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U. S. Nuclear Regulatory Commission
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Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: Request for License Amendment for Core Flow Operating Range Expansion and Oscillation Power Range Monitor (OPRM) Instrumentation

References:

(1) General Electric Company Licensing Topical Report, "Maximum Extended Load Line Limit Analysis Plus Licensing Topical Report," NEDC-33006P, Revision 1, dated August 2002
(2) General Electric Company Licensing Topical Report, "General Electric Boiling Water Reactor Detect and Suppress Solution – Confirmation Density," NEDC-33075P, Revision 2, dated November 2002
(3) Letter from J. S. Keenan (Carolina Power and Light) to U. S. NRC, "Request for License Amendments, Core Flow Operating Range Expansion," dated November 12, 2002
(4) Generic Letter 94-02, " Long-Term Solutions and Upgrade of Interim Operating Recommendations for Thermal-Hydraulic Instabilities in Boiling Water Reactors," dated September 2, 1994
(5) Letter from M. Coyle (AmerGen) to U. S. NRC, "Revision to the Clinton Power Station Implementation Schedule for the Resolution to Generic Letter (GL) 94-02, Long-Term Solution and Upgrade of Interim Operating Recommendation for Thermal-Hydraulic Instabilities in Boiling Water Reactors," dated March 30, 2000
(6) Letter from U. S. NRC to J. K. Wood (First Energy Nuclear Operating Company), "Perry Nuclear Plant, Unit 1 – Issuance of Amendment Re: Activation of Thermal-Hydraulic Stability Monitoring Instrumentation (TAC No. MA8671)," dated February 26, 2001
(7) Letter from U. S. NRC to O. D. Kingsley (Exelon Generation Company, LLC), "Clinton Power Station, Unit 1, - Issuance of Amendment (TAC No. MB2210)," dated April 5, 2002

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit", AmerGen Energy Company, LLC (i.e., AmerGen) requests an amendment to Appendix A, Technical Specifications (TS), of Facility Operating License No. NPF-62 for Clinton Power Station (CPS). The proposed license amendment revises CPS TS, as necessary, to support an expansion of the core flow operating range. This expanded operating region, as described in

A001

Reference 1, is referred to as the Maximum Extended Load Line Limit Analysis Plus (MELLLA+).

On April 5, 2002, the NRC issued License Amendment 149 to the CPS operating license (Reference 7). The amendment allowed an increase in the maximum power level for CPS from the original licensed thermal power of 2894 megawatts thermal (MWt) to 3473 MWt. In support of the extended power uprate, the power-to-flow map that defines the boundaries, inside of which operation of the plant has been analyzed and demonstrated to meet all applicable fuel and system design criteria, was revised. The revised power-to-flow map provides only a narrow operating band with respect to core flow when operating at the current licensed thermal power (CLTP). This narrow operating band unduly restricts plant operation. In order to restore operating flexibility, AmerGen is requesting an expansion of the core flow operating range.

The effects of operation in the MELLLA+ region at CPS have been comprehensively evaluated. As a result of that evaluation, we have concluded that sufficient safety and design margins exist such that an operation in the expanded core flow operating range can be accomplished without adverse impact on the health and safety of the public and without significant impact on the environment. Specifically, the proposed changes follow the guidelines contained in the General Electric (GE) MELLLA+ Topical Report (Reference 1) which is currently under review by the NRC. In addition, these proposed changes include an update to TS Section 5.6.5, "Core Operating Limits Report (COLR)," to require documentation of the MELLLA+ operating region in the COLR.

A second proposed TS change involves the activation of Thermal-Hydraulic Stability monitoring instrumentation as required by Generic Letter 94-02 (Reference 4). A new Specification, TS 3.3.1.3, is being added, providing requirements for the Oscillation Power Range Monitor (OPRM) Instrumentation. The OPRM system was installed during the sixth refueling outage (RF-6) in the fall of 1996. Upon restart from RF-6, CPS operated the OPRM system in a disabled or unarmed state such that it would have alarm capability but not be able to effect a reactor scram. The rationale for operating the system without its automatic protection enabled would allow for evaluation of system performance, the potential for spurious trips, and familiarization with system operation. During the period in which the OPRM system was in operation in an unarmed state, the Interim Corrective Actions (ICAs) described in NRC Bulletin 88-07, Supplement 1, "Power Oscillations in Boiling Water Reactors (BWRs)," remained in effect. The ICAs address the potential for thermal hydraulic instabilities by requiring that plant operation be restricted to certain regions of the power-to-flow map.

The proposed change will provide operability requirements for the OPRM system, required actions when it becomes inoperable and appropriate surveillance requirements. The proposed change also removes manual monitoring guidance (i.e., ICAs) for thermal hydraulic instability monitoring from TS Section 3.4.1, "Recirculation Loops Operating," that will no longer be necessary due to implementation of the OPRM instrumentation TS. The proposed TS changes will allow the enabling of the OPRM instrumentation trips in accordance with Reference 5.

As part of MELLLA+ implementation for CPS, AmerGen will implement a third proposed change, a "Detect and Suppress Solution – Confirmation Density (DSS-CD)" approach to automatically detect and suppress neutronic and thermal-hydraulic instabilities (THI). The detection and suppression of instabilities is required to ensure that the Minimum Critical Power Ratio (MCPR) safety limit is not exceeded during a transient.

DSS-CD implementation is based on the same hardware design as the Boiling Water Reactor Owners' Group (BWROG) Option III Reactor Stability Long-Term Solution, installed (but not armed) during RF-6 at CPS. The evaluation performed to confirm no adverse impact from operation in the MELLLA+ region verifies the applicability of the guidance in the GE DSS-CD topical report (Reference 2) for CPS. The GE DSS-CD topical report is currently under review by the NRC. Following issuance of the MELLLA+ license amendment, the Backup Stability Protection (BSP) described in Reference 2 will be the alternate method to detect and suppress THI oscillations, in lieu of the ICAs, until the new OPRM system is armed. AmerGen intends to operate for up to one cycle with the OPRM trip function bypassed. This will allow sufficient time to collect the operational data necessary to validate trip setpoints or adjustable parameters and thereby, avoid unnecessary reactor scrams. The proposed license amendment revises the TS, as necessary, to support implementation of DSS-CD at CPS.

The proposed changes for the core flow operating range expansion are consistent with those changes provided to the NRC by the Carolina Power & Light Company for the Brunswick Steam Electric Plant Units 1 and 2 in Reference 3. The proposed changes to incorporate the OPRM Instrumentation are consistent with those approved for the Perry Nuclear Power Plant (Reference 6).

This request is subdivided as follows.

1. Attachment 1 provides the notarized affidavit.

2. Attachment 2 provides a detailed description of the proposed changes necessary for operation in the MELLLA+ region and operation of the OPRM, including the technical and safety bases for these changes.

3. Attachment 3 contains the copies of the proposed marked up TS pages.

4. Attachment 4 provides the retyped TS pages and Bases pages for information only.

5. Attachment 5 contains the detailed plant-specific MELLLA+ safety analysis (M+SAR) described by the generic guidelines of the MELLLA+ Licensing Topical Report (Reference 1). This enclosure contains proprietary information and we request that it be withheld from public disclosure in accordance with 10 CFR 2.790, "Public Inspections, Exemptions, Requests for Withholding," paragraph (a) (4).

6. Attachment 6 contains the affidavit supporting the request for withholding Attachment 5 from public disclosure, as requested by 10 CFR 2.790, paragraph (b)(1).

7. Attachment 7 contains a nonproprietary version of the M+SAR.

The proposed changes have been reviewed by the CPS Plant Operations Review Committee and approved by the Nuclear Safety Review Board.

AmerGen plans to implement these proposed changes during refueling outage C1R09, currently scheduled for February 2004. Therefore, AmerGen requests approval of the proposed amendments by December 31, 2003. This will provide adequate time for the affected station documents to be revised using the appropriate change control mechanisms.

AmerGen is notifying the State of Illinois of this license amendment request by transmitting a copy of this letter and its attachments to the designated State Official.

If you should have any questions or require additional information, please contact Mr. Timothy A. Byam at (630) 657-2804.

Respectfully,

Keith R. Jury

Keith R. Jury
Director – Licensing and Regulatory Affairs
Mid-West Regional Operating Group
AmerGen Energy Company, LLC

Attachments:

Attachment 1	Affidavit
Attachment 2	Evaluation of Proposed Changes
Attachment 3	Markup of Proposed Technical Specification Changes
Attachment 4	Retyped Pages for Technical Specification Changes and Bases Changes (for information only)
Attachment 5	GE Report NEDC-33057P, "Safety Analysis Report for Clinton Power Station Maximum Extended Load Line Limit Analysis Plus," April 2003 (Proprietary)
Attachment 6	GE Affidavit for Withholding NEDC-33057P from Public Disclosure
Attachment 7	GE Report NEDO-33057, "Safety Analysis Report for Clinton Power Station Maximum Extended Load Line Limit Analysis Plus," April 2003 (Nonproprietary)

cc: Regional Administrator – NRC Region III
NRC Project Manager, NRR – Clinton Power Station
NRC Senior Resident Inspector – Clinton Power Station
Office of Nuclear Facility Safety – Illinois Department of Nuclear Safety

ATTACHMENT 1
Affidavit

STATE OF ILLINOIS	)	
COUNTY OF DUPAGE	)	
IN THE MATTER OF	)	
AMERGEN ENERGY COMPANY, LLC	)	Docket Number
CLINTON POWER STATION, UNIT 1	)	50-461

SUBJECT: **Request for License Amendment for Core Flow Operating Range Expansion and Oscillation Power Range Monitor Instrumentation**

AFFIDAVIT

I affirm that the content of this transmittal is true and correct to the best of my knowledge, information and belief.

Keith R. Jury
Keith R. Jury
Director – Licensing and Regulatory Affairs
Mid-West Regional Operating Group
AmerGen Energy Company, LLC

Subscribed and sworn to before me, a Notary Public in and

for the State above named, this 1st day of

May, 2003.

Notary Public

"OFFICIAL SEAL"
TIMOTHY A. BYAM
NOTARY PUBLIC STATE OF ILLINOIS
COMMISSION EXPIRES 12/04/05

Subject: Request for License Amendment for Core Flow Operating Range Expansion and Oscillation Power Range Monitor (OPRM) Instrumentation

1.0 DESCRIPTION

Pursuant to 10 CFR 50.90, "Application for amendment of license or construction permit.", AmerGen Energy Company (AmerGen), LLC hereby requests an amendment to Appendix A, Technical Specifications (TS), of Facility Operating License No. NPF-62 for Clinton Power Station (CPS). The changes expand the operating range 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 range is identified as Maximum Extended Load Line Limit Analysis Plus (MELLLA+). In addition, the changes address the Oscillation Power Range Monitor (OPRM) instrumentation system.

The proposed license amendment revises the CPS TS, as necessary, to (1) support an expansion of the core flow operating range, (2) implement an OPRM Instrumentation system and (3) implement the Detect and Suppress Solution – Confirmation Density (DSS-CD) approach to automatically detect and suppress neutronic and thermal-hydraulic instabilities (THI). These changes will support operation of CPS at 3473 megawatts thermal (MWt) with core flow as low as 85% of rated core flow.

The scope of evaluations required to support the expansion of the core flow operating range to the MELLLA+ boundary is contained in the General Electric (GE) Licensing Topical Report (LTR) NEDC-33006P, "Maximum Extended Load Line Limit Analysis Plus Licensing Topical Report", referred to as the M+LTR (Reference 1). The M+LTR is currently under review by the NRC. The detailed plant-specific safety analysis (i.e., M+SAR) provides a systematic disposition of the M+LTR subjects applied to CPS, including performance of plant specific assessments and confirmation of the applicability of generic assessments to support a MELLLA+ core flow operating range expansion. With respect to the power-to-flow map, there are no changes other than the increase in core flow range.

The MELLLA+ core operating range expansion does not require any significant plant modifications. The operating range expansion involves changes to the operating power-to-flow map and a small number of setpoints and alarms. Because there is no change 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). The MELLLA+ operating range 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+.

As part of MELLLA+ implementation for CPS, AmerGen will implement a "Detect and Suppress Solution – Confirmation Density (DSS-CD)" approach to automatically detect and suppress neutronic and thermal-hydraulic instabilities (THI). DSS-CD implementation is based on the same hardware design as the Boiling Water Reactor Owners' Group (BWROG) Option III Reactor Stability Long-Term Solution, installed (but not armed) at CPS. The evaluation performed to confirm no adverse impact from operation in the MELLLA+ region verifies the applicability of the guidance in the GE DSS-CD topical report (Reference 2) for CPS. The GE DSS-CD topical report is currently under review by the NRC.

The OPRM instrumentation modification was committed to be installed and implemented based on our responses to Generic Letter 94-02, "Long-Term Solutions and Upgrade of Interim Operating Recommendations for Thermal-Hydraulic Instabilities in Boiling Water Reactors." The OPRM system was installed during the sixth refueling outage (RF-6). Upon restart from RF-6, CPS operated the OPRM system in a disabled or unarmed state such that it would have alarm capability but not be able to effect a reactor scram. The rationale for operating the system without its automatic protection enabled would allow for evaluation of system performance, the potential for spurious trips, and familiarization with system operation.

In Reference 11, AmerGen submitted an amendment request to incorporate the necessary changes to the operating license in support of making the OPRM system operable. This amendment request was under review by the NRC staff at the time General Electric (GE) Nuclear Energy issued the 10 CFR Part 21, "Reporting of Defects and Noncompliance," notification identifying potential non-conservative assumptions used in the generation of OPRM trip setpoints. As a result of the 10 CFR Part 21 notification, AmerGen decided not to arm the OPRM trip functions at CPS until after resolution of the issue. In addition, based on the time period GE projected to resolve the setpoint issue and the potential changes needed to the submittal to address the nonconservative OPRM assumptions, AmerGen subsequently requested withdrawal of the OPRM amendment request.

Upon startup from the next refueling outage, C1R09 (February 2004), the OPRM instrumentation will be operating in an unarmed state for the operating cycle following C1R09. Operation without the system automatic protection enabled will allow for evaluation of system performance and the potential for spurious trips with the new DSS-CD algorithm in place. During this time the Backup Stability Protection (BSP) will ensure that operation with the potential for instabilities does not occur.

As stated in Section 7.0 of Reference 2, the Interim Corrective Actions (ICAs) were established to provide short term interim measure prior to implementation of the plant specific long-term stability solution. As a result, they were not designed to accommodate significant variations in core and fuel designs. In addition, they are defined to support extended power uprate/MELLLA operation but do not address operation in the MELLLA+ operating domain extension. Therefore, Reference 2 provides a description of an example BSP approach that may be used when the OPRM system is temporarily inoperable, applicable up to and including MELLLA+ operation.

The size of the base (i.e., minimal) BSP regions is equivalent to the current ICA regions. The number of BSP regions is reduced from the three ICA regions (Scram, Exit, and Controlled Entry) to two regions (Scram and Controlled Entry). Operator awareness is required when operating within 10% of rated core flow or power from the BSP Controlled Entry region. The BSP requires operator action should the plant enter one of the BSP regions. Reference 2 defines the operator actions to be taken when entering the BSP regions. These actions are similar to the operator actions currently defined for the ICA Scram and Controlled Entry regions. An immediate manual scram is required upon determination that the Scram region has been entered. If entry is unavoidable, early scram initiation is appropriate. If entry into the Controlled Entry region is inadvertent or

forced, then immediate exit from the region is required. The region can be exited by control rod insertion or core flow increase. Increasing core flow by either restarting or upshifting a recirculation pump is not an acceptable method of exiting the region. Deliberate entry into the Controlled Entry region requires compliance with at least one of the stability controls outlined in Section 7.4.2 of Reference 2. Procedures will be revised to address operation with the BSPs and training will be provided to the operators prior to startup following implementation of MELLLA+.

The proposed TS changes are described in Section 2.0 of this Attachment. The marked-up TS pages are provided in Attachment 3. Revised TS pages reflecting these changes are provided in Attachment 4. A marked-up copy of the affected TS Bases is also included for informational purposes in Attachment 4.

AmerGen requests approval of the proposed amendments by December 31, 2003. This will provide adequate time for the affected station documents to be revised using the appropriate change control mechanisms.

2.0 PROPOSED CHANGE

2.1 TS Section 3.3.1.1, "Reactor Protection System (RPS) Instrumentation"

TS Section 3.3.1.1 Table 3.3.1.1-1, Function 2.b specifies a change to the Allowable Value (AV) for the Average Power Range Monitor (APRM) Flow Biased Simulated Thermal Power - High function. The current AV of ≤ 0.55 W + 62% RTP and ≤ 113% RTP specified in Table 3.3.1.1-1, "Reactor Protection System Instrumentation," is being revised to ≤ 0.61 W + 61.4% RTP and ≤ 113% RTP, where W is reactor recirculation drive flow and RTP is rated thermal power. The MELLLA+ APRM flow-biased scram is established to maintain approximately the same margin between the operating region and the trip that currently exists. The new AV's are required to reflect the change in the Analytical Limits under MELLLA+ conditions consistent with current setpoint methodology. MELLLA+ does not apply to single loop operation (SLO), so the SLO setpoint functions are unchanged.

2.2 TS Section 3.3.1.3, "Oscillation Power Range Monitor (OPRM) Instrumentation"

The proposed change adds the new TS Section 3.3.1.3 including the Limiting Condition for Operation (LCO), Applicability, Actions, and Surveillance Requirements necessary to define operability of the OPRM channels, and the actions the plant operators must take when the instruments become inoperable. These controls are consistent with the approved generic TS provided as Appendix A in Reference 3. Specifically, the LCO, Applicability, Actions and Surveillance Requirements are identical with the example, except for the following.

- A Note is added to the LCO that will state that the LCO is not required to be met until startup from refueling outage C1R10. This note will permit operation with the OPRM instrumentation in an unarmed state without having to enter

the associated action statement. Operation for one cycle with the OPRM instrumentation unarmed will allow for evaluation of system performance and the potential for spurious trips with the new DSS-CD algorithm in place.

- The LCO applicability is changed from "Thermal Power ≥ 25% RTP" to "Thermal Power ≥ 21.6% RTP." The setpoint in %RTP has been scaled to 21.6% to reflect changes due to License Amendment 149 approved for Extended Power Uprate at CPS. The revised RTP is consistent with the current thermal limit monitoring threshold used in the CPS Technical Specifications.
- The 120-day Completion Time for restoring the OPRM trip capability is deleted, consistent with the wording adopted by the Perry Nuclear Power Plant in their amendment approved by the NRC (Reference 4). The OPRM components are safety related, and therefore 10 CFR 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," Section XVI, "Corrective Action," applies. The "timeliness of corrective action" controls in this Section are adequate to ensure restoration of equipment operability. Until operability is restored, Action B.1 requires that the alternative method be in place, similar to the manner in which CPS has been operated for the time period prior to implementation of the OPRM instrumentation.
- The LCO Required Action C.1 is revised to state "Reduce Thermal Power < 21.6% RTP." This change provides consistency between the Required Action and the LCO applicability.
- Surveillance Requirement (SR) 3.3.1.x.5 requires verification that the OPRM is not bypassed when thermal power and recirculation drive flow are within limits. The actual implementation of the OPRM "arming" function and detection that plant conditions are within the "armed region" is done entirely in digital logic in the hardware that implements the OPRM functions. The armed region limits are established by entering digital setpoints into the OPRM equipment. The arming logic is accomplished totally with firmware-controlled logic. There is no additional hardware involved in the armed region detection or OPRM trip arming. The CPS OPRM design does not include a switch to bypass the OPRM scram function. Therefore, since this SR is redundant to the channel calibration requirement (i.e., SR 3.3.1.3.3), SR 3.3.1.x.5 will be deleted.

The proposed change also adds the associated Bases for the new TS added to address the OPRM instrumentation.

2.3 TS Section 3.4.1, "Recirculation Loops Operating"

Due to the automatic scram functions provided by the OPRM instrumentation, the manual operator actions specified in TS Section 3.4.1 (and its associated Conditions, Actions, and Surveillance Requirements), which are required to be taken upon entry into a specified region of the power-to-flow map, are being removed. The removal of these references includes elimination of LCO items 3.4.1.A.2, B.2 and B.3, LCO Note, removal of Actions B, C, D, G.1 and G.2, as well as deletion of SR 3.4.1.2 and Figure 3.4.1-1.

The implementation of the OPRM system permits TS Section 3.4.1 to be reformatted to be consistent with NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6," Revision 2. Similar to the TS Section 3.4.1 approved for the Perry Nuclear Power Plant in Reference 4, the proposed CPS TS Section 3.4.1 is modeled after the standard Technical Specifications with the following exceptions.

- The single loop operation LCO restricts operation in this mode to areas outside the MELLLA+ operating region as defined in the COLR.
- Condition A currently addresses the condition where the recirculation loop jet pump flow mismatch is not within limits. The required action for this condition is to shut down one recirculation loop within two hours. This condition is not contained in the standard TS but will be retained consistent with Reference 4 and the fact that this required action provides additional control above that required by the standard TS.
- Current Condition E (Revised Condition B) addresses the condition where thermal power is > 58% rated thermal power (RTP) during single recirculation loop operation. The required action for this condition is to reduce thermal power to ≤ 58% RTP within 4 hours. This condition is not contained in the standard TS but will be retained since it provides an additional control above that required by the standard TS.

The associated TS Bases are also revised to be consistent with the above changes.

2.4 TS Section 5.6.5, "Core Operating Limits Report (COLR)"

Administrative Control TS 5.6.5.a states that the required core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR. The proposed change to TS 5.6.5.a adds item 5 to the list of required limits documented in the COLR. This new item is the "Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating region."

In summary, the following changes are being proposed.

(1) Modify the AV for the APRM Flow Biased Simulated Thermal Power – High function for two loop operation in TS 3.3.1.1 Table 3.3.1.1-1, to accommodate the expanded operating range.

(2) Add new TS requirements for the OPRM system including LCO, Applicability, Actions, and Surveillance Requirements, to support implementation of the DSS-CD approach to THI.

(3) Revise TS 3.4.1 to remove the manual operator actions associated with entry into a specified region of the power-to-flow map and to restrict single loop operation to areas outside of the MELLLA+ operating region.

(4) Add a new requirement (i.e., TS 5.6.5.a.5) to establish the MELLLA+ operating region in the COLR.

The proposed TS changes are reflected on a marked-up copy of the affected pages from the CPS TS contained in Attachment 3. A marked-up copy of the affected pages from the current TS Bases is provided in Attachment 4 for information only. Following NRC approval of this request, the CPS Bases will be revised in accordance with the TS Bases Control Program of TS Section 5.5.11 to incorporate the changes identified in Attachment 4.

3.0 BACKGROUND

On April 5, 2002, the NRC issued License Amendment 149 to the CPS operating license (Reference 5). The amendment allowed an increase in the maximum power level for CPS from the original licensed thermal power of 2894 MWt to 3473 MWt. In support of the extended power uprate, the power-to-flow map that defines the boundaries, inside of which operation of the plant has been analyzed and demonstrated to meet all applicable fuel and system design criteria, was revised. The revised power-to-flow map provides only a narrow operating band with respect to core flow when operating at the current licensed thermal power (CLTP). This narrow operating band unduly restricts plant operation. In order to restore operating flexibility, AmerGen is requesting an expansion of the core flow operating range.

AmerGen committed in Reference 10 to implement the Interim Corrective Actions (ICAs) described in NRC Bulletin 88-07, Supplement 1, "Power Oscillations in Boiling Water Reactors (BWRs)." The ICAs were intended for use until replaced by the long-term solution (i.e., OPRM instrumentation). TS Section 3.4.1 and the associated actions, surveillance requirement, and Power versus Flow Figure 3.4.1-1, are based on the ICAs and address the potential for thermal hydraulic instabilities by requiring that plant operation be restricted to certain regions of the power-to-flow map. Since CPS is susceptible to instabilities when operating at high power and low flow, TS Figure 3.4.1-1 divides the power-to-flow map into three Regions (i.e., A, B, and C) with Regions A and B being the areas of TS Figure 3.4.1-1 where the potential for instabilities exist. Therefore, Surveillance Requirement (SR) 3.4.1.2 verifies that thermal power and core flow is in Region C. The OPRM instrumentation will initiate an automatic reactor scram upon detection of an instability that could threaten the MCPR safety limit. Thus, the enabling of this trip function requires that the OPRM instrumentation be incorporated into the TS. The proposed TS changes remove manual monitoring guidance from the TS and incorporates the new OPRM TS requirements.

4.0 TECHNICAL ANALYSIS

AmerGen is requesting a revision to the CPS power-to-flow map to restore operating flexibility at the CLTP of 3473 MWt. The required operating flexibility is achieved by permitting operation at the CLTP with core flow as low as 85% of rated core flow versus approximately 99% as limited by the existing power-to-flow map. The changes expand the operating range 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 range is identified as MELLLA+.

The MELLLA+ operating range expansion is applied as an incremental change to the previously approved licensed power uprate. With respect to the power-to-flow map, there are no changes other than the increase in core flow range. The CPS M+SAR, provided in Attachment 5, supports operation of CPS at CLTP with core flow as low as 85% of rated. The M+SAR was prepared following the guidelines contained in Reference 1 and provides a summary of the results of the safety analyses performed for the CPS core flow operating range expansion. Evaluations of the reactor, engineered safety features, power conversion, emergency power, support systems, environmental issues, and design basis accidents were performed. All safety aspects of the plant affected by MELLLA+ were evaluated using previously NRC-approved or industry-accepted analytical methods, as applicable.

The MELLLA+ core operating range expansion does not require major plant hardware modifications. The core operating range expansion involves changes to the operating power-to-flow map and a small number of setpoints and alarms. Because there is no change in the operating pressure, power, steam flow rate, or feedwater flow rate, there are no significant effects on the plant hardware outside of the Nuclear Steam Supply System (NSSS). The MELLLA+ operating range 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+.

As part of MELLLA+ implementation for CPS, AmerGen will also implement the DSS-CD approach (Reference 2) to automatically detect and suppress THI. DSS-CD represents a significant change from the BWROG Option III Reactor Stability Long-Term Solution, currently installed but not armed at CPS. The DSS-CD approach uses the same hardware design as Option III; it introduces an enhanced detection algorithm (i.e., the Confirmation Density Algorithm or CDA) to detect the inception of power oscillations and generate an earlier power suppression trip signal based on successive period confirmation recognition. The existing Option III algorithms are retained to provide defense-in-depth protection. The DSS-CD approach will provide reliable, automatic detection and suppression of stability related power oscillations and provide protection against violation of the Safety Limit Minimum Critical Power Ratio (SLMCPR) for anticipated oscillations. M+SAR Section 2.4, "Stability," verifies the applicability of the DSS-CD LTR (Reference 2) to CPS. Implementation of DSS-CD will require a software/firmware change to the existing Option III system.

The alternate stability protection approach, Backup Stability Protection (BSP), is required to be used when the OPRM system is temporarily inoperable. The definition of the base BSP regions and associated operator actions and the plant specific confirmation process are conservatively established on a generic basis in the DSS-CD LTR (Reference 2). The BSP regions are confirmed on a cycle-specific basis to provide consistency with the long-term stability solution general requirement of long-term applicability. A plant cycle specific assessment is required to confirm the applicability or update the Regions I or II boundaries for reload-specific fuel, core design and operating strategy.

It is AmerGen's intent to operate for one cycle with the OPRM instrumentation in an unarmed state. Therefore, a note is provided for the OPRM instrumentation TS LCO that indicates the LCO is not required to be met during Cycle 9. Operation for a cycle with the OPRM instrumentation unarmed will allow for evaluation of system performance and the potential for spurious trips with the new DSS-CD algorithm in place. During this period, the BSP will be in place as allowed by the proposed TS action. The BSP regions will be defined, as described above, on a cycle specific basis to provide long-term applicability. The actions associated with the BSP are similar to the actions associated with the ICAs.

In Reference 9, the NRC provided their detailed review of the OPRM design. Due to the completion of this detailed review, it was noted that the NRC does not intend to repeat its review of the matters found acceptable in Reference 3 when the report is referenced in licensee-specific applications, except to ensure that the plant-specific issues identified in Reference 9 have been properly addressed. The NRC also stated in Reference 9 that when submitting plant-specific license amendments, licensees should identify and justify any deviations from Reference 3 and the associated SER. The information requested by the NRC consists of the following.

1. "Confirm the applicability of CENPD-400-P, including clarifications and reconciled differences between the specific plant design and the topical report design descriptions."

   Response

   The OPRM instrumentation design at CPS includes alarm, trip, and inoperable/trouble annunciators and is consistent with the design description provided in Reference 3. There are no deviations from Sections 2.3 and 3.0 of Reference 3 other than those created by the addition of the Confirmation Density Algorithm (CDA) described in Reference 2.

2. "Confirm the applicability of BWROG topical reports that address the OPRM and associated instability functions, set points and margin."

   Response

   The BWROG topical reports that address the OPRM and associated instability functions, set points and margins are References 6, 7, and 8. Each of these topical reports has been determined to be applicable to CPS. In addition, the OPRM functions, set points and margins associated with DSS-CD are provided in Reference 2. This review has determined that an acceptable method for CPS to address GDC 10 and 12 is by the LPRM-based detect and suppress method described in References 2, 6, 7, and 8. Implementation of the ABB Option III long-term solution was selected for CPS. The Option III solution is modified as described in Reference 2 for implementation of the DSS-CD solution.

   In their Safety Evaluation (SE) accepting References 6 and 7, the NRC specified five conditions required to be met for implementation of Option III in any type of BWR. Each of these five conditions has been reviewed and the following confirmations or

clarifications of the applicability of References 6 and 7 to the proposed implementation of the Option III solution at CPS are provided.

i. "All three algorithms described in NEDO-31960 and Supplement 1 should be used in Option III or III-A. These three algorithms are high LPRM oscillation amplitude, high-low detection algorithm, and period-based algorithm."

   Response: All three algorithms are included in the Option III design. The CDA described in Reference 2 is also implemented and the Period Based Detection algorithm is modified as described in Reference 2. Automatic protection is actuated if any of the four algorithms meet their trip conditions. Only the CDA, however, is used to demonstrate protection of the MCPR safety limit for anticipated reactor instabilities. The other three algorithms are included as defense-in-depth features. Only the CDA is required for TS operability of the OPRM instrumentation.

ii. "The validity of the scram setpoints selected should be demonstrated by analyses. These analyses may be performed for a generic representative plant when applicable, but should include an uncertainty treatment that accounts for the number of failed sensors permitted by the technical specifications of the plant's applicant."

   Response: Reference 2 provides the methodology for selecting the setpoints and confirming that the generic licensing basis is applicable to a specific plant for the DSS-CD stability solution. The generic setpoints have been confirmed to be applicable to CPS. Two adjustable parameters, the period tolerance and the conditioning filter cutoff frequency, are set as part of the plant specific calibration after installation of the revised software and plant specific testing. The reload checklist includes confirmation that the generic DSS-CD licensing basis is applicable. The setpoints and methods of setting the adjustable parameters as described in Reference 2 will be used at CPS. As described in Reference 2, Section 5.4, the application of uncertainty to the applicable setpoints is not required. Therefore, the number of failed sensors is not required to be addressed in the uncertainty analysis.

iii. "Implementation of Option III or III-A will require that the selected bypass region outside of which the detect and suppress action is deactivated be defined in the technical specifications."

   Response: The definition of the bypass region is modified from that described in Reference 3 in accordance with Reference 2 for implementation of the DSS-CD solution. The thermal power cutoff is defined in the applicability for LCO 3.3.1.3 as provided in Attachment 3. The core flow cutoff limit is defined in the bases for this applicability.

iv. "If the algorithms detect oscillations, an automatic protective action should be initiated. This action may be a full scram or an SRI. If an SRI is implemented with Option III or III-A, a backup full scram must take effect if the oscillations do not disappear in a reasonable period of time or if they reappear before control

position and operating conditions have been adjusted in accordance with appropriate procedural requirements to permit reset of the SRI protective action."

Response: The automatic protective action of the OPRMs when fully implemented will be a full reactor scram, rather than a select rod insert (SRI).

v. "The LPRM groupings defined in NEDO-31960 to provide input to the Option III or III-A algorithms are acceptable for the intended oscillation-detection function. These LPRM groupings are the oscillation power range monitor for Option III or the octant based arrangements for Option III-A. The requirements for a minimum operable number of LPRM detectors set forth in NEDO-31960 are acceptable."

Response: The proposed implementation of the LPRM assignment grouping conforms with LPRM assignments shown in Appendix D to Reference 8. In their SE on Reference 8, the NRC concluded that the initial application methodology proposed in Section 5 of the topical report is acceptable. The LPRM assignments in Appendix D of Reference 8 are identified as examples of the expected LPRM assignments a licensee may choose. Therefore, it is concluded that since the LPRM assignment chosen for CPS is consistent with these examples, which were found to be acceptable by the NRC, the proposed CPS assignments are also acceptable. CPS is also consistent with the requirements for the minimum number of operable LPRM detectors as set forth in Reference 6. Per Reference 2, the maximum number of LPRM detectors per OPRM cell is reduced to four for the DSS-CD solution. The proposed implementation of the LPRM assignments also meets this requirement.

3. "Provide a plant-specific Technical Specification (TS) for the OPRM functions consistent with CENPD-400-P, Appendix A."

Response

The plant-specific TS are provided in Attachment 3 and are consistent with Reference 3. Specific differences are described in Section 2.2 of this attachment.

4. "Confirm that the plant-specific environmental (temperature, humidity, radiation, electromagnetic and seismic) conditions are enveloped by the OPRM equipment environmental qualification values."

Response

The OPRM components are mounted in Main Control Room cabinets that are located in a controlled environment. This environment is maintained during normal and accident plant conditions. The OPRM components installed are those subject to the ABB-CE environmental qualification program. The OPRM system and the dual voltage regulator are qualified to perform their Class 1E safety function for continuous operation for the following environmental conditions as specified in the CPS equipment design criteria.

Temperature: 65°F to 104°F

Relative Humidity: 5% to 60%

Pressure: 0.125 to 2.5 inches water column

Radiation: 1.0E3 Rads

Temperature and humidity qualification of the OPRM module was performed by test. As documented in Reference 3, the OPRM is designed to continuously operate in the following environment, while meeting all performance requirements.

Normal Ambient Temperature: 40°F to 120°F

Abnormal Ambient Temperature: 140°F for 48 hours

Humidity: 40% to 95% relative humidity non-condensing

Frequency: 47.5 to 63 Hz.

In addition, the equipment has been evaluated by the vendor to remain functional at humidity levels down to 10%. Also, equipment is generally considered operable and will not degrade at low humidity conditions. The primary concern at low humidity conditions is the chance for damage from electrostatic discharge.

The OPRM system is designed to provide a high degree of immunity from EMI/RFI and to minimize generated EMI/RFI that may interfere with devices connected to it, devices that share a common AC supply, and devices located in the same enclosure. The OPRM system is designed and tested to meet electrostatic discharge requirements as documented in Reference 3. In addition, fast transient (i.e., burst) withstand capability has been demonstrated for all power input and output and all process input and output circuits, signal common (i.e., signal reference) and protective earth connections. OPRM circuitry is located inside a metal enclosure. All external power, inputs and outputs pass through filters which, together with the metal enclosure, provide an EMI boundary. These features, when combined with grounding and cable separation in accordance with CPS restrictions on welding and portable transceiver use in the main control room area, ensure the OPRM system is protected from the effects of EMI.

The OPRM is seismically qualified by type testing per IEEE-344-1975. The OPRM is subject to a minimum of five equivalent Operation Basis Earthquakes (OBEs) in each axis followed by at least one equivalent Safe Shutdown Earthquake (SSE) in each axis. As documented in Reference 3, the input spectrum was selected to be generic and to envelop all anticipated applications. A design review was performed to verify the existing qualification of safety related devices and components that remain in the modified panels are not affected by the addition of the OPRM instrumentation. The modified panels were found to remain seismically qualified after the new installation.

5. "Confirm that administrative controls are provided for manually bypassing OPRM channels or protective functions, and for controlling access to the OPRM functions."

Response:

The CPS OPRM installation and implementation is consistent with the description provided in Reference 3 as approved by the NRC in Reference 9. CPS procedures provide administrative control for placing individual OPRM modules in manual bypass. In the event of equipment failure or a maintenance function that affects both modules in a given division, the Reactor Protection System (RPS) may be placed in sensor bypass. This would result in the bypass of both OPRM modules in the affected division. CPS procedures and work documents provide adequate administrative control for this activity. When the OPRM modules are not in manual bypass, the OPRM protective function is automatically bypassed or automatically activated when the reactor power and recirculation flow are in the appropriate regions of the reactor power-to-flow map to require automatic bypass or activation respectively. The OPRM as installed and implemented automatically enables its pre-trip alarm and trip outputs upon entry into the high power, low core flow region of the power-to-flow map.

6. "Confirm that any changes to the plant operator's main control room panel have received human factor reviews per plant-specific procedures."

   Response:

   The CPS OPRM installation and implementation includes activation of the main control room annunciator if the OPRM has been manually bypassed or deliberately rendered inoperable. Keylock access is necessary to manually bypass an OPRM module. Changes to OPRM software require both keylock access and a password. Procedural requirements control placing an OPRM module in bypass and verifying restoration.

   The CPS OPRM installation and implementation includes an operator interface via main control room annunciators that signal system status and/or problems, and the OPRM front panel LEDs. Alarms provided on the main control room annunciator panel include the OPRM ENABLED, OPRM OSCILLATION DETECTED, and OPRM TROUBLE/INOP. The OPRM trip function is included in the DIVISION 1 OR 4 NMS TRIP and the DIVISION 2 OR 3 NMS TRIP main control room annunciators. In addition, the OPRM modules are provided with local indicators include the ALARM, TROUBLE, INOP, TRIP, TRIP ENABLED, and READY LEDs.

   This modification was reviewed to ensure human factors considerations were part of the design. The modification was found not to violate human factors commitments as described in the Updated Safety Analysis Report, and that it incorporates adequate human factors principles consistent with the CPS human factors standards for controls and annunciators.

Other than the plant-specific items addressed above and the differences identified in Reference 2, there are no deviations from Reference 3 and the associated SE.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

AmerGen Energy Company (AmerGen), LLC is requesting a revision to Appendix A, Technical Specifications (TS), of Facility Operating License No. NPF-62 for Clinton Power Station (CPS), Unit 1. Specifically, the proposed license amendment revises the CPS TS, as necessary, to (1) support an expansion of the core flow operating range, (2) implement an Oscillation Power Range Monitor (OPRM) Instrumentation system, and (3) implement the Detect and Suppress Solution – Confirmation Density (DSS-CD) approach to automatically detect and suppress neutronic/thermal-hydraulic instabilities (THI). These changes will support operation of CPS at 3473 megawatts thermal (MWt) with core flow as low as 85% of rated core flow. The expanded operating range 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 range to the MELLLA+ boundary is contained in the General Electric (GE) Licensing Topical Report (LTR) NEDC-33006P, "Maximum Extended Load Line Limit Analysis Plus Licensing Topical Report", referred to as the M+LTR.

AmerGen also proposes to add TS Section 3.3.1.3, "Oscillation Power Range Monitor (OPRM) Instrumentation," which provides the minimum operability requirements for the OPRM channels, the Required Actions when they become inoperable, and the appropriate surveillance requirements. The proposed change also removes manual monitoring guidance for thermal hydraulic instability monitoring from TS Section 3.4.1, "Recirculation Loops Operating," that will no longer be necessary due to activation of the automatic OPRM instrumentation. In addition, these proposed changes include an update to TS Section 5.6.5, "Core Operating Limits Report (COLR)" to require documentation of the MELLLA+ operating region in the COLR.

For the CPS MELLLA+ operating range expansion, the long-term stability solution is being changed from the Option III solution to the DSS-CD. The DSS-CD solution algorithm, licensing basis, and application procedures are generically described in GE LTR NEDC-33075P, "General Electric Boiling Water Reactor Detect and Suppress Solution – Confirmation Density," and are verified to be applicable to CPS.

AmerGen has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment.", as discussed below.

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

The probability (frequency of occurrence) of a design basis accident (DBA) occurring is not affected by the operating range expansion, because the plant continues to comply with the regulatory and design basis criteria established for plant equipment. The MELLLA+ core operating range expansion does not require significant plant hardware modifications. The core operating range expansion involves changes to the operating power-to-flow map and a small number of setpoints and alarms. Because there is no change in the operating pressure, power, steam flow rate, or feedwater flow rate, there are no significant effects on the plant hardware outside of the Nuclear Steam Supply System (NSSS). The MELLLA+ operating range 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+. An evaluation of the probabilistic safety assessment concludes that the calculated increase in core damage frequencies due to the MELLLA+ operating range expansion are very small. Scram setpoints (equipment settings that initiate automatic plant shutdowns) are established such that there is no significant increase in scram frequency due to the MELLLA+ operating range expansion. No new challenges to safety related equipment result from the MELLLA+ operating range expansion. As a result there is no significant increase in the probability of an accident previously evaluated.

The proposed changes specify limiting conditions for operation, required actions and surveillance requirements for the OPRM system, and allows operation in regions of the power-to-flow map currently restricted by the requirements of the Interim Corrective Actions (ICAs) and certain limiting conditions of operation of TS Section 3.4.1. The restrictions of the ICAs and TS Section 3.4.1 were imposed to ensure adequate capability to detect and suppress conditions consistent with the onset of thermal-hydraulic oscillations that may develop into a thermal-hydraulic instability event. A thermal-hydraulic instability event has the potential to challenge the Minimum Critical Power Ratio (MCPR) safety limit. The OPRM system can automatically detect and suppress conditions necessary for thermal-hydraulic instability. The Backup Stability Protection (BSP), in lieu of the ICAs, will provide adequate protection should the OPRM equipment become temporarily inoperable. With the activation of the OPRM system, the restrictions of the ICAs and TS Section 3.4.1 will no longer be required.

The probability of a thermal-hydraulic instability event is impacted by power to flow conditions such that only during operation inside specific regions of the power-to-flow map, in combination with power shape and inlet enthalpy conditions, can the occurrence of an instability event be postulated to occur. Operation in these regions may increase the probability that operation with conditions necessary for a thermal-hydraulic instability can occur.

When the OPRM is operable, the OPRM can automatically detect the imminent onset of power oscillations and generate a trip signal. Actuation of a Reactor Protection System (RPS) trip will suppress conditions necessary for thermal-hydraulic instability and decrease the probability of a thermal-

hydraulic instability event. In the event the trip capability of the OPRM is not maintained, the proposed changes limit the period of time before an alternate method to detect and suppress thermal-hydraulic oscillations is required. Since the duration of this period of time is limited, the increase in the probability of a thermal-hydraulic instability event is not significant. Therefore, the proposed changes do not result in a significant increase in the probability of an accident previously evaluated.

The DSS-CD solution is designed to identify power oscillations upon inception and initiate control rod insertion (i.e., scram) to terminate the oscillations prior to any significant amplitude growth. The DSS-CD provides protection against violation of the Safety Limit Minimum Critical Power Ratio (SLMCPR) for anticipated oscillations. Compliance with Criterion 10, "Reactor design.", and Criterion 12, "Suppression of reactor power oscillations.", of 10CFR50, Appendix A, "General Design Criteria For Nuclear Power Plants," is accomplished via an automatic action. A developing instability event is suppressed by the DSS-CD system with substantial margin to the SLMCPR and no clad damage, with the event terminating in a scram and never developing into an accident. The DSS-CD system does not interact with equipment whose failure could cause an accident. Scram setpoints in the DSS-CD will be established so that analytical limits are met. The reliability of the DSS-CD will meet or exceed that of the existing system. No new challenges to safety-related equipment will result from the DSS-CD solution. Because an instability event would reliably terminate in an early scram without impact on other safety systems, there is no significant increase in the probability of an accident.

The spectrum of hypothetical accidents and transients has been investigated, and are shown to meet the plant's currently licensed regulatory criteria. In the area of core design, for example, the fuel operating limits such as Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) and SLMCPR continue to be met. The fuel reload analyses will show plant transients meet the criteria accepted by the NRC as specified in NEDO-24011, "GESTAR II," (Reference 12). Challenges to fuel are evaluated, and shown to still meet the criteria of 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors.", 10 CFR 50 Appendix K, "ECCS Evaluation Models," and Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," Section 6.3. Challenges to the containment have been evaluated, and the containment and its associated cooling systems meet Criterion 38, "Containment heat removal.", and Criterion 50, "Containment design basis.", of the general design criteria. Radiological release events have been evaluated, and are shown to be below the regulatory limits of 10 CFR 100, "Reactor Site Criteria". Operation in the MELLLA+ region does not result in an increase in the consequences of an accident previously evaluated. Operation within the MELLLA+ region has been evaluated to ensure that the CPS response to accidents and transients remains within acceptable criteria. Thus, the proposed changes do not involve a significant increase in the consequences of an accident previously evaluated.

An unmitigated thermal-hydraulic instability event is postulated to cause a violation of the MCPR safety limit. The proposed changes ensure mitigation of thermal-hydraulic instability events prior to challenging the MCPR safety limit if initiated from anticipated conditions by detection of the onset of oscillations and actuation of an RPS trip signal when the OPRM system is operable. The OPRM also provides the capability of an RPS trip being generated for thermal-hydraulic instability events initiated from unanticipated but postulated conditions. These mitigative capabilities of the OPRM system would become available as a result of the proposed changes and have the potential to reduce the consequences of unanticipated and postulated thermal-hydraulic instability events.

As stated above, the DSS-CD solution meets the requirements of Criterion 10 and Criterion 12 of the GDC by automatically detecting and suppressing design basis thermal-hydraulic oscillations prior to exceeding the fuel SLMCPR. Proper operation of the DSS-CD system does not affect any fission product barrier or Engineered Safety Feature. Thus, the proposed change cannot change the consequences of any accident previously evaluated.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any previously evaluated?

   Response: No.

   Equipment that could be affected by MELLLA+ has been evaluated and no new operating mode, safety related equipment lineup, accident scenario, or equipment failure mode was identified. The full spectrum of accident considerations, defined in the CPS Updated Safety Analysis Report (USAR), has been evaluated, and no new or different kind of accident has been identified. The MELLLA+ operating range expansion uses existing technology and NRC approved safety analysis methodology, and applies them within the capabilities of already existing plant equipment in accordance with presently existing regulatory and industry criteria. The MELLLA+ operating range expansion will not create the possibility of a new or different kind of accident from any accident previously evaluated.

   The proposed changes specify limiting conditions for operations, required actions and surveillance requirements of the OPRM system and allows operation in regions of the power-to-flow map currently restricted by the requirements of the ICAs and TS Section 3.4.1. The OPRM system uses input signals shared with the Average Range Power Monitor (APRM) system and rod block functions to monitor core conditions and generate an RPS trip when required. Quality requirements for software design, testing, implementation and module self-testing of the OPRM system provide

assurance that no new equipment malfunctions due to software errors are created. The design of the OPRM system also ensures that neither operation nor malfunction of the OPRM system will adversely impact the operation of the other systems and no accident or equipment malfunction of these other systems could cause the OPRM system to malfunction or cause a different kind of accident. No new failure modes of either the new OPRM equipment or of the existing APRM equipment have been introduced. Therefore, operation with the OPRM system does not create the possibility of a new or different kind of accident from any previously evaluated.

The DSS-CD solution operates within the existing Option III OPRM hardware. Implementation of the DSS-CD will require a software/hardware change to the existing Option III system. No new operating mode, safety-related equipment lineup, accident scenario, system interaction, or equipment failure mode was identified. Therefore, the DSS-CD solution will not adversely affect plant equipment. Because there are no significant hardware changes, there is no change in the possibility or consequences of a failure. The worst-case failure of the equipment is a failure to initiate mitigating action (i.e., scram), but no failure can cause an accident of a new or different kind than any previously evaluated.

As such the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

   Response: No.

   The calculated loads on all affected structures, systems and components have been shown to remain within design allowables for all design basis event categories. No NRC acceptance criteria are exceeded. The margins of safety currently included in the design of the plant are not affected by the MELLLA+ operating range expansion. Because the plant configuration and response to transients and hypothetical accidents do not result in exceeding the presently approved NRC acceptance limits, operation in the MELLLA+ region does not involve a significant reduction in a margin of safety.

   The OPRM system monitors small groups of LPRM signals for indication of local variations of core power consistent with thermal-hydraulic oscillations and generates an RPS trip when conditions consistent with the onset of oscillations are detected. An unmitigated thermal-hydraulic instability event has the potential to result in a challenge to the MCPR safety limit. The OPRM system provides the capability to automatically detect and suppress conditions which might result in a thermal-hydraulic instability event and thereby maintains the margin of safety by providing automatic protection for the MCPR safety limit while reducing the burden on the control room operators significantly. The BSP, in lieu of the ICAs, will provide adequate protection should the OPRM equipment become temporarily inoperable.

Operation with the OPRM system does not involve a significant reduction in a margin of safety.

The DSS-CD solution is designed to identify the power oscillations upon inception and initiate control rod insertion to terminate (i.e., scram) the oscillations prior to any significant amplitude growth. The DSS-CD solution algorithm will maintain or increase the margin to the SLMCPR for anticipated instability events. The safety analyses in NEDC-33075P demonstrate the margin to the SLMCPR for postulated bounding stability events. In addition, the current Option III algorithms are retained to provide defense-in-depth protection for unanticipated reactor instability events. As a result, there is no impact on the MCPR Safety Limit identified for an instability event.

Therefore, operation of CPS in accordance with the proposed changes will not involve a significant reduction in a margin of safety.

Conclusion

Based on the above, AmerGen concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, a finding of no significant hazards consideration is justified.

5.2 Applicable Regulatory Requirements/Criteria

Implementation of MELLLA+ does not require (1) an increase in the current maximum normal operating reactor dome pressure, (2) an increase in core power, (3) an increase in the maximum licensed core flow, (4) a change to source term methodology, (5) a new fuel product line, or (6) a change in fuel cycle length. As such, the impact on plant operation is minimal and, as demonstrated in the M+SAR, the MELLLA+ range expansion can be accomplished without exceeding any existing regulatory limits or design allowable limits applicable to CPS. Implementation of the OPRM instrumentation system meets the requirements of the CPS response to Generic Letter 94-02 for a long-term stability solution. Since the DSS-CD approach will provide reliable, automatic detection and suppression of stability related power oscillations and provide protection against violation of the SLMCPR for anticipated oscillations, compliance with Criterion 10 and Criterion 12 of the GDC is maintained.

AmerGen has determined that the proposed changes do not require any exemptions or relief from regulatory requirements, other than Technical Specifications, and do not affect conformance with any GDC described in the CPS Updated Safety Analysis Report (USAR).

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

AmerGen Energy Company (AmerGen), LLC has evaluated the proposed changes against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21, "Criteria for and identification of licensing and regulatory actions requiring environmental assessments." AmerGen has determined that the proposed changes meet the criteria for a categorical exclusion as set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review.", paragraph (c)(9), and as such, has determined that no irreversible consequences exist in accordance with 10 CFR 50.92, "Issuance of amendment.", paragraph (b). This determination is based on the fact that this change is being proposed as an amendment to a license issued pursuant to 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," which changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20," Standards for Protection Against Radiation," or that changes an inspection or a surveillance requirement, and the amendment meets the following specific criteria.

(i) The amendment involves no significant hazards consideration.

As demonstrated in Section 5.1 of this attachment, the proposed changes do not involve a significant hazards consideration.

(ii) There is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

For operation in the MELLLA+ region, the environmental effects will be controlled to the same limits as for the current operating power-to-flow map. None of the present environmental release limits are increased as a result of MELLLA+. These changes do not result in an increase in power level, do not significantly increase the production, nor alter the flow path or method of disposal of radioactive waste or byproducts. Implementation of MELLLA+ and the Oscillation Power Range Monitor (OPRM) Instrumentation system will not result in modifications to the plant or changes in plant operation that could significantly alter the type or amounts of any effluents that may be released offsite. Therefore, based on the above, there will be no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

The expansion of the core flow operating range, implementation of the OPRM Instrumentation system, and implementation of the DSS-CD does not significantly affect the design or operation of the facility as related to occupational doses. The implementation of the proposed changes has been evaluated and it has been demonstrated that with the requested changes, the dose consequences of the limiting events remain within the regulatory guidance provided by the NRC. As a

result of MELLLA+, there will be no significant change in the quantity of radioactivity released to the environment through liquid effluents, and no increase in airborne emissions of radioactivity. All offsite radiation doses have been determined to be within 10 CFR 20, "Standards for Protection Against Radiation," and 10 CFR 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low As Is Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," limits. Thus, there will be no significant increase in either individual or cumulative occupational radiation exposure.

7.0 REFERENCES

1. General Electric Company Licensing Topical Report, NEDC-33006P, "Maximum Extended Load Line Limit Analysis Plus Licensing Topical Report," Revision 1, dated August 2002

2. General Electric Company Licensing Topical Report, NEDC-33075P, "General Electric Boiling Water Reactor Detect and Suppress Solution – Confirmation Density," Revision 2, dated November 2002

3. CENPD-400-P-A, "Generic Topical Report for the ABB Option III Oscillation Power Range Monitor (OPRM)," Revision 1, dated May 1995

4. Letter from U. S. NRC to J. K. Wood (First Energy Nuclear Operating Company), "Perry Nuclear Plant, Unit 1 – Issuance of Amendment Re: Activation of Thermal-Hydraulic Stability Monitoring Instrumentation (TAC No. MA8671)," dated February 26, 2001

5. Letter from U. S. NRC to O. D. Kingsley (Exelon Generation Company, LLC), "Clinton Power Station, Unit 1 – Issuance of Amendment (TAC No. MB2210)," dated April 5, 2002

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

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

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

9. Letter from B. Boger (U. S. NRC) to R. Pinelli (BWROG), "Acceptance of Licensing Topical Report CENPD-400-P, 'Generic Topical Report for the ABB Option III Oscillation Power Range Monitor,' (TAC NO. M89222)," dated August 16, 1995

10. Letter from J. Cook (Illinois Power) to U. S. NRC, "Illinois Power's (IP's) Response to Generic Letter (GL) 94-02, Long-Term Solutions and Upgrade of

Interim Operating Recommendations for Thermal Hydraulic Instabilities in Boiling Water Reactors," dated September 2, 1994

11. Letter from J. M. Heffley (AmerGen Energy Company, LLC) to U. S. NRC, "Request for Amendment to Appendix A, Technical Specifications for the Oscillation Power Range Monitor Instrumentation," dated June 1, 2001

12. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel, GESTAR-II," as amended through Amendment 26

ATTACHMENT 3

MARKUP OF PROPOSED TECHNICAL SPECIFICATION CHANGES

<u>Revised TS Pages</u>

3.3-7
3.3-14a
3.3-14b
3.4-1
3.4-2
3.4-3
3.4-4
3.4-5
5.0-18

Table 3.3.1.1-1 (page 1 of 3)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Intermediate Range Monitors					
a. Neutron Flux-High	2	4	H	SR 3.3.1.1.1 SR 3.3.1.1.4 SR 3.3.1.1.6 SR 3.3.1.1.7 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 122/125 divisions of full scale
	5(a)	4	I	SR 3.3.1.1.1 SR 3.3.1.1.5 SR 3.3.1.1.13 SR 3.3.1.1.15	≤122/125 divisions of full scale
b. Inop	2	4	H	SR 3.3.1.1.4 SR 3.3.1.1.15	NA
	5(a)	4	I	SR 3.3.1.1.5 SR 3.3.1.1.15	NA
2. Average Power Range Monitors					
a. Neutron Flux-High, Setdown	2	4	H	SR 3.3.1.1.1 SR 3.3.1.1.4 SR 3.3.1.1.7 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.15	≤ 20% RTP
b. Flow Biased Simulated Thermal Power - High	1	4	G	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.8 SR 3.3.1.1.9 SR 3.3.1.1.11 SR 3.3.1.1.14 SR 3.3.1.1.15 SR 3.3.1.1.17	≤0.55 W + 62% RTP and ≤ 113% RTP(b) [≤ 0.61W + 61.4% RTP]
c. Fixed Neutron Flux - High	1	4	G	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.9 SR 3.3.1.1.11 SR 3.3.1.1.15 SR 3.3.1.1.17	≤ 120% RTP
d. Inop	1,2	4	H	SR 3.3.1.1.8 SR 3.3.1.1.9 SR 3.3.1.1.15	NA

(continued)

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

(b) Allowable Value is ≤ 0.55 (W-8) + 42.5% RTP when reset for single loop operation per LCO 3.4.1, "Recirculation Loops Operating."

New TS page

3.3 INSTRUMENTATION

3.3.1.3 Oscillation Power Range Monitor (OPRM) Instrumentation

LCO 3.3.1.3 Four channels of the OPRM instrumentation shall be OPERABLE.

APPLICABILITY: THERMAL POWER ≥ 21.6% RTP.

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required channels inoperable.	A.1	Place channel in trip.	30 days
	OR		
	A.2	Place associated RPS trip system in trip.	30 days
	OR		
	A.3	Initiate alternate method to detect and suppress thermal hydraulic instability oscillations.	30 days
B. OPRM trip capability not maintained.	B.1	Initiate alternate method to detect and suppress thermal hydraulic instability oscillations	12 hours
C. Required Action and associated Completion Time not met.	C.1	Reduce THERMAL POWER < 21.6% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

-------------------------------NOTE-------------------------------
When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the OPRM maintains trip capability.

SURVEILLANCE		FREQUENCY
SR 3.3.1.3.1	Perform CHANNEL FUNCTIONAL TEST.	184 days
SR 3.3.1.3.2	Calibrate the local power range monitors.	1000 MWD/T average core exposure
SR 3.3.1.3.3	------------------NOTE------------------ Neutron detectors are excluded. --- Perform CHANNEL CALIBRATION.	18 months
SR 3.3.1.3.4	Perform LOGIC SYSTEM FUNCTIONAL TEST.	18 months
SR 3.3.1.3.5	------------------NOTE------------------ Neutron detectors are excluded. --- Verify the RPS RESPONSE TIME is within limits.	18 months on a STAGGERED TEST BASIS

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 Recirculation Loops Operating

LCO 3.4.1

A. Two recirculation loops shall be in operation with (matched flows;)

~~1. Matched flows; and~~

~~2. Total core flow and THERMAL POWER within limits.~~

<u>OR</u>

B. One recirculation loop shall be in operation (Insert #1) with:

1. THERMAL POWER ≤ 58% RTP;

2. (Insert #2) ~~Total core flow and THERMAL POWER within limits;~~

3. (Insert #3) ~~Required limits modified for single recirculation loop operation as specified in the COLR~~; and

4. LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation," Function 2.b (Average Power Range Monitors Flow Biased Simulated Thermal Power-High), Allowable Value of Table 3.3.1.1-1 reset for single loop operation.

(9)
~~NOTE~~
~~Required limit and setpoint modifications for single recirculation loop operation may be delayed for up to 12 hours after transition from two recirculation loop operation to single recirculation loop operation~~.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Recirculation loop jet pump flow mismatch not within limits.	A.1 Shut down one recirculation loop.	2 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. Total core flow as a function of THERMAL POWER within Region A or B of Figure 3.4.1-1.	B.1	Determine Average Power Range Monitor (APRM) and Local Power Range Monitor (LPRM) neutron flux noise levels.	Once per 8 hours AND 30 minutes after an increase of ≥ 5% RTP
C. Total core flow as a function of THERMAL POWER within Region B of Figure 3.4.1-1. AND APRM or LPRM neutron flux noise level > 3 times established baseline noise level.	C.1	Restore APRM and LPRM neutron flux noise level to ≤ 3 times established baseline levels.	2 hours
D. Total core flow as a function of THERMAL POWER within Region A of Figure 3.4.1-1.	D.1	Restore total core flow as a function of THERMAL POWER to within Region B or C of Figure 3.4.1-1.	4 hours
E. THERMAL POWER > 58% RTP during single recirculation loop operation.	E.1	Reduce THERMAL POWER to ≤ 58% RTP.	4 hours

(continued)

Insert #4

Insert #5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~F.~~ C ~~One or more required limit or setpoint modifications not performed.~~	~~F.1~~ C ~~Declare associated limit(s) and setpoint(s) not met.~~	~~Immediately~~ 24 hours
~~G.~~ D No recirculation loops in operation. Insert #6	~~G.1 Reduce THERMAL POWER to within Region C of Figure 3.4.1-1.~~	~~4 hours~~
	~~AND~~	
	~~G.2 Be in MODE 2.~~	~~6 hours~~
	~~AND~~	
	~~G.3~~ D.1 Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.1.1	------------------NOTE------------------ Not required to be performed until 24 hours after both recirculation loops are in operation. --	
	Verify recirculation loop jet pump flow mismatch with both recirculation loops in operation is: a. ≤ 10% of rated core flow when operatting at < 70% of rated core flow; and b. ≤ 5% of rated core flow when operating at ≥ 70% of rated core flow.	24 hours

~~(continued)~~

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.1.2	Verify: a. Total core flow ≥ 45% rated core flow; or b. THERMAL POWER and total core flow within Region C of Figure 3.4.1-1.	24 hours.

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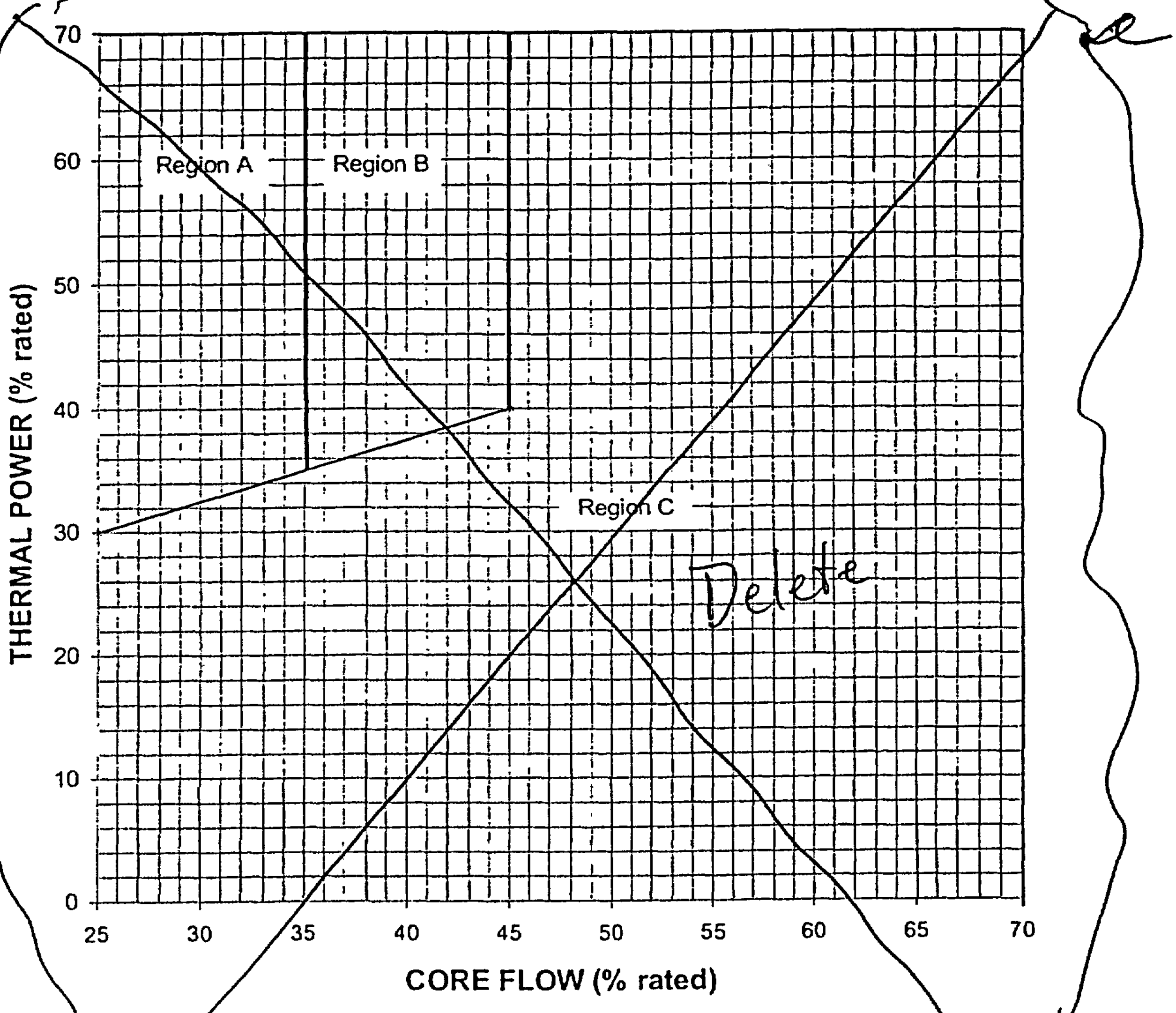

Figure 3.4.1-1 (page 1 of 1)
Thermal Power/Core Flow Stability Regions

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Insert #1 to page 3.4-1:

"provided the plant is not operating in the MELLLA+ region defined in the COLR and"

Insert #2 to page 3.4-1:

"LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," single loop operation limits specified in the COLR;"

Insert #3 to page 3.4-1:

"LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," single loop operation limits specified in the COLR; and"

Insert #4 to page 3.4-3:

"Requirements B.2, B.3, or B.4 of the LCO not met."

Insert #5 to page 3.4-3:

"Satisfy the requirements of the LCO."

Insert #6 to page 3.4-3:

"Required Action and associated completion time of Condition A, B or C not met.

OR"

5.6 Reporting Requirements

5.6.2 Annual Radiological Environmental Operating Report (continued)

report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

5.6.3 Radioactive Effluent Release Report

The Radioactive Effluent Release Report covering the operation of the unit during the previous calendar year shall be submitted by May 1 of each year. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and process control program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

5.6.4 Monthly Operating Reports

Routine reports of operating statistics and shutdown experience, including documentation of all challenges to the main steam safety/relief valves, shall be submitted on a monthly basis no later than the 15th of each month following the calendar month covered by the report.

5.6.5 CORE OPERATING LIMITS REPORT (COLR)

a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

1. LCO 3.2.1, Average Planar Linear Heat Generation Rate (APLHGR),

2. LCO 3.2.2, Minimum Critical Power Ratio (MCPR),

3. LCO 3.2.3, Linear Heat Generation Rate (LHGR), ~~and~~

4. LCO 3.3.1.1, RPS Instrumentation (SR 3.3.1.1.14), and

5. The Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating region.

(continued)

ATTACHMENT 4

RETYPED PAGES
FOR
TECHNICAL SPECIFICATION CHANGES
AND
BASES CHANGES (FOR INFORMATION ONLY)

Retyped TS Pages

3.3-7
3.3-14a
3.3-14b
3.4-1
3.4-2
3.4-3
3.4-4
3.4-5
5.0-18

Bases Pages (for information only)

ii
B3.3-39a through B3.3-39h
B3.4-3 through B3.4-8

Table 3.3.1.1-1 (page 1 of 3)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Intermediate Range Monitors					
a. Neutron Flux-High	2	4	H	SR 3.3.1.1.1 SR 3.3.1.1.4 SR 3.3.1.1.6 SR 3.3.1.1.7 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 122/125 divisions of full scale
	5[(a)]	4	I	SR 3.3.1.1.1 SR 3.3.1.1.5 SR 3.3.1.1.13 SR 3.3.1.1.15	≤122/125 divisions of full scale
b. Inop	2	4	H	SR 3.3.1.1.4 SR 3.3.1.1.15	NA
	5[(a)]	4	I	SR 3.3.1.1.5 SR 3.3.1.1.15	NA
2. Average Power Range Monitors					
a. Neutron Flux-High, Setdown	2	4	H	SR 3.3.1.1.1 SR 3.3.1.1.4 SR 3.3.1.1.7 SR 3.3.1.1.8 SR 3.3.1.1.11 SR 3.3.1.1.15	≤ 20% RTP
b. Flow Biased Simulated Thermal Power - High	1	4	G	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.8 SR 3.3.1.1.9 SR 3.3.1.1.11 SR 3.3.1.1.14 SR 3.3.1.1.15 SR 3.3.1.1.17	≤0.61 W + 61.4% RTP and ≤ 113% RTP[(b)]
c. Fixed Neutron Flux - High	1	4	G	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.9 SR 3.3.1.1.11 SR 3.3.1.1.15 SR 3.3.1.1.17	≤ 120% RTP
d. Inop	1,2	4	H	SR 3.3.1.1.8 SR 3.3.1.1.9 SR 3.3.1.1.15	NA

(continued)

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

(b) Allowable Value is ≤ 0.55 (W-8) + 42.5% RTP when reset for single loop operation per LCO 3.4.1, "Recirculation Loops Operating."

3.3 INSTRUMENTATION

3.3.1.3 Oscillation Power Range Monitor (OPRM) Instrumentation

LCO 3.3.1.3 Four channels of the OPRM instrumentation shall be OPERABLE.

---------------------------NOTE---------------------------
LCO not required to be met until startup from refueling outage C1R10.

APPLICABILITY: THERMAL POWER ≥ 21.6% RTP.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required channels inoperable.	A.1 Place channel in trip. OR A.2 Place associated RPS trip system in trip. OR A.3 Initiate alternate method to detect and suppress thermal hydraulic instability oscillations.	30 days 30 days 30 days
B. OPRM trip capability not maintained.	B.1 Initiate alternate method to detect and suppress thermal hydraulic instability oscillations.	12 hours
C. Required Action and associated Completion Time not met.	C.1 Reduce THERMAL POWER < 21.6% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

-------------------------------NOTE-------------------------------
When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the OPRM maintains trip capability.

SURVEILLANCE		FREQUENCY
SR 3.3.1.3.1	Perform CHANNEL FUNCTIONAL TEST.	184 days
SR 3.3.1.3.2	Calibrate the local power range monitors.	1000 MWD/T average core exposure
SR 3.3.1.3.3	------------------NOTE------------------ Neutron detectors are excluded. -- Perform CHANNEL CALIBRATION.	18 months
SR 3.3.1.3.4	Perform LOGIC SYSTEM FUNCTIONAL TEST.	18 months
SR 3.3.1.3.5	------------------NOTE------------------ Neutron detectors are excluded. -- Verify the RPS RESPONSE TIME is within limits.	18 months on a STAGGERED TEST BASIS

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 Recirculation Loops Operating

LCO 3.4.1

A. Two recirculation loops shall be in operation with matched flows;

OR

B. One recirculation loop shall be in operation provided the plant is not operating in the MELLLA+ region defined in the COLR and:

1. THERMAL POWER ≤ 58% RTP;
2. LCO 3.2.1,"AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," single loop operation limits specified in the COLR;
3. LCO 3.2.2,"MINIMUM CRITICAL POWER RATIO (MCPR)," single loop operation limits specified in the COLR; and
4. LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation," Function 2.b (Average Power Range Monitors Flow Biased Simulated Thermal Power-High), Allowable Value of Table 3.3.1.1-1 reset for single loop operation.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Recirculation loop jet pump flow mismatch not within limits.	A.1	Shut down one recirculation loop.	2 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. THERMAL POWER > 58% RTP during single recirculation loop operation.	B.1	Reduce THERMAL POWER to ≤ 58% RTP.	4 hours
C. Requirements B.2, B.3 or B.4 of the LCO not met.	C.1	Satisfy the requirements of the LCO.	24 hours
D. Required Action and associated completion time of Condition A, B or C not met. <u>OR</u> No recirculation loops in operation.	D.1	Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.1.1	------------------NOTE------------------ Not required to be performed until 24 hours after both recirculation loops are in operation. -- Verify recirculation loop jet pump flow mismatch with both recirculation loops in operation is: a. ≤ 10% of rated core flow when operat-ting at < 70% of rated core flow; and b. ≤ 5% of rated core flow when operating at ≥ 70% of rated core flow.	24 hours

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5.6 Reporting Requirements

5.6.2 Annual Radiological Environmental Operating Report (continued)

report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

5.6.3 Radioactive Effluent Release Report

The Radioactive Effluent Release Report covering the operation of the unit during the previous calendar year shall be submitted by May 1 of each year. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and process control program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

5.6.4 Monthly Operating Reports

Routine reports of operating statistics and shutdown experience, including documentation of all challenges to the main steam safety/relief valves, shall be submitted on a monthly basis no later than the 15th of each month following the calendar month covered by the report.

5.6.5 CORE OPERATING LIMITS REPORT (COLR)

a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

1. LCO 3.2.1, Average Planar Linear Heat Generation Rate (APLHGR),
2. LCO 3.2.2, Minimum Critical Power Ratio (MCPR),
3. LCO 3.2.3, Linear Heat Generation Rate (LHGR),
4. LCO 3.3.1.1, RPS Instrumentation (SR 3.3.1.1.14), and
5. The Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating region.

(continued)

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(continued)

B 3.3 INSTRUMENTATION

B 3.3.1.3 Oscillation Power Range Monitor (OPRM) Instrumentation

BASES

BACKGROUND

General Design Criterion 10 (GDC 10) requires the reactor core and associated coolant, control, and protection systems to be designed with appropriate margin to assure that acceptable fuel design limits are not exceeded during any condition of normal operation, including the affects of anticipated operational occurrences. Additionally, GDC 12 requires the reactor core and associated coolant, control, and protection systems to be designed to assure that power oscillations which can result in conditions exceeding acceptable fuel design limits are either not possible or can be reliably and readily detected and suppressed. The OPRM System provides compliance with GDC 10 and GDC 12, thereby providing protection from exceeding the fuel Minimum Critical Power Ratio (MCPR) safety limit.

Reference 7 describes the primary algorithm used in the OPRM for detecting thermal-hydraulic instability related neutron flux oscillations: the confirmation density algorithm. References 1, 2, and 3 describe three additional algorithms for detecting thermal-hydraulic instability related neutron flux oscillations: the period-based detection algorithm, the amplitude-based algorithm, and the growth-rate algorithm. All four algorithms are implemented in the OPRM Instrumentation, but the safety analysis takes credit only for the confirmation density algorithm. The remaining algorithms provide defense-in-depth and additional protection against unanticipated oscillations.

The OPRM System consists of 4 OPRM trip channels, each channel consisting of two OPRM modules. Each OPRM module receives input from LPRMs. Each OPRM module also receives input from the Neutron Monitoring System (NMS) Average Power Range Monitor (APRM) power and flow signals to automatically enable the trip function of the OPRM module.

Each OPRM module is continuously tested by a self-test function. On detection of any OPRM module failure, either a Trouble alarm or INOP alarm is activated. The OPRM module provides an INOP alarm when the self-test feature indicates that the OPRM module may not be capable of meeting its functional requirements.

(continued)

BASES

APPLICABLE SAFETY ANALYSES

It has been shown that BWR cores may exhibit thermal-hydraulic reactor instabilities in high power and low flow portions of the core power to flow operating domain. GDC 10 requires the reactor core and associated coolant, control, and protection systems to be designed with appropriate margin to assure that acceptable fuel design limits are not exceeded during any condition of normal operation, including the affects of anticipated operational occurrences. GDC 12 requires assurance that power oscillations which can result in conditions exceeding acceptable fuel design limits are either not possible or can be reliably and readily detected and suppressed. The OPRM System provides compliance with GDC 10 and GDC 12 by detecting the onset of oscillations and suppressing them by initiating a reactor scram. This assures that the MCPR safety limit will not be violated for anticipated oscillations.

The OPRM Instrumentation satisfies Criterion 3 of 10CFR 50.36(c)(2)(ii).

LCO

Four channels of the OPRM System are required to be OPERABLE to ensure that stability related oscillations are detected and suppressed prior to exceeding the MCPR safety limit. Only one of the two OPRM modules confirmation density algorithm is required for OPRM channel OPERABILITY. The minimum number of responsive OPRM cells in an OPRM channel will be determined by a function in the DSS-CD algorithm (Reference 7). The Note associated with this LCO is intended to allow operation during Cycle 9 with the OPRM trip function disabled to allow evaluation of system performance to prevent spurious trips. However, until such a time that the OPRM trips are enabled, an alternate stability protection approach (i.e., Backup Stability Protection) will be used to detect and suppress thermal-hydraulic instability during Cycle 9 operations. This alternate stability protection approach follows the methods described in Reference 7 and is consistent with the requirements of Action B.1.

APPLICABILITY

The OPRM instrumentation is required to be OPERABLE in order to detect and suppress neutron flux oscillations in the event of thermal-hydraulic instability. As described in Reference 7, the region of anticipated oscillation is defined by THERMAL POWER ≥ 21.6% RTP and recirculation drive flow is ≤ the value corresponding to 75% of rated core flow. The OPRM trip is required to be enabled in this region, and the OPRM must be capable of enabling the trip function as a

(continued)

BASES

APPLICABILITY (continued)	result of anticipated transients that place the core in that power/flow condition. Therefore, the OPRM is required to be OPERABLE with THERMAL POWER ≥ 21.6% RTP. It is not necessary for the OPRM to be OPERABLE with THERMAL POWER < 21.6% RTP because instabilities are not anticipated to grow large enough to threaten the MCPR safety limit. This expectation is due, in part, to the large MCPR margin that exists at low power.

ACTIONS

A Note has been provided to modify the ACTIONS related to the OPRM instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition discovered to be inoperable or not within limits will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable OPRM instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable OPRM instrumentation channel.

A.1, A.2, and A.3

Because of the reliability and on-line self-testing of the OPRM instrumentation and the redundancy of the RPS design, an allowable out of service time of 30 days has been shown to be acceptable (Ref. 4) to permit restoration of any inoperable channel to OPERABLE status. However, this out of service time is only acceptable provided the OPRM instrumentation still maintains OPRM trip capability (refer to Required Action B.1). The remaining OPERABLE OPRM channels continue to provide trip capability (see Condition B) and provide operator information relative to stability activity. The remaining OPRM modules have high reliability. With this high reliability, there is a low probability of a subsequent channel failure within the allowable out of service time. In addition, the OPRM modules continue to perform on-line self-testing and alert the operator if any further system degradation occurs.
If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, the OPRM channel or associated RPS trip system must be placed in the tripped condition per Required Actions A.1 and A.2. Placing the inoperable OPRM channel in trip (or the associated RPS trip system in trip) would conservatively compensate for the inoperability, restore capability to

(continued)

BASES

ACTIONS (continued)

A.1, A.2, and A.3 (continued)

accommodate a single failure, and allow operation to continue. Alternately, if it is not desired to place the OPRM channel (or RPS trip system) in trip (e.g., as in the case where placing the inoperable channel in trip would result in a full scram), the alternate method of detecting and suppressing thermal-hydraulic instability oscillations is required (Required Action A.3).

The Backup Stability Protection (BSP) approach is the alternate method described in Reference 7. The BSP regions are confirmed on a plant cycle-specific basis and consists of two regions, Scram and Controlled Entry. The BSP approach requires increased operator awareness and monitoring for neutron flux oscillations when operating in the region where oscillations are possible. Upon determination that Scram Region has been entered the operator will initiate a manual scram of the reactor. If entry is unavoidable, early scram initiation is appropriate. If forced or inadvertent entry into the Controlled Entry Region has occurred, immediate exit from the region is required either by control rod insertion or core flow increase. Increasing core flow by either restarting or upshifting a recirculation pump is not an acceptable method of exiting the region. Reference 7 also specifies conditions for deliberate entry into the Controlled Entry Region. Caution is required when operating near (i.e., within approximately 10% of core power or core flow) the Controlled Entry Region boundary.

B.1

Required Action B.1 is intended to ensure that appropriate actions are taken if multiple, inoperable, untripped OPRM channels within the same RPS trip system result in not maintaining OPRM trip capability. OPRM trip capability is considered to be maintained when sufficient OPRM channels are OPERABLE or in trip (or the associated RPS trip system is in trip), such that a valid OPRM signal will generate a trip signal in both RPS trip systems. This would require both RPS trip systems to have one OPRM channel OPERABLE or in trip (or the associated RPS trip system in trip).

Because of the low probability of the occurrence of an instability, 12 hours is an acceptable time to initiate the alternate method of detecting and suppressing thermal-hydraulic instability oscillations described in the Bases for Action A.3 above. The alternate stability protection approach (i.e., BSP) would adequately address detection and mitigation in the event of instability oscillations.

(continued)

BASES

ACTIONS (continued)

Protection is ensured by preventing operation in the region of the power-to-flow map where instabilities may occur or by initiating a scram should entry into the region occur. In addition, the OPRM System may still be available to provide alarms to the operator if the onset of oscillations were to occur. Since plant operation is minimized in areas where oscillations may occur, operation without OPRM trip capability is considered acceptable with implementation of the BSP, during the period when corrective actions are underway to resolve the inoperability that led to entry into Condition B. One reason this Condition may be utilized is to provide time to implement a software upgrade in the plant to correct a common cause software error in all four channels of the OPRM (Ref. 5).

C.1

With any Required Action and associated Completion Time not met, THERMAL POWER must be reduced to < 21.6% RTP within 4 hours. Reducing THERMAL POWER to < 21.6% RTP places the plant in a region where instabilities cannot occur. The 4 hours is reasonable, based on operating experience, to reduce THERMAL POWER < 21.6% RTP from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The Surveillances are modified by a Note to indicate that, when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains trip capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This note is based on the RPS reliability analysis (Ref. 6) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the RPS will trip when necessary.

For the following OPRM instrumentation Surveillances, both OPRM modules are tested, although only one is required to satisfy the Surveillance Requirement.

SR 3.3.1.3.1

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the channel will perform the

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

intended function. A Frequency of 184 days provides an acceptable level of system average availability over the Frequency and is based on the reliability of the channel. (Ref. 4)

SR 3.3.1.3.2

LPRM gain settings are determined from the local flux profiles measured by the Traversing Incore Probe (TIP) System. This establishes the relative local flux profile for appropriate representative input to the OPRM System. The 1000 MWD/T Frequency is based on operating experience with LPRM sensitivity changes.

SR 3.3.1.3.3

The CHANNEL CALIBRATION is a complete check of the instrument loop. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations, consistent with the plant specific setpoint methodology. Calibration of the channel provides a check of the internal reference voltage and the internal processor clock frequency. It also compares the desired trip setpoints in processor memory. The internal reference voltage and processor clock frequency are used to automatically calibrate the internal analog to digital converters. There are four "sets" of OPRM related setpoints or adjustment parameters: a) OPRM trip auto-enable setpoints at 21.6% RTP and 75% rated core flow; b) confirmation density algorithm (CDA) setpoints; c) algorithm tuning parameters; and d) period-based detection algorithm (PBDA), growth rate algorithm (GRA) and amplitude-based algorithm (ABA) setpoints.

The first set, the OPRM auto-enable region setpoints, are treated as nominal setpoints with no additional margins added. The second set, the OPRM CDA trip setpoints, are established in accordance with methodologies defined in Reference 7, and are documented in plant procedures. There are no allowable values for these setpoints. The third set, the OPRM algorithm "tuning" parameters, are established or adjusted in accordance with and controlled by plant procedures. The fourth set, the PDBA, GRA, and ABA setpoints, in Reference 7, are established as nominal values only, and controlled by plant procedures.

As noted, neutron detectors are excluded from CHANNEL CALIBRATION because of the difficulty of simulating a meaningful signal. Changes in neutron detector sensitivity calibration using the TIPs (SR 3.3.1.3.2).

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Frequency of 18 months is based upon the assumption of the magnitude of equipment drift provided by the equipment supplier (Ref. 4).

SR 3.3.1.3.4

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required trip logic for a specific channel. The functional testing of control rods in LCO 3.1.3, "Control Rod OPERABILITY," and scram discharge volume (SDV) vent and drain valves in LCO 3.1.8, "Scram Discharge Volume (SDV) Vent and Drain Valves," overlaps this Surveillance to provide complete testing of theassumed safety function. The OPRM self-test function may be utilized to perform this testing for those components that it is designed to monitor.

The 18 month Frequency is based on engineering judgment, high reliability of the components, and operating experience.

SR 3.3.1.3.5

This SR ensures that the individual channel response times are less than or equal to the maximum values assumed in the stability event analysis (Ref. 7). The OPRM self-test function may be utilized to perform this testing for those components it is designed to monitor. The RPS RESPONSE TIME acceptance criteria are included in plant Surveillance procedures.

As noted, neutron detectors are excluded from RPS RESPONSE TIME testing because the principles of detector operation virtually ensure an instantaneous response time. RPS RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. This Frequency is based upon operating experience, which shows that random failures of instrumentation components causing serious time degradation, but not channel failure, are infrequent.

REFERENCES

1. NEDO-31960, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," June 1991.

2. NEDO-31960, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," Supplement 1, March 1992.

3. NEDO-32465, "BWR Owners' Group Reactor Stability Detect and Suppress Solution Licensing Basis Methodology and reload Application," May 1995

(continued)

BASES

REFERENCES (continued)

4. CENPD-400-P, Rev. 01, "Generic Topical Report for the ABB Option III Oscillation Power Range Monitor (OPRM)," May 1995.

5. NRC Letter, B. Boger to R. Pinelli, "Acceptance of Licensing Topical Report CENPD-400-P, 'Generic Topical Report for the ABB Option III Oscillation Power Range Monitor (OPRM)'," August 16, 1995.

6. NEDO-30851-P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," March 1988.

7. NEDC-33075P, GE BWR Detect and Suppress Solution - Confirmation Density, Revision 2, November 2002.

BASES

APPLICABLE SAFETY ANALYSES (continued)

operating at the lower flow rate), a small mismatch has been determined to be acceptable based on engineering judgement. The recirculation system is also assumed to have sufficient flow coastdown characteristics to maintain fuel thermal margins during abnormal operational transients (Ref. 2), which are analyzed in Chapter 15 of the USAR.

A plant specific LOCA analysis has been performed assuming only one operating recirculation loop. This analysis has demonstrated that, in the event of a LOCA caused by a pipe break in the operating recirculation loop, the Emergency Core Cooling System response will provide adequate core cooling, provided the APLHGR requirements are modified accordingly (Ref. 3).

The transient analyses of Chapter 15 of the USAR have also been performed for single recirculation loop operation (Ref. 3) and demonstrate sufficient flow coastdown characteristics to maintain fuel thermal margins during the abnormal operational transients analyzed provided the MCPR requirements are modified. During single recirculation loop operation, modification to the Reactor Protection System average power range monitor (APRM) instrument setpoints is also required to account for the different relationships between recirculation drive flow and reactor core flow. The APLHGR and MCPR limits for single loop operation are specified in the COLR. The APRM flow biased simulated thermal power setpoint is in LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation." **However, single loop operation is not allowed in the MELLLA+ region defined in the COLR.**

Recirculation loops operating satisfies Criterion 2 of the NRC Policy Statement.

LCO

Two recirculation loops are normally required to be in operation with their flows matched within the limits specified in SR 3.4.1.1 to ensure that during a LOCA caused by a break of the piping of one recirculation loop the assumptions of the LOCA analysis are satisfied. ~~In addition, the total core flow must be ≥ 45% of rated core flow or total core flow expressed as a function of THERMAL POWER must be in Region C as identified in Figure 3.4.1-1, "THERMAL POWER/Core Flow Stability Regions."~~ Alternatively, with only one recirculation loop in operation, THERMAL POWER must be ≤ 58% RTP, ~~total core flow must be ≥ 45% of rated~~

(continued)

BASES

LCO (continued)

~~core flow or total core flow expressed as a function of THERMAL POWER must be in Region C of Figure 3.4.1-1,~~ and modifications to the required APLHGR limits (LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)"), MCPR limits (LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)"), and APRM Flow Biased Simulated Thermal Power—High setpoint (LCO 3.3.1.1) must be applied to allow continued operation consistent with the assumptions of Reference 3.

~~The LCO is modified by a Note which allows up to 12 hours before having to put in effect the required modifications to required limits and setpoints after a change in the reactor operating conditions from two recirculation loops operating to single recirculation loop operations. If the require limits and setpoints are not in compliance with the applicable requirements at the end of this period, the associated equipment must be declared inoperable or the limits "not satisfied," and the ACTIONS required by nonconformance with the applicable Specifications implemented. This time is provided due to the need to the procedural steps necessary to limit flow (to less than the volumetric recirculation loop flow) in the operating loop, monitor for excessive APRM and local power range monitor (LPRM) neutron flux noise levels, and the complexity and detail required to fully implement and confirm the required limit and setpoint modifications.~~

APPLICABILITY

In MODES 1 and 2, requirements for operation of the Reactor Coolant Recirculation System are necessary since there is considerable energy in the reactor core and the limiting design basis transients and accidents are assumed to occur.

In MODES 3, 4, and 5, the consequences of an accident are reduced and the coastdown characteristics of the recirculation loops are not important.

ACTIONS

A.1

With both recirculation loops operating but the flows not matched, the recirculation loops must be restored to operation with matched flows within 2 hours. If the flow mismatch cannot be restored to within limits within 2 hours, one recirculation loop must be shut down.

(continued)

BASES

ACTIONS

A.1 (continued)

Alternatively, if the single loop requirements of the LCO are applied to operating limits and RPS setpoints, operation with only one recirculation loop would satisfy the requirements of the LCO and the initial conditions of the accident sequence.

The 2 hour Completion Time is based on the low probability of an accident occurring during this time period, on a reasonable time to complete the Required Action, and on frequent core monitoring by operators allowing abrupt changes in core flow conditions to be quickly detected.

B.1, C.1, AND D.1

Due to thermal hydraulic stability concerns, operation of the plant is divided into three regions based on THERMAL POWER and core flows. Region A is a power/flow ratio with power > 80% rod line and core flow ≤ 35.5% of rated core flow. Region B is a power/flow ratio with the power > 80% rod line and core flow ≥ 35.5% and ≤ 45% of rated core flow, respectively. A core flow of 35.5% of rated core flow corresponds to the core flow with both recirculation pumps at rated speed and the minimum control valve position. Because the plant is susceptible to instability in power/flow Regions A and B, APRM and LPRM neutron flux noise levels are required to be determined to assure that thermal hydraulic instability is not occurring. For the LPRM neutron flux noise determination, detector levels A and C of one LPRM string per core octant plus detectors A and C of one LPRM string in the center of the core are monitored. If evidence of approaching instability occurs (i.e., APRM or LPRM neutron flux noise levels exceed three times the established baseline levels) prompt action must be initiated to restore the power/flow ratio to within Region C by increasing core flow to ≥ 45% of rated core flow or by reducing THERMAL POWER to less than or equal to the limits for the existing core flow. The allowed Completion Times are reasonable, based on operating experience, to restore plant parameters in an orderly manner and without challenging plants systems.

Baseline values are determined uniquely for each cycle during operation in Regions A or B. Within 2 hours of entering Region A and B, the baseline is established. This initial baseline is then used for comparison to all

(continued)

BASES

ACTIONS

B.1, C.1, and D.1 (continued)

subsequent neutron flux noise levels during operation in this region.

A determination of APRM and LPRM neuton flux noise levels every 8 hours provides frequent periodic information relative to established baseline noise levels (see Condition C) that indicate stable steady state operation. A determination of these noise levels within 30 minutes after an increase of ≥ 5% RTP provides a more frequent indication of the stability of operation following any significant potential for change of the thermal hydraulic properties of the system. These Frequencies provide early detection of neutron flux oscillations due to core thermal hydraulic instabilities. Action must be initiated to restore the plant to a more stable power/flow ratio if such indications of limit cycle neutron flux oscillations are detected.

EB.1

Should a LOCA occur with THERMAL POWER > 58% RTP **during single loop operation,** the core response may not be bounded by the LOCA analyses. Therefore, only a limited time is allowed to reduce THERMAL POWER TO ≤ 58% RTP.

The 4 hour Completion Time is based on the low probability of an accident occurring during this time period, on a reasonable time to complete the Required Action, and on frequent core monitoring by the operators allowing changes in THERMAL POWER conditions to be quickly detected.

FC.1

If the required limit or setpoint modifications **for single loop operation** are not performed within 12 **24** hours after transition from two recirculation loop operation to single recirculation loop operation, the required limit and setpoints which have not been modified must be immediately declared not met. The Required Actions for the associated limits and instrument channels must then be taken.

(continued)

BASES

ACTIONS

C.1 (continued)

or requirements B.2, B.3, or B.4 of the LCO are not met for some other reason, the unit must be brought to a MODE in which the LCO does not apply (see Condition D). The 24 hour Completion Time of the Condition provides time before the required modifications to required limits and setpoints have to be in effect after a change in the reactor operating conditions from two recirculation loops operating to single recirculation loop operation. This time is provided due to the need to stabilize operation with one recirculation loop, including the procedural steps necessary to limit flow and adjust the flow control mode in the operating loop, and the complexity and detail required to fully implement and confirm the required limit and setpoint modifications. The 24 hour Completion Time is also based on the low probability of an accident occurring during this period, on a reasonable time to complete the Required Action, and on frequent monitoring by operators allowing abrupt changes in core flow conditions to be quickly detected.

(continued)

BASES

ACTIONS (continued)

~~G.1, G.2, and G.3~~ **D.1**

With no recirculation loops in operation, **or the Required Action and associated Completion Time of Conditions A, B, or C not met,** the unit is required to be brought to a MODE in which the LCO does not apply. ~~Prompt action must be initiated to reduce THERMAL POWER to be within the limits to assure thermal hydraulic stability concerns are addressed.~~ The plant is ~~then~~ required to be placed in ~~MODE 2 in 6 hours and~~ MODE 3 in 12 hours. In this condition, the recirculation loops are not required to be operating because of the reduced severity of DBAs and minimal dependence on the recirculation loop coastdown characteristics. The allowed Completion Time~~s~~ **of 12 hours is** ~~are~~ reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.4.1.1

This SR ensures the recirculation loop flows are within the allowable limits for mismatch. At low core flow (i.e., < 70% of rated core flow), the MCPR requirements provide larger margins to the fuel cladding integrity Safety Limit such that the potential adverse effect of early boiling transition during a LOCA is reduced. A larger flow mismatch can therefore be allowed when core flow is < 70% of rated core flow. The recirculation loop jet pump flow, as used in this Surveillance, is the summation of the flows from all of the jet pumps associated with a single recirculation loop.

The mismatch is measured in terms of percent of rated core flow. This SR is not required when both loops are not in operation since the mismatch limits are meaningless during single loop or natural circulation operation. The Surveillance must be performed within 24 hours after both loops are in operation. The 24 hour Frequency is consistent with the Frequency for jet pump OPERABILITY verification and has been shown by operating experience to be adequate to detect off normal jet pump loop flows in a timely manner.

With regard to recirculation loop flow values obtained pursuant to this SR, as read from plant indication instrumentation, the specified limit is considered to be a nominal value and therefore does not require compensation for instrument indication uncertainties (Ref. ~~6~~4).

(continued)

BASES

SURVEILLANCE REQUIREMENTS	SR 3.4.1.2 This SR ensures the reactor THERMAL POWER and core flows are within appropriate parameter limits to prevent uncontrolled power oscillations. At low recirculation flows and high reactor power, the reactor exhibits increased susceptibility to thermal hydraulic instability. Actions have been developed based on the guidance provided in References 4 and 5 to respond to operation in these conditions. This SR identifies when the condition requiring these actions are necessary. The Frequency is based on operating experience and the operators' inherent knowledge of reactor status, including significant changes in THERMAL POWER and core flow. With regard to THERMAL POWER and core flow values obtained pursuant to this SR, as read from plant indication instrumentation, the specified limit is considered to be a nominal value and therefore does not require compensation for instrument indication uncertainties (Ref. 6).

REFERENCES

1. USAR, Section 6.3.3.7.
2. USAR, Section 5.4.1.1.
3. USAR, Chapter 15, Appendix 15B.
4. NRC Bulletin 88-07, Supplement 1, "Power Oscillations in Boiling Water Reactors," December 1988.
5. GE Letter, "Interim Recommendations for Stability Actions," November 1988.
64. Calculation IP-0-0029.

ATTACHMENT 6

GE Affidavit for Withholding NEDC-33057P from Public Disclosure

General Electric Company

AFFIDAVIT

I, **David J. Robare,** state as follows:

(1) I am Technical Projects Manager, Technical Services, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in the GE proprietary report NEDC-33057P, *Safety Analysis Report for Clinton Power Station Maximum Extended Load Line Limit Analysis Plus,* Class III (GE Proprietary Information), dated April 2003. The proprietary information is delineated by double underlines inside square brackets.

(3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), 2.790(a)(4), and 2.790(d)(1) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information", and some portions also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

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

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

c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of General Electric, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, of potential commercial value to General Electric;

e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection. GE has filed a patent application which is pending in the US Patent Office and has not been published yet.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a., (4)b and (4)e., above.

(5) The information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.

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

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed results and conclusions from evaluations of the safety-significant changes necessary to demonstrate the regulatory acceptability for the expended power/flow range of MELLLA+ for a GE BWR, utilizing analytical models and methods, including computer codes, which GE has developed, obtained NRC

approval of, and applied to perform evaluations of transient and accident events in the GE Boiling Water Reactor ("BWR"). The development and approval of these system, component, and thermal hydraulic models and computer codes was achieved at a significant cost to GE, on the order of several million dollars.

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

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

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

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

Executed on this 28TH day of APRIL 2003.

[signature]

David J. Robare
General Electric Company