

**From:** [Kalyanam, Kaly](#)  
**To:** [CLARK, ROBERT W](#)  
**Cc:** [Lent, Susan](#)  
**Subject:** Request for Additional Information - TAC No. ME9719  
**Date:** Thursday, March 21, 2013 1:24:56 PM

---

Dave:

By letter dated March 20, and supplemented by letter dated December 17, 2012, Entergy Operations, Inc, the licensee for Arkansas Nuclear One, Unit 1 sent a notice reporting a change or error discovered in an evaluation model or in the application of such a model that affects the peak cladding temperature (PCT) calculation. This report was submitted pursuant to the requirements of 10 CFR 50.46, which requires, in part, that licensees report a change in the evaluation model used resulting in a significant change in PCT (greater than 50°F). The intent of this requirement is to enable the staff to establish the safety significance of this change (See FR Volume 53, No. 180, pp. 35996-36005). On reviewing your submittal, the Nuclear Regulatory Commission staff finds it needs additional information to continue the review.

We understand that there is a possibility for a generic response from the vendor. Please let us know in advance when the NRC staff can expect a response so that our resources can be effectively used.

Thanks

Kaly N. Kalyanam

Docket No. 50-313  
TAC No. ME9719  
Plant: Arkansas Nuclear One, Unit 1  
Licensee: Entergy Operations Inc.

REQUEST FOR ADDITIONAL INFORMATION  
REGARDING ARKANSAS NUCLEAR ONE, UNIT 1  
EMERGENCY CORE COOLING SYSTEM MODEL CHANGES  
REPORTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 50.46  
DOCKET NO. 50-313

By letter dated March 20, 2012 (Agencywide Document Access and Management System (ADAMS) Accession Number ML12080A120), as supplemented by letter dated December 17, 2012 (ADAMS Accession Number ML12353A489), Entergy Operations, Inc, the licensee for Arkansas Nuclear One, Unit 1 (ANO-1) submitted a report describing the nature and estimated effect of two significant ECCS evaluation

model changes/errors. The report was submitted pursuant to the requirements of Title 10 of the *Code of Federal Regulations* (CFR), Part 50, Section 46, paragraph (a)(3)(ii).

The regulations in 10 CFR 50.46(a)(3)(ii) require that licensees report a change in the evaluation model used resulting in a significant change in PCT (greater than 50°F). The intent of this requirement is to enable the staff to establish the safety significance of reported changes and errors (See FR Volume 53, No. 180, pp. 35996-36005).

The December 17, 2012, supplemental letter referenced an additional letter from AREVA NP Inc., which was submitted to the NRC on December 6, 2012 (ADAMS Accession Number ML12342A381). The following questions pertain to the AREVA submittal, insofar as it applies to the ANO-1 10 CFR 50.46 report.

1. For the analyses completed pertaining to the ECCS bypass error for the lowered loop design, a 2.506-ft peak power location was used, and the analyses for the ECCS bypass error for the raised loop design used a 9.536-ft peak power location. In the December 6, 2012, supplemental letter, the effects of the end-of-bypass timing error are expressed in terms of liquid inventory available to reach the lower plenum and initiate a bottom-up core reflood. The effects of an adiabatic heatup, which is terminated by the core reflood, are also discussed. In consideration of these phenomena, it would appear that a higher elevation in the core would be a more limiting location to evaluate the effects of an error associated with end-of-bypass timing.

Provide information to demonstrate that the bottom-peaked power shape being used for the lowered loop design is conservative and/or appropriate.

2. After evaluating a 177 fuel assembly (FA) lowered loop (LL) plant with column weldments modeled for a 205 FA plant, details of the column weldments for a 177 FA plant were developed. The model for column weldments of a 177 FA plant were then used for the analyses of a raised loop (RL) plant. Two 177 FA raised loop cases showed that the newly developed column weldments increased PCT by 3 degrees Fahrenheit.

It was also reported that the column weldments in a lowered loop plant increased PCT by 35.6 degrees Fahrenheit for an unruptured fuel segment. To determine the effect of column weldments on a ruptured fuel segment, the result is doubled. This resulted in a PCT increase of 71.2 degrees Fahrenheit for a ruptured fuel segment. This was bounded by generically estimating the effect of column weldments to be an increase in PCT of 80 degrees Fahrenheit.

Column weldments in a raised loop plant increased PCT by 8.9 degrees Fahrenheit for an unruptured segment, which is one fourth of the effect seen in the lowered loop design.

- a. Provide justification to show that analyzing column weldments

modeled for a 177 FA plant has an effect on PCT of the same magnitude in a lowered loop plant as in a raised loop plant.

- b. Provide justification to show that the generic 80 degree increase in PCT is bounding for a ruptured fuel segment in a lowered loop plant using the 177 FA column weldment model.
- c. Describe the nodalization for the column weldments used in RELAP5 analyses.
- d. Provide drawings to compare the column weldment design for a 205 fuel assembly plant to the column weldments for the 177 fuel assembly plant.