



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

NOV 30 1994

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of the Application of)
Tennessee Valley Authority)

Docket Nos. 50-390
50-391

WATTS BAR NUCLEAR PLANT (WBN) - ADDITIONAL INFORMATION TO NOTICE OF
DEVIATION 50-390, 391/94-30-01

The purpose of this letter is to provide additional information relating to the calcium ion test results discussed as part of TVA's response to Notice of Deviation 50-390, 391/94-30-01 dated June 9, 1994. TVA's response to the NRC question regarding the increase in calcium ion from 19.8 percent to 34.8 percent stated that mortar maintained in water is subject to a calcification process which would result in an increase in calcium ion of this magnitude. Recent testing by TVA has resulted in additional information relating to expected calcium ion percentages. The enclosure discusses the latest test results.

If you should have any questions, contact P. L. Pace at (615)-365-1824.

Sincerely,

Dwight E. Nunn
Vice President
New Plant Completion
Watts Bar Nuclear Plant

Enclosure
cc: See page 2

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Enclosure

cc (Enclosure):

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ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
ADDITIONAL INFORMATION TO TVA'S RESPONSE DATED JUNE 9, 1994,
NRC DEVIATION 50-390, 391/94-30-01

In 1990, calcium ion tests were conducted on a sample of cement mortar lined Essential Raw Cooling Water (ERCW) System pipe. These tests resulted in an indicated calcium ion increase from 19.8 percent to 34.8 percent. In the response to Notice of Deviation 50-390, 391/94-30-01, TVA stated that an increase in calcium ion of this magnitude is typical of mortar maintained in water. However, as a result of recent 1994 tests, the 1990 test results may have been influenced by another phenomenon. The following provides additional information relating to the moving and testing of these samples.

In 1994, the mortar lined piping sample sections were moved from the yard pond to the Unit 1 Cooling Tower basin discharge channel. This move was made to place the samples in water more representative of the actual conditions in the ERCW mortar lined piping. The primary source of water for the cooling towers is the ERCW System and other raw cooling water systems which receive the same chemical treatment as the Intake Pumping Station. In this new location, the sample sections will be exposed to circulating water which should reduce the accumulation of algae and sediment which was a problem in other locations due to the relatively stagnant conditions.

A visual examination of the mortar line samples identified no new cracks; the only cracks evident were those induced by TVA before the samples were initially placed in the Tennessee River. No spalling or other degradation was evident from visual examination. Since cleaning was performed with a high pressure sprayer to remove the accumulation of sediment and algae, and the samples were kept wet, no evidence of calcium leachates was observed.

During the performance of the 1994 annual preventive maintenance inspection, a sample of mortar lining was removed to enable performance of the calcium ion determination. The results received from the TVA Central Laboratories indicated the calcium (Ca) content to be 16.22 percent and the calcium carbonate (CaO) content to be 22 percent. This was a decrease from the results of the 1990 performance which indicate the Ca content was 34.8 percent. TVA's justification for the high Ca content was based on literature such as Properties of Concrete by A. M. Neville and Composition and Properties of Concrete by Troxell, Davis, and Kelly. These texts indicated that mortar maintained in water is subject to a calcification process which typically results in an increase in calcium ion of this magnitude, these texts provided the best explanation for the possible anomaly. Until the latest test was performed there was insufficient data from previous testing to question this justification. Another recently noted phenomena is that calcium leachates or lime compounds may lead to the formation of salt deposits on the surface of the concrete, known as efflorescence. Re-examination of photographs taken in 1990 confirm clusters of white deposits which could have contaminated the sample.

To verify the 1994 Central Laboratories test results, a sample was sent to Singleton Laboratories for an independent analysis. The Singleton results indicate the Ca ion content to be 17.6 percent and the equivalent CaO to be 24.6 percent. The Singleton test was completed using the Atomic Absorption

method while the Central Laboratories test was completed by the Inductively Coupled Plasma method with confirmation by Energy Dispersive X-ray Analysis. Since Atomic Absorption is the method identified in our commitment, the Singleton results provide the results of record. Considering that both methods indicate a decrease in calcium ion from the 1990 test, it is reasonable to conclude that the 1990 test sample may have contained significant calcium carbonate which influenced the results of the testing.

In order to minimize the possibility of contaminating future samples by efflorescence, TVA has revised the PM procedure to require that the area from which the sample is to be taken be scrubbed with a brush and water. In addition, any deviation of 5 percent in calcium ion content, either increase or decrease from previous test results, shall be evaluated and resolved before issuing the PM report.

The conclusion reached by visual examination and evaluation of the test results from the calcium ion testing is that the mortar lining in the ERCW piping is stable. The depletion of calcium ion of approximately 12.5 percent is within the allowable tolerances.