

April 4, 2003

MEMORANDUM TO: Terence L. Chan, Chief
Piping Integrity & NDE Section
Materials and Chemical Engineering Branch
Division of Engineering

FROM: Donald G. Naujock, Materials Engineer */RA/*
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SUBJECT: SUMMARY OF PUBLIC MEETING HELD FEBRUARY 6 & 7, 2003,
WITH EPRI- PDI REPRESENTATIVES (TAC NO. MB6244)

On February 6 & 7, 2003, the staff participated in a public meeting with representatives from the Electric Power Research Institute (EPRI) - Performance Demonstration Initiative (PDI) program at the EPRI Nondestructive Examination (NDE) Center, Charlotte, North Carolina . EPRI provides PDI's business operations and technical support. PDI is a nuclear power industry initiative that was established to develop and administer the qualification requirements of Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," Section XI of the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (Code). The purpose of the meeting was to discuss PDI's approach for implementing selected aspects Appendix VIII and associated items. The subjects discussed were the status of Supplements 5 and 7 specimens, qualifications, and coverage; status of Supplement 10 specimens and qualifications; expansion of Supplement 10 for site specific configurations, and Regulatory Issue Summary 2003-01, "NRC Regulatory Issue Summary 2003-01 Examination of Dissimilar Metal Welds, Supplement 10 to Appendix VIII of Section XI of the ASME Code." The meeting was a continuation of formal dialog between NRC and the industry on PDI's implementation of Appendix VIII. The dialog provides opportunities to discuss testing difficulties, review PDI's program methodology for the selected supplements, and address issues regarding the ASME Code. The NRC staff toured the facility to acquire familiarity with the test specimens and Supplement 10 qualification process. The meeting participants and agenda are listed in Attachments 1 and 2 respectively. Handouts provided by PDI for selected items in the agenda are provided in Attachments 3 through 5.

I. Status of Supplements 5 and 7 Specimens, Qualifications, and Coverage

PDI presented a brief discussion regarding the performance of the reactor vessel inner nozzle radius (Supplement 5) examinations. The discussion is summarized in Attachment 3. Included in the description was a pictorial drawing showing the misorientation angle concept. The misorientation angle concept was developed for selecting the optimum transducer angles necessary to examine an inner nozzle radius from the outer surface. The misorientation

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angle identifies the ideal metal path and the nominal inspection angle for each segment of the inspected volume. One vendor has successfully qualified a number of individuals for Supplement 5 examinations. However, many utilities have opted to use enhanced visual examinations as an alternative for ultrasonic testing (UT) examinations. The quantity of personnel qualified for inner nozzle radius examinations are sufficient for the industry's needs.

In the same handout, PDI discussed the status of personnel qualified for examining RPV-to-nozzle welds from the inside and outside surfaces (Supplement 7). PDI stated that the quantity of personnel qualified for RPV-to-nozzle weld UT examinations are sufficient to handle industry's needs.

There was discussion on the RPV-to-nozzle coverage requirements imposed by 10 CFR 50.55a(b)(2)(xv)(G) and (K). The staff expressed that the coverage criteria of 10 CFR 50.55a(b)(2)(xv)(G) should be achieved when possible, but no less than the criteria stipulated in 10 CFR 50.55a(b)(2)(xv)(K). If the coverage is less than 10 CFR 50.55a(b)(2)(xv)(K) requirements, relief would be necessary. The examination coverage does not affect qualifications. PDI believes that the criteria in 10 CFR 50.55a(b)(2)(xv)(K) is sufficient for these examinations. The NRC staff is seeking legal clarification associated with the 10 CFR 50.55a(b)(2)(xv)(G) and (K) requirements for RPV-to-nozzle weld examinations. This is an open item for the NRC staff to address.

PDI presented a technical paper on the basis for reducing BWR nozzle-to-vessel shell welds and nozzle blend radii inspection requirements. The paper suggested a 75% reduction of nozzle examinations per 10-year interval could be justified. The presentation informed NRC staff of an industry initiative being advanced at the American Society for Mechanical Engineers working committees as a proposed code case. No action required.

II. Status of Supplement 10 Specimens and Qualifications

PDI presented a brief discussion on specimen availability and personnel qualifications for dissimilar metal weld (DMW) examinations. The discussion is summarized in Attachment 5. PDI secured material from canceled nuclear power plants and added defects to create field representative specimens. The number of specimens are sufficient for qualifying personnel. To date, a sufficient number of personnel are qualified for detection and length sizing of DMWs. However, no one has qualified for depth sizing. Supplement 10 requires a root mean square (RMS) calculation of 0.125-inch RMS or less for depth sizing error. The depth sizing RMS demonstrated thus far from the outside surface with automated equipment is 0.155-inch RMS, and with manual equipment, it is 0.200-inch RMS. For demonstrations performed from the inside surface, depth sizing is not very accurate. PDI is working with UT equipment manufacturers and adjusting their procedures in order to achieve the 0.125 RMS depth sizing value. The RMS differences between demonstrated and 0.125-inches is an open PDI item.

Because of the similarities between IGSCC and PWSCC, the NRC staff is concerned about the examiners' ability to reliably detect and characterized PWSCC over time if periodic refresher training is not received by the examiner. For instance prior to Appendix VIII, DMW examiners were qualified according to Appendix VII and the procedures were qualified according to the prescriptive criteria of Section V, Article 4 or 5 or Section XI, Appendix III. Many of these same

personnel are taking the Appendix VIII, Supplement 10 performance test. These personnel are having difficulty in successfully qualifying to Supplement 10. Since flaws like stress corrosion cracks are more challenging to detect and characterize than fatigue cracks or notches (excluding compressed notches), the staff is presenting, for future discussions, the applicability of PWSCC re-qualifications similar to that required of IGSCC examiners. This is a new item for the next meeting.

III. Site Specific Expansion of Supplement 10

There was much discussion on a proposed process for expanding Supplement 10 qualifications to accommodate unique site specific applications, Attachment 6. The NRC staff supports the concept due to the number of possible variations in similar weld geometries. However, the NRC staff is concerned with the process used to determine a site specific application. The process for determining if a configuration is unique to a particular plant or occurs multiple times across several plants has not been addressed. The number of site specific applications are unknown. The NRC staff needs a better understanding of the quantity of site specific applications, and how the industry will determine when multiple occurrences of similar site specific configurations should be addressed as part of the generic procedure.

The process for determining if a procedure is applicable for a specific application is based on the scope of the procedure as defined by essential variables. For applications outside the procedure's scope, the licensee must determine the effects that an examination would have on the essential variables. A study is needed to establish the effects of the essential variable for each site specific application. Based on the study, a determination can be made for expanding an essential variable range in an existing generic procedure, develop another procedure, or expand the generic procedure for a unique site specific configuration.

Expansion of the generic procedure for a unique site specific configuration would be demonstrated on mock-ups. PDI expressed a desire to use notches in site specific mock-ups. The staff considers the use of notches inferior to the use of cracks or simulated cracks because notches do not exhibit representative acoustic response when compared to those of cracks or simulated cracks made from compressed notches. If notches are used, their acoustic response will have to be compared with the response generated from cracks from a related DMW configuration. The comparison is necessary to quantify any reduction in response. The NRC staff recognizes that most site specific mock-ups possessed by licensees currently contain notches and may be applicable for the short term; however, the industry should be developing mock-ups with cracks or, on a limited basis, compressed notches (when generating or creating cracks are difficult).

PDI will address NRC staff's concerns at the next meeting.

IV. Regulatory Issue Summary 2003-01

PDI discussed the possibility of meeting the intent of paragraph 10 CFR 50.55a(g)(6)(ii)(C) by meeting an alternative to Appendix VIII, Supplement 10. PDI has implemented performance demonstrations that satisfy many of the requirements of Supplement 10. Because PDI's protocol for implementing Supplement 10 is compatible with most of the requirements of

Supplement 10, a question was posed as to whether the PDI approach could be submitted as an alternative to ASME Code requirements. The staff has determined that as long as the bulk of the requirements of Supplement 10 are implemented, licensees may submit proposed alternatives for the items that are different from Supplement 10 requirements, pursuant to 10 CFR 50.55a(a)(3).

There was a discussion on relaxing the 0.125 RMS depth sizing criteria for Supplement 10 performance demonstration acceptance criteria. Both Supplement 10 and PDI implementation of Supplement 10 use 0.125 RMS as the depth sizing acceptance criteria. The 0.125 RMS value is the standard used for other Supplements as well, which are being successfully implemented. Proposeing changes to the depth sizing criteria at this time is premature because of the limited number of personnel attempting qualification to date. However, in the short term, licensees may justifying temporary relaxation of the depth sizing tolerance if the difference in the RMS error is accounted for in flaw analyses.

The NRC staff was asked to discuss the consequence of non-compliance to 10 CFR 50.55a(g)(6)(ii)(C) as related to DMWs, as discussed in RIS 2003-01. The staff reiterated the position stated in the RIS, that there are no potential consequences until a UT examination of a DMW is required. If an examination is performed with personnel qualified for detection and nothing is found there are no safety issues. Likewise, if a flaw is found and repaired, there are no safety issues. For items repaired, the Code-required preservice examination may be performed using an alternative volumetric method, i.e., radiography testing (RT). Although the integrity of the repair is assured by an alternative examination, the non-compliance with respect to 10 CFR 50.55a(g)(6)(ii)(C)(2) pertaining to Supplement 10 would still exist. Noncompliance will cease to exist when the requirements of Supplement 10 are met, or when an alternative to the requirements of Supplement 10 has been approved and implemented.

Attachments: As stated:

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Attachments: As stated:

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PUBLIC MEETING WITH EPRI-PDI, FEBRUARY 6, 2003

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