



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

June 4, 2018

MEMORANDUM TO: Mirela Gavrilas, Director
Division of Safety Systems
Office of Nuclear Reactor Regulation

FROM: Michael J. Case, Director */RA/*
Division of Systems Analysis
Office of Nuclear Regulatory Research

SUBJECT: DELIVERY OF FINAL DELIVERABLE ASSOCIATED WITH
MAXIMUM EXTENDED LOAD LINE LIMIT ANALYSIS PLUS
(MELLLA+) ANTICIPATED TRANSIENT WITHOUT SCRAM
WITH INSTABILITY (ATWS-I) CONFIRMATORY ANALYSIS FOR
BRUNSWICK STEAM ELECTRIC PLANT (BSEP) UNDER USER
NEED NRR-2016-009

By memorandum dated May 19, 2016 the Office of Nuclear Reactor Regulation (NRR) requested that the Office of Nuclear Regulatory Research (RES) perform confirmatory analyses to support the licensing of Brunswick Steam Electric Plant (BSEP) license amendment request (LAR) to operate with the Maximum Extended Load Line Limit Analysis Plus (MELLLA+) expanded operating domain (ADAMS Accession No. ML16088A106). In this request, NRR asked that RES perform calculations using the TRACE/PARCS code system of select Anticipated Transient without SCRAM (ATWS) scenarios leading to core instability (ATWS-I). RES responded to the request via memorandum dated June 22, 2016 and tracks this user need under the identifier: NRR-2016-009 (ADAMS Accession No. ML16169A180).

The enclosed report is Part 2 of a series of reports that describe the confirmatory analyses performed by the RES staff. The Part 1 report was previously transmitted to your staff by memorandum dated April 26, 2018 (ADAMS Accession No. ML18116A497) and Part 1 provides the RES staff confirmatory analysis of the three highest priority cases identified in the confirmatory analysis case matrix for this user need. The base case (Case 1) was run to establish a base line which is compared to two sensitivity cases. The sensitivity cases (Case 2-1 and 2-2) study the effect of feedwater temperature response and manual operator action timing.

Part 2 is enclosed and this supplemental report covers the balance of the confirmatory analysis case matrix requested by your staff. Part 2 is a companion report to Part 1 and describes the balance of the case matrix analyses, namely Cases 3-1, 3-2, 3-3, 3-4, and 4. The Case 3-X sensitivity calculations were performed to quantify the sensitivity of the peak cladding temperature (PCT) to analysis parameters associated with the fuel assembly design. Case 4 addresses the difference in turbine bypass capacity between BSEP Unit 1 and Unit 2.

CONTACT: Peter Yarsky, RES/DSA/CRAB
(301) 415-2384

Enclosure transmitted herewith contains Official Use – Proprietary Information. When separated from Enclosure this transmittal document is decontrolled.

M. Gavrilas

Our confirmatory analysis confirm the licensee’s analysis in cases where similar sensitivity studies have been performed and submitted for NRC review. In addition to confirming the licensee’s analyses, we also evaluated the cross-section branch structure used in our own analysis method and concluded that future analyses should rely on an orthogonal structure for the time being.

In addition, the Part 2 report includes two Appendices. Appendix A provides additional analysis of condensation heat transfer in the vessel when level tracking is disabled. This analysis was performed to address an open item from the Part 1 report. Appendix B provides additional analysis of flow asymmetry, which was performed to address an open item from the Part 1 report. These analyses are provided in the Part 2 report to close the Part 1 report open items.

We provided an advanced draft copy of this report to your staff on May 7, 2018. We received comments back from on May 11, 2018 and have fully incorporated these comments in the enclosed, final report. No issues were identified as a result of our confirmatory analysis that would require follow-up with the licensee through the request for additional information (RAI) process.

This transmittal, in combination with Part 1, provides the confirmatory analysis for all cases under the case matrix for BSEP, and therefore fulfils the scope of incoming request with respect to BSEP. However, User Need NRR-2016-009 requests plant-specific analyses for two additional plants, the next of which your staff has specified as Browns Ferry. We look forward to our continued collaboration with your staff on this next project.

Enclosure:

1. Yarsky, P., “TRACE/PARCS Analysis of BSEP MELLLA+ ATWS-I – Part 2,” May 9, 2018.

DISTRIBUTION:

P. Yarsky, RES	T. Zaki, RES	J. Borromeo, NRR	A. Smith, NRR
D. Woodyatt, NRR	J. Whitman, NRR	C. Hoxie, RES	M. Case, RES
K. Webber, RES	S. Bajorek, RES	W. Wang, ACRS	Z. Abdullahi, ACRS

ADAMS Accession No.: ML18152B127

OFFICE	RES/DSA/CRAB	RES/DSA/CRAB	RES/DSA/CRAB	RES/DSA/CRAB
NAME	P. Yarsky	T. Zaki	J. Staudenmeier	C. Gingrich
DATE	5/11/18	5/11/18	5/9/18	5/8/18
OFFICE	RES/DSA	BC:RES/DSA/CRAB	D:RES/DSA	
NAME	S. Bajorek	C. Hoxie	M. Case	
DATE	5/21/18	5/7/18	6/4/18	

OFFICIAL RECORD COPY