November 23, 2005

Mr. James A. Gresham, Manager
Regulatory Compliance and Plant Licensing
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

SUBJECT: CLARIFICATION OF NRC LETTER DATED AUGUST 1, 2005, SUSPENSION OF NRC APPROVAL FOR USE OF WESTINGHOUSE TOPICAL REPORT CENPD-254-P, "POST-LOCA LONG-TERM COOLING MODEL," DUE TO DISCOVERY OF NON-CONSERVATIVE MODELING ASSUMPTIONS DURING CALCULATIONS AUDIT (TAC NO. MB1365)

Dear Mr. Gresham:

The purpose of this letter is to clarify our letter dated August 1, 2005 (Agencywide Documents Access Management System Accession No. ML051920310), that discussed Nuclear Regulatory Commission (NRC) staff concerns associated with Westinghouse's analyses that calculate boric acid behavior following a loss-of-coolant accident (LOCA). Specifically, it was stated that the NRC staff no longer approves the use of Westinghouse Topical Report (TR) CENPD-254-P, “Post-LOCA Long-Term Cooling Model," for post-LOCA long-term cooling (LTC) performance assessments. The contents of this letter were discussed with you in a teleconference with Mr. Girija Shukla on November 21, 2005. While the NRC staff no longer approves all aspects of the TR, the NRC staff does consider the overall framework and general approach to be valid.

The errors and concerns that the staff identified with the use of TR CENPD-254-P were partially addressed in a Waterford Steam Electric Station (Waterford) submittal with a plant-specific analysis and sensitivity study. The study demonstrated that there is sufficient margin to accommodate the errors and still maintain the timing calculated for the switchover to simultaneous injection to control boric acid precipitation.

The sufficient margin is due to the following:

1) The solubility limit is increased significantly due to the additives in the containment sump water during recirculation.

2) A larger mixing volume can be justified and can consist of a portion of the lower plenum, the core, and upper plenum, which is larger than the previously assumed core volume for determining the boric acid concentration.

3) The solubility limit is based on a containment pressure of 14.7 psia at the time of switchover to simultaneous injection. Containment pressures can be in the range of 20 to 25 psia, which will further increase the solubility limit.

Based on the review of the Waterford LTC analysis, all other CE-designed plants, that might have referenced CENPD-254-P, are expected to have similar sufficient margins. On this basis, the NRC staff believes that there is sufficient safety margin for CE-designed plants to continue operation. However, the following specific concerns with this TR, along with the remaining issues described in the August 1, 2005, letter, will need to be addressed in a supplement to TR CENPD-254-P.

(1) The mixing volume must be justified and the void fraction must be taken into account when computing the boric acid concentration.

(2) The mixing volume is a variable quantity that increases with time. The analysis to determine boric acid concentration needs to account for the variation in the mixing region while considering the pressure drop in the loop. The resultant limiting boric acid concentration must be shown to remain below the precipitation limit.

An example of an approach that a licensee could take to determine the limiting boric acid concentration is to conduct an analysis that reflects the variable size of the mixing region just prior to the switchover to simultaneous injection. Under these conditions, the fluid static balance between the downcomer and inner vessel region (i.e., lower plenum, core, and upper plenum regions of the vessel) could then be performed, taking into account the loop pressure drop at a given steaming rate to compute the mixing volume in the core and eventually the upper plenum regions. The boric acid concentration in the resulting mixing volume just prior to expansion into the upper plenum could then be determined.

(3) The solubility limit must be justified, especially if containment pressures greater than 14.7 psia are assumed or additives are contained in the sump water.

(4) If using a Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR), Appendix K model, the decay heat multiplier must be 1.2 for all times. Paragraph 50.46(b)(5) of 10 CFR states that ". . .decay heat shall be removed for an extended period of time required by the long-lived radioactivity remaining in the core." Section I.A.4. of Appendix K, entitled "Fission Product Decay," states, in part, "The heat generation rates from radioactive decay of fission products shall be assumed to be equal to 1.2 times the values for infinite operating time. . . ." If using a non-Appendix K model, a realistic decay heat multiplier may be used with sufficient justification.

Until a supplement to TR CENPD-254-P is issued addressing the NRC staff concerns, the above four items will need to be addressed by licensees on a plant-specific basis in any future submittals regarding post-LOCA LTC.

If you have any questions, please contact Girija Shukla at 301-415-8439.

Sincerely,

/RA/
Daniel S. Collins, Acting Chief
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 700

cc:
Mr. Gordon Bischoff, Manager
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