TENNESSEE VALLEY AUTHORITY
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FEB 13 1987

WBRD-50-390/86-62
WBRD-50-391/86-57

10 CFR 50.55(e)

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Attention: Dr. J. Nelson Grace

WATTS BAR NUCLEAR (WBN) PLANT UNITS 1 AND 2 - DEFICIENT CONCRETE PULLOUT CAPACITY FOR EMBEDDED PLATES - WBRD-50-390/86-62, WBRD-50-391/86-57 - INTERIM REPORT

The subject deficiency was initially reported to NRC-Region II Inspector Morris Branch on August 18, 1986, in accordance with 10 CFR 50.55(e) as SCR WBN CEB 8669. Our interim report was submitted on September 17, 1986. Enclosed is our final report.

If there are any questions, please get in touch with R. D. Schulz at (615) 365-8527.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. A. Domer

R. Gridley, Director
Nuclear Safety and Licensing

Enclosure



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FEB 13 1987

U.S. Nuclear Regulatory Commission

cc (Enclosure):
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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
DEFICIENT CONCRETE PULLOUT CAPACITY
FOR EMBEDDED PLATES
WBRD-50-390/86-62 AND WBRD-50-391/86-57
SCR WBN CEB 8669
10 CFR 50.55(e)
FINAL REPORT

## Description of Deficiency

During the review of embedded plate design calculations for the WBN concrete quality evaluation, one embedded plate was identified for which the original calculation package did not include evaluation of the concrete pullout capacity. The calculation was performed by Teledyne-Brown for the Reactor Coolant System pressurizer surge line pipe rupture restraint on the reactor cavity wall. Subsequently, preliminary calculations were performed which revealed that the embedment did not have an adequate capacity for the originally specified concrete strength. Therefore, if the reactor coolant system pipe restraint receives all of its design load, a concrete failure may occur since the embedded plate has a factor of safety of less than one against the ultimate concrete tensile (pullout) capacity.

The cause of this deficiency was the failure by Teledyne-Brown to follow the design requirements to evaluate concrete pullout capacity as set forth in the Civil Design standard in affect at the time (DS-C6).

## Safety Implications

Pipe rupture restraints for the pressurizer surge line are part of the engineered safety features of the plant. They are required as protective devices to prevent unacceptable damage to piping, equipment, and structures due to the dynamic effects of pipe rupture, jet impingement, and pipe whip. If the embedded plate assembly, with a factor of safety less than one, received all of its design load, a subsequent loss of the pressurizer surge line pipe rupture restraint on a safety-related high energy line could occur. Consequently, this condition could have adversely affected the safe operation of the plant had it remained uncorrected.

## Corrective Action

TVA has completed the evaluation of the embedded plate (MK 59) identified by this CAQ. The final calculations confirmed that this embedded plate has inadequate concrete pullout capacity. Since the review of the pipe rupture analysis did not result in either load reduction or elimination of the pipe rupture restraint, redesign, and field modification of the embedded plate (MK 59) is required.

TVA is conducting a complete evaluation of the concrete pullout capacity for all embedded plates that provide support for pipe rupture restraints designed by Teledyne-Brown. Each Teledyne-Brown restraint design package is being augmented with a concrete pullout evaluation. In some situations where embedments with inadequate concrete pullout capacity are identified, a pipe rupture analysis may provide evidence that loads should be reduced on the pipe rupture restraint such that the embedment is acceptable as-is. In other situations, depending on loading conditions, the embedment/restraint will be redesigned to redistribute the present loads. Revised embedment drawings will be issued, as required, under engineering change notices (ECNs) 6681 for unit 1 and 6769 for unit 2. TVA will be complete with all actions by fuel load for the respective units.

As an enhancement to our program for management of contracted engineering services, TVA's current Nuclear Engineering Procedures (NEP-4.1, Section 4.12) place the responsibility for ensuring that the technical aspects of an architect-engineer contract are met with the responsible branch chief/project engineer who procured the architect-engineer services. This procedural requirement should prevent recurrence of this deficiency.

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