GE ENERGY

Proprietary Notice
This letter forwards proprietary information in accordance with 10CFR2.390. The balance of this letter may be considered non-proprietary upon the removal of Enclosure 1.

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MFN 07-041
January 25, 2007

U.S Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **MELLA Plus LTR NEDC-33006P, Revised Response to RAIs AOO 3, 9, 10, and 17 (TAC No. MB6107)**

By References 1 and 2, GE submitted responses to the subject NRC requests for additional information (RAI) regarding NEDC-33006P, "Maximum Extended Load Line Limit Plus" (MELLLA Plus). During subsequent phone calls, GE agreed to revise the responses to the subject RAIs. The revisions are enclosed, and the changes are identified by revision bars.

Enclosure 1 contains proprietary information of the type that GE maintains in confidence and withholds from public disclosure. The information has been handled and classified as proprietary to GE as indicated in the affidavit. The affidavit contained in Enclosure 3 identifies that the information contained in Enclosure 1 has been handled and classified as proprietary to GE. GE hereby requests that the information in Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17. Enclosure 2 is a non-proprietary version of Enclosure 1.

If you have any questions, please contact, Mike Lalor at (408) 925-2443 or myself.

Sincerely,

R. E. Brown

Robert E. Brown
General Manager, Regulatory Affairs

Project No. 710

D065

References:

1. GE letter, G.B. Stramback (GE) to NRC, MFN 04-026, "Completion of Responses to MELLLA Plus AOO RAIs", dated March 4, 2004

2. GE letter, G.B. Stramback (GE) to NRC, MFN 05-081, "Completion of Responses to MELLLA Plus AOO RAIs", dated August 12, 2005

Enclosures:

1. Revised Responses to RAIs AOO 3, 9, 10, and 17 - Proprietary

2. Revised Responses to RAIs AOO 3, 9, 10, and 17 - Non-proprietary

3. Affidavit

cc: PL Campbell (GE/Washington)
MC Honcharik (NRC)
JF Klapproth (GE/Wilmington)
MA Lalor (GE/San Jose)
MJ Colby (GE/Wilmington)
FT Bolger (GE/Wilmington)
RH Jacobs (GE/Wilmington)
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eDRF 0000-0011-9147

ENCLOSURE 2

MFN 07-041

Revised Responses to RAIs AOO 3, 9, 10, and 17

These revised responses replace the corresponding response previously provided in GE Letters, MFN 04-026, dated March 4, 2004, and MFN 05-081, dated August 12, 2005.

Non-Proprietary Version

IMPORTANT NOTICE

This is a non-proprietary version of Enclosure 1 to MFN 07-041, which has the proprietary information removed. Portions of the enclosure that have been removed are indicated by an open and closed bracket as shown here [[ ]]

NRC RAI 3, [[

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i the performance and accuracy of the results obtained from the codes used to perform core response, during steady state, transients, and accidents (e.g., TRACG, ODYN/ISCOR/PANCEA),

ii the CPR response for all events,

iii the calculation of the moister carryover and carryunder, and

iv bundle level.

c. [[ ]] Explain how this modeling technique affects the accuracy of the corresponding results. State whether the effect [[ ]]

d. [[ ]] detect and suppress instability response and the ATWS instability response. [[ ] please reanalyze all supporting cases.

e. [[ ]] the ATWS instability, the detect and suppress instability, and the anticipated operational occurrence (AOO) analyses. For each event type, discuss what impact the water rod flow would have on the plant's response in terms of the parameters that are important in each phenomenon of interest. [[ ]]

GE Response

Response to part a

[[

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Response to part b

The impact of [[

]] The response to RAI #5 has shown that bypass voiding is not significant for the MELLLA+ region of operation. [[

]] Therefore, the water rod modeling assumptions are not challenged for steady-state and transient calculations, CPR response, and bundle level. The accuracy of moisture carryover and carryunder are related to steam separator performance and not directly related to bypass and water rod flow modeling.

However, the following information is provided to clarify the water rod and out channel flows modeling assumptions:

- [[

  ]] The effects of MELLLA+ on bypass voids as simulated by ISCOR is provided in the response to RAI 5b.

  [[

-

]]

- TRACG has a large degree of modeling flexibility. In particular, [[

]] In particular, the TRACG analysis for the Brunswick MELLLA+ evaluations model [[

]]

Response to part c
See the response to RAI 3b.

Response to part d
Detect and Suppress Instability
The Detect and Suppress instability analysis using TRACG [[

]] (e.g. TRACG analysis documented in NEDC-33075P Rev 3, January 2004).

ATWS Instability
TRACG analysis was performed to address [[

]] The event was initiated at 120% OLTP and 70% rated core flow statepoint. For the evaluated plant, this rated core power to flow ratio is 52.5 MW/Mlb/hr in absolute units, which is bounding of all plants expected to implement MELLLA+.

[[

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Response to part e
TRACG ATWS:
[[

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NRC RAI 9

The hot channel void fraction increases with decreasing flow along the MELLLA+ upper boundary. Therefore, the void fraction at the 55 percent CF and the 80 percent CF statepoints are higher than the void fraction at 99 percent CF. Consequently, it is feasible that the initial conditions of the hot channels could be higher at the minimum core flow statepoints or at the offrated conditions.

a. Justify why the steady-state initial critical power ratio (ICPR) is assumed in determining the offrated AOO response, instead of the ICPR calculated from offrated conditions.

b. For the most bounding conditions, compare the steady-state ICPR calculated based on the actual conditions at the state points (rated, 80 percent CF, and 55 percent CF or offrated lower power and flow conditions).

GE Response

a. [[

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b. The ICPR associated with the results in Table 9-2 of the M+ LTR is as follows:

[[		

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[[		

The offrated ICPR at 55% core flow is as follows:

[[		
		]]

[[

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NRC RAI 10, ISCOR/ODYN/TASC Application

The transient CPR and the peak cladding temperature (PCT) calculations are performed using the ODYN/ISCOR/TASC combination. The staff understands that ISCOR calculates the initial steady-state thermal-hydraulic core calculations. ODYN (1-D code) provides the reactor power, heat flux, core flow conditions, and the axial power shapes of the hot bundle during the transient. [[

]] The ISCOR/TASC combination is also used to calculate the PCT for ECCS-LOCA and Appendix R calculations. In addition, ISCOR/TGBLA/PANAC code combinations are also used in core and fuel performance calculations.

a. ISCOR is widely used in many of the safety analyses, but the code was never reviewed by the NRC. The use of a non-NRC-approved code in a combined code system applications is problematic. Therefore, submit the ISCOR code for NRC review.

b. Although ISCOR is not an NRC-approved code, our audit review did not reveal specific shortcomings. [[

]] Therefore, include in the ISCOR submittal a description and evaluation of the ISCOR/ODYN or ISCOR/TGBLA/PANAC code combination discussed above. Provide sufficient information in the submittal, including sensitivity analyses, to allow the staff to assess the adequacy of these combined applications.

c. During the MELLLA+ audit , the staff discovered that GENE had internally evaluated a potential non-conservatism that may result from the use of the flow-driven ISOR/ODYN/TASC combination to calculate the transient ΔCPR. [[

]]

GE Response

Response to part a.

ISCOR calculates the flow distribution between the fuel channels and the bypass region for a given total core flow. The calculation of the flow distribution is based on a balancing of the pressure drop between the different channels; the flow is distributed such that all channels all have the same pressure drop. The thermal hydraulic model for the pressure drop is described in Section 4.2 of GESTAR II (Reference 1) and further details are contained in the response to request for additional information on Section 4 – Steady State Hydraulic Analyses in Appendix B of GESTAT II US Supplement (Reference 2). The response to the RAI describes the process for the calculation of the hot bundle flow. Further details on the model are provided in Section 4 of reference 3. All of these documents are NRC approved documents.

The hot channel response is calculated by TASC (Reference 4), which is an NRC approved report and describes the use of ISCOR to calculate the hot channel flow for TASC (see Figure 1-1 in Reference 4).

This methodology of using ISCOR in the transient methodology to provide input for the single channel analysis from the core average response has been used in both the GENISIS as well as the GEMINI methodologies. References 5-7 contain the qualification of the combined process starting with the calculation of the system response and ending with the calculation of the hot channel transient CPR response. References 5-7 are NRC approved documents.

GE considers the ODYN/ISCOR/TASC methodology approved based on references 1-7. There is therefore no need to submit ISCOR for NRC review.

<u>Response to part b.</u>
See the response to 10.a and 10.c, part iii.

<u>Response to part c.</u>

i. <u>Describe the issues identified in the PRC</u>
   The PRC 91-01 issue was identified as follows:
   "For some of the GE performed transient analyses, output of the system response code ODYN is used as input to the GETAB/TASC codes to calculate the transient change in MCPR for the hot bundle. This result is then combined with the Safety Limit MCPR and may be used to determine the operating limit MCPR. Currently, the ODYN calculated core flow is used as an input; a GETAB/TASC (ISCORE) determines the flow/pressure drop and transient Critical Power Ratio (CPR) for the hot bundle. Another approach is to assume that the ODYN calculated core pressure drop is the same for all fuel bundles, and have GETAB/TASC calculate the flow and CPR change for the hot bundle. Apparently, previous studies indicated that there was little difference in the results of the two approaches. However, some recent scoping studies have indicated that for some plants, some transients, and some critical power correlations, the latter approach results in higher calculated transient CPR changes that could result in calculationally exceeding the Safety Limit MCPR"

ii. <u>Explain if an alternative approach was proposed in the PRC</u>

   The design basis NRC approved method is the ODYN flow driven method. The alternative approach is the ODYN pressure drop driven method. When GE reviewed the complete ODYN/TASC process, it was evident that the ODYN prediction of pressure drop had a strong influence on the result and there was a concern that the flow driven method may not be adequately conservative.

iii. <u>Explain why it was concluded that the alternative approach was not technically acceptable</u>

The conclusion was that the existing NRC approved ODYN flow driven method is technically acceptable. The alternate ODYN pressure driven method is more conservative, but since the existing approved method is acceptable, it is not necessary to change to the ODYN pressure driven method. Since TRACG is the most complete model, it was utilized to determine the overall accuracy of the approved ODYN/GETAB/TASC (ISCOR) flow driven method. The resulting design transient ΔCPR was found to be conservative relative to TRACG. [[

]] The ODYN/GETAB/TASC (ISCOR) flow driven method was (and still is) considered the NRC approved method. Had the TRACG analysis not shown that the approved ODYN flow driven method was adequate, GE would have informed the NRC of their desire to change to the more conservative ODYN pressure driven method.

iv. <u>Explain the bases for closing the PRC</u>

The PRC 91-01 evaluation determined that the current flow driven method is acceptable. Best estimate calculations for limiting transients showed that the ΔCPR using the current NRC approved analysis procedure provides acceptably conservative results. Therefore, it was concluded that this issue did not represent a Reportable Condition under of 10CFR Part 21.

v. <u>Justify why the NRC was not informed, considering that a non-NRC approved codes were being used to both evaluate the identified non-conservatism (TRACG) and correct the ODYN 1-D hot bundle flow deficiencies (ISCOR)</u>

The NRC is informed when there is a reportable condition, 60 Day Interim Notification, or when a GENE PRC evaluation relates to an industry identified issue. The NRC is not normally informed of issues evaluated by GENE when it is concluded that it is not reportable or a Part 21 Transfer of Information is issued because GENE does not have the necessary information to complete the evaluation. In some cases, GENE may use more realistic, though still conservative methods to perform a PRC evaluation. For this case, that included using a non-NRC approved code to examine the adequacy of the simpler ODYN method to assess a potential non-conservative aspect of the approved procedure. Use of more realistic methods in a GENE internal PRC evaluation does not change the criteria by which an issue is reported to the NRC, i.e., it is reported only when it has been determined to be a reportable condition, the evaluation cannot be completed in 60 days, or it relates to an industry identified issue.

<u>References</u>

1. General Electric Standard Application for Reactor Fuel, GESTAR II, NEDE–24011–P–A–14, June 2000.
2. General Electric Standard Application for Reactor Fuel (Supplement for United States), NEDE–24011–P–A–14-US, June 2000.
3. Steady State Nuclear Methods, NEDE-30130-P-A, April 1985.
4. TASC-03A Computer Program for Transient Analysis of a Single Channel, NEDC-32084P-A, July, 2002.
5. Qualification of the One-Dimensional Core Transient Model for Boiling Water Reactors. NEDO-24154-A, Volume I, August 1986.
6. Qualification of the One-Dimensional Core Transient Model for Boiling Water Reactors. NEDO-24154-A, Volume II, August 1986
7. Qualification of the One-Dimensional Core Transient Model for Boiling Water Reactors. NEDE-24154-P-A, Volume III, August 1988

[[

Figure 10-1 TRACG and ODYN/ISCOR/TASC Normalized Channel Flow and Delta Over Initial Comparison [3]]]

NRC AOO RAI 17, Thermal Limits Assessment

a. SLMCPR. It is possible that the impact on the critical heat flux (CHF) phenomena may be higher at the off rated or minimum core flow state points. Is the SLMCPR value provided in the SLMCPR amendment requests and reported in the TS based on the rated conditions? If so, justify why the SLMCPR is not calculated for state points other than the rated conditions. Quantitatively demonstrate that the SLMCPR calculated at the minimum 80 percent and 55 percent state points would be lower than the SLMCPR calculated at the rated conditions. Use power profiles and core designs that are representative of the EPU/MELLLA+ conditions. Discuss the assumptions made. Include the Brunswick EPU/MELLLA+ application in your sensitivity analyses.

b. SLMCPR at EPU/MELLLA+ Upper Boundary. The SLMCPR at the non rated conditions (EPU power/80 percent CF) could be potentially higher than the SLMCPR at rated conditions, explain how "state point-dependent" SLMCPR would be developed and implemented for operation at the EPU/MELLLA+ condition. Use the Brunswick EPU/MELLLA+ application to demonstrate the implementation of "state point-dependent" SLMCPR.

c. Exposure-Dependent SLMCPR. Discuss the development of the exposure-dependent SLMCPR calculation. State whether this is an NRC-approved method and refer to the applicable GESTAR II amendment request.

GE Response

Response to Part a and b

Summary

The 10CFR21 evaluation documented in MFN 04-108 determined that a lower flow condition at rated power could have a more limiting SLMCPR than the rated flow condition. As a result, the SLMCPR process requires analysis at rated core power and both rated core flow and the minimum licensed core flow. The SLMCPR at off-rated power conditions (including the 55% flow point on the MELLLA+ rod line) will not differ significantly (bounded or less than 0.005 higher) from the rated core power result. The Technical Specification SLMCPR is set to the resulting value or a conservative value.

The Technical Specification SLMCPR is applied to all operating conditions. In other words, state point dependency is not approved.

A comparison of the 55% flow point on the MELLLA+ rod line SLMCPR with rated core power SLMCPR results will be provided in the plant-specific EPU/MELLLA+ application.

SLMCPR Process Background

The calculated SLMCPR was previously based on the highest rated licensed power and flow conditions. This approach had been shown in NEDC-32601P-A to produce SLMCPR values that are slightly conservative compared to off-rated flow conditions (note in particular Figure II.4-1 on page B-5). However, recently it was determined that a rated power / reduced flow condition may result in a higher SLMCPR value due to changes in limiting control rod patterns to compensate for lower reactivity at reduced flow, as was discussed in MFN 04-108. All current SLMCPR evaluations account for this condition by determining the SLMCPR at both rated and lowest licensed flow corresponding to the rated power conditions, and then using the highest calculated SLMCPR value for the cycle specific licensing evaluation. The following discussion extends the evaluation to off-rated power / flow operating conditions, including the MELLLA+ region, and concludes that the cycle specific SLMCPR value calculated as discussed above is conservative to cover off-rated power / flow operating conditions. The two key phenomena at off-rated conditions that affect the SLMCPR are addressed here, first is the off-rated power distribution and second are the off-rated power and flow uncertainties. As discussed herein, the power distribution and, consequently, the CPR distribution tend to have a slightly less limiting effect at reduced power. Additionally, both the power and flow uncertainties are relatively constant at the higher power and flow range, and bounded by the values applied in the design analysis, and become larger at non-limiting low power and flow conditions.

Impact of MELLLA+ Operation on SLMCPR

Whereas CPRs are sensitive to flow and CPR decreases as the flow decreases, the SLMCPR is sensitive to the relative distribution of the CPRs, not their absolute values. The relative distribution of CPRs in the core does not change appreciably with flow changes in the operating domains where the power is high enough for CPRs to be a concern. Rather, the SLMCPR is dominated by the uncertainty in CPRs as a result of the uncertainties in the two dominant inputs: power and flow.

Due to a slight flattening of the relationship between critical power and flow at the higher flows, the CPR distributions in the core tend to be slightly flatter at the higher flows so the calculated SLMCPR increases very slightly for the higher flows (as shown in Figure II.4-1 on page B-5 of NEDC-32601P-A).

The bundle designs and core loading configuration strongly influence the SLMCPR. Both of these are accounted for by performing cycle-specific analyses utilizing the actual bundle designs and the reference core loading. The bundles must be designed and the core loaded to support MELLLA+ operation. From the perspective of CPR performance this generally means that the bundles must have a very flat critical power response over a wide range of flows. MELLLA+ operations that use reduced flow to harden the neutron spectrum in order to build-in plutonium and extend cycle operation have two competing effects on bundle design. (1) Rod peaking factors must be maintained low enough that CPR performance can still be achieved at high powers and lower flows, e.g., the bundle designs need to be flattened. (2) Rod enrichments need to be high enough to achieve the desired cycle exposures and maintain sufficient reactivity to offset the negative impact of higher core voiding at the reduced flows, e.g., the bundle peakings are increased to accommodate more enrichment and the associated increases in gadolinium loaded to control the reactivity. All these effects are accounted for in the present cycle-specific SLMCPR methodology that evaluates the actual bundle designs to be loaded. Generally speaking, bundle designs for MELLLA+ operations tend to go in the same direction as for extended power uprates (EPU) and longer-exposure cycles, namely in the direction of being slightly more peaked which means that calculated SLMCPRs continue to trend downward.

Higher core power levels require lower radial peaking factors to maintain adequate margin to the operating limit MCPR (OLMCPR). Consequently, each bundle must be closer in power to the average bundle power so that either the average power per bundle can increase as is the case for EPU or the flow can be reduced for the same bundle power, as is the case for MELLLA+. Both scenarios result in a flatter MCPR distribution in the as-loaded core. If this were the only effect, one would expect that calculated SLMCPR values would be increasing whereas, in fact, they are not. This is because higher core powers also require higher fresh reload fuel batch fractions. These fresh fuel batches must consist of mixed streams of different bundle designs in order to control reactivity during the cycle and minimize enrichment costs. Thus, the number and distribution of MCPRs for the highest power bundles in the design that set the SLMCPR for the core remain approximately constant. The absolute power needed to drive the MCPR in these bundles down to the SLMCPR during a postulated AOO event remains unchanged since this power depends only on the critical power capability of the bundle. The fact that these limiting bundles may start at a lower MCPR because of reduced flow (or higher power) is relevant for the assessment of the OLMCPR, but is not relevant for the SLMCPR that depends only on the relative distributions of these bundle MCPRs.

Both the SLMCPR and the OLMCPRs for different scenarios are determined on a cycle-specific basis considering the actual bundle designs, the reference loading pattern, and the use of CPR distribution limiting control blade patterns. Again the key point with respect to the SLMCPR is that these considerations are no different from those that are already considered as part of the cycle-specific SLMCPR evaluations.

<u>Off-Rated SLMCPR Sensitivity Demonstration</u>
The Brunswick 1 Cycle 15 core design was selected to illustrate the effects of off-rated power and flow conditions on the SLMCPR calculation for EPU/MELLLA+ applications. The proposed MELLLA+ power / flow map for the Brunswick nuclear units is shown in Figure 17-1. SLMCPR values were determined for three power / flow state points along the upper boundary of the map and for the rated power / lowest flow point being considered for generic MELLLA+ operation (100%P / 80%F), as defined in Table 17-1.

Case (1) was the rated condition (state point "E" in Figure 17-1) SLMCPR evaluation that was used in the Reload Licensing Analysis for Brunswick 1 Cycle 15. Case (2) determined the SLMCPR for the rated power / lowest licensed flow condition (state point "N" in Figure 17-1). Case (3) determined the SLMCPR for rated power / lowest flow for the generic MELLLA+ application, for comparison purposes. Case (4) determined the SLMCPR for the highest off-rated power / lowest off-rated flow statepoint along the Brunswick 1 MELLLA+ upper boundary (point "M" in Figure 17-1).

Cases (1) and (2) addressed the Part 21 reportable condition (MFN 04-108) for the Brunswick 1 MELLLA+ extended operating domain. As discussed above, the SLMCPR for the cycle specific application is the most limiting of these two cases.

Cases (2) and (4) correspond to points N and M, respectively, on the MELLLA+ boundary, as seen in Figure 17-1. The SLMCPR calculations for these two cases used a fixed set of control rod patterns for a given exposure point calculation, as shown in Figure 17-2. This was done to illustrate the impact to SLMCPR when moving between state points M and N along or near the MELLLA+ boundary line without the effects of changing the limiting control rod configuration, which is typical of plant operation following control blade maneuvers which are performed at off-rated conditions.

The SLMCPR calculations for all cases (1) through (4) used uncertainties that have been previously reviewed and approved by the NRC as listed in Table 17-2 and described in NEDC-32601P-A, except for the R-factor uncertainty, which was slightly increased to conservatively account for effects of potential increased channel bow.

It was determined that it is appropriate to use the feedwater and core flow uncertainties currently used for SLMCPR evaluation at rated conditions for the off-rated SLMCPR evaluations. Figure 17-3 provides the change in the feedwater and core flow uncertainties as the core flow decreases, as calculated for various BWR design types. Figure 17-4 provides the sensitivity of the calculated SLMCPR value to changes in the four most significant uncertainties. Figure 17-4 shows that the feedwater flow rate uncertainty has the strongest impact on SLMCPR, followed by the core flow uncertainty. In SLMCPR evaluations a feedwater flow uncertainty of [[ ]] is used for rated conditions, which Figure 17-3 shows is valid down to approximately [[ ]] rated feedwater core flow, covering all off-rated cases of interest. Similarly for core flow, an uncertainty of [[ ]] is used for rated conditions and is valid down to approximately [[ ]] rated core flow. This directly covers the off-rated conditions for cases (2) and (3). Case (4) uses only [[ ]] lower core flow (55% rated core flow), and Figure 17-3 shows that the core flow uncertainty for this case is approximately [[ ]]. Using the SLMCPR / core flow uncertainty relationship from Figure 17-4, the impact of the corresponding uncertainty increase from [[ ]] would be about +0.0012, a negligible effect compared to the inherent 1 sigma uncertainty (>0.005) of the Monte Carlo SLMCPR calculation methodology. Therefore, the rated condition uncertainties in Table 17-2 are appropriate to use for the SLMCPR calculations at off-rated conditions.

Tables 17-3 and 4 summarize the results of the SLMCPR evaluations for Brunswick 1 Cycle 15. For each case, three distinct cycle exposure points were analyzed: beginning-of-cycle (BOC, 181 MWd/ST), peak-hot-excess (PHE, 9072 MWd/ST), and near the end-of-cycle (EOC, 14440 to 14940 MWd/ST). The last column in Table 17-4 shows, for each case, the most limiting SLMCPR result for the entire cycle exposure range. Each column labeled BOC, PHE, EOC, and SLMCPR, is further divided into two sub-columns, the first displaying the SLMCPR results, and the second showing the difference between the two adjacent cases. The last row of Table 17-4 shows the total change in SLMCPR as we follow the path on the power-flow map from the rated point E to the lower MELLLA+ boundary point M (see Figure 17-1). For each exposure point, the total impact in SLMCPR as power and flow vary from the most limiting of the rated case (1) and the low flow case (2) to the lower MELLLA+ boundary case (4) is between -0.01 to -0.00. A change in SLMCPR by more than 0.005 is considered a significant change. This threshold was chosen to correspond to the inherent variability in the Monte Carlo process for determining the safety limit. It is also consistent with the accepted practice of rounding and reporting SLMCPR values to two places past the decimal point. By definition, a change in a statepoint condition that

goes into the evaluation of a SLMCPR is not significant unless it results in an increase in the calculated SLMCPR by +0.005. From the results shown in Tables 17-3 and 4, the changes in power and flow expected with EPU/MELLLA+ operation would not result in any significant changes compared to SLMCPR at the rated power condition.
Consequently, a SLMCPR evaluated for rated power MELLLA+ conditions is also valid for MELLLA+ off-rated power / flow conditions.

Response to Part c
SLMCPR analyses are performed for multiple exposure points throughout the cycle. Exposure interval end points are then selected such as to be equal to an SLMCPR analysis exposure point. The maximum SLMCPR analysis value within that exposure interval (including end points) is selected to be the exposure dependent SLMCPR value for that exposure interval. The following tables present an arbitrary example where five SLMCPR analyses are performed to create two exposure dependent SLMCPR intervals (Note: In this example four unique exposure dependent SLMCPR intervals are possible, but they were collapsed into the use of only two exposure dependent SLMCPR intervals).

NRC approval of GESTAR II Rev. 14 (NEDE-24011-P-A-14) specifically allows the SLMCPR values to be stipulated as a function of exposure. The exposure-dependent SLMCPR values were introduced in Amendment 25 to GESTAR II that was submitted for NRC review and approval in December 1996. The NRC SER approving this approach was issued March 11, 1999. This approval was reflected in section 1.1.5.B.vii of GESTAR II Rev. 14.

SLMCPR Analysis Results

Exposure (GWd/ST)	BOC	5.0	10.0	15.0	EOC
SLMCPR	1.11	1.10	1.09	1.08	1.10

Exposure dependent SLMCPR

Exposure Range (GWd/ST)	SLMCPR
BOC to 10.0	1.11
10.0 to EOC	1.10

Table 17-1. Brunswick 1 Cycle 15 SLMCPR Evaluation Case Description

Evaluation Case Number	Case Description
Case (1)	100%P / 100%F – rated EPU case (state point E in Figure 17-1)
Case (2)	100%P / 85%F – upper BSEP MELLLA+ Power-Flow map case (NEDC-33063P) (state point N in Figure 17-1)
Case (3)	100%P / 80%F – upper generic MELLLA+ Power-Flow map case (NEDC-33006P)
Case (4)	77.6%P / 55%F – lower BSEP MELLLA+ Power-Flow map case (NEDC-33063P) (state point M in Figure 17-1)

Table 17-2. Uncertainties Used for Brunswick 1 Cycle 15 SLMCPR Evaluation Cases

Description	Brunswick 1 Cycle 15
Standard Non-power Distribution Uncertainties	Revised NEDC-32601P-A
Core flow rate (derived from pressure drop)	2.5 (Two Loop)
Individual channel flow area	[[ ]]
Individual channel friction factor	5.0
Friction factor multiplier	[[ ]]
Reactor pressure	[[ ]]
Core inlet temperature	0.2
Feedwater temperature	[[ ]]
Feedwater flow rate	[[ ]]
Standard Power Distribution Uncertainties	Revised NEDC-32601P-A
GEXL R-factor	[[ ]]
Random effective TIP reading	1.2 (Two Loop)
Systematic effective TIP reading	[[ ]]
Integrated effective TIP reading	[[ ]]
Bundle power	[[ ]]
Effective total bundle power uncertainty	[[ ]]
Exceptions to the Standard Uncertainties	
GEXL R-factor	[[ ]]

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Table 17-3. Summary of SLMCPR Results for Brunswick 1 Cycle 15

[[	(1)			(2)			(3)			(4)		
									]]			

Table 17-4. SLMCPR Sensitivity Results for Brunswick 1 Cycle 15

[[									
									]]

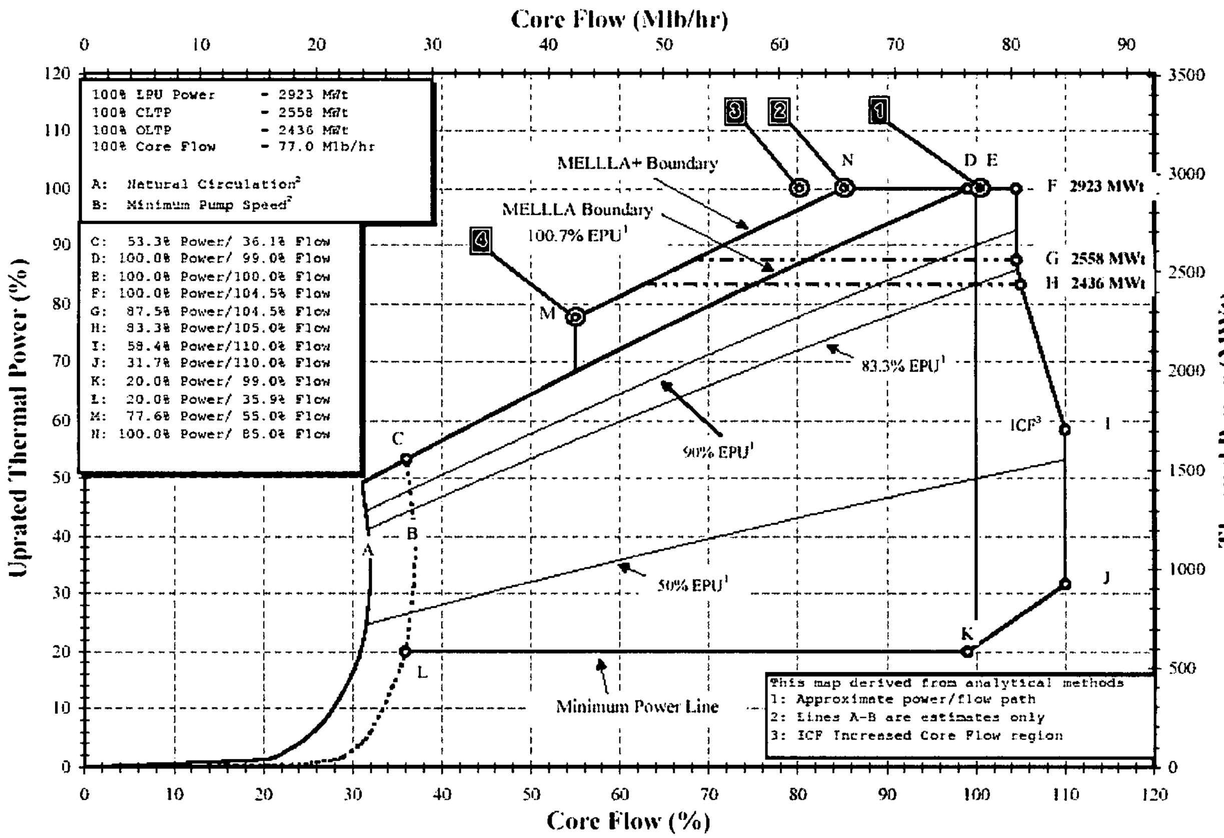

Figure 17-1 BSEP 1 and 2 MELLLA+ Operating Range Power-Flow Map (NEDC-33063P)

Non-proprietary Version

[[

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Figure 17-2 Limiting Rod Patterns Used in Cases 100P/85F and 77.6P/55F

[[

{3}]]

Figure 17-3 Total Core Flow and Feedwater Flow Uncertainties for BWRs 4/5/6

[[

{3}]]

Figure 17-4 Four Dominant SLMCPR Sensitivities for a Factor Change in the Generic GETAB Uncertainty Value

ENCLOSURE 3

MFN 07-041

Affidavit

General Electric Company

AFFIDAVIT

I, Robert E Brown, state as follows:

(1) I am General Manager, Regulatory Affairs, 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 Enclosure 1 to GE letter MFN 07-041, Robert E. Brown to U.S Nuclear Regulatory Commission, *MELLA Plus LTR NEDC-33006P, Revised Response to RAIs AOO 3, 9, 10, and 17*, dated January 25, 2006. The Enclosure 1 (*Revised Responses to RAIs AOO 3, 9, 10, and 17*) proprietary information is delineated by a double underline inside double square brackets. In each case, the sidebars and the superscript notation{3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(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), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought 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 aspects of past, present, or future General Electric customer-funded development plans and programs, resulting in potential products to General Electric;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

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

(5) To address 10 CFR 2.390 (b) (4), 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 data and conclusions from evaluations of the safety-significant shanges necessary to demonstrate the regulatory acceptability for the expanded power/flow range for MELLLA+ for a GE Boiling Water Reactor ("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 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 25th day of January 2007.

R. E. Brown

Robert E. Brown
General Electric Company