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OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

July 23, 2010

Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

GL10-027

ATTN: Rulemakings and Adjudications Staff

COMMENTS ON 10 CFR PART 50
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
CODES AND NEW AND REVISED ASME CODE CASES
DOCKET ID NRC-2008-0554

On May 4, 2010, a proposed rule was published in the Federal Register to amend existing regulations to incorporate by reference various addenda of the ASME Code as well as ASME Code Cases N-772-1 and N-770. The following response is formatted by first restating language published in Tuesday May 4, 2010 Federal Register, Volume 75, Number 85, 10CFR Part 50, American Society of Mechanical Engineers (ASME) Code and New and Revised ASME Code Cases; Proposed Rule and then providing comments. An attempt has been made to restate all of the published text related to the use of Section XI, Nonmandatory Appendix E, "Evaluation of Unanticipated Operating Events". The text related to use of Section XI, Nonmandatory Appendix E, Evaluation of Unanticipated Operating Events" from the Proposed Rule has been separated into smaller parts based upon the context so that the comments can been discussed separately. Dominion Resources Services, Inc. (Dominion) appreciates the opportunity to comment on this proposed rule and offers the attached comments on the proposed conditions for incorporation of the subject Code Sections as well as Code Case N-770.

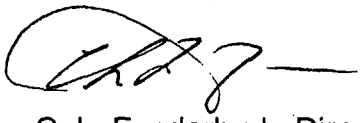
Generally, it is recommended that NRC work with ASME Section XI, Electrical Power Research Institute, and/or Pressurized Water Reactor Owners Group to recommend changes and resolve technical comments. It is believed that some proposed changes are not necessary to ensure structural integrity of the reactor vessel. In addition, it is recommended that NRC adopt Code Case N-770-1, which addresses many of the concerns of the proposed conditions of § 50.55a(g)(6)(ii)(F).

Template = SECY-067

DS10

If you would like further information on our comments, please contact Ms. Kimberly Herman at (804) 273-3707 or Kimberly.Herman@dom.com or Ms. Viki Armentrout at (804) 273-2402 or Viki.Armentrout@dom.com.

Respectfully,



C. L. Funderburk, Director
Nuclear Licensing & Operations Support
Dominion Resources Services, Inc. for
Virginia Electric and Power Company,
Dominion Nuclear Connecticut, Inc. and
Dominion Energy Kewaunee, Inc.

Attachment

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Attachment

Dominion Comments on ASME Codes and New and Revised ASME Code Cases

I. Comments on Proposed Rule

1. Relief Request Submission Schedule

Extracted Language from Federal Register/Vol 75. No 85/Tuesday, May 4, 2010/Proposed Rule Page 24348, bottom 1st column

10 CFR 50.55a(g)(5)(iii)

The NRC proposes to revise paragraph (g)(5)(iii) by adding a sentence to clarify that a request for relief must be submitted to the NRC no later than 12 months after the examination has been attempted during a given ISI interval and the ASME Code requirement determined to be impractical.

10 CFR 55a(g)(5)(iv)

The NRC proposes to revise paragraph (g)(5)(iv) to clarify that licensees are required to submit requests for relief based on impracticality within 12 months after the end of the ISI interval for which relief is being sought.

Dominion Comment

The main point of discussion on page 24341 appears to emphasize the need to attempt the examination before submitting a relief based on impracticality, so that actual exam limitations encountered for the particular interval may be documented. With this approach, percentages of coverage may improve over time with advancing NDE techniques.

Dominion concurs with this logic but questions the deadline for submitting such relief requests as stated in proposed change to 10CFR50.55a(g)(5)(iii) and requests that a revision be made. These type of reliefs are often similar in nature and may be collected and grouped into one relief request letter using a tabular format as outlined in the NEI White Paper, "Standard Format for Requests from Commercial Reactor Licensees Pursuant to 10 CFR50.55(a)", Rev 1, June 2004, Appendix B, Template 6. This method seems practical to minimize preparation and review time for both the licensee and the Commission.

Dominion supports the position that relief requests should be submitted on a regular basis rather than waiting until the end of the Interval to submit all limited examinations; however, we recommend that some flexibility be maintained to avoid premature submittals. For example, a licensee may desire to attempt improved

coverage with a subsequent effort in the next refueling outage. Planning for removal of unanticipated interferences or adjustment in NDE technique may be needed. A substitute weld that can be more fully examined may also be selected upon later review of the program requirements. Second attempts for the examination of the weld selected or for additional welds to supplement justification of acceptance for the limitation are common when implementing a new Risk Informed ISI Program. Furthermore, specific percentages of completion for ASME categories are not required by the ASME Code until the end of each period. Therefore, Dominion recommends that groupings of limited examinations be allowed submittal on a frequency of once within 12 months of the close of each period if not maintaining a deadline of within 12 months of the close of the interval.

2. Acceptability of Section E-1200 for Reactor Vessel Structural Integrity

Extracted Language from Federal Register/Vol 75. No 85/Tuesday, May 4, 2010/Proposed Rule Page 24339

10 CFR 50.55a(b)(2)(xxv) Evaluation of Unanticipated Operating Events (New)

The NRC proposes to add a new § 50.55a(b)(2)(xxv) to condition the use of ASME B&PV Code, Section XI, Nonmandatory Appendix E, "Evaluation of Unanticipated Operating Events." Appendix E provides acceptance criteria and guidance evaluating the effects of out-of-limit conditions on structural integrity of the reactor vessel beltline region. The NRC proposes to specify that Section E–1200 is not acceptable, and to set forth two conditions on the use of Section E–1300. One proposed condition would require that a 1/4T flaw be used in the linear elastic fracture mechanics (LEFM) evaluation with a margin of 1.4 applying to K_{Im} in the two LEFM criteria. The other proposed condition would also use K_{Ic} instead of K_{Ir} in the Appendix E analysis.

Dominion Comment

Dominion is opposed to the portion of the proposed rule change that specifies Section E-1200 is not acceptable. The intent of Section E-1200 is to provide licensees a conservative and yet quick and easy screening method that can be used to immediately judge whether a reactor vessel can be returned to service or whether a more in-depth analysis is needed prior to returning the reactor vessel to service following an unanticipated event. The screening criterion in Section E-1200 is acceptable because it conservatively ensures that reactor vessel materials are in a temperature region corresponding to upper shelf energy versus the transition region and capable of sustaining a plant design transient.

Likewise, Dominion is opposed to the portion of the proposed rule change that would require postulating a 1/4T flaw under Section E-1300. The intent of Section E-1300 is to use margins that are lower than what is currently in ASME Section XI Appendix G, "Fracture Toughness Criteria for Protection Against Failures" while at the same

time the margin must be large enough to ensure that the transient does not produce any extension of a postulated range of crack sizes.

Dominion is in agreement with the proposal to use K_{Ic} instead of K_{Ir} in the Appendix E analysis.

3. **Reactor Pressure Vessel Fracture Toughness Screening Criteria**

Extracted Language from Federal Register/Vol 75. No 85/Tuesday, May 4, 2010/Proposed Rule Page 24339 Continued

The above qualitative justification for selecting the 1-inch depth for the postulated flaw is not sufficient. The ASME B&PV Code, Section XI, Appendix G, "Fracture Toughness Criteria for Protection Against Failure," analysis, which can be considered as the first "screening" criterion for safe operation of an RPV, is based on a postulated flaw of one-quarter of the RPV wall thickness (1/4T). The Section XI, Appendix E analysis is employed when the ASME B&PV Code, Appendix G requirements are exceeded due to an out-of-limit condition. Hence, it is considered as the second "screening" criterion, *i.e.,* once satisfied, a refined analysis or a special RPV inspection is not needed. As the second screening tool, the Section XI, Appendix E analysis has to be conservative.

Dominion Comment

Dominion does not agree with the statement "The above qualitative justification for selecting the 1-inch depth for the postulated flaw is not sufficient". As a first screening criteria, Dominion considers the use of a postulated 1-inch flaw to be sufficient for ensuring that crack extension will not occur. Reactor vessels are inspected in accordance with ASME Section XI by supplemental PDI and Appendix VIII requirements. Actual flaw sizes in reactor vessel beltline regions are small and do not approach 1-inch in depth. As an example, there is still a margin of 10 on flaw size for small flaws that have a depth of 0.10 inch compared to a 1-inch deep postulated flaw. Furthermore, it is noted that the material properties in the beltline weld exceed those used in the analysis related to the lower bound reference temperature. Taken together, use of the lower bound reference temperature and a 1-inch postulated flaw is sufficiently conservative as a screening criteria for preventing crack extension.

The use of a larger postulated flaw size has the potential to produce unacceptable analytical results, when crack extension has not occurred, and thereby produce unnecessary delays in the return of plant operation not commensurate with actual impact of flaw.

4. Postulated Flaw Size in Section E-1300

Extracted Language from Federal Register/Vol 75. No 85/Tuesday, May 4, 2010/Proposed Rule Pages 24339 and 24340 Continued

In addition, the following three concerns prompt the NRC to propose the use of a 1/4T flaw in the Appendix E, Section E–1300 analysis:

- In the probabilistic fracture mechanics (PFM) analyses supporting the proposed PTS rule, the truncated flaw depth for a repair weld flaw is 2 inches. For a deterministic analysis, the possibility of having a repair weld flaw line up with a clad flaw to become a surface flaw cannot be ruled out.

- The Pressure Vessel Research User's Facility (PVRUF) and Shoreham RPV flaw data, used to develop generic flaw distributions for the proposed PTS rule, identified flaws that were consistently smaller than the proposed bounding flaw. However, the PVRUF and Shoreham data represent only a limited sampling of all RPV welds and may not directly provide an adequate bounding flaw size for a deterministic analysis like that of ASME B&PV Code, Section XI, Appendix E.

- The use of a 1/4T flaw assumption also provides additional assurance that any service-induced growth of current fabrication flaws will be bounded for any RPVs having experienced severe transients over the course of their operating lifetimes.

Requiring that a 1/4T flaw be used in the LEFM evaluation with a margin of 1.4 applying to K_{Im} in the two LEFM criteria establishes a consistent approach regarding the postulated flaw size in the two deterministic LEFM analyses in ASME B&PV Code, Section XI, Appendices E and G. Applying the margin of 1.4 only to K_{Im} is consistent with the ASME B&PV Code, Section XI, Appendix G approach, making the decreased margin between the two appendices traceable. The proposed use of a smaller margin of 1.4 in the ASME B&PV Code, Section XI, Appendix E analysis is justified because all significant stress intensity factors resulting from an actual transient are considered. Further, using a 1/4T flaw is also consistent with prior NRC approaches for evaluation of RPV structural integrity after out-of-limit events.

Dominion Comment

Dominion does not agree with the need to change the postulated flaw size in Section E-1300 from a 1-inch deep flaw to a 1/4T flaw. The indicated reason for this change in postulated flaw size is so that the basis for various reactor vessel integrity evaluations would be the same. The basis for analysis of a reactor vessel following an unanticipated transient versus analysis for design operation of a plant should not be the same. It is desirable to require higher margins for PTS and heatup/cooldown curves which are used to establish limits for operation of a plant. If the limits for heatup/cooldown curves are exceeded then different lower margins are appropriate to ensure that crack extension has not occurred during the transient. The use of a 1-

inch deep flaw is acceptable because a larger flaw does not exist (thus the flaw size is conservative) and the analysis uses conservative material properties relative to values in the CMTR and surveillance capsule program (thus the material properties are conservative).

It is further noted that industry has investigated the impact of flaw size on core damage frequency for PTS and heatup and cooldown transients. The results indicate that a 1 inch flaw size is acceptable.

5. Reference Toughness Curve

Extracted Language from Federal Register/Vol 75. No 85/Tuesday, May 4, 2010/Proposed Rule Page 24340 Continued

The EPRI NP–5151 report mentioned that reference toughness K_{Ir} has been used in the LEFM evaluation in the prior NRC evaluation of RPV structural integrity after out-of-limit events. Consistent with the evolution of the ASME B&PV Code, Section XI, Appendix G analysis, the NRC now proposes to use K_{Ic} instead of K_{Ir} in the ASME B&PV Code, Section XI, Appendix E analysis.

Dominion Comment

Dominion finds that the proposed change to K_{Ic} instead of K_{Ir} in the ASME B&PV Code, Section XI, Appendix E analysis is acceptable but not necessary. The use of either K_{Ic} or K_{Ir} is acceptable in that both reference toughness curves are conservative relative to the reactor vessel material properties. The evaluation report to be generated in accordance with Section E-1300 following the unanticipated event should document which reference toughness curve is used in the analysis.

6. Use of Section E-1200

Extracted Language from Federal Register/Vol 75. No 85/Tuesday, May 4, 2010/Proposed Rule Page 24347 Continued

10 CFR 50.55a(b)(2)(xxv) The NRC proposes to add a new paragraph (b)(2)(xxv) which would condition the use of ASME B&PV Code, Section XI, Nonmandatory Appendix E, by establishing that Section E–1200 is not acceptable for use.

Dominion Comment

Dominion does not agree with the proposed rule change to prohibit the use of ASME B&PV Code, Section XI, Nonmandatory Appendix E Section E-1200. Dominion recommends and requests that NRC make no rule change that would restrict the current use and analysis methods under Section E-1200. Section E-1200 is desirable for licensee use to determine if additional analysis is needed to assess the structural integrity of a reactor vessel following an unanticipated transient prior to

returning it to service. The Section E-1200 method of evaluation is quick thus it can be implemented in a timely manner and yet it is conservative as it ensures that upper shelf energy material properties are maintained.

7. Section E-1200 and Minimum Initiation Crack Size

Extracted Language from Federal Register/Vol 75. No 85/Tuesday, May 4, 2010/Proposed Rule Page 24358 Continued

(xxv) *Evaluation of unanticipated operating events.* The provisions of ASME B&PV Code, Section XI, Appendix E, Section E–1200 are not approved for use. In addition, when using the provisions of Section E–1300, the analytical procedure must be based on a postulated semi-elliptical surface flaw of a one-quarter vessel thickness (*i.e.,* the "minimum initiation crack size" in Table E–2 shall be a 1/4T flaw) and the linear elastic fracture mechanics criteria be as follows:

$1.4K_{Im} + K_{Ir} = K_{Ic}$ for the LTOP condition,
and $1.4K_{Im} + K_{It} + K_{Ir} = K_{Ic}$, for the PTT condition.

Dominion Comment

Dominion does not agree with the proposed rule change to prohibit the use of ASME B&PV Code, Section XI, Nonmandatory Appendix E Section E-1200 or the provision to require minimum initiation crack size of 1/4T flaw in Table E–2.

Dominion believes that Section E-1200 is useful and sufficiently conservative to be used to analyze LTOP events. Prohibiting the use of Section E-1200 will result in unnecessary shutdown/loss of generation because of the additional time required to perform the more detailed and comprehensive analysis under Section E-1300. It is estimated that a Section E-1200 evaluation can be completed in hours while a Section E-1300 evaluation may require days or weeks. Furthermore, use of a 1/4T flaw size has the potential to produce unacceptable analytical results due to overconservatism and predicting crack extension when none has occurred. This approach complicates the resolution process.

The requirement to use a minimum initiation crack size in Table E–2 of 1/4T is not necessary. The current provision in Table E-2 for a crack size up to 1 inch deep is sufficient because:

1. Actual flaw sizes do not approach even the 1 inch depth and are closer to a depth of approximately 0.10 inch,

2. Use of Section XI, EPRI PDI, and Appendix VIII provides continuous verification that the beltline region welds are either free of defects larger than approximately 0.10 inch or that they are documented and recorded, and

3. The analysis under Section E-1300 is conservative to prevent crack extension based upon reference toughness curves that are conservative to actual beltline material properties.

II. Comments on Proposed NRC Conditions on Code Case N-770

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(2)) to require that welds mitigated by inlays, cladding, or stress improvement by welding, be categorized as unmitigated welds pending plant-specific NRC review of the mitigation techniques and NRC authorization of an alternative ASME Code Case N–770 Inspection Item for the mitigated weld. ASME Code Case N–770 provides inspection methods and frequencies for welds mitigated by certain specified techniques. Inspections of mitigated welds are performed much less frequently than unmitigated welds. Requirements for most of the mitigation methods are contained in other ASME code cases under development. The NRC has typically approved the application of pressure boundary weld mitigation techniques on a case-by-case basis. This condition is necessary to ensure that appropriate mitigation techniques are applied to welds before they are categorized as mitigated under Code Case N–770.

Dominion Comment

With the exception of the Mechanical Stress Improvement Process (MSIP), all mitigation techniques discussed in Code Case N–770 are the subject of separate Code Cases, which are separately subject to approval by the NRC. MSIP meets the requirements of Appendix I of Code Case N–770 and has been separately approved by the NRC. Therefore, if already approved mitigation techniques are employed, a separate review of the reclassification of the welds should not be required.

This proposed section, requiring that welds that have been mitigated by weld inlay or onlay of corrosion resistant cladding be categorized for ISI frequency as Inspection Item A-1, A-2, or B, is not consistent with other proposed conditions, or with later revisions of Code Case N-770. For example, (g)(6)(ii)(F)(6) requires that a weld that has been mitigated by inlay or corrosion resistant cladding, and then is found to be cracked, be reclassified as and inspected using the frequencies of Inspection Item A-1, A-2, or B. This implies that an uncracked weld that has been mitigated by inlay or corrosion resistant cladding would NOT be categorized as Inspection Items A-1, A-2 or B following an acceptable pre-service examination. Another example is proposed Section (g)(6)(ii)(F)(7), which requires that a weld mitigated by inlay or corrosion resistant cladding be examined each interval if at hot leg temperatures, and as part of a 25 percent sample plan on a 20 year frequency if at cold leg temperatures. Neither of these proposed conditions are consistent with Inspection Items A-1, A-2, or B.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(3)) to require that the baseline examination of welds in Inspection Items A–1, A–2, and B (unmitigated welds) be completed at the next refueling outage after the effective date of the final rule. Paragraph –2200 of Code Case N–770 permits welds in Inspection Items A–1, A–2, and B (unmitigated welds) that have not received a baseline examination to be examined within the next two refueling outages from adoption of the Code Case. Welds in Inspection Items A–1, A–2, and B are the welds most likely to experience PWSCC and some of these welds may not have received a baseline examination, even under the industry initiative, MRP–139. This condition is necessary to ensure the integrity of these welds by requiring that all welds in Inspection Items A–1, A–2 and B be inspected at the first opportunity to perform the inspections.

Dominion Comment

Depending on the implementation date, approval of the final rule may be such that there is not adequate time to plan and prepare for the required baseline inspection and prepare repair contingencies, e.g. approval of the rule in June with the next refueling outage for a plant scheduled for September. By providing the flexibility of the next two refueling outages, required planning and preparation can be accommodated. Dominion considers the Code Case should be unmodified in this regard.

Proposed Condition

The NRC proposes to add a condition (§50.55a(g)(6)(ii)(F)(4)) to require essentially 100 percent coverage for axial flaws. Paragraph –2500(c) of Code Case N–770 permits examination of axial flaws with inspection coverage limitations provided essentially 100 percent coverage for circumferential flaws is achieved and the maximum coverage practical is achieved for axial flaws. This requirement on inspection limitations is inconsistent with comparable inspection requirements of the ASME B&PV Code, Section XI. Axial flaws can lead to through wall cracks and leakage of reactor coolant, which is a safety concern. The proposed condition is necessary for the NRC to ensure that, through NRC review of an authorization of alternative inspection coverage, appropriate actions are being taken to address potential inspection limitations for axial flaws.

Dominion Comment

The requirement in Code Case N–770 addresses those instances where essentially those 100% coverage cannot be achieved due to interferences from other structures. In those instances, if essentially 100% coverage is achieved for circumferential flaws (100% of the susceptible material volume) and the maximum coverage practical is achieved for axial flaws, and limitations are noted in the examination report, the coverage requirements are considered to be satisfied.

Dominion notes that both Code Case N-770 and MRP-139 (Section 5.1.5) permit examination of axial flaws with inspection coverage limitations provided essentially 100 percent coverage for circumferential flaws is achieved and the maximum coverage practical is achieved for axial flaws.

From a practical application perspective, if the proposed condition is placed on Code Case N–770, does its implementation negate taking credit for previous "baseline inspections" of butt welds that met the requirements of MRP-139 and Code Case N–770?

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(5)) to reword Paragraph –3132.3(b) on determining flaw growth using wording consistent with that used in the ASME B&PV Code, Section XI. Paragraph –3132.3(b) contains the statement that a "flaw is not considered to have grown if the size difference (from a previous examination) is within the measurement accuracy of the nondestructive examination (NDE) technique employed." The "measurement accuracy of the NDE technique employed" is not defined in the code case or in the ASME B&PV Code. Use of this terminology may result in a departure from the past practice when applying ASME B&PV Code, Section XI. Under the requirements of Section XI, one concludes that flaw growth has not occurred when a "previously evaluated flaw has remained essentially unchanged." The proposed condition uses this wording. This condition is necessary to clarify the requirements for determining whether flaw growth has occurred and make the requirements consistent with ASME B&PV Code requirements endorsed by the NRC in 10 CFR 50.55a.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, Paragraph –3132.3(b) has been modified to read as follows:

> *Previously evaluated flaws that were mitigated by the techniques identified in Table 1 need not be reevaluated nor have additional or successive examinations performed if new planar flaws have not been identified or the previously evaluated flaws have remained essentially unchanged.*

Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(6)) on welds that are determined through a volumetric examination to have cracking that penetrates beyond the thickness of the inlay or cladding. The condition would require such welds to be reclassified as Inspection Item A–1, A–2, or B, as appropriate, until corrected by repair/ replacement activity in accordance with IWA–4000 or by corrective measures beyond

the scope of Code Case N–770. Code Case N–770 would permit welds mitigated by inlay or cladding (i.e., onlay) in Inspection Items G, H, J, and K, to remain in those Inspection Items if cracking that penetrates through the thickness of the inlay or cladding occurs. The purpose of an inlay or cladding is to provide a corrosion resistant barrier between reactor coolant and the underlying Alloy 82/182 weld material that is susceptible to PWSCC. If cracking penetrates through the thickness of an inlay or cladding, the inspection frequencies of Inspection Items G, H, J, and K would no longer be appropriate even after satisfying the successive examination requirements of paragraph –2420. This condition is necessary because welds with cracking that penetrates beyond the thickness of the protective barrier of the inlay or cladding would no longer be mitigated and would need to be inspected under one of the Inspection Items for unmitigated welds.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, added the following to the end of Note 16(c):

If cracking penetrates beyond the thickness of the inlay or onlay, the weld shall be reclassified as Inspection Item A-1, A-2, or B, as appropriate, until corrected by repair/replacement activity in accordance with IWA-4000 or by corrective measures beyond the scope of this Case (e.g., stress improvement).

Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(7)) on welds in Inspection Items G, H, J, and K, (welds mitigated by inlay or cladding) that the ISI surface examination requirements of Table 1 should apply whether the inservice volumetric examinations are performed from the weld outside diameter or the weld inside diameter. Code Case N–770 only requires a surface examination for welds in Inspection Items G, H, J, and K if a volumetric examination is performed from the weld inside diameter surface. A volumetric examination performed from the weld outside diameter surface would not be capable of detecting flaws in an inlay or cladding. This condition is necessary to ensure that weld inlays or cladding are still performing their intended function of providing a protective barrier between the reactor coolant and the underlying Alloy 82/182 weld that is susceptible to PWSCC.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, modified the "Extent and Frequency of Examination" column in Table 1 to state:

".....Twenty-five percent of this population shall receive surface examination (17) performed from the weld inside surface and a volumetric examination (16) performed from either the inside or outside surface....."

This same modification was applied to Inspection Item G, H, J, and K. Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC also proposes, as part of a new condition as § 50.55a(g)(6)(ii)(F)(*7*), to require that all hot-leg operating temperature welds in Inspection Items G, H, J, and K (welds mitigated by inlay or cladding) be inspected each interval and that a 25 percent sample of cold leg operating temperature welds in Inspection Items G, H, J, and K be inspected whenever the core barrel is removed (unless it has already been inspected within the past 10 years) or 20 years, whichever is less. Code Case N–770 permits welds in Inspection Items G, H, J, and K to be placed in a 25 percent sample inspection program under certain conditions after the required initial inspection. The NRC has performed analyses of crack growth in welds mitigated by Alloy 52/152 inlay or cladding using experimentally derived crack growth data for this weld material. The results of those analyses show that welds in Inspection Items G, H, J, and K at hot leg temperature have to be examined once per interval and welds at cold leg temperature have to be inspected under a sample inspection program to detect potentially significant crack growth. This condition is being proposed to ensure that ASME Code allowable limits would not be exceeded and PWSCC would not lead to leaks or ruptures.

Dominion Comment

Code Case N–770 requires that a pre-service inspection and at least one inservice inspection be performed before a weld mitigated by inlay or onlay can be put in the 25% population. Dominion considers that this approach would provide early crack detection and the detection of any fabrication induced cracks. Thereafter, the leading indicator approach is taken in that the hottest, most susceptible, welds are inspected each interval. If these show indications of new cracking or growth of existing cracks, then the additional and successive examination paragraphs of the Case would apply to expand the examination. This approach is sufficiently conservative and consistent with the philosophy applied to all the other mitigation techniques employed in the Case. Cold leg inspection is not justified unless flaws are discovered in the hot leg welds which is the approach taken in this Case.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(*8*)) to prohibit the first examination following weld inlay, cladding, or stress improvement for Inspection Items D, G, and H from being deferred to the end of the interval. Code Case N–770 provides requirements on the timing of the first examination following weld inlay, cladding, or stress improvement. Inspection Items D, G, and H pertain to mitigation of cracked welds

and the timing of the initial examinations in the code case has been specified in the code case so that the welds are not in service for an extended time period prior to the initial examination. However, the code case does not explicitly preclude deferral of these examinations to the end of the interval. Therefore, this NRC condition is needed to ensure that the initial examinations of welds in Inspection Items D, G, and H take place on an appropriate schedule to verify the effectiveness of the mitigation process.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, modified Notes 11(b)(1) and (2) as follows:

11(b) Examinations of welds originally classified Table IWB-2500-1, Category B-F welds, Item Numbers B5.10, and B5.20 prior to mitigation, may be deferred following weld inlay, onlay, overlay, or stress improvement, as follows:

(1) Examination for Inspection Item C may be deferred to the end of the interval and performed coincident with the vessel nozzle examinations required by Category B-D.

(2) The first examinations following weld inlay, onlay, weld overlay, or stress improvement for Inspection Items E through K shall be performed as specified. For Inspection Item D, the first examinations following stress improvement may be performed any time within 10 years following mitigation. Subsequent examinations for Inspection Items D through K may be performed coincident with the vessel nozzle examinations required by Category B-D.

Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(9)) on Measurement or Quantification Criterion I–1.1 of Appendix I to require the assumption in the weld residual stress (WRS) analysis of a construction weld repair from the inside diameter to a depth of 50 percent of the weld thickness extending 360°around the weld. Measurement or Quantification Criterion I–1.1 does not specify the circumferential extent of the repair that must be assumed. This condition is necessary to clarify the size of the repair to be assumed in the weld residual stress analysis which would ensure that appropriate criteria for the WRS analysis are used for mitigation by stress improvement.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, modified paragraph I-1.1 to read as follows:

".....A pre-stress improvement residual stress condition resulting from a construction weld repair from the inside surface to a depth of 50% of the weld thickness and extending for 360 deg. shall be assumed."

Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC proposes to add a condition (§50.55a(g)(6)(ii)(F)(*10*)) on Measurement or Quantification Criterion I–2.1 of Appendix I to require that the last sentence be replaced. This criterion was inappropriately worded since this criterion pertains to the permanence of a mitigation process by stress improvement and plastic "shakedown" rather than "ratcheting" as the phenomenon that could lead to stress relaxation. This condition is necessary to clarify the type of analysis necessary to ensure that the mitigation process is permanent and that the inspection frequencies associated with the process continue to be correct.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, modified paragraph I-2.1 to read as follows:

"....The analysis or demonstration test shall account for (a) load combinations that could relieve stress due to shakedown and (b) any material properties related to stress relaxation over time."

Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(*11*)) to require that in applying Measurement or Quantification Criterion I–7.1 of Appendix I, an analysis be performed using IWB–3600 evaluation methods and acceptance criteria to verify that the mitigation process will not cause any existing flaws to grow. Measurement or Quantification Criterion I–7.1 permits the growth of existing flaws in welds mitigated by stress improvement. This is an inappropriate provision since the process of mitigating by stress improvement is intended to prevent growth of existing flaws which could lead to leakage or rupture of the weld. This condition is necessary to ensure that stress improvement of welds with existing flaws is an effective mitigation technique consistent with the inspection frequency in the code case.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, modified paragraph I-7.1 to read as follows:

An analysis shall be performed using IWB-3600 evaluation methods and acceptance criteria to verify that the mitigation process will not result in any existing flaws to become unacceptable over the life of the weld, or before the next scheduled examination.

This wording will assure that stress improvement of welds with existing flaws is an effective mitigation technique consistent with the inspection frequency in the code case. It is also consistent with the Code Case methodology. Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(*13*)) to require that the last sentence of the Extent and Frequency of Examination for Inspection Items C and F be revised. Inspection Items C and F apply to butt welds mitigated by full structural weld overlays of Alloy 52/152 material. Note 10 of the Code Case requires that welds in Inspection Items C and F that are not included in the 25 percent sample be examined prior to the end of the mitigation evaluation period if the plant is to be operated beyond that time. This condition would ensure that welds in the 25 percent sample are also examined prior to the end of the mitigation evaluation period; that is, prior to the end of life of the overlay predicted by the mitigation evaluation. Inspection prior to the end of the mitigation evaluation period is necessary to ensure that appropriate information has been obtained to verify the condition of the weld overlay and update the analysis for the predicted life of the weld overlay.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, added the following sentence to the Extent and Frequency of Examination for Inspection Items C and F:

For each overlay in the 25% sample that has a design life of less than 10 yr., at least one inservice inspection shall be performed prior to exceeding the life of the overlay.

Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(*14*)) on the 1/2-inch (13 mm) dimension shown in Figures 2(b) and 5(b) of Code Case N–770. The condition would require that a dimension "b" be used instead of c inch, where "b" is equivalent to the nominal thickness of the nozzle or pipe being overlaid, as appropriate. The code case contains information on component thicknesses to be used in application of the acceptance standards of ASME B&PV Code, Section XI, IWB–3514, to evaluate flaws detected during preservice inspection of weld overlays. The 1/2-inch (13 mm) dimension

shown in Figures 2(b) and 5(b) is nonconservative. The appropriate dimension is a function of the nominal thickness of the nozzle or pipe being overlaid and not a single specified value for all pipes and nozzles. This condition is necessary to ensure that acceptance standards used for evaluation of any flaws detected during preservice inspection of weld overlays assure an appropriate level of safety.

Dominion Comment

Code Case N-770-1, approved by the ASME on Dec. 25, 2009, removed the 1/2-inch (13 mm) dimension shown in Figures 2(b) and 5(b) of Code Case N–770 and replaced them with dimensions "X" and "Y". The notes beneath each figure define dimensions "X" and "Y" as follows:

Dimension "x" or "y" is equivalent to the nominal thickness of the nozzle end preparation or the pipe, respectively, being overlaid.

Adoption of Code Case N-770-1 would remove the need for this condition.

Proposed Condition

The NRC proposes to add a condition (§ 50.55a(g)(6)(ii)(F)(*16*)) on welds mitigated by stress improvement by welding in Inspection Items D and E to not permit them to be placed into a population to be examined on a sample basis after the initial examination. Stress improvement by welding is also called an optimized weld overlay. Code Case N–770 permits welds mitigated by this technique to be placed in a 25 percent inspection sample after the initial examination. Sample inspections could result in three-quarters of the welds never being examined after the initial examination. Although full structural weld overlays have been used extensively in the nuclear industry for many years, the industry does not have experience with optimized weld overlays. Optimized weld overlays are designed to rely on the outer 25 percent of the original Alloy 82/182 material to satisfy the design margins and would not satisfy design margins if significant cracking were to occur. If significant cracking were to occur in the Alloy 82/182 material, the optimized weld overlay material would prevent the weld from leaking and could potentially rupture without prior evidence of leakage under design basis conditions. The proposed condition is necessary to ensure that all optimized weld overlays are periodically inspected for potential degradation.

Dominion Comment

Code Case N–770 requires that a pre-service inspection and at least one inservice inspection be performed before a weld mitigated by an optimized overlay can be put in the 25% population. Dominion considers that this approach would provide early crack detection and the detection of any fabrication induced cracks. Thereafter, the leading indicator approach is taken in that the hottest, most susceptible, welds are inspected each interval. If these show indications of new cracking or growth of existing cracks, then the additional and successive examination paragraphs of the

Case would apply to expand the examination. This approach is sufficiently conservative and consistent with the philosophy applied to all the other mitigation techniques employed in the Case.

Additional Dominion Comment

Code Case N-770, Table 1, Inspection Item "D", Uncracked butt welds mitigated by stress improvement, has a requirement in the second sentence of "Extent and Frequency of Examination" to spread out the population of mitigated welds in years 3 through 10 following applications of the mitigation. This provision creates an unintended penalty when compared to other mitigation categories which allows all of the population to be performed at once. A change was brought to the attention of the ASME Alloy 600 Task Group preparing revisions to the N-770-1 and accepted for incorporation into its next revision. The proposed change is being documented in ASME Codes & Standards Tracking number BC-09-1145. The change was to replace the 1st two sentences under the in the "Extent and Frequency of Examination" column of inspection Item "D" with the following sentence: *"Examine all welds no sooner than the third refueling outage and no later than 10 years following stress improvement application."*

The basis for this proposed change is as follows: The proposed change was made because the current wording in Table 1, "Category D, Uncracked butt weld mitigated with stress improvement, Extent and Frequency of Examination," creates an unnecessary penalty (compared to other mitigation categories) for dissimilar metal piping welds that are mitigated by stress improvement by spreading the examination population for the 1st examination through years 3 through 10. This provision was originally considered as consistent with the ASME Code Section XI, Table IWB-2412-1 and provisions in Table IWB-2500-1 for deferral to end of interval, which are only applicable for RV Nozzle to safe end welds, Category B-F welds item B5.10 and B5.20. However, when the population is applied to small quantity of mitigated welds other than the RV nozzles, it results in multiple mobilizations with possibly 1 weld per inspection period. The multiple mobilizations for these uncracked welds that are mitigated by stress improvement creates an unrecognized inequity in N-770 and N-770-1 when compared to uncracked welds that are not mitigated (and remain in a larger population) as well as cracked welds that are mitigated by the same stress improvement method (Category E). This inequity is clear when recognizing that all other categories of mitigated welds, Categories E-K, do not require the spreading of the mitigated population for the 1st exam after mitigation. The spreading out of the population of mitigated welds in Category D as currently written is considered punitive in the first interval when compared to inspection without mitigation and could result in an impediment to performing mitigation.