RESPONSE TO PUBLIC COMMENTS

COMMENT LETTERS RECEIVED ON DRAFT REGULATORY GUIDES 1.84, Revision 34, and 1.147, Revision 15			
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4	Jack Spanner	Electric Power Research Institute	ML0701104121
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RESPONSE TO PUBLIC COMMENTS ON REGULATORY GUIDE 1.84, PROPOSED REVISION 34

Draft Regulatory Guide DG-1133 (proposed Revision 34 of Regulatory Guide 1.84) was published for public comment in the *Federal Register* (71 FR 62947) on October 27, 2006. This draft guide listed for the first time Code Case N-659. The NRC proposed a condition to address a concern with regard to calibration blocks. No public comments were received relative to this proposed condition.

The statement of considerations of the October 27, 2006, *Federal Register* notice discussed several other concerns emanating from a licensee request to use Code Case N-659. The purpose of the discussion was to alert the industry that it was the NRC's intent to add conditions to the code case in the final guide unless public comments were received indicating that the staff's proposed technical bases for the conditions were incorrect, not applicable, unnecessary, or not justified. The focus of the concerns is whether ultrasonic testing (UT), as required in accordance with Code Case N-659, is an acceptable alternative to radiographic testing (RT), as required in accordance with Section III. The NRC's assessment is that additional demonstrations are needed relative to personnel training and flaw detection and characterization.

Comments were received from eight sources relative to proposed Revision 34 of Regulatory Guide 1.84. All of the comments addressed the same item, i.e., Code Case N-659, "Use of Ultrasonic Examination in Lieu of Radiography for Weld Examination, Section III, Division 1." The commenters were: James H. Riley, Nuclear Energy Institute, Douglas Henry, General Electric, Daniel Kerr, PG&E, Jack Spanner, Electric Power Research Institute, C. Thomas Alley, Jr., Duke Energy, B.T. McKinney, PPL Susquehanna, LLC, C.J. Wirtz, Individual, and Mike Gothard, Electric Power Research Institute.

All eight commenters had difficulties with the NRC's proposed conditions. Several commenters stated that further clarification was needed, and the demonstration program needed to be better defined. Other commenters believe that there is no need to require blind procedure and personnel demonstrations since a blind personnel demonstration would be sufficient in their opinion to also demonstrate the procedure. Some specific questions were raised such as the number of flaws required for the procedure demonstration and false calls.

It should be noted that prior to the publication of Draft Regulatory Guide DG-1133, Draft Regulatory Guide DG-1135 (proposed Revision 2 to Regulatory Guide 1.193, "ASME Code Cases Not Approved for Use"), was published for public comment (71 FR 32615, June 6, 2006). DG-1135 listed for the first time Code Case N-659-1. In Revision 1 of the code case, changes were made that the NRC staff found to be unacceptable. No public comments were received on the NRC's basis for excluding Code Case N-659-1 from Regulatory Guide 1.84.

Accordingly, after reviewing the issues raised in the public comments on Code Case N-659 and given the status of Code Case N-659-1, the NRC has determined that a more effective approach for developing a suitable performance demonstration program would be to work with ASME International. Thus, the NRC is not going to endorse Code Case N-659 or Code Case

N-659-1 at this time, and the NRC staff will work through the ASME Code process to resolve the issues.

To ensure that all stakeholders understand the staff's concerns, responses to some of the public comments on Code Case N-659 dealing with the concept and motive for performance demonstration are provided below. Responses are not provided for many of the public comments addressing details such as acceptance criteria as these will be dependent on the scope of the performance demonstration program. The responses should be considered as the staff's preliminary positions on the issues.

COMMENTER: James H. Riley, Nuclear Energy Institute

Comment 1A:

The three personnel qualifications required for a procedure qualification should be specified for the initial procedure qualification. *Commenter's Proposed Revision:* Insert the word "initial" between the words "a" and "procedure".

Response to Comment 1A:

The staff agrees with the wording change because changes to a qualified generic procedure usually involves one essential variable which can be validated by a single personnel qualification. As the number of essential variables involved in changes increase, the population size needed to evaluate their interaction also increases. Changes of two or more essential variables at one time may effectively be a new procedure and should be qualified with the number of flaws equivalent to three personnel qualifications.

Comment 1B:

Further clarification needs to be provided if the procedure is being requalified due to an essential variable change. *Commenter's Proposed Revision:* Add clarification that for requalification of a procedure due to an essential variable change only one personnel qualification is required.

Response to Comment 1B:

The staff agrees with the comment. For requalification of generic procedures with one essential variable change, or changes to non-generic procedures, only one personnel qualification is required. For procedure requalification, all flaws must be detected. The qualification is to show that the change does not affect other essential variables and that the most difficult flaws can be detected.

Comment 1C:

Each flawed and unflawed volume shall be defined in independent grading units. There is no specified ratio for how many flawed and unflawed grading units are required and there is no specified size for the grading units. *Commenter's Proposed Revision:* Refer to ASME Section

XI, Appendix VIII for the size of grading units and ratio between flawed and unflawed unit. Grading units apply to detection.

Response to Comment 1C:

The staff agrees with the comment. The staff finds the ASME Section XI, Appendix VIII, size of grading units and ratio of flawed to unflawed grading units to be acceptable.

COMMENTERS: Daniel Kerr, PG&E; Jack Spanner, Electric Power Research Institute

Comment 2A (Daniel Kerr, PG&E):

The sentence "The demonstration must show the capability to detect flaws having a minimum 2% through-wall depth and within the flaw length acceptance of NB-2553(c) is excessively conservative and not clear. Interpreting the above sentence conservatively, the intended 2% would be "not to exceed" which is unreasonable and excessive for an adequate UT examination. It appears to be based on typical ASME Section V, RT penetrameter requirements and should not be a requirement for an adequate UT examinations.

For thin components, the ability for UT to detect a 2% through-wall flaw is not possible. For example a component with a 0.3-inch wall thickness, would have to detect a 0.006-inch deep flaw. This condition would result in numerous false calls. UT has the physical capability of detecting 0.03 or 0.06-inch deep flaws. Flaw fabrication processes cannot reliably make such a small flaw. It is recommended that the 2% flaw condition be truncated at 0.06-inch deep.

Response to Comment 2A:

The staff agrees with the comment. The 2% through-wall flaw criteria is to show that UT flaw detection capabilities are on par with RT flaw detection capabilities. The performance demonstration must be capable of detecting a 2% through-wall flaw. As stated in the comment, the practical flaw detection limit for UT is 0.03-inches. Combining the practical flaw detection limit with a millimeter or two for flaw insertion tolerance in a test specimen produces a value for thin wall material that exceeds the 2% through-wall flaw criteria. Thus for thin wall material, the 2% through-wall flaw criteria may be truncated at a depth of 0.05-inches.

Comment 2B (Daniel Kerr, PG&E):

For Code Case N-659, It is suggested that instead of a 2% through-wall flaw depth something more in-line with what is specified in ASME Section VIII, Code Case 2235, which is approximately 10% should be used. No matter what value is specified, the existing wording is not clear. Using my suggested value of 10%, "a minimum of 10%" could be interpreted non-conservatively as allowing the demonstration to show detection of flaws 10% or greater, such as 11% or even 100%. More appropriate wording might be something like "capability to detect flaws having a through-wall extent not exceeding 10% of the nominal wall thickness and" instead of using the confusing term, "minimum."

Response to Comment 2B:

The staff disagrees with the comment of using a limiting value of 10%. Section III, NB-2553(c), NX-5320(b), (c), and (d) have the same flaw size acceptance criteria for RT and UT. The comment to use a less stringent UT flaw acceptance criteria than is currently required for RT ignores flaw detection interchangeability between the volumetric examination methods. The use of different flaw acceptance criteria based on the strengths, weakness, and sizing capabilities of RT versus UT must be supported with technical data. In the absence of a comprehensive study on acceptable flaw sizes for construction activities, the staff has no technical bases for establishing different volumetric flaw acceptance criteria between RT and UT. Therefore, the current acceptance criteria will be applied.

Comment 2C (Daniel Kerr, PG&E; Jack Spanner, Electric Power Research Institute):

Section III, Paragraph NB-5330, UT length acceptance standards for flaws up to 1/4" long are acceptable for wall thicknesses up to 3/4-inch, flaws with a length measurement up to 1/3 the through-wall thickness are acceptable for 3/4-inch through 2-1/2-inch thick material, and flaws up to 3/4" long are acceptable for wall thicknesses greater than 2-1/2-inch. All detected flaws must be correctly identified as acceptable or unacceptable. This condition is impossible to meet because of the known sizing errors, the small flaws of NB-2553(c), and the variety of potential construction flaws that include volumetric and planar shapes. I recommend that 80% of the flaws should be correctly identified based on experience.

For qualifications purposes only, after applying a flaw length tolerance equal to ±10% of the nominal wall thickness, or approximately ±0.2-inch which ever is greater, to the recorded flaw length, all flaws shall be correctly identified as acceptable or unacceptable.

Response to Comment 2C:

The staff agrees that a tolerance is necessary for determining flaw acceptance but disagrees with the need for allowing a specific number of inaccurately dispositioned flaws. The tolerances provide flexibility at the maximum acceptance values to account for UT measurement error and the effects of this error on flaw disposition.

Comment 2D (Daniel Kerr):

If the current number of required qualification flaws remains the same, consider, within limitations, allowing a single qualification flaw to be counted more than once to meet the requirement for “a minimum of 10 flaws” (for sizing), or the number of flaws required for detection. For example, a single flaw on the upstream side of a base metal-to-weld fusion zone weld prep could be considered 2 separate flaws if it can be properly detected or sized from both the upstream and downstream sides independently. Another example might be the use of a different UT mode or angle to detect the same flaw. All methods used to record the required number of flaws properly would then be required to be part of a qualified procedure. A much smaller number of flaws could than still provide the intended statistical basis for substantially less cost.

Response to Comment 2D:

The performance demonstration is a blind test which must demonstrate the effectiveness of the UT technique as described in the procedure and must demonstrate the skills of the personnel applying the technique. The personnel participating in the performance demonstration shall not have prior knowledge of any flaw characteristic that would compromise the blind test. The proposed rule for flaw selection is that the flaws are randomly distributed throughout the weld thickness and representative of the variety of construction flaws common to the welding process and material. The repetitive use of a single flaw in the same performance demonstration is unlikely to satisfy the proposed conditions of random distribution, construction variety, and no prior knowledge criteria. Nevertheless, flaw selection is the prerogative of the organization responsible with maintaining integrity of the blind test while satisfying the Code case as conditioned.

COMMENTER: Douglas Henry, General Electric

Comment 3A:

The conditional acceptance in DG-1133 are not justified and are inconsistent with current 10 CFR regulations and licensing correspondence from the NRC staff. Implementation of the proposed conditions will render Code Case N-659 unusable for practical purposes.

The proposed condition for a performance demonstration increases the minimum qualification requirements for a procedure from one examiner qualifying on a sample containing two or three flaws to three examiners qualifying on a sample set containing a minimum of ten flaws (or a sample set of 30 flaws if only a single examiner is used). Under those proposed performance demonstration requirements, the cost of performing UT under ASME Code Case N-659 would be increased by a factor of two to three, increasing the cost of UT to around 40 to 90 times the cost of performing RT. A cost of that magnitude would completely outweigh the benefits that could otherwise be achieved using the ASME Code Case N-659, rendering the Code case unusable for any application except perhaps for the most extreme situations in which RT simply could not be performed.

Response to Comment 3A:

The primary basis for the argument that the proposed conditions are not justified is that the examinations as defined in the code case must be qualified in accordance with Appendix VIII of Section XI, which has been endorsed by the NRC. However, the provisions of Appendix VIII are based on service-induced flaws rather than flaws associated with construction. Based on recent reviews of a revision to Code Case N-659 and other interactions with the industry, additional concerns were raised by NRC staff relative to the application of the code case. This resulted in the proposed conditions. As discussed previously, the NRC believes it would be prudent to work with ASME International to address the staff's concerns and the concerns raised by the commenters.

With regard to practicality, the comment suggests that conditional acceptance of the code case would result in the costs outweighing the benefits making the code case unusable. The staff wants to ensure that alternatives are effective while minimizing the use of resources. However,

the alternative must be shown to be effective and reliable. In addition, cost comparisons between RT and UT are more involved than just procedure and personnel performance demonstration costs. Other cost consideration are total examination time, the ability to perform parallel maintenance activities, differences in radiation exposure, accessibility of the component and general area, qualification portability to other facilities, and pooling the costs of generic procedures. Given the concerns, the NRC believes it would be best to work with ASME International to resolve the issues.

Comment 3B:

The proposed conditions are not needed based on past and current NRC regulations on UT. The most significant proposed condition is the performance demonstration which only applies to examination of butt welds. The additional UT performance demonstration requirements are not justified by mere differences in the sensitivity to individual fabrication flaws between the RT and UT methods. The requirements can only be justified by a deficiency in the capability of UT to find and reject actual defects, but the commentary neither asserts nor offers support for an assertion that UT performed under current Code requirements or the enhanced requirements under Code Case N-659 would miss actual fabrication defects. Section XI, Appendix VIII is used only for detecting service-induced flaws and does not apply to detecting construction flaws.

Response to Comment 3B:

The staff disagrees with the comment. On December 31, 1996, the NRC staff issued a proposed generic communication, "Effectiveness of Ultrasonic Testing Systems in Inservice Inspection Programs." The proposed generic communications presented the NRC's safety concerns pertaining to the effectiveness of UT procedures and the skills of UT personnel. The generic communication addressed the industry's inability to reliably detect and properly disposition flaws. On September 22, 1999, the NRC issued a final rule that required the accelerated implementation of performance-based qualification requirements of Appendix VIII of Section XI of the ASME Code for the qualification of UT procedures and personnel. The qualification requirement established a minimum level of proficiency and reliability for examination procedures and personnel without changing the prescriptive requirements that existed in Section XI of the ASME Code. To ensure a minimum level of proficiency and reliability for procedures and personnel who perform ultrasonic examination in lieu of the required radiography in accordance with Section III of the ASME Code, the proposed conditions require a blind performance-based demonstration be conducted on representative mockups containing representative construction flaws and flaw distributions for procedures and personnel. Procedures and personnel unable to satisfy the performance demonstration screening criteria are considered unqualified for examinations of the representive mockups. Through the performance demonstration screening process, procedure effectiveness and personnel skills can be quantifiably validated, thus establishing confidence and reliability in UT examinations of pressure retaining butt welds.

The vast improvement in effectiveness and reliability of UT inservice inspections over prescriptive techniques which are the foundation of current Section III UT requirements are well documented. The NRC is applying the lessons learned from the application of performance-based UT examinations at operating nuclear power plants to the development of

performance-based criteria for UT examinations applied as an alternative to Section III required RT examinations for pressure retaining butt welds.

Comment 3C:

Assertions in the commentary conflict in principle with uses of UT already approved by the NRC in 10 CFR 50 by reference to Section III for Class 1, 2, and 3 pressure boundary corner-type welded joints and for all types of welded joints (except electroslag welds) for core support structures. The existing Section III UT Code requirements are less restrictive and been accepted for years without NRC reservation. Despite some differences in the response to different types of imperfections, the field history has shown that both RT and UT methodologies as described in Section V and referenced by Section III for many years are an effective means for identifying and rejecting fabrication defects to ensure the integrity of nuclear construction as evidenced by the NRC approval of both RT and UT.

Response to Comment 3C:

The staff disagrees with the comment. The predominate examination requirement for verifying Section III weldment integrity is RT. Section III permits UT examinations of full penetration oblique and corner welded branch and piping connections. Because it is very difficult to weld these large pieces in the field, it is expected that these fittings would be fabricated in the factory where the weld is accessible from both the inside and outside surfaces. Section III and Section XI require that welds be accessible for examination which is normally conducted, after assembly at a plant, from the outside surface. Because it is difficult to perform an adequate examination from the outside surface only, this would appear to limit the application of UT. Thus, the option of using UT to examine construction fitting welds has been accepted, but the application should be limited as discussed above.

Code Case N-659 provides UT as an alternative for RT butt weld examinations which are currently required by Section III. Any Section III UT requirement for butt welds is a new application. Butt welds are the predominate joining process used for securing the reactor pressure boundary. They are designed for inspection accessability (normally from one surface) and are often fabricated in the field. The performance demonstration ensures that UT will be as effective in detecting and characterizing flaws in the field, for the configurations encountered, as the current RT requirements.

Comment 3D:

The explanation is insufficient to support imposing requirements (performance demonstration) because it does not relate a need for these requirements to the capability of UT to detect actual fabrication defects. The UT performance demonstration requirements are not justified by mere differences in the sensitivity to individual fabrication flaws between the RT and UT methods.

Response to Comment 3D:

The staff disagrees with the comment. The conditions are to ensure that the UT examinations are effective in reliably determining acceptable and unacceptable flaws according to the flaw

type and dimensions contained in Section III of the ASME Code. The suitability of a flaw size for service is a separate issue from demonstration requirements.

Comment 3E:

The commentary only states "RT and UT are not equally effective for flaw detection" citing minor differences between the responses of the two test methods to different types of imperfections found in weldments. This concept error is pervasive and continues in the explanation of the first concern where the statement is made that "Section V prescriptive-based requirements are less effective in detecting flaws than performance based (Section XI) Appendix VIII requirements."

Response to Comment 3E:

The staff disagrees. In theory, procedures and personnel qualified to the prescriptive-based requirements of Section V or Section XI should successfully meet the performance demonstration screening criteria of Section XI, Appendix VIII. However, in practice, the results have been much different. The screening criteria sets a threshold for procedure and personnel proficiency. For example, Appendix VIII, Supplement 10 screening criteria for dissimilar metal welds were known by the industry years before rulemaking set a mandatory implementation date. When the implementation date arrived, not a single prescriptive-based qualified procedure or personnel could demonstrate proficiency in detecting actual flaws in dissimilar metal welds. The NRC issued Regulatory Issue Summary 2003-01, "Examination of Dissimilar Metal Welds, Supplement 10 to Appendix VIII of Section XI of the ASME Code," notifying all licensees of operating nuclear power reactors that they were in noncompliance.

Comment 3F:

The implication is that RT is less effective than UT in detecting planar flaws, but the fact is that both RT and UT have been used for ASME Code, Section III applications for many years and no failure root cause has been attributed to fabrication defects missed by RT or UT performed properly in accordance with ASME Code, Section III rules.

Response to Comment 3F:

The staff disagrees with the comment. For instance, LER 50-423/2005-004-00 documented unacceptable indications in a reactor coolant system pressurizer nozzle-to-safe end weld which were attributed to defects in the weld that occurred during original plant construction. The indications were detected using Section XI, Appendix VIII performance-based qualified procedures and personnel. A review of the Section III RT film showed the existence of the indications which were not recognized at the time of construction. The indications were also not detected by the prescriptive-based preservice UT examination.

Comment 3G:

The field history supports that both RT and UT performed in accordance with current Code are sufficiently effective at detecting and rejecting fabrication defects, including planar defects. The commentary fails to show how the requirements of Code Case N-659 are insufficient. The

commentary fails to show or even claim that a significant level of improvement in detection of actual fabrication defects in the field would be achieved.

Response to Comment 3G:

The staff disagrees with the comment. As discussed in the response to Comment 3E, procedures and personnel qualified to prescriptive-based requirements have not been able to demonstrate sufficient proficiency. In addition, the Code Case permits the examination and evaluation requirements of Section XI to be used for preservice examination, and the acceptance requirements of Section XI are less stringent than those in Section III.

By applying both construction RT and preservice UT examinations, the complementing aspects of these two volumetric methods provide confidence that any detrimental flaws are detected. To require only one volumetric method necessitates demonstrating that the method is effective and reliable.

Comment 3H :

The Code Case N-659 demonstration requires that all flaws in the sample be detected, while the proposed "statistical approach" to performance demonstration described allows 2 out of 10 flaws to be missed completely.

Response to Comment 3H:

The staff disagrees with the implication that the current demonstrations in Code Case N-659 are more stringent than the proposed statistically analyzed performance demonstrations. In Code Case N-659, the Section V demonstration requires the detection of 2 construction flaws under non-blind testing conditions, and the Section XI, Appendix VIII expansion demonstration requires detection of three construction flaws under blind testing conditions. The number of flaws in the demonstration are insufficient to represent the variety of flaws that can occur during construction. The proposed condition is to test the personnel skills on a wide variety of construction flaws and to discourage testmanship by penalizing testers for incorrectly identifying flaws. The statistical approach to performance demonstration is based on a minimum number of detected flaws to a maximum number of incorrectly detected flaws. The statistical approach is a measure of personnel proficiency.

Comment 3I :

Although performance demonstration requirements are a "statistical approach," the commentary offers no probability of detection and confidence interval relating those additional performance demonstration requirements to an improvement factor in the detection and rejection of actual fabrication defects over the expected performance of Code Case N-659 without modification.

Response to Comment 3I:

The staff agrees with the comment. The probability of detection and confidence interval statistics extract data from large performance demonstration populations to make statements on examination expectations or on screening of personnel and procedures. There are no large performance demonstration populations of personnel or procedures using Code Case N-659 criteria to make expectation statements. The probability of detection and confidence interval statistics do not apply to the small number of flaws in a performance demonstration for an individual or procedure.

Comment 3J:

The characterization of flaws as slag or porosity flaw types is not required or necessary under the ASME Code UT acceptance standards. The only specific flaw types characterized under ASME Code acceptance standards are cracks, lack of fusion, and incomplete penetration, and all of those flaw types are considered defects regardless of UT signal response. Other flaws are evaluated based on their signal amplitude response and length regardless of their type.

Response to Comment 3J:

As discussed in the response to Comment 3G, the Code Case permits the less stringent examination and evaluation requirements of Section XI to be used for preservice examination. Thus, it is more important for the examiner to recognize the acoustic signatures and the different flaw types.

Comment 3K:

The NRC staff clearly states in a request for additional information (RAI) in a review of a new reactor design that PDI qualified UT is capable, without question or additional demonstration, of detecting fabrication flaws (Despite the fact that the PDI qualification demonstration contains no fabrication flaws). Yet the proposed conditions take exception to the ASME Code Case N-659 requirement that a PDI qualified UT be subject to a supplemental demonstration on three fabrication flaws. The proposed additional demonstration requirements would subject even a PDI qualified UT procedure and personnel to more demonstrations than are already required by ASME Code Case N-659. The additional requirements are overreaching and clearly in conflict with the expressed staff position in the supplemental RAI.

Response to Comment 3K:

The staff disagrees with comment's conclusion. The review was performed for new reactors where the more stringent acceptance criteria of Section III would be used. In addition, in other RAIs, questions relative to the need for performance demonstration were transmitted.

Comment 3L:

Under the proposed UT demonstration requirements, flaws must be located within 10% of true through-wall depth, whereas a typical RT technique performed under ASME Code requirements provides no through-wall depth information. The demonstration for UT must show the capability

to detect flaws having a minimum of 2% through wall depth, whereas for RT, the 2% factor relates only to the thickness of a penetrameter shim used as an image quality indicator that has no direct relationship whatsoever to the sizes of flaws that can be detected by RT nor to the acceptance standards in Section III of the ASME Code.

Response to Comment 3L:

The staff disagrees with the comment. ASME uses the term "volumetric" to mean examination of the volume as opposed to a surface examination, for example. For UT to be interchangeable with RT, flaws detected by the two methods must be characterized in volumetric terms. The RT examination method detects density differences in material which are normally recorded on film along with the commonly used 2% image quality indicator. Except for comparisons relative to the image quality indicator, the application of density change to determine flaw depth is not applicable. Flaws with less than 2% through-wall density differences from the base material may remain undetected by RT, while flaws with 2% through-wall density changes from the base metal should be detected (unless a flaw is in the shadow of another flaw). Construction flaws with crack like characteristics are extremely difficult to depth size with RT, which explains Section III requirements for their removal. Unlike RT, UT does not have the capability of using differences in density from the base material to detect flaws. UT relies on surface reflections to detect flaws which are volumetrically characterized in terms of length, width, and depth measurements. Although UT and RT use different physical properties to establish the volumetric presence of the flaws, the two methods can achieve similar results. Therefore, the application of UT as a volumetric examination method consists of length, width, and depth dimension.

Comment 3M:

ASME Code Case N-659 does not apply to Subsection NB, Article 2000. The Code case applies to fabrication examinations under Article 5000 of Subsection NB, NC, and ND. Any demonstrations for UT under ASME Code Case N-659 should be based on the UT acceptance standards in Article 5000 of Subsection NB, NC, and ND.

Response to Comment 3M:

The staff agrees with the comment. The proposed condition referenced Section III, NB-2553(c) acceptance standards for determining flaw sizes in the representative mockups used in the performance demonstration. A comparison shows that NB-2553(c) is identical to NB-5320(b), (d), and (e); NC-5320(b), (d), and (e); and ND-2553(b), (d), and (e). Therefore, the proposed condition will reference NB-2553(b), (d), and (e); NC-5320(b), (d), and (e); and ND-2553(b), (d), and (e) from the 2001 Edition with 2003 Addenda or later endorsed editions and addenda.

Comment 3N:

The proposed condition relating to the second leg of the ultrasound metal path is already sufficiently addressed by the Code Case. That concern is based on demonstrations of single-sided examinations for service-induced flaws in austenitic stainless steels. The concern is not valid for ASME Code Case N-659 because it already requires that the capability of the second leg UT examination be demonstrated.

Response to Comment 3N:

The staff disagrees with the comment. ASME Code Case N-659 does not require that the performance demonstration be conducted as a blind test. For an effective demonstration of single side capabilities, the flaws must be located on the far-side of the weld to provide a challenging examination situation for this technique, while the blind performance demonstration establishes procedure effectiveness and personnel skills necessary to reliability detect flaws.

Comment 3O:

The additional base metal examination volume proposed for UT examinations is excessive because the examination volume currently imposed in ASME Code Case N-659 already exceeds the Section III examination volume for RT that UT is intended to replace. The Section III examination volume for RT of butt-type welded joints is limited to the weld and includes no base metal. The commentary to the proposed condition offers no justification for the need to have a larger examination volume for UT of butt-type welded joints than is required for RT of similar joints.

Response to Comment 3O:

The staff disagrees with the rationale in the comment. Section III does not define the term weld but relies on the common usage which is to join by applying heat. Section IX narrows the definition for weld to the localized coalescence of metals or nonmetals produced either by heating or by application of pressure. While examinations of only the localized coalescence should detect volumetric flaws, the examinations would not detect flaws created from heat input to the base metal (cracks at the heat affected zone) or from stresses in the base metal caused by weld shrinkage (lamellar tears). Section III does not prescribe how much of the base metal must be examined with RT. Flaws in the base metal (HAZ) not detected by RT should be detected during preservice examinations which may be required by Section III design specifications or by Section XI. Section III preservice examination are performed to Section XI requirements which frequently identify the examination volume as ½ of the through-wall thickness on both sides of the weld. The through-wall examination volume should be sufficient to detect flaws resulting from fabrication and cover the Section XI examination volume.

The condition for examination of butt weld joints was proposed to ensure that the repairs to the base metal weld edge, repairs to the weld and butter, the heat affect zone, and the actual weld would be examined for detrimental flaws. Depending on the extent of repairs, the as-welded coalescence through-wall metal shape will differ from design weld shape which are normally used for weld inspections.

COMMENTERS: Douglas Henry, General Electric; Thomas Alley, Jr., Duke Energy

Comment 4:

The statement, “with specific techniques development and personnel training on construction flaws, UT can also be used to detect volumetric type flaws such as slag or porosity,” implies that personnel trained and certified under current ASME Code requirements using current ASME Code UT procedures are not capable of detecting flaws such as slag and porosity.

Using UT methodology and personnel requirements, volumetric flaws can be and are detected and evaluated to the ASME Code acceptance standards. The purpose of ASME Code Case N-659 is to establish the minimum requirements to ensure that established UT detection capabilities and techniques have equal sensitivity as RT for fabrication type flaws. The conditions, blind performance demonstration, 2% flat bottom hole sensitivity, and the required number of flaws clearly establishes a requirement for UT that exceed the original requirements of RT.

Response to Comment 4:

The staff disagrees with the comment. Experience has shown that satisfying the minimum prescriptive-based requirements for UT procedures and personnel does not guarantee a reliable and effective UT examination with respect to the flaw acceptance criteria. For instance in 1980, NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking," the ASME Code-applied UT techniques were determined to be ineffective in detecting cracking on inner nozzle radii. In 2003, Regulatory Issue Summary 2003-01, "Examination of Dissimilar Metal Welds, Supplement 10 to Appendix VIII of Section XI of the ASME Code," the NRC discussed the issues with regard to industry being unable to meet the requirements of Supplement 10. The UT difficulties were resolved with specific technique development and personnel training followed by a successful statistically analyzed performance-based demonstration. The application of UT to detect flaws in different configurations and materials is as challenging during UT examinations of plants under construction as during UT examinations of operating plants. The effectiveness and reliability of UT procedures and personnel to correctly identify and disposition flaws, whether service related or construction related, can only be quantified with performance-based demonstrations. The reliability of RT has not been benchmarked.

COMMENTER: Jack Spanner, Electric Power Research Institute

Comment 5A:

The NRC seems to have some misconception concerning UT in lieu of RT. An industry performance demonstration using UT in lieu of RT was conducted according to Code Case N-659 and Section V, Article 14 guidelines. The results of the demonstrations are included in a white paper that accompanies a similar proposed Code Case N-713 for Section XI. Automated and manual procedures were demonstrated using experienced and relatively inexperienced personnel. Greater than 90% of the flaws were detected using Section V, Article 14 and Section XI, Appendix VIII procedures that were essentially only revised to increase the examination volume from 1/3 to full wall thickness. Additional training on construction flaws was not necessary to pass the demonstration. All the procedures had essentially the same effectiveness. Single sided examinations were also demonstrated to be effective, contrary to the NRC staff assertion that they were not demonstrated.

Response to Comment 5A:

The staff disagrees with the premise that Code Case N-659 procedure and personnel requirements are sufficient for achieving reliable examination results. Section XI, Appendix VIII and parts of Section V, Article 14 have performance-based criteria and should be capable of

satisfying the proposed screening criteria for determining the acceptability and unacceptability of flaws according to Section III requirements. The proposed conditions provide parameters for assessing the procedure effectiveness and personnel proficiency to reliability detect and disposition flaws according to Section III requirements. The white paper discussed results from blind performance demonstrations performed on different construction type flaws. While all of the flaws were larger than Section III acceptance requirements, at least one of the flaws was close to the maximum acceptable value. The results showed that at least 79% of the flaws were detected, 62% of the flaws were correctly evaluated and 44% of the flaws were correctly identified. Although most of the demonstration were outside the screening criteria in the proposed conditions, these results indicate that the screening criteria are reasonable. The white paper did not elaborate on the number of flaws in each performance demonstration or the flaw mix between volumetric and planar. Therefore, the white paper does not provide sufficient information to show that the demonstration discussed in the paper quantifies reliability of the examination.

Comment 5B :

There is no need to require blind procedure and personnel demonstrations. A blind personnel demonstration is sufficient, since they are essentially demonstrating the procedure. There is no need to require at least 30 flaws for the procedure demonstration. This will make the demonstration too expensive and not improve the effectiveness of the procedures commensurately.

Response to Comment 5B:

The NRC staff agrees that for non-generic procedures, a blind personnel performance demonstration can also serves as a blind procedure demonstration; however, for dual qualification, the demonstration must correctly detect all flaws and if sizing is required, must correctly size all flaws. After the procedure has been qualified, a personnel performance demonstration shall satisfy the criteria in the minimum detection and maximum false call table.

The selection of 30 flaws for a generic procedure performance demonstration agrees with the Section XI, Appendix VIII performance demonstration requirements which were developed to improve the pass rate for personnel. Generic procedures provide a high level of detail for recognizing and dispositioning of indications common to various configurations and conditions in the nuclear power industry. A blind performance demonstration is necessary to instill confidence in the representativeness of the testing process. The value of a blind performance demonstration is reinforced every time a failure is traced to a missed indication in the records of a prior examination. The larger sample size is to ensure procedure effectiveness in the trade-off with personnel skills.

Based on Section XI, Appendix VIII experience, the variety of mockups for generic procedure performance demonstrations were more than ample to handle the 30 flaw criteria. Therefore, the requirement will be maintained for generic procedure performance demonstrations.

Comment 5C :

One proposed condition required that flaws be located within 10% of the width location. It is not clear what the width location is.

Response to Comment 5C:

The NRC staff does not agree with the comment because the proposed condition does not mention a 10% width location. The only mention of a 10% limit in the proposed condition is the through-wall depth location or the sound beam metal path which are currently requirements in Section XI, Appendix VIII.

Comment 5D:

The ASME Code committee has struggled with the wording for the substitution of qualification or calibration block material for a long time. The words in the ASME Code Case were taken from other NRC approved sections of the Code. They should be removed from ASME Code Case N-659.

Response to Comment 5D:

The staff takes no action. Code Case N-659 permits substitution of calibration blocks for piping when material of the same product form and specification is not available. The substituted blocks must have material of similar chemical analysis, tensile properties, and metallurgical structure as the original piping material. The NRC did not take exception to the substitution of calibration block material.

COMMENTER: Thomas Alley, Jr., Duke Energy

Comment 6A:

RT techniques acceptable to ASME Section III are not required to be demonstrated in a similar manner as a UT performance demonstration. The type of performance demonstration written (in the proposed condition) reflects the current philosophy of ASME Section XI. The level of performance stated in the proposed conditions represent a level of inconsistency with current standards established under Section III and ASME Section V.

Response to Comment 6A:

The staff disagrees. The application of performance demonstration reflects the philosophy of the NRC and is part of Section V, Article 14, and Section XI, Appendix VIII. The improvement of performance based NDE is apparent by the number of flaws being detected that were missed during RT examinations, preservice examinations, and inservice prescriptive UT examinations. This is supported by the white paper referenced by Code Case N-659 which alludes to better flaw detections with performance based UT than non-performance based RT examinations.

Comment 6B:

Scanning direction should not be limited by the code case but should be established during the mock-up and procedure qualification.

Response to Comment 6B:

The staff disagrees. The qualification process does not address every situation or condition found in the field nor is the level of personnel attentiveness maintained at or above the level during the qualification process. The scanning conditions are minimum requirements to provide assurances that any detrimental flaw will be detected.

COMMENTERS: B.T. McKinney, PPL Susquehanna, LLC; Jack Spanner, Electric Power Research Institute; Douglas Henry, GE

Comment 7:

The NRC's desired methodology would be an Appendix VIII type of qualification. However, re-writing a performance base methodology as stated in the proposed conditions could introduce new problems or challenges that would not surface until actual qualifications were attempted. While agreeing with the use of a Section XI performance demonstration methodology, PPL would prefer to use the existing PDI process that is already administered by the EPRI NDE Center and perform a supplemental blind qualification to a previously approved procedure by adding a minimum of three different construction-type flaws. The detection criteria for the additional three flaws should be three (100%). The procedures and personnel that have qualified to Appendix VIII requirements have been demonstrated on more than 10 flaws. The sensitivity of the Appendix VIII procedures are more than enough to detect construction flaws, and the quality of the personnel that have passed Appendix VIII are outstanding. For Section V procedures, 5 to 9 flaws should be included in the demonstration and they must all be detected. The acceptance table should be used for Section V procedures if 10 or more flaws are used. Using the existing EPRI PDI program would remove the uncertainties associated with the proposed criteria.

The application of Code Case N-659 are limited to a few components under special circumstances since using UT with the proposed conditions is generally to expensive for any typical production situation. Those applications usually involve a single examiner qualifying a procedure on a sample application of a single component and using that procedure in a one-time application for that component.

Response to Comment 7:

The staff does not favor one methodology over another for Code Case N-659. The details for a common methodology between Section III and Section XI, Appendix VIII is left to the respective ASME Code committees.

With respect to the flaw types used in qualification, there are differences in the types of flaws and flaw acceptance criteria for Section III and Section XI. For Section III, flaws are smaller in size and have volumetric shapes which necessitate training that differs from Section XI flaws

which are predominantly cracks. To integrate Section III criteria into a Section XI, Appendix VIII, procedure and personnel performance demonstration, the NRC staff believes that the common methodology must include representative construction flaws that are distributed throughout the wall thickness.

The staff agrees that for some circumstances examination proficiency can be demonstrated with less than ten flaws. The number of flaws for a performance demonstration of a specific wall thickness and diameter for a specific material and component can be considered as one half of a performance demonstration for a range of wall thicknesses and diameters for a specific material and component.

The staff agrees that a common process for dual Section III and Section XI performance demonstration might be beneficial rather than two separate programs. The value of a common protocol avoids confusion and the potential of mixing protocols when performing a combined Section III and Section XI performance demonstration. The qualifications for Section III procedures and personnel must be clearly documented for dual Section III and Section XI qualifications.

RESPONSE TO PUBLIC COMMENTS ON REGULATORY GUIDE 1.147, PROPOSED REVISION 15

Draft Regulatory Guide DG-1134 (proposed Revision 15 of Regulatory Guide 1.147) was published for public comment in the Federal Register (71 FR 62947) on October 27, 2006. Comments were received from seven sources relative to proposed Revision 15 of Regulatory Guide 1.147. In general, the comments on this draft guide were administrative and editorial suggesting that the NRC adopt later revisions of Code Cases because the revisions addressed the NRC's concerns, or that conditions on certain Code Cases should be removed based on recent actions between the NRC and ASME International. All of the comments on the draft guide have been addressed as reflected below.

COMMENT 1: D.H. Corlett, Shearon Harris Nuclear Power Plant, Unit No. 1

The NRC should consider listing Code Case N-532-4 (Supplement 9 to the 2004 Edition of the ASME Code) under Table 1, Acceptable Section XI Code Cases, rather than listing Code Case N-532-3 (Supplement 12 to the 2001 Edition of the ASME Code), under Table 2, Conditionally Acceptable Section XI Code Cases. This request would eliminate the condition detailed in the proposed DG-1134 for Code Case N-532-3 because Code Case N-532-4 already incorporates this condition.

Response to Comment 1:

The NRC agrees. The final regulatory guide will list Code Case N-532-4.

Revisions 13 and 14 to Regulatory Guide 1.147 conditionally approved Code Case N-532-1 with the following condition, "Code Case N-532-1 requires an Owner's Activity Report Form OAR-1 to be prepared and certified upon completion of each refueling outage. The OAR-1 forms must be submitted to the NRC within 90 days of the completion of the refueling outage." Draft Revision 15 to the guide proposed to approve Code Case N-532-3 with the same condition. The reporting requirement in the Code Case requires the forms to be submitted following the end of the inspection period. The basis for the condition in the regulatory guides was that findings of significance should be reported in a more timely manner.

The ASME modified the reporting requirements in Code Case N-532-4 adopting the 90-day submittal requirement. Since the change resulting in Code Case N-532-4 is consistent with the previously established regulatory position, the commenter's suggestion has been adopted and Revision 4 to the Code Case will be adopted in the final guide. In addition, the approval of Revision 4 permits the NRC to remove a limitation from the regulatory guide.

Note that B.T. McKinney, PPL Susquehanna, LLC, James H. Riley, Nuclear Energy Institute, C.L. Funderburk, Virginia Electric and Power Company (Dominion), Dominion Nuclear Connecticut, Inc. (DNC), and Dominion Energy Kewaunee, Inc. (DEK), had very similar comments requesting the same resolution, "Code Case N-532-4 should be used in draft Rev. 15 of RG 1.147 instead of Code Case N-532-3 in order to resolve the 90 day submittal after each refuel outage conditional acceptance issue." The approval of Revision 4 to the Code Case also addresses these comments.

COMMENT 2: B.T. McKinney, PPL Susquehanna, LLC James H. Riley, Nuclear Energy Institute

The limitation on this Code Case is unchanged from Revision 14 of Regulatory Guide 1.147. However, the limitation requires the use of Non-Mandatory Appendix Q and points the user to the 'cstools' website. Appendix Q is now published and is available in the 2004 Edition with the 2005 Addenda, and later editions and addenda, of Section XI. The limitation should point users to the 2005 Addenda of Section XI, not the 'cstools' website.

Response to Comment 2:

This comment refers to a condition on the use of Code Case N-504-2 in Regulatory 1.147. The web site was referenced in Revision 14 to the guide because Appendix Q, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," had been developed and approved by ASME but not yet published. The ASME placed the appendix on its web site so that it would be available to users. The NRC believed it was important to promptly reference the appendix as it provides requirements for repairing and examining piping that has experienced stress corrosion cracking. It was an oversight to not delete this reference in draft Revision 15 because as pointed out by the commenter, the ASME published Appendix Q in the 2005 Addenda. The web site reference has been removed from the condition in the final guide. Removal of the web site address also addresses a comment from James H. Riley, Nuclear Energy Institute. Note: see the response to comment 3 regarding Code Case N-504-3.

COMMENT 3: B.T. McKinney, PPL Susquehanna, LLC

Comment 3A:

Applicability of this code case is only up to the 1995 Edition. After 1995, the reference paragraphs in the Code have changed and administratively the Code Case cannot be used. Code Case N-504-3 has corrected these issues. Code Case N-504-3 should be approved for use in Rev. 15 of Reg. Guide 1.147 instead of N-504-2.

Response to Comment 3A:

The NRC agrees. Code Case N-504-3 will be listed in the final regulatory guide.

The Code Case addresses weld overlays on Class 1, 2, and 3 austenitic stainless steel piping. The applicability of the Code Case had not previously been extended past the 1995 Edition because the changes below were made to the ASME Code provisions without corresponding changes to the Code Case. Thus, the references in the Code Case N-504-2 were not correct after the 1995 Edition.

- The 1995 Addenda added a reference in IWA-4810(a) [which later became IWA-4520(a)] to Construction Code examination requirements that were never meant to be applied to these overlays.

- In the 1996 Addenda, Tables IWB-3641-5 and IWB-3641-6 were deleted, and the flaw evaluation requirements for SAW and SMAW weld metal were included in Tables IWB-3641-1 and IWB-3641-2.

- The defect removal provisions were moved from IWA-4410 to IWA-4420 in the 1997 Addenda.

- The 2002 Addenda then deleted these tables and incorporated their provisions into IWB-3640.

These revisions are intended to make the Code Case usable with all Editions and Addenda of Section XI from the Summer 1978 Addenda through the 2004 Edition. As identified by the commenter, the NRC staff's concerns raised during the evaluation of Code Cases for Revision 14 of the regulatory guide were addressed in Code Case N-504-3 and Appendix Q. The NRC has determined that Revision 3 to the Code Case is acceptable. As these changes to the Code Case are administrative in nature, Code Case N-504-3 is adopted in the final guide. Note that C.L. Funderburk, Virginia Electric and Power Company (Dominion), Dominion Nuclear Connecticut, Inc. (DNC), and Dominion Energy Kewaunee, Inc. (DEK), provided similar comments. The response resolves these comments relative to the approval of Code Case N-504-3.

Comment 3B:

Alternatively, we recommend the NRC expedite the review and approval of Code Case N-504-3 (published in supplement 5 of the 2004 edition) with no limitations. During the evaluation of Code Cases for Revision 14 of the Reg. Guide, the NRC identified four concerns with Code Case N-504-2 that were addressed by the ASME in Code Case N-504-3 and Non-Mandatory Appendix Q. Thus, Code Case N-504-3 addresses the concerns the NRC has with Code Case N-504-2.

Response to Comment 3B:

As discussed in the response to comment 3A, Code Case N-504-3 will be approved in Revision 15 to the guide. It cannot be unconditionally approved however. The Code Case does not reference Appendix Q for weld overlay repairs. As discussed in the regulatory analysis for Revision 14 to the guide, the ASME developed the appendix to address recognized shortcomings relative to the repair and examination of austenitic stainless steel piping that has experienced stress corrosion cracking. The NRC noticed its intent to condition the use of Code Case N-504-2 (i.e., require the use of Appendix Q when implementing the Code Case), and no unfavorable public comments were received during the consideration of draft Revision 14. The administrative changes to Revision 2 of the Code Case do not negate the need to condition Revision 3.

COMMENT 4: James H. Riley, Nuclear Energy Institute

In a letter to Mr. Ken Balkey, Vice President Nuclear Codes and Standards, dated August 23, 2006, the NRC evaluated the ASME position on Code Case N-554-2 and stated "Based on preceding, the NRC staff concludes that there is a reasonable basis for pursuing the removal of

the limitations on Code Cases N-554-2 and N-567-1 in Regulatory Guide (RG) 1.147. Based on the evaluation the limitation being proposed should be removed for Code Case N-554-3.

Response to Comment 4:

The NRC agrees. Code Case N-554-3 will be unconditionally approved in the final regulatory guide.

The letter referenced in the comment was from John A. Grobe, Director, Division of Component Integrity, Office of Nuclear Reactor Regulation, to Kenneth R. Balkey, Vice President, Nuclear Codes and Standards, American Society of Mechanical Engineers. It was dated August 23, 2006 [ML062360303].

The NRC evaluated the ASME request for removing the limitation on Code Case N-554-2, "Alternative Requirements for Reconciliation of Replacement Items and Addition of New Systems." The NRC limitation is related to the reconciliation of the administrative requirements. The Code Case does not require that administrative requirements be reconciled. The Code Case includes the following statement: "Administrative requirements, (i.e. those that do not affect the pressure boundary or core support or component support function) need not be reconciled. Examples of such requirements include quality assurance, certification, Code Symbol Stamping, Data Reports and Authorized Inspection." The Code Case allows the use of the administrative requirements of either the construction code of the item being replaced or the construction code of the replacement item. ASME added a footnote to Revision 2 of the Code Case providing a caution that states: "This provision does not negate the requirement to implement the Owner's QA program, nor does it affect Owner commitments to regulatory and enforcement authorities". The NRC staff concern was a potential conflict between the Code Case which says that the administrative requirement, including QA, do not need to be reconciled, and the application of 10 CFR 50, Appendix B to replacement of ASME Code Class 1, 2, and 3 components. The wording in the added footnote addresses the NRC staff concern.

The NRC staff concluded in the letter that there is a reasonable basis for pursuing the removal of the limitations on Code Cases N-554-2 in Regulatory Guide (RG) 1.147. It was stated that the NRC would pursue removing the limitation on Code Case N-554-2 in the course of issuing RG 1.147, Revision 15, and that a final determination on ASME's request would be made as part of that regulatory process. However, Revision 15 to Regulatory Guide actually references Code Case N-554-3. Revision 3 to the Code Case was conditioned identically to Revision 2. The NRC has determined that the basis for removing the condition applies equally to Revision 3 and thus, Code Case N-554-3 will be unconditionally approved in the final guide.

Note that similar comments were received from C.L. Funderburk, Virginia Electric and Power Company (Dominion), Dominion Nuclear Connecticut, Inc. (DNC), and Dominion Energy Kewaunee, Inc. (DEK). The resolution in the response also addresses these comments.

COMMENT 5: James H. Riley, Nuclear Energy Institute

There is no mention in the Federal Register of the limitation proposed on Code Case N-567-1. The same letter addressing Code Case N-554-2 also evaluated Code Case N-567 as stated

above. Based on the evaluation the limitation being proposed should be removed for Code Case N-567-1.

Response to Comment 5:

The NRC agrees. Code Case N-567-1 will be unconditionally approved in the final regulatory guide.

In the August 23, 2006, letter from John A. Grobe to Kenneth R. Balkey 23, 2006, the NRC did discuss its evaluation of the ASME request for removing the limitation on Code Case N-567-1, "Reconciliation Requirements for Class 1, 2, and 3 Replacement Components." The NRC staff had the same concern as that for Code Case N-554-2 discussed in the response to Comment 5 above, i.e., a potential conflict between the Code Case and the application of 10 CFR 50, Appendix B. The footnote added to Code Case N-554-2 to address this concern was also added to Code Case N-567-1. It has been determined that this addresses the NRC staff concern, and Revision 1 to the Code Case will be unconditionally approved in the final guide.

Note that similar comments were received from C.L. Funderburk, Virginia Electric and Power Company (Dominion), Dominion Nuclear Connecticut, Inc. (DNC), and Dominion Energy Kewaunee, Inc. (DEK). The resolution in the response also addresses these comments.

COMMENT 6: James H. Riley, Nuclear Energy Institute

The limitations on Code Case N-533-1 have changed from those specified in Revision 14 of RG 1.147. Therefore, the limitation should be revised to match that specified in Rev. 14 of RG 1.147.

Response to Comment 6:

The NRC agrees. The original wording will be placed in the final regulatory guide.

There was no intent to modify the condition in Revision 15 to Regulatory Guide 1.147. The condition in Revision 15 was identical to that in Revision 13. The more descriptive condition was contained in Revision 14. If the commenter believes that the descriptive condition is more helpful, the Revision 14 version will be retained in the final guide.

COMMENT 7: Chuck Wirtz, Individual; Mike Gothard, Electric Power Research Institute; B.T. McKinney, PPL Susquehanna, LLC; Jack Spanner, Electric Power Research Institute

Use of Code Case N-460 with N-659

While Code Case N-460 should not be used in conjunction with Code Case N-659, the conditional acceptance proposed above is unnecessary. Code Case N-659 and N-659-1 already require that the ultrasonic examination area be accessible and "include 100% of the volume of the entire weld, plus 1/2 in. (13mm) of each side of the welds". Similar provisions are contained in Code Case N-713. Though the actual wording of the proposed condition is not specified, the limitation to "inservice" examinations noted above will be burdensome during

repair and replacement of existing components because of the preservice examination requirements contained in IWA-4530. The inservice only conditional acceptance would prohibit the use of Code Case N-460 for preservice examination of repairs to existing components and in-kind replacements. Neither of which would typically affect access. Though the extent is unknown, the end result would be additional, otherwise unneeded, relief requests.

Response to Comment 7:

Based on the comments, the NRC staff realizes that by focusing on Code Case N-659, the discussion relative to Code Case N-460 was too narrow. The objective is to discourage the fabrication of welds with inspection limitations. Thus, the discussion should have been broader in addressing repair and replacement during construction and fabrication activities. In addition as discussed in the response to the comments on Code Case N-659, the NRC has decided to not approve Code Case N-659 at this time. Accordingly, the condition will not be added to Section 50.55a at this time.

The broader question remains however, i.e., how to ensure that welds fabricated during construction and modification/replacement activities are designed to allow adequate examination. This will be discussed further in the proposed rulemaking for draft revision 16 to the guide. The discussion will include a proposed condition to facilitate the development of an acceptable position.

COMMENT 8: B.T. McKinney, PPL Susquehanna, LLC

The limitation on Code Case N-517-1 is unchanged from Revision 14 of Regulatory Guide 1.147. The limitation should be removed and this Code Case added to the list of acceptable Section XI Code Cases. This limitation was to be addressed by Subcommittee XI action BC04-265. During discussions at the ASME Subcommittee XI meetings in November of 2005, as well as a number of prior telephone conferences, the NRC representatives and the rest of the committee agreed this limitation was no longer needed. The original NRC concerns were with substandard and fraudulent material. The NRC representatives to the committee expressed this issue is no longer a concern. Therefore, this action, BC04-265, was revised to simply incorporate Code Case N-517-1 into the Code. That action has now passed the standards committee with the support of the NRC.

Response to Comment 8:

The condition on Code Case N-517-1 will be removed in the final regulatory guide, but the basis for the removal provided by the commenter is not entirely correct. The basis for the NRC representatives agreement to remove the condition is that the requirements of Appendix B are law and remain in effect even when a code case takes exception or is otherwise silent on the issue. This is discussed in more detail below.

The ASME referenced action, number BC04-265, incorporated Code Case N-517-1 into IWA-4142.1 of Section XI. The Code Case was an approved alternative to the ASME Code to allow plants constructed in accordance with Section III to qualify Material Organizations, utilize the provisions from Section III for unqualified source material, and utilize exemptions in Articles NB, NC, and ND. Per the exemptions, Material Organizations did not have to meet certain

requirements for accreditation or qualification of material organizations for items such as small products and brazing material.

A condition was included in Revision 13 to Regulatory Guide 1.147 based on a concern raised from the NRC review of the alternatives in Code Case N-517-1. There has been some confusion in the industry over the use of code cases. With regard to Code Case N-517-1, this can be summarized as a question whether the code case is stand-alone with regard to quality assurance (QA) requirements. The NRC concern was that unconditional use of the code case with a stand-alone interpretation by a licensee would violate 10 CFR 50, Appendix B, in that it would permit the purchase of materials from sources which do not have approved QA program. Hence, the material would not satisfy the requirements for commercial grade dedication (i.e., certain safety-related functions would not be verified during the manufacturing process). In addition, it was not clear that the code case required QA program requirement verification by the Authorized Nuclear Inspector. To ensure compliance when implementing the Code Case, the condition required that the Owner's NRC approved 10 CFR Part 50, Appendix B QA Program address the use of this code case and any unique QA requirements identified by the code case that are not contained in the Owners QA Program description. This would include the activities performed in accordance with this code case that are subject to monitoring by the Authorized Nuclear Inspector.

With regard to the issue of the authorized nuclear inservice inspectors (ANII) in the condition, NRC Regulatory Issue Summary (RIS) 2004-19, "Authorized Nuclear Inservice Inspector Access and NRC Approved Alternatives to ASME Code," was issued on December 10, 2004. It stated that "In recent years, a few licensees have denied authorized nuclear inservice inspectors access to certain parts of systems, components, documents, and records that were related to licensing actions approved by the NRC as part of relief requests from ASME Code requirements." "The licensees have contended that these approved alternative activities fall outside of the ASME Code jurisdiction, and have denied access to authorized nuclear inservice inspectors. In addition, some licensees have held the view that once the NRC authorizes the licensees' proposed alternative to the ASME Code requirements in a relief request (such as the proposed use of certain ASME Code Cases), they do not have to follow other relevant ASME Code requirements." The RIS discussed that when the NRC reviews and authorizes a specific alternative to the ASME Code requirements through the relief request process, the scope of the review and authorization is based only on matters explicitly addressed in the licensees' request. All other requirements of the ASME Code not explicitly addressed in the authorized alternatives such as in the ASME Code Cases must be met.

COMMENT 9: David P. Helker, AMERGEN

The conditions for approval for both Code Case N-619 and N-648 state: 'The provisions of Table IWB-2500-1, Examination Category B-D, continue to apply except that, in place of examination volumes, the surfaces to be examined are the external surfaces shown in the figures applicable to this table." It is our understanding that the reference to "external surfaces" refers to the surfaces on the inner radius of the nozzle. Therefore, we request that the NRC clarify the conditions for approval for both Code Case N-619 and N-648.

Response to Comment 9:

This is correct. Figure IWB-2500-7(a), *Nozzle in Shell or Head*, shows four examination volumes. The external surface is from point M to point N in the figure. The conditions for the code cases have been clarified.

COMMENT 10: David P. Helker, AMERGEN

Code Case N-706, "Alternate Examination Requirements of Table IWB-2500-1 and Table IWC-2500-1 for PWR Stainless Steel Residual and Regenerative Heat Exchangers, Section XI Division 1," provides alternative examination requirements for Table IWB-2500-1, Examination Categories B-B, B-D and B-J, and Table IWC-2500-1, Examination Categories C-A, C-B, and C-F-1 in lieu of existing Section XI Code requirements. We recommend that the NRC consider including this Code Case in this revision (i.e., Revision 15) to Regulatory Guide 1.147. The NRC has recently approved a relief request using this code case.

Response to Comment 10:

The NRC agrees with the commenter's suggestion, and Code Case N-706 will be approved in the final guide.

The code case permits the performance of a VT-2 visual examination in lieu of a volumetric examination of the welds in pressurized-water reactor (PWR) stainless steel regenerative and residual heat exchangers as presently required in Table IWB-2500-1, Examination Categories B-B, B-D, and B-J, and Table IWC-2500-1, Examination Categories C-A, C-B, and C-F-1, of the ASME Code. The ASME Code requires essentially 100 per cent volumetric examination coverage of the subject welds and in many situations, access is limited due to interference from other pipe lines, supports, and personnel shield walls. In order to gain access to these welds for full examination coverage, a design modification of the heat exchanger would be required. This would be a significant burden to licensees.

The basis for this alternative is that structural integrity is verified by the volumetric examination that was performed prior to the component being placed in service, and on the visual examination for leakage performed during a system pressure test to validate component integrity. As indicated by the commenter, the NRC has previously approved this strategy in relief requests. The approval was based, in large part, on a review performed by Pacific Northwest National Laboratory (PNNL). The results were detailed in a Technical Letter Report in July 2004, entitled, "Assessment of ASME Code Examinations on Regenerative, Letdown and Residual Heat Removal Heat Exchangers." PNNL reviewed the component design, operation conditions, preventative maintenance practices, potential degradation mechanisms, failure history, and risk assessments for these heat exchanges. It was concluded that with this change in inspection strategy, failure frequencies would remain very low and there would be little impact on core damage or large early release frequencies. In addition, this change would significantly reduce occupational exposures. The NRC has determined that the alternative examination of the subject component provides reasonable assurance of structural integrity. Accordingly, the NRC agrees with the commenter's suggestion, and Code Case N-706 has been approved in the final guide.