

TENNESSEE VALLEY AUTHORITY

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JUN 28 1988

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

Gentlemen:

MINIMUM EDGE DISTANCE FOR ANCHOR BOLTS

On May 24, 1988, a meeting was held at NRC's White Flint Building in Rockville, Maryland. The meeting was held with the NRC and invited Architects/Engineers (A/E's) to discuss the March 18, 1988 10 CFR 21 notification from Hilti, Inc., concerning concrete anchorage edge distance. The A/E's gave a brief presentation to provide their perspective of the issue. At the conclusion of the meeting, Goutam Bagchi (NRC) requested that all organizations participating in this meeting provide a copy of their presentations to assist the NRC in preparing meeting minutes and determining what additional actions will be taken. Enclosed is a summary of TVA's presentation from the May 24, 1988 meeting.

If you have any questions, please call D. L. Williams at (615) 632-7170.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

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Enclosure

cc (Enclosure)

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ENCLOSURE

NRC Information Notice No. 88-25

Outline of TVA Presentation to NRC on May 24, 1988

1. What was the "edge distance" as defined in the job specification in nuclear power facilities that you have designed and/or constructed?

RESPONSE:

Since 1975 TVA has specified a minimum edge distance for expansion anchors of 10 bolt diameters (10D) for anchors loaded in shear toward the edge. However, TVA criteria allows for use of a smaller edge distance for anchor location when the design is supported by a detailed analysis of the concrete (including effect on tension and shear capacity).

2. Identify the type of anchors to which the "five diameter" or other edge distance criteria applies (expansion anchors, cast-in-place anchors or all).

RESPONSE:

Edge distance requirements are provided in TVA design standards and specifications for self-drilling anchors, wedge bol' anchors, grouted anchors, cast-in-place anchors, and welded stud anchors.

3. Discuss briefly the type of anchorage used for different types of safety-related equipment in nuclear power plants.

RESPONSE:

The primary expansion anchorage type for Sequoyah, Browns Ferry, and Watts Bar is self-drilling anchors. Wedge bolts and undercut anchors have been used since 1977 and 1982, respectively. Cast-in-place anchors and embedded plates with welded stud anchors are also used.

4. Describe the anchorage design methods used for nuclear power facilities.

RESPONSE:

Anchorage design methods are provided in a TVA design standard. This standard gives allowable expansion anchor loads and allowable stresses for cast-in-place anchors and welded studs. The standard also delineates requirements for determining required embedment, spacing, and edge distance to assure adequate concrete capacity.

5. Describe any anchor tests conducted by your organization and indicate whether any reinforcement, either parallel or normal to the free edge, was present in the test samples.

RESPONSE:

Limited testing for anchors adjacent to concrete edges has been performed by or for TVA. This testing primarily evaluated methods for reinforcing cast-in-place anchors near an edge.

6. Based on your experience, estimate the percentage of anchors installed in nuclear power facilities designed and/or constructed by your company that could be affected by the "edge distance" issue.

RESPONSE:

The percentage of supports with expansion anchors installed in the vicinity of a free edge is estimated to be less than 10 percent. Approximately one-half of these supports would be loaded in shear towards the edge.

Based on previous sampling of supports, we estimate that if a five bolt diameter (5D) criteria were used, the percentage of supports which could potentially have reduced factors of safety for the support anchor due to edge conditions to be less than two percent. However, since TVA has used a 10D criteria since 1975, the percentage would be much smaller.

7. Present your perspective of the "edge distance" issue.

RESPONSE:

Because TVA has applied a rational method to the design of anchor since 1975, the potential edge distance problem indicated by the Hilti tests does not indicate a corresponding problem with TVA anchorage installations. However, in response to NRC Information Notice 88-25 concerning the Hilti 10CFR21 notification, TVA is evaluating the potential effect on pre-1975 anchorage designs. No significant effect on these designs is anticipated.