

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

5N 157B Lookout Place

APR 16 1987

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) - CONCRETE QUALITY EVALUATION

This letter is to provide for NRC review the results and description of in-place testing of the Category I structural concrete at WBN.

On November 13, 1986, TVA submitted a report on the evaluation of concrete quality at WBN. This evaluation was the result of an investigation of an employee concern (IN-85-995-002). Upon review of that document, the NRC requested, in a letter dated February 2, 1987, that TVA propose a test program that would establish the in-place strength of the concrete identified as noncomplying "low strength" concrete.

The program proposed to NRC to verify the adequacy of the in-place concrete consisted of: (1) providing comparison of the concrete pours which were placed during time periods when the TVA specifications were not met to pours that were placed in time periods known to have strength within specifications and (2) coring of selected pours.

The comparison of the concrete strength time periods was based on the results of nondestructive tests on the concrete. The tests were performed in accordance with ASTM C 803 for Penetration Resistance of Hardened Concrete (commonly called the Windsor probe test).

The strengths were evaluated by comparing the Windsor probe results for "control" pours with "low strength" pours. The results were compared using statistical methods to determine the significance of the differences in the probe extension between the "control" pours and pours made during time periods with an excessive number of low strength tests.

The probe results indicated that some strength differences exist between the "control" and "low strength" mixes for the 3,000 psi concrete. (See enclosure "Watts Bar Nuclear Plant - Concrete Quality Evaluation - Testing of Inplace Concrete, CEB-87-03-C.") The accuracy of the test and the number of probes

8704210187 870416
PDR ADDCK 05000390
A PDR

15001
11

APR 16 1987

U.S. Regulatory Commission

were not adequate to quantify the strength differences for the lower strength mixes. The probe data on the higher strength mixes indicated that the probe may not be able to distinguish strength differences for these mixes.

The Windsor probe results and evaluation indicated a need to further quantify the strength of the "low strength" pours. Therefore, drilled cores were taken for further confirmation of the adequacy of in-place concrete strength.

The cores were taken from pours made during "low strength" periods. The selected pour for each of the "low strength" mixes was a pour which had a low probe extension (high penetration) and was also represented by a relatively low 28- and/or 90-day cylinder test. In addition to the "low strength" pours, one pour using a high bedding mortar content was also cored. Please note, Construction Specification G-34, "Repair of Concrete," was referenced in enclosure 1 in regard to repairing the core holes. Copies of that document were provided to the NRC staff during the WBN site meeting on March 7, 1987.

The coring of pours with low probe extensions or low cylinder strengths provided a mechanism to determine a lower bound to the strengths of all pours made during the low strength periods. The acceptability of all concrete made during these periods was demonstrated by the combination of acceptable core strength and the results of the probe testing (see enclosure). Conference calls were held between NRC and TVA personnel on at least three occasions and NRC personnel visited the site on two occasions to witness tests or discuss test results.

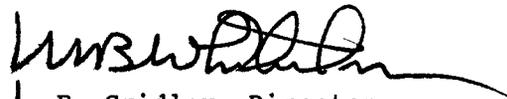
The probe testing and the subsequent core test results show that the concrete strengths at WBN exceed the ACI 318 requirements for specified strength. These results also demonstrate that the in-place strengths exceeded the estimated in-place strength reported in TVA's November 13, 1986 submittal and which are used in TVA design criteria.

Therefore, the in-place testing of the concrete has verified the conclusions contained in TVA's November 13, 1986 submittal that the in-place concrete strengths at WBN adequately meet structural requirements.

If there are any questions, please get in touch with D.A. Kulisek at (615) 365-8761.

Very truly yours,

TENNESSEE VALLEY AUTHORITY


R. Gridley, Director
Nuclear Safety and Licensing

Enclosure
cc: Page 3

U.S. Nuclear Regulatory Commission

APR 16 1987

cc (Enclosure):

Mr. G. G. Zech, Assistant Director
Regional Inspections
Division of TVA Projects
Office of Special Projects
U.S. Nuclear Regulatory Commission
TVA Projects
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Watts Bar Resident Inspector
Watts Bar Nuclear Plant
P.O. Box 700
Spring City, Tennessee 37381

ENCLOSURE 1