



**Letter Enclosure 2 Contains Proprietary Information
Withhold in Accordance with 10 CFR 2.390(a)(6)**

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November 9, 2016

Serial: BSEP 16-0101

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

Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket Nos. 50-325 and 50-324
Response to Request for Supplemental Information for License Amendment
Request Regarding Core Flow Operating Range Expansion

References: 1. Letter from William R. Gideon (Duke Energy) to U.S. Nuclear Regulatory Commission Document Control Desk, *Request for License Amendment Regarding Core Flow Operating Range Expansion*, dated September 6, 2016, ADAMS Accession Number ML16257A418

2. Letter from Andrew Hon (NRC) to William R. Gideon (Duke Energy), *Brunswick Steam Electric Plant, Unit Nos. 1 and 2 – Supplemental Information Needed for Acceptance Review of License Amendment Request Regarding Core Flow Operating Range Expansion (CAC Nos. MF8363 and MF8364)*, dated October 27, 2016, ADAMS Accession Number ML16294A226

Ladies and Gentlemen:

On September 6, 2016 (i.e., Reference 1), Duke Energy Progress, LLC (Duke Energy), submitted a license amendment request to revise the Technical Specifications for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2, to support an expansion of the core power-flow operating range (i.e., Maximum Extended Load Line Limit Analysis Plus (MELLLA+)).

On October 27, 2016 (i.e., Reference 2), the NRC issued a request for supplemental information to enable the NRC to assess the acceptability of the license amendment request for further NRC review. Duke Energy's response to the request for supplemental information is enclosed.

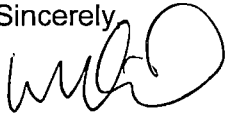
No new regulatory commitments are contained in this letter.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Manager – Regulatory Affairs, at (910) 457-2487.

Ado1
NRK

I declare, under penalty of perjury, that the foregoing is true and correct. Executed on November 9, 2016.

Sincerely,



William R. Gideon

WRM/wrm

Enclosures:

1. Response to NRC Request for Supplemental Information
2. GEH Document GEH-PGN-MPLUS-143, *Response to Request for Supplemental Information in Support of Brunswick Steam Electric Plant MELLLA+ LAR (Proprietary Information – Withhold from Public Disclosure in Accordance With 10 CFR 2.390)*
3. GEH Affidavit Regarding Withholding GE Document GEH-PGN-MPLUS-143, *Response to Request for Supplemental Information in Support of Brunswick Steam Electric Plant MELLLA+ LAR*, from Public Disclosure
4. GEH Document GEH-PGN-MPLUS-143, *Response to Request for Supplemental Information in Support of Brunswick Steam Electric Plant MELLLA+ LAR (Non-Proprietary Information)*

cc (With all enclosures):

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cc (Without Enclosure 2):

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Response to NRC Request for Supplemental Information

On September 6, 2016, Duke Energy Progress, LLC (Duke Energy), submitted a license amendment request to revise the Technical Specifications for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2, to support an expansion of the core power-flow operating range (i.e., Maximum Extended Load Line Limit Analysis Plus (MELLLA+)). On October 27, 2016, the NRC issued a request for supplemental information to enable the NRC to assess the acceptability of the license amendment request for further NRC review. The Duke Energy response to each information request is discussed below.

NRC Request 1:

Appropriate disposition for Limitation and Condition (L&C) 9.5 - Safety Limit Minimum Critical Power Ratio 2, Duke Energy should address experience with AREVA methods in MELLLA+ at high power to flow conditions.

Response:

The applicability of uncertainties for all domains including the MELLLA+ operating domain is discussed in ANP-3108P Revision 1 (i.e., Reference 1). Chapter 3 discusses the Thermal Hydraulic analysis. Figure 3-1 presents a comparison of the anticipated BSEP operation data in the MELLLA+ operating domain and operational data from the benchmark analysis presented in the CASMO 4/MICROBURN-B2 topical report with a backdrop of experimental validation for pressure drop and void fraction measurements. This figure indicates that the anticipated operational data for BSEP operation in the MELLLA+ domain is similar to the topical report benchmark data and clearly bounded by pressure drop and void fraction measurement data.

Appendix C, Chapter C.2 addresses the validity of the power distribution uncertainties. Two figures, Figures C-18 and C-24, are presented that demonstrate that the traversing incore probe (TIP) statistics as a function of the ratio power/flow do not show any adverse trends for power to flow ratios representative of the MELLLA+ operating domain.

Since the parameters of interest for the MELLLA+ operating domain are well validated in terms of pressure drop, void fraction and TIP statistics, there is no need for a penalty on the MCPR Safety Limit when using the AREVA methods for the BSEP. Section 11 of ANP-3108P Revision 1, provides a summary of the conclusions concerning the applicability of the AREVA methods for application to the MELLLA+ operating domain for BSEP.

Applicability of AREVA methods to MELLLA+ conditions notwithstanding, it should also be noted that BSEP uses a gamma TIP measurement system that has lower uncertainty than applied by NRC approved AREVA methodology to calculate the BSEP SLMCPR. The uncertainties used to calculate BSEP SLMCPR are based on D-Lattice core monitoring uncertainties derived in EMF-2158(P)(A) (i.e., Reference 2), from neutron TIP measurements, as discussed in Section 7.2 of EMF-2158(P)(A). As discussed in Section 5.1.5 of the BSEP MELLLA+ Safety Analysis Report (SAR) (i.e., Reference 3), the BSEP gamma TIP system is less sensitive to core voiding when compared to a neutron (i.e., thermal) TIP system. BSEP gamma TIP data has previously been submitted to the NRC in Reference 4 and reviewed by the NRC in Reference 5. The evaluation of the BSEP TIP data presented in Table 17.2 of Reference 4 demonstrates that the EMF-2158(P)(A) uncertainties are conservative relative to

the actual BSEP gamma TIP uncertainties. Monitoring of the BSEP TIP data has confirmed that the Reference 4 evaluation remains representative of BSEP operation.

NRC Request 2:

Appropriate disposition for L&C 9.23 - MELLLA+ Eigenvalue Tracking. This explanation should address how the use of AREVA methods that are not covered by the General Electric-Hitachi letter will clarify L&C 9.23.

Response:

Limitation and Condition (L&C) 9.23 for NEDC-33173P-A (i.e., Reference 6) reads as follows:

In the first plant-specific implementation of MELLLA+, the cycle-specific eigenvalue tracking data will be evaluated and submitted to NRC to establish the performance of nuclear methods under the operation in the new operating domain. The following data will be analyzed:

- Hot critical eigenvalue,
- Cold critical eigenvalue,
- Nodal power distribution (measured and calculated TIP comparison)
- Bundle power distribution (measured and calculated TIP comparison),
- Thermal margin,
- Core flow and pressure drop uncertainties, and
- The MCPR Importance Parameter (MIP) Criterion (e.g., determine if core and fuel design selected is expected to produce a plant response outside the prior experience base).

Provision of evaluation of the core-tracking data will provide the NRC staff with bases to establish if operation at the expanded operating domain indicates: (1) changes in the performance of nuclear methods outside the extended power uprate (EPU) experience base, (2) changes in the available thermal margins, (3) need for changes in the uncertainties and NRC-approved criterion used in the safety limit minimum critical power ratio (SLMCPR) methodology, or (4) any anomaly that may require corrective actions.

To meet L&C 9.23, BSEP will evaluate and submit the requested information to the NRC after the first full operating MELLLA+ cycle for each unit using AREVA methods. One exception will be the MIP parameter will not be evaluated. In Reference 7, the NRC documented it is acceptable to eliminate the MIP parameter from L&C 9.23 because examining the MIP for MELLLA+ provides no additional value with respect to nuclear methods.

NRC Request 3:

Differences between Unit Nos. 1 and 2 that can affect the analysis assumptions needed to be discussed for dual-unit review and approval.

Response:

The key differences in system configuration between BSEP, Unit 1 and Unit 2, are in the core inlet region and the turbine bypass system. The fuel support casting orifice diameter in Unit 2 is

smaller than that for Unit 1. The turbine bypass system for Unit 2 has ten valves, whereas Unit 1 has four valves. This information was previously provided in support of the transition to AREVA fuel (i.e., Reference 8).

NRC Request 4:

ATWS instability (ATWS-I) analysis with Unit No. 2 specific assumptions. (Because of the significant differences in turbine bypass capacities between Unit Nos. 1 and 2 and the potential impact it can have on the competing effects that can lead to the results being more limiting at higher or lower turbine bypass capacities, the NRC staff needs the ATWS-I analysis with Unit No. 2 specific assumptions to conduct its review.)

Response:

Unit 2-specific ATWS-I analysis results are provided in Enclosure 2. Enclosure 2 contains proprietary information as defined by 10 CFR 2.390. GEH, as the owner of the proprietary information, has executed the enclosed affidavit (i.e., Enclosure 3), which identifies that the enclosed proprietary information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information was provided to Duke Energy in a GEH transmittal that is referenced by the affidavit. The proprietary information has been faithfully reproduced in Enclosure 2 such that the affidavit remains applicable. GEH requests that the enclosed proprietary information be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17. Information that is not considered proprietary is provided in Enclosure 4.

References:

1. ANP-3108P Revision 1, *Applicability of AREVA BWR Methods to Brunswick Extended Power Flow Operating Domain*, AREVA Inc., July 2015.
2. EMF-2158(P)(A), *Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2*, Siemens Power Corporation, October 1999.
3. Letter from William R. Gideon (Duke Energy) to the U.S. Nuclear Regulatory Commission Document Control Desk, *Request for License Amendment Regarding Core Flow Operating Range Expansion*, dated September 6, 2016, ADAMS Accession Number ML16257A418.
4. Letter from William Jefferson, Jr. (Duke Energy) to U.S. Nuclear Regulatory Commission Document Control Desk, *Response to Additional Information Request Supporting License Amendment Requests for Addition of Analytical Methodology Topical Reports to Technical Specification 5.6.5 (NRC TAC Nos. ME3856, ME3857, ME3858, and ME3859)*, dated November 18, 2010, ADAMS Accession Number ML103330242.
5. Letter from Farideh E. Saba (NRC) to Michael J. Annacone (Duke Energy), *Brunswick Steam Electric Plant, Units 1 and 2 - Issuance of Amendments Regarding Addition of Analytical Methodology Topical Report To Technical Specification 5.6.5 (TAC Nos. ME3858 and ME3859)*, dated April 8, 2011, ADAMS Accession Number ML11101A043.

6. GE Nuclear Energy, *Applicability of GE Methods to Expanded Operating Domains*, NEDC-33173P-A, Revision 4, November 2012.
7. Letter from Mirela Gavrilas (NRC) to Jerald G. Head (GE-Hitachi), *Response to GE Hitachi Nuclear Energy Letter MFN 15-066 dated August 26, 2015, Clarification of Limitation and Condition 23 for NEDC-33173P, "Applicability of GE Methods to Expanded Operating Domains" (TAC No. MF6665)*, dated November 20, 2015, ADAMS Accession No. ML15292A421.
8. Letter from Benjamin C. Waldrep (Duke Energy) to U.S. Nuclear Regulatory Commission Document Control Desk, *Additional information in Support of Request for License Amendments Regarding Linear Heat Generation Rate and Core Operating Limits Report References for AREVA Fuel (NRC TAC Nos. MD4063 and MD4064)*, dated January 24, 2008, ADAMS Accession Number ML080310843.

GE-H Affidavit Regarding
Withholding GE Document GEH-PGN-MPLUS-143,
Response to Request for Supplemental Information in
Support of Brunswick Steam Electric Plant MELLLA+ LAR,
from Public Disclosure

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, Lisa K. Schichlein, state as follows:

- (1) I am a Senior Project Manager, NPP/Services Licensing, Regulatory Affairs, GE-Hitachi Nuclear Energy Americas LLC ("GEH"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.
- (2) The information sought to be withheld is contained in Attachment 1 of GEH letter, GEH-PGN-MPLUS-143, "GEH Response to the NRC MELLLA+ Request for Supplemental Information on the ATWS-I Analyses," dated November 2, 2016. The GEH proprietary information in Attachment 1, which is entitled "Response to Request for Supplemental Information in Support of Brunswick Steam Electric Plant MELLLA+ LAR," is identified by a dotted underline inside double square brackets. [[This sentence is an example.^{3}]] In each case, the superscript notation ^{3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.
- (3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the *Freedom of Information Act* ("FOIA"), 5 U.S.C. Sec. 552(b)(4), and the *Trade Secrets Act*, 18 U.S.C. Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for trade secrets (Exemption 4). The material for which exemption from disclosure is here sought also qualifies under the narrower definition of trade secret, within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975 F.2d 871 (D.C. Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F.2d 1280 (D.C. Cir. 1983).
- (4) The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. Some examples of categories of information that fit into the definition of proprietary information are:
 - a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;
 - b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
 - c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;
 - d. Information that discloses trade secret or potentially patentable subject matter for which it may be desirable to obtain patent protection.

GE-Hitachi Nuclear Energy Americas LLC

- (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 GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, not been disclosed publicly, and not been made available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary or confidentiality agreements that provide for maintaining the information in confidence. The initial designation of this information as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in the following paragraphs (6) and (7).
- (6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, who is the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or who is the person most likely to be subject to the terms under which it was licensed to GEH.
- (7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary or confidentiality agreements.
- (8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed results and conclusions regarding supporting evaluations of the safety-significant changes necessary to demonstrate the regulatory acceptability of the Maximum Extended Load Line Limit Analysis Plus analysis for a GEH Boiling Water Reactor ("BWR"). The analysis utilized analytical models and methods, including computer codes, which GEH has developed, obtained NRC approval of, and applied to perform evaluations of Maximum Extended Load Line Limit Analysis Plus for a GEH BWR.

The development of the evaluation processes along with the interpretation and application of the analytical results is derived from the extensive experience and information databases that constitute a major GEH asset.

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

GE-Hitachi Nuclear Energy Americas LLC

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

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

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

Executed on this 2nd day of November 2016.



Lisa K. Schichlein
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GE-H Document GEH-PGN-MPLUS-143,
*Response to Request for Supplemental Information in
Support of Brunswick Steam Electric Plant MELLLA+ LAR*
(Non-Proprietary Information)