

Consolidated Edison Company of New York, Inc.
4 Irving Place, New York, N Y 10003
Telephone (212) 460-3819

July 6, 1979

Indian Point Station
Dockets Nos. 50-3
50-247

Mr. Boyce H. Grier, Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

Dear Mr. Grier:

This letter is being provided in response to your March 8, 1979 and June 21, 1979 letters which forwarded IE Bulletin No. 79-02, and Revision No. 1 thereof respectively. This bulletin requested information regarding pipe support base plate designs using concrete expansion anchor bolts associated with the Seismic Category I systems at Indian Point Unit Nos. 1 and 2 plants.

Indian Point Unit No. 1:

With respect to Indian Point Unit No. 1, the unit was shutdown on October 31, 1974 and is presently in the defueled condition awaiting a decision by the Company whether or not to install an emergency core cooling system in accordance with the Regulatory Staff's regulations. The information requested in the bulletin will be provided if an affirmative decision is reached to return the unit to service.

Indian Point Unit No. 2:

Program Description:

The Indian Point Unit No. 2 plant has approximately 1800 base plates secured with approximately 4700 concrete expansion anchor bolts in Seismic Category I piping systems. The majority of these bolts are of the shell type. Approximately 700 of the base plates are located inside containment and are not accessible during plant operation.

Following receipt of IE Bulletin 79-02 in March 1979, Con Edison began the reviews and program development efforts to verify the design and installation of concrete expansion anchor bolts on Seismic Category I piping systems.

A. Generic Program:

Con Edison and a number of other utilities have sponsored a Teledyne/Utility Group Generic Base Plate Program to address certain generic questions of design requirements for cyclic loads and for development of a state-of-the-art finite element computer model for the analysis of bolt design loads. The Teledyne/Utility Group Generic Program was presented to the staff of the NRC on April 26, 1979. Following is a brief description of the analytical and testing program being performed by Teledyne Engineering Services for the Utility group:

*app
cep*

7908070775

Analytical Model:

A finite element model of the anchor bolt, base plate, and concrete sub-grade assembly has been developed to compute the new bolt design loads utilizing the non-linear capabilities of computer code ANSYS. The model includes the effects of base plate flexibility, bolt stiffness, concrete stiffness, bolt spacing, edge distance and stiffening attachments as required by the bulletin. A detailed description of the analytical model will be provided to the Regulatory Staff along with a complete report of the Generic program on its completion.

Generic Test Program:

Teledyne Engineering Services are conducting three tests programs for the Generic program. These are as follows:

1. Tests for Verification of Analytical Model:

Tests shall be performed to verify the results of the finite element computer model. Two typical models shall be verified: one 8-bolt plate 25" x 12" x 3/4" with 3/4" Hilti wedge type anchors, and a 4-bolt plate 10" x 10" x 3/8" with 1/2" Philips self drill shell type anchors.

2. Tests for Shear-Tension Interaction:

The NRC Bulletin requires that shear-tension interaction be considered on the analysis of bolt capability. Tests are being performed on different sizes of anchor bolts from various manufacturers to develop realistic shear-tension interaction curves.

3. Cyclic Tests:

The purpose of the cyclic tests are to establish that a bolt can withstand seismic loads and normal operating vibrating loads if the bolt has been installed properly as per manufacturer's recommendations and sufficient anchorage is available. Two types of Cyclic tests with shall be performed using MTA hydraulic test machines:

- (1) Low frequency-high amplitude tests- 10^3 cycles for the seismic loads.
- (2) High frequency-low amplitude tests- 10^6 cycles for the operating loads.

Schedule For Completion of Generic Program:

Teledyne has indicated that the generic program is progressing as planned and all the shear-tension interaction and cyclic load tests are schedule to be completed by July 15. The results of the generic program shall be submitted to the Regulatory Staff within 10 days after receipt from Teledyne.

B. Plant Specific Program:

In addition to its participation in the Teledyne/Utility Group Base plate Generic Program, Con Edison has also contracted with Ebasco Services, to investigate the design requirements of the subject anchor bolts and to perform on-site inspection

and field testing at Indian Point Unit 2 in order to reconfirm their proper installation. The Con Edison/Ebasco Program is described in Attachment 1 "Interim Report-Concrete Expansion Anchor Verification Program-July 1979." A summary of the plant specific program appears below:

Computation of New Bolt Design Load:

All Seismic Category I piping Systems have been identified using the plant FSAR. For each Seismic Category I pipe line, the applicable pipe support detail drawings have been reviewed to identify those supports that use concrete expansion anchor bolts. The dead weight thermal and seismic loads on the pipe support have been reviewed and translated to support plate loading in terms of six spatial components—three forces and three moments. For analytical purposes, individual expansion anchor pipe support plates were grouped considering plate dimensions, thickness, number of bolts, type of attachment members and type & magnitude of applied load. A finite element analysis is performed for each group to establish new bolt design loads using the computer model developed by Teledyne or using the ANSYS Code directly where necessary.

The new design bolt load is checked to satisfy the requirements of factors of safety as indicated in the bulletin. The bolt ultimate capacity shall account for the effects of shear-tension interaction, minimum edge distance and proper bolt spacing.

If the new bolt design load exceeds the safe working load, the support assembly will be modified to provide the margin of safety as indicated in the Bulletin.

Field Verification Program:

A field inspection and testing program has been developed and field work has been started to check the proper installation of support plates and expansion anchor bolts.

The field verification program essentially consists of two parts:

1. A visual inspection is conducted to identify the anchor type and size; the adequacy of the geometry and the installation by physical measurements to verify the embedment depth, proper shell expansion and thread engagement.
2. A tension test is conducted in which the anchor is pulled using a hydraulic tensioner.

Details of the inspection and test procedures and acceptance criteria are provided in the Ebasco Procedure 2990-01-Inspection and Testing of Existing Concrete Expansion Anchor bolts, a copy of which is enclosed with the attachment 1.

The field inspection program randomly selects and tests one anchor bolt in each support plate. If the bolt initially tested is rejected, then all other bolts in that support plate are tested. If the expansion anchor bolts do not meet the strength requirements as required by the bulletin, a modification to the anchorage is initiated. An analysis is made to determine the extent of the modification required to bring the support into compliance with the requirements of the Bulletin.

II Scope

All pipe support base plates that use concrete expansion anchor bolts in Seismic Category I piping systems as defined in the Indian Point Unit No. 2 FSAR are included in the present review.

Field run piping 2 1/2" in diameter and smaller shall be verified for proper installation by sampling inspections. Tension tests will not be performed on these small diameter pipe supports due to the conservative static design and low design loads.

III Current Status

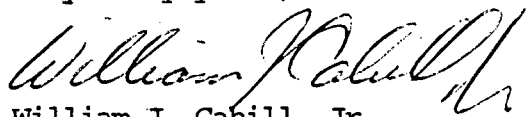
Computations for new design bolt loads are nearing completion. About 50% of the supports have bolt design loads less than 500 lbs. The remaining 50% of supports have bolt design loads in the order of 50% to 75% of the allowable. Thus far approximately 30 supports (of approximately 1800) have been identified where bolt loads or local plate stresses have exceeded the allowable limits. Modification drawings for these supports are being prepared.

Field Verification & Testing program is in progress on a two-shift basis. As of July 3, 1979, visual inspection has been completed on 86 supports and 83 bolts have been pull tested with one failure. For any deficiency encountered, proper modification to the support will be made and adequate QC documentation retained.

IV Schedule:

The Indian Point Unit 2 plant is currently shut down for refueling and the concrete expansion anchor bolt verification program is in progress along with other activities planned for completion during the outage. A final report describing all analyses, field inspections and modifications made to the piping systems supports will be submitted to the Regulatory Staff on completion of the entire project. The generic program as previously discussed, is expected to be completed in mid July 1979, and these results will be sent to the Regulatory Staff as soon as they are available.

Very truly yours,



William J. Cahill, Jr.
Vice President

attach.

cc: U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Division of Reactor Construction Inspection
Washington, D. C. 20555

Mr. T. Rebelowski, Resident Inspector
U. S. Nuclear Regulatory Commission
P. O. Box 38
Buchanan, N. Y. 10511