



SEP 28 1978

MEMORANDUM FOR: Milton J. Grossman, Hearing Division
Director and Chief Counsel, OELD

FROM: Victor Stello, Jr., Director
Division of Operating Reactors, NRR

SUBJECT: BOARD NOTIFICATION - PIPE SUPPORT BASE
PLATE DESIGN

The attached memorandum to Roger Mattson, dated June 28, 1978, presents information concerning failures of safety-related pipe supports at Millstone 1 and design deficiencies on similar equipment at Shoreham Unit 1. As indicated in the attachment, two factors appeared to contribute to failure of anchor-bolt connections of pipe supports. These are, 1) the design assumption that base plates perform structurally as rigid load-bearing members when they may be flexible members, and 2) incorrect anchor bolt torquing.

Recent audits of Architectural Engineering firms and assessments of the actions taken at Millstone, as noted in the attachment, provided the following general information:

1. During the last few years, the A/Es have changed their design and installation procedures for concrete embedded pipe supports.
2. Past and current design and installation procedures vary among the A/Es.
3. In the past many of the pipe support designs have been contracted, and were done with methods not known by the principal A/Es.

We have concluded that the more detailed information required must be obtained from each operating facility. We are preparing a generic

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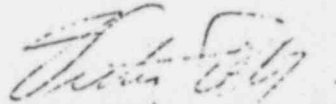
We have concluded that the more detailed information required must be obtained from each operating facility. We are preparing a generic

letter to each operating facility requesting detailed design, installation, and testing information of concrete-embedded anchor-bolted pipe supports of safety-related equipment.

We recommend that this information be provided to the following Boards:

1. Monticello (FTL)
2. Indian Point 1,2,3 (Seismic Design)

We will provide an assessment of this issue upon completion of our evaluations.



Victor Stello, Jr., Director
Division of Operating Reactors
Office of Nuclear Reactor
Regulation

Enclosure:
June 28, 1978 memo, Stello to Mattson

cc w/enclosure:
D. Vassallo
V. Stello
R. Mattson
R. Bevan
L. Olshan
L. Nichols
V. Noonan
A. Schwencer
T. Ippolito
J. Fair



JUN 28 1978

MEMORANDUM FOR: R. J. Mattson, Director
Division of Systems Safety

FROM: Victor Stello, Jr., Director
Division of Operating Reactors

SUBJECT: OPERATING EXPERIENCE MEMORANDUM NO. 13
PIPE SUPPORT BASE PLATE PROBLEM

PROBLEM

Recently during inservice inspections at Millstone Unit 1, structural failures of rigid pipe supports for class 2 safety equipment were observed. These inspections, recently implemented at Millstone, were conducted in accordance with Section XI of the ASME Code, as endorsed by regulation, 10 CFR 50.55 a(g), in February 1976.

Several base-plate anchor bolts of pipe supports in the Core Spray and the Low Pressure Coolant Injection Systems at Millstone were not properly embedded; and, in some cases the anchor bolts were completely pulled out and no supporting function was provided.

Deficiency reports, in accordance with 10 CFR 50.55(e), filed by Long Island Lighting Company, on Shoreham Unit 1, indicate that design of base plates with drilled anchor bolts using rigid plate assumptions has resulted in underestimation of loads on some anchor bolts. Inspection of anchor bolt installations at Shoreham has shown over fifty percent of the bolt installations were deficient. Supports for both piping systems and electrical raceways have been reported as deficient at Shoreham.

PRESUMED CAUSE

It is currently believed that two interacting factors contribute to the failure of the supports. First, the design assumption that the base plates perform structurally as rigid instead of flexible members may provide low estimates of imposed loads on the supports. Secondly, incorrect anchor bolt embedment may also contribute to insufficient support.

The attached memorandum from V. Noonan to B. Grimes, dated June 2, 1978, provides additional information.

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SAFETY SIGNIFICANCE

Depending on equipment layout, improperly designed or installed anchor supports could:

1. result in loss of support function in some cases; and,
2. result in high stressing of piping systems during a seismic event or during a significant flow transient.

REPAIR

Millstone with assistance from Teledyne Engineering has completed design modifications and repairs. These changes include increased base plate thickness and larger anchor bolts for failed supports.

Shoreham in conjunction with Stone and Webster is evaluating both piping and electrical type supports. The review is scheduled to be completed by December, 1978.

DOR ACTION

The Engineering Branch will review the design procedures used on operating plants to determine anchor bolt loads, the techniques used to determine load ratings for anchor bolts, and the installation procedures.

This review will be done through an A/E vendor inspection audit in conjunction with IE. These A/E audits will be started during early July, 1978.

We anticipate that criteria will be developed for design and installation of base plate-anchor bolt assemblies, and those operating plants requiring corrective action will be identified.

Additionally EB staff will further assess the occurrence and corrective actions taken at Millstone.


RECOMMENDATIONS

We recommend that this problem be addressed on all CP and OL reviews. At this time it appears that considerations should be given to the analytical methods used to determine whether or not base plates behave as flexible or rigid members. This in turn may effect the anchor bolt size and embedment to properly cope with loads imposed on the supports.

It may be appropriate to require that applicants provide for review their:

1. methods for determining base plate thickness and anchor bolt loads;
2. criteria for anchor bolt installation; and,
3. criteria for load rating techniques for anchor bolts, including cyclic loads.

We shall coordinate our meetings, discussions and evaluations of this issue with your staff. Supplemental information will be provided.


 Victor Stello, Jr., Director
 Division of Operating Reactors

PRINCIPAL DOR PERSONNEL

reviewer: J. Fair

Enclosure:
Memorandum dated 6/2/78

- cc: w/enclosure
- E. G. Case
 - S. Hanauer
 - R. S. Boyd
 - H. R. Denton
 - F. Schroeder
 - DSS AD's
 - DOR AD's
 - DOR BC's
 - DOR SL's
 - Fair
 - ✓ L. Nichols
 - W. Rutherford
 - J. Sniezek