and (7).

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, who is the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or who is the person most likely to be subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited to a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary or confidentiality agreements.

(8) The information identified in paragraph (2) above is classified as proprietary because it contains results of an analysis performed by GEH to support the Monticello Extended Power Uprate (EPU) and Maximum Extended Load Line Limit Analysis Plus (MELLLA+) license application. This analysis is part of the GEH EPU and MELLLA+ methodologies. Development of the EPU and MELLLA+ methodologies and the supporting analysis techniques and information, and their application to the design, modification, and processes were achieved at a significant cost to GEH.

The development of the evaluation methodology along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply

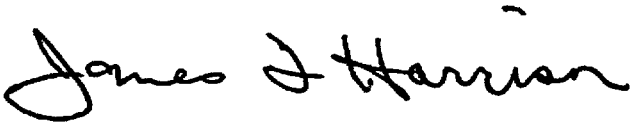
the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH. The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial. GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 2nd day of July, 2013.



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