

ENCLOSURE 2

M190024

Updated TRACG Model Uncertainties

Non-Proprietary Information

IMPORTANT NOTICE

This is a non-proprietary version of Enclosure 1 to M190024, which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed bracket as shown here [[]].

Updates to TRACG Model Uncertainties for BWR/2-6 AOO Applications

Background

The Nuclear Regulatory Commission (NRC) approved the TRACG application of anticipated operational occurrence (AOO) transient analyses (Reference 1) and the use of TRACG04/PANAC11 code versions for these applications (Reference 2). This TRACG methodology requires the application of model uncertainties in the determination of overall uncertainties of key output parameters (i.e., $\Delta\text{CPR}/\text{ICPR}$). In the reassessment of these model uncertainties, some improvements were made. In compliance with Limitation and Condition 17 of the final safety evaluation report for NEDE-32906P, Supplement 3 (Reference 2), these improved model uncertainties are being submitted to the NRC.

Limitation and Condition 17 states:

New data may become available with which the specific model uncertainties described may be reassessed. If the reassessment results in a need to change a specific model uncertainty, the specific model uncertainty may be revised for AOO licensing calculations without NRC staff review and approval as long as the process for determining the uncertainty is unchanged and the change is transmitted to the NRC staff for information. (Section 3.19.2)

The nuclear uncertainties (void coefficient, Doppler coefficient, and SCRAM coefficient) are expected to be revised, as would be the case for the introduction of a new fuel design. These uncertainties may be revised without review and approval as long as the process for determining the uncertainty is unchanged from the method approved in this SE. In all cases, changes made to model uncertainties done without review and approval will be transmitted to the NRC staff for information. (Sections 3.19.2 and 3.20.2)

Model Uncertainty Changes

Since the completion of the licensing topical report (LTR) for the TRACG application for AOOs (Reference 1), LTRs have been produced for additional TRACG applications. In developing these LTRs, some of the biases and uncertainties for phenomena that are applicable to AOOs have been improved. The following lists the phenomena and the improvements made:

- C1CX - Scram Reactivity - [[

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This value was updated based on new data and based only on the uncertainty in scram reactivity. The scram speed uncertainty is implemented separately.

- C2AX - Interfacial Shear/Void Fraction - [[

]] These values were updated in the LOCA LTR (Reference 3) and are applicable to BWR/2-6 AOOs. [[]]

- F1 - Upper Plenum Void Profile / Two-Phase Level - [[

]] These values were updated in the LOCA LTR (Reference 3) and are applicable to BWR/2-6 AOOs.

References

1. GE Nuclear Energy, "TRACG Application for Anticipated Operational Occurrences (AOO) Transient Analyses," NEDE-32906P-A, Revision 3, September 2006.
2. GE Hitachi Nuclear Energy, "Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS Overpressure Transients," NEDE-32906P Supplement 3-A, Revision 1, April 2010
3. GE Hitachi Nuclear Energy, "TRACG Application for Emergency Core Cooling Systems / Loss-of-Coolant-Accident Analyses for BWR/2-6," NEDE-33005P-A, Revision 2, May 2018.