February 05, 2014

Mr. Eric Leeds, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop 13H16
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Dear Mr. Leeds:

Purpose

The purpose of this letter is to formally request support from the U.S. Nuclear Regulatory Commission Office of Nuclear Reactor Regulation in the final steps to resolve a compliance issue self-identified by the industry regarding the implementation of the American Society of Mechanical Engineers (ASME) Section XI, Appendix VIII - Supplement 8 qualification program.

Background

The requirements for examination and acceptance of ASME Class 1 and 2, pressure retaining bolting greater than 2.0 inches in diameter (50 mm), are listed in subsections IWB-2500 and IWC-2500 of Section XI. The code requires volumetric examination of 100% of the specified bolts and studs at each interval. Volumetric examinations of these bolts and studs are performed with ultrasonic examination techniques. Section XI, Article I-2000, requires that ultrasonic procedures, equipment, and personnel used to detect flaws in bolts and studs be qualified by performance demonstration in accordance with Section XI, Mandatory Appendix VIII, Supplement 8.

The Performance Demonstration Initiative (PDI) Appendix VIII, Supplement 8 bolting program, administered by the Electric Power Research Institute (EPRI), has been relied upon by U.S. licensees to satisfy portions of the qualification requirements defined in the ASME Appendix VIII, Supplement 8. This program has been in operation since 1995. Since then, two examination procedures and approximately 362 individuals have successfully been qualified.

The PDI steering committee and their technical working groups designed a bolting qualification program that was modeled after the other ASME Appendix VIII Supplements used for piping and pressure vessels. The other ASME Appendix VIII Supplements allow the use of a range of configurations that are representative of the total expected population of configurations. The program was reviewed by the NRC and the results of this review were documented in a revision

to 10CFR50.55a *"Industry Codes and Standards; Amended Requirements; Final Rule"* published September 22, 1999. The NRC's assessment at that time was that the PDI program would provide reasonable assurance of detecting flaws of concern. However, since this original assessment there have been no follow-up activities taken by the industry to reconcile the program with the requirements in the ASME Code.

Issue

During a public meeting between the industry and the Nuclear Regulatory Commission held on January 8th and 9th 2014 (ADAMS Accession No.: ML13352A389) the industry presented the findings of a recent review of the ASME Boiler and Pressure Vessel Code, Section XI Appendix VIII – Supplement 8 requirements (1995 Edition through 2008 Addenda), as compared to the Performance Demonstration Initiative (PDI) program being implemented by EPRI on behalf of the industry. Based on this review it was determined that the current program deviates from some Code requirements. Attachment A provides additional technical information on the specific differences.

The EPRI PDI program for bolting is currently implemented in two parts. Part 1 is the qualification of personnel, procedure, and equipment, which is accomplished via blind testing performed at EPRI. Part 2 involves the use of plant site calibration standards which are intended to expand these qualifications to the specific bolt or stud configuration that exists at the plant.

EPRI has completed a technical assessment of the differences between the current PDI bolting program and ASME Section XI, Appendix VIII, Supplement 8 and found that examinations performed in accordance with the qualified procedures are adequate to detect the required flaws in these components. This technical evaluation is summarized in Attachment B. Since this assessment was performed on a generic basis, each licensee should evaluate their implementation of this process to determine if the technical assessment is bounding for the plants' bolting examinations. To facilitate this review, the industry was made aware of the issue and the recommended actions by letter NDE 2013-09 on 12/18/2013. The industry review process is underway.

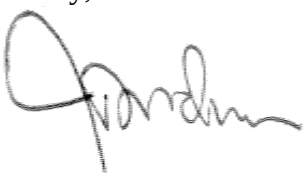
Because the differences outlined in Attachment A may impact several US nuclear utilities, EPRI and the industry are conducting several activities intended to align the ASME Code and EPRI PDI bolting program. These activities are outlined in Attachment C.

Summary

The technical assessment documented in Attachment B concludes that examinations performed in accordance with the requirements of the PDI qualified bolting examination procedures, while not in direct compliance with the Code, provide reasonable assurance that flaws of safety significance would have been detected consistent with the intent of the Code requirements. The deviations between the Code and the PDI program do not represent a substantial safety hazard. As such, this issue was determined not to be reportable under the provisions of 10CFR50 Part 21.

As stated above, EPRI and the industry are conducting several activities intended to align the ASME Code and the EPRI PDI bolting program. The industry will keep the NRC informed as we work through these activities. As the NRC is aware, the Code process can be protracted and Code changes will require NRC review and approval via rulemaking. Because of this, the industry requests the NRC's support with the regulatory processes to be used in the interim as the industry, EPRI, and the NRC work through important ASME Code implementation alignment.

Sincerely,



Joe Donahue
NDE Action Plan Committee Chairman

cc: Steve Swilley, Director, NDE EPRI
Kevin Hacker, NDE Integration Chairman

Attachments

Attachment A: Description of PDI Program Differences for Bolting
Attachment B: Technical Evaluation of PDI Process
Attachment C: Actions to Align the Performance Demonstration Initiative Program and ASME Section XI Appendix VIII Supplement 8

ATTACHMENT A

DIFFERENCES BETWEEN SECTION XI AND THE PDI PROGRAM FOR BOLTING

Based on a review of ASME Boiler and Pressure Vessel Code, Section XI, Appendix VIII, Supplement 8 (1995 Edition through 2008 Addenda), the Performance Demonstration Initiative (PDI) program as implemented by EPRI deviates from the Code requirements as follows:

1) Specimen sets at EPRI may not meet the detailed specimen and scanning surface requirements outlined in Supplement 8, Paragraph 1.1(b) for all bolts and studs at all sites.

2) Bolting examination procedures qualified under the PDI program currently specify that expansion of the procedure to meet Supplement 8, Paragraph 1.1(b), including modification of essential variables, can be performed during the demonstration on the site calibration mock-up. However, the procedures do not specifically require these on-site expansions to be performed in a blind fashion, as required in Supplement 8, Paragraph 2.0.

3) The PDI program specifies acceptance criteria for personnel qualification, which differs from those specified in Supplement 8, Paragraph 3.1. Specifically, the PDI program acceptance criteria require detection of at least 80% of the notches, with less than 20% false calls. Supplement 8, Paragraph 3.1 states, "Examination procedures, equipment, and personnel are qualified for detection when each qualification notch (as described in 1.1) has been detected and its response equals or exceeds the reporting criteria specified in the procedure." The PDI program was designed to be implemented in two parts. Part 1 was the screening of personnel and qualification of the examination procedure and equipment. Part 2 was the use of site calibration standards that would expand these qualifications to the specific bolt or stud configuration on site. In order to satisfy the site demonstration requirement, the examination system (personnel, procedure, and equipment) would be demonstrated during the calibration, thus satisfying the requirements of paragraph 3.1.

4) The sum of the PDI program bolting specimens used for the base qualification does not meet the requirements of Supplement 8, with regard to notch locations. Specifically, Supplement 8, Paragraph 1.1(c) states, "These notches are required on the outside threaded surface." However, some of the actual plant bolt configurations only have threads on one end. Therefore the PDI program samples were designed to represent these configurations. This results in some of the Program specimens containing notches in areas where no threads exist. Not accounting for unthreaded regions of a bolt or stud is considered a shortfall of Section XI.

ATTACHMENT B

TECHNICAL EVALUATION OF PDI QUALIFICATION PROCESS

The requirements for examination and acceptance of ASME Class 1 and 2, pressure retaining bolting greater than 2.0 inches in diameter (50 mm), are listed in subsections IWB-2500 and IWC-2500 of Section XI. IWB-2500 and IWC-2500 require that 100% of the specified bolts and studs be volumetrically examined each interval. Volumetric examinations of these bolts and studs are performed with ultrasonic examination techniques. Section XI, Article I-2000 requires that ultrasonic procedures equipment and personnel used to detect flaws in bolts and studs be qualified by performance demonstration in accordance with Section XI, Mandatory Appendix VIII, Supplement 8.

The Performance Demonstration Initiative (PDI) Appendix VIII, Supplement 8 bolting program, administered by EPRI, has been relied upon by utilities to satisfy portions of the qualification requirements defined in the ASME Appendix VIII, Supplement 8. The PDI program was designed to supplement these qualifications with the use of calibration standards on the plant site, to satisfy the material and geometric condition requirements defined in Appendix VIII, Supplement 8 that may have not been addressed by the base PDI sample set.

A recent review of the PDI program, summarized in Attachment A, has identified differences between specific requirements of Section XI and the PDI program. A technical assessment has been performed to evaluate these differences to determine the impact on examination results achieved by use of the procedures qualified using the PDI bolting program. This evaluation is based on information available to EPRI and may not be directly applicable in all cases.

The following technical attributes were identified during this assessment.

1) In the PDI bolting program, examination systems (personnel, procedure, and equipment) are qualified on a sample set that represents a wide range of the bolts or studs that exist in the fleet. This provides a challenging, robust qualification process.

2) The number of simulated flaws in the sample set exceeds the minimum required by ASME Section XI, Appendix VIII, Supplement 8. As such it represents a more significant challenge for qualification purposes.

3) The examiners are required to demonstrate all aspects of the procedure during the qualification, which assures they are capable of reliably performing the examinations on a variety of bolt sizes and geometric configurations.

4) The procedures require the use of calibration standards that are similar to the actual bolt or stud to be examined in the plant. These calibration standards have similar scan surfaces and are fabricated from similar material. This requirement is meant to satisfy the geometric and material requirements defined in the Code that are not addressed during the blind qualification.

5) The sensitivity for the examination is established using calibration notches of the same size and reflective area as those used to qualify the procedure and personnel during the blind qualification. This step provides added assurance that the examination system is capable of performing in a similar fashion on the specific bolt or stud to be examined.

6) The requirement to use calibration standards also enables the examiner to become familiar with the geometric responses that will be seen during the examination and helps them optimize the technique for the actual examination.

7) This calibration process also assures that the examiner has remained proficient in the specific examination they are going to perform.

Based on this technical evaluation, the following conclusions are made.

- The PDI Supplement 8 program developed by PDI utility members and administered by EPRI is based upon a sound technical position and is adequate to demonstrate examination systems (personnel, procedure, and equipment). The program utilizes a range of qualification specimens that are representative of many of the actual bolts or studs found in the plants. This qualification process is consistent with other ASME Appendix VIII Supplements. In addition to the blind qualification process, the PDI program relies on the use of site calibration standards representing the plant-specific material and geometric bolting conditions. This is needed to fulfill the requirements specified in Supplement 8 and provides added assurance that the personnel are capable of resolving defects located in the examination volume.

- Examinations performed in accordance with the requirements of the PDI qualified bolting examination procedures provide the licensee reasonable assurance that flaws of safety significance would have been detected consistent with the intent of the Code requirements.

- Based on the information above, it is concluded that the PDI qualification procedure does not strictly comply with ASME Section XI, Appendix VIII, Supplement 8; however, it does not represent a substantial safety hazard. As such, this issue is not reportable under the provisions of 10CFR50 Part21.

ATTACHMENT C

ACTIONS TO ALIGN THE PERFORMANCE DEMONSTRATION INITIATIVE PROGRAM AND ASME SECTION XI APPENDIX VIII SUPPLEMENT 8

1) Develop an ASME Code Case to align Section XI, Appendix VIII, Supplement 8 and the PDI program.

2) Develop PDI guidance for consistent implementation of the site demonstrations in compliance with the PDI Supplement 8 program, including NEI03-08 implementation requirements.