September 20, 2005

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 - RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS" (TAC NO. MB9630)

Dear Mr. Singer:

This letter documents Nuclear Regulatory Commission (NRC) staff's acceptance of Tennessee Valley Authority's (TVA's) response dated August 8, 2003, as supplemented by letters dated April 6 and November 19, 2004, and August 5, 2005, to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated June 9, 2003. The NRC issued Bulletin 2003-01 to all pressurized-water reactor licensees requesting that they provide a response, within 60 days of the date of Bulletin 2003-01, that contains either the information requested in the following Option 1 or Option 2 as stated in Bulletin 2003-01:

Option 1: State that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the Discussion section, and are in compliance with all existing applicable regulatory requirements.

Option 2: Describe any interim compensatory measures that have been implemented or that will be implemented to reduce the risk which may be associated with potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance is complete. If any of the interim compensatory measures listed in the Discussion section will not be implemented, provide a justification. Additionally, for any planned interim measures that will not be in place prior to your response to this bulletin, submit an implementation schedule and provide the basis for concluding that their implementation is not practical until a later date.

You provided an Option 2 response.

Bulletin 2003-01 discussed six categories of interim compensatory measures (ICMs):

(1) operator training on indications of and responses to sump clogging; (2) procedural modifications, if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool

the containment and reactor core, and operating the CSS intermittently); (3) ensuring that alternative water sources are available to refill the refueling water storage tank or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere;

(4) more aggressive containment cleaning and increased foreign material controls; (5) ensuring containment drainage paths are unblocked; (6) ensuring sump screens are free of adverse gaps and breaches.

You stated in your bulletin response of August 8, 2003, that you had already implemented the following ICMs:

(1) the presence by design of fibrous material only in locations where it would not be damaged by high energy pipe breaks and be a potential source of debris that could reach the sump screens;

(2) the postconstruction use of Min K (encapsulated hydrophobic) and 3M M20 mat in low concentrations at points in the plant so that the quantities of these materials expected to be released during any one high energy pipe break would not present a challenge the relatively large surface area of the containment sump screens;

(3) two designed entry points to the inner sump area that would cause any debris from a break near one sump screen to travel around to the other side of containment to collect on the opposite sump screen; various sump pit and mesh size to injection path restriction size relationships which make damage to ECCS and CSS pumps, or clogging of the containment spray nozzles, of no concern;

(4) revision of the applicable emergency operating procedure to provide guidance on sump blockage - ICM Category #1;

(5) licensed operator training (including a simulator scenario) on a new sump blockage shift order by October 2003 - ICM Category #1;

(6) a revision to the transfer to sump recirculation procedure in order to enhance monitoring of the sump for indications of sump blockage, and compensatory actions if sump blockage occurs after a loss-of-coolant accident (LOCA) - ICM Category #1;

(7) a new postaccident technical considerations instruction to guide Technical Support Center (TSC) personnel concerning sump blockage - ICM Category #1;

(8) refueling water storage tank (RWST) refill once safety injection recirculation capability has been lost, or, if necessary, direct reactor coolant system (RCS) makeup via normal charging from the volume control tank - ICM Category #3;

(9) a technical instruction that provides guidelines and criteria for entering and exiting containment, including acceptance criteria for housekeeping/cleanliness to ensure that no loose debris is left in containment, and for storage of materials inside containment during Mode 4 and higher operations - ICM Category #4;

(10) a protective coatings procedure that provides the programmatic requirements for planned preventive maintenance and the performance of coatings inspections, repairs, and stabilizations during each outage, with emphasis on the sump "Zone of Influence" in lower containment Quadrants 3 and 4 inside the crane wall - ICM Category #4;

(11) the use of an ice condenser loose debris log to ensure that debris found in the ice condenser system cannot adversely impact sump operation - ICM Category #4;

(12) a containment refueling canal drain procedure that ensures that these drains are not blocked, and an ice condenser flow drain visual inspection procedure to ensure that the drains are not blocked and their associated valve seats are free of any corrosion, pitting or cracking - ICM Category #5;

(13) a revision to the accumulator room floor drain procedure to verify that they are clear and free flowing every outage instead of every other outage - ICM Category #5;

(14) a containment pump suction pit inspection procedure conducted each outage that checks for foreign material in the sump and examines sump components for degradations such as corrosion or other physical damage - ICM Category #6.

You further stated in your response, including justifications, that you would not be implementing the following ICM: (1) procedural modifications, if appropriate, that would delay the switchover to containment pump recirculation - ICM Category #2.

In a November 19, 2004, response to a September 21, 2004, NRC request for additional information (RAI) you:

(1) elaborated on your transfer to containment sump recirculation and monitoring for containment sump blockage procedures, which include licensed operator actions to be taken should sump blockage occur - ICM Category #1;

(2) elaborated on the guidance given to your TSC personnel should indications of sump blockage occur - ICM Category #1;

(3) elaborated on the results of your licensing evaluation to consider preemptive actions that would delay or reduce ECCS and CSS flow during a LOCA, concluding that TVA design decisions to use only stainless steel reflective insulation on the RCS and limit the use of fibrous material in the containment, are equivalent to interim measures to delay transfer to sump recirculation (which would have a limited effect on sump blockage and could challenge the containment design or core cooling).

In your RAI response you also elaborated on your evaluation of the Westinghouse Owners Group (WOG) Candidate Operator Actions (COAs) of WCAP-16204, Revision 1, "Evaluation of Potential ERG [Emergency Response Guideline] and EPG [Emergency Procedure Guideline] Changes to Address NRC Bulletin 2003-01 Recommendations (PA-SEE-0085)" dated March 2004.

You stated that you had considered the 11 COAs, noting that they were developed for a large dry containment reference plant rather than Watts Bar's ice condenser design, and concluded that:

(1) COA A1a “Operator Action to Secure One Spray Pump”: the COA is applicable only for small break LOCAs, which at Watts Bar would generate especially small amounts of debris considering the extensive use of reflective insulation materials; therefore the COA would not be implemented;

(2) COA A1b “Operator Action to Secure Both Spray Pumps”: the COA would not be appropriate without an alternate safety grade containment heat removal system, which is absent in Watts Bar’s ice condenser design;

(3) COA A2 “Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Initiation”: the COA, intended to prevent both ECCS trains from failing simultaneously due to sump clogging, is not beneficial due to ice condenser plant specific timing considerations related to the lack of fan coolers and the needed spray cooling function;

(4) COA A3 “Terminate One Train of Safety Injection after Recirculation Alignment”: the COA, intended to reduce the flow rate across the sump screens after recirculation alignment, would be of limited value since containment spray flow rate is higher than ECCS flowrate, and would be problematic in terms of timing and operational safety;

(5) COA A4 “Early Termination of One LPSI/RHR [Low-Pressure Safety Injection/Residual Heat Removal] Pump Prior to Recirculation Alignment”: the COA, intended to extend injection time and reduce sump flow rate, is less beneficial at Watts Bar than for a typical dry containment plant due to the high spray flow rate at Watts Bar;

(6) COA A5 “Refill of Refueling Water Storage Tank”: this COA has been implemented at Watts Bar - ICM Category #3;

(7) COA A6 “Inject More Than One RWST Volume”: the COA is not useful at Watts Bar because, after injection of one RWST volume, the water level inside containment is up to the mid-plane of the RCS piping;

(8) COA A7 “Provide More Aggressive Cooldown and Depressurization Following a Small Break LOCA”: The COA addressed the existing post-LOCA Cooldown and Depressurization procedure - ICM Category #2;

(9) COA A8 “Provide Guidance on Systems and Identification of Containment Sump Blockage”: the COA is addressed in Appendix D to EOP ES-1.3 (as discussed above) - ICM Category #1;

(10) COA A9 “Develop Contingency Actions in Response to: Containment Sump Blockage, Loss of Suction, and Cavitation”: this COA addresses various actions which have been identified in the WOG “Sump Blockage Control Room Guideline,” which is optimized for sump clogging and provides earlier actions in response to sump clogging, and which TVA intends to incorporate into the Watts Bar emergency procedures in 2005 under TVA’s corrective action program - ICM Category #1;

(11) COA A10 is applicable only to Combustion Engineering designed plants;

(12) COA A11 “Prevent or Delay Containment Sump Spray for Small Break LOCAs (<1.0 Inch Diameter) in Ice Condenser Plants”: the COA was essentially explored in a 1990 Sequoyah Nuclear Plant analysis to determine the time to containment spray actuation, resulting in a conclusion that, considering the reflective metallic RCS insulation in place at Watts Bar, the plant modifications and extensive analyses required to change the spray setpoint to prevent or significantly delay spray actuation is not warranted given the limited benefit.

The NRC staff has considered your Option 2 response for compensatory measures that were, or were to have been, implemented to reduce the interim risk associated with potentially degraded or nonconforming ECCS and CSS recirculation functions. Based on your response, the NRC staff considers your actions to be responsive to, and meet the intent of, Bulletin 2003-01.

Should you have any questions, please contact me at 301-415-1364 or the lead PM for this issue, Alan Wang at 301-415-1445.

Sincerely,

***/RA/***

Douglas V. Pickett, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-390

cc: See next page

(12) COA A11 “Prevent or Delay Containment Sump Spray for Small Break LOCAs (<1.0 Inch Diameter) in Ice Condenser Plants”: the COA was essentially explored in a 1990 Sequoyah Nuclear Plant analysis to determine the time to containment spray actuation, resulting in a conclusion that, considering the reflective metallic RCS insulation in place at Watts Bar, the plant modifications and extensive analyses required to change the spray setpoint to prevent or significantly delay spray actuation is not warranted given the limited benefit.

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