April 21, 2000

Mr. S. E. Scace - Director
Nuclear Oversight and Regulatory Affairs
c/o Mr. David A. Smith
Northeast Nuclear Energy Company
P. O. Box 128
Waterford, CT 06385-0128

SUBJECT: SAFETY EVALUATION FOR ALTERNATIVE ASSOCIATED WITH THE USE OF SUBSECTIONS IWE AND IWL OF THE ASME CODE FOR CONTAINMENT INSPECTION, MILLSTONE NUCLEAR POWER STATION, UNIT NOS. 2 AND 3 (TAC NOS. MA5332 AND MA5338)

Dear Mr. Scace:

By letter dated April 22, 1999, and supplemented by letters dated December 13, 1999, February 17 and February 25, 2000, you requested approval of an alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code) Section XI, Edition and Addenda, specified in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(b)(2) regarding the Code reference for the performance of inservice inspection on Class MC and Class CC components. Specifically, you requested approval to utilize the rules provided in the ASME Code Section XI, 1998 Edition, Subsections IWE and IWL for Class MC and Class CC examinations required to be performed under the expedited containment examination rules of 10 CFR 50.55a(g)(6)(ii)(B).

The U.S. Nuclear Regulatory Commission staff, with the assistance of the Idaho National Engineering and Environmental Laboratory, evaluated the technical acceptability of your request and responses to the staff's requests for additional information (RAI). We have determined that the use of the 1998 Edition of the Code, as proposed in your letter dated April 22, 1999, and as supplemented in your responses to the staff's RAIs, will provide an acceptable level of quality and safety for ensuring the pressure boundary integrity of the containments at Millstone Units 2 and 3. Therefore, use of the proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

Sincerely,

***/RA/***

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-336 and 50-423

Enclosures: 1. Safety Evaluation
2. Technical Evaluation Report

cc w/encls: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ALTERNATIVE ASSOCIATED WITH THE USE OF SUBSECTIONS IWE AND IWL

OF THE ASME CODE FOR CONTAINMENT INSPECTION

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NOS. 2 AND 3

DOCKET NOS. 50-336 AND 50-423

## 1.0 INTRODUCTION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g)(6)(ii)(B), requires containment inspections per the requirements of Subsections IWE and IWL of the 1992 Edition up to and including the 1992 Addenda of Section XI of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code*, as modified by 10 CFR 50.55a(b)(2)(ix) and 10 CFR 50.55a(b)(2)(x). Licensees of all operating nuclear power plants are required to complete their first period inspections by September 9, 2001.

By letter dated April 22, 1999 (Ref. 1), Northeast Nuclear Energy Company (NNECO), submitted a request seeking relief from the requirements of the 1992 Edition and Addenda of the ASME Code, Section XI, Subsections IWE and IWL. Instead, NNECO proposed to use the 1998 Edition of the ASME Code, Section XI, Subsections IWE and IWL pursuant to 10 CFR 50.55a(a)(3)(i). The 1998 Edition has not yet been incorporated by reference into 10 CFR 50.55a. NNECO provided a table comparing the requirements of the 1998 Edition with the 1992 Edition and Addenda. This evaluation addresses the acceptability of NNECO's alternative proposal.

## 2.0 EVALUATION

Idaho National Engineering and Environmental Laboratory (INEEL), as a contractor to the U.S. Nuclear Regulatory Commission (NRC), evaluated the technical acceptability of the subject relief request. The review resulted in two requests for additional information (RAIs). NNECO responded to the RAIs in letters dated December 13, 1999, and February 17, 2000, and submitted a correction to its February 17, 2000, response in a letter dated February 25, 2000 (Refs. 2, 3, and 4).

INEEL's evaluation included a review and comparison of Subsections IWE and IWL requirements in the 1992 Edition and Addenda and 1998 Edition, and an analysis of the changes and/or implications of the Code changes. INEEL's technical evaluation report (TER) (Attachment 2) describes NNECO's bases for requesting relief, and discusses the implication of the alternative in terms of quality and safety as it relates to the inspection of the Millstone Units 2 and 3 containments. Appendix A of the TER is a table of comparison for Subsection IWE,

and Appendix B is a table of comparison for Subsection IWL. The four columns of the tables provide the following information:

| | |
|---|---|
| Col. 1 | Paragraph: The paragraph (sometimes includes articles and subarticles) corresponds to the 1992 Edition and Addenda of Subsections IWE and IWL of the ASME Code, Section XI. |
| Col. 2 | Changes between the 1992 Edition and Addenda and 1998 Edition. |
| Col. 3 | NNECO's statement of significance and/or basis for use as an alternative examination. |
| Col. 4 | INEEL's recommended disposition/comments: INEEL's disposition is principally related to the acceptance of the requirements of the 1998 Edition of the Code in terms of quality and safety related to the containment inspection. |

Based on the review of the comparative requirements, the staff identified several significant Code changes that required additional information from NNECO. These changes are discussed in the following paragraphs:

1. IWE-2300: The 1992 Edition and Addenda (Table-2500-1) invokes the use of IWA-2200 and IWA-2300 for visual, surface, and volumetric examination methods, and for qualification of personnel. IWE-2300 (1998) requires the owner (i.e., licensee) to define requirements for visual examination of containment surfaces, and for qualifying the personnel performing visual examinations. Additionally, IWE-2320 requires the owner to designate a responsible individual (RI) who will be responsible for activities related to the containment surface visual examinations and personnel qualification. In response to the RAIs (Refs. 2 and 3), NNECO provided the following information:

   - A general visual examination is equivalent to the VT-3 examination in terms of assessing the general condition and potential for deterioration within the containment system. It will be performed on 100% of the accessible surfaces of the containment pressure boundary during each inspection interval. Results of a general visual examination are acceptable for continued service without further evaluation only when there is no evidence of damage or degradation of the inspected component or surface area.

   - General or detailed visual examinations are performed using accepted examination methods and tools, including verification of sufficient lighting for adequate illumination, and approved visual aids to ensure appropriate visual acuity.

   - The general visual examinations performed per the NNECO Containment Inspection Manual provide a screening mechanism to locate conditions that may be indicative of damage or distress. Containment surfaces are accepted on the basis of a general visual examination only when there are no indications of damage or distress that are a Code concern.

- For IWE examinations, the NNECO Containment Inspection Program has a written practice that meets the requirements specified in the 1992 Edition of the Code, ANSI/ASNT CP-189 and SNT-TC-1A for the qualification of personnel performing examinations. In addition, the inspection and evaluation procedures that are used to perform inspections are reviewed and approved by a certified NDE Level III [Examiner] and also the ANII [Authorized Nuclear Inservice Inspector].

The staff concludes that the incorporation of these provisions in NNECO's containment inservice inspection (ISI) procedures provides reasonable assurance that NNECO's defined visual examination methods and personnel qualification procedures are adequate.

2. IWE-2500: The requirement to examine paint or coating prior to removal was deleted in the 1998 Code Edition. The staff has no objection to this deletion. However, the staff is concerned that, in the absence of any examination for detecting flaws or degradation in the containment base metal, the recoating may be applied to a degraded containment surface. In response to the RAI related to the subject, NNECO provided the following information (Ref. 2):

   At Millstone 2 and 3, the Protective Coatings & Linings Program establishes the characteristics of the coatings such that compatibility is maintained. Coordination between the IWE/IWL Containment Inspection Program and the Protective Coatings & Linings Program will be established procedurally such that the RI is notified prior to coating or painting applications. Once notified, the RI ensures that the surface is inspected, evaluated and documented using the same methods, procedures and acceptance standards required for Class MC and CC preservice and ISIs. These examinations, performed prior to painting or coating, will verify the condition of the containment surface, including the condition of base metal.

The staff believes that the implementation of the above process will ensure that the base metal degradation will be identified, and appropriate action taken, prior to recoating of the Millstone containment liner.

3. IWE 3510.1 IWE 3511.1 (1998): The owner is required to define the acceptance criteria for visual examination of containment surfaces in performing Category E-A and Category E-C examinations. However, the basic requirements for these examinations are provided in IWE-2310 as augmented by NNECO and described in 1. above.

The staff finds that complying with the 1998 Edition of the Code augmented by the specific requirements in NNECO's containment inspection procedure (as described in References 1, 2, and 3) will provide reasonable assurance that significant flaws and degradations of the containment are adequately identified during Category E-A and Category E-C examinations.

4. In Paragraph IWE-3511.3 of the 1998 Code, examination of Class CC metallic liners has been excluded from the acceptance criterion, which requires disposition of areas where material loss exceeds 10% of the nominal wall thickness. Therefore, the 1998 Code is not acceptable for Class CC metallic liners without augmentation by NNECO. For Millstone, Units 2 and 3, NNECO proposed the use of Code-specified acceptance criteria for both Class CC and Class MC liners. Specifically, if greater than 10% material

loss is identified, the area shall be subject to acceptance by engineering evaluation or acceptance by repair. This is equivalent to the requirements of the 1992 Addenda.

Therefore, the staff concludes that the proposed acceptance criterion for wall thinning will ensure that the integrity of the liner plate will be maintained and, thus, will provide an acceptable level of quality and safety.

5. Examination Category E-D, Seals, Gaskets, and Moisture Barriers, and Examination Category E-G, Pressure Retaining Bolting, have been eliminated from the 1998 Code. The examination of pressure-retaining bolting and moisture barriers is now included in Examination Category E-A, footnote (1)(d) and Item E1.30, respectively. The NRC staff has determined that verification leak-tight integrity through Appendix J testing also provides an adequate method to verify the pressure integrity of bolted connections, seals, and gaskets.

   Regarding the condition of the bolting, the NRC staff has determined that all accessible bolted connections will be visually examined each inspection period per the requirements of the Subsection IWE of the 1998 Edition of the ASME Code, Section XI, Table IWE-2500-1, Category E-A. This Code provision requires an examination of all bolted connections three times per inspection interval. NNECO proposed performing a general visual examination (VT-3 or equivalent) on the exposed portions of the connection. If the general visual examination indicates suspect areas of degradation or damage, a detailed visual examination (VT-1 or equivalent) is required. If assembled, the suspect bolted connection will be disassembled to facilitate the detailed examination. Bolted connections need not be disassembled solely for the performance of VT-3 examinations.

   Furthermore, if a bolted connection is disassembled at the time of scheduled inspections, all accessible surface areas of the connection will be visually examined (VT-3 or VT-1 if necessary).

   If a bolted connection is disassembled at times other than scheduled inspections, written maintenance procedures will be followed to ensure the integrity of reassembled bolted connections is maintained. The written procedures will include acceptance criteria for the continued use of all parts of the connection including bolts, studs, nuts, bushings, washers, and threads in base material and flange ligaments between fastener holes.

NNECO's description for examination of containment pressure boundary bolted connections in Reference 3 provides a reasonable and practical approach to ensure that degraded and damaged bolting is adequately identified. Therefore, the staff finds that NNECO's proposed alternative provides an acceptable level of quality and safety.

6. IWL-2510 Examination of Concrete: The 1992 Edition and Addenda requires the use of visual examination procedures VT-3C and VT-1C. In the 1998 Edition, these procedures have been changed to "general visual" and "detailed visual" examinations. The 1998 Code requires that the owner define the qualification requirements for personnel performing examinations of concrete and tendon anchorage hardware, wire, and strands, and that the owner define the requirements for visual examination of

tendon anchorage hardware, wire, and strands. In response to a question in the staff's RAI, in the February 25, 2000, submittal, NNECO stated:

"The General Visual examinations performed per the NNECO Containment Inspection Manual provide a screening mechanism to locate conditions that may be indicative of damage or distress. Containment surfaces are accepted on the basis of a general visual examination, only when there are no indications of damage or distress that are a Code concern.

IWE and IWL detailed visual examinations are conducted when the criteria for acceptance by general visual examination are not met, or when the surface or component is initially classified as suspect or otherwise requires augmented examination. Augmented examination requirements are specified in IWE-1241, and suspect areas in Table IWL-2500-1, Categories L1.12 and L2.30.

For Subsection IWL detailed visual examinations, surfaces may be accepted for continued service without further evaluation provided one of the following is demonstrated:

1. The Responsible Engineer determines that the flaw or area of degradation is nonstructural in nature or has no unacceptable effect on the structural integrity of the containment, as determined by an evaluation of the magnitude and extent of the relevant indication from ACI 201.1R, and ACI 349.3R as appropriate.

2. The Responsible Engineer determines that the flaw or area of degradation is limited to the outermost concrete layer or when the depth of deterioration exposes rebar without evidence of corrosion.

3. The Responsible Engineer is able to accept the indication based on a review of a previous evaluation from historical records.

The detailed visual examination acceptance criteria outlined above for IWE/IWL exams provide a conservative basis for accepting containment surfaces without further evaluation. For these reasons the acceptance criteria presented in the NNECO Containment Inspection Manual provide a level of quality and safety consistent with the 1992 Code."

The staff finds that the scope of responsibility and visual acceptance criteria discussed above provide a reasonable and adequate method for performing visual examinations of concrete. See 1. above for the qualification of personnel performing examinations.

7. Table IWL-2500-1 (1998): Requires "General Visual Examination" for Item L1.12 (suspect area). The 1992 Addenda of the Code requires VT-1 examination. In response to the request for clarification, NNECO committed to use "Detailed Visual Examination" for suspect areas. NNECO's proposal meets the intent of the 1992 ASME Code requirements and thus is acceptable.

## 3.0 CONCLUSION

Based on the review of NNECO's submittal and responses to the staff's RAIs, the staff finds that the use of the 1998 Edition of the Code, as proposed in NNECO's application of April 22, 1999, and as supplemented in NNECO's responses to the staff's RAIs, will provide an acceptable level of level of quality and safety for ensuring the pressure boundary integrity of the containments at Millstone Units 2 and 3. Therefore, the use of NNECO's proposed alternative for performing ISIs of the Millstone Units 2 and 3 containments is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

Principal Contributor: H. Ashar

Date: April 21, 2000

## 4.0 REFERENCES

1. Letter, NNECO to NRC, “Alternative to Requirements of ASME Section XI, Subsections IWE, IWL”, dated April 22, 1999.

2. Letter, NNECO to NRC, amending the request in Ref. 1 and responding to the request for additional information, dated December 13, 1999.

3. Letter, NNECO to NRC, retracting the amendment to the application requested in Ref. 2, and responding to request for additional information, dated February 17, 2000.

4. Letter, NNECO to NRC, correcting Ref. 3, dated February 25, 2000.

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