

**EVALUATION OF CODE CASES IN SUPPLEMENT 12 to the
1998 EDITION and SUPPLEMENT 1 THROUGH
SUPPLEMENT 6 to the 2001 EDITION
(ADAMS Accession No. ML040480074)**

1. Purpose:

For proposed Revision 33 to Regulatory Guide (RG) 1.84 (DG-1124), "Design, Fabrication, and Materials Code Case Acceptability, American Society of Mechanical Engineers (ASME) Section III," proposed Revision 14 to RG 1.147 (DG-1125), "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," and Proposed Revision 1 to RG 1.193 (DG-1126), "ASME Code Cases Not Approved for Use," the Nuclear Regulatory Commission (NRC) staff reviewed the Code cases in Supplement 12 to the 1998 Edition and Supplement 1 through Supplement 6 to the 2001 Edition (except for those Code cases pertaining to high-temperature gas-cooled reactors; certain requirements in Section III, Division 2, not endorsed by the NRC; liquid metal; and submerged spent fuel waste casks). Lists are provided indicating the proposed disposition of each Code case. For Code cases determined to be conditionally acceptable, a summary of the basis for the determination is provided to afford users of the ASME Code an opportunity to comment on the proposed disposition and basis.

2. Discussion of ASME Process:

Code cases provide alternatives to the applicable provisions of the ASME Boiler and Pressure Vessel Code developed and approved by the ASME. Code cases are approved by the ASME with three-year terms. Code cases can be categorized as one of three types: new, revised, or reaffirmed. A *new* Code case addresses a specific need for the first time. Existing Code cases may be *revised* or modified to address, for example, enhancements in examination techniques. Code cases still in use and not requiring revision may be *reaffirmed* or approved without change by the ASME for another three years.

3. Discussion of Regulatory Process:

The NRC considers each Code case in a supplement. New Code cases that are determined to be acceptable by the NRC are approved as published by the ASME and may be used in the design, construction, and inservice (ISI) of components and their supports for water-cooled nuclear power plants. When a determination is made that the provisions of a new Code case need to be augmented, that Code case is conditionally approved. Such Code cases are acceptable to the NRC within the limitations recommended by the NRC staff. Unless otherwise stated, limitations recommended by the NRC staff are in addition to the conditions specified in the Code case. A discussion of the basis for the limitation or modification is provided, and the NRC invites public comment on these conditions. A determination may be made that a new Code case is unacceptable for use by licensees. Code cases determined to be unacceptable are listed in proposed Revision 1 to RG 1.193. A summary of the basis for the determination is provided, and the NRC invites public comment on the basis for the disapproval. Revised Code cases have been modified in some manner by the ASME. The NRC compares the revised Code case to the original Code case (which has become part of the regulations through the incorporation by reference process), and a determination is made whether the revised Code case is acceptable, conditionally acceptable, or unacceptable. In the context of the RGs, when

a Code case is reaffirmed, the Code case was approved in a previous version of an RG. The status of such Code cases remains unchanged in the RG unless additional information becomes available (e.g., emerging degradation issues) indicating that a change in position is warranted.

4. List of Code Cases and Summary of Bases:

4.1 **Acceptable Code Cases:** The Code cases in Supplement 12 to the 1998 Edition and Supplement 1 through Supplement 6 to the 2001 Edition listed below are acceptable to the NRC.

4.2 **Section III Code Cases**

<u>CODE CASE NUMBER</u>	<u>TYPE</u>	<u>TITLE</u>
N-4-11	Reaffirmed	<i>Special Type 403 Modified Forgings or Bars, Section III, Division 1, Class 1 and CS</i>
N-60-5	Reaffirmed	<i>Material for Core Support Structures, Section III, Division 1</i>
N-192-3	Revised	<i>Use of Braided Flexible Connectors, Section III, Division 1, Class 2 and 3</i>
N-205	Reaffirmed	<i>Use of Ductile Iron SA-395, Section III, Division 1, Class 3</i>
N-213	Reaffirmed	<i>SA-203, Grade E (Plate), and SA-350, Grade LF3 (Forging), 3.5% Ni Nominal Composition Used in Class 1 Construction</i>
N-329	Reaffirmed	<i>Examination of Bar Material, Section III, Division 1, Class 1</i>
N-373-2	Revised	<i>Alternative PWHT Time at Temperature for P-No. 5 Material, Section III, Division 1, Classes 1, 2, and 3</i>
N-391-2	Reaffirmed	<i>Procedure for Evaluation of the Design of Hollow Circular Cross Section Welded Attachments on Class 1 Piping, Section III, Division 1</i>
N-392-3	Reaffirmed	<i>Procedure for Evaluation of the Design of Hollow Circular Cross Section Welded Attachments on Classes 2 and 3 Piping, Section III, Division 1</i>
N-405-1	Reaffirmed	<i>Socket Welds, Section III, Division 1</i>
N-453-3	Reaffirmed	<i>Nickel-Chromium-Molybdenum-Copper Stainless Steel (UNS N08925) for Class 2 and 3 Construction, Section III, Division 1</i>

N-493	Reaffirmed	<i>Alternative Radiographic Acceptance Criteria for Vessels Used as Shipping Casks, Section III, Division 1, Class 1</i>
N-505	Reaffirmed	<i>Alternative Rules for the Examination of Butt Welds Used as Closure Welds for Electrical Penetration Assemblies in Containment Structures, Section III, Division 1</i>
N-511	Reaffirmed	<i>Design Temperature for Atmospheric and 0-15 psi Storage Tanks, Section III, Division 1</i>
N-525	Reaffirmed	<i>Design Stress Intensities and Yield Strength Values for UNS N06690 With a Minimum Specified Yield Strength of 30 ksi, Class 1 Components, Section III, Division 1</i>
N-539	Reaffirmed	<i>UNS N08367 in Class 2 and 3 Valves, Section III, Division 1</i>
N-548	Reaffirmed	<i>Air Cooling of SA-182 Grades F304, F304L, F316, F316L Forgings Instead of Liquid Quenching After Solution Heat Treatment, Class 1, 2, and 3, Section III, Division 1</i>
N-558	Reaffirmed	<i>Stamping of Class 2 Vessels Fabricated to Subsection NB, Section III, Division 1</i>
N-570	Reaffirmed	<i>Alternative Rules for Linear Piping and Linear Standard Supports for Class 1, 2, 3, and MC, Section III, Division 1</i>
N-572	Reaffirmed	<i>Use of SB-425 (UNS N08825) Bar and Rod for Class 1 Construction, Section III, Division 1</i>
N-594	Reaffirmed	<i>Repairs to P-4 and P-5A Materials for Pumps and Valves Without Postweld Heat Treatment, Section III, Division 1</i>
N-607	Reaffirmed	<i>Guidance on Implementation of NS Certificate of Accreditation, Section III, Division 1</i>
N-625-1	Revised	<i>Ni-Cr-Mo Alloy (UNS N06059) Welded Construction to 800 °F, Section III, Division 1</i>
N-631	Reaffirmed	<i>Use of Fracture Toughness Test Data to Establish Reference Temperature for Pressure Retaining Materials Other Than Bolting for Class 1 Vessels, Section III, Division 1</i>
N-635	Reaffirmed	<i>Use of 22Cr-5Ni-3Mo-N (Alloy UNS S31803) Forgings, Plate, Bar, Welded and Seamless Pipe, and/or Tube, Fittings, and Fusion Welded Pipe With Addition of Filler Metal, Classes 2 and 3, Section III, Division 1</i>

N-637	Reaffirmed	<i>Use of 44Fe-25Ni-21Cr-Mo (Alloy UNS N08904) Plate, Bar, Fittings, Welded Pipe, and Welded Tube, Classes 2 and 3, Section III, Division 1</i>
N-650	New	<i>Use of SA-537, Class 2 Plate Material in Non-pressure Boundary Application Service 700 °F to 850 °F, Class 1 or CS, Section III, Division 1</i>
N-657	New	<i>Use of the N-1A Data Report for Spent Fuel Canisters, Section III, Division 1</i>

4.3 **Section XI Code Cases**

<u>CODE CASE NUMBER</u>	<u>TYPE</u>	<u>TITLE</u>
N-307-3	Revised	<i>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</i>
N-416-3 ¹	Revised	<i>Alternative Pressure Test Requirement for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2, and 3, Section XI, Division 1</i>
N-432-1	Revised	<i>Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique, Section XI, Division 1</i>
N-435-1	Reaffirmed	<i>Alternative Examination Requirements for Vessels With Wall Thickness 2 in. or Less, Section XI, Division 1</i>
N-471	Reaffirmed	<i>Acoustic Emission for Successive Inspections, Section XI, Division 1</i>
N-494-3	Reaffirmed	<i>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</i>
N-496-2	Revised	<i>Helical-Coil Threaded Inserts, Section XI, Division 1</i>
N-508-2	Revised	<i>Rotation of Serviced Snubbers and Pressure Relief Valves for the Purpose of Testing, Section XI, Division 1</i>

¹See Section 4.7 - The NRC is proposing to impose conditions upon the use of this Code case.

N-522	Reaffirmed	<i>Pressure Testing of Containment Penetration Piping, Section XI, Division 1</i>
N-523-2	Reaffirmed	<i>Mechanical Clamping Devices for Class 2 and 3 Piping, Section XI, Division 1</i>
N-526	Reaffirmed	<i>Alternative Requirements for Successive Inspections of Class 1 and 2 Vessels, Section XI, Division 1</i>
N-553-1	Revised	<i>Inservice Eddy Current Surface Examination of Pressure Retaining Pipe Welds and Nozzle-to-Safe End Welds</i>
N-566-2	Revised	<i>Corrective Action for Leakage Identified at Bolted Connections, Section XI</i>
N-586	Reaffirmed	<i>Alternative Additional Examination Requirements for Class 1, 2, and 3 Piping, Components, and Supports, Section XI, Division 1</i>
N-588	Reaffirmed	<i>Attenuation to Reference Flow Orientation of Appendix G for Circumferential Welds in Reactor Vessels, Section XI</i>
N-592	Reaffirmed	<i>ASNT Central Certification Program</i>
N-598	Reaffirmed	<i>Alternative Requirements to Required Percentages of Examinations</i>
N-600	New	<i>Transfer of Welder, Welding Operator, Brazer, and Brazing Operator Qualifications Between Owners, Section XI, Division 1</i>
N-601	Reaffirmed	<i>Extent and Frequency of VT-3 Visual Examination for Inservice Inspection of Metal Containments</i>
N-603	Reaffirmed	<i>Alternative to the Requirements of IWL-2421, Sites with Two Plants</i>
N-605	Reaffirmed	<i>Alternative to the Requirements of IWE-2500(c) for Augmented Examination of Surface Areas</i>
N-613-1	New	<i>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</i>
N-617	Reaffirmed	<i>Alternative Examination Distribution Requirements for Table IWE-2500-1, Examination Category C-G, Pressure Retaining Welds in Pumps and Valves</i>

N-623	Reaffirmed	<i>Deferral of Inspections of Shell-to-Flange and Head-to-Flange Welds of a Reactor Vessel</i>
N-624	Reaffirmed	<i>Successive Inspections</i>
N-629	Reaffirmed	<i>Use of Fracture Toughness Data to Establish Reference Temperature for Pressure Retaining Materials</i>
N-640	Reaffirmed	<i>Alternative Reference Fracture Toughness for Development of P-T Limit Curves</i>
N-649	New	<i>Alternative Requirements for IWE-5240 Visual Examination, Section XI, Division 1</i>
N-651	New	<i>Ferritic and Dissimilar Metal Welding Using SMAW Temper Bead Technique Without Removing the Weld Bead Crown for the First Layer, Section XI, Division 1</i>
N-652	New	<i>Alternative Requirements to Categorize B-G-1, B-G-2, and C-D Bolting Examination Methods and Selection Criteria, Section XI, Division 1</i>
N-658	New	<i>Qualification Requirements for Ultrasonic Examination of Wrought Austenitic Piping Welds, Section XI, Division 1</i>
N-663	New	<i>Alternative Requirements for Classes 1 and 2 Surface Examinations, Section XI, Division 1</i>
N-664	New	<i>Performance Demonstration Requirements for Examination of Unclad Reactor Pressure Vessel Welds, Excluding Flange Welds, Section XI, Division 1</i>

- 4.4 **Conditionally Acceptable Code Cases:** The Code cases listed below are acceptable to the NRC subject to the limitations and modifications listed. Notations have been made to indicate those conditions carried over from previous versions of the RGs.

4.5 **Section III**

- Code Case N-71-18
Type: Revised
Title: *Additional Materials for Subsection NF, Class 1, 2, 3, and MC Component Supports Fabricated by Welding, Section III, Division 1*

This revision updates references to material specifications, and the NRC has determined that these changes are acceptable. Code Case N-71-17 was conditionally approved in RG 1.84, Revision 32. The conditions on the use of N-71-18 in Revision 33 to RG 1.184 are the same as those for N-71-17.

- Code Case N-249-14
Type: Revised
Title: *Additional Materials for Subsection NF, Class 1, 2, 3, and MC Component Supports Fabricated Without Welding, Section III, Division 1*

This revision updates references to material specifications, and the NRC has determined that these changes are acceptable. Code Case N-249-13 was conditionally approved in RG 1.84, Revision 32. The conditions on the use of N-249-14 in Revision 33 to RG 1.184 are the same as those for N-249-13.

- Code Case N-292
Type: Reaffirmed
Title: *Depositing Weld Metal Prior to Preparing Ends for Welding, Section III, Division 1, Class 1, 2, and 3*

Code Case N-292 was conditionally approved in Revision 32 to RG 1.84. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 33 to the guide.

- Code Case N-626
Type: Reaffirmed
Title: *Use of Plastic Analysis for the Design of Type B Containment Components for Nuclear Material Transportation Casks, Section III, Division 3*

Code Case N-626 was conditionally approved in Revision 32 to RG 1.84. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 33 to the guide.

- Code Case N-655
Type: New
Title: *Use of SA-738, Grade B, for Metal Containment Vessels, Class MC, Section III, Division 1*

The guide would require for metal containment vessels up to 1.75 inch thick that Supplementary Requirements S17 and S20 of Material Specification SA-738 be applied to the use of SA-738, Grade B. These two conditions are needed to ensure adequate material properties and weldability of the containment vessel material. The ASME Code, Section III, exempts SA-738, Grade B, material up to 1.75 inch of thickness from post-weld stress relief heat treatment. Because the welds in containment vessel material thickness up to 1.75 inch thick will not be stress-relieved, higher residual stresses will be present in the welds. Also, the material will likely be procured in the quenched and tempered condition. Welding will reduce the impact properties of the material in the heat-affected zone. Requiring Supplementary Requirement S17 and the use of vacuum degassed steel will ensure adequate material properties because nonmetallic inclusions such as oxides and silicates will be minimized as a result of the vacuum degassing of the steel. Requiring Supplementary Requirement S20 and a carbon equivalent weldability check will ensure that the steel is readily weldable.

- Code Case N-656
Type: New
Title: *Rules for the Construction of Inner Transportation Containments, Section III, Division 3*

The Code case does not address the condition of the material being shipped. Because the presence of water introduces a criticality issue, the inner transportation containment must contain only solid and dry material.

4.6 **Section XI**

- Code Case N-498-4
Type: Revised
Title: *Alternative Requirements for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems, Section XI, Division 1*

Code Case N-498-3 was conditionally approved in Revision 13 to RG 1.147. This Code case has been revised to clarify what portions of systems must be pressurized and at what pressures. The revision is acceptable, and no changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-513-1
Type: Revised
Title: *Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1*

Code Case N-513 was endorsed in Revision 13 to RG 1.147. Code Case N-513 addressed the timing of the repair of Class 3 moderate energy (200 °F, 275 psig) piping systems. A Section XI Code repair may be impractical for a flaw detected during plant operation (i.e., a plant shutdown would be required to effect the Code repair). Under certain conditions, temporary acceptance of flaws, including through-wall leaking, of low and moderate energy Class 3 piping has been deemed acceptable provided that the conditions are met, and the repair is effected during the next outage. The Code case has been revised (N-513-1) to address Class 2 moderate energy piping. The NRC has found this to be acceptable subject to the same conditions contained in Revision 13 to RG 1.147.

- Code Case N-516-3
Type: Revised
Title: *Underwater Welding, Section XI, Division 1*

Code Case N-516-2 was endorsed in Revision 13 to RG 1.147. The Code case has been revised to add laser beam welding as one of the methods that may be used for underwater welding. Laser beam welding has been demonstrated to be an acceptable welding method provided certain guidelines are followed. Specialized welding methods are proprietary. The Code case addresses the welding of critical Class 1 in-vessel components, and there are a variety of methods and techniques which may be used in the weld repair. Because the Code case is not specific relative to the techniques to be

followed (i.e., proprietary information), Code Case N-516-2 was conditioned to require NRC approval regarding the technique to be used in the weld repair or replacement of irradiated material underwater. The NRC has determined that N-516-3 is acceptable subject to the same conditions contained in Revision 13 to RG 1.147.

- Code Case N-517-1
Type: Reaffirmed
Title: *Quality Assurance Program Requirements for Owners, Section XI, Division 1*

Code Case N-517-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-528-1
Type: Reaffirmed
Title: *Purchase, Exchange, or Transfer of Material Between Nuclear Plant Sites, Section XI, Division 1*

Code Case N-528-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-533-1
Type: Reaffirmed
Title: *Alternative Requirements for VT-2 Visual Examination of Class 1, 2, and 3 Insulated Pressure-Retaining Bolted Connections, Section XI, Division 1*

Code Case N-533-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-546
Type: Reaffirmed
Title: *Alternative Requirements for Qualification of VT-2 Examination Personnel*

Code Case N-546 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. The second condition in regarding the requalification of examination personnel every three years has been deleted to be consistent with the recent amendment to 10 CFR 50.55a.

- Code Case N-552
Type: Reaffirmed
Title: *Alternative Methods - Qualification for Nozzle Inside Radius Section from the Outside Surface*

Code Case N-552 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-557-1

Type: Revised

Title: *In-Place Dry Annealing of a PWR Nuclear Reactor Vessel*

Code Case N-557-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-567-1

Type: Revised

Title: *Alternative Requirements for Class 1, 2, and 3 Replacement Components*

Code Case N-567-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-569-1

Type: Revised

Title: *Alternative Rules for Repair by Electrochemical Deposition of Class 1 and 2 Steam Generator Tubing*

Code Case N-569-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-576-1

Type: Revised

Title: *Repair of Class 1 and 2 SB-163, UNS N06600 Steam Generator Tubing*

Code Case N-576-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-597-1

Type: Reaffirmed

Title: *Requirements for Analytical Evaluation of Pipe Wall Thinning*

Code Case N-597-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-599

Type: Reaffirmed

Title: *Alternatives to Qualification of Nondestructive Examination Personnel for Inservice Inspection of Metal (Class MC) and Concrete (Class CC) Containments*

Code Case N-599 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-606-1
Type: Reaffirmed
Title: *Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique*

Code Case N-606-1 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-616
Type: Reaffirmed
Title: *Alternative Requirements to Stress-Based Selection Criteria for Category B-J Welds*

Code Case N-616 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-619
Type: Reaffirmed
Title: *Alternative Requirements for Nozzle Inner Radius Inspections for Class 1 Pressurizer and Steam Generator Nozzles*

Code Case N-619 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-638
Type: Reaffirmed
Title: *Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique*

Code Case N-638 was listed in Table 1, "Acceptable Section XI Code Cases," in Revision 13 to RG 1.147. After further consideration however, the NRC has determined that Section III acceptance criteria for nondestructive examination must be used. The Code case specifically states that repair of Class 1 components for certain materials may be made "without the nondestructive examination requirements of the Construction Code," provided certain requirements are met. Thus, the Code case permits the use of Section XI acceptance criteria for nondestructive examination. The NRC believes that this is not appropriate. The Section XI nondestructive examination requirements are directed at detecting operationally induced flaws, not fabrication flaws. In addition, Section XI examinations typically examine the inner one-third of the component and not the entire weld. Hence, the NRC has determined that the Code case is acceptable provided that the Section III acceptance criteria for nondestructive examination are used.

- Code Case N-639
Type: Reaffirmed
Title: *Alternative Calibration Block Material*

Code Case N-639 was conditionally approved in Revision 13 to RG 1.147. This Code case was reaffirmed by the ASME. No changes to the conditions have been made in Revision 14 to the guide.

- Code Case N-660
Type: New
Title: *Risk-Informed Safety Classification for Use in Risk-Informed Repair/Replacement Activities, Section XI, Division 1*

This Code case provides a process for determining the risk-informed safety classification (RISC) for use in risk-informed repair/replacement activities. Code Case N-662, *Alternative Repair/Replacement Requirements for Items Classified in Accordance with Risk-Informed Processes, Section XI, Division 1*, a companion Code case, contains the repair/replacement requirements to be used for components classified under the RISC process. The NRC staff has determined that the Code case may only be applied to ASME Code Class 2 and 3, and nonclass pressure-retaining items and their associated supports, except core supports.

Per the scope, the Code case would be applicable to ASME Code Classes 1, 2, and 3. The South Texas Project (STP) exemption from repair/replacement requirements is only applicable to ASME Code Class 2 and 3 items, however. Similarly, proposed 10 CFR 50.69 would only exempt ASME Code Class 2 and 3 structures, systems, and components that are categorized as RISC-3 or RISC-4 from the repair and replacement requirements of 10 CFR 50.55a(g). The categorization process used to support the STP exemption was based on the Electric Power Research Institute's (EPRI) risk informed ISI methodology and included the pipe failure potential. In practice, this means that segments with a conditional core damage probability less than $1E-4$ and exposed to no degradation mechanism would be placed in the low safety significance (LSS) category. The result could be that much of the Class 1 piping would be categorized as LSS. For example, if licensees account for leak-before-break, as is permitted by the Code case, relatively large piping might be categorized as LSS. In addition, there are other piping segments that could be placed in the LSS category that would result in a loss-of-coolant-accident (LOCA) if a break occurs. The NRC staff will review on a case-by-case basis application of the method to ASME Code Class 1 piping.

- Code Case N-661
Type: New
Title: *Alternative Requirements for Wall Thickness Restoration of Classes 2 and 3 Carbon Steel Piping for Raw Water Service, Section XI, Division 1*

The NRC has determined that several conditions on the use of the Code case are necessary. The first condition is that "if the root cause of the degradation has not been determined, the repair is only acceptable for one cycle." An adequate root cause determination requires establishing a reinspection frequency. A suitable reinspection frequency cannot be established without confirmation of the cause of the degradation. The second condition is that "weld overlay repair of an area can only be performed once in the same location." This will ensure that ineffective repairs are not being repeatedly implemented in the same location. The third condition is that "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.” Problems with performing through-wall weld repairs on surfaces that are wet or exposed to water include porosity, lack of fusion, and cracking. Performing a surface exam on the seal weld, first pass, and final pass can provide a measure of assurance that the root of the joint has been successfully sealed and defects do not extend through-wall. A 48-hour liquid penetrants testing and magnetic particle testing (PT/MT) on the final weld inspects for through-wall or surface delayed hydrogen cracking. Hydrogen cracking can still be present below the surface of the weld. It is highly unlikely that a weld can be made on an open root joint with water present on the backside of the weld without having several weld defects. These types of weld defects can, and many times do, lead to premature failure of a weld joint. These types of defects would render the weld unacceptable based on a construction radiograph. Also, this type of weld is outside the conditions for which the procedure is qualified. Thus, these types of repairs should only be considered temporary.

- Code Case N-662
Type: New
Title: *Alternative Repair/Replacement Requirements for Items Classified in Accordance with Risk-Informed Processes, Section XI, Division 1*

This Code case has been conditioned in the same manner as Code Case N-660 (i.e., the Code case may only be applied to ASME Code Class 2 and 3, and nonclass pressure-retaining items and their associated supports, except core supports). As discussed above in Code Case N-660, this makes use of the Code case consistent with the staff positions taken in the NRC safety evaluation in support of STP multiple exemption request (Safety Evaluation dated August 3, 2001, ADAMS Accession No. ML012040370, Sections 10.3.1 and 10.4.1, pp. 73 to 76) and proposed 10 CFR 50.69. As with Code Case N-660, application of Code Case N-662 to ASME Code Class 1 items will be reviewed and approved by the NRC staff on a case-by-case basis.

4.7 Code Cases N-416-3 and N-504-2

Code Case N-416-3, “Alternative Pressure Test Requirement for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2, and 3, Section XI, Division 1,” and N-504-2, “Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping, Section XI, Division 1,” are listed in Draft Revision 14 to Regulatory Guide 1.147 as unconditionally acceptable. After the draft guide had been published but prior to release of the guide for public comment, the NRC became aware of the need to modify its intended unconditional endorsement of these two Code cases. The NRC is proposing to condition the use of the two Code cases in final Revision 14 to Regulatory Guide 1.147, unless public comments are received that indicate that the staff's proposed technical bases for the conditions are not applicable, incorrect, unnecessary to provide reasonable assurance of adequate protection to public health and safety and common defense and security, or otherwise not justified in light of the increase in protection to public health and safety or common defense and security that would be provided by imposition of the conditions. A discussion of the need for the conditions follows.

4.7.1 Code Case N-416-3

The NRC became aware of an ambiguity in Code Case N-416-3 during the consideration of a proposed licensee action to replace a pressurizer. The Code case permits the performance of a system leakage test in lieu of a hydrostatic pressure test 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. The NRC is proposing to limit the applicability of this Code case to exclude vessel welds such as shell welds and girth welds associated with fabrication. As written, the Code case would allow, for example, the joining of two (or more) shop fabricated sections of a replacement steam generator or pressurizer in the field, and placement of the component into service without performance of a Construction Code hydrostatic test. Instead, only a Section XI system leakage test would be performed. Because it is presumed in accident analyses that the failure of a major component does not occur, a very high degree of assurance of the component's structural integrity is needed. A system leakage test does not provide the defense in depth and safety margin needed for that level of assurance. Furthermore, attachment piping is usually not connected to such components when they are replaced. Therefore, typical hardship issues such as the installation of temporary supports for main steam line piping, and blocking of system valves do not apply.

Proposed Condition: A Construction Code hydrostatic pressure test must be performed prior to service for vessels shipped as subassemblies and joined on site.

4.7.2 Code Case N-504-2

The ASME Code permits defects to be reduced to a flaw of acceptable size through mechanical means (by grinding for example). Code Case N-504-2 is an alternative whereby a defect in austenitic stainless steel piping may be reduced to a flaw of acceptable size through the placement of weld overlays on the outside of the pipe. The American Society of Mechanical Engineers Subcommittee on Nuclear Inservice Inspection (SC XI) recently passed Appendix P, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," which addresses the repair and examination of austenitic stainless steel piping that has experienced stress corrosion cracking. These repairs are performed through weld overlays on the outside surface of the pipe. SC XI also recently passed some important revisions to Code Case N-504-2 to incorporate some of the provisions contained in Appendix P. Thus, the Code case is out of date. The NRC could propose to "correct" the Code case by adding many of the provisions of the appendix to the regulatory guide. However, the appendix should be available to the public during the public comment period for the guide. Hence, a more straightforward approach would be to condition the use of the Code case on also meeting the provisions of Appendix P.

There are four substantial technical differences between Appendix P and Code Case N-504-2. (1) Appendix P restricts weld overlays to the repair of flaws caused by stress corrosion cracking (SCC). Code Case N-504-2 has no such restriction. (2) The acceptance standards of Appendix P contain preservice examination standards for laminar flaws. Laminar flaws resulting from the welding process such as lack-of-fusion, slag, and porosity can result in uninspectable volumes. The appendix contains provisions to address these circumstances while the Code case does not. (3) The appendix does not permit the submerged arc welding (SAW) method to be used for weld overlays. SAW is a high heat input method that can sensitize the pipe making it more susceptible to

cracking. The Code case does not restrict the welding method. (4) For weldments with four or fewer axial flaws, each less than 1.5 inches, the appendix requires a design analysis to ensure that Construction Code stress limits for primary local and bending stresses, secondary, and peak stresses are satisfied. Laminar flaws in the weld overlay are to be evaluated to ensure that load redistribution satisfies the Construction Code stress limits. The Code case does not require an evaluation for weldments with four or fewer axial flaws.

Proposed condition: The provisions of Section XI, Appendix P, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," must also be met.