Attachment 5 of L-MT-10-003

MELLLA Plus Safety Analysis Report

(Non-Proprietary)

HITACHI

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Non-Proprietary Information

Safety Analysis Report
for
Monticello
Maximum Extended Load Line Limit Analysis Plus

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EXECUTIVE SUMMARY

This report summarizes the results of all significant safety evaluations performed that justify the expansion of the core flow operating domain for the Monticello Nuclear Generating Plant (Monticello). The changes expand the operating domain in the region of operation with less than rated core flow, but do not increase the licensed power level or the maximum core flow. The expanded operating domain is identified as Maximum Extended Load Line Limit Analysis Plus (MELLLA+).

The scope of evaluations required to support the expansion of the core flow operating domain to the MELLLA+ boundary is contained in the Licensing Topical Report (LTR) NEDC-33006P-A, "Maximum Extended Load Line Limit Analysis Plus," referred to as the M+LTR (Reference 1). This report provides a systematic disposition of the M+LTR subjects applied to Monticello, including performance of plant-specific assessments and confirmation of the applicability of generic assessments to support a MELLLA+ core flow operating domain expansion.

It is not the intent of this report to address all the details of the analyses and evaluations reported herein. Only previously NRC-approved or industry-accepted methods were used for the analyses of accidents and transients. Therefore, because the safety analysis methods have been previously addressed, the details of the methods are not presented for review and approval in this report. Also, event and analysis descriptions that are already provided in other licensing reports or the Updated Safety Analysis Report (USAR) are not repeated within this report.

The MELLLA+ operating domain expansion is applied as an incremental expansion of the operating boundary without changing the maximum licensed power or core flow, or the current plant vessel dome pressure. This report supports operation of Monticello at Current Licensed Thermal Power (CLTP) of 2004 MWt with core flow as low as 80% of rated core flow with the assumption that the Extended Power Uprate (EPU) has been implemented at Monticello. The MELLLA+ core operating domain expansion does not require major plant hardware modifications. The core operating domain expansion involves changes to the operating power/core flow map and changes to a small number of instrument and alarm setpoints. Because there are no increases in the operating pressure, power, steam flow rate, and feedwater flow rate, there are no significant effects on the plant hardware outside of the Nuclear Steam Supply System (NSSS). There is a potential increase in the steam moisture content at certain times while operating in the MELLLA+ operating domain. The effects of the potential increase in moisture content on plant hardware have been evaluated and determined to be acceptable. The MELLLA+ operating domain expansion does not cause additional requirements to be imposed on any of the safety, balance-of-plant, electrical, or auxiliary systems. No changes to the power generation and electrical distribution systems are required as a result of the MELLLA+ operating domain expansion.

Evaluations of the reactor, engineered safety features, power conversion, emergency power, support systems, environmental issues, and design basis accidents were performed. The following conclusions summarize the results of the evaluations presented in this report.

- All safety aspects of the plant that are affected by MELLLA+ operating domain expansion were evaluated.
- There is no change in the existing design basis and licensing basis acceptance criteria of the plant.
- Evaluations were performed using NRC-approved or industry-accepted analytical methods.
- Where applicable, more recent industry codes and standards were used.
- USAR updates for MELLLA+ related changes are implemented in accordance with the requirements of 10 CFR 50.71(e).
- No major hardware modifications to safety-related equipment are required to support MELLLA+ operating domain expansion. Modifications associated with MELLLA+ are reviewed in accordance with plant procedures to ensure compliance with 10 CFR 50.59.
- Systems and components affected by MELLLA+ were reviewed to assure that there is no significant challenge to any safety system.
- Potentially affected commitments to the NRC were reviewed.
- Planned changes not yet implemented have also been reviewed for the effects of MELLLA+.

This report summarizes the results of the safety evaluations needed to justify a licensing amendment to allow the MELLLA+ operating domain expansion to a minimum core flow rate of 80% of rated core flow at 100% CLTP. These safety evaluations demonstrate that the MELLLA+ operating domain expansion can be accommodated:

- without a significant increase in the probability or consequences of an accident previously evaluated;
- without creating the possibility of a new or different kind of accident from any accident previously evaluated; and
- without exceeding any presently existing regulatory limits or acceptance criteria applicable to the plant that might cause a reduction in a margin of safety.

Therefore, the requested MELLLA+ operating domain expansion does not involve a significant hazards consideration.

ACRONYMS

Term	Definition
2RPT	Two Recirculation Pump Trip
ABSP	Automated Backup Stability Protection
AC	Alternating Current
ADS	Automatic Depressurization System
AL	Analytical Limit
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
AOO	Anticipated Operational Occurrence
AOP	Abnormal Operating Procedure
APRM	Average Power Range Monitor
ART	Adjusted Reference Temperature
ARTS	APRM / RBM / Technical Specifications
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
AV	Allowable Value
BOP	Balance-of-Plant
BSP	Backup Stability Protection
BTU/lbm	BTU per Pounds Mass
BWR	Boiling Water Reactor
BWROG	Boiling Water Reactor Owners' Group
CDA	Confirmation Density Algorithm
CDF	Core Damage Frequency
cfm	Cubic Feet per Minute
CFR	Code Of Federal Regulations
CLTP	Current Licensed Thermal Power
CLTR	Constant Pressure Power Uprate Licensing Topical Report, NEDC-33004P-A
CO	Condensation Oscillation
COLR	Core Operating Limits Report
CPR	Critical Power Ratio
ΔCPR	Change in Critical Power Ratio
CRD	Control Rod Drive
CRDA	Control Rod Drop Accident
CRGT	Control Rod Guide Tube
CS	Core Spray
CST	Condensate Storage Tank
DBA	Design Basis Accident
DC	Direct Current

Term	Definition
DIR	Design Input Request
DL	Design Limit
DOR	Division of Responsibility
DRF	Design Record File
DSS-CD	Detect and Suppress Solution–Confirmation Density
DSS-CD LTR	DSS-CD Licensing Topical Report, NEDC-33075P-A
DSS-CS TRACG LTR	DSS-CD TRACG Licensing Topical Report, NEDE-66447P-A
DTR	Draft Task Report
ECCS	Emergency Core Cooling System
EFPY	Effective Full Power Years
EOP	Emergency Operating Procedure
EPU	Extended Power Uprate
EQ	Equilibrium
ESF	Engineered Safety Feature
°F	Degrees Fahrenheit
FAC	Flow Accelerated Corrosion
FFWTR	Final Feedwater Temperature Reduction
FHA	Fuel Handling Accident
FIV	Flow-Induced Vibration
FOM	Figure of Merit
FTR	Final Task Report
FW	Feedwater
FWCF	Feedwater Controller Failure (Maximum Demand)
FWHOOS	Feedwater Heater(s) Out of Service
GEH	GE-Hitachi Nuclear Energy Americas LLC
GESTAR	General Electric Standard Application for Reactor Fuel
GNF	Global Nuclear Fuels
GWd/ST	Gigawatt Days per Short Ton
HELB	High Energy Line Break
HFCL	High Flow Control Line
HPCI	High Pressure Coolant Injection
HPCIL8	Inadvertent HPCI Startup at Level 8
HVAC	Heating, Ventilation, and Air Conditioning
IASCC	Irradiation Assisted Stress Corrosion Cracking
ICF	Increased Core Flow
ID	Internal Diameter
IGSCC	Intergranular Stress Corrosion Cracking
ILBA	Instrument Line Break Accident
IPE	Individual Plant Examination

Term	Definition
IRM	Intermediate Range Monitor
JPSL	Jet Pump Sensing Line
LAR	License Amendment Request
LERF	Large Early Release Frequency
LFWH	Loss of Feedwater Heater
LHGR	Linear Heat Generation Rate
$LHGRFAC_f$	Linear Heat Generation Rate Flow Factor
LOCA	Loss of Coolant Accident
LOOP	Loss of Off-site Power
LPCI	Low Pressure Coolant Injection
LPCIIV	LPCI Injection Valve
LPRM	Local Power Range Monitor
LRNBP	Generator Load Rejection Without Bypass
LTR	Licensing Topical Report
MAPFAC	Maximum Average Planar Linear Heat Generation Rate Reduction
MAPLHGR	Maximum Average Planar Linear Heat Generation Rate
MCO	Moisture Carryover
MCPR	Minimum Critical Power Ratio
$MCPR_f$	Flow-dependent Minimum Critical Power Ratio
$MCPR_p$	Power-dependent Minimum Critical Power Ratio
MCR	Main Control Room
MELB	Moderate Energy Line Break
MELLLA	Maximum Extended Load Line Limit Analysis
MELLLA+	Maximum Extended Load Line Limit Analysis Plus
Monticello	Monticello Nuclear Generating Plant
M+LTR	MELLLA+ Licensing Topical Report NEDC-33006P-A
M+SAR	MELLLA+ Safety Analysis Report (Plant Specific Safety Analysis Report)
M+LTR SER	MELLLA+ Safety Evaluation Report
Mlbm/hr	Millions Of Pounds Mass per Hour
MOV	Motor-Operated Valve
MS	Main Steam
MSIV	Main Steam Isolation Valve
MSIVC	Main Steam Isolation Valve Closure
MSIVF	Main Steam Isolation Valve Closure with Scram on High Flux
MSLBA	Main Steam Line Break Accident
MWd/ST	Megawatt Days per Short Ton
MWe	Megawatt-Electric
MWt	Megawatt-Thermal

Term	Definition
NCL	Natural Circulation Line
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
NSPM	Northern States Power – Minnesota
NSSS	Nuclear Steam Supply System
NTSP	Nominal Trip Setpoint
OLMCPR	Operating Limit Minimum Critical Power Ratio
OLTP	Original Licensed Thermal Power
OPRM	Oscillation Power Range Monitor
PCT	Peak Cladding Temperature
ppm	Parts per Million
PRA	Probabilistic Risk Assessment
PRFO	Pressure Regulator Failure - Open
psi	Pounds per Square Inch
psia	Pounds per Square Inch - Absolute
psid	Pounds per Square Inch - Differential
psig	Pounds per Square Inch - Gauge
PWP	Project Work Plan
QAP	Quality Assurance Program
RAI	Request for Additional Information
RBM	Rod Block Monitor
RCF	Rated Core Flow
RCIC	Reactor Core Isolation Cooling
RCPB	Reactor Coolant Pressure Boundary
RE	Responsible Engineer
RG	Regulatory Guide
RHR	Residual Heat Removal
RIPD	Reactor Internal Pressure Difference
RPT	Recirculation Pump Trip
RPV	Reactor Pressure Vessel
RRS	Reactor Recirculation System
RSLB	Recirculation Suction Line Break
RWCU	Reactor Water Cleanup
RWE	Rod Withdrawal Error
SAR	Safety Analysis Report
SBO	Station Blackout
SDC	Shutdown Cooling
SE	Safety Evaluation
SER	Safety Evaluation Report

Term	Definition
SGTS	Standby Gas Treatment System
SLC	Standby Liquid Control
SLCS	Standby Liquid Control System
SLMCPR	Safety Limit Minimum Critical Power Ratio
SLO	Single (Recirculation) Loop Operation
SPC	Suppression Pool Cooling
SRLR	Supplemental Reload Licensing Report
SRM	Source Range Monitor
SRO	Strong Rod Out
SRP	Standard Review Plan
SRV	Safety Relief Valve
SRVDL	Safety Relief Valve Discharge Line
SRVOOS	Safety Relief Valve – Out of Service
STP	Simulated Thermal Power
TAF	Top of Active Fuel
TIP	Traversing Incore Probe
TR	Task Report
TS	Technical Specification
TSD	Task Scoping Document
TSV	Turbine Stop Valve
TTNBP	Turbine Trip Without Bypass
TTWBP	Turbine Trip With Bypass
UHS	Ultimate Heat Sink
USAR	Updated Safety Analysis Report
USE	Upper Shelf Energy
V&V	Verification and Validation
VPF	Vane Passing Frequency
wt %	Percent by Weight

1.0 INTRODUCTION

This report summarizes the results of all significant safety evaluations performed that justify the expansion of the operating boundary that would permit Monticello operation at Current Licensed Thermal Power (CLTP) of 2004 MWt with core flow as low as 80% of rated core flow (RCF). This report is based on the assumption that the Extended Power Uprate (EPU) has been implemented at Monticello. The changes expand the operating domain in the region of operation with less than rated core flow, but do not increase the licensed power level or the maximum core flow. The expanded operating domain is identified as Maximum Extended Load Line Limit Analysis Plus (MELLLA+).

The scope of evaluations required to support the expansion of the core flow operating domain to the MELLLA+ boundary is contained in the Licensing Topical Report (LTR) NEDC-33006P-A, "Maximum Extended Load Line Limit Analysis Plus," referred to as the M+LTR (Reference 1). This report provides a systematic disposition of the M+LTR subjects applied to Monticello, including performance of plant-specific assessments and confirmation of the applicability of generic assessments to support a MELLLA+ core flow operating domain expansion.

The MELLLA+ core operating domain expansion does not require major plant hardware modifications. In accordance with Limitation and Condition 12.2 of the NRC Safety Evaluation Report (SER) for MELLLA+ (Reference 2), referred to as the M+LTR SER, Monticello will implement the Detect and Suppress Solution–Confirmation Density (DSS-CD) solution, with limitations and conditions as identified in the DSS-CD SER (Reference 3) and the DSS-CD TRACG SER (Reference 4), consistent with the M+LTR. DSS-CD requires a revision to the existing stability solution software. The operating domain expansion involves changes to the operating power/core flow map and changes to a small number of instrument and alarm setpoints. Because there are no increases in the operating pressure, power, steam flow rate, and feedwater (FW) flow rate, there are no significant effects on the plant hardware outside of the Nuclear Steam Supply System (NSSS). There is a potential increase in the steam moisture content at certain times while operating in the MELLLA+ operating domain. The effects of the potential increase in moisture content on plant hardware have been evaluated and determined to be acceptable. The MELLLA+ operating domain expansion does not cause additional requirements to be imposed on any of the safety, balance-of-plant, electrical, or auxiliary systems. No changes to the power generation and electrical distribution systems are required due to the introduction of MELLLA+.

This report also addresses applicable limitations and conditions as described in the M+LTR SER and the NRC SER for the GE-Hitachi Nuclear Energy Americas, LLC (GEH) LTR NEDC-33173P, "Applicability of GE Methods to Expanded Operating Domains," referred to as the Methods LTR SER (Reference 5).

The disposition of each limitation and condition is discussed along with the relevant section of this report. A complete listing of the required M+LTR SER, Methods LTR SER, DSS-CD SER, and DSS-CD TRACG SER limitations and conditions and the sections of this report which address them is presented in Appendices A, B, C, and D, respectively.

1.1 Report Approach

The evaluations provided in this report demonstrate that the MELLLA+ operating domain expansion can be accomplished within the applicable safety design criteria. Many of the safety evaluations and equipment assessments previously performed for the Monticello extended power uprate are unaffected because the MELLLA+ operating domain expansion effects are limited to the NSSS system.

This Monticello MELLLA+ safety analysis report (M+SAR) follows the same structure and content as the M+LTR (Reference 1). Two dispositions of the evaluation topics are used to characterize the MELLLA+ evaluation scope. Topics are dispositioned as either "Generic" or "Plant-Specific" as described in Sections 1.1.1 and 1.1.2, respectively.

1.1.1 Generic Assessments

Generic assessments are those safety evaluations that can be dispositioned by:

- Providing or referencing a bounding analysis for the limiting conditions;
- Demonstrating that there is a negligible effect due to MELLLA+;
- Identifying the portions of the plant that are unaffected by the MELLLA+ power/flow map operating domain expansion; or
- Demonstrating that the sensitivity to MELLLA+ is small enough that the required plant cycle-specific reload analysis process is sufficient and appropriate for establishing the MELLLA+ licensing basis in accordance with M+LTR SER Limitation and Condition 12.3.c and as defined in General Electric Standard Application for Reactor Fuel (GESTAR) (Reference 6).

  As per M+LTR SER Limitation and Condition 12.4, the plant-specific MELLLA+ application shall provide the plant-specific thermal limits assessment and transient analysis results. Considering the timing requirements to support the reload, the fuel and cycle-dependent analyses including the plant-specific thermal limits assessment may be submitted by supplementing the initial M+SAR. Additionally, the Supplemental Reload Licensing Report (SRLR) for the initial MELLLA+ implementation cycle shall be submitted for Nuclear Regulatory Commission (NRC) staff confirmation.

  Some of the safety evaluations affected by MELLLA+ are fuel operating cycle (reload) dependent. Reload dependent evaluations require that the reload fuel design, core loading pattern, and operational plan be established so that analyses can be performed to establish core operating limits. The reload analysis demonstrates that the core design for MELLLA+ meets the applicable NRC evaluation criteria and limits documented in Reference 6. [[

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]] No plant can enter the MELLLA+ domain unless the appropriate reload core analysis is performed and all criteria and limits documented in Reference 6 are satisfied. Otherwise, the plant would be in an unanalyzed condition. Based on current requirements, the reload analysis results are documented in the SRLR, and the applicable core operating limits are documented in the plant-specific Core Operating Limits Report (COLR).

Monticello will supplement this M+SAR with the fuel and cycle dependent analysis including the plant-specific thermal limits assessment. Additionally, Monticello will submit the SRLR for the initial MELLLA+ implementation cycle for NRC staff confirmation.

As required by M+LTR SER Limitation and Condition 12.3.b, the applicability of the generic assessments to Monticello is identified and confirmed in the applicable sections. In the event that the generic assessment presented in the M+LTR is not applicable to Monticello, a plant-specific evaluation per Section 1.1.2 is completed to demonstrate the acceptability of the MELLLA+ operating domain expansion.

1.1.2 Plant-Specific Evaluation

A Monticello-specific evaluation is provided for safety evaluations not categorized as Generic. Where applicable, the assessment methodology in References 1, 6, 7, 8, or 9 is referenced. As required by M+LTR SER Limitation and Condition 12.3.a, the plant-specific evaluations are reported consistent with the content, structure, and level of detail indicated in the M+LTR.

The plant-specific evaluations performed and reported in this document use plant-specific values to model the actual plant systems, transient response, and operating conditions.

1.1.3 Computer Codes and Methods

NRC-approved or industry-accepted computer codes and calculational techniques are used in the evaluations for the MELLLA+ operating domain. The primary computer codes used for Monticello evaluations are listed in Table 1-1. The application of these codes complies with the limitations, restrictions, and conditions specified in the approving NRC SER. Exceptions to the use of the code or special conditions of the applicable SER are included as notes to Table 1-1.

The Methods LTR NEDC-33173P (Reference 10) documents all analyses supporting the conclusions in this section that the application ranges of GEH codes and methods are adequate in the MELLLA+ operating domain. In accordance with the M+LTR SER Limitation and Condition 12.1, the range of mass fluxes and power/flow ratios in the GEXL database covers the intended MELLLA+ operating domain. The database includes low flow, high qualities, and void fractions. There are no restrictions on the application of the GEXL-PLUS correlation in the MELLLA+ operating domain.

As required by M+LTR SER Limitation and Condition 12.23.2, the Monticello-specific ODYN and TRACG calculations are provided to the NRC as required.

As discussed in Section 1.0, the specific limitations and conditions associated with the M+LTR, Methods LTR, DSS-CD LTR, and DSS-CD TRACG LTR are discussed along with the relevant section of this report. A complete listing of the required M+LTR SER, Methods LTR SER, DSS-CD SER, and DSS-CD TRACG SER limitations and conditions and the sections of this report which address them is presented in Appendices A, B, C, and D, respectively.

1.1.4 Scope of Evaluations

Sections 2.0 through 11.0 provide evaluations of the MELLLA+ operating domain expansion on the respective topics. The scope of the evaluations is summarized in the following sections.

Section 2.0, Reactor Core and Fuel Performance: Core and fuel performance parameters are confirmed for each fuel cycle, and will be evaluated and documented in the SRLR and COLR for each fuel cycle that implements the MELLLA+ operating domain.

Section 3.0, Reactor Coolant and Connected Systems: Evaluations of the NSSS components and systems are performed in the MELLLA+ operating domain. Because the reactor operating pressure and the core flow are not increased by MELLLA+, the effects on the Reactor Coolant and Connected Systems are minor. These evaluations confirm the acceptability of the MELLLA+ changes to process variables in the NSSS.

Section 4.0, Engineered Safety Features: The effects of MELLLA+ operating domain expansion on the containment, Emergency Core Cooling Systems (ECCS), Standby Gas Treatment System (SGTS), and other Engineered Safety Features (ESFs) are evaluated. The operating pressure for ESF equipment is not increased because operating pressure and safety/relief valve setpoints are unchanged as a result of MELLLA+.

Section 5.0, Instrumentation and Control: The instrumentation and control systems and analytical limits for setpoints are evaluated to establish the effects of MELLLA+ operating domain expansion on process parameters. The scope of MELLLA+ effects on the controls and setpoints is limited because the MELLLA+ parameter variations are limited to the core.

Section 6.0, Electrical Power and Auxiliary Systems: Because the power level is not changed by MELLLA+, the electrical power and distribution systems are not affected. The auxillary systems have been previously evaluated to ensure they are capable of supporting safe plant operation at CLTP, which is unchanged by MELLLA+ operating domain expansion.

Section 7.0, Power Conversion Systems: Because the pressure, steam flow, and FW flow do not change as a result of MELLLA+ operating domain expansion, the power conversion systems are not affected by MELLLA+.

Section 8.0, Radwaste Systems and Radiation Sources: The liquid and gaseous waste management systems are not affected by the MELLLA+ operating domain changes. However, slightly higher loading of the condensate demineralizers is possible if the moisture carryover (MCO) in the reactor steam increases. The radiological consequences are evaluated to show that applicable regulations are met.

Section 9.0, Reactor Safety Performance Evaluations: The Updated Safety Analysis Report (USAR) Anticipated Operational Occurrences (AOOs), Design Basis Accidents (DBAs), and Special Events are reviewed as part of the MELLLA+ evaluation.

Section 10.0, Other Evaluations: High energy line break and environmental qualification evaluations for the MELLLA+ domain are confirmed to demonstrate the operability of plant equipment at MELLLA+ conditions. The effects on the Individual Plant Examination (IPE) are evaluated to demonstrate there is no significant change to the Monticello vulnerability to severe accidents.

Section 11.0, Licensing Evaluations: This section includes the effect on Technical Specifications (TS). The Environmental Assessment and the No Significant Hazards Consideration are provided as a part of the accompanying License Amendment Request (LAR).

1.1.5 Product Line Applicability

The M+LTR describes processes, evaluations, and dispositions applicable to GE BWR/3, BWR/4 BWR/5, and BWR/6 product lines. As such, the M+LTR process is applicable to Monticello, a BWR/3. Where there are differences associated with the design characteristics of a BWR/3, the items specified for the BWR/3 in the appropriate M+LTR sections were used for Monticello.

1.1.6 Report Generation and Review Process

GEH Scope

This M+SAR represents several years of project planning activities, engineering analysis, technical verification, and technical review. The final stages of the M+SAR preparation include M+SAR integration, additional review, on-site review committee review, and submittal to NRC. The Monticello MELLLA+ project relied on the generic M+LTR (Reference 1) submitted to and approved by the NRC (Reference 2).

The project began with the respective GEH and Northern States Power – Minnesota (NSPM) Project Managers creating a Project Work Plan (PWP). This PWP, developed in accordance with GEH engineering procedures, was used to define the plant-specific work scope, inputs and outputs required for project activities. A Division of Responsibility (DOR) between NSPM and GEH was used to further develop the work scope and assign responsible engineers (REs) from each organization. A Task Scoping Document (TSD) applicable for each GEH task was created, reviewed, and approved by NSPM prior to any technical work being performed. Each GEH task RE submitted a Design Input Request (DIR) to the NSPM task RE interface to define the correct plant information for use in the GEH task analysis and evaluation. Additional DIRs were submitted as the project continued. A plant-specific M+SAR "shell" was created that contains the appropriate depth of information (but not the specifics) expected in the final M+SAR.

All pertinent information is captured in an individual task Design Record File (DRF) maintained by the GEH RE with oversight by the respective engineering manager. Each DRF contains the Quality Assurance records applicable to the task, which includes evidence of design verification.

A Draft Task Report (DTR) and Draft Licensing Input Report were created for every GEH task. The DTR includes a description of the analysis performed, inputs, methods, and results obtained. The Draft Licensing Input Report includes input to the applicable M+SAR section(s). The DTR and Draft Licensing Input Report were verified, in accordance with the GEH Quality Assurance Program (QAP), by a GEH technical verifier and a GEH Regulatory Affairs verifier, with oversight by the responsible GEH technical manager and GEH Project Manager. The DTR and Draft Licensing Input Report were transmitted by the GEH Project Manager to NSPM and reviewed by the NSPM RE and other NSPM engineers, as appropriate. Subsequent comments were resolved between the GEH and the NSPM REs and a Final Task Report (FTR) and Final Licensing Input Report were developed. The FTR and Final Licensing Input Report were again verified (whether or not there were changes to the document), in accordance with the GEH QAP, by a GEH technical verifier and a GEH Regulatory Affairs verifier, with oversight by the responsible GEH technical manager and GEH Project Manager. The GEH Project Manager transmitted the FTR and the Final Licensing Input Report to the NSPM Project Manager.

For the Monticello MELLLA+ project, NSPM personnel:

1. Conducted multidisciplinary technical reviews of GEH evaluation reports (DTRs, Draft Licensing Input Reports, FTRs, and Final Licensing Input Reports) to ensure:
    i. Appropriate use of design inputs;
    ii. Consistency with the M+LTR; and
    iii. Design basis and licensing basis requirements were addressed.
2. Provided technical review results, in the form of detailed comments, to GEH performers;
3. Participated in discussions with GEH REs to address and resolve comments; and
4. Controlled the application of the NSPM off-site services process to GEH.

The Regulatory Affairs RE integrated the individual M+SAR sections creating a Draft M+SAR that was verified, in accordance with the GEH QAP, by another GEH Regulatory Affairs engineer, with oversight by the GEH Regulatory Affairs Services Licensing Manager and the GEH Project Manager. The GEH Project Manager transmitted the verified Draft M+SAR to NSPM where it received another complete review by NSPM's technical personnel, project staff, and Licensing staff.

NSPM personnel generated questions and comments, which were responded to by GEH's technical and Regulatory Affairs personnel. The M+SAR was then presented to the NSPM's on-site review committee. After resolution of any final comments, the Final M+SAR was submitted to the NRC.

A technical assessment of GEH's work was performed during reviews conducted at NSPM offices in Monticello, Minnesota during December 2009.. The scope of these assessments included work performed by GEH and Global Nuclear Fuels (GNF) in support of the Monticello MELLLA+ project. Participating in those activities were representatives of Monticello mechanical/structural, nuclear, and reactor engineering disciplines, and project engineering. The Monticello team reviewed design inputs, analysis methodologies, and results in the GEH DRFs.

The reviews included discussion with GEH technical task performers to obtain a thorough understanding of GEH analysis methods.

NSPM Scope

As noted in Section 1.1.6 above, a DOR between NSPM and GEH was used to further develop the work scope and assign REs from each organization. Tasks assigned to NSPM REs were performed under the NSPM 10 CFR 50, Appendix B QAP, where applicable. The NSPM assigned tasks were performed internally by NSPM engineers or contracted out to engineering consulting firms on the NSPM approved supplier list. Where applicable, the contractors applied a 10 CFR 50, Appendix B QAP.

NSPM internal tasks were prepared, reviewed, and approved in accordance with applicable procedures.

For contracted tasks, a TSD applicable for each task was created, reviewed, and approved by NSPM prior to any technical work being performed. This work scope formed the basis for the MELLLA+ task. The design inputs were then collected, reviewed, and forwarded to the engineering consultant, in accordance with applicable procedures.

DTRs were created that included a description of the analysis performed, inputs, methods, results obtained. Draft Licensing Input Reports were created that included input to the applicable M+SAR section(s). NSPM engineering personnel, MELLLA+ project personnel, and NSPM subject matter experts, as appropriate, reviewed the DTR and Draft Licensing Input Report, and an integrated set of comments on the DTR and Draft Licensing Input Report were forwarded for comment resolution and incorporation into the FTR and final Licensing Input Report. Appropriate information for NSPM tasks was captured in PassPort SharePoint files associated with each task. FTRs, when issued, are processed through the NSPM engineering change process as a final verification of acceptability and retained as quality records in the NSPM nuclear records management system.

1.2 OPERATING CONDITIONS AND CONSTRAINTS

1.2.1 Power/Flow Map

The Monticello power/flow map including the MELLLA+ operating domain expansion is shown in Figure 1-1. [[

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All lines on the power/flow map in Figure 1-1, other than those associated with the MELLLA+ operating domain expansion, are unchanged by MELLLA+.

In accordance with M+LTR SER Limitation and Condition 12.5.c, Monticello currently includes the power/flow map in the COLR for each cycle. Monticello will continue to include the power/flow map in the COLR once the MELLLA+ operating domain expansion is approved.

The MELLLA+ domain extends from 57.4% rated core flow to 99% rated core flow. Normal core performance characteristics support plant power and flow maneuvers above 57.4% rated core flow. Due to stability considerations at high power and low core flow, the MELLLA+ domain was not extended below 57.4% rated core flow. The reactor operating conditions following an unplanned event could stabilize at a power/flow point outside the allowed operating domain. If this occurs the operator must reduce power or increase flow in accordance with plant procedures to place the plant back into the allowed operating domain.

CLTP is 2004 MWt and the 100% rated core flow is 57.6 Mlbm/hr. In accordance with Methods LTR SER Limitation and Condition 9.3, the steady state core thermal power to core flow ratio does not exceed the 50 MWt/Mlbm/hr requirement in the MELLLA+ operating domain. The core thermal power to core flow ratios are presented in Table 1-3.

1.2.2 Reactor Heat Balance

The reactor heat balance is affected. Operation in the MELLLA+ domain, with lower core flow, results in a decrease in recirculation pump heat and core inlet enthalpy.

1.2.3 Core and Reactor Conditions

As mentioned previously, the MELLLA+ operating domain expansion results in changes to the core and reactor.

Table 1-2 compares MELLLA and MELLLA+ thermal-hydraulic operating conditions for Monticello. The differences shown in Table 1-2 are typical of other Boiling Water Reactor (BWR) plants analyzed for MELLLA+ operating domain expansion, and the core operating conditions listed in Table 1-2 represent the maximum allowed power-to-flow ratio statepoints within the boundaries of the MELLLA+ operating domain. [[

]]

The decay heat is principally a function of the reactor power level and the irradiation time. The MELLLA+ operating domain expansion does not alter either of these two parameters, and therefore, there is no first order effect on decay heat. Enrichment, exposure, void fraction, power history, cycle length, and refueling batch fraction have a second order effect on decay heat. [[

]]

1.2.4 Operational Enhancements

The following table provides the performance improvement and/or equipment out-of-service features applicable to Monticello and whether they are allowed in the MELLLA+ operating domain. The table also dispositions other operational enhancements that were discussed in the M+LTR (Reference 1).

Operational Enhancements	MELLLA+	Monticello M+SAR
Increased Core Flow (ICF)	Allowed	Included
Average Power Range Monitor (APRM) / Rod Block Monitor (RBM) / Technical Specifications (ARTS)	Allowed	Included
Safety Relief Valve – Out of Service (SRVOOS) (3 valves)	Not Allowed	Not Included
Final Feedwater Temperature Reduction (FFWTR)	Allowed[1]	Not Included
Feedwater Heater Out of Service (FWHOOS)	Not Allowed	Not Included
Single Loop Operation	Not Allowed	Not Included

1. Although the M+LTR allows FFWTR to be considered as part of the MELLLA+ operating domain expansion, it is not included in this application because Monticello is not currently licensed for FFWTR.

The evaluations performed in support of MELLLA+ operating domain expansion consider each of the operational enhancements listed as "Allowed". Because the operational enhancements are considered as a part of the design inputs for evaluations performed in support of MELLLA+ operating domain expansion, these operational enhancements are evaluated across the scope of this M+SAR and are therefore not dispositioned in a specific section.

[[

]] As required by M+LTR SER Limitation and Condition 12.5.b, the Monticello plant design does not allow the plant to be operated with FW heaters bypassed.

Single loop operation (SLO) in the MELLLA+ domain is not proposed. The present licensing basis for SLO will remain available per plant technical specifications. As required by M+LTR SER Limitation and Condition 12.5.a, Technical Specification 3.4.1 is being modified as shown in the NSPM MELLLA+ License Amendment Request package to specify that SLO operation is prohibited in the MELLLA+ operating domain.

1.3 SUMMARY AND CONCLUSIONS

This M+SAR documents the results of analyses necessary to expand the operating domain of the Monticello plant to include the MELLLA+ domain. This document conforms to the scope, content and structure described in the M+LTR, which the NRC has determined "is acceptable for referencing in licensing applications for GE-designated boiling water reactors to the extent specified and under the limitations and conditions delineated in the TR [task report] and in the enclosed final SE [safety evaluation]."

Table 1-1 Computer Codes Used in the M+SAR Evaluations

Task	Computer Code	Version or Revision	NRC Approved	Comments
Reactor Heat Balance	ISCOR	09	Y(1)	NEDE-24011P Rev. 0 SER
Reactor Core and Fuel Performance	TGBLA PANAC ISCOR	06 11 09	Y(2) Y(2) Y(1)	NEDE-30130P-A NEDE-30130P-A NEDE-24011P Rev. 0 SER
Thermal Hydraulic Stability	ODYSY TRACG TRACG ISCOR PANACEA	05 02 04 09 11	Y Y(15) N(15) Y(1) Y(3)	NEDC-33213P-A NEDC-33147P-A Rev. 2 NEDE-24011P Rev. 0 SER NEDE-30130P-A
Reactor Internal Pressure Differences	LAMB TRACG ISCOR	07 02 09	(4) Y(5) Y(1)	NEDE-20566P-A NEDE-32176P, Rev. 2, Dec. 1999 NEDC-32177P, Rev. 2, Jan. 2000 NRC TAC No. M90270, Sept. 1994 NEDE-24011P Rev. 0 SER
Reactor Pressure Vessel (RPV) Fluence	TGBLA DORTG	06 01	Y(2) Y (12, 13)	NEDE-30130P-A CCC-543
Annulus Pressurization Loads	ISCOR	09	Y(1)	NEDE-24011P Rev. 0 SER
Transient Analysis	PANAC ODYN ISCOR TASC	11 09 09 03	Y Y Y (1) Y	NEDE-30130P-A (6) NEDE-24154P-A NEDC-24154P-A, Vol 4, Sup 1 NEDE-24011P Rev. 0 SER NEDC-32084P-A Rev. 2
Anticipated Transient Without Scram (ATWS)	ODYN STEMP PANACEA TASC ISCOR TRACG	10 04 11 03A 09 04	Y (7) Y(6) Y Y(1) N(14)	NEDC-24154P-A, Vol 4, Sup 1 NEDC-32084P-A Rev. 2 NEDE-24011P Rev. 0 SER
Containment System Response	M3CPT LAMB	05 08	Y (4)	NEDO-10320, April 1971 NEDE-20566P-A, September 1986
Reactor Recirculation System	BILBO	04V	(8)	NEDE-23504, Feb. 1977
ECCS-Loss of Coolant Accident (LOCA)	LAMB GESTR SAFER ISCOR TASC	08 08 04 09 03	Y Y Y Y(1) Y	NEDE-20566P-A NEDE-23785-1P-A, Rev. 1 (9)(10) (11) NEDE-24011P Rev. 0 SER NEDC-32084P-A

* The application of these codes to the MELLLA+ analyses complies with the limitations, restrictions, and conditions specified in the approving NRC SER where applicable for each code. The application of the codes also complies with the SERs for the extended power uprate programs.

Notes for Table 1-1:

(1) The ISCOR code is not approved by name. However, in the SER supporting approval of NEDE-24011P Rev. 0 by the May 12, 1978 letter from D. G. Eisenhut (NRC) to R. Gridley (GE), the NRC finds the models and methods acceptable for steady-state thermal-hydraulic analysis, and mentions the use of a digital computer code. The referenced digital computer code is ISCOR. The use of ISCOR to provide core thermal-hydraulic information in reactor internal pressure differences, Transient, ATWS, Stability, and LOCA applications is consistent with the approved models and methods.

(2) The use of TGBLA Version 06 and PANACEA Version 11 was initiated following approval of Amendment 26 of GESTAR II by letter from S.A. Richards (NRC) to G.A. Watford (GE) Subject: "Amendment 26 to GE Licensing Topical Report NEDE-24011P-A, GESTAR II Implementing Improved GE Steady-State Methods," (TAC NO. MA6481), November 10, 1999.

(3) The use of PANACEA Version 11 was initiated following approval of Amendment 26 of GESTAR II by letter from S.A. Richards (NRC) to G.A. Watford (GE) Subject: "Amendment 26 to GE Licensing Topical Report NEDE-24011P-A, GESTAR II Implementing Improved GE Steady-State Methods," (TAC NO. MA6481), November 10, 1999.

(4) The LAMB code is approved for use in ECCS-LOCA applications (NEDE-20566P-A), but no approving SER exists for the use of LAMB for the evaluation of reactor internal pressure differences or containment system response. The use of LAMB for these applications is consistent with the model description of NEDE-20566P-A.

(5) NRC has reviewed and accepted the TRACG application for the flow-induced loads on the core shroud as stated in NRC SER TAC No. M90270.

(6) The physics code PANACEA (PANAC) provides inputs to the transient code ODYN. The use of PANACEA Version 11 in this application was initiated following approval of Amendment 26 of GESTAR II by letter from S.A. Richards (NRC) to G.A. Watford (GE) Subject: "Amendment 26 to GE Licensing Topical Report NEDE 24011P-A, GESTAR II Implementing Improved GE Steady-State Methods," (TAC NO. MA6481), November 10, 1999.

(7) The STEMP code uses fundamental mass and energy conservation laws to calculate the suppression pool heatup. The use of STEMP was noted in NEDE-24222, "Assessment of BWR Mitigation of ATWS, Volume I & II (NUREG-0460 Alternate No. 3) December 1, 1979." The code has been used in ATWS applications since that time. There is no formal NRC review and approval of STEMP or the ATWS topical report.

(8) Not a safety analysis code that requires NRC approval. The code application is reviewed and approved by GEH for "Level-2" application and is part of GEH's standard design process. Also, the application of this code has been used in other MELLLA+ and power uprate submittals.

(9) "SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-Jet Pump Plants," NEDE-30996P-A, General Electric Company, October 1987.

(10) "Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," NEDC-32950P, January 2000.

(11) Letter, S.A. Richards (NRC) to J.F. Klapproth (GE), "General Electric Nuclear Energy Topical Reports NEDC-32950P and NEDC-32084P Acceptability Review," May 24, 2000.

(12) CCC-543, "TORT-DORT Two-and Three-Dimensional Discrete Ordinates Transport Version 2.8.14," Radiation Shielding Information Center (RSIC), January 1994.

(13) Letter, H. N. Berkow (NRC) to G.B. Stramback (GE), "Final Safety Evaluation Regarding Removal of Methodology Limitations for NEDC-32983P-A, General Electric Methodology for Reactor Pressure Vessel Fast Neutron Flux Evaluations (TAC No. MC3788)," November 17, 2005.

(14) The TRACG04 code is not approved by the NRC for long-term ATWS calculations including ATWS with depressurization and ATWS with core instability. However, TRACG04 is used as a best-estimate code, while ODYN remains as the licensing basis code for ATWS consistent with the NRC SE for NEDC-33006P. The use of TRACG04 for the best-estimate TRACG ATWS analysis is also consistent with the NRC SE for NEDC-33006P. TRACG02, the predecessor code to TRACG04, is approved by the NRC for application to ATWS overpressure transients in NEDE-32906P Supplement 1-A, "TRACG Application for Anticipated Transient Without Scram," November 2003. TRACG04 has been submitted for NRC approval for application to ATWS overpressure transients in NEDE-32906P Supplement 3, "Migration to TRACG04 / PANAC11 from TRACG02 / PANAC10 for TRACG AOO and ATWS Overpressure Transients," May 2006.

(15) TRACG02 remains the licensing basis code for DSS-CD applications consistent with the NRC SE for NEDC-33147P. The TRACG02 licensing topical report NEDC-33147P-A, Rev. 2 is only applicable to DSS-CD methodology. The Monticello plant-specific amplitude discriminator setpoint is based on TRACG02 evaluations. TRACG04 is not approved by the NRC for DSS-CD stability applications and is only used as a best-estimate code to confirm the generic Minimum Critical Power Ratio (MCPR) margin demonstrated by TRACG02 for plant-specific application.

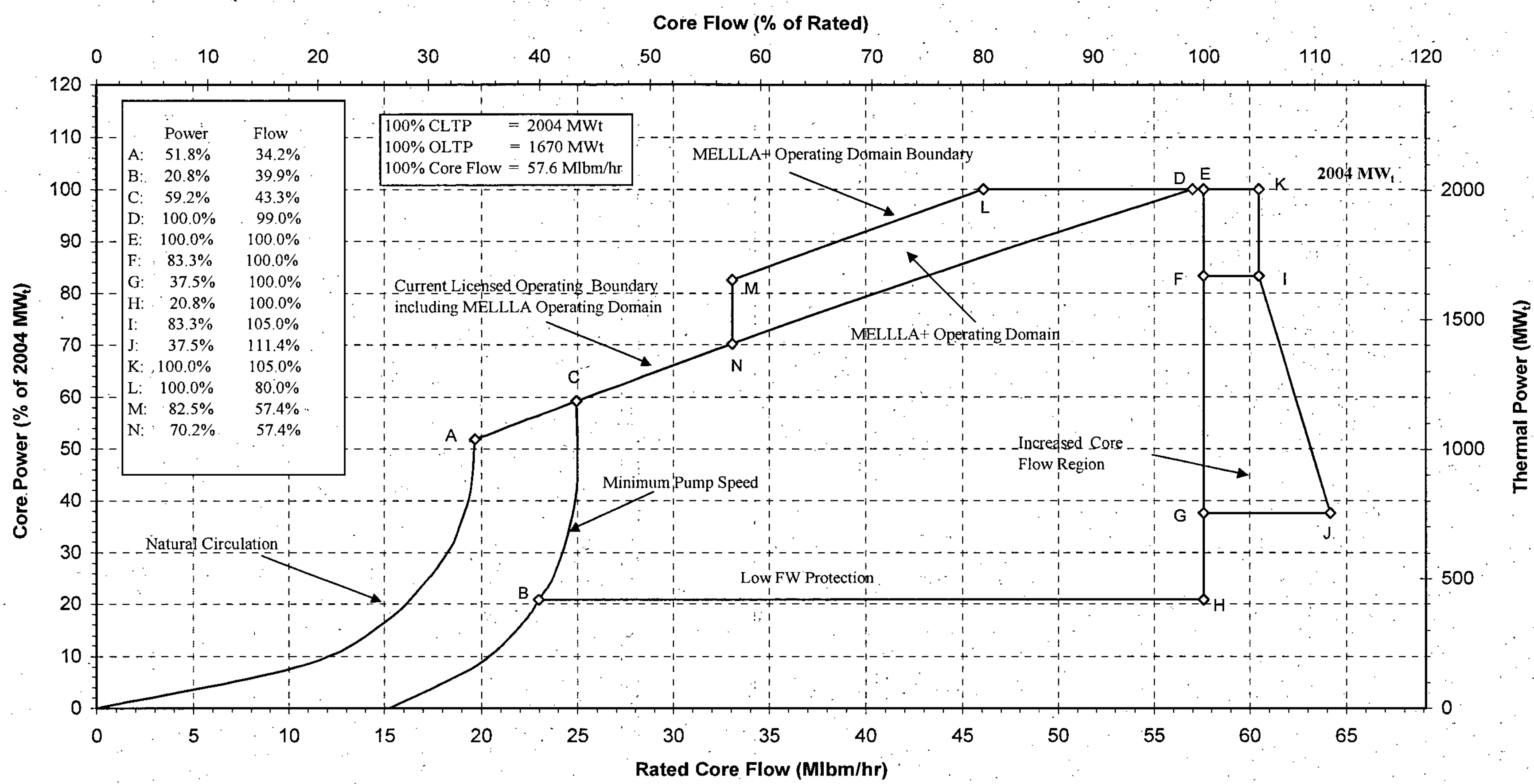
Table 1-2 Comparison of Thermal-Hydraulic Parameters

Parameter	MELLLA 100% CLTP, 99% Core Flow	MELLLA+ 100% CLTP, 80% Core Flow	MELLLA+ 82.5% CLTP, 57.4% Core Flow
Thermal Power (MWt)	2004	2004	1653
Dome Pressure (psia)	1025	1025	996
Recirculation System Flow Rate (Mlbm/hr) per Loop	11.6	9.4	6.7
Steam Flow Rate (Mlb/hr)	8.335	8.326	6.690
Feedwater Flow Rate (Mlbm/hr)	8.308	8.299	6.663
Feedwater Temperature (°F)	395.8	395.7	376.9
Core Flow (Mlb/hr)	57.0	46.1	33.1
Core Inlet Enthalpy (BTU/lbm)	523	516	505
Core Pressure Drop (psi)	22	16	10
Core Average Void Fraction	0.47	0.50	0.50
Core Exit Void Fraction	0.69	0.72	0.73

Table 1-3 Core Thermal Power to Core Flow Ratios

Steady-State Operation	Core Thermal Power (MWt/%CLTP)	Core Flow (Mlbm/hr/%rated	Power-to-Flow Ratio (MWt/Mlbm/hr)
Current Operating Domain 100% Rated Core Flow	2004 / 100	57.6 / 100	34.79
Current Operating Domain 99% Rated Core Flow	2004 / 100	57.0 / 99	35.16
MELLLA+ Operating Domain 80% Rated Core Flow	2004 / 100	46.1 / 80	43.47
MELLLA+ Operating Domain 57.4% Rated Core Flow	1653 / 82.5	33.1 / 57.4	49.94

Figure 1-1 Power/Flow Operating Map for MELLLA+



2.0 REACTOR CORE AND FUEL PERFORMANCE

This section addresses the evaluations that are applicable to MELLLA+.

Because Monticello currently uses only GE14 fuel, the following limitations and conditions from the Methods LTR SER, M+LTR SER, and DSS-CD SER are not applicable to the Monticello M+SAR:

Methods LTR SER Limitations and Conditions:

APPLICATION OF 10 WEIGHT PERCENT GD: Limitation and Condition 9.13

MIXED CORE METHOD 1: Limitation and Condition 9.21

MIXED CORE METHOD 2: Limitation and Condition 9.22

M+LTR SER Limitations and Conditions:

CONCURRENT CHANGES: Limitation and Condition 12.3.d, 12.3.e, and 12.3.f

APPENDIX A RAI 14-9: Limitation and Condition 12.23.6

APPENDIX A RAI 14-10: Limitation and Condition 12.23.7

DSS-CD SER Limitations and Conditions:

Limitation and Condition 4.5

2.1 FUEL DESIGN AND OPERATION

The effect of MELLLA+ on the fuel design and operation is described below. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Fuel Product Line Design	[[	
Core Design		
Fuel Thermal Margin Monitoring Threshold		]]

2.1.1 Fuel Product Line

The fuel design limits are established for all new fuel product line designs as a part of the new fuel introduction and reload analyses. The M+LTR establishes that [[

]] no additional fuel and core design evaluation is required.

Monticello currently operates with GE14 fuel. The cycle in which MELLLA+ operating domain expansion is implemented shall contain GE14 fuel. [[

]] Therefore, the SRLR will confirm that [[ ]] and validate the conclusion that no additional fuel and core design evaluation is required is applicable for Monticello.

[[ ]]

2.1.2 Core Design and Fuel Thermal Monitoring Threshold

[[ ]] the maximum licensed power level and [[ ]] do not change as a result of MELLLA+. [[ ]] there is no change to the average power density as a result of MELLLA+ operating domain expansion. Because the maximum licensed power level [[ ]] do not change as a result of MELLLA+, there is no increase in the average bundle power or in the maximum allowable peak bundle power. Because there is no change in average power density there is no change required to the fuel thermal monitoring threshold.

[[ ]] or fuel design limits as a result of MELLLA+. Monticello continues to use GE14 fuel. The CLTP remains at 2004 MWt. The SRLR will confirm that for Monticello, there are no changes to [[ ]] fuel design limits, and that the average power density and maximum allowable peak bundle power are not changed. This validates the conclusion that there are no changes needed to the fuel thermal monitoring threshold is applicable to Monticello.

Furthermore, because the MELLLA+ operating domain allows higher bundle power versus flow conditions, [[ ]] the range of void fraction, axial and radial power shape, and rod positions in the core may change slightly. The change in power distribution in the core is achieved, while the individual fuel bundles remain within the allowable thermal limits as defined in the COLR.

Also, [[ ]], the range of void fraction, axial and radial power shape, and rod positions in the core does change slightly as a result of MELLLA+ operating domain expansion. For Monticello, the predicted bypass void fraction at the D-Level Local Power Range Monitor (LPRM) is less than the [[ ]] design requirement. The SRLR will validate that the power distribution in the core is achieved while maintaining individual fuel bundles within the allowable thermal limits as defined in the COLR.

As required by Methods LTR SER Limitation and Condition 9.24, the following core design and fuel monitoring parameters are plotted as indicated below in Table 2-1 and Figures 2-1 through 2-6 for each cycle exposure statepoint. The parameters are compared to the experience base reported in Reference 11:

Table 2-1 Peak Nodal Exposures
Figure 2-1 Power of Peak Bundle versus Cycle Exposure
Figure 2-2 Coolant Flow for Peak Bundle versus Cycle Exposure
Figure 2-3 Exit Void Fraction for Peak Power Bundle versus Cycle Exposure
Figure 2-4 Maximum Channel Exit Void Fraction versus Cycle Exposure

Figure 2-5 Core Average Exit Void Fraction versus Cycle Exposure
Figure 2-6 Peak LHGR versus Cycle Exposure

Also, quarter core maps with mirror symmetry are plotted in Figures 2-7 through 2-15 showing bundle power, bundle operating Linear Heat Generation Rate (LHGR), and MCPR for Beginning of Cycle (BOC) (200 MWd/ST), Middle of Cycle (MOC) (8500 MWd/ST), and End of Cycle (EOC) (13946 MWd/ST). The largest Maximum Fraction of Limiting Critical Power Ratio (MFLCPR) and Maximum Fraction of Limiting Power Density (MFLPD) occur at different cycle exposures for this core design. See Figures 2-16 and 2-17. In Figures 2-7 through 2-9, the bundle power is dimensionless. To obtain the bundle power in MWt, multiply each number by a factor of 4.141. This factor equals 2004/484, where 2004 MWt is the RTP and 484 is the total number of fuel bundles in the core.

Table 2-1 shows that Monticello's Peak Nodal Exposure is lower than the top three reference plants. Figures 2-1 through 2-6 show that the Monticello MELLLA+ operation is in the expected range as compared to the reference plants. Figures 2-7 through 2-9 show the relative bundle power for BOC, MOC, and EOC, respectively. Figures 2-10 through 2-12 show the operating LHGR for BOC, MOC, and EOC, respectively. Figures 2-13 through 2-15 show the MCPR for BOC, MOC, and EOC, respectively. Figures 2-7 through 2-17 show that the general operational conditions for Monticello in the MELLLA+ operating domain are well within expected parameters.

[[

]]

2.2 THERMAL LIMITS ASSESSMENT

The effect of MELLLA+ on the MCPR safety and operating limits, Maximum Average Planar Linear Heat Generation Rate (MAPLHGR), and LHGR limits is described below. As required by Limitation and Condition 9.6 of the Methods LTR SER, the bundle R-factors used during the reload analysis are consistent with lattice axial void conditions expected for the hot channel operating state. The nodal void reactivity biases applied in TRACG are applicable to the lattices representative of fuel loaded in the core. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Safety Limit MCPR	[[	
Operating Limit MCPR		
MAPLHGR Limit		
LHGR Limit		]]

2.2.1 Safety Limit Minimum Critical Power Ratio

[[

]] the SLMCPR is calculated based on the actual core loading pattern for each reload core. In the event that the cycle-specific SLMCPR is not bounded by the current Monticello Technical Specification value, Monticello must implement a license amendment to change the Technical Specification.

[[ ]], the SLMCPR analysis for Monticello reflects the actual plant core loading pattern and is performed for each reload core. The cycle-specific SLMCPR will be determined using the methods defined in Reference 6. As required by M+LTR SER Limitation and Condition 12.6, the SLMCPR will be calculated at the rated statepoint (120% of OLTP/100% of Core Flow (CF)), the plant-specific minimum CF statepoint (e.g., 120% of OLTP/80% of CF), the plant-specific maximum CF statepoint (e.g., 120% of OLTP/105% of CF), and at the 99% of OLTP at 57.4% of CF statepoint (i.e., Figure 1-1 statepoints E, L, K and M, respectively). See Section 1.2.1 for further information on the power to flow statepoints. The currently approved off-rated CF uncertainty is used for the minimum CF and at 57.4% of CF statepoints. The uncertainty will be consistent with the CF uncertainty currently applied to the SLO operation for the minimum CF and at 57.4% of CF statepoints. The calculated values will be documented in the SRLR.

As required by Methods LTR SER Limitation and Condition 9.5, for MELLLA+ operation, a 0.03 adder will be added to the cycle-specific SLMCPR. The cycle-specific SLMCPR analysis will incorporate the 0.03 adder for MELLLA+ operation. The calculated values will be documented in the SRLR. A Technical Specification change will be requested if the current value is not bounding.

[[

]]

2.2.2 Operating Limit Minimum Critical Power Ratio

[[

]] the OLMCPR is calculated by adding the change in MCPR due to the limiting AOO event to the SLMCPR. [[

]] The OLMCPR is determined on a cycle-specific basis from the results of the reload transient analysis, as described in Reference 6. The cycle-specific analysis results are documented in the SRLR and included in the COLR. The MELLLA+ operating conditions do not change the methods used to determine this limit.

[[ ]] the OLMCPR for Monticello is calculated by adding the change in MCPR due to the limiting AOO event to the SLMCPR. [[

]] for Monticello. The OLMCPR for Monticello is determined on a cycle-specific basis from the results of the reload transient analysis, as described in

Reference 6. The Monticello cycle-specific analysis results are documented in the SRLR and included in the COLR. The MELLLA+ operating conditions do not change the methods used to determine this limit. A 0.01 adder will be applied to the resulting OLMCPR as required by Limitation and Condition 9.19 of the Methods LTR SER.

[[

]]

2.2.3 Maximum Average Planar Linear Heat Generation Rate Limits

[[

]] MAPLHGR limits ensure that the plant does not exceed regulatory limits established in 10 CFR 50.46. Section 4.3, Emergency Core Cooling System Performance, presents the evaluation to demonstrate that plants meet the regulatory limits in the MELLLA+ operating domain. [[

]]

[[ ]] the Monticello MAPLHGR limits ensure that Monticello does not exceed regulatory limits established in 10 CFR 50.46. Section 4.3 of this M+SAR presents the evaluation to demonstrate that Monticello meets the regulatory limits in the MELLLA+ operating domain. [[

]] The MELLLA+ operating conditions do not change the methods used to determine this limit.

[[

]]

2.2.4 Linear Heat Generation Rate Limits

[[

]] LHGR limits ensure that the plant does not exceed fuel thermal-mechanical design limits. The LHGR is determined by the fuel rod thermal-mechanical design and is not affected by MELLLA+ operating domain expansion. No changes to the fuel rod are required as a part of MELLLA+. [[

]]

[[ ]] the Monticello LHGR limits ensure that the plant does not exceed fuel thermal-mechanical design limits. There are no changes to the Monticello [[ ]] or fuel design limits as a result of MELLLA+. Monticello continues to use GE14 fuel. [[

]] The MELLLA+ operating conditions do not change the methods used to determine this limit.

[[

]]

2.3 REACTIVITY CHARACTERISTICS

The effect of MELLLA+ on hot excess reactivity, strong rod out (SRO) shutdown margin, and SLCS shutdown margin is described below. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Hot Excess Reactivity	[[	
Strong Rod Out Shutdown Margin		
SLCS Shutdown Margin		]]

2.3.1 Hot Excess Reactivity

[[ ]] operation in the MELLLA+ operating domain may change the hot excess reactivity during the cycle. This change in reactivity does not affect safety and is not expected to significantly affect the ability to manage power distribution through the cycle and to achieve the target power level. [[ ]] The MELLLA+ operating conditions do not change the methods used to evaluate hot excess reactivity.

[[ ]] Monticello operates on a 24-month cycle. The MELLLA+ operating conditions do not change the Monticello methods used to evaluate that sufficient hot excess reactivity exists to match the 24-month cycle conditions.

[[ ]]

2.3.2 Strong Rod Out Shutdown Margin

[[ ]] higher core average void fraction results in higher plutonium production, increased hot reactivity later in the operational cycle, and decreased hot-to-cold reactivity differences. Smaller cold shutdown margins may result from cores designed for operation with the MELLLA+ operating domain expansion. This potential loss in margin is offset through core design to maintain current design and Technical Specification cold shutdown margin requirements. All minimum SRO shutdown margin requirements apply to cold most reactive conditions and are maintained without change for MELLLA+ implementation. In order to account for reactivity uncertainties, including the effects of temperature and analysis methods, margins in excess of the Technical Specification limits are included in the design requirements. [[ ]] The MELLLA+ operating conditions do not change the methods used to evaluate strong rod out shutdown margin.

[[

]] Monticello current design and Technical Specification cold shutdown margin limits are unchanged by MELLLA+. The MELLLA+ operating conditions do not change the Monticello methods used to evaluate that SRO shutdown margin meets the current Monticello design and Technical Specification cold shutdown limits.

[[

]]

2.3.3 SLCS Shutdown Margin

[[

]] higher core average void fraction results in higher plutonium production, increased hot reactivity later in the operational cycle, and decreased hot-to-cold reactivity differences. Smaller cold shutdown margins may result from cores designed for operation with the MELLLA+ operating domain expansion. This potential loss in margin is offset through core design to maintain current design and SLCS Technical Specification requirements. All minimum SLCS Technical Specification requirements apply to most reactive SLCS conditions and are maintained without change for MELLLA+ implementation. In order to account for reactivity uncertainties, including the effects of temperature and analysis methods, margin in excess of the Technical Specification limits are included in the design requirements. [[

]] The MELLLA+ operating conditions do not change the methods used to evaluate the SLCS shutdown margin.

[[

]] Monticello current design and SLCS Technical Specification requirements are unchanged by MELLLA+. The MELLLA+ operating conditions do not change the Monticello methods used to evaluate that SLCS shutdown margin meets the current Monticello design and SLCS Technical Specification requirements.

[[

]]

2.4 STABILITY

The Detect and Suppress Solution–Confirmation Density (DSS-CD) stability solution (Reference 3) has been shown to provide an early trip signal upon instability inception prior to any significant oscillation amplitude growth and MCPR degradation for both core wide and regional mode oscillations. Monticello will implement the DSS-CD solution consistent with the M+LTR. DSS-CD implementation includes any limitations and conditions in the applicable DSS-CD SER (Reference 3) and DSS-CD TRACG SER (Reference 4).

Topic	M+LTR Disposition	Monticello Result
DSS-CD Setpoints	[[	
Armed Region		
Backup Stability Protection (BSP)		]]

2.4.1 DSS-CD Setpoints

[[

]] As a part of DSS-CD implementation, the applicability checklist is incorporated into the reload evaluation process and is documented in the SRLR. DSS-CD implementation also includes incorporation of appropriate [[ ]] analyses to be performed if a specific reload analysis [[ ]] DSS-CD is incorporated per the requirements of the DSS-CD LTR. This implementation requires that a process for reviewing the DSS-CD setpoints for each reload analysis is in place. [[ ]] no further review of MELLLA+ is necessary to evaluate the adequacy of the DSS-CD Setpoints.

[[ ]] Monticello will incorporate the DSS-CD solution consistent with the requirements of the DSS-CD LTR. Implementation of DSS-CD in accordance with the DSS-CD LTR ensures that Monticello incorporates the applicability checklist into the reload evaluation process and documents the results of the applicability checklist review in the SRLR. DSS-CD implementation per the DSS-CD LTR also ensures that Monticello incorporates appropriate [[ ]] analyses to be performed if a specific reload analysis [[

]]

2.4.2 Armed Region

[[

]]

The generic boundaries of the Armed Region were approved as part of the DSS-CD LTR. [[ ]] no further review of MELLLA+ is necessary to evaluate the adequacy of the Armed Region.

[[ ]] no further review of MELLLA+ is necessary to evaluate the adequacy of the Armed Region.

[[ ]]

2.4.3 Backup Stability Protection

[[ ]] that the DSS-CD LTR defines the BSP along with a generic process for confirming that the BSP requirements are met in each reload analysis. This BSP may be used when the OPRM system is temporarily inoperable. Implementation of DSS-CD per the DSS-CD LTR requires that the alternate stability protection approach is confirmed on a cycle-specific basis to demonstrate adequacy for each reload cycle. Provided that DSS-CD is incorporated per the requirements of the DSS-CD LTR as described in Section 11.3.3, this implementation requires that a process for reviewing the BSP for each reload analysis is in place. [[ ]] no further review of MELLLA+ is necessary to evaluate the adequacy of the BSP.

[[ ]] Monticello will incorporate the DSS-CD solution in accordance with the requirements of the DSS-CD LTR and as described in Section 11.3.3. Implementation of DSS-CD in accordance with the DSS-CD LTR requires that Monticello confirm the BSP approach is adequate as a part of the reload. [[ ]] no further review of BSP is required.

[[

]]

Consistent with Section 7.5.3 of the DSS-CD LTR (Reference 3), approved setpoint calculation methodology was applied to the ABSP APRM STP setpoints, as a function of the Reactor Recirculation Drive Flow, in order to define the Allowable Values (AVs). The ABSP APRM STP setpoints associated with the ABSP Scram Region will be defined in the COLR.

Consistent with Section 7.4.1 of the DSS-CD LTR (Reference 3), ABSP APRM STP Rod Blocks, as a function of Recirculation Drive flow, were constructed to provide the standard scram avoidance protection. Approved setpoint methodology (Reference 12) was applied in order to define the Rod Block AVs. For the ABSP APRM Rod Block setpoint functions, the proper terminology is "Design Limit" (DL) instead of "Analytical Limit" (AL), because there are no accident or transient analyses based on these Rod Blocks.

SLO is not allowed in the MELLLA+ region.

2.5 REACTIVITY CONTROL

The Control Rod Drive (CRD) system controls core reactivity by positioning neutron absorbing control rods within the reactor and scramming the reactor by rapidly inserting control rods into the core. No change is made to the control rods or drive system due to MELLLA+. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Scram Time Response	[[	
CRD Positioning and Cooling		
CRD Integrity		]]

2.5.1 Control Rod Scram

[[ ]] for BWR/3, BWR/4, and BWR/5 plants the Hydraulic Control Unit accumulators supply the initial scram pressure and, as the scram continues, the reactor becomes the primary source of pressure to complete the scram. [[

]]

[[ ]] the Monticello Hydraulic Control Unit accumulators supply the initial scram pressure and, as the scram continues, the reactor becomes the primary source of pressure to complete the scram. The Monticello reactor dome pressure is 1025 psia (1010 psig) and does not change as a result of MELLLA+ operating domain expansion. [[

]]

[[

]]

2.5.2 Control Rod Drive Positioning and Cooling

[[

]] As a result of MELLLA+, there is no increase in temperature and [[

]] Therefore, the CRD positioning and cooling functions are not affected by MELLLA+.

[[ ]] for Monticello, the reactor coolant temperature does not increase. [[

]]

[[ ]]

2.5.3 Control Rod Drive Integrity

[[ ]] the postulated abnormal operating conditions for the CRD design assume a failure of the CRD system pressure-regulating valve that applies the maximum pump discharge pressure to the CRD mechanism internal components. This postulated abnormal pressure bounds the American Society of Mechanical Engineers (ASME) reactor overpressure limit. [[ ]] no further evaluation of CRD integrity is required as result of MELLLA+.

[[ ]] the Monticello CRD mechanism has been analyzed for an abnormal pressure operation (the application of the maximum CRD pump discharge pressure) that bounds the ASME reactor pressure vessel (RPV) overpressure condition. [[ ]] Also, as stated in Section 3.1, for the ASME RPV overpressure condition, the peak RPV bottom head pressure is unchanged and remains less than the limit of 1375 psig. [[ ]] and no further evaluation of CRD integrity is required as result of MELLLA+.

[[ ]]

2.6 Additional Limitations and Conditions Related to Reactor Core and Fuel Performance

For that subset of limitations and conditions relating to Reactor Core and Fuel Design, which did not fit conveniently into the organizational structure of the M+LTR, the required information is presented here. The information is identified by either the M+LTR SER (Reference 1) limitation and condition or the Methods LTR SER (Reference 5) limitation and condition to which it relates.

2.6.1 TGBLA/PANAC Version

In developing the Monticello equilibrium core, the latest versions of TGBLA and PANAC were used. Refer to Table 1-1 for the latest revisions to TGBLA and PANAC. Cycle-specific analyses will include the most recent TGBLA and PANAC versions. As required by Methods LTR SER Limitation and Condition 9.1, the most recent versions of TGBLA/PANAC are used.

2.6.2 M+LTR SER Limitation and Condition 12.24.1

[[

]]

Table 2-1 Peak Nodal Exposures

Plant	Cycle	EOC Peak Nodal Exposure (GWd/ST)
A	18	38.849
A	19	43.784
B	9	56.359
B	10	51.544
C	7	53.447
C	8	47.766
D	13	56.660
E	11	55.387
F	EQ	51.174
Monticello CLTP/M+	EQ	55.050

Table 2-2 [[

]]

S_{AD}	$\frac{OLMCPR_{Rated} - SLMCPR}{OLMCPR_{Rated}}$	$\frac{OLMCPR_{SLO} - SLMCPR}{OLMCPR_{SLO}}$	BASIS
[[			Reference 3
		]]	Reference 3 method and results

[[*

]]

Table 2-3 [[ ]]

[[		
		]]

Table 2-4 [[ ]]

[[				

]]

Figure 2-1 Power of Peak Bundle versus Cycle Exposure

[[

]]

Figure 2-2 Coolant Flow for Peak Bundle versus Cycle Exposure

[[

]]

Figure 2-3 Exit Void Fraction for Peak Power Bundle versus Cycle Exposure

[[

]]

Figure 2-4 Maximum Channel Exit Void Fraction versus Cycle Exposure

[[

]]

Figure 2-5 Core Average Exit Void Fraction versus Cycle Exposure

[[

]]

Figure 2-6 Peak LHGR versus Cycle Exposure

[[

]]

Figure 2-7 Dimensionless Bundle Power at BOC (200 MWd/ST)

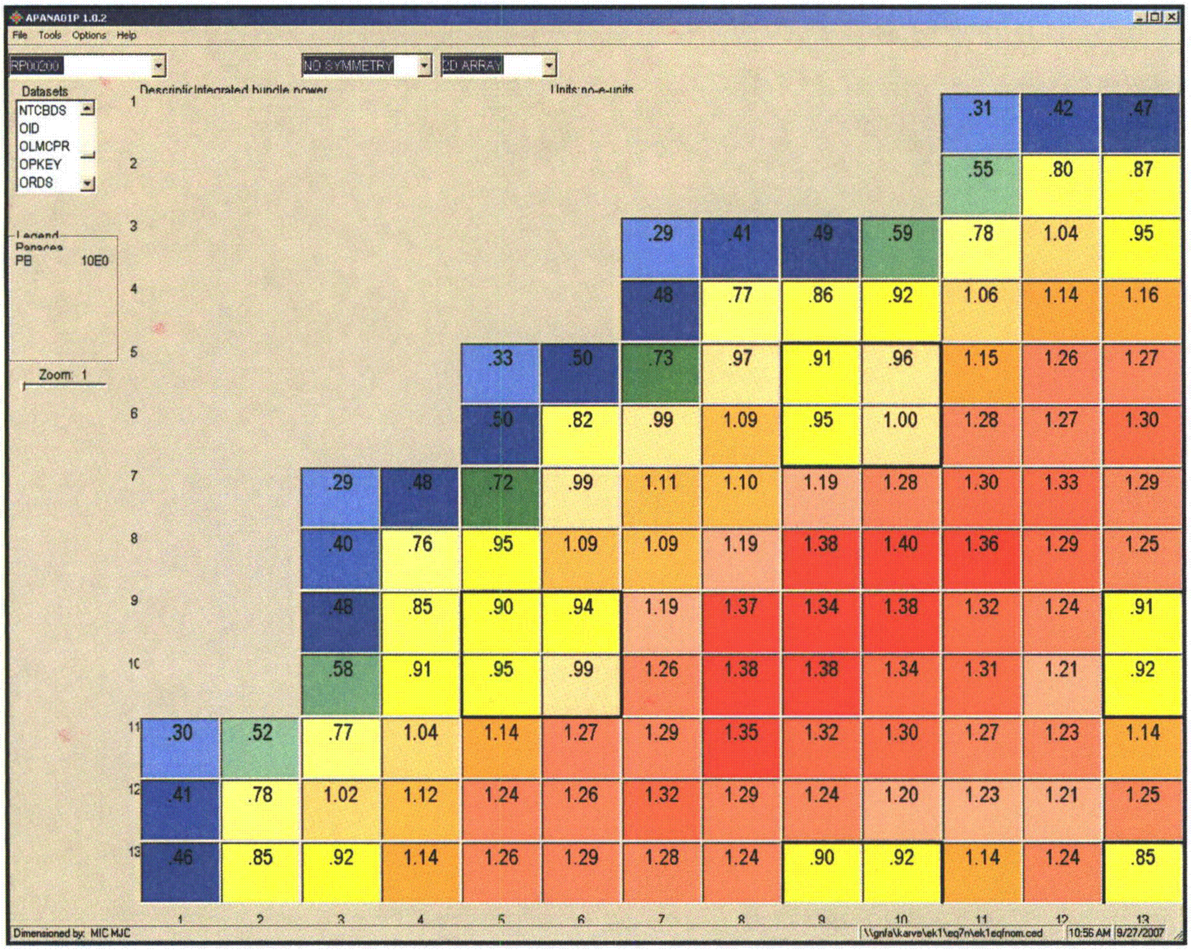


Figure 2-8 Dimensionless Bundle Power at MOC (8500 MWd/ST)

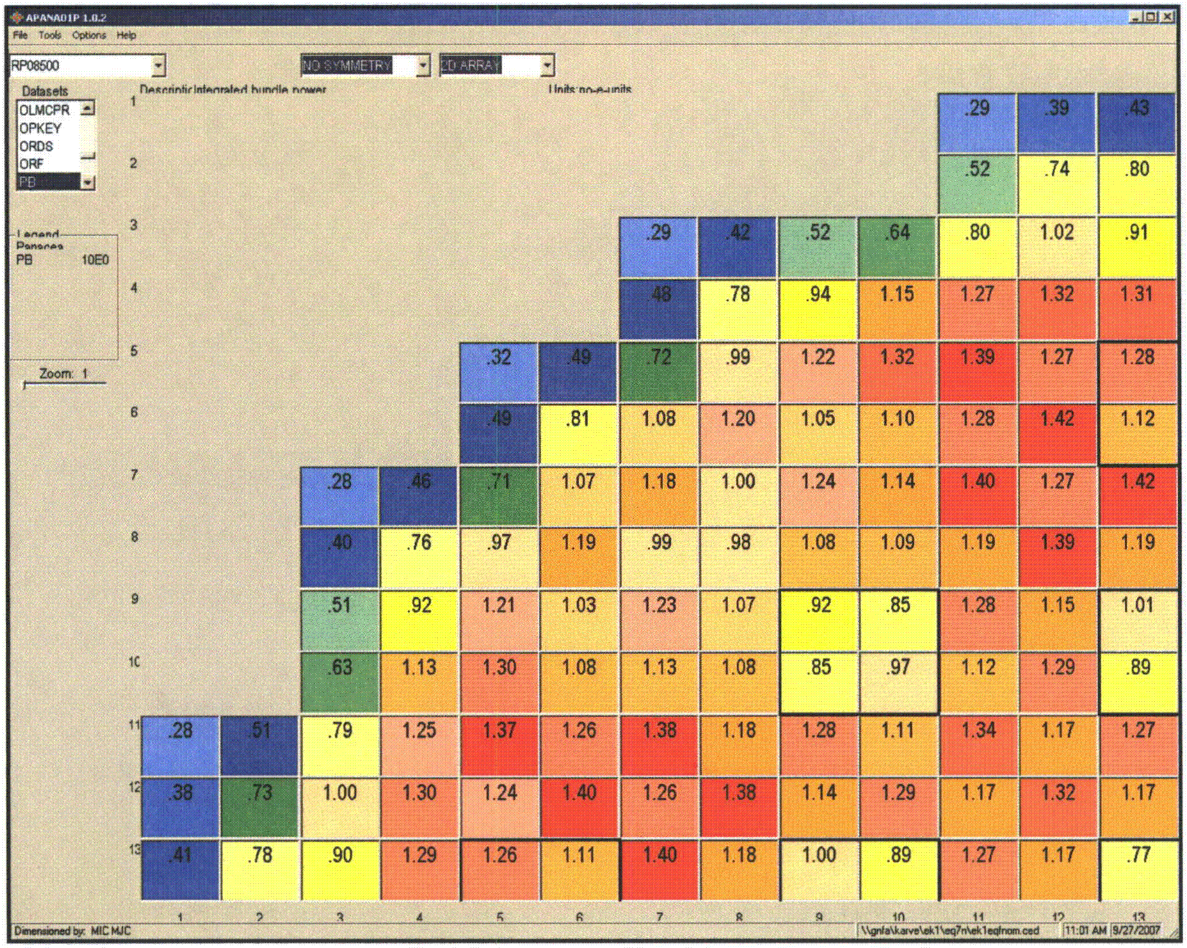


Figure 2-9 Dimensionless Bundle Power at EOC (13946 MWd/ST)

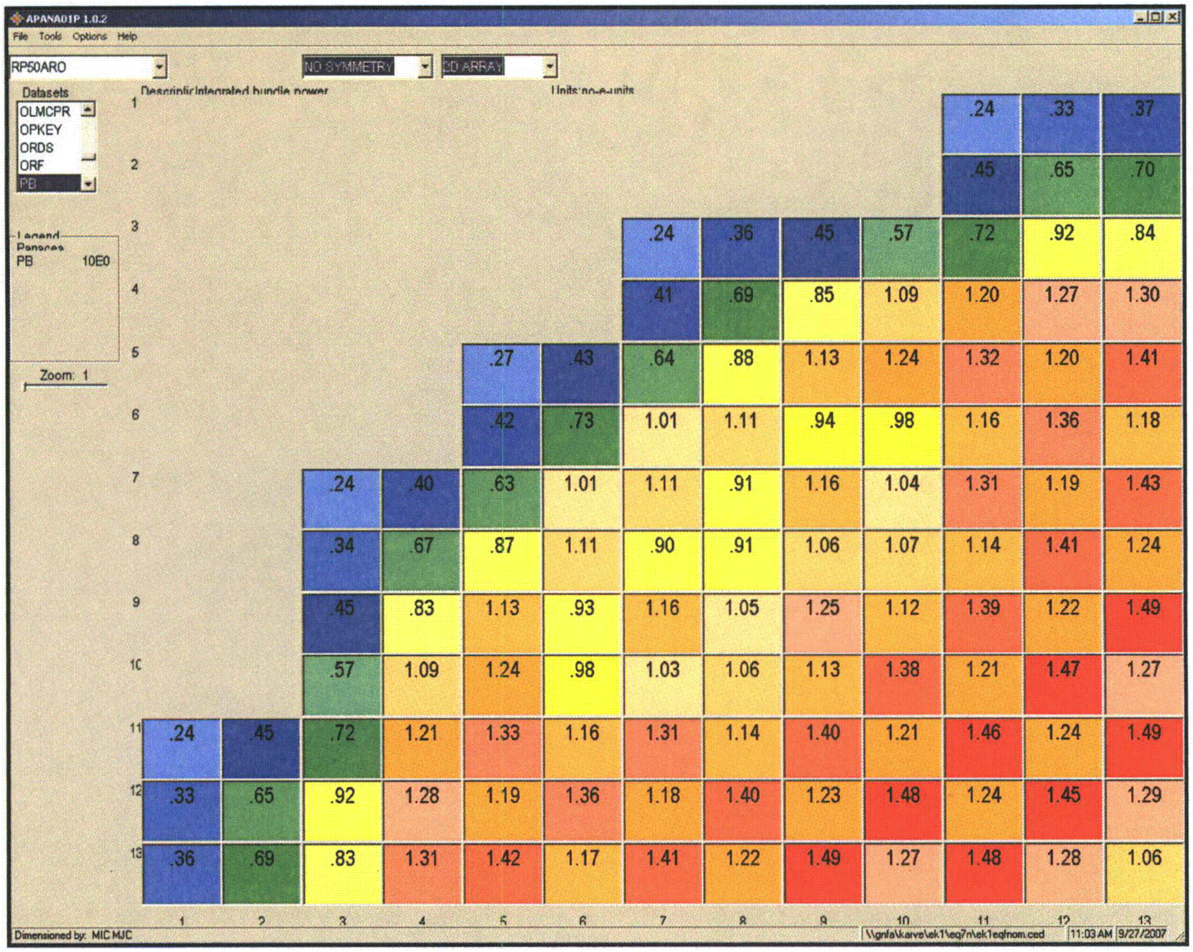


Figure 2-10 Bundle Operating LHGR (kW/ft) at BOC (200 MWd/ST)

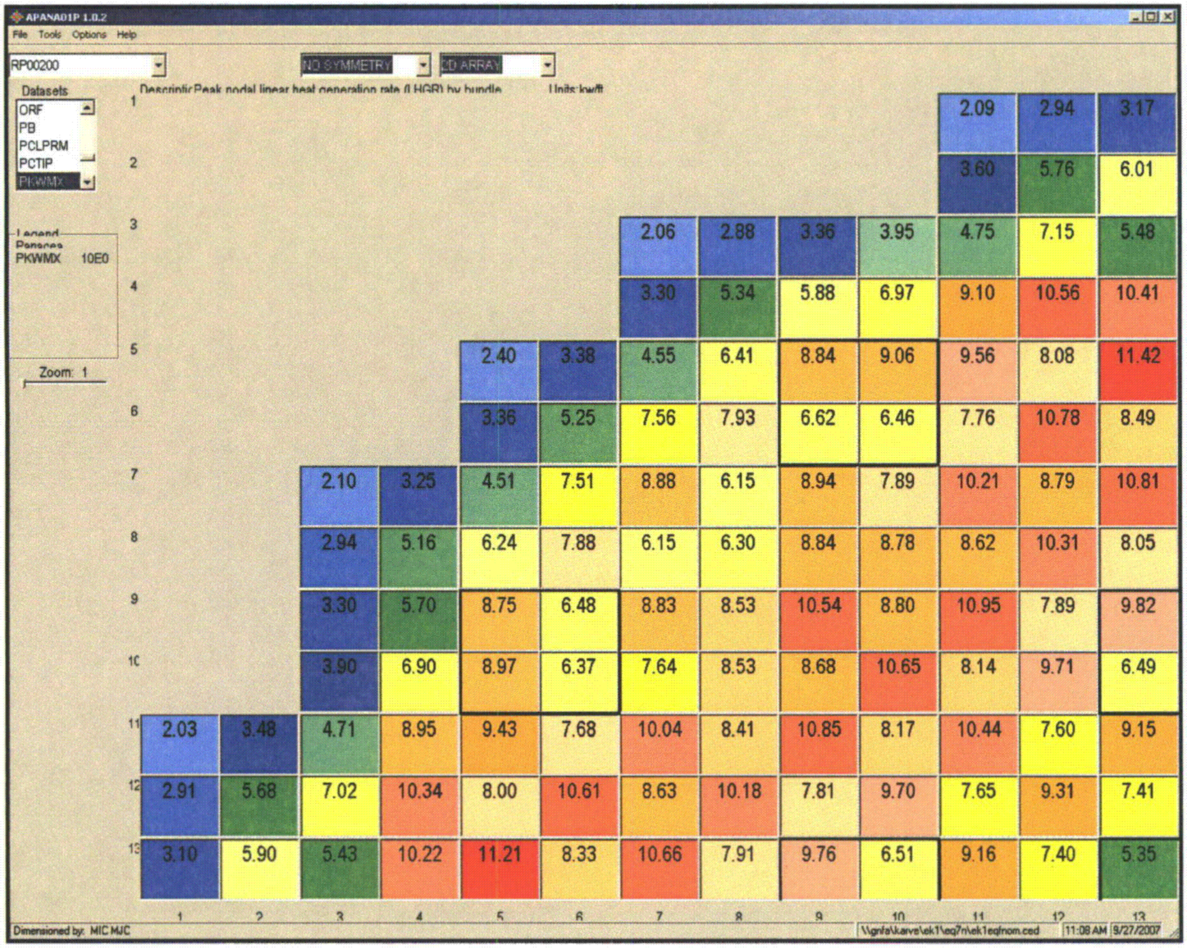


Figure 2-11 Bundle Operating LHGR (kW/ft) at MOC (8500 MWd/ST)

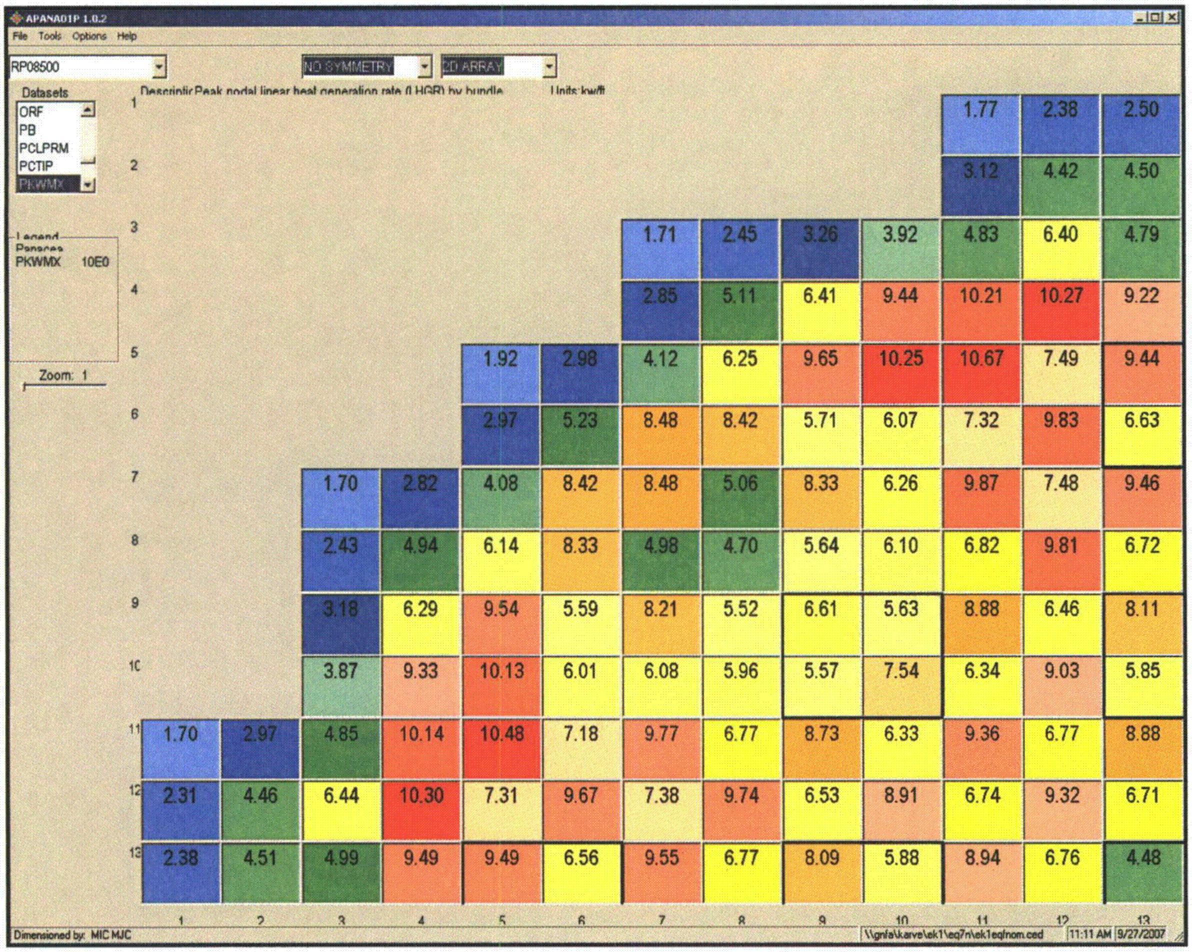
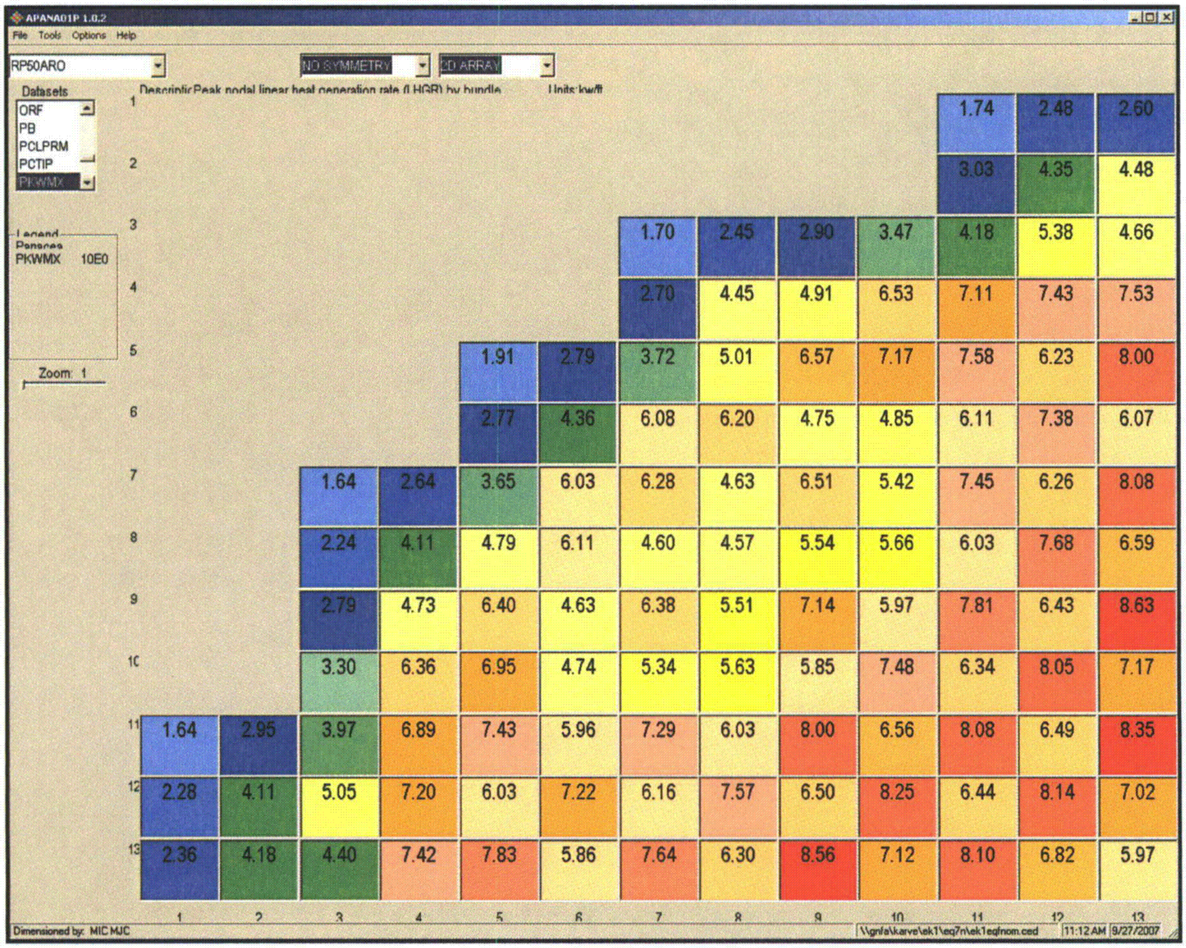


Figure 2-12 Bundle Operating LHGR (kW/ft) at EOC (13946 MWd/ST)



	1	2	3	4	5	6	7	8	9	10	11	12	13
1											1.74	2.48	2.60
2											3.03	4.35	4.48
3							1.70	2.45	2.90	3.47	4.18	5.38	4.66
4							2.70	4.45	4.91	6.53	7.11	7.43	7.53
5					1.91	2.79	3.72	5.01	6.57	7.17	7.58	6.23	8.00
6					2.77	4.36	6.08	6.20	4.75	4.85	6.11	7.38	6.07
7			1.64	2.64	3.65	6.03	6.28	4.63	6.51	5.42	7.45	6.26	8.08
8			2.24	4.11	4.79	6.11	4.60	4.57	5.54	5.66	6.03	7.68	6.59
9			2.79	4.73	6.40	4.63	6.38	5.51	7.14	5.97	7.81	6.43	8.63
10			3.30	6.36	6.95	4.74	5.34	5.63	5.85	7.48	6.34	8.05	7.17
11	1.64	2.95	3.97	6.89	7.43	5.96	7.29	6.03	8.00	6.56	8.08	6.49	8.35
12	2.28	4.11	5.05	7.20	6.03	7.22	6.16	7.57	6.50	8.25	6.44	8.14	7.02
13	2.36	4.18	4.40	7.42	7.83	5.86	7.64	6.30	8.56	7.12	8.10	6.82	5.97

Figure 2-13 Bundle Operating MCPR at BOC (200 MWd/ST)

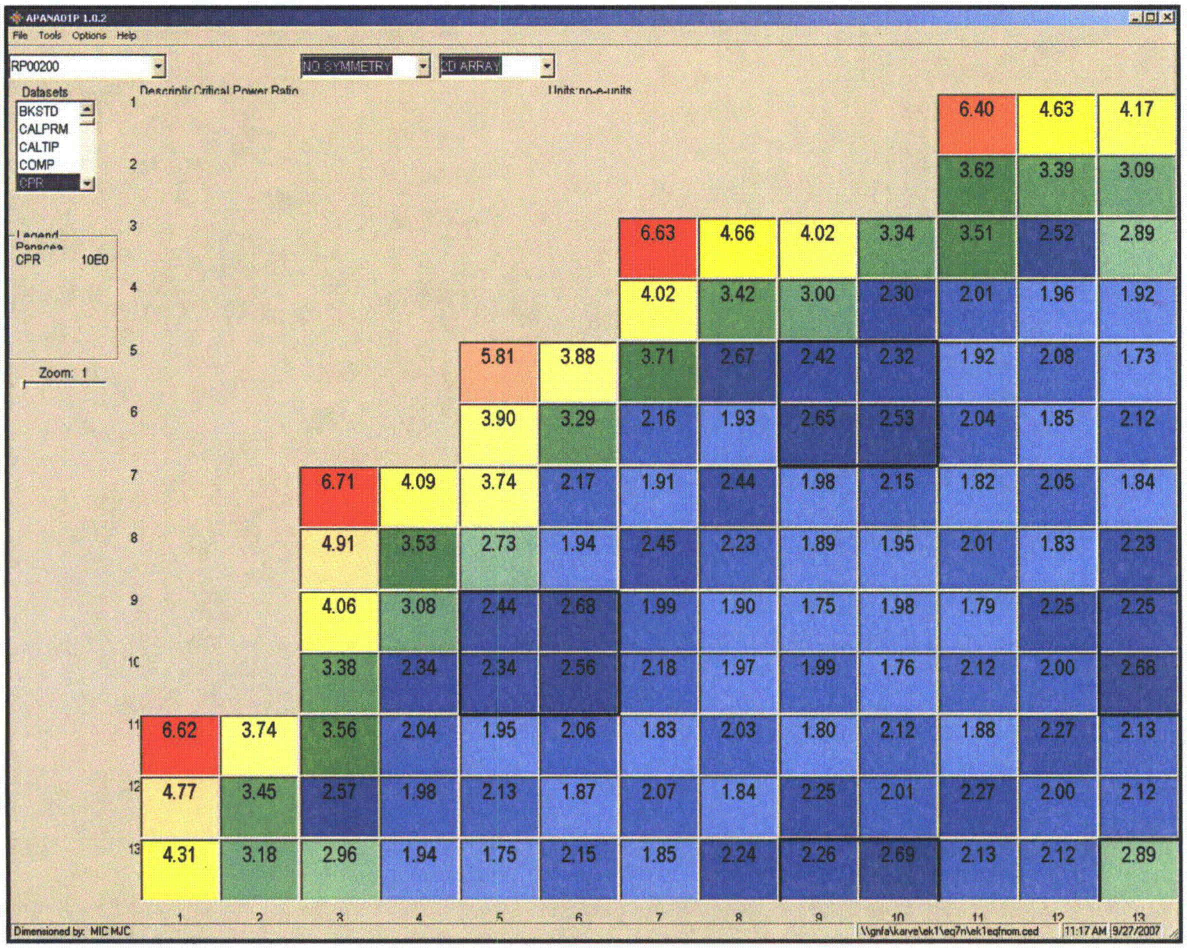


Figure 2-14 Bundle Operating MCPR at MOC (8500 MWd/ST)

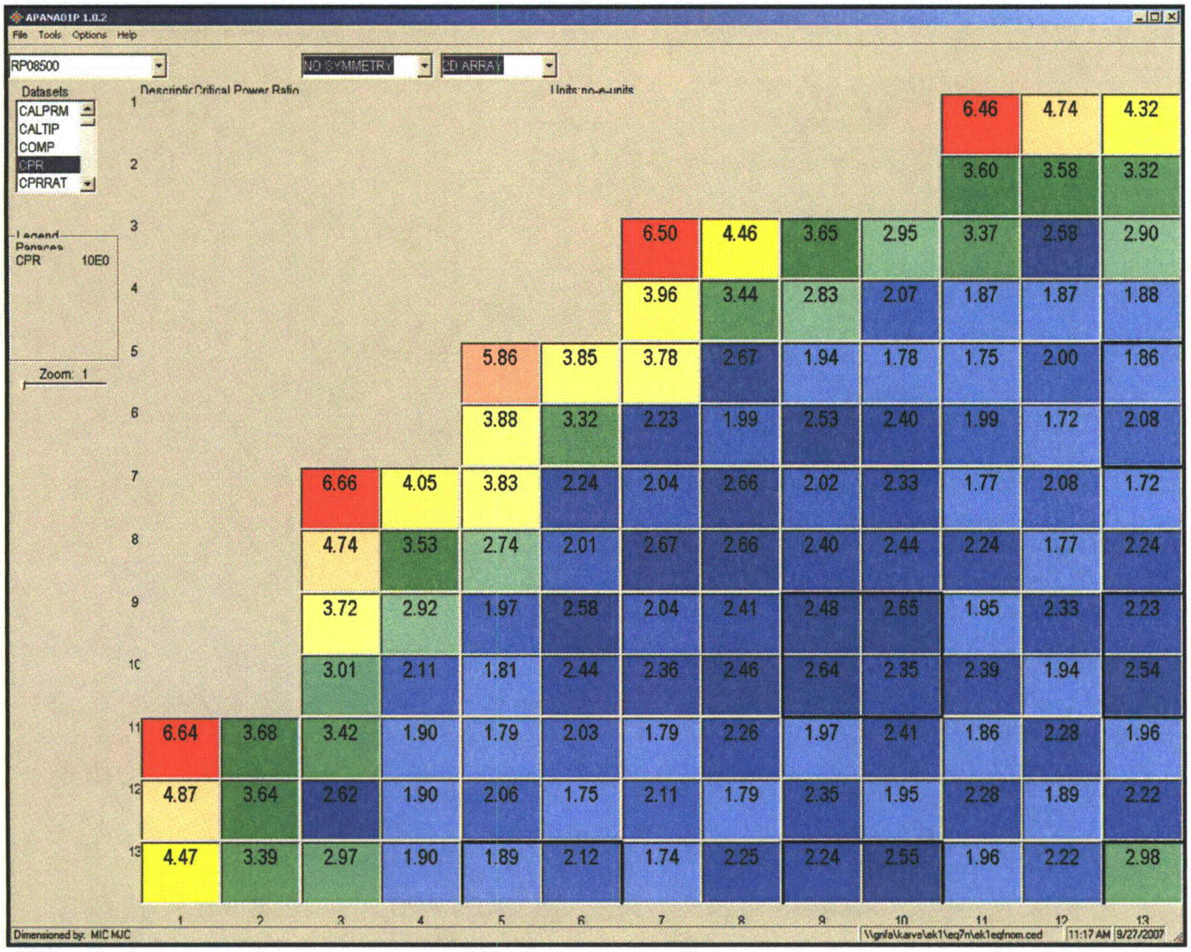


Figure 2-15 Bundle Operating MCPR at EOC (13946 MWd/ST)

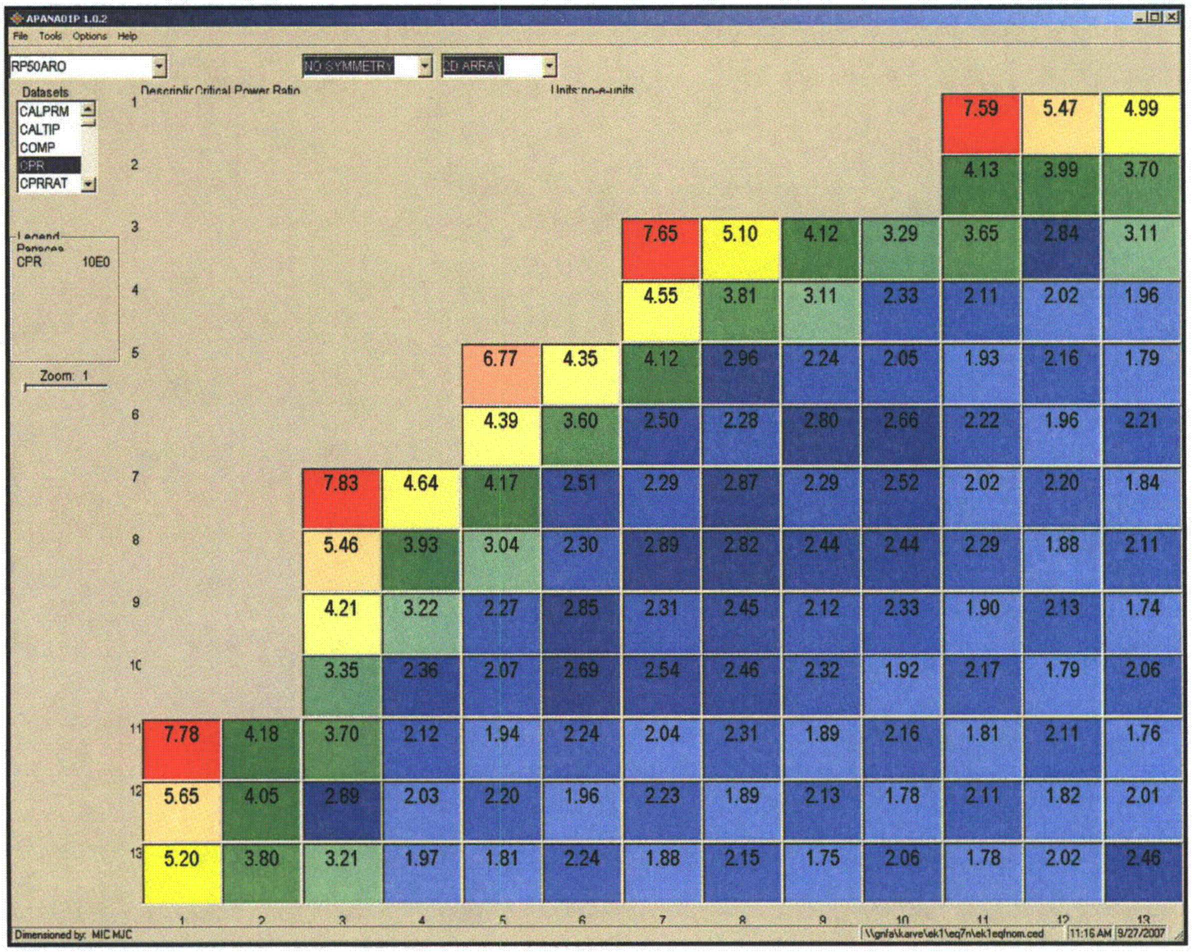
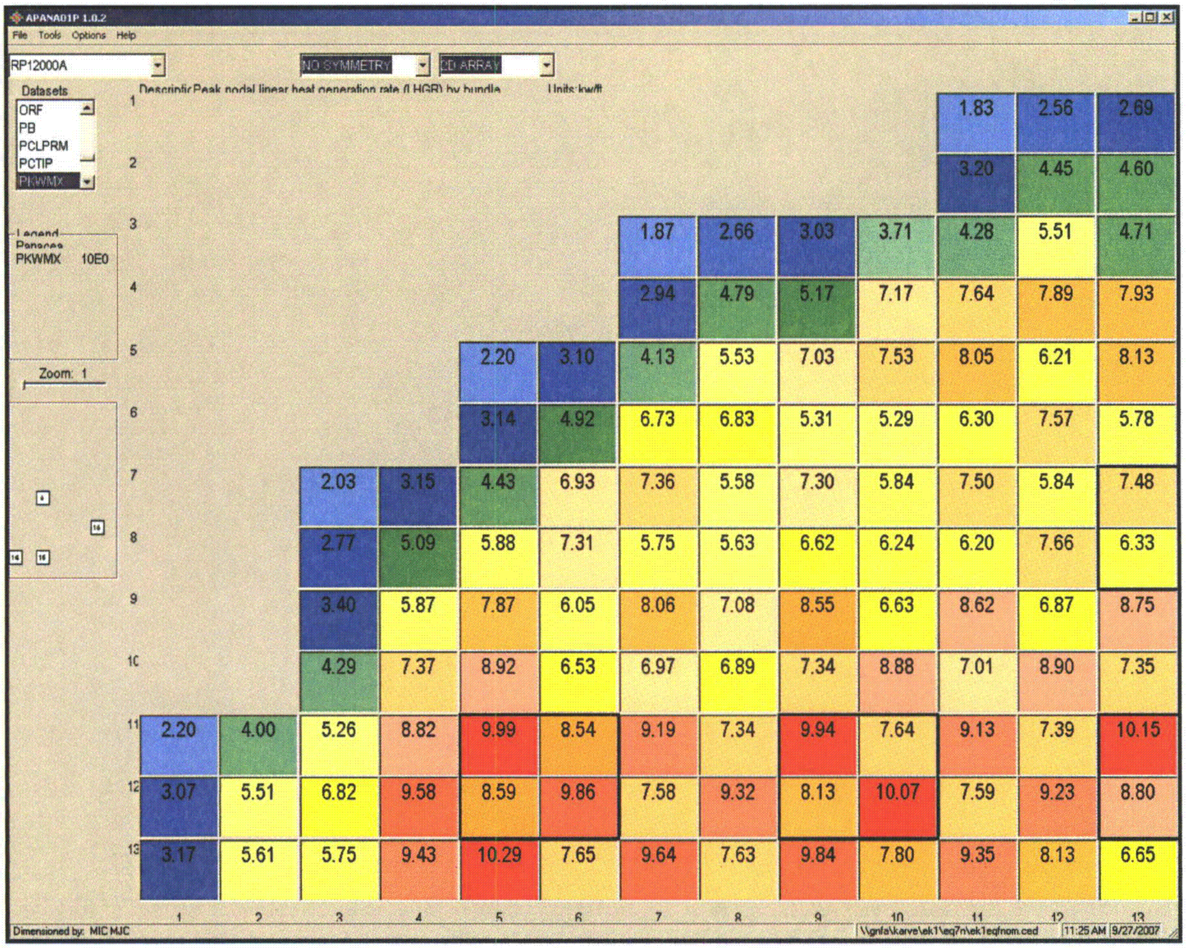
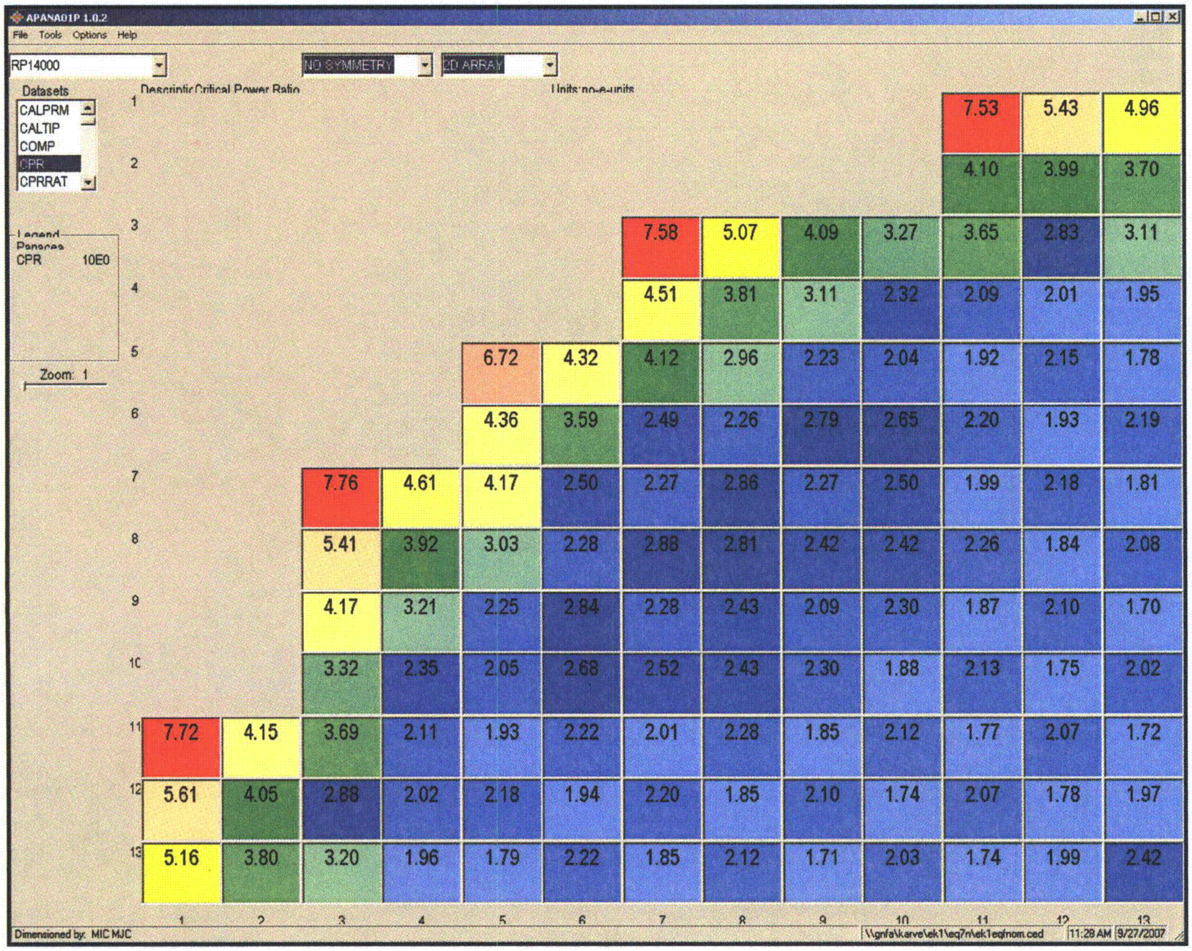


Figure 2-16 Bundle Operating LHGR (kW/ft) at 12000 MWd/ST (peak MFLPD*)



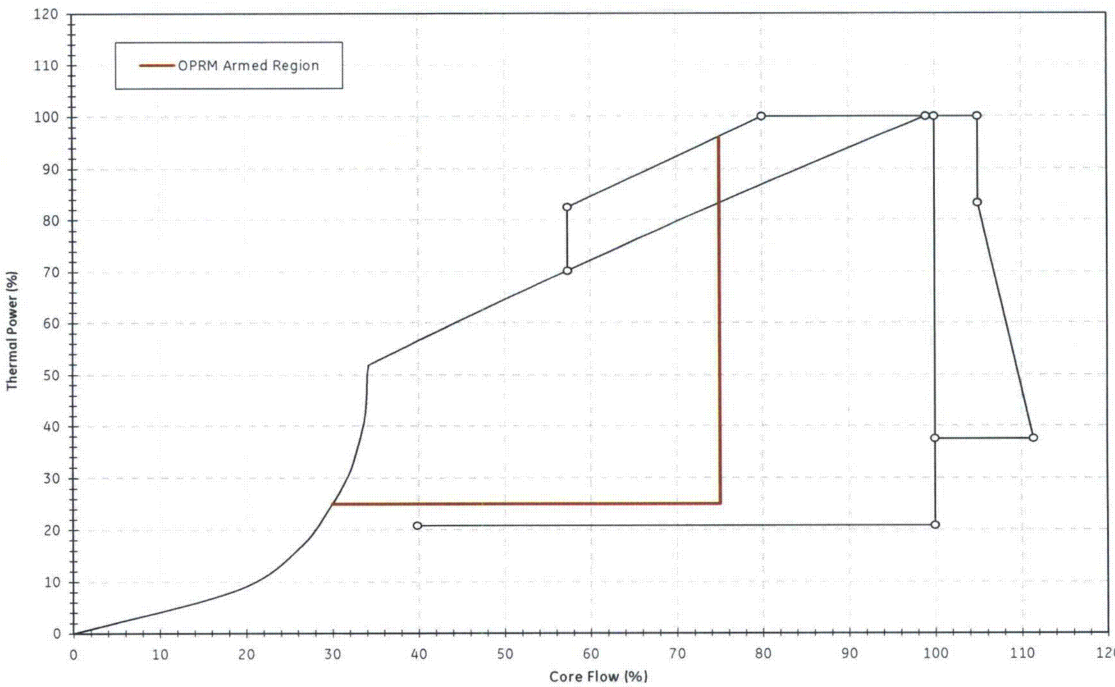
* Maximum Fraction of Linear Power Density

Figure 2-17 Bundle Operating MCPR at 13750 MWd/ST (peak MFLCPR* point)



* Maximum Fraction of Limiting Critical Power Ratio

Figure 2-18 Required OPRM Armed Region



3.0 REACTOR COOLANT AND CONNECTED SYSTEMS

This section addresses the evaluations that are applicable to MELLLA+.

3.1 NUCLEAR SYSTEM PRESSURE RELIEF AND OVERPRESSURE PROTECTION

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Flow-Induced Vibration	[[	
Overpressure Relief Capacity		]]

3.1.1 Flow Induced Vibration

[[ ]] because there is no increase in the maximum main steam (MS) line flow for the MELLLA+ operating domain expansion, there is no effect on the flow-induced vibration of the piping and Safety Relief Valves (SRVs) during normal operation. [[ ]]

[[ ]] for Monticello, maximum MS line flow in the MELLLA+ operating domain does not increase. The numerical values showing no increase in maximum steam flow rate are presented in Table 1-2. MELLLA+ does not result in any increase to the Monticello maximum MS line flow, and there is no effect on the flow-induced vibration experienced by the SRVs or piping during normal operation. [[ ]]

[[ ]]

3.1.2 Overpressure Relief Capacity

The pressure relief system prevents overpressurization of the nuclear system during AOOs, the plant ASME Upset overpressure protection event, and postulated ATWS events. The SRVs along with other functions provide this protection. For Monticello, the limiting overpressure event is the Main Steam Isolation Valve Closure with Scram on High Flux (MSIVF). The peak RPV bottom head pressure is unchanged and remains less than the ASME limit of 1375 psig.

The SRV setpoint tolerance is independent of the MELLLA+ operating domain expansion. The AOO, ASME overpressure, and ATWS response evaluations for MELLLA+ are performed using existing Monticello SRV setpoint tolerances. The SRV setpoint tolerances are monitored at Monticello for compliance to the Technical Specification requirements.

[[ ]] There are no changes made to the Monticello licensing basis for the ASME overpressure event.

[[

]] The SRV tolerance assumed in the Monticello ASME overpressure event analysis is 3%. The tolerance is consistent with the actual SRV performance testing conducted on the Monticello SRVs per Technical Specification Surveillance Requirement 3.4.3.1.

[[

]] There are no changes to the existing licensing basis assumptions and code inputs used for the Monticello ASME overpressure event analysis. The ASME overpressure analysis for Monticello was performed at the 105% ICF core flow statepoint, and at the 80% minimum core flow statepoint using an approximate MELLLA+ equilibrium core. The analysis of the limiting overpressure event for Monticello demonstrates that no change in overpressure relief capacity is required. The ATWS analysis discussed in Section 9.3.1 concludes that an [[

]] No other changes in the pressure relief system or SRV setpoints are required for MELLLA+. [[

]] This process is unchanged by MELLLA+.

3.2 REACTOR VESSEL

The RPV structure and support components form a pressure boundary to contain reactor coolant and form a boundary against leakage of radioactive materials into the drywell. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Fracture Toughness	[[	
Reactor Vessel Structural Evaluation		]]

3.2.1 Fracture Toughness

The MELLLA+ operating domain expansion results in a slightly higher operating neutron flux in the upper portion of the core due to decreased water density. The effect of this water density reduction is [[ ]] in peak vessel and peak shroud flux. In accordance with M+LTR SER Limitation and Condition 12.8, the MELLLA+ flux is calculated using the GEH flux evaluation methodology contained in NEDC-32983P-A (Reference 13), which is consistent with Regulatory Guide (RG) 1.190 and was approved by the NRC in November 2005. The MELLLA+ operating domain flux distribution is assumed to be similar to that of current licensed operating domain flux distribution, whereas the magnitude of flux level is proportional to the thermal power. The change to the Monticello 54 Effective Full Power Years (EFPY) Vessel Internal Diameter (ID) Peak fluence as a result of implementing MELLLA+ is [[ ]]

Because there is a negligible change to the Monticello 54 EFPY Vessel ID Peak fluence as a result of MELLLA+, there is a negligible change to the beltline Adjusted Reference Temperature (ART). Therefore, the pressure/temperature curves do not require revision as a result of MELLLA+ operating domain expansion.

Because there is a negligible change to the Monticello 54 EFPY Vessel ID Peak fluence as a result of MELLLA+, there is a negligible change to the Upper Shelf Energy (USE). Monticello continues to meet the 50 ft-lb requirement in 10 CFR 50, Appendix G by remaining bounded by the BWR Owners' Group (BWROG) equivalent margin analysis, thereby demonstrating compliance with Appendix G.

Because there is a negligible change to the Monticello 54 EFPY Vessel ID Peak fluence as a result of MELLLA+, there is a negligible change to the Weld Inspection Relief criteria. Therefore, the inspection relief request does not require revision as a result of MELLLA+ operating domain expansion.

As a result of MELLLA+, there is a negligible change in the Monticello 54 EFPY Vessel ID Peak fluence. Therefore, no changes to the Monticello ART, USE or weld inspection relief values are required as a result of MELLLA+.

[[ ]]

3.2.2 Reactor Vessel Structural Evaluation

[[ ]] there are no changes in the reactor operating pressure, FW flow rate or steam flow rates for the MELLLA+ operating domain expansion. Other applicable mechanical loads do not increase for the MELLLA+ operating domain expansion. [[ ]] there is no change in the stress or fatigue for the reactor vessel components as a result of MELLLA+, and no further evaluation is required.

[[ ]] for Monticello there are no increases in the reactor operating pressure, or maximum steam or FW flow rates for the MELLLA+ operating domain expansion. The numerical values showing no increases in reactor operating pressure, or maximum steam or FW flow rates are presented in Table 1-2. Other Monticello mechanical loads do not increase as a result of the MELLLA+ operating domain expansion. Therefore, there is no change in the stress and fatigue for the Monticello reactor vessel components and no further evaluation of Monticello reactor vessel structural integrity is required.

[[ ]]

3.3 REACTOR INTERNALS

The reactor internals include core support structure and non-core support structure components. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Fuel Assembly and Control Rod Guide Tube Lift Forces	[[	
Reactor Internals Pressure Differences for Normal, Upset, Emergency and Faulted Conditions		
Reactor Internals Pressure Differences (Acoustic and Flow-Induced Loads) for Faulted Conditions		
Reactor Internals Structural Evaluation for Normal, Upset, and Emergency Conditions		
Reactor Internals Structural Evaluation for Faulted Conditions		
Steam Dryer Separator Performance		]]

3.3.1 Fuel Assembly and Control Rod Guide Tube Lift Forces

[[

]] fuel assembly and CRGT lift forces are calculated for normal, upset, emergency, and faulted conditions consistent with the existing plant design basis. There are no increases in the core exit steam flow, reactor operating pressure, FW or steam flow rates for the MELLLA+ operating domain expansion. Because none of the preceding values change, the only remaining variable affecting the forces on the fuel assemblies and CRGTs for the normal, upset, emergency and faulted conditions in the MELLLA+ operating domain is the core flow. Maximum core flow is reduced in the MELLLA+ operating domain. [[

]] Therefore, no further evaluation of fuel assembly or CRGT lift forces is required.

[[ ]] for Monticello the difference between the 100% CLTP / 105% core flow ICF operation point core exit steam flow and the 100% CLTP / 80% core flow MELLLA+ operation point core exit steam flow is less than a 0.4% increase. The differences between the vessel steam flow and FW flow rates for the two power-flow points are both less than a 0.2% decrease. The dome pressures for the two power-flow points are identical. The small differences between the core exit steam flows, vessel steam flows and FW flow rates will have a negligible effect on the Fuel Assembly and CRGT Lift Forces calculated for normal, upset, emergency and faulted conditions. Therefore, because the Monticello core flow at the MELLLA+ statepoint at 80% core flow is less than the current licensed operating domain statepoint at 105% core flow, the normal, upset, emergency and faulted fuel assembly and CRGT lift forces for the MELLLA+ operating domain [[

]] and no further evaluation of these forces is required.

[[
]]

3.3.2 Reactor Internal Pressure Differences for Normal, Upset, Emergency and Faulted Conditions

[[
]] RIPDs (pressure differentials across the components) are calculated for normal, upset, emergency and faulted conditions consistent with the existing plant design basis. There are no changes in the core exit steam flow, reactor operating pressure, FW or steam flow rates for the MELLLA+ operating domain expansion. Because none of the preceding values change, the only remaining variable affecting the RIPDs for the normal, upset, emergency and faulted conditions in the MELLLA+ operating domain is the core flow. Maximum core flow is reduced in the MELLLA+ operating domain. [[

]] Therefore, no further evaluation of RIPDs for normal, upset, emergency and faulted conditions is required.

[[ ]] for Monticello the difference between the 100% CLTP / 105% core flow ICF operation point core exit steam flow and the 100% CLTP / 80% core flow MELLLA+ operation point core exit steam flow is less than a 0.4% increase. The differences between the vessel steam flow and FW flow rates for the two power-flow points are both less than a 0.2% decrease. The dome pressures for the two power-flow points are identical. The small differences between the core exit steam flows, vessel steam flows and FW flow rates will have a negligible effect on the RIPDs for normal, upset, emergency and faulted conditions. Therefore, because the Monticello core flow at the MELLLA+ statepoint at 80% core flow is less than the current licensed operating domain statepoint at 105% core flow, the normal, upset, emergency and faulted condition RIPDs for MELLLA+ operating domain [[ ]] which includes increased core flow up to 105% of rated core flow. [[

]] and no further evaluation of these pressure differentials is required for normal, upset, emergency and faulted conditions.

[[
]]

3.3.3 Reactor Internals Pressure Differences (Acoustic and Flow-Induced Loads) for Faulted Conditions

As part of RIPDs, the faulted acoustic and flow induced loads in the RPV annulus on jet pump, core shroud and core shroud support resulting from the recirculation line break LOCA have been considered in the Monticello evaluation. [[

]] and Monticello RIPDs for faulted conditions continue to be acceptable.

[[

]]

3.3.4 Reactor Internals Structural Evaluation

Structural integrity evaluations for MELLLA+ operating domain expansion are performed consistent with the existing design basis of the components. [[

]]

Therefore, no further structural evaluation of the reactor internals is required. An evaluation of the load categories applicable to the reactor internals under normal, upset, and emergency conditions is presented below:

Load Category	MELLLA+ Results for Normal, Upset and Emergency Conditions
Dead Weight	[[
Seismic	
RIPDs	
Fuel Lift Loads	
Thermal Effects	
Flow	]]

[[
]]

3.3.5 Reactor Internals Structural Evaluation for Faulted Conditions

[[
]] The M+LTR also defines that if the load conditions do not increase in the MELLLA+ operating domain, then the existing analysis results are bounding and no further evaluation is required. Applicable loads, load combinations, and service conditions are evaluated consistent with the plant design basis for each component. As shown below, [[
]] and thus no further evaluation is required.

Load Category	MELLLA+ Results for Faulted Conditions
Dead Weight	[[
Seismic	
RIPDs	
Fuel Lift Loads	
Flow	
Acoustic and Flow-Induced Loads Due To Recirculation Line Break	]]

The faulted condition loads for the Monticello reactor internal components resulting from the MELLLA+ operating domain conditions [[

]] no further evaluation for Reactor Internals Structural Evaluation for faulted conditions is required.

[[

]]

3.3.6 Steam Separator and Dryer Performance

The performance of the Monticello steam separator-dryer has been evaluated to determine the moisture content of the steam leaving the reactor pressure vessel. Compared to the current licensed operating domain, 105% core flow statepoint, the average separator inlet flow decreases and the average separator inlet quality increases at MELLLA+ conditions. These factors, in addition to the core radial power distribution, affect the steam separator-dryer performance. Steam separator-dryer performance was evaluated at equilibrium cycle limiting conditions of high radial power peaking and 80% rated core flow to assess their capability to provide the quality of steam necessary to meet operational criteria at MELLLA+ operating conditions.

The evaluation of steam separator and dryer performance at MELLLA+ conditions indicates an increase in MCO will occur. The effect of increasing steam moisture content has been analyzed and is discussed in the following sections of this report:

a. 3.5.1 Reactor Coolant Pressure Boundary Piping
b. 8.1 Liquid and Solid Waste Management
c. 8.4.2 Fission and Activation Corrosion Products
d. 8.5 Radiation Levels
e. 10.4 Testing
f. 10.7.2 Flow Accelerated Corrosion

The effect of increased MCO on plant operation has been analyzed to verify acceptable steam separator-dryer performance under MELLLA+ operating conditions. MCO is monitored during operation to ensure adequate operating limitations are implemented as required to maintain MCO within analyzed conditions.

3.4 FLOW INDUCED VIBRATION

The flow-induced vibration (FIV) evaluation addresses the influence of the MELLLA+ operating domain expansion on reactor coolant pressure boundary (RCPB) piping, RCPB piping components and RPV internals. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Piping FIV Evaluation Recirculation Piping Main Steam Piping Feedwater Piping Safety Related Thermowells and Probes	[[	
RPV Internals FIV Evaluation		]]

3.4.1 FIV Influence on Piping

[[

]] Flow rates in the recirculation system piping, MS piping, and FW piping as well as associated MS and FW branch lines do not increase as a result of MELLLA+ operating domain expansion. [[

]] and no further evaluation of FIV influence on recirculation, MS and FW piping is required.

[[

]] For Monticello, there are no increases in the recirculation system, MS, or FW flow rates as a result of MELLLA+ operating domain expansion as compared to the current licensed operating domain. The numerical values showing no increases in recirculation system, MS, or FW flow rates are presented in Table 1-2. [[

]] and no further evaluation of FIV influence on recirculation, MS and FW piping is required.

[[

]] Because the flow rates in these piping systems do not increase for MELLLA+, there is no increase in FIV for the safety-related thermowells and probes. [[

]] and no further evaluation of FIV influence on safety-related thermowells and probes is required.

Also, [[

]] For Monticello there is no increase in flow in these systems for MELLLA+. Therefore, there is no increase in FIV for the safety-related thermowells and probes. [[

]] and no further evaluation of FIV influence on safety-related thermowells and probes is required.

[[ ]]

3.4.2 FIV Influence on Reactor Internals

[[ ]] evaluates the effect of the MELLLA+ operating domain expansion on the following components: Shroud, Shroud Head and Steam Separator-Dryer, Core Spray (CS) Line, Low Pressure Coolant Injection (LPCI) Coupling, CRGT, In-Core Guide Tubes, Fuel Channel, LPRM / Intermediate Range Monitor (IRM) Tubes, Jet Pumps, Jet Pump Sensing Lines (JPSLs) and FW Sparger. The MELLLA+ operating domain expansion results in decreased core and recirculation flow as well as no increase in the MS and FW flow rates. [[ ]]

[[ ]] the effect of the MELLLA+ operating domain expansion is presented for the following components:

Component(s)	MELLLA+ Results
Shroud Shroud Head and Separator Steam Dryer	[[
Core Spray Line LPCI Coupling Control Rod Guide Tube In-Core Guide Tubes	
Fuel Channel LPRM/IRM Tubes	
Jet Pumps	
Jet Pump Sensing Lines	
FW Sparger	]]

For Monticello, the MELLLA+ operating domain expansion results in decreased core and recirculation flow as well as no increase in the MS and FW flow rates. The numerical values showing a decrease in core and recirculation flow as well as no increase in maximum steam or FW flow rates are presented in Table 1-2. As presented in the table above, [[ ]] The reduced core flow and recirculation flow in the MELLLA+ domain [[ ]] Therefore, no further evaluation of the FIV influence on reactor internals is required for the Monticello MELLLA+ operating domain expansion.

[[

]]

3.5 PIPING EVALUATION

3.5.1 Reactor Coolant Pressure Boundary Piping

The RCPB piping systems evaluation consists of a number of safety-related piping subsystems that move fluid through the reactor and other safety systems. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Main Steam and Feedwater (Inside Containment)	[[	
Recirculation and Control Rod Drive		
Reactor Core Isolation Cooling (RCIC) High Pressure Coolant Injection (HPCI) Reactor Water Cleanup (RWCU) Core Spray (CS) Line Standby Liquid Control (SLC) Residual Heat Removal (RHR) RPV Head Vent Line SRV Discharge Line (SRVDL) Safety Related Thermowells		]]

The piping systems are required to comply with the structural requirements of the ASME Boiler and Pressure Vessel Code (or an equivalent Code) applicable at the time of construction or the governing code used in the stress analysis for a modified component.

3.5.1.1 Main Steam and Feedwater Piping Inside Containment

[[

]] the system temperatures, pressure, and flows in the MELLLA+ operating domain are within the range of rated operating parameters for the MS and FW piping system (inside containment). [[

]] the temperatures, pressures, and flows in MS and FW systems for MELLLA+ operation are within the range of rated operating parameters for those systems, no further evaluation is required related to RCPB piping for MS and FW piping inside containment.

[[ ]] for Monticello the MS and connected branch piping (i.e., RCIC and HPCI steam lines) and FW temperatures, pressures and flow are within the rated operating parameters for the MS and FW systems. MS and FW temperatures, flows, and pressures at MELLLA+ conditions are bounded by the EPU temperatures, flows, and pressures, and as such are within the design values used in the design of the piping and supports chosen for worst case conditions. Monticello main steam and feedwater piping inside containment is typically designed in accordance with the codes identified in USAR Table 12.2.1. [[

]] the temperatures, pressures, and flows in Monticello MS and FW systems for MELLLA+ operation are within the range of rated operating parameters for those systems, and no further evaluation is required related to the Monticello RCPB piping for MS and FW inside containment.

[[ ]] as discussed in Section 3.3.6, the MCO may increase for a period of time during the cycle when a plant is operating at or near the MELLLA+ minimum core flow rate. The time that a plant spends in this flow condition is not excessive. The generic disposition concludes that the change in erosion/corrosion rates as a result of increased carryover is adequately managed by the existing programs discussed in Section 10.7.

[[ ]], the MCO for Monticello may increase to a maximum of 0.5 wt% for a period of time during the cycle when Monticello is operating at or near the MELLLA+ minimum core flow rate. Monticello implements programs adequate to manage this change in the erosion/corrosion rate as described in Section 10.7.

[[

]]

3.5.1.2 Reactor Recirculation and Control Rod Drive Systems

[[

]] there is no change in the maximum operating system temperatures, pressures, and flows in the MELLLA+ operating domain for the recirculation piping system and attached RHR piping system. [[

]] no further evaluation of the RCPB Piping - Reactor Recirculation and CRD systems is required for MELLLA+ operation domain expansion.

[[ ]] for Monticello the Reactor Recirculation and CRD system temperatures, flows, and pressures at MELLLA+ conditions are bounded by the EPU temperatures, flows, and pressures, and as such are within the design values used in the design of the piping and supports chosen for worst case conditions.

[[

]]

3.5.1.3 Other RCPB Piping Systems

3.5.1.3.1 Other RCPB Piping Systems - CS and SLCS

[[

]]

Because the piping systems meeting the criteria [[ ]] their susceptibility to erosion/corrosion does not increase, and no further evaluation of these Other RCPB Piping systems is required.

[[ ]] MELLLA+ operating domain expansion for Monticello does not change the maximum operating temperature, pressure, or flow rate of any of the following systems: CS and SLCS.

CS and SLCS system temperatures, flows, and pressures at MELLLA+ conditions are bounded by the EPU temperatures, flows, and pressures, and as such are within the design values used in the design of the piping and supports chosen for worst case conditions.

Each of these Monticello systems [[

]] their susceptibility to erosion/corrosion does not increase, and no further evaluation of these Other RCPB Piping Systems is required for Monticello.

3.5.1.3.2 Other RCPB Piping Systems – RPV Head Line and SRV Discharge Lines

[[

]] For the RPV head line and the SRV discharge line, there is no change in the temperature, pressure, or flows in these systems as a result of MELLLA+ operating domain expansion. Because the piping systems have no change in system temperature, pressure or flow as a result of MELLLA+ operating domain expansion, [[ ]] Their susceptibility to erosion/corrosion does not increase, and no further evaluation of these Other RCPB Piping Systems is required.

[[ ]] MELLLA+ operating domain expansion for Monticello does not change the maximum operating temperature, pressure, or flow rate of any of the following piping systems: RPV Head Vent Line and SRVDL.

RPV Head Vent line and SRVDL temperatures, flows, and pressures at MELLLA+ conditions are bounded by the EPU temperatures, flows, and pressures, and as such are within the design values used in the design of the piping and supports chosen for worst case conditions. Additionally, there is no flow through the SRVDL during normal operating conditions.

The RPV head vent line and the SRVDL are unaffected by MELLLA+ operating domain expansion. [[ ]] their susceptibility to erosion/corrosion does not increase, and no further evaluation of these Other RCPB Piping Systems is required for Monticello.

3.5.1.3.3 Other RCPB Piping Systems – RWCU

[[

]] Because the RWCU system has no change in system temperature, pressure or flow as a result of MELLLA+ operating domain expansion, [[ ]] RWCU system susceptibility to erosion/corrosion does not increase, and no further evaluation of the RWCU system is required.

[[ ]] MELLLA+ operating domain expansion for Monticello does not change the maximum operating temperature, pressure, or flow rate of the RWCU system. RWCU system temperatures, flows, and pressures at MELLLA+ conditions are bounded by the EPU temperatures, flows, and pressures, and as such are within the design values used in the design of the piping and supports chosen for worst case conditions. The Monticello RWCU system is unaffected by MELLLA+ operating domain expansion. [[ ]] the RWCU system susceptibility to erosion/corrosion does not increase, and no further evaluation of the RWCU system is required.

3.5.1.3.4 Other RCPB Piping Systems – Safety Related Thermowells

[[

]]. Because the RCPB piping systems evaluated for EPU do not experience any increase in pressure, temperature, or flow at MELLLA+, their susceptibility to erosion/corrosion does not increase and no further evaluation of safety-related thermowells is required for Monticello.

[[ ]] the Monticello safety-related thermowells are unaffected by MELLLA+ as the evaluations performed for the currently licensed operating domain are bounding for MELLLA+ conditions. [[ ]] Their susceptibility to erosion/corrosion does not increase and no further evaluation of safety-related thermowells is required for Monticello.

Because all of the piping systems in Section 3.5.1.3 meet the criteria listed [[ ]] their susceptibility to erosion/corrosion does not increase, and no further evaluation of these Other RCPB Piping Systems is required.

[[

]]

3.5.1.4 Other Than Category "A" RCPB Material

As required by Limitation and Condition 12.9 of the M+LTR SER, the following discussion is presented regarding other than Category "A" materials that exist in the RCPB Piping.

The augmented inspection program for intergranular stress corrosion cracking (IGSCC), as addressed in NRC Generic Letter 88-01 (Reference 14) and NUREG-0313, Revision 2 (Reference 15), has been resolved by Monticello's pipe replacement program whereby all susceptible material was replaced with resistant material. All welds are therefore classified as IGSCC Category "A". In accordance with EPRI TR-112657 (Reference 16), piping welds identified as Category "A" are considered resistant to IGSCC, and as such are assigned a low failure potential provided no other damage mechanisms are present. Examination criteria for these welds are in accordance with the Risk-Informed In-Service Inspection (RI-ISI) process.

[[ ]] confirms that the Augmented Inspection Program at Monticello is adequate to address concerns related to other than Category "A" materials in the RCPB.

[[

]]

3.5.2 Balance-of-Plant Piping

The Balance-of-Plant (BOP) piping evaluation consists of a number of piping subsystems that move fluid through systems outside the RCPB. The topics considered in this section are:

Topic	M+LTR Disposition	Monticello Result
Main Steam and Feedwater (Outside Containment)	[[	
Reactor Core Isolation Cooling (RCIC) High Pressure Coolant Injection (HPCI) Core Spray (CS) Residual Heat Removal (RHR)		
Off Gas System Containment Air Monitoring Neutron Monitoring System		]]

3.5.2.1 Main Steam and Feedwater (Outside Containment)

[[

]] for all MS and FW piping systems, including the associated branch piping, the temperature, pressure, flow, and mechanical loads do not increase due to the MELLLA+ operating domain expansion. [[

]] As discussed in Section 3.5.1.1, the susceptibility of these piping systems to erosion/corrosion does not increase. [[

]] no further evaluation is required for BOP Piping – MS and FW (outside containment).

[[ ]] MELLLA+ operating domain expansion for Monticello does not change (no increase) the maximum operating temperature, pressure, flow rate, or mechanical loads for the MS and FW piping outside containment. MS and FW system temperatures, flows, and pressures at MELLLA+ conditions are bounded by the EPU temperatures, flows, and pressures, and as such are within the design values used in the design of the piping and supports chosen for worst case conditions. The Monticello MS and FW piping outside containment is unaffected by the MELLLA+ operating domain expansion. The Monticello BOP piping outside containment was typically designed in accordance with ANSI B31.1 (Reference 17) and as such there were no fatigue analyses required or performed. [[ ]], the MS and FW piping outside containment susceptibility to erosion/corrosion does not increase, and no further evaluation is required.

[[ ]]

3.5.2.2 Other BOP Piping Systems

3.5.2.2.1 Other BOP Piping Systems - RCIC, HPCI, CS, and RHR

[[ ]] the loads and temperatures used in the analyses depend on the containment hydrodynamic loads and temperature evaluation results (Section 4.1). [[ ]] The design basis LOCA dynamic loads including the pool swell loads, vent thrust loads, condensation oscillation (CO) loads, and chugging loads have been defined and evaluated for the current licensed operating domain. The pool temperatures due to a design basis LOCA were also defined for the current licensed operation domain. The values for the MELLLA+ operating domain remain within these bounding values. [[ ]] For these BOP piping systems, no further evaluation is required as a result of MELLLA+.

The MELLLA+ operating domain expansion for Monticello does not change the maximum operating temperature, pressure, or flow rate, or increase mechanical loads for any of the following systems: RCIC, HPCI, CS, and RHR.

RCIC, HPCI, CS, and RHR system temperatures, flows, and pressures at MELLLA+ conditions are bounded by the EPU temperatures, flows, and pressures, and as such are within the design values used in the design of the piping and supports chosen for worst case conditions.

[[ ]] for each of the Monticello systems described above, the loads and temperatures used in the analyses continue to be bounded by the loads and temperatures used in the analyses performed for the current licensed operating domain. Section

4.1 shows that the Monticello LOCA dynamic loads including the pool swell loads, vent thrust loads, CO loads, and chugging loads have been evaluated and are bounded by the current design basis. The Monticello peak suppression pool temperatures due to a design basis LOCA are also bounded by the current design basis. [[

]] For these BOP piping systems, no further evaluation is required as a result of MELLLA+.

3.5.2.2.2 Other BOP Piping Systems – Off Gas System, Containment Air Monitoring, and Neutron Monitoring System

[[

]] For these BOP piping systems, no further evaluation is required as a result of MELLLA+.

[[ ]] there is no change to the Monticello reactor operating pressure or power level as a result of MELLLA+ operating domain expansion. The numerical values showing no increases in reactor operating pressure are presented in Table 1-2. [[

]] For these BOP piping systems, no further evaluation is required as a result of MELLLA+.

Because all of the piping systems in Section 3.5.2.2 meet the criteria listed [[ ]] their susceptibility to erosion/corrosion does not increase, and no further evaluation of these Other BOP Piping Systems is required.

[[
]]

3.6 REACTOR RECIRCULATION SYSTEM

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
System Evaluation	[[	
Net Positive Suction Head (NPSH)		
Single Loop Operation		
Flow Mismatch		]]

3.6.1 System Evaluation

[[
]] all of the RRS operating conditions for the MELLLA+ operating

domain are within the operating conditions in the current licensed operating domain. SLO is not allowed in the MELLLA+ operating domain. [[ ]] and no further evaluation of this topic is required.

[[ ]] the Monticello RRS operating conditions in the MELLLA+ operating domain are within the operating conditions in the current licensed operating domain. For Monticello, there are no increases in the RRS temperature, pressure, or flow rates as a result of MELLLA+ operating domain expansion as compared to the current licensed operating domain. RRS system temperature for the current licensed operating domain is 532°F and in the MELLLA+ operating domain is 529°F. RRS system pressure for the current licensed operating domain and in the MELLLA+ operating domain is 1040 psia. The numerical values showing no increases in RRS system flow rates are presented in Table 1-2. For Monticello, SLO is not allowed in the MELLLA+ operating domain. [[ ]] and no further evaluation of this topic is required.

[[ ]]

3.6.2 Net Positive Suction Head

[[ ]] Therefore, no further evaluation of the RRS NPSH topic is required.

[[ ]]. For Monticello, the FW temperature and flow does not change as a result of MELLLA+ operating domain expansion. The numerical values showing the changes in FW temperature and flow and no increase in RRS flow are presented in Table 1-2. Therefore, no further evaluation of the RRS NPSH topic is required.

[[ ]]

3.6.3 Single Loop Operation

[[ ]] SLO is not allowed in the MELLLA+ operating domain.

[[ ]] SLO operating is not allowed in the MELLLA+ operating domain. There is no fixed power limit setpoint for SLO at Monticello. SLO is limited to the normal region of the power/flow map per Technical Specification 3.4.1. Section 1.2.1 confirms that this region does not change for MELLLA+. Therefore, SLO is not allowed in the MELLLA+ operating range and is not affected by the MELLLA+ domain expansion.

[[ ]]

As required by M+LTR SER Limitation and Condition 12.5.a, Monticello will modify Technical Specification 3.4.1 to recognize that SLO operation is prohibited in the MELLLA+ operating domain. This information is presented in the NSPM MELLLA+ License Amendment Request package. As required by M+LTR SER Limitation and Condition 12.5.c, Monticello currently includes the power/flow map in its COLR and will continue to include the power/flow map in the COLR after the MELLLA+ operating domain expansion is approved.

3.6.4 Flow Mismatch

Flow mismatch is discussed in Section 4.3.7.

3.7 MAIN STEAM LINE FLOW RESTRICTORS

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Structural Integrity	[[	]]

[[ ]] there is no increase in MS flow as a result of the MELLLA+ operating domain expansion. [[ ]] and no further evaluation of this topic is required.

[[ ]] there is no increase in Monticello MS flow as a result of MELLLA+ operating domain expansion. The numerical values showing that MS flow does not increase as a result of MELLLA+ are presented in Table 1-2. [[ ]] and no further evaluation of this topic is required.

[[ ]]

3.8 MAIN STEAM ISOLATION VALVES

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Isolation Performance	[[	
Valve Pressure Drop		]]

[[

]] there is no increase in MS pressure, flow, or pressure drop as a result of the MELLLA+ operating domain expansion. [[

]] and no further evaluation of this topic is required.

[[ ]] there is no increase in Monticello MS pressure, flow, or pressure drop as a result of MELLLA+ operating domain expansion. The MS pressure for the current licensed operating domain and in the MELLLA+ operating domain is 1025 psia. The numerical values showing that MS flow does not increase as a result of MELLLA+ are presented in Table 1-2. The total sum of the pressure drop across both MSIVs is 11.92 psid for the current licensed operating domain and slightly less than 11.92 psid for the MELLLA+ operating domain due to the slight decrease in steam flow. [[

]] and no further evaluation of this topic is required.

[[

]]

3.9 REACTOR CORE ISOLATION COOLING

The RCIC system provides inventory makeup to the reactor vessel when the vessel is isolated from the normal high pressure makeup systems. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
System Hardware	[[	
System Initiation		
Net Positive Suction Head		
Inventory Makeup Level Margin to Top of Active Fuel (TAF)		]]

3.9.1 System Hardware

[[ ]] there are no changes to the RCIC system hardware as a result of MELLLA+ operating domain expansion.

[[ ]] there are no changes to the Monticello RCIC system hardware as a result of MELLLA+.

[[

]]

3.9.2 System Initiation

[[ ]] there are no changes to the normal reactor operating pressure, decay heat or SRV setpoints as a result of MELLLA+ operating domain expansion. [[

]] no further evaluation of this topic is required.

[[ ]] there are no changes to the normal reactor operating pressure, decay heat or SRV setpoints as a result of MELLLA+ operating domain expansion. The Monticello reactor operating pressure for the current licensed operating domain and in the MELLLA+ operating domain remain unchanged. The numerical values showing that reactor operating pressure does not increase as a result of MELLLA+ are presented in Table 1-2. As described in Section 1.2.3, the generic disposition in the M+LTR concludes that there is no increase in decay heat as a result of MELLLA+ operating domain expansion. As discussed in Section 3.1.2, SRV setpoints are unchanged by MELLLA+ operating domain expansion. Therefore, for Monticello [[

]] No further evaluation of this topic is required.

[[

]]

3.9.3 Net Positive Suction Head

[[ ]] the NPSH available for the RCIC pump [[

]] For ATWS (Section 9.3) and Fire Protection (Section 6.7), operation of the RCIC system at suppression pool temperatures greater than the operational limit may be accomplished by using the condensate storage tank (CST) volume as the source of water. Therefore, the specified operational temperature limit for the process water does not change with MELLLA+. The NPSH required by the RCIC pump [[

]] Therefore, no further evaluation is required for this topic.

[[ ]] for Monticello there are no physical changes to the pump suction configuration. The Monticello RCIC flow rate for the current licensed operating domain and in the MELLLA+ operating domain is 400 gpm. Minimum atmospheric pressure in the suppression chamber and the CST for the current licensed operating domain and in the MELLLA+ operating domain is 14.26 psia. The RCIC system has the capability of using the CST or the torus as a suction source at CLTP and MELLLA+ conditions. The CST provides additional head over that provided by the torus for the RCIC pump, and the CST is not subject to the heat addition from reactor blowdown, which reduces suction head. Consequently, torus suction is more limiting for RCIC NPSH. Monticello calculations demonstrate that the RCIC pump would have adequate NPSH and low suction pressure trip margins given a torus water temperature of 170°F.

The design basis function of the RCIC system is to provide coolant to the reactor vessel so that the core is not uncovered as a result of loss of off-site Alternating Current (AC) power or for a Loss of Feedwater (LOFW) event. Analyses performed for EPU confirm the worst case torus temperature for RCIC operation is due to the LOFW event and is 140°F. Because MELLLA+ does not increase core power and therefore decay heat, the EPU evaluation is not affected and remains bounding for the MELLLA+ operating domain expansion.

The NPSH required by the Monticello RCIC pump [[

]] Therefore, no further evaluation is required for this topic.

[[

]]

3.9.4 Inventory Makeup Level Margin to TAF

The makeup capacity of RCIC and the level margin to the Top of Active Fuel (TAF) are evaluated in Section 9.1.3.

3.10 RESIDUAL HEAT REMOVAL SYSTEM

The Residual Heat Removal (RHR) system is designed to restore and maintain the reactor coolant inventory following a LOCA and remove reactor decay heat following reactor shutdown for normal, transient, and accident conditions. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Low Pressure Coolant Injection Mode	[[	
Suppression Pool and Containment Spray Cooling Modes		
Shutdown Cooling Mode		
Steam Condensing Mode		
Fuel Pool Cooling Assist		]]

The primary design parameters for the RHR system are the decay heat in the core and the amount of reactor heat discharged into the containment during a LOCA. The RHR system operates in various modes, depending on plant conditions. [[

]]

3.10.1 LPCI Mode

The Low Pressure Coolant Injection (LPCI) mode, as it supports the LOCA response, is discussed in Section 4.2.3, Low Pressure Coolant Injection.

3.10.2 Suppression Pool and Containment Spray Cooling Modes

[[ ]] the Suppression Pool Cooling (SPC) mode is manually initiated to maintain the containment pressure and suppression pool temperature within design limits following isolation transients or a postulated LOCA. [[ ]]

[[ ]] Therefore, no further evaluation is required for this topic.

[[ ]]

3.10.3 Shutdown Cooling Mode

[[ ]] the Shutdown Cooling (SDC) mode is designed to remove the sensible and decay heat from the reactor primary system during a normal reactor shutdown. This non safety-related mode allows the reactor to be cooled down within a certain time, so that the SDC mode of operation does not become a critical path during refueling operations. [[ ]]

[[ ]] Therefore, no further evaluation is required for this topic.

[[ ]]

3.10.4 Steam Condensing Mode

The Steam Condensing mode is not applicable for Monticello.

3.10.5 Fuel Pool Cooling Assist Mode

The Fuel Pool Cooling Assist mode, using existing RHR heat removal capacity, provides supplemental fuel pool cooling in the event that the fuel pool heat load exceeds the capability of the Fuel Pool Cooling and Cleanup system. [[ ]] Therefore, there is no effect on the Fuel Pool Cooling Assist mode.

3.11 Reactor Water Cleanup System

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
System Performance	[[	
Containment Isolation		]]

3.11.1 System Performance

[[

]] the MELLLA+ operating domain expansion does not change the pressure or fluid thermal conditions experienced by the RWCU system. Operation in the MELLLA+ operating domain does not increase the quantity of fission products, corrosion products, and other soluble and insoluble impurities in the reactor water. Reactor water chemistry is within fuel warranty and Technical Specification limits on effluent conductivity and particulate concentration, and thus, no changes will be made in water quality requirements.

[[ ]] for Monticello there is no increase in the quantity of fission products, corrosion products, and other soluble and insoluble impurities in the reactor water (see Section 8.4). Consistent with the generic disposition discussed above, for Monticello there is no significant change in the FW line temperature, pressure, or flow rate. FW line temperature for the current licensed operating domain and in the MELLLA+ operating domain is 396°F (upstream of the RWCU return). As shown in Table 1-2, the FW flow rate in the MELLLA+ operating domain decreases slightly from the flow rate in the current licensed operating domain. As discussed in Section 1.2, reactor pressure for the current licensed operating domain and in the MELLLA+ operating domain does not change. Therefore, FW system resistance and operating conditions do not change and the pressure at the RWCU/FW system interface doesn't change. As discussed in Sections 1.2 and 3.6, reactor and recirculation system parameters are bounded by or unchanged from EPU conditions. Therefore there is no effect on RWCU inlet conditions due to MELLLA+. Because there is no change to the pressure or fluid thermal conditions experienced by the RWCU system, and because there is no increase in the quantity of fission products, corrosion products, and other soluble and insoluble impurities in the reactor water, [[

]] Therefore, no further evaluation of this topic is required.

[[

]]

3.11.2 Containment Isolation

[[

]] the RWCU system is a normally operating system with no safety-related functions other than containment isolation. [[

]] because there is no change in the FW line pressure, temperature, and flow rate.

[[ ]] for Monticello there is no significant change in the FW line temperature, pressure, or flow rate. FW line temperature for the current licensed operating domain and in the MELLLA+ operating domain is 396°F (upstream of the RWCU return). As shown in Table 1-2, the maximum FW flow rate in the MELLLA+ operating domain decreases slightly from the maximum flow rate in the current licensed operating domain. As such, the FW flow rates in the MELLLA+ operating domain remain within the FW flow rates in the current licensed operating domain. As discussed in Section 1.2, reactor pressure for the current licensed operating domain and in the MELLLA+ operating domain does not change. Therefore, FW system resistance and operating conditions do not change and the pressure at the RWCU/FW system interface doesn't change for RWCU return lines. As discussed in Section 3.11.1 above, there is no change to RWCU inlet conditions. [[

]]

[[ ]]

4.0 ENGINEERED SAFETY FEATURES

This section addresses the evaluations that are applicable to MELLLA+.

4.1 CONTAINMENT SYSTEM PERFORMANCE

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Short-Term Pressure and Temperature Response	[[	
Long-Term Suppression Pool Temperature Response		
Containment Dynamic Loads Loss of Coolant Accident Loads Subcompartment Pressurization		
Containment Dynamic Loads Safety-Relief Valve Loads		
Containment Isolation		
Generic Letter 89-10		
Generic Letter 89-16		
Generic Letter 95-07		
Generic Letter 96-06		]]

4.1.1 Short-Term Pressure and Temperature Response

According to Section 4.1.1 of the M+LTR, operation in the MELLLA+ range may change the break energy for the design basis accident (DBA) recirculation suction line break (RSLB). The break energy is derived from the break flow rate and enthalpy. [[

]]

[[ ]] Monticello short-term RSLB containment temperature and pressure responses are affected by the change in enthalpy as a result of MELLLA+ operating domain expansion. The peak drywell temperatures for the current licensed operating domain and the MELLLA+ operating domain are 291°F and 290°F, respectively. The peak drywell pressures for the current licensed operating domain and the MELLLA+ operating domain are 44.1 psig and 44.0 psig, respectively. The peak drywell-to-wetwell differential pressures for the current licensed operating domain and the MELLLA+ operating domain are 24.8 psig and 24.7 psig, respectively. [[

]]

[[

]]

4.1.2 Long-Term Suppression Pool Cooling Temperature Response

[[

]] Therefore, no further evaluation of this topic is required.

[[ ]] the sensible and decay heat do not change as a result of MELLLA+ operating domain expansion. [[ ]] No further evaluation of this topic is required.

[[ ]]

4.1.3 Containment Dynamic Loads – LOCA Loads, Subcompartment Pressurization

As described in the M+LTR, a [[ ]] evaluation is performed to determine the effect of MELLLA+ on the LOCA containment dynamic loads. Results from [[

]] are used to evaluate the effect of the MELLLA+ operating domain expansion on LOCA containment dynamic loads. The key parameters are [[ ]] The LOCA dynamic loads include vent thrust, pool swell, CO and chugging.

The results of the [[ ]] LOCA containment dynamic loads evaluation demonstrate that existing vent thrust, pool swell, CO and chugging load definitions remain bounding for operation in the MELLLA+ operating domain. Therefore, the LOCA containment dynamic loads are not affected by the MELLLA+ operating domain expansion.

Because the MELLLA+ operating domain containment dynamic loads for LOCA and [[ ]] no further evaluation of this topic is required.

[[ ]]

4.1.4 Containment Dynamic Loads – SRV Loads

[[ ]] because the sensible and decay heat do not change in the MELLLA+ operating domain and because the SRV setpoints do not change, the SRV loads do not change. Therefore, no further evaluation of this topic is required.

[[ ]] the sensible and decay heat do not change as a result of MELLLA+ operating domain expansion. This response is discussed in Section 1.2.3. Also, there is no change to the Monticello SRV setpoints as a result of MELLLA+

operating domain expansion. This topic is discussed in Section 3.1.2. Therefore, there is no change to the Monticello SRV loads. No further evaluation of this topic is required.

[[
]]

4.1.5 Containment Isolation

[[
]] evaluation is required to demonstrate the adequacy of the containment isolation system.

[[
]] Therefore, no containment isolation system evaluations are required for Monticello.

[[
]]

4.1.6 Generic Letter 89-10

[[
]] evaluation to evaluate changes to the GL 89-10 program is required.

[[
]] Sections 6.6 and 10.1 confirm that other parameters with the potential to affect the capability of safety-related motor-operated valves (MOVs), such as the ambient temperature profile are unchanged. For each of the assessed parameters, the values in the MELLLA+ operating domain are bounded by those in the Monticello current licensed operating domain. Therefore, a GL 89-10 MOV program evaluation is not required.

[[
]]

4.1.7 Generic Letter 89-16

[[
]] some plants have installed a hardened wetwell vent system in response to GL 89-16. A design requirement for this system is the ability to vent 1% of the CLTP. [[

]]

[[ ]] the power level does not change as a result of MELLLA+ operating domain expansion. Therefore, the capability of the hardened wetwell vent system to vent 1% of the CLTP is unaffected by MELLLA+. [[

]]

[[

]]

4.1.8 Generic Letter 95-07

[[

]] evaluation of the GL 95-07 program is required.

[[

]] Therefore, no GL 95-07 evaluation is required.

[[

]]

4.1.9 Generic Letter 96-06

[[

]] evaluation of the GL 96-06 program is required.

[[

]] Therefore, no GL 96-06 evaluation is required.

[[

]]

4.2 EMERGENCY CORE COOLING SYSTEMS

The ECCS includes HPCI, the CS system, the LPCI mode of the RHR system, and the Automatic Depressurization System (ADS). The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
High Pressure Coolant Injection	[[	
Core Spray		
Low Pressure Coolant Injection Mode of the RHR System		
Automatic Depressurization System		
ECCS Net Positive Suction Head		]]

4.2.1 High Pressure Coolant Injection

[[ ]] the HPCI system is a turbine driven system designed to pump water into the reactor vessel over a wide range of operating pressures. For MELLLA+ operating domain expansion, there is no change to the normal reactor operating pressure or decay heat, and SRV setpoints remain the same. [[

]] no further evaluation of the HPCI system is required.

[[ ]] there is no change to the reactor pressure as a result of MELLLA+ operating domain expansion. The numerical values showing no increases in reactor operating pressure are presented in Table 1-2. The sensible and decay heat do not change as a result of MELLLA+ operating domain expansion. This response is discussed in Section 1.2.3. Also, there is no change to the Monticello SRV setpoints as a result of MELLLA+ operating domain expansion. This topic is discussed in Section 3.1.2. [[

]] and no further evaluation of the HPCI system is required.

[[ ]].

4.2.2 Core Spray

[[ ]] the CS system is automatically initiated in the event of a LOCA. The primary purpose of the CS system is to provide reactor coolant makeup for a large break LOCA and for any small break LOCA after the reactor vessel has depressurized. It also provides spray cooling for long-term core cooling in the event of a LOCA. [[

]] no further evaluation of the CS system for MELLLA+.

[[ ]] there is no change to the reactor pressure as a result of MELLLA+ operating domain expansion. The numerical values showing no increases in reactor operating pressure are presented in Table 1-2. [[

]] and no further evaluation of the CS system is required. In the event of a design basis Appendix R event discussed in Section 6.7, the CS System injects water into the reactor vessel to restore inventory and maintain core cooling following vessel depressurization.

[[ ]]

4.2.3 Low Pressure Coolant Injection

[[ ]] the LPCI mode of the RHR system is automatically initiated in the event of a LOCA. The primary purpose of the LPCI mode is to provide reactor coolant makeup for a large break LOCA and for any small break LOCA after the reactor vessel has depressurized. [[

]] no further evaluation of the LPCI system for MELLLA+.

[[ ]] there is no change to the reactor pressure as a result of MELLLA+ operating domain expansion. The numerical values showing no increases in reactor operating pressure are presented in Table 1-2. [[

]] and no further evaluation of the LPCI system is required.

[[

]]

4.2.4 Automatic Depressurization System

[[ ]] the ADS uses SRVs to reduce the reactor pressure following a small break LOCA, when it is assumed that the high pressure systems have failed. This allows the CS and LPCI systems to inject coolant into the reactor vessel. [[

]] no further evaluation of the ADS system is required.

[[

]] and no further evaluation of the ADS system is required.

[[

]]

4.2.5 ECCS Net Positive Suction Head

NRC letter to NSPM, Monticello Nuclear Generating Plant – Revised Schedule for Review of Extended Power Uprate Amendment Application (TAC MD9990), dated October 1, 2009 notified NSPM of a delay reviewing the Monticello Nuclear Generating Plant (MNGP) Extended Power Uprate (EPU) license amendment request to allow for the development of additional regulatory guidance on the use of containment accident pressure (CAP) credit. The NRC resolution of the CAP issue is expected in the spring of 2010. The impact on ECCS Net Positive Suction Head will be evaluated and submitted following receipt of NRC guidance.

4.3 EMERGENCY CORE COOLING SYSTEM PERFORMANCE

The Monticello ECCS is designed to provide protection against postulated LOCAs caused by ruptures in the primary system piping. The ECCS performance characteristics do not change for the MELLLA+ operating domain expansion.

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Large Break Peak Clad Temperature	[[	
Small Break Peak Clad Temperature		
Local Cladding Oxidation		
Core Wide Metal Water Reaction		
Coolable Geometry		
Long-Term Cooling		
Flow Mismatch Limits		]]

These topics are described in Sections 4.3.2 through 4.3.8.

4.3.1 Break Spectrum Response and Limiting Single Failure

[[

]] The break spectrum response is determined by the ECCS network design and is common to all BWRs. SAFER evaluation experience shows that the basic break spectrum response is not affected by changes in core flow (Reference 18). [[

]]

The factors influencing the selection of the limiting single failure for Monticello are [[

]] The trends discussed in the M+LTR regarding the first and second clad temperature peaks are applicable to Monticello. [[

]]

4.3.2 Large Break Peak Clad Temperature

The effect of MELLLA+ operating domain expansion on the Monticello LOCA performance is similar to that observed in the current licensed operating domain, which includes the MELLLA operating domain low core flow region. The PCT response following a large recirculation line break has two peaks. The first peak is determined by the boiling transition during core flow coastdown early in the event. The second peak is determined by the core uncovery and reflooding.

MELLLA+ operating domain expansion has two effects on the boiling transition and first peak PCT. First, the reduced core flow causes the boiling transition to occur earlier and lower in the bundle. Second, the reduced core flow causes the initial subcooling in the downcomer to be higher so that the break flow is greater in the early phase of the LOCA event. For a given power level, the early boiling transition times (boiling transitions that occur before jet pump uncovery) for Monticello occur earlier in the event and penetrate lower in the fuel bundle as the core flow is reduced, but the effect of the earlier boiling transition on the LOCA PCT depends on the particular conditions.

Effect of MELLLA+ at Rated Power

[[

]]

Effect of MELLLA+ at Less Than Rated Power

M+LTR SER Limitation and Condition 12.10.a requires the M+SAR provide a discussion on the power/flow combination scoping calculations that were performed to identify the limiting statepoints in terms of DBA-LOCA PCT response for the operation within the MELLLA+ boundary. As required by this limitation, [[

]] The PCT results summarized below show that there are no unusual trends in PCT in the MELLLA+ region and that there is margin to the 2200°F PCT limit.

Effect of Axial Power Shape

As required by M+LTR SER Limitation and Condition 12.11 (Reference 2) and Methods LTR SER Limitation and Condition 9.7 (Reference 5), for MELLLA+ applications, the small and large break ECCS-LOCA analyses shall include top-peaked and mid-peaked power shape in establishing the MAPLHGR and determining the PCT. This limitation is applicable to both the licensing bases PCT and the upper bound PCT. The plant-specific applications should report the limiting small and large break licensing basis and upper bound PCTs. [[

]]

Large Break Licensing Basis PCT

Reference 19 provides justification for the elimination of the 1600°F Upper Bound PCT limit and generic justification that the Licensing Basis PCT will be conservative with respect to the Upper Bound PCT. The NRC SER in Reference 20 accepted this position by noting that, because plant-specific Upper Bound PCT calculations have been performed for all plants, other means may be used to demonstrate compliance with the original SER limitations. These other means are acceptable provided there are no significant changes to a plant's configuration that would invalidate the existing Upper Bound PCT calculations. The changes in magnitude of the PCT due to MELLLA+ demonstrate that this plant configuration change does not invalidate the existing Upper Bound PCT of [[ ]]

M+LTR SER Limitations and Conditions 12.12.a and 12.12.b and Methods LTR SER Limitation and Condition 9.8 also require that the ECCS-LOCA evaluation be performed for all statepoints in the upper boundary of the expanded operating domains. [[

]]

Power/Flow[2]	Nominal PCT (°F)[1]		Appendix K PCT (°F)[1]	
	1st Peak	2nd Peak	1st Peak	2nd Peak
[[				
				]]

(1) PCT results shown are for GE14 fuel.

(2) Power level shown is percent of CLTP. Flow level shown is percent of rated core flow.

(3) [[ ]]

(4) [[ ]]

4.3.3 Small Break Peak Clad Temperature

[[

]]

M+LTR SER Limitation and Condition 12.13 requires that the MELLLA+ plant-specific SAR include calculations for the limiting small break at rated power/rated core flow and rated power/MELLLA+ boundary, if the small break PCT at rated power/rated core flow is within [[ ]] of the limiting Appendix K PCT. For Monticello, the small break PCT at rated power/rated core flow is [[ ]] than the Appendix K PCT. Therefore, no small break PCT calculations are performed for MELLLA+ flow.

M+LTR SER Limitation and Condition 12.14 requires that for plants that will implement MELLLA+, a sufficient number of small break sizes shall be analyzed at the rated EPU power level to ensure that the peak PCT break size is identified. [[ ]]

As required by M+LTR SER Limitation and Condition 12.11 and Methods LTR SER Limitation and Condition 9.7, for MELLLA+ applications, the small and large break ECCS-LOCA analyses shall include top-peaked and mid-peaked power shape in establishing the MAPLHGR and determining the PCT. This limitation is applicable to both the licensing bases PCT and the upper bound PCT. The plant-specific applications shall report the limiting small and large break licensing basis and upper bound PCTs. [[

]]

The factors influencing the selection of the limiting single failure for Monticello are [[ ]] The trends discussed in the M+LTR regarding the first and second clad temperature peaks are applicable to Monticello. [[

]]

M+LTR SER Limitation and Condition 12.12 and Methods LTR SER Limitation and Condition 9.8 also requires that the ECCS-LOCA evaluation be performed for all statepoints in the upper boundary of the expanded operating domains. [[ ]]

4.3.4 Local Cladding Oxidation

[[ ]] Sections 4.3.1 and 4.3.2 that determine the effect to the PCT. [[ ]] and no further evaluation of this topic is required.

[[ ]] for Monticello Sections 4.3.1 and 4.3.2 show acceptable PCT results that meet the 2200°F limit. [[ ]] and no further evaluation of this topic is required.

[[ ]]

4.3.5 Core Wide Metal Water Reaction

[[ ]] Sections 4.3.1 and 4.3.2 that determine the effect on the PCT. [[ ]] and no further evaluation of this topic is required.

[[ ]] for Monticello Sections 4.3.1 and 4.3.2 show acceptable PCT results that meet the 2200°F limit. [[ ]] and no further evaluation of this topic is required.

[[ ]]

4.3.6 Coolable Geometry

[[ ]]

[[ ]] Monticello's compliance with the coolable geometry acceptance criteria was generically demonstrated as a GE BWR [[ ]]

[[ ]]

4.3.7 Long Term Cooling

[[ ]]

[[ ]] Monticello's compliance with the long term cooling acceptance criteria was generically demonstrated as a GE BWR [[ ]]

[[ ]]

4.3.8 Flow Mismatch Limits

[[ ]] limits have been placed on recirculation drive flow mismatch over a range of core flow. For most plants, the limits on flow mismatch are more relaxed at lower core flow rates. The drive flow mismatch affects the core flow coastdown following the break. The effect of the drive flow mismatch on the LOCA evaluation is similar to a small change in the initial core flow. [[ ]]

[[ ]] the discussion and trends in the M+LTR are applicable to Monticello. [[ ]]

[[

]]

4.4 MAIN CONTROL ROOM ATMOSPHERE CONTROL SYSTEM

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Iodine Intake	[[	]]

[[ ]] the MELLLA+ operating domain expansion does not result in a change in the source terms or the release rates (Section 8.0). [[ ]] Provided this criterion is met, no further evaluation of the Main Control Room Atmosphere Control system is required.

[[ ]], there is no change in the Monticello source term or release rates as a result of MELLLA+ operating domain expansion. This topic is discussed in Section 8.0. [[ ]] No further evaluation of the Main Control Room Atmosphere Control system is required.

[[

]]

4.5 STANDBY GAS TREATMENT SYSTEM

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Flow Capacity	[[	
Iodine Removal Capability		]]

4.5.1 Flow Capacity

[[ ]] the SGTS is designed to maintain secondary containment at a negative pressure and to filter the exhaust air for removal of fission products potentially present during abnormal conditions. By limiting the release of airborne particulates and halogens, the SGTS limits off-site dose following a postulated design basis accident. [[

]] and no further evaluation of the SGTS flow is required.

[[ ]] the design flow capacity of the Monticello SGTS was selected to maintain the secondary containment at the required negative pressure to minimize the potential for exfiltration of air from the reactor building. [[

]] and no further evaluation is required.

[[

]]

4.5.2 Iodine Removal Capacity

[[

]] the SGTS is designed to maintain secondary containment at a negative pressure and to filter the exhaust air for removal of fission products potentially present during abnormal conditions. By limiting the release of airborne particulates and halogens, the SGTS limits off-site dose following a postulated design basis accident. [[

]]

[[ ]] the core fission product inventory is not changed by the MELLLA+ operating domain expansion (Section 8.3), and coolant activity levels are defined by Technical Specifications and don't change, so no change occurs in the SGTS adsorber iodine loading, decay heat rates, or iodine removal efficiency. [[ ]] No further evaluation of this topic is required.

[[

]]

4.6 MAIN STEAM ISOLATION VALVE LEAKAGE CONTROL SYSTEM

Monticello does not use a Main Steam Isolation Valve Leakage Control System (MSIV-LCS).

4.7 POST-LOCA COMBUSTIBLE GAS CONTROL SYSTEM

10 CFR 50.44 was revised in September 2003 and no longer defines a design basis LOCA hydrogen release and eliminates the requirements for hydrogen control systems to mitigate such releases. Monticello has adopted the revised ruling per Monticello License Amendment Number 138, issued in May 2004, which eliminated the requirements for hydrogen recombiners. The hydrogen recombiners have since been abandoned in place. However, NSPM made commitments to maintain the hydrogen and oxygen monitoring systems capable of diagnosing beyond design basis accidents. MELLLA+ operating domain expansion has no effect on the design of these systems or on the ability of these systems to perform their intended functions. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Hydrogen and Oxygen Production	[[	]]

[[ ]] the Combustible Gas Control system is designed to maintain the post-LOCA concentration of oxygen or hydrogen in the containment atmosphere below the lower flammability limit. [[ ]] Provided these criteria are met, no further evaluation of the Combustible Gas Control System is required.

[[ ]] there is no change in core power as a result of MELLLA+ operating domain expansion. There is no change in decay heat as discussed in Section 1.2.3. There is also no change to the fuel design as a result of MELLLA+ operating domain expansion as discussed in Section 2.1.1. As discussed in the introduction to Section 4.7, Monticello does not have a Combustible Gas Control System. However, [[ ]] and no further evaluation is required.

[[ ]]

5.0 INSTRUMENTATION AND CONTROL

This section addresses the evaluations that are applicable to MELLLA+.

5.1 NSSS MONITORING AND CONTROL

Changes in process parameters resulting from the MELLLA+ operating domain expansion and their effects on instrument performance are evaluated in the following sections. The effect of the MELLLA+ operating domain expansion on the Technical Specifications is addressed in Section 11.1 and the effect on the allowable values in Section 5.3. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Average Power Range, Intermediate Range, and Source Range Monitors	[[	
Local Power Range Monitors		
Rod Block Monitor		
Rod Worth Minimizer		
Traversing Incore Probes		]]

5.1.1 Average Power Range, Intermediate Range, and Source Range Monitors

[[ ]]

the APRM output signals are calibrated to read 100% at the CLTP. [[

]] Using normal plant surveillance procedures, the IRMs may be adjusted to ensure adequate overlap with the SRMs and APRMs. Therefore, no further evaluation of the APRMs, IRMs, or SRMs is required for MELLLA+.

[[ ]] there is no change in Monticello core power as a result of MELLLA+ operating domain expansion. [[

]] The APRMs, IRMs, and SRMs are installed at Monticello in accordance with the requirements established by the GEH design specifications. Monticello uses normal plant procedures to adjust the IRMs to ensure adequate overlap with the SRMs and APRMs. Therefore, no further evaluation is required.

[[

]]

5.1.2 Local Power Range Monitors

[[ ]] there is no change in the neutron flux experienced by the LPRMs resulting from the MELLLA+ operating domain expansion. [[ ]] No further evaluation of these topics is required for MELLLA+.

[[ ]] there is no change in the neutron flux experienced by the Monticello LPRMs resulting from the MELLLA+ operating domain expansion. The [[ ]] The LPRMs are installed at Monticello in accordance with the requirements established by the GEH design specifications. No further evaluation of these topics is required for MELLLA+.

[[ ]]

5.1.3 Rod Block Monitors

[[ ]] the RBM uses LPRM instrumentation inputs that are combined and referenced to an APRM channel. [[ ]]

[[ ]] and as described in Sections 5.1.1 and 5.1.2, the [[ ]] No further evaluation of these topics is required for MELLLA+.

Section 9.1.1 evaluates the adequacy of the generic RBM setpoints.

[[ ]]

5.1.4 Rod Worth Minimizer

[[ ]] the function of the RWM is to support the operator by enforcing rod patterns until reactor power has reached appropriate levels. The RWM functions to limit the local power in the core to control the effects of the postulated Control Rod Drop Accident (CRDA) at low power. [[ ]] Therefore, no further evaluation is required.

[[ ]] the Monticello RWM supports the operator by enforcing rod patterns until reactor power has reached appropriate levels. [[ ]] Therefore, no further evaluation is required.

[[

]]

5.1.5 Traversing Incore Probes

[[

]] there is no change in the neutron flux experienced by the TIPs resulting from the MELLLA+ operating domain expansion. [[

]] No further evaluation of these topics is required for MELLLA+.

[[ ]] there is no change in the neutron flux experienced by the Monticello TIPs resulting from the MELLLA+ operating domain expansion. [[ ]] The TIPs are installed at Monticello in accordance with the requirements established by the GEH design specifications. No further evaluation of these topics is required for MELLLA+.

[[

]]

In accordance with Methods LTR SER Limitation and Condition 9.17 and M+LTR SER Limitation and Condition 12.15, for Monticello, the predicted bypass void fraction at the D-Level LPRMs is less than the [[ ]] design requirement. The SRLR will validate that the power distribution in the core is achieved while maintaining individual fuel bundles within the allowable thermal limits as defined in the COLR. When moving down and left on the MELLLA+ upper boundary, the Hot Channel exit void in the bypass region increases. The Hot Channel Exit Void in the bypass region exceeds [[ ]] at the [[

]] point.

5.2 BOP MONITORING AND CONTROL

Operation of the plant in the MELLLA+ domain has no effect on the Balance-of-Plant (BOP) system instrumentation and control devices. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Pressure Control System	[[	
Turbine Steam Bypass System (Normal Operation)		
Turbine Steam Bypass System (Safety Analysis)		
Feedwater Control System (Normal Operation)		
Feedwater Control System (Safety Analysis)		
Leak Detection System		]]

5.2.1 Pressure Control System

[[

]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]] for Monticello there are no increases in reactor operating pressure, MS or FW flow rates. The numerical values showing no increases in reactor operating pressure, MS or FW flow rates are presented in Table 1-2. The system dynamic characteristics of the Monticello Pressure Control System are not changed. [[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]]

5.2.2 Turbine Steam Bypass System (Normal Operation)

[[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]] for Monticello there are no increases in reactor operating pressure, MS or FW flow rates. The numerical values showing no increases in reactor operating pressure, MS or FW flow rates are presented in Table 1-2. The system dynamic characteristics of the Monticello Turbine Steam Bypass system under normal operation are not changed. [[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[ ]]

5.2.3 Turbine Steam Bypass System (Safety Analysis)

[[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]] for Monticello there are no increases in reactor operating pressure, MS or FW flow rates. The numerical values showing no increases in reactor operating pressure, MS or FW flow rates are presented in Table 1-2. The system dynamic characteristics of the Monticello Turbine Steam Bypass system in safety analysis conditions are not changed. [[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]]

5.2.4 Feedwater Control System (Normal Operation)

[[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]] for Monticello there are no increases in reactor operating pressure, MS or FW flow rates. The numerical values showing no increases in reactor operating pressure, MS or FW flow rates are presented in Table 1-2. The system dynamic characteristics of the Monticello FW Control System under normal operation are not changed. [[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]]

5.2.5 Feedwater Control System (Safety Analysis)

[[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]] for Monticello there are no increases in reactor operating pressure, MS or FW flow rates. The numerical values showing no increases in reactor operating pressure, MS or FW flow rates are presented in Table 1-2. The system dynamic characteristics of the Monticello FW Control System in safety analysis conditions are not changed. [[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]]

5.2.6 Leak Detection System

[[ ]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[ ]] for Monticello there are no increases in reactor operating pressure, MS or FW flow rates. In addition, RWCU, RHR, HPCI and RCIC pressures, temperatures, and flows are also unchanged. The numerical values showing no increases in reactor operating pressure, MS or FW flow rates are presented in Table 1-2. In addition, as discussed in Sections 4.1.1 and 4.1.2, suppression pool time history response temperatures are reduced slightly in the MELLLA+ operating domain. Therefore, the system dynamic characteristics of the Monticello Leak Detection System are not changed. [[

]] Therefore, no further evaluation of this system is required as a result of MELLLA+.

[[

]]

5.3 TECHNICAL SPECIFICATION INSTRUMENT SETPOINTS

The Technical Specifications instrument allowable values (AVs) and the nominal trip setpoints (NTSPs) are those sensed variables which initiate protective actions and are generally associated with the safety analysis. The determination of the AV and NTSP includes consideration of measurement uncertainty and are derived from the analytical limit (AL). Standard GEH setpoint methodologies (References 9 and 12) are used to generate the AV and NTSPs from the related ALs.

The MELLLA+ operating domain expansion results in the development of two AVs.

GEH uses the approved simplified process to determine the instrument AV and NTSP for MELLLA+ applications. The NRC staff has previously reviewed and accepted the simplified approach in the review of NEDC-33004P-A (Reference 9). Consistent with that approval, for Monticello the following criteria are satisfied for using the simplified process:

1. [[

]]

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
APRM Flow-Biased Scram	[[	
Rod Block Monitor		]]

5.3.1 APRM Flow-Biased Scram

The MELLLA+ APRM STP scram AV line (also referred to as the APRM flow-biased scram AV line in Reference 3) is established to [[

]]

The MELLLA+ APRM STP AV expressions are:

$AV_{M+ROD\ BLOCK}$ = 0.61 W + 61.2%, for the Rod Block, and

$AV_{M+SCRAM}$ = 0.61 W + 67.2%, for the Scram.

SLO is not applicable to the MELLLA+ operating domain as discussed in Section 3.6.3. Therefore, the SLO setpoints are unchanged.

The evaluation of APRM STP scram setpoints is consistent with the methods described for [[ ]] this topic in the M+LTR. The ARPM STP scram setpoints for the Monticello [[ ]] are therefore acceptable.

5.3.2 Rod Block Monitor

[[ ]] the RBM setpoints are established to mitigate the Rod Withdrawal Error (RWE) event during power operation. For plants with ARTS RBM systems, [[

]]

Therefore, no further evaluation of the RBM Technical Specification values is required as a result of MELLLA+.

[[ ]] for Monticello there is no change in reactor power level as a result of MELLLA+ operating domain expansion. [[

]] Therefore, no further evaluation of the RBM Technical Specification values is required as a result of MELLLA+.

[[

]]

6.0 ELECTRICAL POWER AND AUXILIARY SYSTEMS

This section addresses the evaluations that are applicable to MELLLA+. Because there is no change in power output, most of the topics in this section are unaffected by the MELLLA+ operating domain expansion.

6.1 AC POWER

The alternating current (AC) power supply includes both off-site and on-site power. The on-site power distribution system consists of transformers, buses, and switchgear. AC power to the distribution system is provided from the transmission system or from on-site Diesel Generators. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
AC Power (Normal or Degraded Voltage)	[[	]]

[[

]] there is no change in the thermal power from the reactor or the electrical output from the station that results from the MELLLA+ operating domain expansion. [[

]]

No further evaluation of the AC Power system is required.

[[ ]] there is no change in the Monticello reactor thermal power or the electrical output from the station that results from the MELLLA+ operating domain expansion. [[

]] No further evaluation of the AC Power system is required.

[[

]]

6.2 DC POWER

The direct current (DC) power distribution system provides control and motive power for various systems/components within the plant. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
DC Power	[[	]]

[[ ]] the MELLLA+ operating domain expansion does not change system requirements for control or motive power loads. [[ ]] Therefore, no further evaluation of this topic is required.

[[ ]] as a result of MELLLA+ operating domain expansion. The MELLLA+ operating domain expansion does not change system requirements for control or motive power loads. Therefore, no further evaluation of the DC Power system is required.

[[ ]].

6.3 FUEL POOL

The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Fuel Pool Cooling	[[	
Crud Activity and Corrosion Products		
Radiation Levels		
Fuel Racks		]]

6.3.1 Fuel Pool Cooling

[[ ]] the MELLLA+ operating domain expansion does not increase the core power level. [[ ]] No further evaluation of the fuel pool cooling systems are required for MELLLA+ operating domain expansion.

[[ ]] Monticello reactor power level does not increase as a result of MELLLA+ operating domain expansion. [[ ]] No further evaluation of the Monticello fuel pool cooling systems are required for MELLLA+ operating domain expansion.

[[ ]].

6.3.2 Crud Activity and Corrosion Products

[[ ]] No further evaluation of the crud and corrosion products in the spent fuel pools is required for MELLLA+ operating domain expansion.

[[

]] Therefore, no further evaluation of the crud and corrosion products in the spent fuel pools is required for the Monticello MELLLA+ operating domain expansion.

[[

]]

6.3.3 Radiation Levels

[[

]] No further evaluation of the radiation levels in the spent fuel pools is required for MELLLA+ operating domain expansion.

[[

]]

Therefore, no further evaluation of the radiation levels in the spent fuel pools is required for the Monticello MELLLA+ operating domain expansion.

[[

]]

6.3.4 Fuel Racks

[[ ]] the MELLLA+ operating domain expansion does not increase the core power level. [[

]] No further evaluation of the fuel racks is required for MELLLA+ operating domain expansion.

[[ ]] the MELLLA+ operating domain expansion does not increase the Monticello core power level. [[

]] No further evaluation of the fuel racks is required for MELLLA+ operating domain expansion.

[[

]]

6.4 WATER SYSTEMS

The water systems are designed to provide a reliable supply of cooling water for normal operation and design basis accident conditions. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Water Systems	[[	]]

[[ ]] the performance of the safety-related Service Water System during and following the most limiting design basis event, the LOCA, is not affected by the MELLLA+ operating domain expansion.

[[

]] No further evaluation of water systems is required for MELLLA+.

[[ ]] for Monticello the MELLLA+ operating domain expansion does not affect the performance of the safety-related Emergency Service Water System or the RHR Service Water System during and following the most limiting design basis event, the LOCA, as discussed in Section 4.3. [[

]] No further evaluation of the Monticello water systems is required for MELLLA+ operating domain expansion.

[[

]]

6.5 STANDBY LIQUID CONTROL SYSTEM

The Standby Liquid Control System (SLCS) is a manually operated system that pumps a sodium pentaborate solution into the vessel to provide neutron absorption and achieve a subcritical reactor condition in the situation where none of the control rods can be inserted. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Shutdown Margin	[[	
System Hardware		
ATWS Requirements		]]

6.5.1 Shutdown Margin

[[

]] An increase in the reactor boron concentration may be achieved by increasing, either individually or collectively, (1) the minimum solution volume, (2) the minimum specified solution concentration, or (3) the isotopic enrichment of the B^{10} in the stored neutron absorber solution. In order to account for reactivity variations between cycles, the USAR Section 6.6 limit for SLCS Boron concentration has sufficient margin to accommodate most core design variations.

[[

]] Because no new fuel product line designs are introduced for MELLLA+ operating domain expansion, the USAR Section 6.6 limit for minimum SLCS Boron of 660 ppm does not change as a result of

MELLLA+ operating domain expansion. Monticello calculates SLCS shutdown margin as a part of the core reload analysis. Therefore, no further evaluation of SLCS shutdown margin is required for MELLLA+.

[[ ]]

6.5.2 System Hardware

The Monticello reactor operating pressure is unchanged by MELLLA+ operating domain expansion. The numerical values showing no increases in reactor operating pressure are presented in Table 1-2. As discussed in Section 3.1.2, there are no changes to the Monticello SRV setpoints as a result of MELLLA+ operating domain expansion. Because the reactor dome pressure and SRV setpoints are unchanged for MELLLA+, the SLCS process parameters do not change. Therefore, the capability of the SLCS to perform its shutdown function is not affected by MELLLA+. [[ ]] Therefore, the Monticello SLCS remains capable of performing its shutdown function.

[[ ]]

6.5.3 ATWS Requirements

As described in the M+LTR, the SLCS ATWS performance is evaluated in Section 9.3.1 [[ ]] The representative MELLLA+ evaluation shows that the SLCS maintains the capability to mitigate an ATWS and that the current boron injection rate is sufficient relative to the peak suppression pool temperature. The ATWS analysis in Section 9.3.1 also demonstrates that there is no increase in the peak vessel dome pressure during the time the SLCS is in operation.

The Monticello plant-specific ATWS analysis shows the maximum reactor lower plenum pressure following the limiting ATWS event reaches 1205.3 psig (1220 psia) during the time the SLCS is analyzed to be in operation. The pressure margin for the pump discharge relief valves remains above the minimum value needed to ensure that the SLC relief valves remain closed during system injection. Because Monticello does not take credit for the operation of the SRVs in a power actuated relief mode during an ATWS, the peak reactor pressures for the Loss of Off-site Power (LOOP) event would be bounded by the results of the Pressure Regulator Failure-Open (PRFO) ATWS event. The minimum reactor pressure, just prior to the time when SLCS initiates, remains low enough to ensure SLC relief valve closure prior to the analyzed SLCS initiation time in the event of an early initiation of the SLCS during the initial ATWS transient pressure response. Consequently, the current Monticello SLCS process parameters associated with the minimum boron injection rate do not need to change. Therefore, SLCS operation during an ATWS is not affected by the MELLLA+ operating domain expansion.

[[ ]]

6.6 HEATING, VENTILATION AND AIR CONDITIONING

The Heating, Ventilation, and Air Conditioning (HVAC) systems consists mainly of heating, cooling supply, exhaust and recirculation units in the turbine building, containment building and the drywell, auxiliary building, fuel handling building, control building, and the radwaste building. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Heating, Ventilation. and Air Conditioning	[[	]]

[[ ]] the process temperatures and heat load from motors and cables do not change due to MELLLA+ operating domain expansion. [[

]] No further evaluations of the HVAC system are required for MELLLA+ operating domain expansion.

[[ ]] for Monticello HVAC systems, the process temperatures and heat load from motors and cables are bounded by the EPU process temperatures and heat loads and as such are within the design of the HVAC equipment chosen for worst case conditions. [[

]] No further evaluations of the Monticello HVAC systems are required for MELLLA+ operating domain expansion.

[[

]].

6.7 FIRE PROTECTION

This section addresses the fire protection program, fire suppression and detection systems, and safe shutdown system responses to postulated fire events. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Fire Protection	[[	]]

[[ ]] because the decay heat does not change for the MELLLA+ operating domain expansion, there are no changes in vessel water level response, operator response time, peak cladding temperature, and peak suppression pool temperature and containment pressure. [[

]] Provided the above criteria are met, no further evaluation of Fire Protection is required for MELLLA+ operating domain expansion.

[[ ]] for Monticello these parameters do not change as a result of MELLLA+ operating domain expansion. As discussed in Section 1.2.3, decay heat does not change as a result of MELLLA+ operating domain expansion. Reactor vessel water level response is unchanged by MELLLA+ operating domain expansion. Operator response times are not affected by MELLLA+ because: [[

]] The effect of MELLLA+ operating domain expansion on peak cladding temperatures is evaluated to be acceptable in Section 4.3. The effect of MELLLA+ operating domain expansion on peak suppression pool temperatures and containment pressure response are evaluated to be acceptable in Section 4.1. [[

]], and no further evaluation of Fire Protection is required for MELLLA+ operating domain expansion.

[[
]]

6.8 OTHER SYSTEMS AFFECTED

The topics addressed in this evaluation are other systems that may be affected by the MELLLA+ operating domain expansion:

Topic	M+LTR Disposition	Monticello Result
Other Systems	[[	]]

The generic disposition of the Other Systems Affected topic in the M+LTR describes that the systems typically found in a BWR power plant have been evaluated to establish those systems that are affected by the MELLLA+ operating domain expansion. Those systems that are significantly affected by the MELLLA+ operating domain expansion are addressed in this report. Other systems not addressed by this report are not significantly affected by the MELLLA+ operating domain expansion.

[[ ]] the Monticello systems evaluated [[ ]] were reviewed for MELLLA+ operating domain expansion to ensure that all significantly affected systems were addressed. This topic confirms that those systems that are significantly affected by the MELLLA+ operating domain expansion are addressed in this report. Other systems not addressed by this report are not significantly affected by the MELLLA+ operating domain expansion.

[[
]]

7.0 POWER CONVERSION SYSTEMS

This section addresses the evaluations that are applicable to MELLLA+. Because the pressure, steam and FW flow rate, and FW fluid temperature ranges are unchanged by the operating domain expansion, the power conversion systems are unaffected.

7.1 TURBINE-GENERATOR

The turbine-generator converts the thermal energy in the steam into electrical energy. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Turbine-Generator	[[	]]

[[ ]] the MELLLA+ operating domain expansion does not change the pressure, thermal energy, and steam flow from the reactor. Likewise, there is no change in the electrical output of the generator. Therefore, there is no change in the previous missile avoidance and protection analysis. No further evaluation of this topic is required.

[[ ]] there is no change in the reactor power level as a result of MELLLA+ operating domain expansion. For Monticello there are no increases in reactor operating pressure or MS flow rates. The numerical values showing no increases in reactor operating pressure and MS flow rates are presented in Table 1-2. The electrical output in the current licensed operating domain and in the MELLLA+ operating domain is approximately 691 MWe. Therefore, there is no change to the Monticello missile avoidance and protection analysis for the current licensed operating domain. No further evaluation of this topic is required.

[[ ]].

7.2 CONDENSER AND STEAM JET AIR EJECTORS

The condenser removes heat from the steam discharged from the turbine and provides liquid for the condensate and FW systems. The steam jet air ejectors remove non-condensable gases from the condenser to improve thermal performance. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Condenser And Steam Jet Air Ejectors	[[	]]

[[ ]] the MELLLA+ operating domain expansion does not change the steam flow rate or power level. [[ ]] MELLLA+ operating domain expansion does not affect the condenser and steam jet air ejectors, and no further evaluation is required.

[[ ]] there is no change in the reactor power level as a result of MELLLA+ operating domain expansion. For Monticello there are no increases in reactor operating pressure or MS flow rates. The numerical values showing no increases in reactor operating pressure and MS flow rates are presented in Table 1-2. [[ ]] MELLLA+ operating domain expansion does not affect the Monticello condenser and steam jet air ejectors, and no further evaluation is required.

[[ ]]

7.3 TURBINE STEAM BYPASS

The Turbine Steam Bypass system provides a means of accommodating excess steam generated during normal plant maneuvers and transients. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Turbine Steam Bypass	[[	]]

[[ ]] there is no change in the power level, pressure or steam flow for the MELLLA+ operating domain expansion. Therefore, MELLLA+ operating domain expansion does not affect the turbine steam bypass system, and no further evaluation is required.

[[ ]] there is no change in the reactor power level as a result of the MELLLA+ operating domain expansion. For Monticello there are no increases in the reactor operating pressure or MS flow rates. The numerical values showing no increases in the reactor operating pressure and MS flow rates are presented in Table 1-2. Therefore, MELLLA+ operating domain expansion does not affect the Monticello turbine steam bypass system, and no further evaluation is required.

[[ ]]

7.4 FEEDWATER AND CONDENSATE SYSTEMS

The Feedwater and Condensate systems provide the source of makeup water to the reactor to support normal plant operation. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Feedwater And Condensate Systems	[[	]]

[[ ]] there is no change in the FW pressure, temperature, or flow for the MELLLA+ operating domain expansion. The performance requirements for the FW and condensate systems are not changed by MELLLA+ operating domain expansion, and no further evaluation is required.

[[ ]] there is no change in the Monticello FW pressure, temperature, and flow rates. Because FW flow is unchanged in the MELLLA+ domain, system resistance and therefore operating pressures in the MELLLA+ operating domain are not changed. The numerical values showing no increases in FW temperature and flow rates are presented in Table 1-2. Therefore, MELLLA+ operating domain expansion does not affect the Monticello FW and condensate systems, and no further evaluation is required.

[[

]]

8.0 RADWASTE SYSTEMS AND RADIATION SOURCES

This section addresses the evaluations that are applicable to MELLLA+.

8.1 LIQUID AND SOLID WASTE MANAGEMENT

The Liquid Radwaste system collects, monitors, processes, stores and returns processed radioactive waste to the plant for reuse or discharge. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Coolant Fission and Corrosion Product Levels	[[	
Waste Volumes		]]

8.1.1 Coolant Fission and Corrosion Product Levels

A discussion of the Coolant Activation Products as well as Fission and Activated Corrosion Products levels in the coolant is presented in Section 8.4.

8.1.2 Waste Volumes

[[ ]] because the power level, FW flow, and steam flow do not change for the MELLLA+ operating domain expansion, the volume of liquid radwaste and the coolant concentrations of fission and corrosion products will be unchanged. The largest source of liquid and wet solid waste is from the backwash of the condensate demineralizers. Although the volume of waste generated is not expected to increase, potentially higher MCO in the reactor steam could result in slightly higher loading on the condensate demineralizers. Because the higher moisture content will occur infrequently, the MELLLA+ operating domain expansion will not cause the condensate demineralizer or the reactor water cleanup filter demineralizer backwash frequency to be changed significantly. Therefore, the waste volumes will not be affected by the MELLLA+ operating domain expansion, and no further evaluation of this topic is required.

[[ ]] there is no change in the reactor power level as a result of MELLLA+ operating domain expansion. For Monticello there are no increases in the MS or FW flow rates. The numerical values showing no increases in MS and FW flow rates are presented in Table 1-2. The EPU evaluation was not limited by MCO, but is based on an increase in backwash frequency proportional to FW flow. The increase in FW flow due to EPU resulted in an increase in liquid waste processing of 2% of system capacity, bringing total usage to approximately 55% of capacity.

[[
]]

8.2 GASEOUS WASTE MANAGEMENT

The primary function of the Gaseous Waste Management (Offgas) system is to process and control the release of gaseous radioactive effluents to the site environs so that the total radiation exposure of persons in off-site areas is as low as reasonably achievable (ALARA) and does not exceed applicable guidelines. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Off-site Release Rate	[[	
Recombiner Performance		]]

8.2.1 Off-site Release Rate

[[ ]] the radiological release rate is administratively controlled to remain within existing limits and is a function of fuel cladding performance, main condenser air inleakage, charcoal adsorber inlet dew point, and charcoal adsorber temperature. [[

]] No further evaluation of this topic is required.

[[ ]] the Monticello radiological release rate is administratively controlled to remain within existing release rate limits. In addition, none of the applicable identified parameters are affected by MELLLA+ operating domain expansion. The Monticello Offgas system also incorporates a direct mechanical holdup system utilizing compressed gas storage tanks to effect holdup delay times. Because the storage tank volume does not change for MELLLA+, it can be concluded that the generic discussion in the M+LTR would envelop this design. [[ ]], and no further evaluation is required.

[[ ]]

8.2.2 Recombiner Performance

[[

]] Therefore, recombiner performance is unaffected by the MELLLA+ operating domain expansion, and no further evaluation is required.

[[ ]] the Monticello-specific value for radiolytic gas flow rate is 0.0677 cfm/MWt, which does not change as a result of MELLLA+ operating domain expansion. Therefore, the Monticello recombiner performance is unaffected by the MELLLA+ operating domain expansion, and no further evaluation is required.

[[ ]]

[[ ]]

8.3 RADIATION SOURCES IN THE REACTOR CORE

During power operation, the radiation sources in the core are directly related to the fission rate. These sources include radiation from the fission process, accumulated fission products, and neutron activation reactions. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Post Operational Radiation Sources for Radiological and Shielding Analysis	[[	]]

[[

]] the post-operation radiation sources in the core are primarily the result of accumulated fission products. [[

]] Therefore, no further evaluation of radiation sources in the reactor core is required.

[[ ]] the reactor power does not increase as a result of MELLLA+ operating domain expansion. Monticello core average exposure is [[

]] No further evaluation of radiation sources in the reactor core is required.

[[

]]

8.4 RADIATION SOURCES IN REACTOR COOLANT

Radiation sources in the reactor coolant include activation products, activation corrosion products, and fission products. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Coolant Activation Products	[[	
Fission and Activated Corrosion Products		]]

8.4.1 Coolant Activation Products

[[

]] during reactor operation, the coolant passing through the core region becomes radioactive as a result of nuclear reactions. The coolant activation process is the dominant source resulting in the production of short-lived radionuclides of N-16 and other activation products. These coolant activation products are the primary source of radiation in the turbines during operation. The M+LTR states that if [[

]] no further evaluation of this topic is required.

[[ ]] the reactor power does not increase as a result of MELLLA+ operating domain expansion. As discussed in Section 3.2.1, the change in fluence as a result of MELLLA+ operating domain expansion is insignificant. The Monticello steam flow rate does not change as a result of MELLLA+ operating domain expansion. Numerical values demonstrating that the MS flow does not increase are provided in Table 1-2. [[

]] No further evaluation of this topic is required.

[[

]]

8.4.2 Fission and Activation Corrosion Products

The reactor coolant contains fission products and activated corrosion products. For the MELLLA+ operating domain there is no change in the FW flow, steam flow, or power. However, [[

]]

For Monticello, reactor power and fuel thermal limits do not change as a result of the MELLLA+ operating domain expansion. The Monticello MS and FW flow rates do not change as a result of the MELLLA+ operating domain expansion. Numerical values demonstrating that the MS and FW flow rates do not increase are provided in Table 1-2. Therefore, the MELLLA+ operating domain expansion does not affect the total activity concentration in the reactor coolant.

Steam separator and dryer performance for MELLLA+ operation is discussed in Section 3.3.6. The moisture content of the MS leaving the vessel may increase up to 0.5wt% at times while operating near the minimum core flow in the MELLLA+ operating domain. The distribution of the fission and activated corrosion product activity between the reactor water and steam is affected by the increased moisture content. With increased MCO, additional activity is carried over from the reactor water with the steam. While the moisture content limit is 0.5 wt%, [[

]] the fission and activated corrosion product levels in the plant are not significantly affected for operation in the MELLLA+ operating domain.

[[

]]

8.5 Radiation Levels

Radiation levels during operation are derived from coolant sources. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Normal Operational Radiation Levels	[[	
Post-Shutdown Radiation Levels		
Post-Accident Radiation Levels		]]

8.5.1 Normal Operational Radiation Levels

The M+LTR describes that plant radiation levels for normal and post-shutdown operation are directly dependent upon radiation levels and radionuclide species in the reactor coolant (steam and water) except where the core is directly involved. [[

]]

For Monticello reactor power does not change as a result of the MELLLA+ operating domain expansion. The Monticello MS flow rate does not change as a result of the MELLLA+ operating domain expansion. Numerical values demonstrating the MS flow rate does not increase are provided in Table 1-2. Because there is no change in power or steam flow rate for the MELLLA+ expanded operating domain, the radiation levels from the coolant activation products do not vary significantly. These radionuclide concentrations in the coolant do not vary significantly unless the MCO from the vessel increases, which affects the equilibrium concentrations in the coolant. As discussed in Section 8.4, the moisture content of the MS leaving the vessel may increase at certain times while operating in the MELLLA+ operating domain. However, the Monticello cycle average value will be monitored and controlled within the existing analytical assumption of 0.5 wt% used in the determination of normal operation radiation levels. The overall radiological effect of the increased moisture content is a function of the plant water radiochemistry and the levels of activated corrosion products maintained. Monticello maintains appropriate health physics and ALARA controls to address any increase in the normal operation levels.

8.5.2 Post-Shutdown Radiation Levels

The M+LTR describes that plant radiation levels for normal and post-shutdown operation are directly dependent upon radiation levels and radionuclide species in the reactor coolant (steam and water) except where the core is directly involved. [[

]]

For Monticello, reactor power does not change as a result of the MELLLA+ operating domain expansion. The Monticello MS flow rate does not change as a result of the MELLLA+ operating domain expansion. Numerical values demonstrating the MS flow rate does not increase are provided in Table 1-2. The shutdown radiation levels are dominated by the accumulated contamination of some fission and activated corrosion products. These radionuclide concentrations in the coolant do not vary significantly unless the MCO from the vessel increases, which affects the equilibrium concentrations in the coolant. As discussed in Section 8.4, the moisture content of the MS leaving the vessel may increase at certain times while operating in the MELLLA+ operating domain. However, the Monticello cycle average value will be monitored and controlled within the existing analytical assumption of 0.5 wt% used in the determination of post-shutdown radiation levels. The overall radiological effect of the increased moisture content is a function of the plant water radiochemistry and the levels of activated corrosion products maintained. Monticello maintains appropriate health physics and ALARA controls to address any increase in the shutdown radiation levels.

8.5.3 Post-Accident Radiation Levels

The M+LTR describes that the post-accident radiation levels depend primarily upon the core inventory of fission products and Technical Specification levels of radionuclides in the coolant. [[

]] Section 9.2 discusses off-site doses for post-accident calculations.

8.6 NORMAL OPERATION OFF-SITE DOSES

The primary source of normal operation off-site doses is: (1) airborne releases from the Offgas System, and (2) gamma shine from the plant turbines. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Plant Gaseous Emissions	[[	
Gamma Shine from the Turbine		]]

8.6.1 Plant Gaseous Emissions

[[ ]] for the MELLLA+ operating domain expansion, there is no change in the core power and the steam flow rate. [[ ]] No further evaluation of plant gaseous emissions is required.

[[ ]] the reactor power does not change as a result of the MELLLA+ operating domain expansion. The Monticello steam flow rate does not change as a result of the MELLLA+ operating domain expansion. Numerical values demonstrating that the MS flow does not increase are provided in Table 1-2. [[

]] Therefore, no further evaluation of plant gaseous emissions is required.

[[

]]

8.6.2 Gamma Shine from the Turbine

[[

]] Provided these conditions are met, no further evaluation of gamma shine from the turbine is required.

[[ ]] and as discussed in Section 3.2.1, the change in fluence as a result of the MELLLA+ operating domain expansion is insignificant. The Monticello steam flow rate does not change as a result of the MELLLA+ operating domain expansion. Numerical values demonstrating the MS flow does not increase are provided in Table 1-2. [[

]]

[[

]]

[[

]]

9.0 REACTOR SAFETY PERFORMANCE EVALUATIONS

This section addresses the evaluations that are applicable to MELLLA+.

9.1 ANTICIPATED OPERATIONAL OCCURRENCES

The Monticello USAR defines the licensing basis AOOs. Table 9-1 of the M+LTR provides an assessment of the effect of the MELLLA+ operating domain expansion on each of the Reference 6 limiting AOO events and key non-limiting events. Table 9-1 of the M+LTR includes fuel thermal margin, overpressure, and loss of water level events. The overpressure protection analysis events are addressed in Section 3.1. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Fuel Thermal Margins Events	[[	
Power and Flow Dependent Limits		
Non-Limiting Events		]]

9.1.1 Fuel Thermal Margin Events

[[

]]. The limiting thermal margin events defined in Reference 6 include:

- Generator Load Rejection Without Bypass (LRNBP) or Turbine Trip Without Bypass (TTNBP),
- Loss of Feedwater Heater (LFWH) or Inadvertent HPCI Startup,
- Control Rod Withdrawal Error, and
- Feedwater Controller Failure (Maximum Demand) (FWCF).

The fuel loading error is categorized as an Infrequent Incident. However, if the licensee does not meet the requirements of GESTAR II (Reference 6), the fuel loading error event would be analyzed as an AOO. Monticello does not meet the requirements of Reference 6. Therefore, the fuel loading error event is evaluated as an AOO for each reload. [[

]]

[[

]]

[[

]]

The thermal margin event analysis is performed as part of the reload process for each reload core and results are documented in the SRLR. From M+LTR SER Limitation and Condition 12.4, [[

]] In accordance with Methods LTR SER Limitation and Condition 9.19, an additional 0.01 will be added to the OLMCPR for conditions above the stretch power uprate power level or above the MELLLA boundary (MELLLA+ conditions), until such time that GEH 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.

In accordance with M+LTR SER Limitation and Condition 12.16, an RWE analysis was performed to confirm the adequacy of the generic RBM setpoints. The RWE was simulated using the three-dimensional core simulator PANACEA. The analysis was performed with an approximate equilibrium core at the MELLLA+ 100% power, 80% core flow statepoint for a comprehensive set of RBM setpoints. The results of this RWE analysis confirmed the validity of the generic RBM setpoints. The RWE results also meet the 1% cladding circumferential plastic strain acceptance criterion.

In accordance with Methods LTR SER Limitations and Conditions 9.9, 9.10, and 9.11, acceptable fuel rod thermal-mechanical performance for both UO_2 and GdO_2 fuel rods was demonstrated. Results for all AOO pressurization transient events analyzed, including equipment out-of-service, showed at least 10% margin to the fuel centerline melt and the 1% cladding circumferential plastic strain acceptance criteria. Fuel rod thermal-mechanical performance will be evaluated as part of the reload licensing analyses performed for the cycle-specific core. Documentation of acceptable fuel rod thermal-mechanical response will be included in the SRLR or COLR.

9.1.2 Power and Flow Dependent Limits

The operating MCPR, LHGR, and/or MAPLHGR thermal limits are modified by a flow factor when the plant is operating at less than 100% core flow. The MCPR flow factor ($MCPR_f$) and the LHGR flow factor ($LHGRFAC_f$) are primarily based upon an evaluation of the slow recirculation flow increase event. [[

]]

Similarly, the thermal limits are modified by a power factor ($MCPR_p$) when the plant is operating at less than 100% power. [[

]]

[[

]]

9.1.3 Non-Limiting Events

[[ ]] provides an assessment of the effect of the MELLLA+ operating range expansion for each of the Reference 6 limiting AOO events and key non-limiting events. Provided these evaluations are applicable to Monticello, no further evaluations are required for non-limiting events. The results of the M+LTR assessment are presented in the table below:

Event	Discussion
Fuel Thermal Margin Events	
Inadvertent HPCI Start (If not bounded by LFWH) (Reference 6 limiting AOO)	[[
Slow Recirculation Increase (K_f, $MCPR_f$) (Reference 6 event – bounds recirculation event AOOs)	
Fast Recirculation Increase	]]

[[

]]

[[

]]

9.2 DESIGN BASIS ACCIDENTS AND EVENTS OF RADIOLOGICAL CONSEQUENCE

9.2.1 Design Basis Events

This section addresses the radiological consequences of a Design Basis Accident (DBA). The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Control Rod Drop Accident (CRDA)	[[	
Instrument Line Break Accident (ILBA)		
Main Steam Line Break Accident (MSLBA) (Outside Containment)		
Loss of Coolant Accident (LOCA) (Inside Containment)		
Fuel Handling Accident (FHA)		]]

9.2.1.1 Control Rod Drop Accident

[[ ]] the radiological consequences of this DBA are evaluated to determine off-site doses as well as control room operator doses. DBA calculations are generally based on core inventory sources or Technical Specification source terms, [[

]]

For Monticello, two postulated CRDA events govern the analysis of radiological consequences. For event 1, the release path is via the mechanical vacuum pump at low power operation. For event 2, the release path is at normal power and the release path is via the condenser and the steam jet air ejectors. For event 1, the plant is not operating in the MELLLA+ operating domain as shown by the Power/Flow map, and therefore there is no effect on the results. Because Monticello may operate with portions of the Offgas system bypassed, event 2 represents the bounding radiological consequences.

The CRDA release is dependent on the source terms and maximum peaking factor. Operation in the MELLLA+ operating domain does not affect the Alternate Source Term (AST) CRDA source term and the peaking factor remains bounding. There are no changes to removal, transport, or dose conversion assumptions for this event. Therefore, the Monticello CRDA evaluation for the MELLLA+ operating domain is bounded by the analysis for the current licensed operating domain, and no further evaluation is required.

9.2.1.2 Instrument Line Break Accident

This topic is not applicable for Monticello because the Instrument Line Break Analysis is not a reviewed accident per the Monticello USAR.

9.2.1.3 Main Steam Line Break Accident (Outside Containment)

[[ ]] the radiological consequences of this DBA are evaluated to determine off-site doses as well as control room operator doses. DBA calculations are generally based on core inventory sources or Technical Specification source terms, [[ ]] Table 9-4 of the M+LTR provides a detailed evaluation of the MSLBA events. [[ ]] then no further review is required.

[[ ]] In addition, the analysis of record for the worst-case MSLBA radiological consequences is at hot standby conditions, which is outside of the MELLLA+ operating domain as shown by the Power/Flow map. Therefore the Monticello MSLBA evaluation is not affected by the MELLLA+ operating domain expansion and no further evaluation is required.

[[ ]]

9.2.1.4 Loss of Coolant Accident (Inside Containment)

[[ ]] the radiological consequences of this DBA are evaluated to determine off-site doses as well as control room operator doses. DBA calculations are generally based on core inventory sources or Technical Specification source terms, [[

]]

The design input and assumptions for suppression pool pH were previously evaluated. The source term assumptions are not changing for MELLLA+. In addition, the acid production terms are not changing for MELLLA+ conditions. The use of Sodium Pentaborate as a buffer per USAR Section 6.6.1.3 continues to be appropriate.

Table 9-4 of the M+LTR provides a detailed evaluation of each of the above events. [[

]] then no further review is required.

[[

]] Therefore, the Monticello LOCA evaluation is not affected by the MELLLA+ operating domain expansion and no further evaluation is required.

[[

]]

9.2.1.5 Fuel Handling Accident

[[

]] the radiological consequences of this DBA are evaluated to determine off-site doses as well as control room operator doses. DBA calculations are generally based on core inventory sources or Technical Specification source terms, [[

]] Table 9-4 of the M+LTR provides a detailed evaluation of each of the above events. [[

]] then no further review is required.

[[

]] Therefore, the Monticello FHA evaluation for the MELLLA+ operating domain is bounded by the analysis for the current licensed operating domain, and no further evaluation is required.

[[

]]

9.2.2 Other Events with Radiological Consequences

This section addresses the radiological consequences of other events as described in the M+LTR. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Large Line Break (Feedwater or Reactor Water Cleanup)	[[	
Liquid Radwaste Tank Failure		
Offgas System Failure		
Cask Drop		]]

9.2.2.1 Large Line Break (Feedwater or Reactor Water Cleanup)

This topic is not applicable for Monticello because the Large Line Break (FW or RWCU) is not an evaluated accident per the Monticello USAR.

9.2.2.2 Liquid Radwaste Tank Failure

This topic is not applicable for Monticello because the Liquid Radwaste Tank Failure is not an evaluated accident per the Monticello USAR.

9.2.2.3 Offgas System Failure

This topic is not applicable for Monticello because the Offgas System Failure is not an evaluated accident per the Monticello USAR.

9.2.2.4 Cask Drop

This topic is not applicable for Monticello because the Cask Drop is not an evaluated accident per the Monticello USAR.

9.3 SPECIAL EVENTS

This section considers three special events: ATWS, Station Blackout, and ATWS with Core Instability. The operator actions required as a result of ATWS are reviewed and discussed as a part of Section 10.9. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
ATWS (Overpressure)	[[	
ATWS (Suppression Pool Temperature and Containment Pressure)		
ATWS (Peak Cladding Temperature and Oxidation)		
Station Blackout		
ATWS with Core Instability		]]

9.3.1 Anticipated Transients without Scram

There is no change in core power, decay heat, pressure, or steam flow as a result of the MELLLA+ operating range expansion. [[

]] The ATWS evaluation acceptance criteria are to:

- Maintain reactor vessel integrity (i.e., peak vessel bottom pressure less than the ASME Service Level C limit of 1500 psig)
- Maintain containment integrity (i.e., maximum containment pressure lower than the design pressure of the containment structure and maximum suppression pool temperature lower than the pool temperature limit)
- Maintain coolable core geometry

Plant-specific ATWS analyses are performed to demonstrate that the ATWS acceptance criteria are met for operation in the MELLLA+ operating domain. Monticello meets the ATWS mitigation requirements in 10 CFR 50.62 for an Alternate Rod Insertion (ARI) system, SLCS boron injection equivalent to 86 gpm, and automatic RPT logic (i.e., ATWS-RPT). The plant-specific ATWS analyses take credit for the ATWS-RPT and SLCS. However, ARI is not credited.

In accordance with M+LTR SER Limitations and Conditions 12.18.e and 12.18.f, the key input parameters to the plant-specific ATWS analyses are provided in Table 9-2. For key input parameters that are important to simulating the ATWS analysis and are specified in the Technical Specification (e.g., SLCS parameters, ATWS-RPT), the calculation assumptions are consistent with the allowed Monticello Technical Specification values and plant configuration. Although conservative inputs consistent with the Monticello Technical Specification values were used, this does not imply that ATWS is part of the Technical Specification Bases. In some instances, nominal input parameters are used consistent with the approach in Reference 22. Reference 22 contained sensitivity studies on key parameters for information. However, there was no specific uncertainty treatment applied. In addition, the Equipment Out-Of-Service (EOOS) assumptions for ATWS are consistent with Technical Specification requirements. M+LTR SER Limitation and Condition 12.23.2 requires that the plant-specific automatic settings be modeled for ATWS. For Monticello, the plant automatic settings, which include the ATWS-RPT, low pressure isolation, and SRV actuation, are modeled based on the input parameters in Table 9-2. As required by M+LTR SER Limitation and Condition 12.23.8, the plant-specific ATWS analyses account for plant- and fuel-design-specific features including debris filters.

9.3.1.1 Anticipated Transients without Scram (Licensing Basis)

The plant-specific ATWS analysis is performed using the approved ODYN methodology documented in Section 5.3.4 of ELTR1 (Reference 7). The ATWS analysis using the ODYN methodology is the plant's licensing basis for this application.

[[

]]

A licensing basis ODYN ATWS analysis was performed to demonstrate the effect of MELLLA+ on the ATWS acceptance criteria. [[

]]

The results of the licensing basis ODYN ATWS analysis are provided in Table 9-3. [[

]] The peak vessel bottom pressure response is dependent on several inputs, including the SRV upper tolerances assumed in the ATWS analysis. In accordance with M+LTR SER Limitation and Condition 12.23.3, [[

]] Monticello as-found SRV lift setpoint tests do not show a propensity for setpoint drift higher than the 3% drift tolerance. Therefore, the SRV upper tolerances used in the ATWS analysis are consistent with the plant-specific performance.

[[

]] M+LTR SER Limitation and Condition 12.23.11 requires that the use of suppression pool temperature limits higher than the Heat Capacity Temperature Limit (HCTL) for emergency depressurization must be justified. The containment design limit is the ATWS acceptance criteria. [[

]]

[[

]]

A coolable core geometry is assured by meeting the 2200°F PCT and 17% local cladding oxidation acceptance criteria of 10 CFR 50.46. [[

]]

The results of the licensing basis ODYN ATWS analysis meet the ATWS acceptance criteria. Therefore, the Monticello response to an ATWS event initiated in the MELLLA+ operating domain is acceptable.

9.3.1.2 Anticipated Transients without Scram (Best-Estimate Calculation)

Monticello Emergency Operating Procedures (EOPs) require depressurization during an ATWS event when the suppression pool temperature reaches the HCTL. As a result, M+LTR SER Limitation and Condition 12.18.a requires that a best-estimate TRACG ATWS analysis must be performed for Monticello because hot shutdown was not achieved prior to reaching the HCTL based on the licensing basis ODYN calculation.

The best-estimate TRACG ATWS analysis was performed to demonstrate that the ATWS acceptance criteria are met for an ATWS event initiated in the MELLLA+ operating domain with depressurization explicitly modeled. The best-estimate TRACG ATWS analysis accounts for plant parameters and Monticello EOP actions, including water level control strategy and emergency depressurization. The best-estimate TRACG ATWS analysis modeled in-channel water rod flow in accordance with M+LTR SER Limitation and Condition 12.24.1. The calculation was performed using the latest NRC-approved neutronic and thermal-hydraulic codes TGBLA06/PANAC11 and TRACG04, which is under NRC review (Reference 23).

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The results of the best-estimate TRACG ATWS analysis are provided in Table 9-4. Figures 9-3 through 9-6 show the sensitivity of the plant response [[ ]] Figures 9-7 through 9-11 show the sensitivity of the plant response [[ ]]

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The results of the best-estimate TRACG ATWS analysis meet the ATWS acceptance criteria. Therefore, the Monticello response to an ATWS event initiated in the MELLLA+ operating domain is acceptable when accounting for plant parameters and Monticello EOP actions, including water level control strategy and emergency depressurization.

9.3.2 Station Blackout

[[ ]]
there is no significant change in core power, decay heat, pressure, or steam flow as a result of the MELLLA+ operating domain expansion. [[

]]

[[ ]] there is no change in the reactor power level as a result of the MELLLA+ operating domain expansion. As discussed in Section 1.2.3, there is no significant change in decay heat as a result of the MELLLA+ operating domain expansion. For Monticello, there are no increases in reactor operating pressure as result of MELLLA+ operating domain expansion. For Monticello there are no significant changes in the MS flow rate. The numerical values showing no significant changes to reactor operating power and MS flow rate are presented in Table 1-2. [[

]] No further evaluation is required.

[[
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9.3.3 ATWS with Core Instability

The NRC has reviewed and accepted GEH's disposition of the effect of large coupled thermal-hydraulic/neutronic core oscillations during a postulated ATWS event, presented in NEDO-32047-A (Reference 25). The companion report, NEDO-32164 (Reference 26) was approved by the same NRC SER. The NRC review concluded that the GEH TRACG code is an adequate tool to estimate the behavior of operating reactors during transients that may result in large power oscillations. The review also concluded that despite the severity of the event, the ATWS criteria are met. The ATWS criteria are established as:

1. Radiological consequences must be maintained within 10 CFR 100 guidelines;
2. Primary system integrity to be maintained;
3. Fuel damage limited so as not to significantly distort the core, impede core cooling, or prevent safe shutdown;
4. Containment integrity to be maintained; and
5. Long-term shutdown and cooling capability to be maintained.

Furthermore, the NRC review concluded that the specified operator actions are sufficient to mitigate the consequences of an ATWS event with large core power oscillations. [[

]]

M+LTR SER Limitation and Condition 12.19 requires that a plant-specific ATWS instability calculation be performed to demonstrate that Monticello EOP actions, including boron injection and water level control strategy, effectively mitigate an ATWS event with large power oscillations in the MELLLA+ operating domain. The plant-specific ATWS instability calculation was (1) based on the peak reactivity exposure condition, (2) modeled the plant-specific configuration important to the ATWS instability response, and (3) used the regional mode nodalization scheme. M+LTR SER Limitation and Condition 12.23.5 requires that the power density be less than 52.5 MWt/Mlbm/hr. For Monticello, the plant-specific maximum power-to-flow ratio at rated power and minimum core flow is 43.5 MWt/Mlbm/hr, which meets the requirement. The plant-specific TRACG calculation modeled in-channel water rod flow in accordance with M+LTR SER Limitation and Condition 12.24.1. The plant-specific ATWS instability calculation was performed using the latest NRC-approved neutronic and thermal-hydraulic codes TGBLA06/PANAC11 and TRACG04, which is under NRC review (Reference 23).

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The results of the plant-specific TRACG ATWS instability calculation are provided in Table 9-5. Figures 9-12 through 9-14 show the mitigating effect of decreasing water level and boron injection on the core and bundle response to the ATWS instability event.

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The results of the plant-specific TRACG ATWS instability calculation meet the ATWS acceptance criteria. Therefore, the Monticello response to an ATWS with core instability event initiated in the MELLLA+ operating domain is acceptable. Monticello EOP actions, including boron injection and water level control strategy, effectively mitigate an ATWS event with large power oscillations in the MELLLA+ operating domain.

Table 9-1 AOO Event Results Summary

Event	Parameter	Unit	CLTP ICF (105%) Rated Core Flow	CLTP 80% Rated Core Flow
TTWBP	Peak Neutron Flux	% Initial	634	423
	Peak Heat Flux	% Initial	137	127
	Peak Vessel Pressure	psig	1272	1260
	ΔCPR Option B	NA	0.44	0.40
TTNBP	Peak Neutron Flux	% Initial	565	350
	Peak Heat Flux	% Initial	132	120
	Peak Vessel Pressure	psig	1256	1245
	ΔCPR Option B	NA	0.40	0.33
LRNBP	Peak Neutron Flux	% Initial	458	270
	Peak Heat Flux	% Initial	123	109
	Peak Vessel Pressure	psig	1247	1234
	ΔCPR Option B	NA	0.36	0.25
FWCF	Peak Neutron Flux	% Initial	609	361
	Peak Heat Flux	% Initial	140	126
	Peak Vessel Pressure	psig	1252	1241
	ΔCPR Option B	NA	0.43	0.36
HPCIL8	Peak Neutron Flux	% Initial	549	339
	Peak Heat Flux	% Initial	139	126
	Peak Vessel Pressure	psig	1242	1231
	ΔCPR Option B	NA	0.43	0.36
LFWH	ΔCPR	NA	0.16 @ 99% RCF	0.13

Table 9-2 Key Input Parameters for ATWS Analyses

Parameter	CLTP	MELLLA+	Basis
Reactor Power (MWt)	2004	2004	[[
Analyzed Power (MWt)	2044	2044	
Analyzed Core Flow (Mlbm/hr / % Rated)	57.0 / 99.0%	46.1 / 80.0	
Reactor Dome Pressure (psia)	1025	1025	
MSIV Closure Time (sec)	4	4	
High Pressure ATWS-RPT Setpoint (psig)	1162	1162	
Low Pressure Isolation Setpoint (psig)	809	809	
RCIC Flow Rate (gpm)	400	400	
HPCI Flow Rate (gpm)	3,000	3,000	
Number of SRVs / SRVs Out-Of-Service (OOS) [1]	8 / 1	8 / 0	
Each SRV Capacity at 1120 psig (Mlbm/hr)	0.821	0.821	
SRV Analytical Opening Setpoints (psig)	1142	1142	
SLCS Injection Location	Lower Plenum	Lower Plenum	
SLCS Injection Rate (gpm)	24	24	
Boron-10 Enrichment (Atom %)	55	55	
Sodium Pentaborate Concentration (% by Weight)	10.7	10.7	
SLCS Liquid Transport Time (sec)	60	60	
Initial Suppression Pool Liquid Volume (ft^3)	68,000	68,000	
Initial Suppression Pool Temperature (°F)	90	90	
Number of RHR Suppression Pool Cooling Loops	2	2	
RHR Heat Exchanger Effectiveness Per Loop (BTU/sec-°F)	193	193	
RHR Heat Exchanger Effectiveness Per Loop during LOOP Event (BTU/sec-°F)	145	145	
RHR Service Water Temperature (°F)	90	90	]]

Notes:

1. The ATWS analysis was performed with one SRV OOS for CLTP and zero SRV OOS for MELLLA+ in order to achieve peak vessel bottom pressures below the ASME Service Level C limit of 1500 psig.

Table 9-3 Key Results for Licensing Basis ODYN ATWS Analysis

ATWS Acceptance Criteria	CLTP	MELLLA+	Design Limit
Peak Vessel Pressure (psig) [1]	[[		1500
Peak Suppression Pool Temperature (°F)			281
Peak Containment Pressure (psig)			56
Peak Cladding Temperature (°F)			2200
Peak Local Cladding Oxidation (%) [3]		]]	17

Notes:

1. The peak vessel pressure is greater for CLTP because the ATWS analysis was performed with one SRV OOS for CLTP and zero SRV OOS for MELLLA+.
2. [[
]]
3. [[
]]

Table 9-4 Key Results for Best-Estimate TRACG ATWS Analysis from MELLLA+ Operating Domain

ATWS Acceptance Criteria	[[			Design Limit
Peak Vessel Pressure (psig) [2]				1500
Peak Suppression Pool Temperature (°F)				281
Peak Containment Pressure (psig)				56.0
Peak Cladding Temperature (°F)				2200
Peak Local Cladding Oxidation (%) [3]			]]	17

Notes:

1. [[

]]

2. The TRACG calculation of peak vessel pressure is based on 1 SRV OOS.

3. [[

]]

Table 9-5 Key Results for ATWS with Core Instability Analysis from MELLLA+ Operating Domain

ATWS Acceptance Criteria	MELLLA+	Design Limit
Peak Vessel Pressure (psig) [1]	[[	1500
Peak Suppression Pool Temperature (°F)		281
Peak Containment Pressure (psig)		56.0
Peak Cladding Temperature (°F)		2200
Peak Local Cladding Oxidation (%) [2]	]]	17

Notes:

1. The TRACG calculation of peak vessel pressure is based on one SRV OOS.
2. [[

]]

Figure 9-1 TTWBP Current Licensed Operating Domain with 105% Core Flow

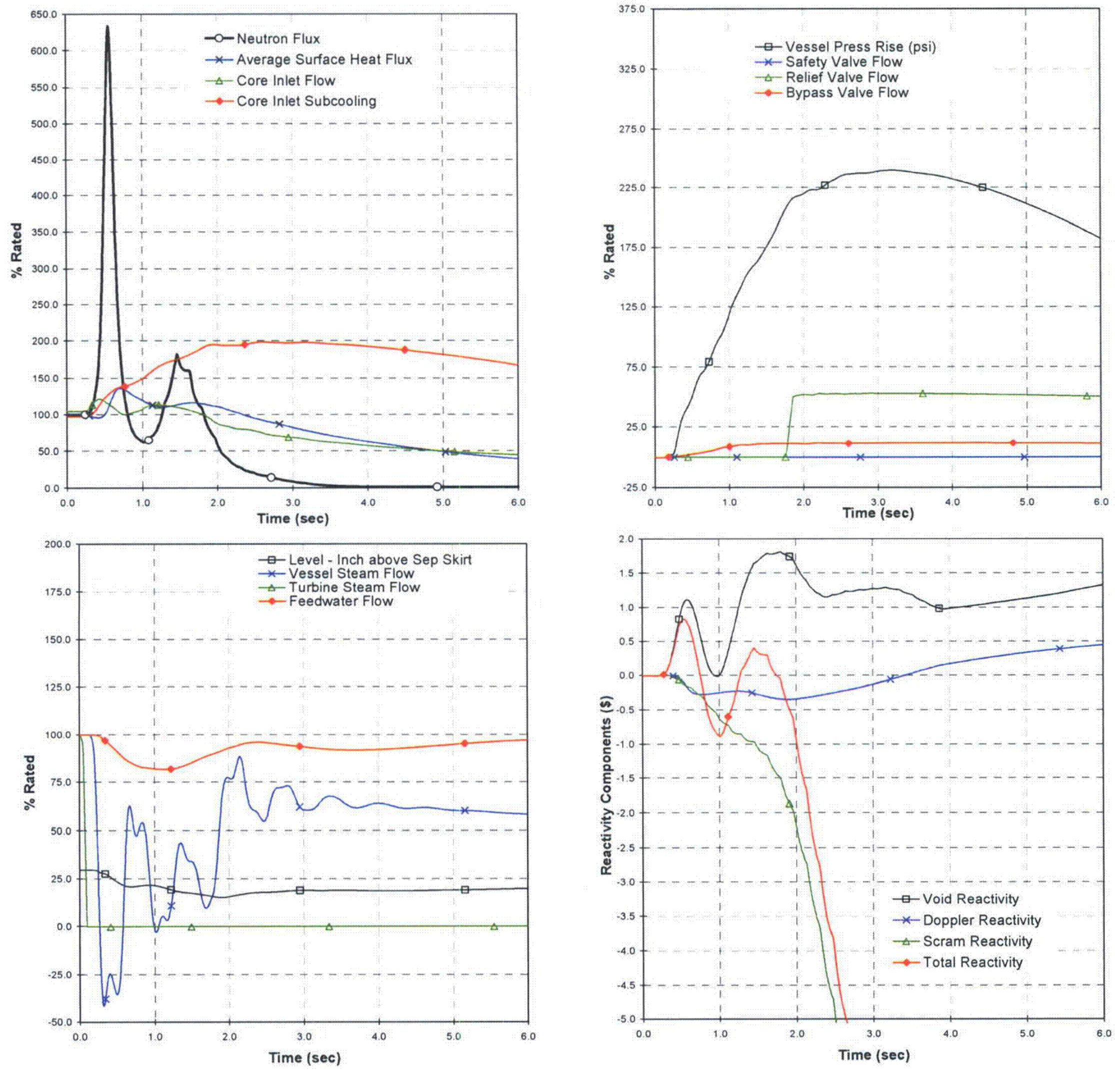

Figure 9-2 TTWBP MELLLA+ Operating Domain with 80% Core Flow

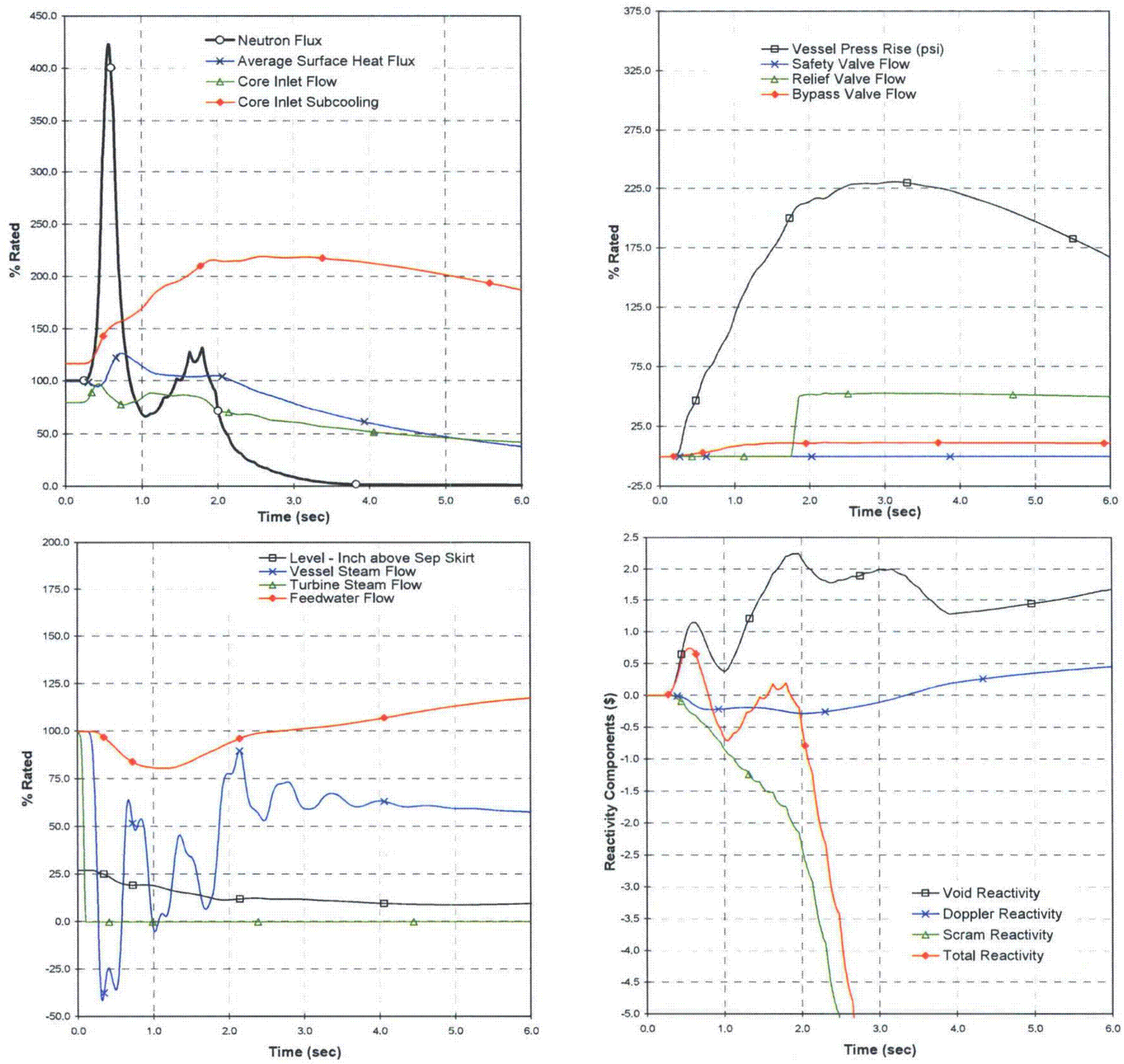

Figure 9-3 [[

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Figure 9-4 [[

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Figure 9-5 [[

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Figure 9-6 [[

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Figure 9-7 [[

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Figure 9-8 [[

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Figure 9-9 [[

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Figure 9-10 [[

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Figure 9-11 [[

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Figure 9-12 [[

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Figure 9-13 [[

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Figure 9-14 [[

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10.0 OTHER EVALUATIONS

This section addresses the evaluations in Section 10 of the M+LTR.

10.1 HIGH ENERGY LINE BREAK

High energy line breaks (HELBs) are evaluated for their effects on equipment qualification. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Steam Lines	[[	
Balance of Plant Liquid Lines		
Other Liquid Lines		]]

10.1.1 Steam Lines

[[ ]] MELLLA+ operating domain expansion has no effect on the steam pressure or enthalpy at the postulated steam line break locations. [[

]]

[[ ]] a review of the heat balances produced for Monticello MELLLA+ operating domain expansion confirms that there is no effect on the steam pressure or enthalpy at the postulated break locations (e.g., MS, HPCI, RCIC). [[

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[[

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10.1.2 Balance of Plant Liquid Lines

[[

]] MELLLA+ operating domain expansion has no effect on the steam pressure or enthalpy at the postulated FW line break locations. [[

]]

[[ ]] a review of the heat balances produced for MELLLA+ confirms that there is no effect on the liquid line conditions at the postulated FW break locations. [[

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[[

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10.1.3 Other Liquid Lines

[[

]] The scope of these evaluations includes MELLLA+ operating domain expansion effects on subcompartment pressures and temperatures, pipe whip, jet impingement, and flooding, consistent with the plant licensing basis.

[[ ]] a review of the heat balances produced for the Monticello MELLLA+ operating domain confirms that there is no effect on the liquid line conditions (excluding FW addressed in Section 10.1.2) at the postulated break locations. [[

]] The scope of these evaluations includes MELLLA+ operating domain expansion effects on subcompartment pressures and temperatures, pipe whip, jet impingement, and flooding, consistent with the plant licensing basis. [[
]]

[[
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10.2 MODERATE ENERGY LINE BREAK

Moderate energy line breaks (MELBs) are not included in the Monticello Licensing Basis.

10.3 ENVIRONMENTAL QUALIFICATION

Safety-related components are required to be qualified for the environment in which they operate. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Electrical Equipment	[[	
Mechanical Equipment with Non-Metallic Components		
Mechanical Component Design Qualification		]]

10.3.1 Electrical Equipment

[[ ]] there is no change in core power, radiation levels, decay heat, pressure, steam flow, or FW flow as a result of the MELLLA+ operating domain expansion. [[

]] No further evaluation is required for environmental qualification of electrical equipment as a result of MELLLA+ operating domain expansion.

[[ ]] the reactor power does not increase as a result of MELLLA+ operating domain expansion. There is no change in normal operation radiation levels (see Section 8.5). There is also no change in decay heat (see Section 1.2.3). For Monticello there are no increases in reactor operating pressure, MS or FW flow rates. The numerical values showing no increases in reactor operating pressure, MS or FW flow rates are presented in Table 1-2. [[

]] No further evaluation is required for environmental qualification of electrical equipment as a result of MELLLA+ operating domain expansion.

[[

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10.3.2 Mechanical Equipment With Non-Metallic Components

[[

]] operation in the MELLLA+ operating domain does not increase any of the normal process temperatures. [[

]] No further evaluation is required for environmental qualification of mechanical equipment with non-metallic components as a result of the MELLLA+ operating domain expansion.

[[ ]] for Monticello normal process temperatures are not affected by MELLLA+. [[

]] No further evaluation is required for environmental qualification of mechanical equipment with non-metallic components equipment as a result of the MELLLA+ operating domain expansion.

[[

]]

10.3.3 Mechanical Component Design Qualification

[[ ]] operation in the MELLLA+ operating domain does not change any of the normal process temperatures, pressures, or flow rates. [[ ]] The change in fluid induced loads on safety-related components is discussed in Sections 3.2.2, 3.5 and 4.1.3. [[ ]]

[[ ]] for Monticello normal process temperatures, pressures, and flow rates are not affected by MELLLA+. There is no change in radiation levels (see Section 8.5). [[ ]]

[[ ]]

10.4 TESTING

When the MELLLA+ operating domain expansion is implemented, testing is recommended to confirm operational performance and control aspects of the MELLLA+ changes. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Steam Separator-Dryer Performance	[[	
APRM Calibration		
Core Performance		
Pressure Regulator		
Water Level Setpoint Changes		
Neutron Flux Noise Surveillance		]]

10.4.1 Steam Separator-Dryer Performance

The performance of the steam separator-dryer (i.e., MCO) is determined by a test similar to that performed in the original startup test program. Testing will be performed near the CLTP and the MELLLA+ minimum core flow statepoint of 80% as well as other statepoints that may be deemed valuable for the purpose of defining the MCO magnitude and trend. This test does not involve safety-related considerations.

10.4.2 Average Power Range Monitor Calibration

The APRM system is calibrated and functionally tested. The APRM STP scram and rod block are calibrated with the MELLLA+ equations and the APRM trips and alarms tested. This test will confirm that the APRM trips, alarms, and rod blocks perform as intended in the MELLLA+ operating domain.

10.4.3 Core Performance

The core performance test will evaluate the core thermal power, fuel thermal margin, and core flow performance to ensure a monitored approach to CLTP in the MELLLA+ operating domain. Measurements of reactor parameters are taken in the MELLLA+ operating domain. Core thermal power and fuel thermal margin are calculated using accepted methods. After steady-state conditions are established, measurements will be taken, core thermal power and fuel thermal margin calculated, and evaluated against projected values and operational limits.

10.4.4 Pressure Regulator

The pressure regulator test will confirm that the pressure control system settings established for operation with the current power versus flow upper boundary at CLTP are adequate in the MELLLA+ operating domain. The pressure regulator should not require any changes from the settings established for the current licensed operating domain. The pressure control system response to pressure setpoint changes is determined by making a down setpoint step change and, after conditions stabilize, an upward setpoint step change.

10.4.5 Water Level Setpoint Changes

The water level setpoint changes test verifies that the FW control system can provide acceptable reactor water level control in the MELLLA+ operating domain. Reactor water level setpoint step changes are introduced into the FW control system, while the plant response is monitored.

10.4.6 Neutron Flux Noise Surveillance

The neutron flux noise surveillance test verifies that the neutron flux noise level in the reactor is within expectations in the MELLLA+ operating domain. The noise will be recorded by monitoring the LPRMs and APRMs at steady state conditions in the MELLLA+ operating domain.

10.5 Individual Plant Examination

In accordance with M+LTR SER Limitation and Condition 12.21, a plant-specific Probabilistic Risk Assessment (PRA) evaluation was performed, which included Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) impacts associated with operation in the MELLLA+ operating domain. The evaluation scope included all of the elements of Section 10.5, Individual Plant Examination, of the M+LTR (Reference 1). The associated PRA report is provided in an enclosure to the NSPM MELLLA+/DSS-CD License Amendment Request.

The best estimate of the CDF risk increase for at-power internal events due to MELLLA+ is a delta CDF of 7.36E-8. The best estimate of the LERF increase for at-power internal events due to MELLLA+ is a delta LERF of 1.62E-8. Using the NRC guidelines established in Regulatory

Guide 1.174 and the calculated results from the Level 1 and 2 PRA, the best estimate for the CDF risk increase (7.36E-8/yr) and the best estimate for the LERF increase (1.62E-8/yr) are both within Region III (i.e., changes that represent very small risk changes).

Based on the risk results from the plant-specific PRA evaluation, operation within the proposed Monticello MELLLA+ operating domain is acceptable.

10.6 OPERATOR TRAINING AND HUMAN FACTORS

Some additional training is required to prepare for Monticello operation in the MELLLA+ operating domain. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Operator Training and Human Factors	[[	]]

The description of the Operator Training and Human Factors topic in the M+LTR describes that the operator training program and plant simulator will be evaluated to determine the specific changes required. The selection of training topics, operator training, the control room modifications, and simulator modifications are within the scope of the Licensee. Required changes are part of the MELLLA+ implementation plan and will be made consistent with the Licensee's current plant training program requirements. These changes will be made consistent with similar changes made for other plant modifications and include any changes to Technical Specifications, EOPs, and plant systems.

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Consistent with the requirements for the plant-specific analysis as described in the M+LTR, the operator training program and plant simulator will be evaluated to determine the specific changes required. Simulator changes and fidelity validation will be performed in accordance with applicable American National Standards Institute (ANSI) standards currently being used at the training simulator. Section 10.9 addresses the MELLLA+ operating domain effects on the Emergency Operating Procedures.

The primary effects of MELLLA+ operating domain expansion on Main Control Room (MCR) operation involve changes to the power/flow map. Other than the changes to the computer display for the power/flow map, there are no major physical changes to the MCR controls, displays or alarms as a result of MELLLA+ operating domain expansion. Some changes are required to MCR panel board alarm settings and automatic actuation setpoints to accommodate changes due to MELLLA+ operating domain expansion.

The APRM STP scram and rod block AVs are also being changed as a result of MELLLA+ operating domain expansion. These changes are described in Section 5.3. Changes to the automatic actuation setpoints are implemented as design changes in accordance with the Monticello approved change control procedures. The change control process includes a review by operations and training personnel. Training and implementation requirements are identified and tracked, including effects on the simulator. Verification of training is required as part of the design change closure process.

There are no planned upgrades of controls, displays or alarms from analog to digital instruments as part of MELLLA+ operating domain expansion. There are no changes to the analog and digital inputs for the Safety Parameter Display System (SPDS) for MELLLA+ operating domain expansion.

Training required to operate Monticello following the MELLLA+ operating domain expansion will be conducted prior to operation in the MELLLA+ domain. Training for the MELLLA+ startup testing program will be performed using "just in time" training of plant operation personnel where appropriate. Data obtained during operation in the MELLLA+ domain will be incorporated into additional training, as needed. The classroom training will cover various aspects of MELLLA+ operating domain expansion, including changes to the power/flow map, changes to important setpoints, changes to plant procedures, and startup test procedures. The classroom training may be combined with simulator training for normal operational sequences unique to operation in the MELLLA+ domain. Because the plant dynamics do not change substantially for operation in the MELLLA+ domain, specific simulator training on transients is not anticipated. However, enhanced training on ATWS event mitigation in the MELLLA+ domain will be conducted.

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10.7 PLANT LIFE

The plant life evaluation identifies degradation mechanisms influenced by increases in fluence and flow rate. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Irradiated Assisted Stress Corrosion Cracking (IASCC)	[[	
Flow Accelerated Corrosion (FAC)		]]

10.7.1 Irradiated Assisted Stress Corrosion Cracking

With regard to Irradiated Assisted Stress Corrosion Cracking (IASCC), the M+LTR states that the longevity of most equipment is not affected by the MELLLA+ operating domain expansion. The peak fluence experienced by the reactor internals may increase, representing a minor increase in the potential for IASCC. Therefore, the current inspection strategy for the reactor internal components is adequate to manage any potential effects of MELLLA+.

Section 3.2.1 provides an evaluation of the change in fluence experienced by the reactor internals. The change in fluence is minor, resulting in an insignificant change in the potential for IASCC. Therefore, the current inspection strategy based on the Boiling Water Reactor Vessel Internals Project (BWRVIP) (Reference 27) is sufficient to address the small increase in fluence.

Fluence calculations performed at MELLLA+ conditions as required by M+LTR SER Limitation and Condition 12.22 indicate that only the top guide and shroud exceed the 5E20 n/cm^2 threshold value for IASCC. The core plate fluence was calculated to be 4.51E20 n/cm^2, and as such, remains beneath the IASCC threshold. Incore instrumentation dry tubes and guide tubes are included in the evaluation due to an existing identification as being susceptible to IASCC in BWRVIP-47.

The increase in fluence due to MELLLA+ does cause an increased potential for IASCC. However, the inspection strategies and inspections recommended by BWRVIP-25, 26, 47 and 76 are based on component configuration and field experience and this inspection program is considered adequate to address the increase in potential for IASCC in the top guide, shroud, and incore instrumentation dry tubes and guide tubes.

The BWRVIP evaluated the failure modes and effects of reactor vessel internals and published the results in BWRVIP-06. This evaluation for the shroud concluded that the inspections and evaluations performed in response to GL 94-03 provided conservative assurance that the shroud is able to perform its safety function. The inspections of the shroud and top guide are conducted using the guidance of BWRVIP- 26, 76 and 183. These guidelines in the areas of detection, inspection, repair or mitigation ensure the long-term function of these components.

10.7.2 Flow Accelerated Corrosion

[[

]] for MELLLA+, there is no increase in the MS flow rate or temperature, or the FW flow rate and temperature. As described in Section 3.3.6, the MCO may increase in the MS lines. If this occurs, it may slightly increase the FAC rates for a small period of time during the cycle when the plant is operating at or near the MELLLA+ minimum core flow. [[

]] The Maintenance Rule also provides oversight for the other mechanical and electrical components important to plant safety, to guard against age-related degradation. Therefore, no further evaluation of this topic is required per the M+LTR.

[[ ]] for Monticello there are no significant changes in MS or FW temperatures, MS or FW flow rates. The MS temperature in the MELLLA+ operating domain and in the current licensed operating domain is 540°F. As discussed in Section 3.3.6, there is a small increase in average moisture content during short periods of the cycle. This small increase in moisture content has no significant effect on FAC parameters. Therefore, there is no change in the potential for FAC. The evaluation of and inspection for flow-induced erosion/corrosion in piping systems affected by FAC is addressed by compliance with NRC Generic Letter (GL) 89-08. The requirements of GL 89-08 are implemented at Monticello by utilization of the Electric Power Research Institute generic program, "CHECWORKS." Monticello specific parameters are entered into this program to develop requirements for monitoring and maintenance of specific system components. No changes are required to the Monticello specific parameters that are entered into the CHECWORKS program. The FAC monitoring programs are adequate to manage potential effects of MELLLA+ operating domain expansion.

In addition to FAC, a periodic non-destructive examination program was established to inspect safety-related piping and heat exchangers at known or suspected high corrosion, biofouling or silt buildup areas in response to GL 89-13. This program is supplemented by visual inspections of opened piping and heat exchangers whenever possible.

The Maintenance Rule also provides oversight for other mechanical and electrical components important to plant safety, to monitor performance and guard against age-related degradation. The longevity of Monticello equipment is not affected by the MELLLA+ operating domain expansion.

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10.8 NRC and Industry Communications

The topic addressed in this evaluation is:

Topic	M+LTR Disposition	Monticello Result
Plant Disposition of NRC and Industry Communications	[[	]]

[[

]] NRC and industry communications could affect the plant design and safety analyses. As discussed in Section 1.0, the MELLLA+ operating domain expansion has a limited effect on the safety evaluations and system assessments. Because the maximum thermal power and core flow rate do not change for MELLLA+ operating domain expansion, the effect of the changes is limited to the NSSS, primarily within the core. The evaluations and calculations included in this M+SAR, along with any supplements, demonstrate that the MELLLA+ operating domain expansion can be accomplished within the applicable design criteria. Because these evaluations of plant design and safety analyses inherently include any effect as a result of NRC and industry communications, it is not necessary to review prior communications and no additional information is required in this area.

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10.9 Emergency and Abnormal Operating Procedures

Emergency and abnormal operating procedures (EOPs, AOPs) can be affected by MELLLA+ operating domain expansion. The topics addressed in this evaluation are:

Topic	M+LTR Disposition	Monticello Result
Emergency Operating Procedures	[[	
Abnormal Operating Procedures		]]

10.9.1 Emergency Operating Procedures

EOPs include variables and limit curves, which define conditions where operator actions are indicated. The EOPs remain symptom-based and thus the operator actions remain unchanged. MELLLA+ operating domain expansion is not expected to affect the Monticello EOPs. However, in accordance with M+LTR SER Limitation and Condition 12.23.4, the EOPs will be reviewed for any effect and revised as necessary prior to implementation of MELLLA+ operating domain expansion. Any changes identified to the EOPs will be included in the operator training to be conducted prior to implementation of MELLLA+. The ATWS calculation performed for MELLLA+ was based on the Monticello operator actions from the EOPs.

10.9.2 Abnormal Operating Procedures

AOPs include event based operator actions. No significant AOP revisions are expected as a result of MELLLA+ operating domain expansion. However, the AOPs will be reviewed for any effect and revised as necessary prior to implementation of MELLLA+ operating domain expansion. Any changes identified to the AOPs will be included in the operator training to be conducted prior to implementation of MELLLA+.

11.0 LICENSING EVALUATIONS

The licensing evaluations addressed in this section include:

- Effect on Technical Specifications
- Environmental Assessment
- Significant Hazards Consideration Assessment

11.1 EFFECT ON TECHNICAL SPECIFICATIONS

The Technical Specifications that are affected by a MELLLA+ operating domain expansion are provided in the NSPM MELLLA+ License Amendment Request package. In contrast to a power uprate, the CLTP, both in relative (%) terms and absolute terms (MWt), does not change as a result of MELLLA+ operating domain expansion. Therefore, the implementation of MELLLA+ requires revision of a limited number of the Technical Specifications. In addition, changes required for the DSS-CD stability solution option, as described in Section 11.3.3, are included.

11.2 ENVIRONMENTAL ASSESSMENT

The environmental effects of MELLLA+ operating domain expansion are controlled at the same limits as the current analyses. None of the present limits for plant environmental releases are increased as a consequence of MELLLA+ operating domain expansion. MELLLA+ has no effect on the non-radiological elements of concern, and the plant will be operated in an environmentally acceptable manner as documented by the Environmental Assessment for Monticello's current licensed operating domain. Existing Federal, State and local regulatory permits presently in effect accommodate the MELLLA+ operating domain expansion without modification.

The evaluation of the effects of MELLLA+ operating domain expansion on normal radiological effluents is included in Section 8.0. There will be no change in the radiological effluents released to the environment due to the MELLLA+ operating domain expansion. The normal effluents and doses remain well within the 10 CFR 20 limits and the 10 CFR 50, Appendix I guidance. There is no change to the predicted doses from postulated accidents and the 10 CFR 50.67 dose criteria continue to be met. In addition, the quantity of spent fuel does not increase as a result of MELLLA+ operating domain expansion.

The environmental evaluations also demonstrate that the MELLLA+ changes qualify for a categorical exclusion not requiring an environmental assessment in accordance with 10 CFR 51.22(c)(9). See the NSPM License Amendment Request for an evaluation of the 10 CFR 51.22(c)(9) criteria.

11.3 SIGNIFICANT HAZARDS CONSIDERATION ASSESSMENT

Increasing the operating domain can be done safely within plant-specific limits, and is a highly cost effective way to provide needed flexibility in the generating capacity. The M+SAR provides the safety analyses and evaluations to justify expanding the core flow rate operating domain.

DSS-CD introduces an enhanced detection algorithm, the Confirmation Density Algorithm (CDA), which reliably detects the inception of power oscillations and generates an early power suppression trip signal prior to any significant oscillation amplitude growth and MCPR degradation.

A complete Significant Hazards Consideration Assessment will be submitted with the License Amendment Request accompanying this M+SAR.

11.3.1 Modification Summary

The MELLLA+ core operating domain expansion does not require major plant hardware modifications. The core operating domain expansion involves changes to the core power/flow map and a small number of setpoints and alarms. Because there is no significant change in the operating pressure, power, steam flow rate, and FW flow rate, there are no major modifications to other plant equipment.

The stability solution is being changed from Option III to the DSS-CD solution. The DSS-CD solution algorithm, licensing basis, and application procedures are generically described in NEDC-33075P (Reference 3), and are applicable to Monticello. The DSS-CD solution uses the same hardware as the current Option III solution.

11.3.2 Discussion of MELLLA+ Issues

Plant performance and responses to hypothetical accidents and transients have been evaluated for the MELLLA+ operating domain expansion license amendment. This section summarizes the plant reactions to events evaluated for licensing the plant, and the potential effects on various margins of safety, and thereby concludes that no significant hazards consideration will be involved.

11.3.2.1 MELLLA+ Analysis Basis

The MELLLA+ safety analyses are based on a RG 1.49 power factor times the rated power level, except for some analyses that are performed at nominal rated power, either because the RG 1.49 power factor is already accounted for in the analysis methods or RG 1.49 does not apply.

11.3.2.2 Fuel Thermal Limits

No change is required in the mechanical fuel design to meet the plant licensing limits while operating in the MELLLA+ domain. No increase in allowable peak bundle power is needed and fuel thermal design limits will be met in the MELLLA+ domain. The analyses for each fuel reload are required to meet the criteria accepted by the NRC as specified in Reference 6 or otherwise approved in the Technical Specification amendment request. In addition, future fuel designs will meet acceptance criteria approved by the NRC.

11.3.2.3 Makeup Water Sources

The BWR design concept includes a variety of ways to pump water into the reactor vessel to deal with all types of events. There are numerous safety-related and non-safety related cooling water sources. The safety-related cooling water sources alone can maintain core integrity for all postulated events by providing adequate cooling water. There are high and low pressure, high and low volume, safety and non-safety grade means of delivering water to the vessel. These means include at least:

- FW and condensate system pumps
- Low pressure emergency core cooling system (CS) pumps
- High pressure emergency core cooling system (HPCI) pump
- Reactor core isolation cooling (RCIC) pump
- Standby liquid control (SLC) pumps
- Control rod drive (CRD) pumps.

Many of these diverse water supply means are redundant in both equipment and systems.

The MELLLA+ operating domain expansion does not result in an increase or decrease in the available water sources, nor does it change the selection of those assumed to function in the safety analyses. NRC-approved methods were used to evaluate the performance of the ECCS during postulated LOCAs.

11.3.2.4 Design Basis Accidents

DBAs are very low probability hypothetical events whose characteristics and consequences are used in the design of the plant, so that the plant can mitigate their consequences to within acceptable regulatory limits. For BWR licensing evaluations, capability is demonstrated for coping with: 1) the range of hypothetical pipe break sizes in the largest recirculation, steam, and FW lines, 2) a postulated break in one of the ECCS lines, and 3) the most limiting small lines. This break range bounds the full spectrum of large and small, high and low energy line breaks and demonstrates the ability of plant systems to mitigate the accidents while accommodating a single active equipment failure in addition to the postulated LOCA. Several of the significant licensing assessments are based on the LOCA and include:

- Challenges to Fuel (ECCS Performance Analyses) (USAR Section 6.3) in accordance with the rules and criteria of 10 CFR 50.46 and Appendix K where the limiting criterion is the fuel PCT.
- Challenges to the Containment (USAR Section 6.2) wherein the primary criteria of merit are the maximum containment pressure calculated during the course of the LOCA and maximum suppression (cooling) pool temperature for long-term cooling.
- DBA Radiological Consequences (USAR Section 15) calculated and compared to the criteria of 10 CFR 50.67.

11.3.2.5 Challenges to Fuel

ECCS are described in Section 6.2 of the plant USAR. With MAPLHGR setdowns as indicated for low flow conditions, the PCT calculated for a LOCA from the MELLLA+ domain is bounded by the license basis PCT that was calculated based on rated flow. However, the ECCS performance evaluation (Section 4.3) demonstrates significant margin to criteria of 10 CFR 50.46 at the reduced flow of MELLLA+ domain. Therefore, the ECCS safety margin is not significantly affected by MELLLA+ operating domain expansion.

11.3.2.6 Challenges to the Containment

The peak values for containment pressure and temperature for events initiated in the MELLLA+ domain meet design requirements and confirm the suitability of the plant for operation in the MELLLA+ domain. The containment dynamic and structural loads for events initiated in the MELLLA+ domain continue to meet design requirements. The change in short-term containment response is negligible and, because there is no change in decay heat, there is no change in the long-term response. The containment pressure and temperature remains below the design limits following any DBA. Therefore, the containment and its cooling systems are satisfactory for operation in the MELLLA+ domain.

11.3.2.7 Design Basis Accident Radiological Consequences

The magnitude of the potential radiological consequences depends on the quantity of fission products released to the environment, the atmospheric dispersion factors, and the dose exposure pathways. The atmospheric dispersion factors and the dose exposure pathways do not change. The quantity of activity released to the environment is a function of the activity released from the core and the transport mechanisms between the core and the effluent release point. The radiological releases for events initiated in the MELLLA+ domain do not increase.

The radiological consequences of LOCA inside containment, MSLBA, ILBA, CRDA and FHA are bounded by the evaluation at the current licensed operating domain and need not be reevaluated for the MELLLA+ domain. The radiological results for all accidents remain below the applicable regulatory limits for the plant.

11.3.2.8 Anticipated Operational Occurrence Analyses

AOOs are evaluated to demonstrate consequences that meet the SLMCPR. The SLMCPR is determined using NRC-approved methods. The limiting transients are core specific and are analyzed for each reload fuel cycle to meet the licensing acceptance criteria (Section 2.2.1). Therefore, the margin of safety to the SLMCPR is not affected by operation in the MELLLA+ domain.

11.3.2.9 Non-LOCA Radiological Release Accidents

All of the limiting non-LOCA events discussed in USAR Chapter 14 were reviewed for the effect of MELLLA+. The dose consequences for all of the non-LOCA radiological release accident events are shown in Section 9.0 to remain below regulatory limits.

11.3.2.10 Equipment Qualification

Plant equipment and instrumentation have been evaluated against the applicable criteria. The qualification envelope either does not change due to the MELLLA+ operating domain expansion or is bounded by the current licensed operating domain.

11.3.2.11 Balance-of-Plant

Because the power, pressure, steam and FW flow rate, and FW temperature do not change for MELLLA+ operating domain expansion, there are no changes to the BOP systems/equipment.

11.3.2.12 Environmental Consequences

For operation in the MELLLA+ domain, the environmental effects will be controlled to the same limits as for the current operating power/flow map. None of the present environmental release limits are increased as a result of MELLLA+ operating domain expansion.

As a result of MELLLA+ operating domain expansion, there will be no change in the quantity of radioactivity released to the environment through liquid effluents, and no increase in airborne emissions of radioactivity. All off-site radiation doses will be small and within 10 CFR 20 and 10 CFR 50, Appendix I guidance.

As a result, it is concluded that the Monticello MELLLA+ operating domain expansion does not constitute an unreviewed environmental question and is eligible for categorical exclusion as provided by 10 CFR 51.22(c)(9).

11.3.2.13 Technical Specifications Changes

The Technical Specifications ensure that plant and system performance parameters are maintained within the values assumed in the safety analyses. The Technical Specification setpoints, allowable values, operating limits, and the like are selected such that the equipment parameter values are equal to or more conservative than the values used in the safety analyses. Monticello Technical Specification changes are provided in the NSPM MELLLA+ License Amendment Request package. Instrument uncertainties were properly considered for the setpoint changes associated with MELLLA+ operating domain expansion.

The Technical Specifications also address equipment operability (availability) and put limits on equipment out-of-service (not available for use) times such that the plant can be expected to have the complement of equipment available to mitigate abnormal plant events assumed in the safety analyses. Because the safety analyses for the MELLLA+ operating domain expansion show that the results are within regulatory limits, there is no undue risk to public health and safety. Technical Specification changes are made in accordance with methodology approved for the plant, and provide a level of protection comparable to previously issued Technical Specifications.

11.3.2.14 Assessment of 10 CFR 50.92 Criteria

The assessment of significant hazards consideration is included in the licensee submittal.

11.3.3 Discussion of DSS-CD Stability Solution Issues

For the Monticello MELLLA+ operating domain expansion, the long-term stability solution is being changed from the currently approved Option III solution to DSS-CD. The DSS-CD solution algorithm, licensing basis, and application procedures are generically described in NEDC-33075P-A (Reference 3) and NEDE-33147P-A (Reference 4), and are applicable to Monticello including any limitations and conditions associated with their use and approval.

The DSS-CD solution is designed to identify the power oscillation upon inception and initiate control rod insertion to terminate the oscillations prior to any significant amplitude growth. DSS-CD provides protection against violation of the Safety Limit Minimum Critical Power Ratio

(SLMCPR) for anticipated oscillations. DSS-CD is based on the same hardware design as Option III. However, it introduces an enhanced detection algorithm that detects the inception of power oscillations and generates an earlier power suppression trip signal exclusively based on successive period confirmation recognition. The existing Option III algorithms are retained (with generic setpoints) to provide defense-in-depth protection for unanticipated reactor instability events.

The assessment of significant hazards consideration is included in the licensee submittal.

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Appendix A

Disposition of additional limitations and conditions related to the final SE for NEDC-33173P, "Applicability of GE Methods to Expanded Operating Domains"

There are 24 limitations and conditions listed in Section 9 of the Methods LTR SER. The table below lists each of the 24 limitations and conditions. The table also shows that Monticello complies with 14 of the limitations and conditions. The table identifies which section of this M+SAR discusses compliance with each limitation and condition. Nine limitations and conditions are not applicable to Monticello for the following reasons:

9.2	Monticello MELLLA+ based on TGBLA06/PANAC11, not TGBLA 04/PANAC10.
9.4	This penalty is specific for EPU applications. Limitation and Condition 9.3 addresses MELLLA+ SLMCPR penalty.
9.12	The Thermal–Mechanical evaluation was performed using GESTR because the PRIME licensing topical report (LTR) and its application were not approved at the time of the development of the Monticello MELLLA+ license application.
9.13	Monticello MELLLA+ is less than 10 weight percent Gd.
9.15	Monticello MELLLA+ licensing basis is not based on TRACG for the void reactivity coefficient bias and uncertainties relative to lattice designs.
9.16	Monticello MELLLA+ licensing basis is not based on TRACG for the void coefficient biases and uncertainties for known dependencies.
9.20	Monticello MELLLA+ licensing basis is not based on TRACG for the Void-Quality Correlation.
9.21	Monticello MELLLA+ is not based on a mixed core.
9.22	Monticello MELLLA+ is not based on unapproved fuel product lines.

There is one remaining limitation and condition, Limitation and Condition 9.23 that relates to MELLLA+ Eigenvalue tracking. Monticello intends to comply with that limitation and condition. The required data will be collected and evaluated in accordance with Limitation and Condition 9.23. This information will be submitted to the NRC in accordance with the limitation and condition following the implementation of the MELLLA+ expanded operating domain at Monticello.

Note that Reference 31 clarifies the implementation of Limitations and Conditions 9.3, 9.8, 9.17, and 9.19.

Appendix A (continued)
Disposition of additional limitations and conditions related to the final SE for NEDC-33173P, "Applicability of GE Methods to Expanded Operating Domains"

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.1	TGBLA/PANAC Version	The neutronic methods used to simulate the reactor core response and that feed into the downstream safety analyses supporting operation at EPU/MELLLA+ will apply TGBLA06/PANAC11 or later NRC-approved version of neutronic method.	Comply	M+SAR Table 1-1 and Section 2.6.1
9.2	3D Monicore	For EPU/MELLLA+ applications, relying on TGBLA04/PANAC10 methods, the bundle RMS difference uncertainty will be established from plant-specific core-tracking data, based on TGBLA04/PANAC10. The use of plant-specific trendline based on the neutronic method employed will capture the actual bundle power uncertainty of the core monitoring system.	N/A	M+SAR Table 1-1 (1)
9.3	Power/Flow Ratio	Plant-specific EPU and expanded operating domain applications will confirm that the core thermal power to core flow ratio will not exceed 50 MWt/Mlbm/hr at any statepoint in the allowed operating domain. For plants that exceed the power-to-flow value of 50 MWt/Mlbm/hr, the application will provide power distribution assessment to establish that neutronic methods axial and nodal power distribution uncertainties have not increased.	Comply	M+SAR Section 1.2.1 (2)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.4	SLMCPR 1	For EPU operation, a 0.02 value shall be added to the cycle-specific SLMCPR value. This adder is applicable to SLO, which is derived from the dual loop SLMCPR value.	N/A	(3)
9.5	SLMCPR 2	For operation at MELLLA+, including operation at the EPU power levels at the achievable core flow statepoint, a 0.03 value shall be added to the cycle-specific SLMCPR value.	Comply	M+SAR Section 2.2.1
9.6	R-Factor	The plant specific R-factor calculation at a bundle level will be consistent with lattice axial void conditions expected for the hot channel operating state. The plant-specific EPU/MELLLA+ application will confirm that the R-factor calculation is consistent with the hot channel axial void conditions.	Comply	M+SAR Section 2.2
9.7	ECCS-LOCA 1	For applications requesting implementation of EPU or expanded operating domains, including MELLLA+, the small and large break ECCS-LOCA analyses will include top-peaked and mid-peaked power shape in establishing the MAPLHGR and determining the PCT. This limitation is applicable to both the licensing bases PCT and the upper bound PCT. The plant-specific applications will report the limiting small and large break licensing basis and upper bound PCTs.	Comply	M+SAR Sections 4.3.2 and 4.3.3

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.8	ECCS-LOCA 2	The ECCS-LOCA will be performed for all statepoints in the upper boundary of the expanded operating domain, including the minimum core flow statepoints, the transition statepoint, as defined in Reference A-2 and the 55 percent core flow statepoint. The plant-specific application will report the limiting ECCS-LOCA results as well as the rated power and flow results. The SRLR will include both the limiting statepoint ECCS-LOCA results and the rated conditions ECCS-LOCA results.	Comply	M+SAR Sections 4.3.2 and 4.3.3 (2)
9.9	Transient LHGR 1	Plant-specific EPU and MELLLA+ applications will demonstrate and document that during normal operation and core-wide AOOs, the T-M acceptance criteria as specified in Amendment 22 to GESTAR II will be met. Specifically, during an AOO, the licensing application will demonstrate that the: (1) loss of fuel rod mechanical integrity will not occur due to fuel melting and (2) loss of fuel rod mechanical integrity will not occur due to pellet–cladding mechanical interaction. The plant-specific application will demonstrate that the T-M acceptance criteria are met for the both the UO_2 and the limiting GdO_2 rods.	Comply	M+SAR Section 9.1.1
9.10	Transient LHGR 2	Each EPU and MELLLA+ fuel reload will document the calculation results of the analyses demonstrating compliance to transient T-M acceptance criteria. The plant T-M response will be provided with the SRLR or COLR, or it will be reported directly to the NRC as an attachment to the SRLR or COLR.	Comply	M+SAR Section 9.1.1

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.11	Transient LHGR 3	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.	Comply	M+SAR Section 9.1.1
9.12	LHGR and Exposure Qualification	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 A-3). 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.	N/A	(4)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.13	Application of 10 Weight Percent Gd	Before applying 10 weight percent Gd to licensing applications, including EPU and expanded operating domain, the NRC staff needs to review and approve the T-M LTR demonstrating that the T-M acceptance criteria specified in GESTAR II and Amendment 22 to GESTAR II can be met for steady-state and transient conditions. Specifically, the T-M application must demonstrate that the T-M acceptance criteria can be met for TOP and MOP conditions that bounds the response of plants operating at EPU and expanded operating domains at the most limiting statepoints, considering the operating flexibilities (e.g., equipment out-of-service). Before the use of 10 weight percent Gd for modern fuel designs, NRC must review and approve TGBLA06 qualification submittal. Where a fuel design refers to a design with Gd-bearing rods adjacent to vanished or water rods, the submittal should include specific information regarding acceptance criteria for the qualification and address any downstream impacts in terms of the safety analysis. The 10 weight percent Gd qualifications submittal can supplement this report.	N/A	(5)
9.14	Part 21 Evaluation of GESTR-M Fuel Temperature Calculation	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.	Comply	(6)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.15	Void Reactivity 1	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.	N/A	(7)
9.16	Void Reactivity 2	A supplement to TRACG /PANAC11 for AOO is under NRC staff review (Reference A-4). 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 A-4). This limitation applies until the new TRACG/PANAC methodology is approved by the NRC staff.	N/A	(7)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.17	Steady-State 5 Percent Bypass Voiding	The instrumentation specification design bases limit the presence of bypass voiding to 5 percent (LRPM *(sic)* levels). Limiting the bypass voiding to less than 5 percent for long-term steady operation ensures that instrumentation is operated within the specification. For EPU and MELLLA+ operation, the bypass voiding will be evaluated on a cycle-specific basis to confirm that the void fraction remains below 5 percent at all LPRM levels when operating at steady-state conditions within the MELLLA+ upper boundary. The highest calculated bypass voiding at any LPRM level will be provided with the plant-specific SRLR.	Comply	M+SAR Sections 2.1.2 and 5.1.5 (2)
9.18	Stability Setpoints Adjustment	The NRC staff concludes that the presence bypass voiding at the low-flow conditions where instabilities are likely can result in calibration errors of less than 5 percent for OPRM cells and less than 2 percent for APRM signals. These calibration errors must be accounted for while determining the setpoints for any detect and suppress long term methodology. The calibration values for the different long-term solutions are specified in the associated sections of this SE, discussing the stability methodology.	Comply	M+SAR Section 2.4.1

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.19	Void-Quality Correlation 1	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.	Comply	M+SAR Sections 2.2.2 and 9.1.1 (2)
9.20	Void-Quality Correlation 2	The NRC staff is currently reviewing Supplement 3 to NEDE-32906P, "Migration to TRACG04/PANAC11 from TRACG02/PANAC10," dated May 2006 (Reference A-4). 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 A-4) will be applicable as approved.	N/A	(7)
9.21	Mixed Core Method 1	Plants implementing EPU or MELLLA+ with mixed fuel vendor cores will provide plant-specific justification for extension of GE's analytical methods or codes. The content of the plant-specific application will cover the topics addressed in this SE as well as subjects relevant to application of GE's methods to legacy fuel. Alternatively, GE may supplement or revise LTR NEDC-33173P (Reference A-1) for mixed core application.	N/A	(8)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.22	Mixed Core Method 2	For any plant-specific applications of TGBLA06 with fuel type characteristics not covered in this review, GE needs to provide assessment data similar to that provided for the GE fuels. The Interim Methods review is applicable to all GE lattices up to GE14. Fuel lattice designs, other than GE lattices up to GE14, with the following characteristics are not covered by this review: • square internal water channels water crosses • Gd rods simultaneously adjacent to water and vanished rods • 11x11 lattices • MOX fuel The acceptability of the modified epithermal slowing down models in TGBLA06 has not been demonstrated for application to these or other geometries for expanded operating domains. Significant changes in the Gd rod optical thickness will require an evaluation of the TGBLA06 radial flux and Gd depletion modeling before being applied. Increases in the lattice Gd loading that result in nodal reactivity biases beyond those previously established will require review before the GE methods may be applied.	N/A	(8)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.23	MELLLA+ Eigenvalue Tracking	In the first plant-specific implementation of MELLLA+, the cycle-specific eigenvalue tracking data will be evaluated and submitted to NRC to establish the performance of nuclear methods under the operation in the new operating domain. The following data will be analyzed: • Hot critical eigenvalue, • Cold critical eigenvalue, • Nodal power distribution (measured and calculated TIP comparison), • Bundle power distribution (measured and calculated TIP comparison), • Thermal margin, • Core flow and pressure drop uncertainties, and • The MIP Criterion (e.g., determine if core and fuel design selected is expected to produce a plant response outside the prior experience base). Provision of evaluation of the core-tracking data will provide the NRC staff with bases to establish if operation at the expanded operating domain indicates: (1) changes in the performance of nuclear methods outside the EPU experience base; (2) changes in the available thermal margins; (3) need for changes in the uncertainties and NRC-approved criterion used in the SLMCPR methodology; or (4) any anomaly that may require corrective actions.	GEH Task	(9)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
9.24	Plant-Specific Application	The plant-specific applications will provide prediction of key parameters for cycle exposures for operation at EPU (and MELLLA+ for MELLLA+ applications). The plant-specific prediction of these key parameters will be plotted against the EPU Reference Plant experience base and MELLLA+ operating experience, if available. For evaluation of the margins available in the fuel design limits, plant-specific applications will also provide quarter core map (assuming core symmetry) showing bundle power, bundle operating LHGR, and MCPR for BOC, MOC, and EOC. Since the minimum margins to specific limits may occur at exposures other than the traditional BOC, MOC, and EOC, the data will be provided at these exposures.	Comply	M+SAR Section 2.1.2

References:

A-1 MFN 08-089, Ho K. Nieh, Deputy Director, Division of Policy and Rulemaking, Office of Nuclear Reactor Regulation to Robert E. Brown (GEH), "Final Safety Evaluation For General Electric (GE)-Hitachi Nuclear Energy Americas, LLC (GHNE) Licensing Topical Report (LTR) NEDC-33173P, "Applicability Of GE Methods To Expanded Operating Domains" (TAC NO. MD0277)," January 17, 2008.

A-2 GE Letter (MFN 05-141), L. M. Quintana to NRC, NEDC-33006P, Revision 2, "General Electric Boiling Water Reactor Maximum Extended Load Line Limit Analysis Plus," November 28, 2005. (ADAMS Accession No. ML053360526).

A-3 GNF Letter (FLN-2007-001), A. A. Lingenfelter to NRC, "The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance," January 19, 2007. (ADAMS Package Accession No. ML070250414).

A-4 Licensing Topical Report NEDE-32906P, Supplement 3, "Migration to TRACG04/PANAC11 from TRACG02/PANAC10," May 2006.

Appendix A (continued)

Disposition of additional limitations and conditions related to the final SE for NEDC-33173P, "Applicability of GE Methods to Expanded Operating Domains"

Notes:

1. As demonstrated in Table 1-1, Monticello used TGBLA06 and PANAC11.
2. Correspondence concerning implementation of this limitation and condition is docketed in Reference 28.
3. This limitation and condition relates to EPU Applications and as such is not applicable to the M+SAR.
4. The Thermal–Mechanical evaluation performed in support of the Monticello M+SAR was performed using GESTR. The PRIME licensing topical report (LTR) and its application were not approved at the time of the development of the Monticello MELLLA+ license application.
5. Monticello uses GE14 fuel, and as such does not seek to apply 10 wt % Gd to this licensing application.
6. This limitation and condition relates to GEH's treatment of the NRC staff review of the 10 CFR Part 21 report related to the GESTR-M thermal-mechanical evaluation. Appendix F of the Methods LTR SER (Reference 5) imposes a 350 psi penalty on the fuel rod critical pressure. Reference 29 includes a specific Linear Heat Generation Rate (LHGR) limit curve to be used by plants referencing the Methods LTR (Reference 10). The evaluation in Reference 29 demonstrates compliance with fuel licensing criteria while incorporating the 350 psi penalty. As stated in Reference 30, subsequent communication with the NRC staff indicated that the 10 CFR Part 21 concern was sufficiently addressed such that the additional 350 psi margin was no longer warranted. That position was reflected in a recent NRC approval of an EPU application that referenced the use of the Methods LTR but did not apply the additional margin of 350 psi. GEH anticipates a revision to the referenced Appendix F to remove the additional margin.
7. Monticello M+SAR analysis use ODYN as licensing basis code, and as such this limitation and condition is not applicable to the Monticello M+SAR.
8. Monticello uses GE14, and as such this limitation and condition is not applicable to the Monticello M+SAR.
9. This limitation and condition relates to a GEH commitment to submit cycle-specific Eigenvalue tracking data to the NRC to establish performance of GEH methods under operation in the MELLLA+ operating domain. As such, this requirement specifies information to be supplied at a later date by GEH. This is not a requirement to be addressed by Monticello in the M+SAR.

Appendix B

Disposition of additional limitations and conditions related to the final SE for NEDC-33006P, "Maximum Extended Load Line Limit Analysis Plus"

There are 52 limitations and conditions listed in Section 12 of the M+LTR SER. The table below lists each of the 52 limitations and conditions. The table also shows that Monticello complies with 44 of the limitations and conditions. The table identifies which section of this M+SAR discusses compliance with each limitation and condition. The remaining eight limitations and conditions are not applicable to Monticello for the following reasons:

12.3d	Monticello MELLLA+ is not based on unapproved fuel product lines
12.3e	Monticello MELLLA+ is not based on unapproved fuel product lines
12.3f	Monticello MELLLA+ is not based on unapproved fuel product lines
12.10.c	Monticello MELLLA+ takes credit for off-rated limits at minimum CF statepoint. Core monitoring is required.
12.18.b	Monticello MELLLA+ employs best-estimate TRACG analysis to confirm ODYN calculations.
12.20	Monticello MELLLA+ based on plant specific ATWS Instability (12.19)
12.23.6	Monticello MELLLA+ is not based on unapproved fuel product lines
12.23.7	Monticello MELLLA+ is not based on unapproved fuel product lines

Appendix B (continued)

Disposition of additional limitations and conditions related to the final SE for NEDC-33006P, "Maximum Extended Load Line Limit Analysis Plus"

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.1	GEXL-PLUS	The plant-specific application will confirm that for operation within the boundary defined by the MELLLA+ upper boundary and maximum CF range, the GEXL-PLUS experimental database covers the thermal-hydraulic conditions the fuel bundles will experience, including, bundle power, mass flux, void fraction, pressure, and subcooling. If the GEXL-PLUS experimental database does not cover the within bundle thermal-hydraulic conditions, during steady state, transient conditions, and DBA conditions, GHNE will inform the NRC at the time of submittal and obtain the necessary data for the submittal of the plant-specific MELLLA+ application. In addition, the plant-specific application will confirm that the experimental pressure drop database for the pressure drop correlation covers the pressure drops anticipated in the MELLLA+ range. With subsequent fuel designs, the plant-specific applications will confirm that the database supporting the CPR correlations covers the powers, flows and void fractions BWR bundles will experience for operation at and within the MELLLA+ domain, during steady state, transient, and DBA conditions. The plant-specific submittal will also confirm that the NRC staff reviewed and approved the associated CPR correlation if the	Comply	M+SAR Section 1.1.3

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
		changes in the correlation are outside the GESTAR II (Amendment 22) process. Similarly, the plant-specific application will confirm that the experimental pressure drop database does cover the range of pressures the fuel bundles will experience for operation within the MELLLA+ domain.		
12.2	Related LTRs	Plant-specific MELLLA+ applications must comply with the limitations and conditions specified in and be consistent with the purpose and content covered in the NRC staff SEs approving the latest version of the following LTRs: NEDC-33173P, NEDC-33075P, and NEDC-33147 (References 37, 45, and 47).	Comply	M+SAR Section 1.0, 1.1.3
12.3.a	Concurrent Changes	The plant-specific analyses supporting MELLLA+ operation will include all operating condition changes that are implemented at the plant at the time of MELLLA+ implementation. Operating condition changes include, but are not limited to, those changes that affect, an increase in the dome pressure, maximum CF, fuel cycle length, or any changes in the licensed operational enhancements. For example, with an increase in dome pressure, the following analyses must be analyzed: the ATWS analysis, the ASME overpressure analyses, the transient analyses, and the ECCS-LOCA analysis. Any changes to the safety system settings or any actuation setpoint changes necessary to operate with the increased dome pressure must be included in the evaluations (e.g., SRV setpoints).	Comply	M+SAR Section 1.1.2

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.3.b		For all topics in LTR NEDC-33006P that are reduced in scope or generically dispositioned, the plant-specific application will provide justification that the reduced scope or generic disposition is applicable to the plant. If changes that invalidate the LTR dispositions are to be implemented at the time of MELLLA+ implementation, the plant-specific application will provide analyses and evaluations that demonstrate the cumulative effect with MELLLA+ operation. For example, if the dome pressure is increased, the ECCS performance will be evaluated on a plant-specific basis.	Comply	M+SAR Section 1.1.1
12.3.c		Any generic bounding sensitivity analyses provided in LTR NEDC-33006P will be evaluated to ensure that the key plant-specific input parameters and assumptions are applicable and bounded. If these generic sensitivity analyses are not applicable or additional operating condition changes affect the generic sensitivity analyses, a plant-specific evaluation will be provided. For example, with an increase in the dome pressure, the ATWS sensitivity analyses that model operator actions (e.g., depressurization if the HCTL is reached) needs to be reanalyzed, using the bounding dome pressure condition.	Comply	M+SAR Section 1.1.1

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.3.d		If a new GE fuel product line or another vendor's fuel is loaded at the plant, the applicability of any generic sensitivity analyses supporting the MELLLA+ application shall be justified in the plant-specific application. If the generic sensitivity analyses cannot be demonstrated to be applicable, the analyses will be performed including the new fuel. For example, the ATWS instability analyses supporting the MELLLA+ condition are based on the GE14 fuel response. New analyses that demonstrate the ATWS instability performance of the new GE fuel or another vendor's fuel for MELLLA+ operation shall be provided to support the plant-specific application.	N/A	(1)
12.3.e		If a new GE fuel product line or another vendor's fuel is loaded at the plant prior to a MELLLA+ application, the analyses supporting the plant-specific MELLLA+ application will be based on a specific core configuration or bounding core conditions. Any topics that are generically dispositioned or reduced in scope in LTR NEDC-33006P will be demonstrated to be applicable, or new analyses based on the specific core configuration or bounding core conditions will be provided.	N/A	(1)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.3.f		If a new GE fuel product line or another vendor's fuel is loaded at the plant prior to a MELLLA+ application, the plant-specific application will reference an NRC-approved stability method supporting MELLLA+ operation, or provide sufficient plant-specific information to allow the NRC staff to review and approve the stability method supporting MELLLA+ operation. The plant-specific application will demonstrate that the analyses and evaluations supporting the stability method are applicable to the fuel loaded in the core.	N/A	(1)
12.3.g		For MELLLA+ operation, core instability is possible in the event a transient or plant maneuver places the reactor at a high power/low-flow condition. Therefore, plants operating at MELLLA+ conditions must have a NRC-approved instability protection method. In the event the instability protection method is inoperable, the applicant must employ an NRC-approved backup instability method. The licensee will provide technical specification (TS) changes that specify the instability method operability requirements for MELLLA+ operation, including any backup stability protection methods.	Comply	M+SAR Section 2.4
12.4	Reload analysis submittal	The plant-specific MELLLA+ application shall provide the plant-specific thermal limits assessment and transient analysis results. Considering the timing requirements to support the reload, the fuel and cycle-dependent analyses including the plant-specific thermal limits assessment may be submitted by supplementing the initial M+SAR. Additionally, the SRLR for the	Comply	M+SAR Section 1.1.1

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
		initial MELLLA+ implementation cycle shall be submitted for NRC staff confirmation.		
12.5.a	Operating Flexibility	The licensee will amend the TS LCO for any equipment out-of-service (i.e., SLO) or operating flexibilities prohibited in the plant-specific MELLLA+ application.	Comply	M+SAR Sections 1.2.4 and 3.6.3
12.5.b		For an operating flexibility, such as FWHOOS, that is prohibited in the MELLLA+ plant-specific application but is not included in the TS LCO, the licensee will propose and implement a license condition.	Comply	M+SAR Sections 1.2.4
12.5.c		The power flow map is not specified in the TS; however, it is an important licensed operating domain. Licensees may elect to be licensed and operate the plant under plant-specific-expanded domain that is bounded by the MELLLA+ upper boundary. Plant-specific applications approved for operation within the MELLLA+ domain will include the plant-specific power/flow map specifying the licensed domain in the COLR.	Comply	M+SAR Sections 1.2.1 and 3.6.3
12.6	SLMCPR Statepoints and CF Uncertainty	Until such time when the SLMCPR methodology (References 40 and 41) for off-rated SLMCPR calculation is approved by the staff for MELLLA+ operation, the SLMCPR will be calculated at the rated statepoint (120 percent P/100 percent CF), the plant-specific minimum CF statepoint (e.g., 120 percent P/80 percent CF), and at the 100 percent OLTP at 55 percent CF statepoint. The currently approved off-rated CF uncertainty will be used for the minimum CF and 55 percent CF statepoints. The uncertainty must be consistent with the CF uncertainty currently applied to the SLO operation or as NRC-approved for MELLLA+ operation. The calculated values will be documented in	Comply	M+SAR Section 2.2.1

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
		the SRLR.		
12.7	Stability	Manual operator actions are not adequate to control the consequences of instabilities when operating in the MELLLA+ domain. If the primary stability protection system is declared inoperable, a non-manual NRC-approved backup protection system must be provided, or the reactor core must be operated below a NRC-approved backup stability boundary specifically approved for MELLLA+ operation for the stability option employed.	Comply	M+SAR Section 2.4
12.8	Fluence Methodology and Fracture Toughness	The applicant is to provide a plant-specific evaluation of the MELLLA+ RPV fluence using the most up-to-date NRC-approved fluence methodology. This fluence will then be used to provide a plant-specific evaluation of the RPV fracture toughness in accordance with RG 1.99, Revision 2.	Comply	M+SAR Section 3.2.1
12.9	Reactor Coolant Pressure Boundary	MELLLA+ applicants must identify all other than Category "A" materials, as defined in NUREG-0313, Revision 2, that exist in its RCPB piping, and discuss the adequacy of the augmented inspection programs in light of the MELLLA+ operation on a plant-specific basis.	Comply	M+SAR Section 3.5.1.4

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.10.a	ECCS-LOCA Off-rated Multiplier	The plant-specific application will provide the 10 CFR Part 50, Appendix K, and the nominal PCTs calculated at the rated EPU power/rated CF, rated EPU power/minimum CF, at the low-flow MELLLA+ boundary (Transition Statepoint). For the limiting statepoint, both the upper bound and the licensing PCT will be reported. The M+SAR will justify why the transition statepoint ECCS-LOCA response bounds the 55 percent CF statepoint. The M+SAR will provide discussion on what power/flow combination scoping calculations were performed to identify the limiting statepoints in terms of DBA-LOCA PCT response for the operation within the MELLLA+ boundary. The M+SAR will justify that the upper bound and licensing basis PCT provided is in fact the limiting PCT considering uncertainty applications to the non-limiting statepoints.	Comply	M+SAR Section 4.3.2

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.10.b		LOCA analysis is not performed on cycle-specific basis; therefore, the thermal limits applied in the M+SAR LOCA analysis for the 55 percent CF MELLLA+ statepoint and/or the transition statepoint must be either bounding or consistent with cycle-specific off-rated limits. The COLR and the SRLR will contain confirmation that the off-rated limits assumed in the ECCS-LOCA analyses bound the cycle-specific off-rated limits calculated for the MELLLA+ operation. Every future cycle reload shall confirm that the cycle-specific off-rated thermal limits applied at the 55 percent CF and/or the transition statepoints are consistent with those assumed in the plant-specific ECCS-LOCA analyses.	Comply	M+SAR Section 4.3.2
12.10.c		Off-rated limits will not be applied to the minimum CF statepoint.	N/A	(2)
12.10.d		If credit is taken for these off-rated limits, the plant will be required to apply these limits during core monitoring.	Comply	M+SAR Section 4.3.2
12.11	ECCS-LOCA Axial Power Distribution Evaluation	For MELLLA+ applications, the small and large break ECCS-LOCA analyses will include top-peaked and mid-peaked power shape in establishing the MAPLHGR and determining the PCT. This limitation is applicable to both the licensing bases PCT and the upper bound PCT. The plant-specific applications will report the limiting small and large break licensing basis and upper bound PCTs.	Comply	M+SAR Sections 4.3.2 and 4.3.3
12.12.a	ECCS-LOCA Reporting	Both the nominal and Appendix K PCTs should be reported for all of the calculated statepoints, and	Comply	M+SAR Sections 4.3.2 and 4.3.3

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.12.b		The plant-variable and uncertainties currently applied will be used, unless the NRC staff specifically approves a different plant variable uncertainty method for application to the non-rated statepoints.	Comply	M+SAR Sections 4.3.2 and 4.3.3
12.13	Small Break LOCA	Small break LOCA analysis will be performed at the MELLLA+ minimum CF and the transition statepoints for those plants that: (1) are small break LOCA limited based on small break LOCA analysis performed at the rated EPU conditions; or (2) have margins of less than or equal to [[ ]] relative to the Appendix K or the licensing basis PCT.	Comply	M+SAR Section 4.3.3
12.14	Break Spectrum	The scope of small break LOCA analysis for MELLLA+ operation relies upon the EPU small break LOCA analysis results. Therefore, the NRC staff concludes that for plants that will implement MELLLA+, sufficient small break sizes should be analyzed at the rated EPU power level to ensure that the peak PCT break size is identified.	Comply	M+SAR Section 4.3.3
12.15	Bypass Voiding Above the D-level	Plant-specific MELLLA+ applications shall identify where in the MELLLA+ upper boundary the bypass voiding greater than 5 percent will occur above the D-level. The licensee shall provide in the plant-specific submittal the operator actions and procedures that will mitigate the impact of the bypass voiding on the TIPs and the core simulator used to monitor the fuel performance. The plant-specific submittal shall also provide discussion on what impact the bypass voiding greater than 5 percent will have on the NMS as defined in Section 5.1.1.5. The NRC staff will evaluate on plant-specific bases acceptability of bypass voiding	Comply	M+SAR Section 5.1.5

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
		above D level.		
12.16	RWE	Plants operating at the MELLLA+ operating domain shall perform RWE analyses to confirm the adequacy of the generic RBM setpoints. The M+SAR shall provide a discussion of the analyses performed and the results.	Comply	M+SAR Section 9.1.1
12.17	ATWS LOOP	As specified in LTR NEDC-33006P, at least two plant-specific ATWS calculations must be performed: MSIVC and PRFO. In addition, if RHR capability is affected by LOOP, then a third plant-specific ATWS calculation must be performed that includes the reduced RHR capability. To evaluate the effect of reduced RHR capacity during LOOP, the plant-specific ATWS calculation must be performed for a sufficiently large period of time after HSBW injection is complete to guarantee that the suppression pool temperature is cooling, indicating that the RHR capacity is greater than the decay heat generation. The plant-specific application should include evaluation of the safety system performance during the long-term cooling phase, in terms of available NPSH.	Comply	M+SAR Section 9.3.1.1 (9)
12.18.a	ATWS TRACG Analysis	For plants that do not achieve hot shutdown prior to reaching the heat capacity temperature limit (HCTL) based on the licensing ODYN code calculation, plant-specific MELLLA+ implementations must perform best-estimate TRACG calculations on a plant-specific basis. The TRACG analysis will account for all plant parameters, including water-level control strategy and all plant-specific emergency operating procedure (EOP) actions.	Comply	M+SAR Section 9.3.1.2

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.18.b		The TRACG calculation is not required if the plant increases the boron-10 concentration/enrichment so that the integrated heat load to containment calculated by the licensing ODYN calculation does not change with respect to a reference OLTP/75 percent flow ODYN calculation.	Comply	M+SAR Section 6.5.1
12.18.c		Peak cladding temperature (PCT) for both phases of the transient (initial overpressure and emergency depressurization) must be evaluated on a plant-specific basis with the TRACG ATWS calculation.	Comply	M+SAR Section 9.3.1.2

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.18.d		In general, the plant-specific application will ensure that operation in the MELLLA+ domain is consistent with the assumptions used in the ATWS analysis, including equipment out of service (e.g., FWHOOS, SLO, SRVs, SLC pumps, and RHR pumps, etc.). If assumptions are not satisfied, operation in MELLLA+ is not allowed. The SRLR will specify the prohibited flexibility options for plant-specific MELLLA+ operation, where applicable. For key input parameters, systems and engineering safety features that are important to simulating the ATWS analysis and are specified in the Technical Specification (TS) (e.g., SLCS parameters, ATWS RPT, etc.), the calculation assumptions must be consistent with the allowed TS values and the allowed plant configuration. If the analyses deviate from the allowed TS configuration for long term equipment out of service (i.e., beyond the TS LCO), the plant-specific application will specify and justify the deviation. In addition, the licensee must ensure that all operability requirements are met (e.g., NPSH) by equipment assumed operable in the calculations.	Comply	M+SAR Section 9.3.1 (9)
12.18.e		Nominal input parameters can be used in the ATWS analyses provided the uncertainty treatment and selection of the values of these input parameters are consistent with the input methods used in the original GE ATWS analyses in NEDE-24222. Treatment of key input parameters in terms of uncertainties applied or plant-specific TS value used can differ from the original NEDE-24222 approach, provided the manner in which it is used yields more conservative ATWS results.	Comply	M+SAR Section 9.3.1

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.18.f		The plant-specific application will include tabulation and discussion of the key input parameters and the associated uncertainty treatment.	Comply	M+SAR Section 9.3.1
12.19	Plant-Specific ATWS Instability	Until such time that NRC approves a generic solution for ATWS instability calculations for MELLLA+ operation, each plant-specific MELLLA+ application must provide ATWS instability analysis that satisfies the ATWS acceptance criteria listed in SRP Section 15.8. The plant-specific ATWS instability calculation must: (1) be based on the peak-reactivity exposure conditions, (2) model the plant-specific configuration important to ATWS instability response including mixed core, if applicable, and (3) use the regional-mode nodalization scheme. In order to improve the fidelity of the analyses, the plant-specific calculations should be based on latest NRC-approved neutronic and thermal-hydraulic codes such as TGBLA06/PANAC11 and TRACG04.	Comply	M+SAR Section 9.3.3
12.20	Generic ATWS Instability	Once the generic solution is approved, the plant-specific applications must provide confirmation that the generic instability analyses are relevant and applicable to their plant. Applicability confirmation includes review of any differences in plant design or operation that will result in significantly lower stability margins during ATWS such as: • turbine bypass capacity, • fraction of steam-driven feedwater pumps, • any changes in plant design or operation that will significantly increase core inlet subcooling during ATWS events, • significant differences in radial and axial power	N/A	(4)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
		distributions, • hot-channel power-to-flow ratio, • fuel design changes beyond GE14.		
12.21	Individual Plant Evaluation	Licensees that submit a MELLLA+ application should address the plant-specific risk impacts associated with MELLLA+ implementation, consistent with approved guidance documents (e.g., NEDC-32424P-A, NEDC-32523P-A, and NEDC-33004P-A) and the Matrix 13 of RS-001 and re-address the plant-specific risk impacts consistent with the approved guidance documents that were used in their approved EPU application and Matrix 13 of RS-001. If an EPU and MELLLA+ application come to the NRC in parallel, the expectation is that the EPU submittal will have incorporated the MELLLA+ impacts.	Comply	M+SAR Section 10.5
12.22	IASCC	The applicant is to provide a plant-specific IASCC evaluation when implementing MELLLA+, which includes the components that will exceed the IASCC threshold of $5x10^{20}$ n/cm^2 (E>1MeV), the impact of failure of these components on the integrity of the reactor internals and core support structures under licensing design bases conditions, and the inspections that will be performed on components that exceed the IASCC threshold to ensure timely identification of IASCC, should it occur.	Comply	M+SAR Section 10.7.1
12.23.1	Limitations from	See limitation 12.18.d.	N/A	(3) (5)

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.23.2	the ATWS RAI Evaluations	The plant-specific ODYN and TRACG key calculation parameters must be provided to the staff so they can verify that all plant-specific automatic settings are modeled properly.	Comply	M+SAR Sections 1.1.3, 9.3.1
12.23.3		The ATWS peak pressure response would be dependent upon SRVs upper tolerances assumed in the calculations. For each individual SRV, the tolerances used in the analysis must be consistent with or bound the plant-specific SRV performance. The SRV tolerance test data would be statistically treated using the NRC's historical 95/95 approach or any new NRC-approved statistical treatment method. In the event that current EPU experience base shows propensity for valve drift higher than pre-EPU experience base, the plant-specific transient and ATWS analyses would be based on the higher tolerances or justify the reason why the propensity for the higher drift is not applicable the plant's SRVs.	Comply	M+SAR Section 9.3.1.1
12.23.4		EPG/SAG parameters must be reviewed for applicability to MELLLA+ operation in a plant-specific basis. The plant-specific MELLLA+ application will include a section that discusses the plant-specific EOPs and confirms that the ATWS calculation is consistent with the operator actions.	Comply	M+SAR Sections 9.3.1.1, 9.3.1.2, 10.9

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.23.5		The conclusions of this LTR and associated SE are limited to reactors operating with a power density lower than 52.5 MW/MLBM/hr for operation at the minimum allowable CF at 120 percent OLTP. Verification that reactor operation will be maintained below this analysis limit must be performed for all plant-specific applications.	Comply	M+SAR Sections 1.2.3, 9.3.3
12.23.6		For MELLLA+ applications involving GE fuel types beyond GE14 or other vendor fuels, bounding ATWS Instability analysis will be provided to the staff. Note: this limitation does not apply to special test assemblies.	N/A	(1)
12.23.7		See limitation 12.23.6.	N/A	(1) (6)
12.23.8		The plant-specific ATWS calculations must account for all plant- and fuel-design-specific features, such as the debris filters.	Comply	M+SAR Section 9.3.1
12.23.9		Plant-specific applications must review the safety system specifications to ensure that all of the assumptions used for the ATWS SE indeed apply to their plant-specific conditions. The NRC staff review will give special attention to crucial safety systems like HPCI, and physical limitations like NPSH and maximum vessel pressure that RCIC and HPCI can inject. The plant-specific application will include a discussion on the licensing bases of the plant in terms of NPSH and system performance. It will also include NPSH and system performance evaluation for the duration of the event.	Comply	M+SAR Section 9.3.1

Limitation and Condition Number from NRC SER	Limitation and Condition Title	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
12.23.10		Plant-specific applications must ensure that an increase in containment pressure resulting from ATWS events with EPU/MELLLA+ operation does not affect adversely the operation of safety-grade equipment.	Comply	M+SAR Section 9.3.1
12.23.11		The plant-specific applications must justify the use of plant-specific suppression pool temperature limits for the ODYN and TRACG calculations that are higher than the HCTL limit for emergency depressurization.	Comply	M+SAR Section 9.3.1.1
12.24.1	Limitations from Fuel Dependent Analyses RAI Evaluations	For EPU/MELLLA+ plant-specific applications that use TRACG or any code that has the capability to model in-channel water rod flow, the supporting analysis will use the actual flow configuration.	Comply	M+SAR Sections 2.6.2. 9.3.1.2, 9.3.3
12.24.2		The EPU/MELLLA+ application would provide the exit void fraction of the high-powered bundles in the comparison between the EPU/MELLLA+ and the pre-MELLLA+ conditions.	Comply	M+SAR Sections 1.2.3, 2.1.2
12.24.3		See limitation 12.6.	Comply	(7)
12.24.4		See limitation 12.18.d.	Comply	(3) (8)

Appendix B (Continued)

Disposition of additional limitations and conditions related to the final SE for NEDC-33006P, "Maximum Extended Load Line Limit Analysis Plus"

Notes:

1. Monticello uses GE14, and as such this limitation and condition is not applicable to the Monticello M+SAR.
2. Because Monticello does take credit for off-rated condition, the M+LTR requires implementation of Limitation and Condition 12.10.d. Therefore Limitation and Condition 12.10.c is not applicable.
3. Because Monticello M+ evaluation performed the TRACG ATWS analysis, this limitation and condition is not applicable and no modification to the SLCS system is required.
4. This requirement relates to implementation of a Generic ATWS Instability Solution, which is not yet approved by the NRC.
5. This is a repeat of Limitation and Condition 12.18.d.
6. This is a repeat of Limitation and Condition 12.23.6.
7. This is a repeat of Limitation and Condition 12.6.
8. This is a repeat of Limitation and Condition 12.18.d.
9. The impact on ECCS Net Positive Suction Head will be evaluated and submitted following receipt of NRC guidance on the use of containment accident pressure (CAP) credit. See Section 4.2.5 for additional details.

Appendix C

Disposition of additional limitations and conditions related to the final SE for NEDC-33075P, "General Electric Boiling Water Reactor Detect and Suppress Solution – Confirmation Density"

There are 9 limitations and conditions listed in Section 4 of the DSS-CD SER. The table below lists each of the 9 limitations and conditions. The table also shows that Monticello complies with 7 of the limitations and conditions. The table identifies which section of this M+SAR discusses compliance with each limitation and condition. Two limitations and conditions are not applicable to Monticello for the following reasons:

4.3 The applicability checklist in Limitation 4.2 is satisfied.

4.5 Monticello uses GE14 fuel, and does not seek to transition to another fuel in this licensing application.

Appendix C (continued)

Disposition of additional limitations and conditions related to the final SE for NEDC-33075P, "General Electric Boiling Water Reactor Detect and Suppress Solution – Confirmation Density"

Limitation and Condition Number from NRC SER	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
4.1	The NRC staff has reviewed on a separate report the implementation of DSS-CD using the approved GENE Option III firmware and software and found it acceptable. Implementations on other Option III platforms will require plant-specific review.	Comply	M+SAR Section 2.4.1
4.2	Tables 6.1 and 6.2 of NEDC-33075P, Revision 5, document a plant-specific applicability checklist, which contains specific criteria that must be reviewed and satisfied for each core reload. This methodology is a technically acceptable process for plant- and cycle-specific reviews of DSS-CD applicability.	Comply	M+SAR Sections 1, 2.0, 2.4.1, and Table 2-2
4.3	For situations where the plant applicability checklist is not satisfied (e.g., introduction of a new fuel type), Tables 6.3 and 6.4 of NEDC-33075P, Revision 5, describe a technically acceptable procedure to extend the future applicability of DSS-CS.	N/A	Applicability checklist in Limitation 4.2 is satisfied.
4.4	Section 8 of NEDC-33075P, Revision 5, provides a description of required changes to TSs and an example is provided in Appendix A. The proposed TSs are acceptable for the implementation of DSS-CD.	Comply	MELLLA+ License Amendment Request Package
4.5	Table 6.5 of NEDC-33075P, Revision 5, describes the fuel transition scenarios, which are subject to a plant-specific review for each application.	N/A	Monticello uses GE14 fuel, and does not seek to transition to another fuel in this licensing application.

Limitation and Condition Number from NRC SER	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
4.6	Application of an alternative to the generic CDA setpoints with respect to the susceptibility of a plant's intrinsic noise will require a plant-specific review.	Comply	M+SAR Section 2.4.1
4.7	The hardware components required to implement DSS-CD are expected to be those currently used for the approved Solution III. If the DSS-CD hardware implementation deviates significantly from the approved Solution III, a hardware review by the NRC staff may be necessary.	Comply	The hardware components for DSS-CD are those currently installed for the NRC-approved Option III solution.
4.8	The NRC staff concludes that the plant-specific settings for eight of the FIXED parameters and three of the ADJUSTABLE parameters appear to be licensing basis values. The process by which these values will be controlled must be addressed by licensees.	Comply	The values of the FIXED and ADJUSTABLE parameters will be established by GEH and will be documented in a DSS-CD Settings Report.
4.9	The NRC staff concludes that if plants other than Brunswick Steam Electric Plant, Units 1 and 2, use the DSS-CD trip function, those plant licensees must ensure the DSS-CD trip function is applicable in their plant licensing bases, including the optional BSP trip function, if it is to be installed.	Comply	Verification and validation (V&V) of the DSS-CD trip function code was performed for transportability considerations.

Appendix D

Disposition of additional limitations and conditions related to the final SE for NEDC-33147P, "DSS-CD TRACG Application"

There is 1 limitation and condition listed in Section 4 of the DSS-CD TRACG SER. The table below lists the limitation and condition. The table also shows that Monticello complies with the limitation and condition. The table identifies which section of this M+SAR discusses compliance with the limitation and condition.

Appendix D (continued)

Disposition of additional limitations and conditions related to the final SE for NEDC-33147P, "DSS-CD TRACG Application"

Limitation and Condition Number from NRC SER	Limitation and Condition Description	Disposition	Section of Monticello M+SAR which addresses the Limitation and Condition
4.1	The NRC staff will require a submittal for review if any significant change in the bounding uncertainty or any change in the process to bound the uncertainty in the MCPR is proposed.	Comply	M+SAR Section 2.4.1.