PSNH PUBLIC SERVICE
Company of New Hampshire

TIE

SEABROOK STATION
Engineering Office:
20 Turnpike Road
Westborough, MA 01581

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SB-7984
T.F. B 4.2.5

United States Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

Attention: Office of Inspection and Enforcement

Reference: 1. Docket No. 50-443 and 50-444
2. NRC letters dated March 8, 1979 and June 21, 1979
3. IE Bulletin 79012. Revision 1.

Subject: Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts

Dear Sir:

We have the following responses to the above referenced IE Bulletin:

Item 1

Calculations will be reviewed to assure that the effects of plate flexibility have been accounted for in the determination of anchor bolt loads. When the plates have been determined to be rigid (i.e. the distance from the edge of the support member to the edge of the plate is less than 2 times the thickness of the plate) the compressive force is assumed to act at the centerline of the anchor bolts on the compression side of the plate. Otherwise the plate will be assumed as flexible and the compressive force will be placed closer to the supporting member. The effects of 'prying action' in causing additional anchor bolt loading will be considered. A straight line shear-tension interaction will be assumed in determining anchor bolt capacity reduction when both shear and tension act on the anchor bolts. Minimum edge distance and anchor bolt spacing will be per the manufacturer's recommendations. When anchor bolt spacing and/or edge distance are not within the manufacturer's recommendations the load capacity of the anchor will be reduced in accordance with the recommendations of the manufacturer.

The approach used to caluclate anchor bolt load for a typical pipe support base plate configuration is provided below:

$$T = \alpha_i \left(\frac{M}{N_1 h_i} + \frac{P}{N_2} \right)$$

$$V = \frac{F}{N_2}$$

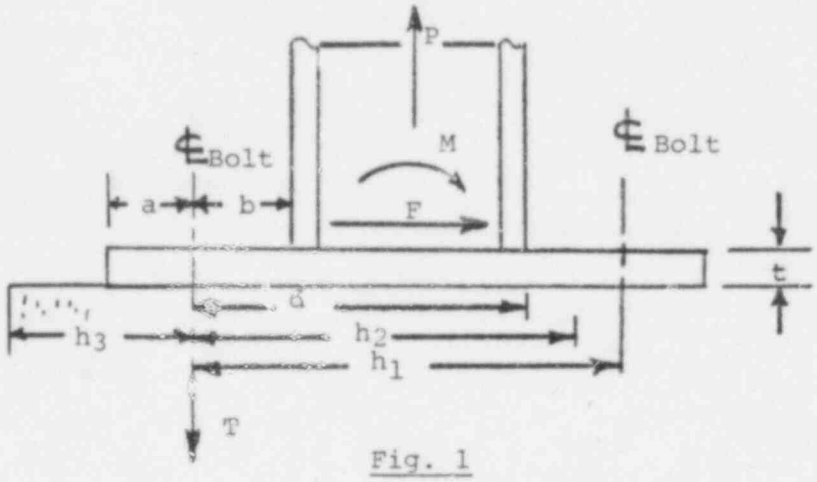

Fig. 1

Where: T.V. Anchor design tension and shear loads.

M,F,P Moment, shear and axial force acting on the connection.

N_1 Number of tension anchor bolts.

N_2 Total number of anchor bolts.

i Index to identify base plate flexibility

(i = 1 rigid, i = 2 flexible)

α_i Factor to account for prying action for given plate flexibility.

($\alpha_1 = 1.0$, $\alpha_2 = 1.2$)

hi Moment Arm

h_1 = Center line distance between bolts.

h_2 = d + 2t (not to exceed h_1)

Item 2

The design load of the anchor bolts which accounts for base plate flexibility is chosen such that the design load is always less than the maximum allowable design load (MADL).

MADL	=	Fu/SF
where Fu	=	Ultimate Static Capacity of anchor bolt based on manufacturer's published test values
SF (Safety Factors)	$\geq$	4 for the wedge type anchors that are used (no sleeve or shell type anchors are used)

Item 3

All anchors have an initial preload tension applied which is greater than 1.5 but less than 2 times the MADL, where MADL is defined in (2) above. This preload tension is applied by the use of Belleville washers or installation torque.

Item 4

The consideration of cyclic loadings will be covered by following the requirements stated in (3) above. The size and length of each concrete expansion anchor is marked with an appropriate identification visible on the exposed stud end.

Item 5

Not applicable.

Item 6

To date no pipe support base plates with concrete expansion anchors have been installed on safety related systems at Seabrook. A design review of all ASME III pipe supports will be undertaken to assure that Items 1 through 4 are met.

Very truly yours,

Arthur M. Shepard

Arthur M. Shepard
Manager of Projects

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