May 17, 2010

MEMORANDUM TO: Michael L. Scott, Chief
Safety Issues Resolution Branch
Division of Safety Systems

FROM: Ervin L. Geiger ***/RA/***
Safety Issues Resolution Branch
Division of Safety Systems
Office of Nuclear Reactor Regulation

SUBJECT: STAFF REVIEW OF WCAP-16571-P REFERENCED IN VIRGIL C. SUMMER'S GL 2004-02 SUPPLEMENTAL RESPONSE FOR DOWNSTREAM EFFECTS EVALUATIONS OF COMPONENTS.

The South Carolina Electric & Gas (SCE&G) Generic Letter 2004-02 supplemental response for Virgil C. Summer Nuclear Station, dated February 29, 2008 (ML080640545), stated that the downstream effects evaluations for components and systems were performed in accordance with the Nuclear Regulatory Commission staff-approved Topical Report (TR) WCAP-16406-P, Revision 1, except that the erosive wear analysis for the emergency core cooling system safety-injection-line throttle valves used coating erosion data extracted from WCAP-16571-P, "Test of Pump and Valve Surfaces to Assess the Wear from Paint Chip Debris Laden Water." To facilitate the staff's review of SCE&G's supplemental response, the staff requested that WCAP-16571-P be made available for staff review.

The wear-rate data in WCAP-16406-P used to evaluate erosion of wetted emergency core cooling system component surfaces are based on wear testing using a specific mixture of sand, concrete, glass fiber and protective coatings debris. Since the V. C. Summer debris mix is comprised mainly of coatings debris and contains only small quantities of the more erosive debris used in the WCAP-16406-P debris mix, it was advantageous for SCE&G to adjust the WCAP-16406-P erosive wear rate model using WCAP-16571-P erosive wear rates developed for coating debris.

WCAP-16571-P developed wear rates for aluminum and 300-series stainless steel using water slurries containing a mixture of inorganic zinc, epoxy and alkyd chips and particulate circulated in a loop for 24 hours. The aluminum was used to provide a reference point for observed erosion. Using a comparison from the test data to that presented in WCAP-16406-P, a wear model was developed for the erosive effects of paint coatings (minus glass, concrete, etc.). The resultant paint coatings wear model was then used in the V. C. Summer downstream effects evaluation for the emergency core cooling system (ECCS) valves.

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The NRC staff reviewed the method used in WCAP-16571-P to develop the erosive wear rate of metal parts due, exclusively, to coatings debris and found the method to be acceptable because it followed the same method that was used in the staff-approved TR WCAP-16406-P, revision 1, to develop the wear rate model for the more erosive debris mix. The one exception is that the WCAP-16571-P test duration was 24 hours, versus the WCAP-16406-P test duration of 6 hours. The longer test period is acceptable because it results in more measurable wear and a more accurate wear rate measurement.

The method in which the WCAP-16751-P and WCAP-16406-P erosion rates were applied to calculate the total valve wear is described in SCE&G's RAI response number 22, in SCE&G's letter to the NRC dated February 28, 2008 and, therefore, is reviewed as part of SCE&G's GL-2004-02 response.

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