Nebraska Public Power District
Nebraska's Energy Leader

50.46

NLS2002088
July 12, 2002

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Reporting of Changes and Errors in ECCS Evaluation Models
Cooper Nuclear Station
NRC Docket 50-298, DPR-46

Reference: Letter from J.H. Swailes (Nebraska Public Power District) to U. S. Nuclear Regulatory Commission, dated June 6, 2001, Reporting of Changes and Errors in ECCS Evaluation Models.

In accordance with 10 CFR 50.46(a)(3)(ii), the Nebraska Public Power District (NPPD) is submitting this special report enumerating the impact of changes and errors in the evaluation model used by General Electric (GE) to demonstrate compliance with the Emergency Core Cooling System (ECCS) requirements of 10 CFR 50.46. In the Reference letter, the District provided revisions to the Licensing Basis (LB) Peak Clad Temperatures (PCT) for Cooper Nuclear Station (CNS), in accordance with 10 CFR 50.46(a)(3)(i) and (ii). As a result of two reports of errors identified in the SAFER analyses, NPPD is updating the LB PCT values for CNS. Attachment 1 summarizes, by fuel type, the baseline PCTs, the PCT error accumulations, and the resultant estimated LB PCTs for the limiting and non-limiting fuel types.

A core spray injection elevation error was found in SAFER. An error was found in the automation code that prepares the input basedecks for the SAFER analysis. This error resulted in too low a value being calculated for the core spray injection elevation for the lower core spray sparger. The injection elevation for the lower sparger was set slightly above the top of the fuel channels (bottom of the lower plenum region in the SAFER code). This error affects the buildup and draining of the pool in the upper plenum. The error also affects the amount of steam quenched by the core spray water. The incorrect injection elevation may result in an incorrect calculation for the PCT.

Because the core spray injection elevation controls several competing phenomena, the effect of correcting the injection elevation may result in an increase or decrease in the PCT. Raising the injection elevation increases the amount of inventory that can be held up in the pool of water that may form in the upper plenum. This inventory holdup may delay the reflooding of the core, which can result in an increase in the PCT. On the other hand, the higher injection elevation results in more steam being condensed by the spray water. The increased condensation can result in a faster vessel depressurization and

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higher ECCS flows, which can result in an earlier reflooding of the core and a decrease in the PCT. In addition, the spray water flowing to the lower plenum will be warmer (having condensed more steam). The core may then reflood faster with a more highly voided mixture, again resulting in a decrease in the PCT. The analysis assumptions (nominal or Appendix K) can also affect whether the correction results in an increase or decrease in PCT.

A study was performed to assess the impact of the correction in the core spray injection elevation on the PCT. A set of representative jet pump plants covering the Boiling Water Reactor (BWR)/3-6 product lines was selected, and SAFER runs were performed to obtain the change in PCT for both Nominal and Appendix K conditions. The impact on the PCT ranged from - 95°F to + 60°F. A small break analysis was also performed for both Nominal and Appendix K conditions on a few selected plants. The impact on the PCT was increases of up to +30°F.

The impact of this error for CNS was an increase in the LB PCT of + 5°F for GE9 fuel and N/A for GE14 fuel.

Another error in SAFER was found. The initial vessel water level used in some SAFE/REFLOOD and SAFER Loss of Coolant Accident (LOCA) analyses did not properly account for the effect of the steam dryer pressure drop on the initial inventory of water in the vessel. In the LOCA analyses, the initial water level is assumed to be at either normal water level or at the low water level scram (Level 3) analytical limit, depending on the analysis assumptions. The numerical value used in the analysis was based on the level as indicated by the level instrumentation. The indicated level shows the water level in the annular region between the dryer skirt and the vessel wall. The water inside the dryer skirt is at a lower level; the difference between the levels inside and outside the dryer skirt is equivalent to the steam dryer pressure drop. The SAFE and SAFER codes do not model the steam dryer effects on the initial water level. The initial liquid inventory in the vessel is determined by the value of the initial bulk water level input in the SAFE and SAFER codes. Using the indicated water level as the initial water level results in too high an initial liquid inventory because the lower water level inside the dryer skirt is not addressed. This additional water in the vessel assumed in the analysis may delay the core uncovery, which may result in a non-conservative calculation of the PCT.

When corrected for the dryer pressure drop, the initial bulk water level in the vessel is lower than that used in the original SAFE or SAFER analyses. A SAFER evaluation was performed to assess the impact of the correction in the bulk water level on the PCT. A set of representative plants covering the BWR/2-6 product lines was selected and SAFER runs were performed to obtain the change in PCT for both Nominal and Appendix K conditions. The impact on the PCT ranged from -5°F to +20°F. A similar evaluation

showed that the impact of the error was negligible for plants using the SAFE/REFLOOD methodology.

This error applies to SAFE/REFLOOD and SAFER analyses for BWR/2-6 plants. The impact of this error for CNS was an increase in the LB PCT of + 10°F for GE9 fuel and N/A for GE14 fuel.

As shown in Attachment 1, the LB PCT values have more than 300°F margin to the 2200°F limit specified in 10 CFR 50.46. Due to the large margin to the 2200°F limit, no reanalysis is planned at this time.

If you have any questions, please do not hesitate to contact Jerry Lewis at (402) 825-5770.

Sincerely,

Michael T. Coyle
Site Vice President

Attachment

cc: Regional Administrator w/attachment
USNRC – Region IV

Senior Project Manager w/attachment
USNRC – NRR Project Directorate IV-1

Senior Resident Inspector w/attachment
USNRC

Records w/attachment

Current Baseline LB PCT (°F) Values and Error Accumulation
Cooper Nuclear Station

	GE9	GE14
Baseline PCT	1570	1760
Existing Error (Reported 12/23/1999)	+5	N/A
Existing Error (Reported 12/28/2000)	-5	N/A
Existing Errors (Reported 6/6/2001)	+95	+95
GE 10 CFR 50.46 Notification Letter 2002-01	+5	N/A
GE 10 CFR 50.46 Notification Letter 2002-01	+10	N/A
PCT Error Accumulation	120	95
New Estimated Licensing Basis PCT Values	1680	1855

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The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the NL&S Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
None	