TOLEDO EDISON

JOE WILLIAMS, JR.
Senior Vice President—Nuclear
(419) 249-2300
(419) 249-5223

Docket No. 50-346

License No. NPF-3

Serial No. 1-644

June 18, 1986

Mr. C. J. Paperiello, Director
Division of Reactor Safety
United States Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Paperiello:

Toledo Edison acknowledges receipt of your April 30, 1986 letter (Log No. 1-1377), Notice of Violation, and Inspection Report No. 50-346/86004. As committed to in our previous submittal (Serial 1-639), we are providing a response to address your concern related to abandoned drilled anchor bolt holes behind pipe support base plates. Attached are the results of Toledo Edison's evaluation of this concern.

Very truly yours,

JW:TJB:plf

Attachment

cc: DB-1 NRC Resident Inspector

JUN 23 1986

1/1 IE01

Docket No. 50-346
License No. NPF-3
Serial No. 1-644
June 18, 1986
Attachment

ABANDONED UNFILLED ANCHOR BOLT HOLES BEHIND BASEPLATES

During the recent inspection conducted by the NRC, several abandoned ungrouted anchor bolt holes were identified upon the removal of baseplates for the repair of hangers 30-GCC-8-H6 and H10. The NRC inspector identified a generic concern regarding the existence of other such conditions and their potential effect on plant safety. In response to this concern, Toledo Edison has conducted an evaluation to determine the effect of abandoned ungrouted anchor bolt holes behind base plates relative to the pullout capacity of expansion anchors. This evaluation was conducted utilizing the Davis-Besse project design criteria for anchor bolts and a paper entitled, "Effect of Abandoned Holes on Capacity of Wedge Bolts", which was published as part of the journal of the American Society of Civil Engineers, ASCE, Vol. 108, No. ST4, April 1982.

As described in more detail below, the results of the evaluation indicate that even if abandoned anchor bolt holes are located behind some base plates, substantial safety margins against bolt pullout would still exist so that the safety function of the hanger would not be degraded. Specifically, the ungrouted holes discovered for hangers 30-GCC-8-H6 and H10 were evaluated. The evaluations concluded that the ungrouted holes were acceptable in the as found condition. They were regrouted prior to baseplate installation as required by specification. Further, to evaluate the potential reductions in pullout strength for possible, albeit, undiscovered ungrouted holes, test data from the referenced ASCE paper was reviewed. The test data indicates that even for unfilled holes very close to the installed bolts, sufficient margin would exist to preclude bolt pullout. For example, for the worst case tested (3½" bolt embedment; 3800 psi concrete; 2 abandoned full depth holes 1.5 diameters (center to center) from the loaded bolt) indicate that the pullout capacity for an individual bolt was reduced approximately 45%. This reduction would in turn reduce the factor of safety from a normal Davis-Besse design value of 4.0 to about 2.3. Even for this condition, which is considered to be very unlikely, bolt pullout capacity would be approximately 2.3 times the design load.

The potential for more than one bolt within a support baseplate being affected by multiple abandoned holes to the extent that the anchor system pullout capacity is less than the design load is considered exceedingly small. This would require multiple abandoned unfilled holes adjacent (less than 1½ diameters from center to center) to each of the anchor bolts for the support. More likely, a single bolt for the support might be affected. The other anchor bolts would be capable of sharing any other anchor bolts additional pullout load albeit with a somewhat reduced safety factor which would be based upon the number of bolts sharing the load and the loss of pullout strength for the one bolt affected. Therefore, we believe that a concern for system integrity/operability does not exist and that there is no need of inspection for additional cases of abandoned bolt holes.

Based on the previous discussion, we conclude that sufficient design margin exists in the design of the Davis-Besse anchor bolts and support baseplate anchor systems to ensure adequate pullout strength even for extremely adverse postulated unfilled anchor bolt locations.