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July 24, 1998

L-98-194
10 CFR 50.46

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington D.C. 20555

Re: St. Lucie Unit 1
Docket 50-335
LBLOCA Evaluation Model
30 Day 10 CFR 50.46 Report

The attached report is submitted pursuant to 10 CFR 50.46(a)(3)(ii) to provide notification of errors discovered in computer codes, or in their application, that are used in the large break loss of coolant accident (LBLOCA) evaluation model for St. Lucie Unit 1. The estimated impact on calculated peak cladding temperature (PCT) from each identified anomaly is not significant; however, cumulative (absolute) PCT changes are estimated to exceed 50°F and meet the criteria for reporting within 30 days. A summary of the cumulative changes to the limiting PCT is provided.

Should there be any questions, please contact us.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

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JAS/RLD

Attachment

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant

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Siemens Power Corporation (SPC) is the current fuel vendor for St. Lucie Unit 1 and performs the associated reactor core reload safety analyses. A number of deviations have been identified recently by SPC in the computer codes that are used in the large break loss of coolant accident (LBLOCA) model designed for calculating ECCS cooling performance. The estimated impact on the limiting calculated peak cladding temperature (PCT) from each anomaly discussed below is not significant; however, cumulative (absolute) PCT changes are estimated to exceed 50°F and therefore meet the 30 day reporting criteria.

Reference 1 documents SPC's action plan to correct their LBLOCA evaluation model for excessive RELAP4 variability. The impact of the following code deviations has been evaluated consistent with the discussion in that letter, and each evaluation was performed in conjunction with a RELAP4 code version in which the excessive variability has been corrected. Since the code deviations are applicable to both the approved EXEM/PWR LBLOCA model (modified by the interim FCTF correlation) and the developmental (corrected) model discussed in Reference 1, FPL has applied the estimated impact on the calculated PCT to the analysis of record PCT reported in Reference 2.

A summary of the cumulative (absolute) changes estimated for the limiting LBLOCA calculated PCT since the last annual report (Reference 2) is provided in section VI of this report, and shows that St. Lucie Unit 1 remains in compliance with 10 CFR 50.46 acceptance criteria.

I. Asymptotic Fuel Density Input (SWMDEN) to the RDX2LSE (RODEX2) Code

SWMDEN is a RODEX2 code input defined as the asymptotic fuel density that occurs after full densification and full accommodation of the solid swelling by the as-fabricated fuel porosity. The processes employed during fuel manufacturing determine the value of SWMDEN, and SPC discovered that this numerical value should be increased from .9755 to .995 to reflect the current manufacturing process. The increased value of SWMDEN is considered to have a negligible effect on small break LOCA calculations since initial stored energy is not a significant parameter for this event. However, calculations performed by SPC estimate that LBLOCA calculated PCT would increase by less than 20°F.

II. Decay Heat Re-normalization in RELAP4 at the Initiation of Transient

A deviation was identified in the re-normalization of decay heat in RELAP4 at the initiation of the LOCA transient. The re-normalization incorrectly adjusted the fission product decay heat by slightly less than the 1.2 multiplier required for RELAP4 decay heat equations. The LBLOCA calculated PCT impact is estimated to be an increase of 15°F.

III. Fuel Average Temperature Calculation in RELAP4

A deviation was identified in the RELAP4 average fuel temperature calculation as a result of using one-half the volume of the first gap node in calculating fuel volume. The deviation described in Section II of this report (re-normalization of decay heat in RELAP4) was corrected prior to estimating the PCT impact from incorrect computation of average fuel temperature, and the LBLOCA calculated PCT impact from this deviation is estimated to be an increase of 1°F.

IV. Calculation of Gap Dimensions in RODEX2

A deviation was identified in the calculation of gap dimensions in RODEX2 that are used as inputs to TOODEE2. These dimensions were calculated at zero power hot standby conditions rather than at cold conditions. The deviations previously described for re-normalization of decay heat and incorrect average fuel temperature calculation in RELAP4 were corrected prior to estimating the PCT impact from the incorrect gap dimensions, and the LBLOCA calculated PCT impact from this deviation is estimated to be an increase of 2°F.

V. Resolution of ICECON Code Issue for St. Lucie Unit 1

Reference 3 reported an ICECON code error involving calculation of the energy removed by containment fan coolers which was estimated, on a generic basis, to potentially increase the LBLOCA calculated PCT by less than 20°F. SPC has determined that the code calculation for fan energy removal is correct, but that the analysis was in error for one plant because of improper data entry. That is, the suspected ICECON code error did not exist. SPC verified that the St. Lucie Unit 1 LOCA input deck for this code is correct, and there is no impact on the St. Lucie Unit 1 LBLOCA calculated PCT from this event.

VI. Summary of Cumulative (absolute) PCT Changes

St. Lucie Unit 1 LBLOCA Model Summary	Δ PCT (°F)
* Change following correction of z-equivalent error	-1
* Change due to revised containment spray and fan cooler minimum delay time	+ 14
Change due to corrected RELAP4 variability (previously reported in Reference 3)	-28
ICECON Code issue (previously estimated to be < 20°F in Reference 3)	0
Asymptotic fuel density input (SWMDEN) to the RDX2LSE (RODEX2) code	< 20
Decay heat re-normalization in RELAP4 at initiation of transient	+ 15
Fuel average temperature calculation in RELAP4	+ 1
Calculation of gap dimensions in RODEX2	+ 2

* Changes annotated with an asterisk are included in the limiting PCT value of 2040°F reported in Reference 2.

V. References

1. Siemens Power Corporation letter NRC:98:016, James F. Mallay to NRC (DCD): ATTN: Chief, Planning, Program and Management Support Branch: RELAP4 Excessive Variability; March 17, 1998.
2. Florida Power and Light Company letter L-98:057, J. A. Stall to NRC(DCD): Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors, 10 CFR 50.46 Annual Report; March 4, 1998.
3. Florida Power and Light Company letter L-98-158, J. A. Stall to NRC (DCD): LBLOCA Evaluation Model, 30 Day 10 CFR 50.46 Report; June 15, 1998.



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