ATTACHMENT 2

PIPE SUPPORT - BASE PLATE
FLEXIBILITY EVALUATION PROCEDURE
FOR USNRC I & E BULLETIN 79-02
SALEM NUCLEAR GENERATING STATION

ASSOCIATED TECHNOLOGIES, INC.

CLIFTON, NJ

PIPE SUPPORT - BASE PLATE

FLEXIBILITY EVALUATION PROCEDURE

Prepared by: _____

Ajit K. Khaund

Approved by: _____

Oscar P. Wong

1.0 PURPOSE

The purpose of this procedure is to provide the method by which pipe support base plates are evaluated for flexibility conditions and the ensuing effects on anchor bolt loading. This evaluation is in reponse to NRC Bulletin 79-02 Rev. 2.

2.0 SCOPE

This procedure applies to all nuclear safety related structures, systems and components on the Salem Nuclear Generating Station. The procedure will be augmented by specific client and project design criteria which are provided in the references below.

3.0 REFERENCES

3.1 PSE&G letter dated January 18, 1980, R. D. Rippe to Oscar Wong.

3.2 USNRC IE Bulletin No. 79-02.

3.3 USNRC IE Bulletin No. 79-02 (Supplement No. 1)

3.4 AISC Manual

3.5 ATI Engineering Standard PS-AD1-02

4.0 PROCEDURE

The procedure for base plate evaluation is in addition to that used for pipe support design. Determination of loadings on the base plate are obtained from design calculations of the pipe support (per PS-AD1-02) which in turn are designed on the basis of piping stress calculations. The additional consideration of this evaluation takes into account the flexibility of the base plate which may increase the normally calculated bolt pull out values. Standard procedures assume rigidity of the plate.

For the purposes of this procedure, three methods of calculation will be considered acceptable for the determination of the bolt design loads.

1. Manual calculations

2. BASEPLT program used as a pre- and post-processor for STARDYNE. BASEPLT was developed by E. A. Botty and Associates.

3. ANSYS finite element computer program developed by Swanson Associates.

4.1 Manual determination of bolt loads will be carried out as follows:

4.1.1 Assume rigid plate conditions and calculate bolt tension from applied loads.

4.1.2 Determine thickness of base plate required per AISC.

4.1.3 If actual thickness is significantly greater than required by design then the loads determined in 4.1.1 are acceptable.

4.1.4 If the actual thickness is marginal or less than that required by AISC then the rigid plate assumption is not acceptable and further review is required. Section 4.2 is applicable.

4.2 Using the BASEPLT or ANSYS program determine the bolt design load. The computer analysis takes into account the flexibility of the plate and its interaction with the concrete and anchor bolt.

5.0 DOCUMENTS

Bolt loads for maximum shear and tension shall be transmitted to PSE&G and identified by pipe stress calculation, hanger mark and transmittal numbers. See Attachment 1.

ATTACHMENT 3

Burns and Roe, Inc.

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February 6, 1984

Public Service Electric and Gas Company
P.O. Box 236 - TB-002
Hancocks Bridge, N.J. 08038

Attention: Mr. R.L. Gura
Manager Plant Engineering

Gentlemen:

This is to inform you of the procedure used by Burns and Roe for performing base plate and concrete anchor bolt calculations for Salem 1 and 2, to show compliance with NRC Bulletin No. 79-02.

The majority, in fact practically all the Salem 1 and 2 base plates analyzed by Burns and Roe were angle, and channel type connections. Therefore, a simplified procedure was developed for analyzing these connections, using the ANSYS Finite element program. This procedure, PSP-001, titled "Simplified Concrete Anchor Bolt Analysis", was approved by PSE&G per letter R.D. Rippe to P.W. Chan, titled "Bolt Load Design Review", March 7, 1980.

For the few cases where the connection was other than an angle or channel shape, a more extensive ANSYS finite element analysis was performed.

In case the connection was made with a flat plate, an extensive finite element analysis was performed using Teledynes BASEPLATE program. Since this program was developed specifically for base plates, it is simpler and cheaper to use than the ANSYS program.

We trust this provides the information you require.

Very truly yours,

R.T. Simmons

R.T. Simmons
Project Engineer

RTS:ga

cc: F. Sullivan
R.C. Kirk