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DRAFT REGULATORY GUIDE

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INSERVICE INSPECTION CODE CASE ACCEPTABILITY, ASME SECTION XI, DIVISION 1

Purpose

This regulatory guide (RG) lists the American Society of Mechanical Engineers (ASME) Section XI Code Cases that the U.S. Nuclear Regulatory Commission (NRC) has approved for use as voluntary alternatives to the mandatory ASME *Boiler and Pressure Vessel* (BPV) Code provisions that are incorporated by reference into Title 10, Part 50, of the *Code of Federal Regulations* (10 CFR Part 50), "Domestic Licensing of Production and Utilization Facilities" (Ref. 1).

Applicable Rules and Regulations

- General Design Criterion (GDC) 1, "Quality Standards and Records," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, in part, that structures, systems, and components important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed. Where generally recognized codes and standards are used, Criterion 1 requires that they be identified and evaluated to determine their applicability, adequacy, and sufficiency and be supplemented or modified as necessary to ensure a quality product in keeping with the required safety function.

- Criterion 30, "Quality of Reactor Coolant Pressure Boundary," of Appendix A to 10 CFR Part 50 requires, in part, that components that are part of the reactor coolant pressure boundary be designed, fabricated, erected, and tested to the highest practical quality standards.

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants," to 10 CFR Part 50 requires, in part, a program for inspection of activities affecting quality to verify conformance with documented instructions and procedures.

This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received final staff review or approval and does not represent an official NRC final staff position. Public comments are being solicited on this draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Rules, Announcements, and Directives Branch, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; submitted through the NRC's interactive rulemaking Web page at http://www.nrc.gov; or faxed to (301) 492-3446. Copies of comments received may be examined at the NRC's Public Document Room, 11555 Rockville Pike, Rockville, MD. Comments will be most helpful if received by 5/16/2016.

Electronic copies of this draft regulatory guide are available through the NRC's interactive rulemaking Web page (see above); the NRC's public Web site under Draft Regulatory Guides in the Regulatory Guides document collection of the NRC Library at http://www.nrc.gov/reading-rm/doc-collections/; and the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html, under Accession No. ML15027A202.

- The regulation in 10 CFR 50.55a(g), "Inservice Inspection Requirements," requires, in part, that Classes 1, 2, 3, MC, and CC components and their supports meet the requirements of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME BPV Code (Ref. 2) or equivalent quality standards.

Related Guidance

- Regulatory Guide 1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III" (Ref. 3), lists the ASME Section III Code Cases that the NRC has approved for use as voluntary alternatives to the mandatory ASME BPV Code provisions that are incorporated into 10 CFR 50.55a.

- Regulatory Guide 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code" (Ref. 4), lists the ASME Operation and Maintenance Code (OM Code) Code Cases that the NRC has approved for use as voluntary alternatives to the mandatory ASME OM Code provisions that are incorporated into 10 CFR 50.55a.

- Regulatory Guide 1.193, "ASME Code Cases Not Approved for Use" (Ref. 5), lists the ASME Section III and Section XI, and ASME OM Code, Code Cases that the NRC has not approved for generic use.

Purpose of This Regulatory Guide

The NRC will amend 10 CFR 50.55a to incorporate by reference the new Code Cases and revisions to existing Code Cases listed as approved in Tables 1 and 2 of this guide, and to state the requirements governing the use of Code Cases. Code Cases approved by the NRC may be used voluntarily by licensees as an alternative to compliance with ASME Code provisions that have been incorporated by reference into 10 CFR 50.55a. Because of continuing change in the status of Code Cases, the staff plans periodic updates to 10 CFR 50.55a and this guide to accommodate new Code Cases and any revisions of existing Code Cases.

Paperwork Reduction Act (Ref. 6)

This regulatory guide contains information collection requirements covered by 10 CFR Part 50 that the Office of Management and Budget (OMB) approved under OMB control number 3150-0011. The NRC may neither conduct nor sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

B. DISCUSSION

Reason of Revision

Revision 18 of RG 1.147 includes new information reviewed by the NRC that is provided in Section XI Code Cases listed in Supplement 11 to the 2007 Edition and Supplement 0 through 10 to the 2010 Edition of the BPV Code. This is an update to RG 1.147, Revision 17, which included information from Supplements 1 through 10 to the 2007 Edition.

Background

Provisions of the ASME BPV Code have been used since 1971 as one part of the framework to establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety in nuclear power plants. Among other things, ASME standards committees develop improved methods for the construction and inservice inspection (ISI) of ASME Class 1, 2, 3, MC (metal containment), and CC (concrete containment) nuclear power plant components. A broad spectrum of stakeholders participates in the ASME process, which helps to ensure that the various interests are considered.

The ASME publishes a new edition of the BPV Code, which includes Section XI, every 2 years. The latest edition of Section XI that the NRC has approved for use is referenced in 10 CFR 50.55a(a)(1)(ii). The ASME also publishes Code Cases quarterly. Code Cases provide alternatives developed and approved by ASME. This regulatory guide identifies the Code Cases that have been determined by the NRC to be acceptable alternatives to applicable parts of Section XI. Section XI Code Cases not yet endorsed by the NRC may be used by a licensee or applicant through 10 CFR 50.55a(z). That section permits the use of alternatives to the Code requirements referenced in 10 CFR 50.55a provided that the proposed alternatives result in an acceptable level of quality and safety, and that their use is authorized by the Director of the Office of Nuclear Reactor Regulation.

The ASME Code is incorporated by reference into 10 CFR 50.55a. Code Cases approved by the NRC provide an acceptable voluntary alternative to the mandatory ASME Code provisions. Requirements related to Code Case implementation are provided in 10 CFR 50.55a(b). When a licensee initially applies a Code Case listed in Tables 1 or 2, the licensee must implement the most recent version of that Code Case incorporated by reference in 10 CFR 50.55a.

Code Cases may be annulled because the provisions have been incorporated into the Code, the application for which it was specifically developed no longer exists, or experience has shown that an examination or testing method is no longer adequate. After the ASME annuls a Code Case and the NRC amends 10 CFR 50.55a and this guide, licensees may not implement that Code Case for the first time. However, a licensee who implemented the Code Case prior to annulment may continue to use that Code Case through the end of the present ISI interval. An annulled Code Case cannot be used in the subsequent ISI interval unless implemented as an approved alternative under 10 CFR 50.55a(z). If a Code Case is incorporated by reference into 10 CFR 50.55a and later annulled by the ASME because experience has shown that an examination or testing method is inadequate, the NRC will amend 10 CFR 50.55a and this guide to remove the approval of the annulled Code Case. Licensees should not begin to implement such annulled Code Cases in advance of the rulemaking. Notwithstanding these requirements, the Commission may impose new or revised Code requirements, including implementation schedules, which it determines are consistent with the Backfit Rule (10 CFR 50.109).

A Code Case may be revised, for example, to incorporate user experience. The older or superseded version of the Code Case cannot be applied by the licensee or applicant for the first time. If

an applicant or a licensee applied a Code Case before it was listed as superseded, the applicant or the licensee may continue to use the Code Case until the applicant or the licensee updates its construction Code of Record (in the case of an applicant, updates its application) or until the licensee's 120-month ISI/IST update interval expires, after which the continued use of the Code Case is prohibited unless NRC approval is granted under 10 CFR Part 50.55a(z). If a Code Case is incorporated by reference into 10 CFR Part 50.55a and later a revised version is issued by the ASME because experience has shown that the design analysis, construction method, examination method, or testing method is inadequate; the NRC will amend 10 CFR Part 50.55a and the relevant RG to remove the approval of the superseded Code Case. Applicants and licensees should not begin to implement such superseded Code Cases in advance of the rulemaking.

With regard to the use of any Code Case, it is the responsibility of the user to make certain that the provisions of the Code Case do not conflict with licensee commitments or regulatory requirements.

C. STAFF REGULATORY GUIDANCE

For Revision 18 of Regulatory Guide 1.147, the NRC reviewed the Section XI Code Cases listed in Supplement 11 to the 2007 Edition and Supplement 0 through Supplement 10 to the 2010 Edition of the ASME BPV Code. Appendix A to this guide lists the supplements reviewed, the edition, the supplement number, and the date on which the supplement was approved by the ASME Board on Nuclear Codes and Standards. Appendix B is a list of the Section XI Code Cases published by the ASME in the eleven supplements. Finally, Appendix C is a current list of all Section XI Code Cases. The Code Cases addressed by this regulatory guide are listed in five tables:

(1) Table 1, "Acceptable Section XI Code Cases," lists the Code Cases that are acceptable to the NRC for implementation in the ISI of light-water-cooled nuclear power plants.

(2) Table 2, "Conditionally Acceptable Section XI Code Cases," lists the Code Cases that are acceptable, provided that they are used with the identified conditions (i.e., the Code Case is generally acceptable but the NRC has determined that the requirements in the Code Case, which are an alternative to requirements in the BPV Code, must be supplemented in order to provide an acceptable level of quality and safety).

(3) Table 3, "Annulled Unconditionally Approved Section XI Code Cases," lists Code Cases annulled by the ASME that the NRC previously determined to be fully acceptable.

(4) Table 4, "Annulled Conditionally Acceptable Section XI Code Cases," lists Code Cases that the NRC determined to be acceptable, provided that they were used with the identified conditions, but were subsequently annulled by the ASME.

(5) Table 5, "Section XI Code Cases That Have Been Superseded by Revised Code Cases," lists Code Cases that have been superseded through revision.

1. Acceptable Section XI Code Cases

The Code Cases listed in Table 1 are acceptable to the NRC for application in licensee's Section XI inservice inspection programs. The 2010 Edition of the ASME BPV Code was published on July 1, 2010. An addenda was issued in 2011; no addenda was issued in 2012. Beginning with 2013, new editions of the BPV Code will be issued every two years. Code Cases will continue to be published quarterly in supplements to each edition. To assist users, new and revised Code Cases are shaded to distinguish them from those approved in previous versions of this guide. The shading will assist in focusing attention during the public comment period on the changes to the guide. For Code Cases previously listed in this guide, the third column of Table 1 lists the date of ASME approval. For new or revised Code Cases, the third column of Table 1 lists the supplement and edition in which each Code Case was published (e.g., "5/10E" means Code Case Supplement 5 to the 2010 Edition).

Code Cases that the NRC determined to be unacceptable are listed in Regulatory Guide 1.193, "ASME Code Cases Not Approved for Use."

Table 1. Acceptable Section XI Code Cases

Code Case Number	Table 1 Acceptable Section XI Code Cases	Date or Supplement/ Edition
N-432-1	*Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique, Section XI, Division 1*	3/28/01
N-460	*Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1*	2/14/03
N-491-2	*Rules for Examination of Class 1, 2, 3, and MC Component Supports of Light-Water Cooled Power Plants, Section XI, Division 1*	2/14/03
N-494-4	*Pipe Specific Evaluation Procedures and Acceptance Criteria for Flaws in Class 1 Ferritic Piping that Exceed the Acceptance Standards of IWB-3514.2 and in Class 1 Austenitic Piping that Exceed the Acceptance Standards of IWB-3514.3, Section XI, Division*	1/12/05
N-496-2	*Helical-Coil Threaded Inserts, Section XI, Division 1*	8/04/04
N-517-1	*Quality Assurance Program Requirements for Owners, Section XI, Division 1*	3/28/01
N-526	*Alternative Requirements for Successive Inspections of Class 1 and 2 Vessels, Section XI, Division 1*	8/20/02
N-532-5	*Alternative Requirements to Repair and Replacement Documentation Requirements and Inservice Summary Report Preparation and Submission as Required by IWA-4000 and IWA-6000, Section XI, Division 1*	1/04/11
N-534	*Alternative Requirements for Pneumatic Pressure Testing, Section XI, Division 1*	5/09/03
N-537	*Location of Ultrasonic Depth-Sizing Flaws, Section XI, Division 1*	3/28/01
N-553-1	*Inservice Eddy Current Surface Examination of Pressure Retaining Pipe Welds and Nozzle-to-Safe End Welds, Section XI, Division 1*	3/28/01
N-554-3	*Alternative Requirements for Reconciliation of Replacement Items and Addition of New Systems, Section XI, Division 1*	2/14/03
N-566-2	*Corrective Action for Leakage Identified at Bolted Connections, Section XI, Division 1*	3/28/01
N-567-1	*Alternative Requirements for Class 1, 2, and 3 Replacement Components, Section XI, Division 1*	4/19/02
N-573	*Transfer of Procedure Qualification Records Between Owners, Section XI, Division 1*	2/14/03
N-586-1	*Alternative Additional Examination Requirements for Classes 1, 2, and 3 Piping, Components, and Supports, Section XI, Division 1*	5/04/04
N-600	*Transfer of Welder, Welding Operator, Brazer, and Brazing Operator Qualifications Between Owners, Section XI, Division 1*	9/18/01

Code Case Number	Table 1 Acceptable Section XI Code Cases	Date or Supplement/ Edition
N-609-1	*Alternative Requirements to Stress-Based Selection Criteria for Category B-J Welds, Section XI, Division 1*	3/10E
N-613-2	*Ultrasonic Examination of Full Penetration Nozzles in Vessels, Examination Category B-D, Reactor Nozzle-To-Vessel Welds, and Nozzle Inside Radius Section Figs. IWB-2500-7(a), (b), (c), and (d), Section XI, Division 1*	4/10E
N-624	*Successive Inspections, Section XI, Division 1*	4/19/02
N-629	*Use of Fracture Toughness Test Data to Establish Reference Temperature for Pressure Retaining Materials, Section XI, Division 1*	8/20/02
N-641	*Alternative Pressure-Temperature Relationship and Low Temperature Overpressure Protection System Requirements, Section XI, Division 1*	2/03/03
N-643-2	*Fatigue Crack Growth Rate Curves for Ferritic Steels in PWR Water Environment, Section XI, Division 1*	5/04/04
N-649	*Alternative Requirements for IWE-5240 Visual Examination, Section XI, Division 1*	3/28/01
N-651	*Ferritic and Dissimilar Metal Welding Using SMAW Temper Bead Technique Without Removing the Weld Bead Crown for the First Layer, Section XI, Division 1*	8/14/01
N-652-2	*Alternative Requirements to Categorize B-G-1, B-G-2, and C-D Bolting Examination Methods and Selection Criteria, Section XI, Division 1*	9/10E
N-653-1	*Qualification Requirements for Full Structural Overlaid Wrought Austenitic Piping Welds, Section XI, Division 1*	9/10E
N-658	*Qualification Requirements for Ultrasonic Examination of Wrought Austenitic Piping Welds, Section XI, Division 1*	4/4/02
N-663	*Alternative Requirements for Classes 1 and 2 Surface Examinations, Section XI, Division 1*	9/17/02
N-664	*Performance Demonstration Requirements for Examination of Unclad Reactor Pressure Vessel Welds, Excluding Flange Welds, Section XI, Division 1*	8/20/02
N-665	*Alternative Requirements for Beam Angle Measurements Using Refracted Longitudinal Wave Search Units, Section XI, Division 1*	2/28/03
N-683	*Method for Determining Maximum Allowable False Calls When Performing Single-Sided Access Performance Demonstration in Accordance with Appendix VIII, Supplements 4 and 6, Section XI, Division 1*	2/28/03
N-685	*Lighting Requirements for Surface Examination, Section XI, Division 1*	2/28/03
N-686-1	*Alternative Requirements for Visual Examinations, VT-1, VT-2, and VT-3, Section XI, Division*	1/10/07

Code Case Number	Table 1 Acceptable Section XI Code Cases	Date or Supplement/ Edition
N-694-2	*Evaluation Procedure and Acceptance Criteria for PWR Reactor Vessel Head Penetration Nozzles, Section XI, Division 1*	1/13E
N-695	*Qualification Requirements for Dissimilar Metal Piping Welds, Section XI Division 1*	5/21/03
N-696	*Qualification Requirements for Appendix VIII Piping Examinations Conducted from the Inside Surface, Section XI, Division 1*	5/21/03
N-697	*Pressurized Water Reactor (PWR) Examination and Alternative Examination Requirements for Pressure Retaining Welds in Control Rod Drive and Instrument Nozzle Housings, Section XI, Division 1*	11/18/03
N-700	*Alternative Rules for Selection of Classes 1, 2, and 3 Vessel Welded Attachments for Examination, Section XI, Division 1*	11/18/03
N-705	*Evaluation Criteria for Temporary Acceptance of Degradation in Moderate Energy Class 2 or 3 Vessels and Tanks, Section XI, Division 1*	10/12/06
N-706-1	*Alternative 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* (Note: Code Case N-706 was unconditionally approved in Revision 15 to Regulatory Guide 1.147*)*	1/10/07
N-712	*Class 1 Socket Weld Examinations, Section XI, Division 1*	5/12/04
N-716-1	*Alternative Piping Classification and Examination Requirements, Section XI, Division 1*	1/27/13
N-730-1	*Roll Expansion of Class 1 Control Rod Drive Bottom Head Penetrations in BWRs, Section XI, Division 1*	10/10E
N-731	*Alternative Class 1 System Leakage Test Pressure Requirements, Section XI, Division 1*	2/22/05
N-733	*Mitigation of Flaws in NPS 2 (DN 50) and Smaller Nozzles and Nozzle Partial Penetration Welds in Vessels and Piping by Use of a Mechanical Connection Modification, Section XI, Division 1*	7/01/05
N-735	*Successive Inspection of Class 1 and 2 Piping Welds, Section XI, Division 1*	10/12/06
N-739-1	*Alternative Qualification Requirements for Personnel Performing Class CC Concrete and Post-Tensioning System Visual Examinations, Section XI, Division 1*	1/21/07
N-747	*Reactor Vessel Head-to-Flange Weld Examinations, Section XI, Division 1*	1/13/06
N-753	*Vision Tests, Section XI, Division 1*	7/14/06

Code Case Number	Table 1 Acceptable Section XI Code Cases	Date or Supplement/ Edition
N-762	*Temper Bead Procedure Qualification Requirements for Repair/Replacement Activities Without Post Weld Heat Treatment, Section XI, Division 1*	1/27/07
N-765	*Alternative to Inspection Interval Scheduling Requirements of IWA-2430, Section XI, Division 1*	1/26/09
N-769-2	*Roll Expansion of Class 1 In-Core Housing Bottom Head Penetrations in BWRs, Section XI, Division 1*	10/10E
N-771	*Alternative Requirements for Additional Examinations of Class 2 or 3 Items, Section XI, Division 1*	7/10E
N-773	*Alternative Qualification Criteria for Eddy Current Examinations of Piping Inside Surfaces, Section XI, Division 1*	1/26/09
N-775	*Alternative Requirements for Bolting Affected by Borated Water Leakage, Section XI, Division 1*	2/10E
N-776	*Alternative to IWA-5244 Requirements for Buried Piping, Section XI, Division 1*	1/10E
N-786	*Alternative Requirements for Sleeve Reinforcement of Class 2 and 3 Moderate-Energy Carbon Steel Piping, Section XI, Division 1*	5/10E
N-798	*Alternative Pressure Testing Requirements for Class 1 Piping Between the First and Second Vent, Drain, and Test Isolation Devices, Section XI, Division 1*	4/10E
N-800	*Alternative Pressure Testing Requirements for Class 1 Piping Between the First and Second Injection Valves, Section XI, Division 1*	4/10E
N-803	*Similar and Dissimilar Metal Welding Using Ambient Temperature Automatic or Machine Dry Underwater Laser Beam Welding (ULBW) Temper Bead Technique, Section XI, Division 1*	5/10E
N-805	*Alternative to Class 1 Extended Boundary End of Interval or Class 2 System Leakage Testing of the Reactor Vessel Head Flange O-Ring Leak-Detection System, Section XI, Division 1*	6/10E
N-823	*Visual Examination, Section XI, Division 1*	9/10E
N-825	*Alternative Requirements for Examination of Control Rod Drive Housing Welds, Section XI, Division 1*	3/13E
N-845	*Qualification Requirements for Bolts and Studs, Section XI, Division 1*	6/13E

2. Conditionally Acceptable Section XI Code Cases

The Code Cases listed in Table 2 are acceptable to the NRC for application in licensee's Section XI inservice inspection programs within the limitations imposed by the NRC staff. Unless otherwise stated, limitations imposed by the NRC are in addition to the conditions specified in the Code Case. The 2010 Edition of the ASME BPV Code was published on July 1, 2010. An addenda was issued in 2011; no addenda was issued in 2012. Beginning with 2013, new editions of the BPV Code will be issued every two years. Code Cases will continue to be published quarterly in supplements to each edition. To assist users, new and revised Code Cases are shaded to distinguish them from those approved in previous versions of this guide. The shading will assist in focusing attention during the public comment period on the changes to the guide. For Code Cases previously listed in this guide, the third column of Table 1 lists the date of ASME approval. For new or revised Code Cases, the third column of Table 1 lists the supplement and edition in which each Code Case was published (e.g., "5/10E" means Code Case Supplement 5 to the 2010 Edition).

Table 2. Conditionally Acceptable Section XI Code Cases

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases	Date or Supplement/ Edition
	Condition	
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*	1/12/05
	Nondestructive examination shall be performed on 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.	
N-498-4	*Alternative Requirements for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems, Section XI, Division 1*	4/08/02
	Prior to conducting the VT-2 examination of Class 2 and Class 3 components not required to operate during normal plant operation, a 10-minute holding time is required after attaining test pressure. Prior to conducting the VT-2 examination of Class 2 and Class 3 components required to operate during normal plant operation, no holding time is required, provided the system has been in operation for at least 4 hours for insulated components or 10 minutes for non-insulated components.	

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases	Date or Supplement/ Edition
	Condition	
N-504-4	*Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping, Section XI, Division 1*	7/14/06
	The provisions of Section XI, Nonmandatory Appendix Q, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," must also be met. In addition, the following conditions shall be met: (a) the sum of laminar flaw length in any direction shall be less than 10% of the overlay with a total reduction in area equal to or less than Table IWB-3514-3; (b) the finished overlay surface shall be 250 micro-in (6.3 micrometers) root mean square or smoother; (c) the surface flatness shall be adequate for ultrasonic examination; and (d) radiography shall not be used to detect planar flaws under or masked by laminar flaws.	
N-508-4	*Rotation of Serviced Snubbers and Pressure Retaining Items for the Purpose of Testing, Section XI, Division 1*	1/26/09
	When Section XI requirements are used to govern the examination and testing of snubbers and the ISI Code of Record is earlier than Section XI, 2006 Addenda, Footnote 1 shall not be applied.	
N-513-3	*Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1*	1/26/09
	The repair or replacement activity temporarily deferred under the provisions of this Code Case shall be performed during the next scheduled outage.	
N-516-3	*Underwater Welding, Section XI, Division 1*	4/08/02
	Licensees must obtain NRC approval in accordance with 10 CFR 50.55a(z) regarding the technique to be used in the weld repair or replacement of irradiated material underwater.	
N-528-1	*Purchase, Exchange, or Transfer of Material Between Nuclear Plant Sites, Section XI, Division 1*	4/19/02
	The requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance" (Ref. 7), are to be applied to the nuclear plant site supplying the material as well as to the nuclear plant site receiving the material that has been purchased, exchanged, or transferred between sites.	
N-533-1	*Alternative Requirements for VT-2 Visual Examination of Class 1, 2, and 3 Insulated Pressure-Retaining Bolted Connections, Section XI, Division 1*	4/08/02
	Prior to conducting the VT-2 examination of Class 2 and Class 3 components not required to operate during normal plant operation, a 10 minute holding time is required after attaining test pressure. Prior to conducting the VT-2 examination of Class 2 and Class 3 components required to operate during normal plant operation, no holding time is required, provided the system has been in operation for at least 4 hours for insulated components or 10 minutes for non-insulated components.	

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases Condition	Date or Supplement/ Edition
N-552-1	*Alternative Methods - Qualification for Nozzle Inside Radius Section from the Outside Surface, Section XI, Division 1* To achieve consistency with the 10 CFR 50.55a rule change published September 22, 1999 (64 FR 51370), incorporating Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," to Section XI, add the following to the specimen requirements: "At least 50 percent of the flaws in the demonstration test set must be cracks and the maximum misorientation must be demonstrated with cracks. Flaws in nozzles with bore diameters equal to or less than 4 inches may be notches." Add to detection criteria, "The number of false calls must not exceed three." Note: The above conditions are identical to those imposed on Code Case N-552, Rev. 16, RG 1.147.	10/10E
N-557-1	*In-Place Dry Annealing of a PWR Nuclear Reactor Vessel, Section XI, Division 1* The secondary stress allowable of $3S_m$, shown in Figure 1 of the Code Case, must be applied to the entire primary plus secondary stress range during the anneal.	8/20/02
N-561-2	*Alternative Requirements for Wall Thickness Restoration of Class 2 and High Energy Class 3 Carbon Steel Piping, Section XI, Division 1* (1) Paragraph 5(b): for repairs performed on a wet surface, the overlay is only acceptable until the next refueling outage. (2) Paragraph 7(c): if the cause of the degradation has not been determined, the repair is only acceptable until the next refueling outage. (3) The area where the weld overlay is to be applied must be examined using ultrasonic methods to demonstrate that no crack-like defects exist. (4) Piping with wall thickness less than the diameter of the electrode shall be depressurized before welding.	1/22/07
N-562-2	*Alternative Requirements for Wall Thickness Restoration of Class 3 Moderate Energy Carbon Steel Piping, Section XI, Division 1* (1) Paragraph 5(b): for repairs performed on a wet surface, the overlay is only acceptable until the next refueling outage. (2) Paragraph 7(c): if the cause of the degradation has not been determined, the repair is only acceptable until the next refueling outage. (3) The area where the weld overlay is to be applied must be examined using ultrasonic methods to demonstrate that no crack-like defects exist. (4) Piping with wall thickness less than the diameter of the electrode shall be depressurized before welding.	1/22/07

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases Condition	Date or Supplement/ Edition
N-569-1	*Alternative Rules for Repair by Electrochemical Deposition of Class 1 and 2 Steam Generator Tubing, Section XI, Division 1* NOTES: Steam generator tube repair methods require prior NRC approval through the Technical Specifications. This Code Case does not address certain aspects of this repair, e.g., the qualification of the inspection and plugging criteria necessary for staff approval of the repair method. In addition, if the user plans to "reconcile," as described in Footnote 2, the reconciliation is to be performed in accordance with IWA-4200 in the 1995 Edition, 1996 Addenda of ASME Section XI.	4/19/02
N-576-2	*Repair of Class 1 and 2 SB-163, UNS N06600 Steam Generator Tubing, Section XI, Division 1* NOTES: Steam generator tube repair methods require prior NRC approval through the Technical Specifications. This Code Case does not address certain aspects of this repair, e.g., the qualification of the inspection and plugging criteria necessary for staff approval of the repair method. In addition, if the user plans to "reconcile," as described in Footnote 2, the reconciliation is to be performed in accordance with IWA-4200 in the 1995 Edition, 1996 Addenda of ASME Section XI. (Note: this condition is identical to condition on the use of Code Case N-576-1, RG 1.147, Rev. 17)	9/10E
N-583	*Annual Training Alternative, Section XI, Division 1* (1) Supplemental practice shall be performed on material or welds that contain cracks, or by analyzing prerecorded data from material or welds that contain cracks. (2) The training must be completed no earlier than 6 months prior to performing ultrasonic examinations at a licensee's facility.	2/14/03
N-593-2	*Alternative Examination Requirements for Steam Generator Nozzle to Vessel Welds, Section XI, Division 1* (1) Essentially 100 percent (not less than 90 percent) of the examination volume A-B-C-D-E-F-G-H must be inspected. (Note: the above condition is identical to condition on the use of Code Case N-593, RG 1.147, Rev. 16) (2) The examination volume specified in Section XI, Table IWB-2500-1, Examination Category B-D, must be used for the examination of steam generator nozzle-to-vessel welds at least once prior to using the reduced examination volume allowed by Code Case N-593-2.	8/10E

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases	Date or Supplement/ Edition
	Condition	
N-597-2	*Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1*	11/18/03
	(1) Code Case must be supplemented by the provisions of EPRI Nuclear Safety Analysis Center Report 202L-R2,"Recommendations for an Effective Flow Accelerated Corrosion Program" (Ref. 8), April 1999, for developing the inspection requirements, the method of predicting the rate of wall thickness loss, and the value of the predicted remaining wall thickness. As used in NSAC-202L-R2, the term "should" is to be applied as "shall" (i.e., a requirement). (2) Components affected by flow-accelerated corrosion to which this Code Case are applied must be repaired or replaced in accordance with the construction code of record and Owner's requirements or a later NRC approved edition of Section III, "Rules for Construction of Nuclear Power Plant Components," of the ASME Code (Ref. 9) prior to the value of t_p reaching the allowable minimum wall thickness, t_{min}, as specified in -3622.1(a)(1) of this Code Case. Alternatively, use of the Code Case is subject to NRC review and approval per 10 CFR 50.55a(z). (3) For Class 1 piping not meeting the criteria of -3221, the use of evaluation methods and criteria is subject to NRC review and approval per 10 CFR 50.55a(z). (4) For those components that do not require immediate repair or replacement, the rate of wall thickness loss is to be used to determine a suitable inspection frequency so that repair or replacement occurs prior to reaching allowable minimum wall thickness, t_{min}. (5) For corrosion phenomenon other than flow accelerated corrosion, use of the Code Case is subject to NRC review and approval. Inspection plans and wall thinning rates may be difficult to justify for certain degradation mechanisms such as MIC and pitting. (6) The evaluation criteria in Code Case N-513-2 may be applied to Code Case N-597-2 for temporary acceptance of wall thinning (until the next refueling outage) for moderate-energy Class 2 and 3 piping. 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-597-2 shall not be used to evaluate through-wall leakage conditions.	

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases	Date or Supplement/ Edition
	Condition	
N-606-1	*Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique for BWR CRD Housing/Stub Tube Repairs, Section XI, Division 1*	8/20/02
	Prior to welding, an examination or verification must be performed to ensure proper preparation of the base metal, and that the surface is properly contoured so that an acceptable weld can be produced. This verification is to be required in the welding procedures.	
N-616	*Alternative Requirements for VT-2 Visual Examination of Classes 1, 2, 3 Insulated Pressure Retaining Bolted Connections, Section XI, Division 1*	4/08/02
	(1) Insulation must be removed for VT-2 examination during the system pressure test for any 17-4 PH stainless steel of 410 stainless steel stud or bolt aged at a temperature below 1100 °F or with hardness above R_c 30. (2) For A-286 stainless steel studs or bolts, the preload must be verified to be below 100 Ksi or the thermal insulation must be removed and the joint visually examined. (3) Prior to conducting the VT-2 examination of Class 2 and Class 3 components not required to operate during normal plant operation, a 10-minute holding time is required after attaining test pressure. Prior to conducting the VT-2 examination of Class 2 and Class 3 components required to operate during normal plant operation, no holding time is required, provided the system has been in operation for at least 4 hours for insulated components or 10 minutes for non-insulated components.	
N-619	*Alternative Requirements for Nozzle Inner Radius Inspections for Class 1 Pressurizer and Steam Generator Nozzles, Section XI, Division 1*	4/08/02
	In lieu of a UT examination, licensees may perform a VT-1 examination in accordance with the code of record for the Inservice Inspection Program utilizing the allowable flaw length criteria of Table IWB-3512-1 with limiting assumptions on the flaw aspect ratio.	

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases	Date or Supplement/ Edition
	Condition	
N-638-6	*Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique, Section XI, Division 1*	6/10E
	(1) Demonstration for ultrasonic examination of the repaired volume is required using representative samples which contain construction type flaws. (Note: the above conditions is identical to the condition on the use of Code Case N-638-4, RG 1.147, Rev. 17) (2) Section 1(b)(1) for through-wall circumferential welds is unacceptable.	
N-639	*Alternative Calibration Block Material, Section XI, Division 1*	8/20/02
	Chemical ranges of the calibration block may vary from the materials specification if (1) it is within the chemical range of the component specification to be inspected, and (2) the phase and grain shape are maintained in the same ranges produced by the thermal process required by the material specification.	
N-647	*Alternative to Augmented Examination Requirements of IWE-2500, Section XI, Division 1*	11/18/03
	A VT-1 examination is to be used in lieu of the "detailed visual examination." [Note: Draft Regulatory Guide DG-1070, "Sampling Plans Used for Dedicating Simple Metallic Commercial Grade Items for Use in Nuclear Power Plants" (Ref. 10), is being developed to provide acceptable guidelines for sampling criteria.]	
N-648-1	*Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles, Section XI Division 1*	9/18/01
	In lieu of a UT examination, licensees may perform a VT-1 examination in accordance with the code of record for the Inservice Inspection Program utilizing the allowable flaw length criteria of Table IWB-3512-1 with limiting assumptions on the flaw aspect ratio.	
N-660	*Risk-Informed Safety Classification for Use in Risk-Informed Repair/Replacement Activities, Section XI, Division 1*	7/23/02
	The Code Case must be applied only to ASME Code Classes 2 and 3, and non-Code Class pressure retaining components and their associated supports.	

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases	Date or Supplement/ Edition
	Condition	
N-661-2	*Alternative Requirements for Wall Thickness Restoration of Classes 2 and 3 Carbon Steel Piping for Raw Water Service, Section XI, Division 1*	3/22/07
	(1) Paragraph 4(b): for repairs performed on a wet surface, the overlay is only acceptable until the next refueling outage. (2) Paragraph 7(c): if the cause of the degradation has not been determined, the repair is only acceptable until the next refueling outage. (3) The area where the weld overlay is to be applied must be examined using ultrasonic methods to demonstrate that no crack-like defects exist. (4) Piping with wall thickness less than the diameter of the electrode shall be depressurized before welding.	
N-662-1	*Alternative Repair/Replacement Requirements for Items Classified in Accordance with Risk-Informed Processes, Section XI, Division 1*	6/10E
	The Code Case must be applied only to ASME Code Classes 2 and 3, and non-Code Class pressure retaining components and their associated supports. (Note: this condition is identical to condition on the use of Code Case N-662, RG 1.147, Rev. 16).	
N-666-1	*Weld Overlay of Class 1, 2, and 3 Socket Welded Connections, Section XI, Division 1*	9/10E
	(1) A surface examination (magnetic particle or liquid penetrant) must be performed after installation of the weld overlay and seal weld on Class 1 and 2 piping socket welds. Fabrication defects, if detected, must be dispositioned using the surface examination acceptance criteria of the Construction Code identified in the Repair/Replacement Plan. (2) When the construction code does not require a surface or volumetric examination of the completed weld overlay a VT-1 visual examination is required to be performed after completion of the weld overlay and seal weld for Class 3 piping. (Note: Code Case N-666 was unconditionally approved in Rev. 17, RG 1.147.)	

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases	Date or Supplement/ Edition
	Condition	
N-702	*Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1*	2/20/04
	The technical basis supporting the implementation of this Code Case is addressed by 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) and BWRVIP-241: BWR Vessels and Internals Project, "Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," EPRI Technical Report 1021005, October 2010 (ML11119A041). 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 dated December 18, 2007 (ML073600374) or Section 5.0 of NRC Safety Evaluation regarding BWRVIP-241 dated April 19, 2013 (ML13071A240) are met. The evaluation demonstrating the applicability of the Code Case shall be reviewed and approved by the NRC prior to the application of the Code Case.	
N-749	*Alternative Acceptance Criteria for Flaws in Ferritic Steel Components Operating in the Upper Shelf Temperature Range, Section XI, Division 1*	9/10E
	In lieu of the upper shelf transition temperature, T_c, as defined in the Code Case, the following shall be used: $T_c = 170.4\ °F + 0.814 \times RT_{NDT}$ (in U.S. Customary Units), and $T_c = 73.6\ °C + 0.814 \times RT_{NDT}$ (in SI Units). Alternatively, the licensee may use a different T_c value if it can be justified by plant-specific Charpy Curves.	
N-751	*Pressure Testing of Containment Penetration Piping, Section XI, Division 1*	8/03/06
	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, nondestructive examination must be performed in accordance with IWA-4540(a)(2) of the 2002 Addenda of Section XI.	

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases	Date or Supplement/ Edition
	Condition	
N-754	*Optimized Structural Dissimilar Metal Weld Overlay for Mitigation of PWR Class 1 Items, Section XI, Division 1*	6/10E
	1) The conditions imposed on the optimized weld overlay design in the NRC safety evaluation for MRP-169, Revision 1-A (Agencywide Document Access and Management System No. ML101620010 and ML101660468) must be satisfied. 2) The preservice and inservice inspections of the overlaid weld must satisfy 10 CFR 50.55a(g)(6)(ii)(F). 3) The first layer of weld metal deposited shall not be credited toward the required optimized weld overlay thickness unless the chromium content of the first layer is at least 24 per cent. The presence of the first layer shall be considered in the design analysis requirements of paragraph 2(b) of Code Case N-754 regardless of the chromium content.	
N-778	*Alternative Requirements for Preparation and Submittal of Inservice Inspection Plans, Schedules, and Preservice and Inservice Inspection Summary Reports, Section XI, Division 1*	0/10E
	Licensees must submit the following reports to the regulatory authority: 1) The preservice inspection summary report must be submitted prior to the date of placement of the unit into commercial service. 2) The inservice inspection summary report must be submitted within 90 calendar days of the completion of each refueling outage.	
N-789	*Alternative Requirements for Pad Reinforcement of Class 2 and 3 Moderate-Energy Carbon Steel Piping, Section XI, Division 1*	6/10E
	1) Areas containing pressure pads shall be visually observed at least once per month to monitor for evidence of leakage. If the areas containing pressure pads are not accessible for direct observation, then monitoring will be accomplished by visual assessment of surrounding areas or ground surface areas above pressure pads on buried piping, or monitoring of leakage collection systems, if available. 2) For the pressure pad design, the higher of the 2 times the actual measured corrosion rate and 4 times the estimated maximum corrosion rate for the system must be used. If the actual measured corrosion rate in the degraded location is unavailable, the estimated maximum corrosion rate for the system assumed in the design must be calculated based on the same degradation mechanism as the degraded location.	

Code Case Number	Table 2 Conditionally Acceptable Section XI Code Cases Condition	Date or Supplement/ Edition
N-795	*Alternative Requirements for BWR Class 1 System Leakage Test Pressure Following Repair/Replacement Activities, Section XI, Division 1*	3/10E
	1) The use of nuclear heat to conduct the BWR Class 1 system leakage test is prohibited (i.e., the reactor must be in a non-critical state). a. This condition also applies to pressure testing of reactor coolant pressure boundary components repaired or replaced in accordance with Section XI, IWA-4000. 2) The test condition holding time, after pressurization to test conditions, and before the visual examinations commence, shall be 1 hour for non-insulated components.	
N-799	*Dissimilar Metal Welds Joining Vessel Nozzles to Components, Section XI, Division 1*	4/10E
	1) The gap between the ultrasonic probe and component surface shall not exceed 1/32 in. If the gap exceeds 1/32 in., the weld shall be considered to be unexamined unless the examination technique is successfully demonstrated on representative mockups. 2) The following requirements must be implemented when applying this Code Case to ensure that welds are adequately inspected: a. Examination requirements of Section XI, Mandatory Appendix I, paragraph I-3200(c) must be applied. b. The examination of the dissimilar metal welds joining vessel nozzles to components must be full volume, including the cast austenitic stainless steel component of the weld. c. Ultrasonic depth and sizing qualifications for cast austenitic stainless steel components must follow Appendix VIII, Supplement 10, using representative cast austenitic stainless steel mockups containing representative cracks and be independent of other Supplement 10 qualifications. d. For components with wall thicknesses beyond the crack detection and sizing capabilities of a through-wall ultrasonic performance-based qualification, the examination's acceptability shall be based on an ultrasonic examination of the qualified examination volume and a flaw evaluation of the largest hypothetical crack that could exist in the volume and not be qualified for ultrasonic examination. e. Cracks detected and not depth sized to Appendix VIII type performance-based procedures, equipment, and personnel qualifications shall be repaired or removed.	

3. Annulled Unconditionally Approved Section XI Code Cases

The Code Cases listed in Table 3 were previously unconditionally approved by the NRC and have been annulled by the ASME.

Table 3. Annulled Unconditionally Approved Section XI Code Cases

Code Case Number	Table 3 Annulled Unconditionally Approved Section XI Code Cases	Annulment Date
N-34 (1551)	*Inservice Inspection of Welds of Nuclear Components, Section XI*	11/20/81
N-72 (1646)	*Partial Postponement of Category B-C Examination for Class 1 Components, Section XI*	1/1/81
N-73 (1647)	*Partial Postponement of Category B-D Examination for Class 1 Components, Section XI*	1/1/81
N-98 (1705-1)	*Ultrasonic Examination - Calibration Block Tolerances, Section XI, Division 1*	8/9/96
N-112 (1730)	*Acceptance Standards for Class 2 and 3 Components, Section XI, Division 1*	7/1/79
N-113-1	*Basic Calibration Block for Ultrasonic Examination of Weld 10 in. to 14 in. Thick, Section XI, Division 1*	8/9/96
N-167 (1804)	*Minimum Section Thickness Requirements for Repair of Nozzles, Section XI, Division 1*	1/14/80
N-198-1	*Exemption from Examination for ASME Class 1 and 2 Piping Located at Containment Penetrations, Section XI, Division 1*	3/28/01
N-211	*Recalibration of Ultrasonic Equipment Upon Change of Personnel, Section XI, Division 1* (The Code Case was annulled on 3/20/81 and reinstated on 7/13/81. There was no change in the Code Case, and the NRC considers that the Code Case was in effect during the period 3/20/81 through 7/13/81)	4/30/93
N-216	*Alternative Rules for Reactor Vessel Closure Stud Examination, Section XI, Division 1*	5/7/90
N-234	*Time Between Ultrasonic Calibration Checks, Section XI, Division 1*	12/3/90
N-235	*Ultrasonic Calibration Checks per Section V, Section XI, Division 1*	8/9/96
N-236-1	*Repair and Replacement of Class MC Vessels, Section XI, Division 1*	8/5/97
N-288	*Hydrostatic Test Requirements for Class 1 and Class 2 Components, Section XI, Division 1*	5/25/83
N-306	*Calibration Block Material Selection, Appendix 1, 1-3121, Section XI, Division 1*	5/7/90

Code Case Number	Table 3 Annulled Unconditionally Approved Section XI Code Cases	Annulment Date
N-307-3	*Revised Ultrasonic Examination Volume for Class 1 Bolting, Table IWB-2500-1, Examination Category B-G-1, When the Examinations Are Conducted from the End of the Bolt or Stud or from the Center-Drilled Hole, Section XI, Division 1*	1/21/07
N-308	*Documentation of Repairs and Replacements of Components in Nuclear Power Plants, Section XI, Division 1*	9/30/90
N-311	*Alternative Examination of Outlet Nozzle on Secondary Side of Steam Generators, Section XI, Division 1*	11/18/03
N-322	*Examination Requirements for Integrally Welded or Forged Attachments to Class 1 Piping at Containment Penetrations, Section XI, Division 1*	2/14/03
N-323-1	*Alternative Examination for Welded Attachments to Pressure Vessels, Section XI, Division 1*	1/21/07
N-334	*Examination Requirements for Integrally Welded or Forged Attachments to Class 2 Piping at Containment Penetrations, Section XI, Division 1*	7/14/06
N-335-1	*Rules for Ultrasonic Examination of Similar and Dissimilar Metal Piping Welds, Section XI, Division 1*	5/11/97
N-343	*Alternative Scope of Examination of Attachment Welds for Examination Categories B-H, B-K-1, and C-C, Section XI, Division 1*	12/3/90
N-355	*Calibration Block for Angle Beam Ultrasonic Examination of Large Fittings in Accordance with Appendix III-3410, Section XI, Division 1*	8/9/96
N-356	*Certification Period for Level III NDE Personnel, Section XI, Division 1* (Note: July 1, 1988, is the date that the provisions of the Code Case were acceptable to the NRC.)	8/5/97
N-375-2	*Rules for Ultrasonic Examination of Bolds and Studs, Section XI, Division 1*	5/7/90
N-389-1	*Alternative Rules for Repairs, Replacements, or Modifications, Section XI, Division 1*	4/19/02
N-401-1	*Eddy Current Examination, Section XI, Division 1*	5/11/97
N-402-1	*Eddy Current Calibration Standards, Section XI, Division 1*	5/11/97
N-406	*Alternative Rules for Replacement, Section XI, Division 1*	5/7/90
N-408-3	*Alternative Rules for Examination of Class 2 Piping, Section XI, Division 1*	4/19/02

Code Case Number	Table 3 Annulled Unconditionally Approved Section XI Code Cases	Annulment Date
N-409-3	*Procedure and Personnel Qualification Requirements for Ultrasonic Detection and Sizing of Flaws in Piping Welds, Section XI, Division 1*	4/30/96
N-415	*Alternative Rules for Testing Pressure Relief, Section XI, Division 1*	8/14/94
N-419	*Extent of VT-1 Examinations, Category B-G-1 of Table IWB-2500-1, Section XI, Division 1*	5/13/94
N-424	*Qualification of Visual Examination Personnel, Section XI, Division 1*	7/18/88
N-426	*Extent of VT-1 Examinations, Category B-G-2 of Table IWB-2500-1, Section XI, Division 1*	5/13/94
N-427	*Code Cases in Inspection Plans, Section XI, Division 1*	12/16/94
N-429-2	*Alternative Rules for Ultrasonic Instrument Calibration, Section XI, Division 1*	7/27/95
N-435-1	*Alternative Examination Requirements for Vessels With Wall Thickness 2 in. or Less, Section XI, Division 1*	5/4/04
N-436-1	*Alternative Methods for Evaluation of Flaws in Austenitic Piping, Section XI, Division 1*	12/3/90
N-437	*Use of Digital Readout and Digital Measurement Devices for Performing Pressure Tests, Section XI, Division 1*	7/27/95
N-444	*Preparation of Inspection Plans, Section XI, Division 1* (Valve stroke times may be documented outside of the IST program. However, if included within the IST program and it becomes necessary to revise the maximum stroke time required by "Supplement 4—Content of IWV Valve Test Tables," it is not necessary to submit a revised IST program to the NRC solely to document a revision in valve stroke time.)	12/30/90
N-445	*Use of Later Editions of SNT-TC-1A for Qualification of Nondestructive Examination Personnel, Section XI, Division 1, 2 and 3*	5/7/90
N-446	*Recertification of Visual Examination Personnel, Section XI, Division 1*	5/7/90
N-448	*Qualification of VT-2 and VT-3 Visual Examination Personnel, Section XI, Division 1*	4/30/96
N-449	*Qualification of VT-4 Visual Examination Personnel, Section XI, Division 1*	4/30/96
N-457	*Qualification Specimen Notch Location for Ultrasonic Examination of Bolts and Studs, Section XI, Division 1*	4/19/02
N-458-1	*Magnetic Particle Examination of Coated Materials, Section XI, Division 1*	3/38/01

Code Case Number	Table 3 Annulled Unconditionally Approved Section XI Code Cases	Annulment Date
N-461-1	*Alternative Rules for Piping Calibration Block Thickness, Section XI, Division 1*	3/28/01
N-463-1	*Evaluation Procedures and Acceptance Criteria for Flaws in Class 1 Ferritic Piping That Exceed the Acceptance Standards of IWB-3514.2, Section XI, Division 1*	3/28/01
N-471	*Acoustic Emission for Successive Inspections, Section XI, Division 1*	4/19/02
N-472	*Use of Digital Readout and Digital Measurement Devices for Performing Pump Vibration Testing, Section XI, Division 1*	8/14/97
N-478	*Inservice Inspection for Class CC Concrete Components Of Light-Water Cooled Power Plants, Section XI, Division 1*	3/2/98
N-479-1	*Boiling Water Reactor (BWR) Main Steam Hydrostatic Test, Section XI, Division 1*	4/19/02
N-481	*Alternative Examination Requirements for Cast Austenitic Pump Casings, Section XI, Division 1*	3/28/04
N-485-1	*Eddy Current Examination of Coated Ferritic Surfaces as an Alternative to Surface Examination, Section XI, Division 1*	2/14/03
N-489	*Alternative Rules for Level III NDE Qualification Examinations, Section XI, Divisions 1, 2, and 3*	4/19/02
N-490-1	*Alternative Vision Test Requirements for Nondestructive Examiners, Section XI, Divisions 1, 2, and 3*	2/14/03
N-495	*Hydrostatic Testing of Relief Valves, Section XI, Division 1*	4/19/02
N-496-1	*Helical-Coil Threaded Inserts, Section XI, Division 1*	5/11/97
N-503	*Limited Certification of Nondestructive Examination Personnel, Section XI, Division 1* (Note: Because of the statistical screening criteria used for Appendix VIII to Section XI qualifications, this Code Case is not applicable to Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems.")	2/14/03
N-514	*Low Temperature Overpressure Protection, Section XI, Division 1*	4/19/02
N-515	*Class 1 Mechanical Joint Pressure Tests, Section XI, Division 1*	4/19/02
N-521	*Alternative Rules for Deferral of Inspections of Nozzle-to-Vessel Welds, Inside Radius Sections, and Nozzle-to-Safe End Welds of a Pressurized Water Reactor (PWR) Vessel, Section XI, Division 1*	4/19/02
N-522	*Pressure Testing of Containment Penetration Piping, Section XI, Division 1*	4/8/02
N-523-2	*Mechanical Clamping Devices for Class 2 and 3 Piping, Section XI, Division 1*	3/28/04

Code Case Number	Table 3 Annulled Unconditionally Approved Section XI Code Cases	Annulment Date
N-524	*Alternative Examination Requirements for Longitudinal Welds in Class 1 and 2 Piping, Section XI, Division 1*	4/19/02
N-535	*Alternative Requirements for Inservice Inspection Intervals, Section XI, Division 1*	3/28/01
N-538	*Alternative Requirements for Length Sizing Performance Demonstration in Accordance with Appendix VIII, Supplements 2, 3, 10, 11, and 12, Section XI, Division 1*	4/19/02
N-541	*Alternative Requirements for Performance Demonstration in Accordance with Appendix VIII, Supplements 4 and 6, Section XI, Division 1*	3/28/01
N-543	*Alternative to Performing Periodic Calibration Checks, Section XI, Division 1*	9/18/01
N-544	*Repair/Replacement of Small Items, Section XI, Division 1*	3/28/01
N-545	*Alternative Requirements for Conduct of Performance Demonstration Detection Test of Reactor Vessel, Section XI, Division 1*	5/20/98
N-555	*Use of Section II, V, and IX Code Cases, Section XI, Division 1*	4/8/02
N-556	*Alternative Requirements for Verification of Acceptability Of Replacements, Section XI, Division 1*	4/19/02
N-563	*Grading of Examinations, IWA-2320, Section XI, Division 1*	4/19/02
N-588	*Attenuation to Reference Flaw Orientation of Appendix G for Circumferential Welds in Reactor Vessels, Section XI, Division 1*	3/28/04
N-592	*ASNT Central Certification Program, Section XI, Division 1*	3/28/04
N-598	*Alternative Requirements to Required Percentages of Examinations, Section XI, Division 1*	3/28/04
N-601	*Extent and Frequency of VT-3 Visual Examination for Inservice Inspection of Metal Containments, Section XI, Division 1*	3/28/04
N-603	*Alternative to the Requirements of IWL-2421, Sites with Two Plants, Section XI, Division 1*	3/28/04
N-604	*Alternative to Bolt Torque or Tension Test Requirements of Table IWE-2500-1, Category E-G, Item E8.20, Section XI, Division 1*	9/18/04
N-605	*Alternative to the Requirements of IWE-2500(c) [sic, should state IWE-2500(b)] for Augmented Examination of Surface Areas, Section XI, Division 1* [Note: Draft Regulatory Guide DG-1070 (Ref. 9) is being developed to provide acceptable guidelines for sampling criteria.]	3/28/04
N-617	*Alternative Examination Distribution Requirements for Table IWC-2500-1, Examination Category C-G, Pressure Retaining Welds in Pumps and Valves, Section XI, Division 1*	4/19/02

Code Case Number	Table 3 Annulled Unconditionally Approved Section XI Code Cases	Annulment Date
N-623	*Deferral of Inspections of Shell-to-Flange and Head-to-Flange Welds of a Reactor Vessel, Section XI, Division 1*	4/19/02
N-627	*VT-1 Visual Examination in Lieu of Surface Examination for RPV Closure Nuts, Section XI, Division 1*	5/7/02
N-640	*Alternative Reference Fracture Toughness for Development of P-T Limit Curves, Section XI, Division 1*	4/19/02

4. Annulled Conditionally Acceptable Section XI Code Cases

The Code Cases listed in Table 4 were conditionally approved by the NRC but were subsequently annulled by the ASME.

Table 4. Annulled Conditionally Acceptable Section XI Code Cases

Code Case Number	Table 4 Annulled Conditionally Acceptable Section XI Code Cases	Annulment Date
N-118 (1738)	*Examination—Acceptance Standards for Surface Indications in Cladding, Section XI*	12/3/90
	The last sentence of the "Reply" is to be replaced with the following: "The provisions of this Code Case may not be applied for the examination of clad surfaces of nozzles, including the inner surface of the nozzle-to-vessel insert welds."	
N-210	*Exemption to Hydrostatic Tests After Repairs, Section XI, Division 1*	3/20/81
	Paragraph (3) of the "Reply" is to be replaced with the following: "Repairs to piping, pumps, and valves where the depth of the repaired cavity does not exceed 25 percent of the wall thickness."	
N-252	*Low Energy Capacitive Discharge Welding Method for Temporary or Permanent Attachments to Components and Supports, Section III, Division 1, and Section XI*	7/16/82
	The applicant should indicate in the safety analysis report the application, the material, and the thickness of the material to which the strain gage or thermocouple will be attached by CD welding.	
N-278	*Alternative Ultrasonic Calibration Block Configuration I-3131 and T-434.3, Section XI, Division 1* (Code Case N-278 was inadvertently allowed to expire because of an ASME administrative error on 3/17/83. The Code Case was reinstated without technical change on May 25, 1993. Thus, the NRC considered the Code Case to be in effect during the period from March 17, 1983, through May 25, 1993.)	2/19/92
	When a universal calibration block is used and some or all of the reference holes are larger than the reflector holes at comparable depths recommended by Article IV, Section V, 1980 Edition of the ASME Code, a correction factor should be used to adjust the DAC level to compensate for the larger reflector holes. Also, if the reactor pressure vessel was previously examined using a conventional block, a ratio between the DAC curves obtained from the two blocks should be noted (for reference) with the significant indication data.	

Code Case Number	Table 4 Annulled Conditionally Acceptable Section XI Code Cases	Annulment Date
N-509	*Alternative Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments, Section XI, Division 1*	5/20/01
	A minimum 10% sample of integrally welded attachments for each item in each Code class per interval should be examined.	
N-512-1	*Assessment of Reactor Vessels With Low Upper Shelf Charpy Impact Energy Levels, Section XI, Division 1*	5/20/01
	The material properties and transient selection must follow the guidance in Regulatory Guide 1.161, "Evaluation of Reactor Pressure Vessels with Charpy Upper-Shelf Energy Less Than 50 ft-lb" (Ref. 12), or an equivalent method approved by the NRC staff.	
N-546	*Alternative Requirements for Qualification of VT-2 Examination Personnel, Section XI, Division 1*	9/18/04
	This Code Case is applicable only to the performance of VT-2 examinations and may not be applied to other VT-2 functions such as verifying the adequacy of procedures and training VT-2 personnel.	
N-568	*Alternative Examination Requirements for Welded Attachments, Section XI, Division 1*	2/14/03
	This Code Case may only be used for examination of the accessible portions of lugs on piping where riser clamps (i.e., clamps on vertical runs of pipe) obstruct access to welded surfaces.	
N-599	*Alternatives to Qualification of Nondestructive Examination Personnel for Inservice Inspection of Metal (Class MC) and Concrete (Class CC) Containments, Section XI, Division 1*	9/18/04
	This Code Case may not be used when a licensee updates to the 1992 or later Edition of Section XI that requires the use of ANSI/ASNT CP-189, "Standard for Qualification and Certification of Nondestructive Testing Personnel" (Ref. 13).	
N-630	*Alternatives to VT-1C and VT-3C Visual Examination for Inservice Inspection of Concrete and VT-1 Visual Examination for Inservice Inspection of Anchorage Hardware and Surrounding Concrete for Concrete Containments, Section XI, Division 1*	4/8/02
	The Responsible Engineer's written practice must define qualification requirements for concrete and tendon hardware examination personnel in accordance with IWA-2300 in lieu of the Owner defined qualification requirements specified in Paragraph (c) of the Code Case. However, limited certification in accordance with IWA-2350 is permitted.	

5. Code Cases That Have Been Superseded

Table 5 lists Code Cases that have been superseded by revision. The third column of the table indicates the date on which each Code Case was superseded. Note: Some of these Code Cases were not approved for use by the NRC in previous versions of this guide.

Table 5. Section XI Code Cases That Have Been Superseded

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-113 (1731)	*Basic Calibration Block for Ultrasonic Examination of Weld 10 in. To 14 in. Thick, Section XI, Division 1*	N-113-1 Published on 12/31/82
N-236	*Repair and Replacement of Class MC Vessels, Section XI, Division 1* (a) In paragraph 1.0(a), second sentence, the phrase, "while the plant is not in service," refers to a refueling outage. (b) In paragraph 1.0(a), third sentence, the phrase, "the next scheduled plant outage," refers to the next scheduled refueling outage. For clarification, "Repair and Replacement of Class MC Vessels" means Repair and Replacement of Class MC Vessels and Components (systems). Acceptance of this Code Case in no way provides/constitutes NRC approval to violate the technical specification or any NRC requirements with regard to breach of containment during repair and replacement procedures while the plant is in operation. Where a numbered Code paragraph is not identified by a particular edition of the Code, the Code in effect at the time of the ASME meeting (November 3, 1978) that approved the Code Case should be governing.	N-236-1 Published on 9/5/85
N-307 N-307-1 N-307-2	*Revised Ultrasonic Examination Volume for Class 1 Bolting, Table IWB-2500-1, Examination Category B-G-1, When the Examinations Are Conducted from the Center-Drilled Hole, Section XI, Division 1*	N-307-1 Published on 12/5/84 N-307-2 Published on 9/24/99 N-307-3 Published on 3/28/01
N-335	*Rules for Ultrasonic Examination of Similar and Dissimilar Metal Piping Welds, Section XI, Division 1*	N-335-1 Published on 6/20/85
N-375 N-375-1	*Rules for Ultrasonic Examination of Bolds and Studs, Section XI, Division 1*	N-375-1 Published on 4/14/83; N-375-2 Published on 4/5/84

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-389	*Alternative Rules for Repairs, Replacements, or Modifications, Section XI, Division 1* The applicant should submit for approval the appropriate edition and addenda of the Code that is to be used for the repair, replacement, or modification before the start of the work.	N-389-1 Published on 12/9/93
N-401	*Eddy Current Examination, Section XI, Division 1*	N-401-1 Published on 5/4/88
N-402	*Eddy Current Calibration Standards, Section XI, Division 1*	N-402-1 Published on 3/14/91
N-408	*Alternative Rules for Examination of Class 2 Piping, Section XI, Division 1*	N-408-1 Published on 3/8/89
N-408-1 N-408-2	*Alternative Rules for Examination of Class 2 Piping, Section XI, Division 1* The applicant for an operating license should define the Class 2 piping subject to volumetric and surface examination in the Preservice Inspection for determination of acceptability by the NRC staff.	N-408-2 Published on 7/24/89 N-408-3 Published on 8/9/93
N-409	*Procedure and Personnel Qualification Requirements for Ultrasonic Detection and Sizing of Flaws in Piping Welds, Section XI, Division 1*	N-409-1 Published on 12/7/87
N-409-1 N-409-2	*Procedure and Personnel Qualification Requirements for Ultrasonic Detection and Sizing of Flaws in Piping Welds, Section XI, Division 1* The applicant should give prior notification to the NRC of the intention to use the Code Case.	N-409-2 Published on 7/27/88; N-409-3 Published on 4/30/93
N-416 N-416-1 N-416-2 N-416-3	*Alternative Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2, and 3, Section XI, Division 1*	N-416-1 Published on 2/15/94 N-416-2 Published on 5/5/00 N-416-3 Published on 7/7/01 N-416-3 Published on 1/12/05 N-416-4 Published on 1/12/05
N-429 N-429-1	*Alternative Rules for Ultrasonic Instrument Calibration, Section XI, Division 1*	N-429-1 Published on 2/23/87; N-429-2 Published on 7/27/92
N-432	*Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique, Section XI, Division 1*	N-432-1 Published on 3/28/01

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-435	*Alternative Examination Requirements for Vessels With Wall Thickness 2 in. Or Less, Section XI, Division 1*	N-435-1 Published on 7/30/86
N-436	*Alternative Methods for Evaluation of Flaws in Austenitic Piping, Section XI, Division 1*	N-436-1 Published on 12/7/87
N-458	*Magnetic Particle Examination of Coated Materials, Section XI, Division 1*	N-458-1 Published on 3/14/95
N-461	*Alternative Rules for Piping Calibration Block Thickness, Section XI, Division 1*	N-461-1 Published on 3/14/95
N-463	*Evaluation Procedures and Acceptance Criteria for Flaws in Class 1 Ferritic Piping That Exceed the Acceptance Standards of IWB-3514.2, Section XI, Division 1*	N-463-1 Published on 3/5/90
N-479	*Boiling Water Reactor (BWR) Main Steam Hydrostatic Test, Section XI, Division 1*	N-479-1 Published on 12/3/90
N-485	*Eddy Current Examination of Coated Ferritic Surfaces as an Alternative to Surface Examination, Section XI, Division 1*	N-485 Published on 8/14/91
N-490	*Alternative Vision Test Requirements for Nondestructive Examiners, Section XI, Divisions 1, 2, and 3*	N-490-1 Published on 5/13/91
N-491 N-491-1	*Alternative Rules for Examination of Class 1, 2, 3, and MC Component Supports of Light-Water Cooled Power Plants, Section XI, Division 1*	N-491-1 Published on 4/30/93; N-491-2 Published on 3/12/97
N-494 N-494-1 N-494-2 N-494-3	*Pipe Specific Evaluation Procedures and Acceptance Criteria for Flaws in Class 1 Ferritic Piping that Exceed the Acceptance Standards of IWB-3514.2, Section XI, Division 1*	N-494-1 Published on 7/27/92; N-494-2 Published on 12/9/93 N-494-3 Published on 8/9/96 N-494-4 Published on 10/11/05
N-496 N-496-1	*Helical-Coil Threaded Inserts, Section XI, Division 1*	N-496-1 Published on 5/11/94; N-496-1 Annulled on 5/11/97 N-496-2 Published on 9/18/01

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-498 N-498-1 N-498-2 N-498-3	*Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems, Section XI, Division 1*	N-498-1 Published on 5/11/94 N-498-2 Published on 6/9/95 N-498-3 Published on 5/20/98 N-498-4 Published on 2/15/99
N-504 N-504-1 N-504-2 N-504-3	*Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping, Section XI, Division 1*	N-504-1 Published on 8/9/93 N-504-2 Published on 3/12/97 N-504-3 Published on 8/4/04 N-504-4 Published on 7/14/06
N-508 N-508-1 N-508-2 N-508-3	*Rotation of Serviced Snubbers and Pressure Relief Valves for the Purpose of Testing, Section XI, Division 1*	N-508-1 Published on 5/11/94 N-508-2 Published on 3/28/01 N-508-3 Published on 11/18/03 N-508-4 Published on 1/26/09
N-512	*Assessment of Reactor Vessels With Low Upper Shelf Charpy Impact Energy Levels, Section XI, Division 1*	N-512-1 Published on 8/24/95
N-513	*Evaluation Criteria for Temporary Acceptance of Flaws in Class 3 Piping, Section XI, Division 1*	N-513-1 Published on 3/28/01
N-513-1	*Evaluation Criteria for Temporary Acceptance of Flaws in Class 3 Piping, Section XI, Division 1*	N-513-2 Published on 2/20/04 N-513-3 Published on 1/26/09
N-513-2	(1) Specific safety factors in paragraph 4.0 must be satisfied. (2) Code Case N-513 may not be applied to: (a) Components other than pipe and tube. (b) Leakage through a gasket. (c) Threaded connections employing nonstructural seal welds for leakage prevention (through seal weld leakage is nota structural flaw; thread integrity must be maintained). (d) Degraded socket welds	
N-516 N-516-1	*Underwater Welding, Section XI, Division 1*	N-516-1 Published on 12/31/96; N-516-2 Published on 1/17/00
	When welding is to be performed on high neutron fluence Class 1 material, then a mockup, using material with similar fluence levels, should be welded to verify that adequate crack prevention measures were used.	

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-516-2	*Underwater Welding, Section XI, Division 1* Licensees must obtain NRC approval in accordance with 10 CFR 50.55a(z) regarding the method to be used in the weld repair or replacement of irradiated material underwater.	N-516-3 Published on 4/8/02
N-517	*Quality Assurance Program Requirements for Owners, Section XI, Division 1*	N-517-1 Published on 7/30/98
N-523 N-523-1	*Mechanical Clamping Devices for Class 2 and 3 Piping, Section XI, Division 1*	N-523-1 Published on 8/24/95 N-523-2 Published on 10/2/00
N-528	*Purchase, Exchange, or Transfer of Material Between Nuclear Plant Sites, Section XI, Division 1*	N-528-1 Published on 5/7/99
N-532 N-532-1 N-532-2 N-532-3 N-532-4	*Alternative Requirements to Repair and Replacement Documentation Requirements and Inservice Summary Report Preparation and Submission as Required by IWA-4000 and IWA-6000, Section XI, Division 1*	N-532-1 Published on 3/28/01 N-532-2 Published on 7/23/02 N-532-3 Published on 2/20/04 N-532-4 Published on 4/19/06 N-532-5 Published on 1/04/11
N-533	*Alternative Requirements for VT-2 Visual Examination of Class 1 Insulated Pressure-Retaining Bolted Connections, Section XI, Division 1*	N-533-1 Published 2/26/99
N-552	*Alternative Methods – Qualification for Nozzle Inside Radius Section from the Outside Surface, Section XI, Division 1* To achieve consistency with the 10 CFR 50.55a rule change published September 22, 1999 (64 FR 51370), incorporating Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," to Section XI, add the following to the specimen requirements: "At least 50 percent of the flaws in the demonstration test set must be cracks and the maximum misorientation must be demonstrated with cracks. Flaws in nozzles with bore diameters equal to or less than 4 inches may be notches." Add to detection criteria, "The number of false calls must not exceed three."	N-552-1 Published on 6/22/12

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-553	*Inservice Eddy Current Surface Examination of Pressure Retaining Pipe Welds and Nozzle-to-Safe End Welds, Section XI, Division 1*	N-553-1 Published on 3/28/01
N-554 N-554-1 N-554-2	*Alternative Requirements for Reconciliation of Replacement Items, Section XI, Division 1*	N-554-1 Published on 7/98E; N-554-2 Published on 2/25/00 N-554-3 Published on 2/14/03
N-557	*In-Place Dry Annealing of a PWR Nuclear Reactor Vessel, Section XI, Division 1*	N-557-1 Published on 12/31/96
N-560 N-560-1	*Alternative Examination Requirements for Class 1, Category B-J Piping Welds, Section XI, Division 1*	N-560-1 Published on 8/9/96; N-560-2 Published on 3/28/00
N-561 N-561-1	*Alternative Requirements for Wall Thickness Restoration of Class 2 and High Energy Class 3 Carbon Steel Piping, Section XI, Division 1*	N-561-1 Published on 7/30/98 N-561-2 Published on 3/22/07
N-562 N-562-1	*Alternative Requirements for Wall Thickness Restoration of Class 3 Moderate Energy Carbon Steel Piping, Section XI, Division 1*	N-562-1 Published on 7/30/98 N-562-2 Published on 3/22/07
N-566 N-566-1	*Corrective Action for Leakage Identified at Bolted Connections, Section XI, Division 1*	N-566-1 Published on 2/15/99 N-566-2 Published on 3/28/01
N-567	*Alternative Requirements for Class 1, 2, and 3 Replacement Components, Section XI, Division 1*	N-567-1 Published on 2/26/99
N-569	*Alternative Rules for Repair by Electrochemical Deposition of Class 1 and 2 Steam Generator Tubing, Section XI, Division 1*	N-569-1 Published on 5/7/99
N-576 N-576-1	*Repair of Class 1 and 2 SB-163, UNS N06600 Steam Generator Tubing, Section XI, Division 1*	N-576-1 Published on 5/7/99 N-576-2 Published on 3/16/12
N-577	*Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method A, Section XI, Division 1*	N-577-1 Published on 3/28/00
N-578	*Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1*	N-578-1 Published on 3/28/00

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-586	*Alternative Additional Examination Requirements for Class 1, 2, and 3 Piping, Components, and Supports, Section XI, Division 1*	N-586-1 Published on 5/4/04
	The engineering evaluations addressed under Item (a) and the additional examinations addressed under Item (b) shall be performed during this outage. If the additional examinations performed under Item (b) reveal indications exceeding the applicable acceptance criteria of Section XI, the engineering evaluations and the examinations shall be further extended to include additional evaluations and examinations at this outage.	
N-589	*Class 3 Nonmetallic Cured-in-Place Piping, Section XI, Division 1*	N-589-1 Published on 7/23/02
N-593 N-593-1	*Alternative Examination Requirements for Steam Generator Nozzle to Vessel Welds, Section XI, Division 1*	N-593-1 Published on 10/8/04 N-593-2 Published on 11/8/11
N-597 N-597-1	*Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1*	N-597-1 Published on 7/7/01 N-597-2 Published on 11/18/03
N-606	*Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique, Section XI, Division 1*	N-606-1 Published on 9/24/99
N-609	*Alternative Requirements to Stress-Based Selection Criteria for Category B-J Welds, Section XI, Division 1*	N-609-1 Published on 9/17/10
N-613 N-613-1	*Ultrasonic Examination of Penetration Nozzles in Vessels, Examination Category B-D, Item Nos. B3.10 and B3.90, Reactor Nozzle-to-Vessel Welds, Figs. IWB-2500-7(a), (b), and (c), Section XI, Division 1*	N-613-1 Published on 8/20/02 N-613-2 Published on 12/10/10
N-638 N-638-1 N-638-2 N-638-3	*Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique, Section XI, Division 1*	N-638-1 Published on 5/9/03 N-638-2 Published on 7/1/05 N-638-3 Published on 4/19/06 N-638-4 Published on 10/12/06
	The Construction Code of Record acceptance criteria must be used for volumetric examinations.	

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-638-4 N-638-5	*Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique, Section XI, Division 1* (1) Demonstration for ultrasonic examination of the repaired volume is required using representative samples which contain construction type flaws. (2) The provisions of 3(e)(2) or 3(e)(3) may only be used when it is impractical to use the interpass temperature measurement methods described in 3(e)(1), such as in situations where the weldment area is inaccessible (e.g., internal bore welding) or when there are extenuating radiological conditions.	N-638-5 Published on 4/27/09 N-638-6 Published on 6/25/11
N-643 N-643-1	*Fatigue Crack Growth Rate Curves for Ferritic Steels in PWR Water Environment, Section XI, Division 1*	N-643-1 Published on 2/3/03 N-643-2 Published on 5/4/04
N-648	*Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles, Section XI, Division 1*	N-648-1 Published on 7/7/01
N-652 N-652-1	*Alternative Requirements to Categorize B-G-1, B-G-2, and C-D Bolting Examination Methods and Selection Criteria, Section XI, Division 1*	N-652-1 Published on 2/20/04 N-652-2 Published on 9/3/10
N-653	*Qualification Requirements for Full Structural Overlaid Wrought Austenitic Piping Welds, Section XI, Division 1*	N-653-1 Published on 4/4/12
N-661	*Alternative Requirements for Wall Thickness Restoration of Classes 2 and 3 Carbon Steel Piping for Raw Water Service, Section XI, Division 1* (a) If the root cause of the degradation has not been determined, the repair is only acceptable for one cycle. (b) Weld overlay repair of an area can only be performed once in the same location. (c) 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.	N-661-1 Published on 10/11/05
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*	N-661-2 Published on 3/22/07
N-662	*Alternative Repair/Replacement Requirements for Items Classified in Accordance with Risk-Informed Processes, Section XI, Division 1*	N-662-1 Published on 6/25/11

Code Case Number	Table 5 Section XI Code Cases That Have Been Superseded	Date
N-666	*Weld Overlay of Class 1, 2, and 3 Socket Welded Connections, Section XI, Division 1* A surface (magnetic particle or liquid penetrant) examination must be performed after installing the seal weld and weld overlay on Class 1 and 2 piping socket welds. The fabrication defects, if detected, must be dispositioned using the surface examination acceptance criteria of the Construction Code identified in the Repair/Replacement Plan.	N-666-1 Published on 3/12/12
N-686	*Alternative Requirements for Visual Examinations, VT-1, VT-2, and VT-3, Section XI, Division 1*	N-686-1 Published on 1/10/07
N-694 N-694-1	*Evaluation Procedure and Acceptance Criteria for PWR Reactor Vessel Upper Head Penetration, Section XI, Division 1* (a) The maximum instantaneous through-thickness stress distribution along the crack front and in the crack-length path must be used to calculate the crack driving force. (b) The stress intensity factor expression Raju and Newman is only applicable to cylindrical products having a ratio of wall thickness to inside radius between 0.1 and 0.25.	N-694-1 Published on 2/20/04 N-694-2 Published on 1/16/13
N-706	*Alternative 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*	N-706-1 Published on 1/10/07
N-716	*Alternative Piping Classification and Examination Requirements, Section XI, Division 1*	N-716-1 Published on 1/27/13
N-730	*Roll Expansion of Class 1 Control Rod Drive Bottom Head Penetrations in BWRs, Section XI, Division 1*	N-730-1 Published on 7/16/12
N-739	*Alternative Qualification Requirements for Personnel Performing Class CC Concrete and Post-Tensioning System Visual Examinations, Section XI, Division 1*	N-739-1 Published on 1/21/07
N-769 N-769-1	*Roll Expansion of Class 1 In-Core Housing Bottom Head Penetrations in BWRs, Section XI, Division 1*	N-769-1 Published on 9/17/10 N-769-2 Published on 7/16/12

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide. The requirements addressing implementation of Section XI Code Cases are contained in 10 CFR 50.55a(b)(5). No backfitting is intended or approved in connection with the issuance of this guide.

REGULATORY ANALYSIS

A separate regulatory analysis was not prepared for this regulatory guide. The regulatory basis for this guide is the regulatory analysis prepared for the amendment to 10 CFR 50.55a, "Codes and Standards." The amendment to 10 CFR 50.55a incorporates this regulatory guide by reference.

REFERENCES[1]

1. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities" (10 CFR Part 50), U.S. Nuclear Regulatory Commission, Washington, DC.

2. ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," American Society of Mechanical Engineers, New York, NY.[2]

3. Regulatory Guide 1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III," U.S. Nuclear Regulatory Commission, Washington, DC.

4. Regulatory Guide 1.192, Operation and Maintenance Code Case Acceptability, ASME OM Code," U.S. Nuclear Regulatory Commission, Washington, DC.

5. Regulatory Guide 1.193, "ASME Code Cases Not Approved for Use," U.S. Nuclear Regulatory Commission, Washington, DC.

6. Paperwork Reduction Act of 1995 (Public Law 104-13), *United States Code*, Title 44, "Public Printing and Documents," Chapter 35, "Coordination of Federal Information Policy" (44 U.S.C. 3501 *et seq*.), 104th Congress of the United States of America, Washington, DC.[3]

7. *Code of Federal Regulations*, Title 10, *Energy*, Part 21, "Reporting of Defects and Noncompliance" (10 CFR Part 21), U.S. Nuclear Regulatory Commission, Washington, DC.

8. EPRI Nuclear Safety Analysis Center Report 202L-R2, "Recommendations for an Effective Flow Accelerated Corrosion Program," Electric Power Research Institute, Palo Alto, California, April 1999.[4]

9. ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Power Plant Components," American Society of Mechanical Engineers, New York, NY.[2]

10. Draft Regulatory Guide DG-1070, "Sampling Plans Used for Dedicating Simple Metallic Commercial Grade Items for Use in Nuclear Power Plants," U.S. Nuclear Regulatory Commission, Washington, DC. [DG-1070 was issued in October 1997.]

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[1] Publicly available NRC published documents are available electronically through the NRC Library on the NRC's public Web site at: http://www.nrc.gov/reading-rm/doc-collections/. The documents can also be viewed on-line or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone 301-415-4737 or (800) 397-4209; fax (301) 415-3548; and e-mail pdr.resource@nrc.gov.

[2] Copies may be purchased from the American Society of Mechanical Engineers, Three Park Avenue, NewYork, NY 10016-5990; phone (212) 591-8500; fax (212) 591-8501; www.asme.org.

[3] The Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq*.) is available electronically through the *Federal Register* Web site administered by the U.S. National Archives and Records Administration, at http://www.archives.gov/ federal-register/laws/paperwork-reduction/.

[4] Copies of the listed EPRI standards and reports may be purchased from the Electric Power Research Institute (EPRI), 3420 Hillview Ave., Palo Alto, California 94304; telephone (800) 313-3774; fax (925) 609-1310.

11. Regulatory Guide 1.161, "Evaluation of Reactor Pressure Vessels with Charpy Upper-Shelf Energy Less Than 50 ft-lb," U.S. Nuclear Regulatory Commission, Washington, DC.

12. ANSI/ASNT CP-189, "Standard for Qualification and Certification of Nondestructive Testing Personnel," American Society for Nondestructive Testing, Columbus, OH.[5]

13. Raju, I. S. and J. C, Newman. Jr., *Stress Intensity Factor Influence Coefficients for Internal and External Surface Cracks in Cylindrical Vessels*, ASME PVP 58, Aspects of Fracture Mechanics in Pressure Vessel and Piping, pp, 35-41, 1982

[5] Copies may be obtained from the American Society for Nondestructive Testing, 1711 Arlingate Lane, Columbus, OH, 43228-0518; telephone (800) 222-2768 or (614) 274-6003; fax (614) 274-6899. Purchase information is available through the ASNT Web-based store at http://www.asnt.org/publications/standards/cp-189/index.htm

APPENDIX A

SUPPLEMENTS ADDRESSED IN PROPOSED REVISION 18 OF REGULATORY GUIDE 1.147

Edition	Supplement Number	BNCS[1] Approval Date of Code Cases in Supplement[2]
2007	11	November 10, 2009
2010	0	December 25, 2009
2010	1	April 9, 2010
2010	2	June 24, 2010
2010	3	September 20, 2010
2010	4	December 23, 2010
2010	5	March 24, 2011
2010	6	July 15, 2011
2010	7	October 14, 2011
2010	8	December 29, 2011
2010	9	April 4, 2012
2010	10	July 16, 2012

[1] BNCS = ASME Board on Nuclear Codes and Standards
[2] Publication of supplements approximately 6 months after BNCS approval.

APPENDIX B

NUMERICAL LISTING OF SECTION XI CODE CASES IN SUPPLEMENT 11 TO THE 2007 EDITION AND SUPPLEMENT 0 THROUGH SUPPLEMENT 10 TO THE 2010 EDITION

Legend

1	Code Case N-532-5 was approved in Revision 17 to Regulatory Guide 1.147
2	Code Case in unacceptable for use. See Draft Regulatory Guide DG-1193, proposed Revision 5 of Regulatory Guide 1.193.
3	Code Case is directly addressed in 10 CFR 50.55a.
4	Code Case published in Supplement 1 to the 2013 Edition; included at request of ASME
5	Code Case published in Supplement 3 to the 2013 Edition; included at request of ASME
6	Code Case published in Supplement 6 to the 2013 Edition; included at request of ASME

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APPENDIX C

NUMERICAL LISTING OF SECTION XI CODE CASES AND TABLE WHERE EACH CODE CASE IS LISTED

Legend

1	Code Case in unacceptable for use. See Draft Regulatory Guide DG-1298, proposed Revision 5 of Regulatory Guide 1.193.
2	Code Case is directly addressed in 10 CFR 50.55a.

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