



March 2, 2016

L-2016-049  
10 CFR 50.46

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

Re: St. Lucie Units 1 and 2  
Docket Nos. 50-335 and 50-389  
Acceptance Criteria for Emergency Core Cooling  
Systems for Light Water Nuclear Power Reactors  
10 CFR 50.46 Annual Report

Pursuant to 10 CFR 50.46(a)(3)(ii), the nature of any change to or error discovered in the evaluation models for emergency core cooling systems (ECCS), or in the application of such models, that affect the fuel cladding temperature calculations for St. Lucie Units 1 and 2 is reported in the attachment to this letter. The estimated effect from any such change or error on the limiting ECCS analysis for each unit is also addressed. The data interval for the report is from January 1, 2015 through December 31, 2015.

Please contact Ken Frehafer at 772-467-7748 should you have any questions regarding this submittal.

Sincerely,

A handwritten signature in black ink, appearing to read 'ESK', is written over a large, stylized 'X' or 'Z' mark.

SCIENCE FOR ESK

Eric S. Katzman  
Licensing Manager  
St. Lucie Plant

ESK/KWF

Attachment

ADD  
NRR

St. Lucie Units 1 and 2  
10 CFR 50.46 Annual Report

Emergency core cooling system (ECCS) analyses for St. Lucie Unit 1 and St. Lucie Unit 2 are performed by AREVA and Westinghouse Electric Company (W), respectively. The following information pertaining to the evaluation models for small break loss of coolant accidents (SBLOCA) and large break loss of coolant accidents (LBLOCA), and the application of such models to each St. Lucie Unit, is provided pursuant to 10 CFR 50.46(a)(3)(ii). A summary of calculated peak cladding temperature (PCT) changes is provided in Tables 1 and 2 (for St. Lucie Units 1 and 2, respectively). The data interval for this report is from January 1, 2015 through December 31, 2015. A discussion of the changes follows.

St. Lucie Unit 1 transitioned to M5 fuel rod cladding during the year 2015 and the new evaluation model PCT with M5 cladding was reported to the NRC in Reference 3.2.

## **1.0 ST LUCIE UNIT 1**

### **1.1 Changes to SBLOCA**

Reference 3.2 notified the NRC of a change in evaluation model PCT to support the change to M5 cladding. No errors were found in the SBLOCA ECCS performance analysis since the previous report of Reference 3.2. The limiting SBLOCA PCT remains at 1850 °F and is documented in Table 1.

### **1.2 Changes to LBLOCA**

Reference 3.2 notified the NRC of a change in evaluation model PCT to support the change to M5 cladding. There was one error found in the LBLOCA ECCS performance analysis since the previous report of Reference 3.2.

The error is in the cutback ratio (relative power) for once-burned gadolima bearing fuel rod compared to rods containing only U235. This resulted in gadolima bearing rods being modeled at an artificially reduced power, and when corrected results in an estimated impact to the PCT of 0 °F

The limiting LBLOCA PCT with the above estimated impact remains at 1794 °F and is documented in Table 1.

## **2.0 ST. LUCIE UNIT 2**

### **2.1 Changes to SBLOCA**

No errors were found in the SBLOCA ECCS performance analysis since the previous annual report of Reference 3.1. The limiting SBLOCA PCT remains at 1903 °F and is documented in Table 2.

## **2.2 Changes to LBLOCA**

No errors were found in the LBLOCA ECCS performance analysis since the previous annual report of Reference 3.1. The limiting LBLOCA PCT remains at 2087 °F and is documented in Table 2.

## **3.0 REFERENCES**

- 3.1 Letter L-2015-093, Eric Katzman to U.S. Nuclear Regulatory Commission Document Control Desk, "St. Lucie Units 1 and 2 Docket Nos. 50-335 and 50-389 Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors 10 CFR 50.46 Annual Report," March 24, 2015 (ML 15092A097).
- 3.2 Letter L-2015-155, Eric Katzman to U.S. Nuclear Regulatory Commission Document Control Desk, "St. Lucie Unit 1 Docket No. 50-335 Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors 10 CFR 50.46 Change Report," May 14, 2015 (ML 15149A150).

**Table 1: 2015 St. Lucie Unit 1 SBLOCA and LBLOCA PCT Summary**

**Unit 1 SBLOCA Summary**

**Evaluation Model: EMF-2328(P)(A) Rev. 0 as supplemented by ANP-3000(P), Revision 0.**

**Evaluation Model PCT: 1828°F**

		Net PCT Effect	Absolute PCT Effect	PCT
A	Prior 10 CFR 50.46 Changes or Error Corrections – Previous Years (New evaluation model during Year 2015, Reference 3.2)	N/A	N/A	N/A
B	Prior 10 CFR 50.46 Changes or Errors Corrections – Current Year (Reference 3.2)			
	Vapor absorptivity correlation applied outside the bounds of the correlation	+52 °F	52 °F	1880 °F
	Design Change for Initial Pressurization of Fuel Rod	-30 °F	30 °F	1850 °F
C	10 CFR 50.46 Changes in Current Year Since Item B	0 °F	0 °F	1850 °F
D	Sum of 10 CFR 50.46 Changes	+22 °F	82 °F	
The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis		1850 °F < 2200 °F		

## Unit 1 LBLOCA Summary

Evaluation Model: EMF-2103(P)(A) Rev. 0 as supplemented by ANP-2903(P), Revision 1.

Evaluation Model PCT: 1788°F

		Net PCT Effect	Absolute PCT Effect	PCT
A	Prior 10 CFR 50.46 Changes or Error Corrections – Previous Years (New evaluation model during Year 2015, Reference 3.2)	N/A	N/A	N/A
B	Prior 10 CFR 50.46 Changes or Errors Corrections – Current Year (Reference 3.2)			
	S-RELAP5 RODEX3a Trapped Stack Coding Error	+6 °F	6 °F	1794 °F
	S-RELAP5 Vapor Absorptivity Correlation Error	0 °F	0 °F	1794 °F
	Modal Decomposition Generation of Non-Physical Shapes	0 °F	0 °F	1794 °F
	Design Change for Initial Pressurization of Fuel Rod	0 °F	0 °F	1794 °F
C	10 CFR 50.46 Changes in Current Year Since Item B			
	Incorrect cutback ratio applied to gadolina bearing rods	+0 °F	0 °F	1794 °F
D	Sum of 10 CFR 50.46 Changes	+6 °F	6°F	

The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis	<b>1794 °F &lt; 2200 °F</b>
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**Table 2: 2015 St. Lucie Unit 2 SBLOCA and LBLOCA PCT Summary**

**Unit 2 SBLOCA Summary**

**Evaluation Model: CENPD-137, Supplement 2-P-A (S2M)**

**Evaluation Model PCT: 1903°F**

		Net PCT Effect	Absolute PCT Effect	PCT
A	Prior 10 CFR 50.46 Changes or Error Corrections – Previous Years (Reference 3.1)	0 °F	0 °F	1903 °F
B	Prior 10 CFR 50.46 Changes or Errors Corrections – Current Year	0 °F	0 °F	1903 °F
C	10 CFR 50.46 Changes in Current Year Since Item B	0 °F	0 °F	1903 °F
D	Sum of 10 CFR 50.46 Changes	0 °F	0 °F	

*The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis*

**1903 °F < 2200 °F**

**Unit 2 LBLOCA Summary**

**Evaluation Model: CENPD-132, Supplement 4-P-A (1999 EM)**

**Evaluation Model PCT: 2087°F**

		Net PCT Effect	Absolute PCT Effect	PCT
A	Prior 10 CFR 50.46 Changes or Error Corrections – Previous Years (Reference 3.1)	0 °F	0 °F	2087 °F
B	Prior 10 CFR 50.46 Changes or Errors Corrections – Current Year	0 °F	0 °F	2087 °F
C	10 CFR 50.46 Changes in Current Year Since Item B	0 °F	0 °F	2087 °F
D	Sum of 10 CFR 50.46 Changes	0 °F	0 °F	

*The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis*

**2087 °F < 2200 °F**