

April 27, 2007

Mr. Preston D. Swafford
Interim Chief Nuclear Officer
Nuclear Support
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 - REVIEW OF 10 CFR 50.46
NOTIFICATIONS OF ECCS EVALUATION MODEL CHANGES
(TAC NO. MD1235)

Dear Mr. Swafford:

This letter documents the U.S. Nuclear Regulatory Commission (NRC) staff review of two reports for Watts Bar Nuclear Plant Unit 1 that were submitted by the Tennessee Valley Authority (TVA, the licensee) pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46, "Acceptance criteria for emergency core cooling systems [ECCS] for light-water nuclear power reactors."

By letter dated August 16, 2005, as supplemented by letter dated September 11, 2006, TVA submitted a 30-day report pursuant to 10 CFR 50.46(a)(3)(ii), which requires such a report if a change in an ECCS evaluation model results in a significant change (greater than 50 degrees Fahrenheit (°F)) in peak cladding temperature (PCT). The 30-day report indicated that leakage in the piping relief valves could result in a loss of up to 30 gallons per minute (gpm) in safety injection (SI) flow to the pressurizer relief tank when the SI system was in operation. The licensee assessed the effects of the reduced SI flow on the analysis of record (AOR) for the large-break (LB) and small-break (SB) loss-of-coolant accidents (LOCAs). The licensee's assessment showed that the PCT remained unchanged for the LBLOCA, while it increased by 120 °F for the limiting SBLOCA with a 4-inch diameter pipe break. The resulting PCTs were estimated to be significantly lower than the 10 CFR 50.46 PCT limit of 2200 °F. Therefore, the NRC staff agreed with the licensee that the AOR for the LOCA with the PCT penalties to account for a reduction of 30 gpm in SI flow remained valid.

By letter dated April 12, 2006, TVA submitted the annual report for 2005. The 2005 annual report indicated that eight changes were made to the "best estimate large break code." The changes were:

- (1) revised iteration algorithm for calculating the average fuel temperature;
- (2) pellet radial profile option;
- (3) improved automation of end of blowdown time;
- (4) general code maintenance;
- (5) thermodynamic properties from THERMO;
- (6) pressurizer fluid volume;

- (7) vessel unheated conductor nodding; and
- (8) containment relative humidity assumption.

The licensee assessed the impact of the model changes on the PCTs for the LBLOCA analysis and showed that the impact was very small, and the resulting LBLOCA PCT remained essentially unchanged. The NRC staff did not review the acceptability of the model changes and the impact analysis; however, the staff noted that the limiting PCT for the LBLOCA (1790 °F) was significantly lower than the 10 CFR 50.46 PCT limit of 2200 °F. Therefore, the NRC staff agreed with the licensee that the AOR for the LBLOCA, with consideration of the effects of the model changes, remained valid.

The following additional comments and observations are provided so that TVA can assess whether its procedures need to be updated:

- The NRC staff reviewed the LOCA PCT summary tables for best estimate large break and found that the LBLOCA analysis had not been reanalyzed for both cases with the original steam generators and replacement steam generators since 1998. Many model changes or error corrections were made since then.
- The NRC staff also found that the sums of the absolute magnitudes of the PCT changes were greater than 50°F for six LOCA cases presented in the annual report. As previously noted, 10 CFR 50.46(a)(3)(ii) requires this to be reported within 30 days.
- When the leakage in the piping relief valves is corrected and the licensee reassesses the effects on PCT for SBLOCAs, if the change in PCT is greater than 50°F, current regulations require that the licensee report the change even though it is an improvement in the margin.

This completes the NRC staff's actions for TAC No. MD1235. If there are any questions, please contact me at (301) 415-3974.

Sincerely,

/RA/

Brendan T. Moroney, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-390

cc: See next page

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