ATTACHMENT 1

CHANGES TO THE WESTINGHOUSE

ECCS EVALUATION MODEL

AND PCT PENALTY ASSESSMENTS

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1.   **FUEL ROD GAP CONDUCTANCE ERROR**

An error was identified in the fuel rod gap conductance model in the NOTRUMP computer code (reactor coolant system response model). The error is associated with the use of an incorrect temperature in the calculation of the cladding emissivity term. This error corresponds to a Non-Discretionary Change as described in Section 4.1.2 of WCAP-13451.

Based on a combination of engineering judgment of the phenomena and physics of a small break LOCA, and sensitivity calculations performed with the advanced plant version of NOTRUMP, Westinghouse has concluded that this error has a negligible effect, leading to an estimated Peak Cladding Temperature (PCT) impact of 0°F on small break LOCA analysis results.

2.   **RADIATION HEAT TRANSFER MODEL ERROR**

Two errors were discovered in the calculation of the radiation heat transfer coefficient within the fuel rod model of the NOTRUMP computer code (reactor coolant system response model). First, existing logic did not preclude non-physical negative or large (negative or positive) radiation heat transfer coefficients from being calculated. These erroneous calculations occurred when the vapor temperature exceeded the cladding surface temperature or when the predicted temperature difference was less than 1°F. Second, a temperature term incorrectly used degrees Fahrenheit instead of Rankine. These errors represent a closely related group of Non-Discretionary problems in accordance with Section 4.1.2 of WCAP-13451.

Based on a combination of engineering judgment of the phenomena and physics of a small break LOCA, and sensitivity calculations performed with the advanced plant version of NOTRUMP, Westinghouse has concluded that this error has a negligible effect, leading to an estimated PCT impact of 0°F on small break LOCA analysis results.

3.   **SBLOCTA PRE-DNB CLADDING SURFACE HEAT TRANSFER COEFFICIENT
        CALCULATION**

Two errors were discovered in the pre-departure from nucleate boiling (pre-DNB) cladding surface heat transfer coefficient calculation in the SBLOCTA code (cladding heat-up calculations). The first error is a result of inconsistent time units (hours vs. seconds) in the parameters used for the calculation of the Reynolds and Prandtl numbers, and the second error relates to an incorrect diameter used to develop the area term in the cladding surface heat flux calculation. Both of these issues impact the calculation of the pre-DNB convective heat transfer coefficient, representing a closely related group of Non-Discretionary Changes to the Evaluation Model as described in Section 4.1.2 of WCAP-13451.

These errors have been corrected in the SBLOCTA code. Because this condition occurs prior to DNB, it was judged that these errors had no direct impact on the cladding heat-up related to the core uncovery period. A series of validation tests were performed by Westinghouse and confirmed that these errors have a negligible effect on SBLOCA analysis results, leading to an estimated PCT impact of 0°F.

4.   GENERAL CODE MAINTENANCE

Various changes have been made to enhance the usability of the codes and to help preclude errors in analyses. This includes items such as modifying input variable definitions, units, and defaults; improving the input diagnostic checks; enhancing the code output; optimizing active coding; and eliminating inactive coding. These changes have been evaluated for impact on existing Small Break LOCA analysis results and they represent discretionary changes that will be implemented on a forward-fit basis in accordance with Section 4.1.1 of WCAP-13451.

Westinghouse has judged this issue to have an estimated PCT impact of 0°F on existing Small Break LOCA analysis results.

5.   LOCA EVALUATION OF GAIA LFAs FOR CALLAWAY

Background

The impact of inserting Framatome GAIA lead fuel assemblies (LFAs) in the Callaway core on the Callaway Appendix K large break loss of coolant accident (LBLOCA) and Appendix K small break loss-of-coolant accident (SBLOCA) analyses was evaluated. This change represents a change in plant configuration, which is distinguished from an evaluation model change in Section 4 of WCAP-13451.

Estimated Effect

The presence of GAIA LFAs in non-limiting core locations has a negligible effect on the Appendix K LBLOCA and Appendix K SBLOCA analysis results, leading to an estimated PCT impact of 0°F.

ATTACHMENT TWO

ECCS EVALUATION MODEL

MARGIN ASSESSMENT FOR CALLAWAY

LARGE BREAK LOCA

A.   ANALYSIS OF RECORD (AOR)   PCT = 1939°F

B.   PRIOR ECCS MODEL ASSESSMENTS   + 58°F

C.   CURRENT LOCA MODEL ASSESSMENTS -   + 0°F
       March 2021

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       LICENSING BASIS PCT + MARGIN ALLOCATIONS   1997°F

       ABSOLUTE MAGNITUDE OF MARGIN ALLOCATIONS   58°F
       SINCE LAST ANALYSIS OF RECORD OR LBLOCA 30-DAY REPORT

SMALL BREAK LOCA

A.   ANALYSIS OF RECORD (AOR)   PCT = 1043°F

B.   PRIOR ECCS MODEL ASSESSMENTS   +   0°F

C.   CURRENT ECCS MODEL ASSESSMENTS -   +   0°F

       March 2021

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       LICENSING BASIS PCT + MARGIN ALLOCATIONS   1043°F

       ABSOLUTE MAGNITUDE OF MARGIN ALLOCATIONS   0°F
       SINCE LAST ANALYSIS OF RECORD OR SBLOCA 30-DAY REPORT