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SUBJECT: Discusses changes in peak fuel cladding temps resulting from rev to large break LOCA analysis for plant.

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September 19, 1996

SERIAL: HNP-96-160
10CFR50.46

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-63
EMERGENCY CORE COOLING SYSTEM EVALUATION CHANGES

Dear Sir or Madam:

Carolina Power and Light (CP&L) was notified by Siemen's Power Corporation (SPC) on August 19, 1996 of significant changes in the peak fuel cladding temperatures (PCT) resulting from a revision to the large break loss of coolant accident (LBLOCA) analysis for the Harris Plant. The changes to the LBLOCA analysis of record (AOR) and the effects of those changes are being reported in accordance with 10 CFR 50.46(a)(3)(ii). The revised analysis removes the SPC 1991 changes to the TOODEE2 LBLOCA analysis code currently under review by the NRC, and includes the correction of a complier problem. The revised analysis uses the 1986 approved reflood methodology and thereby avoids the concern relative to changes that SPC implemented to the LOCA model which were not specifically reviewed and approved by the NRC.

The new LBLOCA analysis results in a PCT of 1982°F for a 0.8 Double-Ended-Guillotine-Cold-Leg break and middle-of-cycle axial power shape. The previous LOCA analysis which used the 1991 TOODEE2 model reported a PCT of 2025°F for the same break and power shape combination.

This PCT reduction from 2025°F to 1982°F results from three factors. First, Siemens recognized an error associated with the compiler used in the LBLOCA calculations. Correction of that compiler error produced a reduction in the Harris PCT of about 6°F. Based on that assessment, Siemens determined that the Harris analysis of record (AOR) was conservative and it was not formally revised at that time. The compiler error correction is incorporated in this revised analysis.

Secondly, correction of the complier error coincidentally eliminated a conservative, non-physical spurious critical heat flux (CHF) lockout condition occasionally observed in some LOCA computer analysis runs. The CHF lockout was triggered when junction flows at each end of a RELAP4 volume were in opposite directions.

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These flows were averaged by the RELAP4 code, resulting in a momentary, unrealistically low flow rate being used in the calculation of CHF. This produced an unrealistic spiked decrease in the CHF, resulting in momentary entry into CHF which trips an early CHF lockout in one of the RELAP4 volumes. The early CHF lockout results in a overly-conservative calculation of PCT. The previous AOR for Harris contained this spurious lockout which contributed 115°F to the 2025°F PCT. The correction of the compiler error caused the RELAP4 code to experience a slightly different calculational path. This calculational path coincidentally did not produce the spurious CHF lockout and its 115°F overly-conservative contribution to the PCT. Therefore, the elimination of the spurious CHF lockout reduced PCT for LBLOCA analysis by 115°F.

Removing the 1991 SPC changes to the TOODEE2 model actually produced a + 78°F increase in the PCT. The NRC is currently reviewing the 1991changes to determine if the changes should have been classified by SPC as a model change to the NRC approved evaluation model.

The LBLOCA analysis changes and resulting PCT contributions discussed above are summarized in the following table.

Base Calculation and Subsequent Individual Changed Conditions	Calculated PCTs	Individual Changed Condition ΔPCTs
Post-1991 TOODEE2 Model Used	2025 °F	-----
Compiler Error Corrected	2019 °F	- 6 °F
Spurious CHF Lockout Eliminated	1904 °F	- 115 °F
Pre-1991 TOODEE2 Model Used	1982 °F	+ 78 °F

Collectively, the changes result in a net decrease in PCT of 43°F. These changes are considered to be significant per 10CFR50.46 (a)(3)(i) and are therefore being reported to the NRC in accordance with 10CFR50.46 (a)(3)(ii). Harris remains in compliance with the requirements specified in 10CFR50.46(b).

Questions regarding this matter may be referred to Mr. T. D. Walt at (919) 362-2711.

Sincerely,

WER

DBA/dba

c: Mr. J. B. Brady, HNP Senior Resident Inspector, NRC
Mr. S. D. Ebneter, Region II Regional Administrator, NRC
Mr. N. B. Le, NRR Project Manager, NRC