STAFF RESPONSES TO COMMENTS RECEIVED ON DRAFT REGULATORY GUIDES (DGs) 1191, 1192, AND 1193

DISCUSSION OF COMMENTS

The U.S. Nuclear Regulatory Commission (NRC) received no comments on the proposed rulemaking and 19 public comment letters on the draft regulatory guides (DGs). The comments relate to the associated notice of issuance and availability of the proposed regulatory guides [74 FR 26303].

General Comment

Table 2 in the proposed rulemaking identifies outdated ADAMS Accession numbers for DG-1191 (ML080910389), DG-1192 (ML080910245), and DG-1193 (ML080920854). The Accession numbers listed are for versions of the DGs dated April 2009. NRC's electronic reading room contains later versions of these DGs (ML090900381, ML090900445, and ML090900461, respectively) dated June 2009. The Accession numbers in Table 2 of the proposed rule should be updated to the latest available version of the DGs.

NRC response. NRC appreciates the comment, and the Accession numbers in Table 2 of the final regulatory guide (RG) have been checked to ensure that the numbers reflect the final versions of the RG.

RG 1.84

Three comment letters pertained to proposed Revision 35 of RG 1.84.

Code Case N-71-18

NRC proposed to impose the same conditions on Code Case N-71-18, "Additional Materials for Subsection NF, Class 1, 2, 3, and MC Component Supports Fabricated by Welding, Section III, Division 1," as were imposed on Code Case N-71-17. The commenter stated that some of the conditions should be deleted because they were no longer appropriate because of changes made in the latest revisions. Also, the commenter believes that other conditions are no longer required because the issues are addressed in Code Case N-249-14, "Additional Materials for Subsection NF, Class 1, 2, 3, and MC Component Supports Fabricated Without Welding, Section III, Division 1."

NRC response. NRC agrees that the references in conditions (3) and (4) that were appropriate for previous editions of the Code Case are not appropriate for Code Case N-71-18. Therefore, condition (3) will be modified to reference paragraph 4.2, and not paragraph 5.3, for weld filler hydrogen content requirements. Also, the references to paragraphs 16.2.1 and 16.2.2 in condition (4) will be modified to reference paragraphs 15.2.1 and 15.2.2, respectively. With regard to condition (6), the NRC staff's understanding of the intent of the provisions is not in agreement with the commenters (i.e., that the fracture toughness requirements as listed in this Code Case address Class 1, Class 2, and Class 3 component supports in addition to piping supports). The NRC staff believes that the fracture toughness requirements listed in Code Case N-71-18 apply only to piping supports. NRC approved implementation of this Code Case on this basis. Cognizant NRC staff will initiate discussions with the appropriate American Society of Mechanical Engineers (ASME) committees.

NRC agrees with the commenters that the minimum tensile strength values for all materials listed in Code Case N-71-18 do not exceed the value of 125 ksi. However, conditions (1) and (2) provide a cautionary note that high-strength materials are susceptible to brittleness and stress corrosion cracking. On this basis, conditions (1) and (2) are appropriate for this Code Case.

Code Cases N-655-1, N-757-1, N-759-1, N-782

Westinghouse Electric Company suggested that the Code Cases being used in the AP1000 should be considered for inclusion in the next revision of RG 1.84 (i.e., Code Case N-655-1, "Use of SA-738, Grade B, for Metal Containment Vessels, Class MC, Section III, Division 1;" Code Case N-757-1, "Alternative Rules for Acceptability for Class 2 and 3 Valves, NPS 1 (DN25) and Smaller with Welded and Nonwelded End Connections other than Flanges, Section III, Division 1;" Code Case N-759-2, "Alternative Rules for Determining Allowable External Pressure and Compressive Stresses for Cylinders, Cones, Spheres, and Formed Heads, Section III, Division 1;" and Code Case N-782, "Use of Code Editions, Addenda, and Cases Section III, Division 1."

NRC response. The Code Cases referenced in the comment are not currently listed in the latest AP1000 Design Control Document (Revision 17). In addition, public comment has not yet been sought on these Code Cases. Accordingly, Code Cases N-655-1, N-757-1, N-759-2, and N-782 will be included in DG-1230 (proposed Revision 36 to RG 1.84) that is currently under development. When Westinghouse includes the above ASME Code Cases in its next revision to the AP1000 design control document, the NRC staff will provide an evaluation of the acceptability of using these four ASME Code Cases in a supplement to its Final Safety Evaluation Report for the AP1000 design certification amendment as alternatives to the regulations pursuant to 10 CFR 50.55a(a)(3).

Code Case N-520-2

The commenter suggested including Code Case N-520-2, "Alternative Rules for Renewal of Active or Expired N-type Certificates for Plants Not in Active Construction," in the final RG rather than Revision 1 of the Code Case that was listed in the DG as Revision 2 is representative of the current nuclear plants for which construction is likely to be renewed.

NRC response. Code Case N-520-2 was published by ASME in Supplement 4 to the 2007 Edition. The DG addressed Code Cases up to Supplement 1 to the 2007 Edition, and hence Code Cases in Supplement 4 were not considered. However, NRC has reviewed Code Case N-520-2 and has determined that it is acceptable subject to one condition. NRC believes that the present wording of the Code Case could create confusion regarding the relationship between the Authorized Inspection Agency (AIA) and the Authorized Nuclear Inspector (ANI). Accordingly, Code Case N-520-2 will be listed in the final RG as conditionally approved with the clarification that "AIA" is an Authorized Inspection Agency and the AIA employs the "ANI" (Authorized Nuclear Inspector).

RG 1.147

Sixteen comment letters pertained to proposed Revision 16 of RG 1.147.

Code Case N-416-4

Several commenters disagreed with the NRC-proposed condition to require that when using Code Case N-416-4, "Alternative Pressure Test Requirement for Welded or Brazed Repairs, Fabrication Welds or Brazed Joints for Replacement Parts and Piping Subassemblies, or Installation of Replacement Items by Welding or Brazing, Classes 1, 2, and 3, Section XI, Division 1," that nondestructive examination (NDE) be performed for welded or brazed repairs and fabrication and installation joints in accordance with the methods and acceptance criteria of the applicable subsection of the 1992 Edition of Section III.

NRC response. NRC does not believe that an adequate argument was provided to justify modifying the condition to require that NDE be performed for welded or brazed repairs and fabrication and installation joints in accordance with the methods and acceptance criteria of the applicable subsection of the 1992 Edition of Section III.

As mentioned in the discussion in the proposed rulemaking for DG-1192 for certain welding repairs or replacements, the previous version of this Code Case (Code Case N-416-3) permitted a system leakage test to be performed in lieu of performing a hydrostatic pressure test provided that certain requirements are met. One of the requirements was that NDE be performed on welded repairs, fabrication, and installation joints in accordance with the methods and acceptance criteria of the applicable subsection of the 1992 Edition of Section III. When Code Case N-416 was originally developed, NRC agreed to the performance of system leakage testing in lieu of hydrostatic testing provided that NDE performed in conjunction with the repair met the requirements of the 1992 Edition of Section III. The requirement to perform NDE in accordance with Section III was removed when Code Case N-416-4 was issued.

NRC believes that many analyses of the effectiveness and reliability of the later NDE requirements have demonstrated the inadequacies of earlier Code NDE requirements. Improvements in NDE have significantly increased the probability of detecting defects. With regard to leakage tests, the NRC staff's position was that even though the primary purpose of a leakage test is the leak-tightness of the primary pressure boundary, the higher pressure hydrostatic test provided some additional assurance of primary boundary integrity. Industry conclusions are that the increased stress from a hydrostatic test is extremely unlikely to cause a subsurface defect to grow through-wall (and therefore leak during a test) and that the stresses involved in a hydrostatic test are similarly unlikely to cause leakage even with the presence of a through-wall flaw. Based on these conclusions, the need for effective and reliable NDE is even greater.

Because it has been concluded that pressure tests are not adequate for ensuring structural integrity (i.e., adequate component repair and replacement), it is paramount that high-quality NDE be performed. Thus, NRC rejects the argument that the lower quality NDE as conducted to earlier Codes is adequate. Accordingly, the condition as proposed will be retained in the final RG.

Code Case N-504-4

With regard to Code Case N-504-4, "Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping, Section XI, Division 1," NRC proposed to retain the condition

that had been placed on the use of Revision 3 of the Code Case and also proposed some new conditions. The commenters concluded that all of the conditions should be deleted in the final RG.

NRC response. Although the commenters addressed some of the differences between Section XI, Nonmandatory Appendix Q, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," and Code Case N-504-4, differences remain that were not addressed. For example, Appendix Q has requirements pertaining, in part, to the inspection and design of a weld overlay. Until the differences between Appendix Q and N-504-4 are addressed, the condition to follow Appendix Q must be retained.

Based on the comments, NRC does not believe that the commenters provide an adequate basis for removing the conditions. However, based on the information provided, NRC revised the conditions to make the objective of the conditions clearer. With regard to condition (a), "the total laminar flaw area shall not exceed 10% of the weld surface area, and no linear dimension of the laminar flaw area shall exceed the greater of 3 inches or 10% of the pipe circumference," paragraph (i) of Code Case N-504-4 addresses laminar flaws but the NRC staff does not believe that the provision is stringent or clear. Condition (a) in the RG is needed to limit the number of laminar flaws in the weld overlay. If a weld overlay contains too many laminar flaws, the flaws may affect the structural integrity of the weld overlay.

Relative to condition (b), "radiography shall not be used to detect planar flaws under or masked by laminar flaws," NRC concluded that this condition must be retained until information is provided demonstrating the effectiveness of radiography at detecting flaws (e.g., cracks) that are potentially masked by laminar flaws.

Code Case N-508-4

The DG contained Code Case N-508-3. The commenter suggests that Code Case N-508-4 be listed in the final RG because the commenter believes it would be beneficial to the industry. Code Case N-508-4 adds pumps, control rod drive mechanisms, and pump seal packages to the list of components that may be rotated for the purposes of testing or preventive maintenance.

NRC response. NRC approves the request to include Code Case N-508-4 in the final RG. Code Case N-508-4 was not considered for the DG because the Code Cases in Supplement 8 to the 2007 Edition were not published for consideration when the DG was developed. Nonetheless, NRC reviewed Revision 4 and determined that it is conditionally acceptable. The condition addresses a potential conflict. Code Case N-508-3 allowed snubbers and relief valves to be rotated from stock and installed on components for the purpose of testing or preventive maintenance. Code Case N-508-4 adds pumps, control rod drive mechanisms, and pump seal packages to the list. The staff now realizes that Footnote 1, added later to the Code Case, conflicts with Subsection IWF, Section XI, up to and including the 2004 Edition through 2005 Addenda if Section XI is used to govern snubbers examination and testing. Footnote 1 directs the user to implement the ASME Operation and Maintenance Code (OM Code) for snubber examination and testing. The OM Code was developed to have a separate Code for the development and maintenance of provisions for the inservice testing (IST) of pumps and valves. In 1990, the ASME published the initial edition of the OM Code, thereby transferring responsibility for these provisions from Section XI to the OM Committee. Although

the use of the OM Code is an option per 10 CFR 50.55a (b)(3)(v), the examination and testing requirements for snubbers are also provided in the 2005 Addenda and earlier editions and addenda of Section XI. No conflict exists for licensees who have adopted the 2006 Addenda or later editions and addenda of Section XI. Therefore, Code Case N-508-4 has been listed in the final RG with the condition that Footnote 1 does not apply when the inservice inspection (ISI) code of record is earlier than Section XI, 2006 Addenda, and Section XI requirements are used to govern the examination and testing of snubbers.

Code Case N-513-2

The DG listed Code Case N-513-2, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1." The commenter notes that for those licensees that have updated their ISI plans to the 2004 Edition of Section XI, Code Case N-513-2 can no longer be used because of limits on its applicability. The commenter suggests that Code Case N-513-3, which was recently published by ASME in Supplement 8 to the 2007 Edition, be listed in the final RG because its applicability period extends to the 2007 Edition with the 2008 Addenda.

NRC response. NRC agrees with the request. However, the approval is conditional. The Code Case was originally developed to reduce the number of plant shutdowns to correct insignificant degradation in Class 2 or 3 lower energy piping. The Code Case states that certain flaws may be acceptable without performing a repair or replacement activity for a limited period not exceeding the time to the next scheduled outage. This provision has been modified in Code Case N-513-3 to state that temporary acceptance of the degradation is not to exceed 26 months from the initial discovery of the condition. The basis for NRC approval of Code Case N-513-2 was that the degraded condition would be monitored and evaluated during continued operation, and operation was only approved until plant shutdown. Once the plant was shut down, it was expected that the degraded piping would be repaired.

ASME Code rules required plants to shut down to repair degradation in Class 2 or 3 piping. The Code Case was developed to permit plants to avoid unscheduled shutdowns to correct certain minor conditions. The modification of the provision in the Code Case to allow 26 months from the discovery of the condition to pass before repair or replacement is required could permit operation through several outages. NRC believes that the original timeframe is prudent. The Class 2 and 3 systems addressed by the Code Case contain safety-significant components, and repairs should be performed at the first opportunity. Accordingly, Revision 3 of the Code Case has been included in the final guide with the condition that the repair or replacement activity must be completed during the next scheduled outage.

Code Case N-597-2

The commenter suggests that the method used to evaluate local degradation for Code Case, N-597-2, "Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1," should be the same as that used in Code Case N-513-2, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1."

NRC response. NRC agrees, in part, with the comment and has added a sixth condition to the conditional approval of Code Case N-597-2 in final Revision 16 to RG 1.147. NRC agrees that it should be permissible for licensees to evaluate local thinning using the

acceptance criteria of the Code Case without NRC review and acceptance. However, NRC disagrees that through-wall leakage should be one of the conditions included in the scope. Code Case N-597 does not address leakage (i.e., it is focused only on analytical evaluation of wall thinning). The temporary acceptance of through-wall leakage is governed by other Code Cases such as N-513. The addition of leakage as a condition to Code Case N-597 as suggested would imply that leakage could be justified on a permanent basis.

NRC does not believe that Code Case N-597-2 should be used to evaluate through-wall leakage conditions. To permit the evaluation of local thinning using the acceptance criteria of the Code Case without NRC review and acceptance, condition (6) has been added that reads as follows: "For moderate-energy Class 2 and 3 piping, wall thinning acceptance criteria may be determined on a temporary basis based on the provisions of Code Case N-513-2. Moderate-energy piping is defined as Class 2 and 3 piping whose maximum operating temperature does not exceed 200 °F (93 °C) and whose maximum operating pressure does not exceed 275 psig (1.9MPa)."

Code Case N-583

The commenter requests that NRC consider the removal of the requirement in the conditions on the use of Code Case N-583, "Annual Training Alternative, Section XI, Division 1," requiring practice "6 months prior" to performing exams and leave "as-is" in the case to "annually." If this not acceptable, the commenter would like to recommend that a 6-month "proficiency" similar to the "annual proficiency" specified and implemented by ASNT CP-189 be considered. It is agreed that performing the practice on specimens with actual cracks is definitely beneficial and that ASME should adopt this position. However, after 10 years of implementation, the twice-yearly requirement of the "hands on" practice has become significantly burdensome, specifically with logistics and cost of implementation, and particularly for owners and vendors who generally employ the Performance Demonstration Initiative (PDI)-qualified individuals.

NRC response. NRC agrees that it would be worthwhile for the industry to consider a 6-month proficiency test similar in nature to the annual proficiency specified and implemented by ASNT CP-189. However, NRC believes that several issues would first have to be addressed. Accordingly, no changes are being made to the conditions at this time.

Two issues are discussed in the comment. The first issue is the suggestion to remove the current condition requiring practice 6 months prior to performing exams and leave "as-is" in the case to "annually." NRC believes the current requirement is justified. EPRI has conducted several studies on the relationship of education, training, and experience. The correlation was at best low and in some instances (such as experience versus intergranular stress corrosion cracking [IGSSC]), the data showed a negative correlation. For example, a group of 12 ultrasonic examiners with about 1 year of ultrasonic examination experience but with 3 weeks of quality training had a pass rate of 92.7 percent on the IGSCC detection practical examination. However, the success rate of individuals with experience averaging in excess of 7.7 years was only 37.6 percent.

One of the major keys to effective training is to perform a detailed task and skills analysis to determine the NDE parameters that impact detection performance. The conventional training course outlines address a number of these parameters such as

illumination levels and calibration procedures. However, most outlines do not address the more subtle parameters such as visual search procedures and ultrasonic manual scanning techniques to assure coverage and effective beam orientation. Moreover, the outlines do not address the evaluation of subtle ultrasonic signal characteristics such as signal rise, decay time, and pulse duration. As appropriate, these must be identified and included in the training provided to examiners. Computer-based training through the use of animations, simulation, and actual data is evolving as an effective way to transfer this information.

Many individuals do not routinely perform examinations. Signals can be difficult to interpret. Although programs employ “qualified” personnel using “qualified” procedures, operating experience, round robin trials, and research results have shown that skills will diminish without frequent training. Personnel and procedures must be qualified and also be effective. Experience and studies indicate that the examiner must practice on a frequent basis to maintain the capability for proper interpretation. In addition, these studies have shown that this capability begins to diminish within about 6 months if skills are not maintained. Classroom instruction is not sufficient to maintain an examiner’s skills in this highly specialized skill area. Examiner training needs to focus on hands-on training with flawed specimens.

The second issue is the recommendation to adopt a 6-month proficiency. The commenter believes that adoption of such a procedure would relieve some of the burden on vendors who generally employ the PDI-qualified individuals. This may be a viable option, but the initiative for such an approach would have to emanate from the industry. The data to either support or undermine such an approach are contained within the Electric Power Research Institute Performance Demonstration Initiative database. These data are considered proprietary, and NRC has no access to them to perform the needed analyses. The data could prove useful in determining, for example, optimum training intervals.

Code Case N-619 and Code N-648-1

The commenter requests that the conditions placed on Code Case N-619, "Alternative Requirements for Nozzle Inner Radius Inspections for Class 1 Pressurizer and Steam Generator Nozzles, Section XI, Division 1," and Code Case N-648-1, "Alternative Requirements for Inner Radius Examination of Class 1 Reactor Pressure Vessel Nozzles, Section XI, Division 1," be reconsidered based on the information provided in this letter.

NRC response. No changes are being made to the conditions on the Code Cases at this time. Although the NRC staff supports the replacement of the wire resolution standard, the staff believes the shift to characters should be part of broader changes to the visual testing provisions as related to Code Cases N-619 and N-648-1.

As indicated in the comment, “enhanced” visual examinations are used in certain situations as alternatives to volumetric and/or surface examination tests. The use of remote visual examinations can reduce occupational exposure in high-radiation fields. Visual examinations also are used where the geometry of the component precludes a complete volumetric examination. This “enhancement” is based on the ability of the system to resolve a wire 12 μm (0.0005 in.) in diameter. If the camera and lighting are sufficient to detect such a wire, then the camera system is deemed to have a resolution sufficiently high for the inspection.

NRC initiated an investigation of the effectiveness and reliability of visual examinations as currently practiced in the industry in response to proposals to expand the use of visual examinations of certain safety-related components. As indicated in the comment, initial results of the investigation were published in NUREG/CR-6860. One of the findings discussed in the report was that the wire resolution standard is not sufficient to determine the visual acuity of a remote system (i.e., important differences exist between visually detecting a wire and a crack). It was recommended that other calibration standards be adapted for visual testing such as reading charts and resolution targets. Additional results supporting this recommendation were later published in NUREG/CR-6943, “A Study of Remote Visual Methods to Detect Cracking in Reactor Components.”

However, as also discussed in the reports, other parameters such as crack size, lighting conditions, camera resolution, and surface conditions were assessed. It was concluded from the investigation that a significant fraction of the cracks that have been reported in nuclear power plant components are at the lower end of the capabilities of the visual testing equipment currently being used. Code Case N-619 addresses the examination of the nozzle inner radius of Class 1 pressurizers and steam generators. Code Case N-648-1 provides an alternative for examining the inner radius of Class 1 reactor vessel nozzles. NRC’s investigation of crack-opening dimensions of service-induced cracks in nuclear components included thermal fatigue, mechanical fatigue, and stress corrosion cracks. It was concluded that current visual testing systems may not reliably detect a significant number of these cracks (approaching 50 percent under certain conditions). It was shown that detection of these cracks under field conditions is strongly dependent on camera magnification, lighting, inspector training, and inspector vigilance.

Although this research supports the use of characters in lieu of a wire standard, the research also shows that more substantial changes are required to visual testing as related to these two Code Cases. The NRC staff has determined that such substantial changes should be undertaken by the cognizant ASME Code committees.

Code Case N-638-1

The commenter believes that Code Case N-638-4, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique, Section XI, Division 1," addresses NRC’s concern that the Section XI examination volume and acceptance criteria were not appropriate for the subject weld repair. Case N-638-4, paragraph 4(a), requires that the examination of the repair be performed in accordance with and meet the acceptance criteria of the Construction Code or Section III. Therefore, the condition is no longer necessary.

NRC response. The commenter is correct that paragraph 4(a)(4) of Code Case N-638-4 specifies the acceptance criteria for the surface and volumetric examination as the Construction Code or Section III; however, Code Case N-638-4 still does not specify a demonstration must be performed with representative samples that shows the ultrasonic examination technique is capable of detecting construction type flaws in the repaired volume. Thus, a condition is required to address this issue, but NRC believes the condition can be revised to be clearer. The condition in final Revision 16 to RG 1.147 reads as follows: "Ultrasonic examination shall be demonstrated for the repaired volume using representative samples that contain construction-type flaws."

Code Case N-661-1

The commenter believes that Code Case N-661-1, "Alternative Requirements for Wall Thickness Restoration of Class 2 and 3 Carbon Steel Piping for Raw Water Service, Section XI, Division 1," already addresses certain issues discussed in the proposed rulemaking and that a clarification of "cycle or refueling outage" in is the only issue that needs to be considered for the approval of this Code Case.

NRC response. NRC agrees that paragraph 1(d) of the Code Case addresses the issue of multiple repairs to the same location through weld overlay and that condition (b) on the Code Case can be deleted. With regard to condition (a) of the draft RG (i.e., "if the root cause of the degradation has not been determined, the repair is only acceptable for one cycle"), NRC believes the condition is still required to provide the needed clarity on two issues. First, the second sentence of paragraph 7(b) of the Code Case uses the term "cause" rather than "root cause." These terms have specific meaning to licensees. NRC believes it is appropriate relative to maintaining safety to require a root cause analysis that is more rigorous than merely inferring the "cause" of the degradation. The second issue relative to clarity is the use of the term ''one fuel cycle.'' As discussed in the proposed rulemaking, it is unclear what one fuel cycle actually infers if a repair is performed in mid-cycle. It may be interpreted that the repair is acceptable for the remainder of the current fuel cycle plus the subsequent fuel cycle. In addition, other terms are used in the Code Case such as ''one cycle.'' Although the Code Case provision and the draft RG condition (a) are otherwise nearly identical, NRC believes condition (a) is needed so that users clearly understand that "next refueling outage" is what is meant. In addition, NRC believes condition (a) is needed to ensure that a suitable re-inspection frequency has been established when the cause of the degradation is unknown or when the potential for hydrogen cracking exists due to the welding conditions.

Condition (c) of the draft RG states, "When through-wall repairs are made by welding on surfaces that are wet or exposed to water, the weld overlay repair is only acceptable until the next refueling outage." This condition is addressed through a combination of paragraphs 4(c) and 5(b) of the Code Case. However, the same concern exists with regard to the use of the term "one fuel cycle." Accordingly, this condition will be retained in the final RG to ensure that it is clear that what is meant is the next refueling outage.

Code Case N-702

The commenter believes that the use of Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1," will provide substantial dose reduction and should be conditionally accepted in the final RG with the criteria given in the NRC Safety Evaluation of BWRVIP-108, "BWR Vessel and Internals Project, Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," EPRI Technical Report 1003557, October 2002 (ML023330203).

NRC response. NRC agrees with the suggestion to conditionally accept Code Case N-702 consistent with the NRC staff's Safety Evaluation (dated December 18, 2007, ML073600374). Accordingly, the Code Case is included in final Revision 16 of RG 1.147 with a condition that the applicability of Code Case N-702 must be shown by demonstrating that the criteria in Section 5.0 of NRC Safety Evaluation regarding BWRVIP-108 will be met and that the

evaluation demonstrating the applicability of the Code Case must be submitted to NRC for review and approval prior to the application of the Code Case.

Code Case N-712 and Code N-730

The commenter notes that the titles of Code Cases N-712 and N-730 were inadvertently switched in the discussion of the proposed rulemaking.

NRC response. The error in the rulemaking table provided as part of the discussion of NRC's disposition of the new and revised Code Cases is noted. This table is not included in the final rulemaking because this particular section is replaced by the discussion of the public comments. The titles were correctly listed in the draft RG.

Code Case N-716

NRC has approved requests from four plants to use provisions similar to Code Case N-716, "Alternative Piping Classification and Examination Requirements, Section XI, Division 1." The commenters believe that—based on the approvals, lessons learned from the pilot plant applications, and a number of follow-on applications—the lessons learned could easily be incorporated into final Revision 16 to RG 1.147 thereby allowing plants to use this Code Case in the short term. The commenters suggest that approval of the Code Case for generic use will result in a substantial reduction in worker exposure and radwaste and will also reduce unnecessary NRC staff burden (as compared to waiting until the Code Case is revised by ASME and subjected to further review by NRC).

NRC response. The Code Case has not been included in final Revision 16 to RG 1.147. The NRC staff is continuing to gain experience with the review of risk-informed inservice inspection (RI-ISI) programs based, in part, on Code Case N-716. The NRC staff has not yet systematically identified all differences between the method described in the Code Case and those approved at individual licensees nor has the staff received any such description by industry. One issue not addressed during the review of plant-specific submittals is the application of Code Case N-716 to new reactors. Another issue not yet explored in the plant-specific submittals is the application of Revision 2 of RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," which expands the scope of initiating events whose evaluation is required to be consistent with the ASME/ANS RA-Sa-2009 PRA Standard.

The review of EPRI Topical Report 1018427, "Nondestructive Evaluation: PRA Technical Adequacy Guidance for RI-ISI Programs," is proceeding according to schedule. A request for additional information (RAI) was transmitted to EPRI on September 15, 2009. A staff-endorsed document describing acceptable PRA quality requirements for RI-ISI will be necessary for the staff to endorse some version of Code Case N-716 in RG 1.147.

Code Case N-747

The commenter believes that the basis for listing Code Case N-747, "Reactor Vessel Head-to Flange Weld Examinations, Section XI, Division 1," in DG-1193 (not approved for use) was flawed, and the Code Case should be unconditionally accepted in final Revision 16 of RG 1.147.

NRC response. NRC agrees with the technical basis provided by the commenter and will include the Code Case without condition in final Revision 16 to RG 1.147.

Three concerns had been summarized in the DG. The first concern was that no supporting fluence assessment or documentation to establish a conservative neutron fluence estimate for these welds and a conservative RT_{NDT} value for the welds was provided through the Code Case. The commenter submitted additional information to support a conclusion that the fracture toughness is high. Westinghouse reviewed the Certified Material Test Reports for all of its early plant designs and used the NRC Standard Review Plan (NUREG 0800) to calculate RT_{NDT} for the upper head region. In addition, fluences were calculated for all the irradiated regions of a pressurized-water reactor from the core region up to the inlet and outlet nozzle regions. The fluence was determined to be very low in the upper head region and, therefore, there will be no irradiation-induced change in RT_{NDT}.

NRC also agrees with the information provided regarding Appendix G and the P-T limit curves and the material property. Thus, Code Case N-747 has been deleted from RG 1.193 and is included in final Revision 16 of RG 1.147.

Code Case N-751

The commenter believes that the Construction Code, which may or may not have included provisions for NDE of piping welds in penetrations, continues to apply. Therefore, the presence or absence of specific NDE provisions in the Construction Code should not be a reason to condition Code Case N-751, “Pressure Testing of Containment Penetration Piping, Section XI, Division 1.”

NRC response. NRC disagrees that specific NDE requirements are not needed. As discussed in the proposed rulemaking, the Code Case would allow an Appendix J Type C test to be performed as an alternative to the ASME Code requirement to pressure test piping that penetrates a containment vessel if the piping and isolation valves that are part of the containment system are Class 2 and the balance of the piping system is outside the scope of Section XI. However, the NDE requirement associated with the system leakage test was removed from Section XI paragraph IWA-4540 of the 2003 Addenda (and the later edition and addenda of the ASME Code). In addition, for plants that used the ASME B31.1 Code for construction, no requirement existed to volumetrically examine certain piping components during fabrication.

Section XI requires NDE per the Construction Code as part of repair and replacement activities. Thus, if a B31.1 plant or a licensee using the 2003 Addenda or later performs a repair to certain Class 2 or Class 3 piping, no requirement exists to perform NDE. Volumetric examination after repair or replacement is required to ensure high-quality welds. Because the industry has concluded that pressure tests are not adequate for ensuring structural integrity (i.e., adequate component repair and replacement), it is paramount that high-quality NDE be performed. Volumetric examination ensures high-quality welds capable of performing its design function for the life of the component. Therefore, the final RG has retained the condition on the use of Code Case N-751 that NDE must be performed in accordance with IWA-4540(a)(2) of the 2002 Addenda of Section XI when a 10 CFR 50, Appendix J, Type C test is performed as an alternative to the requirements of IWA-4540 (IWA-4700 in the 1989 edition through the 1995 edition) during repair and replacement activities.