

NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

October 16, 1985

Docket No. 50-245

B11820

Director of Nuclear Reactor Regulation
Attn: Mr. Christopher I. Grimes, Chief
Systematic Evaluation Program Branch
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

- References: (1) J. F. Opeka letter to C. I. Grimes, dated May 17, 1985.
(2) H. L. Thompson letter to J. F. Opeka, dated July 31, 1985.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 1
Integrated Safety Assessment Program

In Reference (1), Northeast Nuclear Energy Company (NNECO) provided a proposed scope for the Integrated Safety Assessment Program (ISAP) review of Millstone Unit No. 1. In Reference (2), the Staff formally issued the results of the ISAP screening review process, establishing the scope of ISAP for Millstone Unit No. 1 and initiating issue-specific evaluations. Reference (1) also indicated that for each issue or topic included in ISAP, NNECO would provide a discussion of the safety objective and an evaluation of the plant design with respect to the issue being addressed to identify specific items to be considered in the integrated assessment. In accordance with this commitment, reviews for the following ISAP topics are attached.

- o ISAP Topic 1.40 - "Bolting Degradation or Failure"
- o ISAP Topic 1.49 - "Reactor Vessel Surveillance Program"

If you have any questions concerning the attached reviews, please contact us.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

J. F. Opeka

J. F. Opeka
Senior Vice President

8510290333 851016
PDR ADOCK 05000245
P PDR

C. F. Sears

By: C. F. Sears
Vice President

cc: J. A. Zwolinski

1001
11

Docket No. 50-245

ISAP TOPIC NO. 1.40

BOLTING DEGRADATION OR FAILURE

October, 1985

ISAP Topic No. 1.49
Bolting Degradation or Failure

I. Introduction

NRC Generic Issue 29 arose from a concern that bolting degradation at nuclear power plants might proceed unnoticed to the point where bolting might fail and jeopardize the safe operation of nuclear power plants. Specifically, the NRC's statement of Generic Issue 29 is:

"There are numerous bolting applications in nuclear power plants. The most crucial bolting applications are those constituting an integral part of the primary pressure boundary such as closure studs and bolts on reactor vessels, reactor coolant pumps, and steam generators. Failure of these bolts or studs could result in the loss of reactor coolant and thus jeopardize the safe operation of nuclear power plants. Other bolting applications, such as component support and embedded anchor bolts or studs, are essential for withstanding transient loads created during abnormal or accidental conditions.

In recent years, the number of bolting-related incidents reported by the licensees of operating reactors and reactors under construction has increased. A large number of the reported bolting incidents are related to primary pressure boundary applications and major component support structures. Therefore, there is increasing concern regarding the integrity of the primary pressure boundary in operating nuclear power plants and the reliability of the component support structures following a LOCA or earthquake."

In addition, there have been several I&E Bulletins and Information Notices expressing concerns and relaying events within the industry relating to bolting degradation, in nuclear power plants.

II. Review Criteria

- 1) NUREG-0933 - Generic Issue 29
- 2) I&E Information Notice 80-27
- 3) I&E Information Notice 80-29.
- 4) I&E Information Notice 80-36
- 5) I&E Information Notice 82-06
- 6) I&E Information Notice 84-07
- 7) I&E Information Notice 85-15
- 8) I&E Bulletin 79-02
- 9) I&E Bulletin 79-07
- 10) I&E Bulletin 79-14

- 11) I&E Bulletin 82-02
- 12) I&E Bulletin 74-03
- 13) Regulatory Guide 1.65

III. Related Topics/Interfaces

ISAP Topic No. 1.06 - Seismic Qualification of Safety-Related Piping

IV. Evaluation

Based on a review of the 44 bolting incidents reported by licensees of PWR plants, the principal types or modes of bolting failure or degradation were classified as stress corrosion, fatigue, boric acid corrosion, erosion corrosion, and other types. A total of 19 bolting incidents were identified as resulting from stress corrosion which, as it turns out, is the most common type of bolting failure. Boric acid corrosion was the second most common type of bolting failure or degradation reported and occurred only in PWRs. A total of 12 bolting incidents resulting from boric acid corrosion have occurred. The remaining 13 incidents were either fatigue, erosion, corrosion, or other types. It is important to note that no bolting failures have been reported occurring in domestic BWRs (Reference 1).

INPO SOER 84-5, "Bolt Degradation or Failure in Nuclear Plants," (Reference 2) was issued in September 1984 and provided recommendations concerning the address of this issue. The recommendations are listed below, as are NNECO's position on each.

Recommendation 1: Administrative

Ensure that operating and maintenance practices require prompt repair of leaking pressure boundary joints in systems containing borated water.

Response 1:

Millstone Unit No. 1 ISI uses Northeast Procedure NU-VT-1, which references Section 11 of the BP&V Code, section IWA 2400, to perform visual inspections of plant systems per the required frequency. ACP QA 2.02C, "Work Order," is used to report leaks or repairs that require attention. This is a generic procedure for the Millstone Unit No. 1 station. The Operations Department also does a drywell inspection, per SP 645.1, to check the condition of pipes, hangers, valves and equipment.

Recommendation 2: Procedures

Ensure that procedures governing the procurement of bolt materials provide the necessary controls on specification, certification, identification, receipt inspection, and handling.

Response 2:

Millstone Unit No. 1 incorporates the above recommendation in the following procedures: ACP QA 4.02 "Procurement and Receipt inspection," and ACP QA 3.04 A and B "Plant Design Change Request".

Recommendation 3: Procedures

Ensure that maintenance instructions define proper preload for bolted joints (for both pressure boundary and support joints) and establish methods for obtaining this preload during bolt installation.

Response 3:

Millstone Unit No. 1 uses specific procedures for the reactor coolant system and other major components, such as MSIV's, recirculation pumps, and control rod drive scram valves, to ensure that the proper preload values are used. All other fasteners are torqued by using a "Production Torque Guide" chart that lists the proper torque values for all size bolts and fasteners.

Recommendation 4: Procedures

Ensure that maintenance instructions or procedures for the assembly of flanged fittings in borated systems take into account the considerations discussed above.

Response 4:

Millstone Unit No. 1 Maintenance has developed a procedure on the proper use of fasteners and torque values to be used. A copy of the procedure is attached. This knowledge is also considered to be part of a mechanic's general ability to perform his job.

Recommendation 5: Training

Training programs for maintenance, plant engineering, and quality control personnel should include the following:

- a. industry experience concerning bolt failures, including the effects of borated water leakage on closure bolts.
- b. specification, verification, inspection and handling of bolt material.
- c. proper assembly of pressure boundary flanged fittings
- d. establishment of proper preload in bolted joints (both pressure boundary and support).

Response 5a:

Industry experiences concerning bolt failures or other significant events are routed to the individual stations through the following methods. The

NUSCO Nuclear Operations Department vehicle of Nuclear Operations Assignments (NOA's), requiring written responses, ensures that IE Information Notices, Bulletins and other materials are presented to the units, and applicable departments, for disposition and distribution. The Nuclear Safety Engineering Branch issues NUSOER's to ensure that needed actions are taken to address safety problems identified by INPO. This includes relaying the information to the applicable departments and personnel. Nuclear Safety Engineering (NSE) reviews INPO SOERS, the Nuclear Network System, and plant LER's; and informs individual departments of items that may be of interest or significant in nature to plant operation, through the implementation of NSE procedure 4.01 "Operating Experience Assessment." These methods are used for all four of Northeast Utilities' nuclear plants, and are governed by procedures. Northeast Utilities considers this to be adequate in lieu of an individual training program for the units.

Response 5b:

Millstone Station Procedure ACP-QA-8.16 "Training, Certification and Identification of Qualified Inspection, and Testing Personnel" is a generic procedure that ensures the QC personnel involved in receipt inspection are qualified and certified to perform their job. The maintenance and engineering personnel are aware of these requirements through the procedures listed in the NNECO response to Recommendation 2.

Responses 5c and 5d:

The Millstone Unit No. 1 Maintenance Department has a training procedure (MP 790.7) that includes skilled training, and general, on valves, fasteners, and other areas that fall into this category. Vendor training is given as needed in specific areas.

The Engineering Department has procedure EN 21060 "Department Training" that is given quarterly and annually in specific areas, i.e., lessons learned, pipe flanges and fittings, hanger and supports, mechanical training on pumps, and valves, and ASME/IEEE codes.

V. Conclusions

Based on the above information, NNECO considers this issue to be resolved for Millstone Unit No. 1.

VI. References

1. NUREG-0933, U. S. Nuclear Regulatory Commission, June, 1985.
2. INPO SOER 84-5, "Bolt Degradation and Failure in Nuclear Plants, September 20, 1984."