TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

Reactor Facilities Branch

March 9, 1976

Mr. John G. Davis, Acting Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

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Dear Mr. Davis:

WATTS BAR NUCLEAR PLANT UNIT 2 - REPORTABLE DEFICIENCY - CONTAINMENT ANCHOR BOLT NUTS - HO 1143 F2 - FINAL REPORT

The subject deficiency was reported to J. G. Bryant, NRC-OIE Senior Inspector, on January 9, 1976, and was followed by our February 9, 1976, interim report, J. E. Gilleland to Donald F. Knuth. Enclosed is the final report concerning this deficiency.

Very truly yours,

for J. E. Gilleland
Assistant Manager of Power

Enclosure
CC: Mr. Norman C. Moseley, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 818
230 Peachtree Street, NW.
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WATTS BAR NUCLEAR PLANT UNIT 2

REPORTABLE DEFICIENCY

CONTAINMENT ANCHOR BOLT NUTS

FINAL REPORT

1. Description of the Deficiency

The reactor containment vessel bottom shell ring is anchored to a concrete foundation mat by 360 3-1/2-inch diameter bolts. These bolts are arranged in two concentric circles inside and outside the bottom shell ring. The bolts are located in pairs at equal distance from the middle surface of the shell ring on radial lines at 2-degree intervals. An embedded anchor plate at the lower end of the bolts is provided to transfer the bolt load to the concrete. The bolts are partially embedded, then pretensioned to 423 kips by elongating the bolts and tightening the top nuts to maintain the elongation. Finally, the anchorage (bolts, nuts, etc.) is embedded in concrete. Details of this embedded anchorage are shown in Figure 1.

During the final inspection, prior to embedment of the unit 2 reactor building structural steel containment vessel anchorage in concrete, a total of twenty top anchor bolt nuts were found with indications which appeared to be surface irregularities.

2. Safety Implication

Should any of the anchor bolt nuts have failed under accident conditions, there would have been a redistribution of the load to the remaining anchor bolts. Had this situation gone uncorrected, the safety of Watts Bar Nuclear Plant would not have been compromised.

3. Corrective Action

Nine of the twenty suspect unit 2 top anchor bolt nuts were determined to have minor surface imperfections. The remaining eleven nuts were removed for detailed examination. Two of the eleven were determined to have only minor surface imperfections and were released for use. The remaining nine nuts which had potentially injurious surface indications were replaced with nuts free of surface indications.

CB&I performed a chemical analysis, a hardness determination, and a metallographic examination on one of the nine nuts. The examination showed that the indications were folded metal with nonmetallic inclusions in the seams and adjoining metals. An additional two nuts, which were considered to have the worst appearing indications, were sectioned and metallographically examined with similar results. Therefore, the surface indications were considered not injurious.

Because of the discoveries on unit 2, the unit 1 top anchor bolt nuts were visually examined. Twenty-one nuts had surface indications, but only eleven nuts had potentially injurious surface indications. These eleven nuts were replaced with nuts free from surface indications.

4. Summary

In summary, the detail examinations have shown that the indications on the twenty nuts (nine from unit 2 and eleven from unit 1) that were removed were not injurious; however, to remove any doubt, these twenty nuts were replaced. In any event, the integrity of the containment vessels would not have been impaired by the anchor bolt nuts.

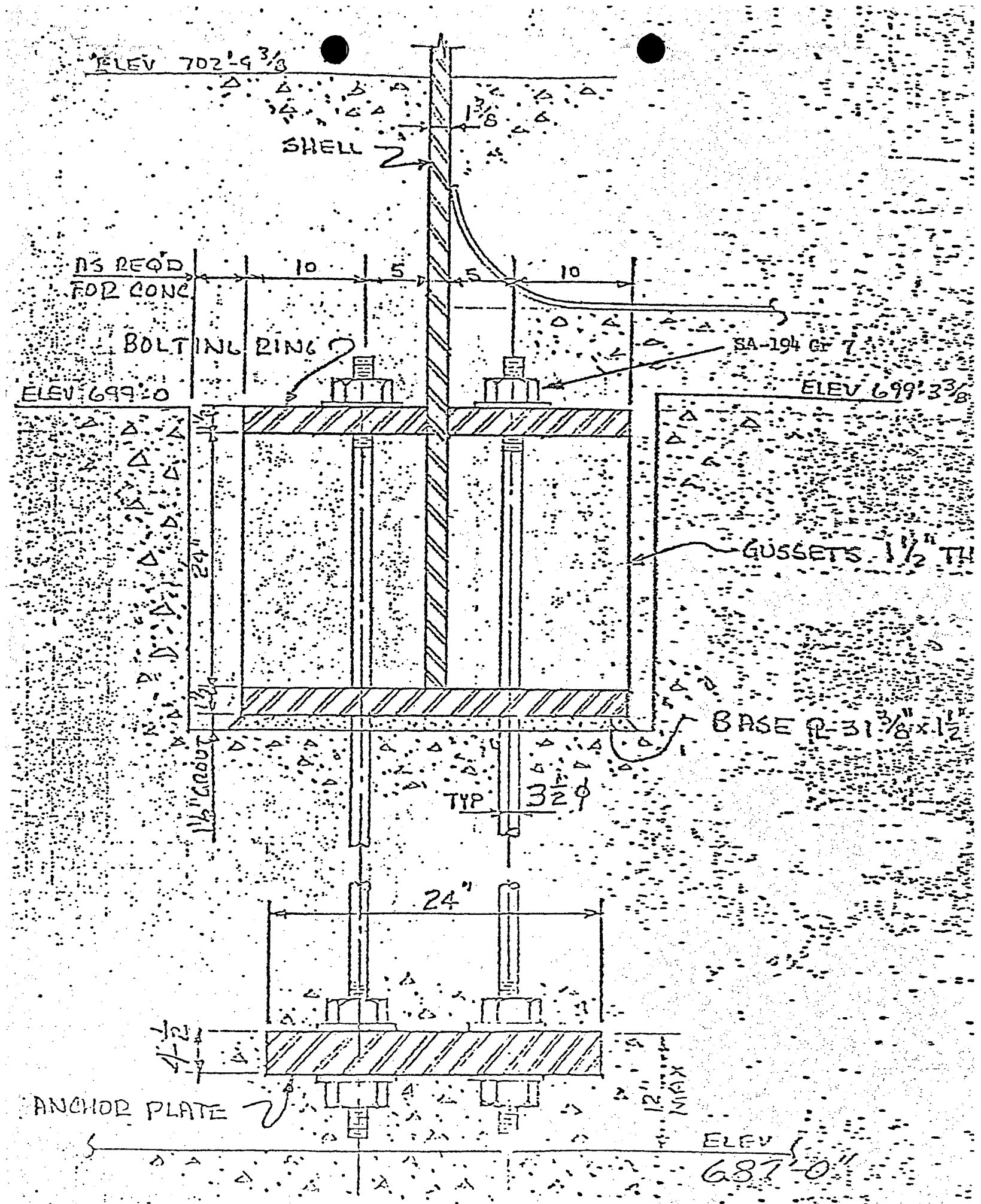

Figure 1. Final Anchorage Design