ENCLOSURE

BELLEFONTE NUCLEAR PLANT UNITS 1 & 2
PIPES EMBEDDED IN CONCRETE
NCR CEB-79-3 (10CFR50.55(e))
FINAL REPORT

Description of Condition

TVA failed to comply with some of the requirements of ACI 318-71, Section 6.3, "Conduits and Pipes Embedded in Concrete." Our investigation has identified the following types of code violation.

1. Spacing and Size of Embedded Conduit and Pipe - Violation of ACI 318-71 Section 6.3.1

   Documentary evidence did not exist that civil engineers reviewed the drawings listed below for conformance to these requirements of ACI 318-71.

   A. 5RW0816-RU-15 thru -22
   B. 5RW0818-RU-12 thru -16
   C. 5RW0820-RU-13 and -14

2. Leak Testing Holding Time Less Than Four Hours - Violation of ACI 318-71, Section 6.3.2.4

   The piping embedded in concrete was leak tested in accordance with the recognized piping codes, either ASME Code, NFPA Code, or ANSI Code. These codes require holding times which are less than four hours.

3. Pressurization Above 200 psi - Violation of ACI 318-71, Section 6.3.2.3

   The piping listed below located in the intake pumping station was leak tested prior to being embedded. However, after the concrete hardened, it was repressurized above 200 psi while leak testing another portion of the system.

System	Piping Diameter, Inch	Repressurization Pressure, psi
ERCW	30 and 6	300
RSW	10 and 2	263
Screen Wash	4 and 2	265
Screen Wash	1 and 1-1/2	263
Fire Protection	4	263
Trash Sluice Flush	3	263

4. Test Pressures That Were Less Than 150 psig - Violation of ACI 318-71, Section 6.3.2.4

   Various low pressure piping in the auxiliary and reactor buildings and at the intake pumping station were tested at pressures less than 150 psig, but these tests were in accordance with the applicable piping code. The lowest test pressure used was 20 psig.

5. Use of Screw Connections Embedded in Concrete - Violation of ACI 318-71, Section 6.3.2.11

Embedded screw connections are used in the following systems:

A. Service Air (1/2-inch diameter) in intake pumping station.
B. Hypochlorite (2-inch diameter) in intake pumping station.

6. Operating Pressures Greater Than 200 psi - Violation of ACI 318-71, Section 6.3.2.3

Fuel handling equipment piping (1-inch diameter) in reactor building has a design pressure of 250 psig.

7. Operating Temperatures Greater Than 150°F - Violation of ACI 318-71, Section 6.3.2.2

A. Fuel handling equipment piping (1-inch diameter) in reactor building has maximum temperature of 180°F.

B. Spent fuel cooling piping (12-inch diameter) in auxiliary building has maximum temperature of 210°F.

Safety Implication Statement

The results of the investigations into each violation, as reflected below, indicate that the integrity of the structures and the piping systems were not degraded by these violations. Therefore, had the deficiency gone uncorrected, the safety of operation of the plant would not have been adversely affected.

Corrective Action

A comprehensive review of the embedded conduit and piping shown on the drawings listed in item 1 was performed. This review confirmed that no conduit or pipe size or spacing violation impaired structural integrity.

The piping systems in items 2, 4, and 5 above were designed, fabricated, and tested in accordance with the recognized piping codes either the ASME Code, NFPA Code, or ANSI Code as specified by the design documents. The use of these codes gives assurance of the leak tightness of the embedded pipes, including those that use screw fittings. This assurance of leak tightness provides assurance that the structural integrity of the concrete is maintained. Therefore, TVA intends to use the pipes as constructed.

The piping system in items 3 and 6 which either were, or will be, subjected to pressures greater than 200 psi following the hardening of the concrete were evaluated. It was concluded that the structural capacities would not be impaired by these violations.

The concrete structures in the area of the embedded piping system having an operating temperature greater than 150°F were analyzed, and the structural integrity of the affected structures was not impaired.