ATTACHMENT 3

FINAL REGULATORY ANALYSIS

REGULATORY ANALYSIS FOR FINAL RULE:
AMENDMENT TO 10 CFR 50.55a, CODES AND STANDARDS
INCORPORATION OF ASME BPV AND CODE CASES BY REFERENCE

1. Statement of Problem and Objective

The American Society of Mechanical Engineers (ASME) develops and publishes the *Boiler and Pressure Vessel Code* (BPV Code), which contains requirements for design, construction, and inservice inspection (ISI) of nuclear power plant components, and the *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code), which contains requirements for inservice testing of certain pumps and valves. The ASME publishes a new edition of the BPV Code and the OM Code every three years, and a new addenda every year. The ASME also publishes BPV Code Cases on a quarterly basis and OM Code Cases annually. Code Cases provide alternatives to existing Code requirements developed and approved by the ASME. The applicable portions of the BPV Code and the OM Code are incorporated by reference in the NRC's regulations. However, the alternative requirements in the corresponding Code Cases have been published in regulatory guides which, though mentioned in the regulations, have not in the past been incorporated by reference. The final rule incorporates the regulatory guides listing NRC-approved ASME Code Cases by reference so that they will have the same legal status as the corresponding requirements in the BPV Code and the OM Code.

2. Background

General Design Criterion 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.

The National Technology Transfer and Advancement Act of 1995 mandated that all Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments. In carrying out this legislation, Federal agencies are to consult with voluntary consensus standards bodies and participate with such bodies in the development of technical standards when such participation is in the public interest and compatible with agency mission, priorities, and budget resources. If the technical standards are inconsistent with applicable law or otherwise impractical, a Federal agency may elect to use technical standards that are not developed or adopted by voluntary consensus bodies.

Provisions of the ASME BPV Code have been utilized 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. Various technical interests (e.g., utility, manufacturing, insurance, regulatory) are represented on the ASME standards committees which develop, among other things, 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. This broad spectrum of stakeholders helps to ensure that the various interests are considered.

In 1990, the ASME published the initial edition of the OM Code, which gives rules for inservice testing of pumps and valves. The OM Code was developed and is maintained by the ASME Committee on Operation and Maintenance of Nuclear Power Plants (ASME OM Committee). The OM Code was developed in response to the ASME Board on Nuclear Codes and Standards directive that transferred responsibility for development and maintenance of rules for the inservice testing of pumps and valves from the ASME Section XI Subcommittee on Nuclear Inservice Inspection to the ASME OM Committee. The ASME intended that the OM Code replace Section XI rules for inservice testing of pumps and valves. The Section XI rules for inservice testing of pumps and valves that were previously incorporated by reference into NRC regulations are no longer updated by the Section XI Committee.

Section 50.55a of the NRC regulations requires that nuclear power plant owners construct Class 1, Class 2, and Class 3 components in accordance with Section III, Division 1, of the ASME BPV Code. Section 50.55a also requires that owners perform ISI of Class 1, Class 2, Class 3, Class MC, and Class CC components in accordance with Section XI, Division 1, of the BPV Code, and that they perform IST of Class 1, Class 2, and Class 3 safety-related pumps and valves in accordance with the OM Code. The ASME publishes a new edition of the BPV Code every three years, and a new addenda every year. New editions were published in 1995 and 1998. The ASME also publishes Code Cases on a quarterly basis (Sections III and XI) or annually (OM Code) to provide alternatives to existing Code requirements developed and approved by ASME. Code Cases are developed to: gain experience with new technology prior to incorporation into the ASME Code; permit licensees to use advancements in ISI and IST; provide alternative examinations for older plants; provide an expeditious response to user needs; or provide a limited, clearly focused alternative to specific ASME Code provisions.

The NRC has revised Regulatory Guide 1.84, “Design and Fabrication Code Case Acceptability, ASME Section III," (Revision 32) and Regulatory Guide 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1" (Revision 13). These regulatory guides identify those Code Cases which have been determined by the NRC to be acceptable alternatives to applicable parts of Section III and Section XI. Revision 31 to Regulatory Guide 1.84 and Revision 12 to Regulatory Guide 1.147 were published in May 1999 and addressed those Code Cases published by the ASME through Supplement 3, 1992 Edition. Regulatory Guide 1.84, Revision 32 and Regulatory Guide 1.147, Revision 12, address those Code Cases published in Supplement 4, 1992 Edition, through Supplement 11, 1998 Edition (Code Cases approved by the ASME on December 8, 2000).

Previously, Regulatory Guide 1.84 was entitled, “Design and Fabrication Code Case Acceptability, ASME Section III, Division 1,” and listed only those Section III Code Cases oriented to design and fabrication. Companion Regulatory Guide 1.85, entitled, “Materials Code Case Acceptability, ASME Section III, Division 1,” listed those Section III Code Cases oriented to materials and testing. Revision 32 to Regulatory Guide 1.84 lists for the first time in one guide all Section III Code Cases that have been approved for use by the NRC. Hence, the title of Regulatory Guide 1.84 has been changed to “Design, Fabrication, and Materials Code Acceptability, ASME Section III.” In addition, Division 1 has been deleted from the title. Previous versions of the guide contained some Division 2 Code Cases, and the guide now contains some Division 3 Code Cases. Thus, the title change reflects the revised scope of

Regulatory Guide 1.84. Regulatory Guide 1.85 will no longer be updated, but it will not be withdrawn as some Code Cases contained in Regulatory Guide 1.85 continue to be used.

Two new regulatory guides have been developed. The first, Regulatory Guide DG-1089, “Operation and Maintenance Code Case Acceptability, ASME OM Code," endorses for the first time ASME Operations and Maintenance (OM) Code Cases. OM Code Cases OMN-1 through OMN-13 were reviewed for inclusion in this guide. The second Regulatory Guide, DG-1112, “ASME Code Cases Not Approved for Use,” list those Section III, Section XI, and OM Code Cases that the NRC determined to be unacceptable for use by licensees. DG-1112 is not part of this rulemaking. It was developed at industry request to provide a list of the Code Cases that the NRC staff has determined to be unacceptable for use in licensee design and construction, inservice inspection, and inservice testing programs. Providing the basis for disapproval of a Code Case affords licensees the opportunity to address NRC staff concerns through 10 CFR 50.55a(a)(3), which permits the use of alternatives to the mandated ASME Code requirement provided the proposed alternatives result in an acceptable level of quality and safety and their use is authorized by the Director of the Office of Nuclear Reactor Regulation.

It has been the NRC's practice to review ASME BPV and OM Code Cases, determine their acceptability, and specify its findings in the above regulatory guides. The NRC has permitted nuclear power plant licensees to adopt the NRC-approved Code Cases listed in these regulatory guides as alternatives to the requirements in the ASME BPV Code and the OM Code. The NRC currently references these regulatory guides in Footnote 6 to § 50.55a in Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a). However, Footnote 6 does not cite the specific versions of the Regulatory guides. In the past when the regulatory guides have been revised, the rule has not been changed. Because the practice of generally referencing the regulatory guides may not fully satisfy the notice and comment provisions of the Administrative Procedure Act of 1946 (APA) (5 U.S.C. 551, et seq.), as amended, the NRC has determined that it is necessary to include these Code Cases in the Commission's regulations through incorporation by reference. This action accords the NRC-approved alternative Code Cases the same legal status and the same notice and comment provisions as the ASME BPV Code and the OM Code requirements that are incorporated by reference in 10 CFR 50.55a.

3. Discussion

Code Cases are published with three-year expiration dates. Code Cases that the ASME has determined a continued need for may be: reaffirmed for another three-year term; revised; or incorporated into the ASME BPV or OM Code. The endorsement of a Code Case in these regulatory guides constitutes acceptance of their technical positions for applications not precluded by regulatory or other requirements or by the recommendations in this or other regulatory guides. With regard to the use of any Code Case, it is the responsibility of the user to make certain that use of the Code Case does not conflict with regulatory requirements (e.g., plant technical specifications) or licensee commitments. The Code Cases listed in the regulatory guides are acceptable for use within the limits specified in the Code Case, provided that they are used with any identified limitations or modifications.

Code Cases may be revised for many reasons such as incorporating operational examination and testing experience or to update material requirements based on research results. On occasion, an inaccuracy in an equation is discovered or an examination as practiced is found not to be adequate to detect a newly discovered degradation mechanism.

Hence, it follows that when a licensee initially implements a Code Case, 10 CFR 50.55a requires that the licensee implement the most recent version of that Code Case as listed in the approved or conditionally approved tables. Code Cases superseded by revision are no longer acceptable, and earlier or later revisions of a Code Case are not endorsed by these regulatory guides unless otherwise indicated.

Section III applies only to new construction (i.e., the edition and addenda to be used in the construction of a plant are selected based upon the date of the construction permit and are not changed thereafter, except voluntarily by the licensee). Hence, if a Section III Code Case is implemented by a licensee, and a later version of the Code Case is incorporated by reference into § 50.55a and listed in the regulatory guide tables, that licensee may use either version of the Code Case.

Section XI ISI and OM IST programs are updated every 10 years to the latest edition and addenda of Section XI that were incorporated by reference into § 50.55a and in effect 12 months before the start of the next inspection interval. Licensees who were using a Code Case prior to the effective date of its revision may continue to use the previous version for the remainder of the 120-month ISI or IST interval. This relieves licensees from the burden of having to update their ISI or IST program each time a Code Case is revised by the ASME. Since Code Cases are applicable to specific editions and addenda, and as discussed above, Code Cases may be revised because they are no longer accurate or adequate, licensees choosing to continue use of a Code Case during the subsequent ISI interval must implement the latest version incorporated by reference into § 50.55a and listed in the regulatory guides.

The ASME may annul Code Cases which are no longer required, have been determined to be inaccurate or inadequate, or have been incorporated into the BPV or OM Code. Based on public comment, the NRC has revised its policy regarding the use of annulled Code Cases. Annulled or expired Code Cases may be used provided the provisions of the Code Case have been incorporated into the BPV or OM ASME Code, subject to NRC approval in one of the guides with any limitations or modifications.

4. Identification and Analysis of The Alternative Approaches

4.1 Alternative 1 - Take No Action

Most regulatory analyses include a status quo option for the Commission's consideration; in this case, this would be considered a non-rulemaking alternative. However, the staff is not recommending that the Commission consider this alternative because the Office of the General Counsel (OGC) has advised that maintaining the status quo would involve litigative risk and might be interpreted as a violation of the APA.

4.2 Alternative 2 - Incorporate by Reference NRC-Approved ASME BPV Code and OM Code Cases

Alternative 2 consists of incorporating the regulatory guides listing NRC-approved Code Cases by reference. This alternative involves removing Footnote 6 (and all references thereto) from 10 CFR 50.55a, and incorporating the regulatory guides addressing NRC approval of ASME BPV Code and OM Code Cases by reference into NRC's regulations. This would allow licensees to implement these Code Cases and their conditions and modifications, if any, without

seeking prior NRC approval. This alternative would begin a process of periodic rulemakings to incorporate by reference in 10 CFR 50.55a the latest regulatory guides which list all acceptable and conditionally acceptable ASME Code Cases. This alternative provides a sound regulatory basis for NRC's approval of the generic use of Code Cases by licensees as alternatives to the provisions of the ASME Codes as incorporated by reference in the NRC regulations. The staff would prepare periodic rulemakings to keep the regulations current with the latest versions of the regulatory guides. Based on consultations with OGC and officials from the Office of the Federal Register (OFR), this approach would meet OFR guidelines for incorporation of documents by reference in the *Code of Federal Regulations*.

Pursuing this alternative meets the NRC goal of maintaining safety by continuing to provide NRC approval of new ASME Code Cases. In addition, it would reduce unnecessary regulatory burden by eliminating the need for licensees to submit plant-specific relief requests and for NRC to review those submittals.

This alternative would also increase public confidence by indicating the NRC's acceptance of Code Cases as alternatives to the provisions of the ASME Codes.

This rulemaking and subsequent updates will involve some additional burden to the NRC. This burden would be more than offset by the reduction in the number of relief requests that the staff would be obligated to process. Also, the staff will explore the feasibility of issuing direct final rules to update the revision numbers of the revised regulatory guides that address Code Cases.

4.3 Alternative 3 - Discontinue Review and Approval of Code Cases on a Generic Basis

Under this alternative, the staff would review individual relief requests by licensees for use of Code Cases as alternatives to the requirements in the ASME BPV Code or the OM Code. Rulemaking to remove Footnote 6 from 10 CFR 50.55a would still be required. However, the staff would not prepare rulemakings to incorporate by reference the regulatory guides listing NRC-approved Code Cases.

This process would continue to maintain safety. However, this approach would result in considerable additional regulatory burden because each licensee would need to submit an individual request for relief for each ASME Code Case it wished to implement, even if other licensees have sought and been granted such relief. In addition, the staff would be required to review each of these requests on a plant-specific basis. This alternative could have an adverse effect on public confidence by creating a perception that NRC does not have a uniform approach to reviewing and approving the use of ASME Code Cases. Also, the process for approving individual relief requests would not readily provide an opportunity for public involvement.

5. Regulatory Impact - Qualitative Costs and Benefits

Since the staff does not recommend maintaining the status quo, this regulatory analysis will examine the qualitative costs and benefits of Alternative 2 and Alternative 3. However, there are some small cost considerations involving reporting and recordkeeping requirements which must be compared to the status quo for the purpose of obtaining OMB approval of these estimated changes in licensee burden.

5.1 Facility Licensees

5.1.1 General

The use of ASME BPV and OM Code Cases is attractive to NRC licensees for a number of reasons. Code Cases may be used by licensees immediately upon approval by the ASME (pending NRC approval). In addition, Code Cases are stand-alone alternatives to specific provisions contained in the ASME Code which makes their implementation very straightforward. Hence, a Code Case is a good tool for introducing the use of advanced techniques, procedures, and measures on a trial basis to gain experience. This experience is used to either refine or reject the new provisions. Code Cases are also ideally suited for use in the risk-informing arena. In those areas where the application of risk-informed principles indicate that the number of examination or tests has been excessive or that occupational exposure can be reduced, Code Cases can provide a quick means for implementation. Alternative 2 has the advantage that the Code Cases are generically approved through the regulatory guides (i.e., no action required by licensees). Alternative 3, however, requires each licensee to submit a relief request to implement each Code Case of interest.

Submission of a relief request to the NRC is not a trivial matter. Once the Code Case is approved by the ASME, the licensee must make a determination as to the applicability of the Code Case to its facility and the benefit to be derived. A request must be prepared, and all appropriate levels of licensee management must review and approve such a request. The NRC estimates that this process would involve an average of 3 person-weeks or 120 hours of effort by a licensee. At an estimated labor rate of $80[1] per hour, this would result in a cost to the licensee of $9,600 per relief request. It is expected that licensees deciding whether relief should be sought would weigh this cost against the benefit to be derived. In some cases, licensees would decide to forfeit the benefits of using a Code Case, whether in terms of radiological considerations or burden reduction. The NRC staff estimates that this would occur in the case of approximately 15 percent of ASME Code Cases.

If it is assumed that each of NRC's 103 nuclear power reactor licensees would desire to implement two ASME Code Cases per year, under Alternative 2 there would be 206 Code Cases implemented with no cost impact for relief requests (assuming that each of these Code Cases and their modifications and limitations have been incorporated by reference in 10 CFR 50.55a). Under Alternative 3, 175 (i.e., 85 percent of 206 Code Cases) relief requests would need to be prepared at an industry-wide cost of approximately $1.7 million per year.

5.1.2 Code Case N-532

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[1]It should be noted that the NRC labor rates presented here differ from those developed under the NRC's license fee recovery program (10 CFR Part 170). For regulatory analysis purposes, labor rates are developed under strict incremental cost principles wherein only variable costs that are directly related to the implementation, and operation and maintenance of the proposed requirement are included. This approach is consistent with guidance set forth in NUREG/CR-3560, "A Handbook for Value-Impact Assessment," and general cost-benefit methodology. Alternatively, NRC labor rates for fee recovery purposes are appropriately designed for full cost recovery of the services rendered and as such include non-incremental costs (e.g., overhead, administrative, and logistical support costs).

The ASME Code requires licensees to prepare records of examinations, tests, and repair and replacement activities. These records must be prepared following activities conducted during a refueling outage (approximately once every 18 months). Alternative 2 would adopt Code Case N-532, which reduces the recordkeeping and reporting requirements resulting from each outage.

Recordkeeping

During consideration of Code Case N-532 by the ASME, the industry inservice inspection specialist indicated that the recordkeeping burden associated with those requirements currently in the ASME Code is approximately 15 days or 120 person-hours per licensee every 18 months. Assuming 18 month intervals for these reports, each licensee will provide two reports in the 3-year OMB clearance period. Therefore, there will be 103 (reactors) X 2 (reports per clearance period) ÷ 3 years = 69 reports annually. The current total industry recordkeeping burden for refueling outages is approximately 8,280 person-hours per year (69 reports X 120 person-hours). It is estimated that the alternative recordkeeping burden associated with Code Case N-532 is 16 person-hours per licensee every 18 months. Thus, the total industry recordkeeping burden associated with the Code Case N-532 would be 1,104 person-hours per year (69 reports X 16 person-hours). This equates to a decrease in total industry recordkeeping burden of 7,176 person-hours per year.

Reporting

With respect to reporting, the current ASME Code requirements for examinations, tests, and repair and replacement activities are estimated to be 5 days or 40 person-hours every 18 months. The total industry reporting burden is approximately 2,760 person-hours per year (69 reports X 40 person hours). It is estimated that the alternative proposed reporting burden associated with the implementation of Code Case N-532 is 8 person-hours per licensee every 18 months. The total industry reporting burden for Code Case N-532 would be 552 person-hours per year (69 reports X 8 person-hours). Thus, the total industry decrease in reporting burden would be 2,208 person-hours per year (2,760 - 552).

5.1.3 Code Case N-573

Code Case N-573 provides an alternative to the welding and brazing procedure qualification requirements (PQR) of IWA-4000. IWA-4000 requires that all welding be performed in accordance with Welding Procedure Specifications that have been qualified by the Owner. The Code Case alternative would allow Owners to use welding procedure qualifications performed and documented by other Owners.

Recordkeeping

During consideration of Code Case N-573 by the ASME, the industry inservice inspection specialist indicated that the recordkeeping burden associated with those requirements currently in the ASME Code is approximately 24 person-hours per PQR (8 person-hours per PQR) every 18 months. Assuming 18 month intervals for these reports, each licensee would be performing procedure qualifications six times in the 3-year OMB clearance period. Therefore, there will be 103 (reactors) X 6 (procedure qualifications) ÷ 3 years = 206 procedure qualifications annually. The total industry burden would be 206 (procedure qualifications) X 8 (person-hours per PQR) = 1,648 person-hours per year. It is estimated that

the implementation of Code Case N-573 will reduce the number of procedure qualifications performed annually by half (i.e., through the sharing of PQRs). Thus, the decrease in industry recordkeeping burden associated with the Code Case N-573 would be 824 person-hours per year.

Reporting

There is no change with respect to reporting requirements associated with the use of Code Case N-573. Thus, the total industry reporting burden is not affected by the use of this Code Case.

Total

The total estimated decrease in cost to the industry resulting from the decrease in recordkeeping requirements and decrease in reporting requirements associated with Code Case N-532 is estimated to be $816,640 [(7,716 person-hours + 2,208 person-hours + 824 person- hours) x $80].

5.2 NRC Staff

The NRC staff resources would be affected if either Alternative 2 or Alternative 3 is pursued. If Alternative 2 is undertaken, additional rulemakings will be required to update NRC's approval of new Code Cases. The initial proposed rule will be the most burdensome i.e., the staff has to develop the statement of considerations, regulatory analysis, etc., as well as consider the changes to 10 CFR 50.55a necessary to satisfy the APA. The final rule should be straightforward as the industry is in favor of NRC endorsement of Code Cases, and the majority of public comments are expected to address staff limitations and modifications on the use of specific Code Cases. The only anticipated changes required for subsequent proposed rulemakings will be to update the versions of the regulatory guides listed in 10 CFR 50.55a. The cost of these additional rulemaking efforts will be more than offset by the reduction in the number of relief requests to be processed by the NRC staff. NRC approval of ASME Code Cases through regulatory guide publication has been performed by the Office of Nuclear Regulatory Research (RES) staff for many years. Therefore, this effort and the concomitant task of revising the regulatory guides will not impose a significant new burden on the staff. In addition, the staff plans to analyze the nature of the public comment on the proposed rule to determine whether it would be advisable to publish direct final rules for updating RG revisions in the future.

With respect to Alternative 3, the staff would publish a single rulemaking to delete the reference to Footnote 6. Licensees would submit relief requests to obtain NRC approval for the use of ASME-published Code Cases. It is estimated that each relief request would require approximately 2 staff weeks or 80 person-hours to review and approve. If the expected 175 requests are submitted each year, the NRC would expend approximately $1.1 million (175 relief requests X 80 person-hours X $80 per hour) to process these requests.

6. Decision Rationale

The staff recommends Alternative 2. As discussed above, this alternative meets the NRC goal of maintaining safety by continuing to provide NRC approval of new ASME Code Cases. In addition, it would reduce unnecessary regulatory burden by eliminating the need for

licensees to submit plant-specific relief requests and for NRC to review those submittals. Finally, this alternative would also increase public confidence by indicating the NRC's acceptance of Code Cases as alternatives to the provisions of the ASME Codes. The NRC's cost of preparing periodic rule changes under Alternative 2 would be more than offset by a large reduction in relief requests that would need to be processed relative to Alternative 3.

Several other important considerations lead the staff to recommend Alternative 2. These include the industry's familiarity with the process of Code Case approval through NRC regulatory guides, the public perception of a more consistent treatment of the code case approval process across the industry, and the public perception that the NRC will continue to support the use of the most updated and technically sound techniques as developed by the ASME while continuing to provide adequate protection to the public.

7. Implementation Schedule

After the publication of the proposed rule in the *Federal Register* and the consideration and resolution of the public comments, a final rule, which will become effective 60 days after its publication in the *Federal Register,* will be published.

8. Regulatory Guides

For the purposes of the discussion below, only new and revised Code Cases are considered. Reaffirmed Code Cases have been approved by the ASME for a new 3-year term without change, and thus the NRC's position in previous guides relative to these Code Cases has not changed.

Code Cases provide alternatives to existing requirements contained in the ASME BPV and OM Codes. Code Cases are implemented voluntarily by licensees. Thus, the regulatory guides do not impose new or amended requirements. In addition, the BPV and OM Codes have been incorporated by reference into 10 CFR 50.55a in previous amendments and hence, the inservice examinations and inservice testing provisions incorporated into § 50.55a are presently being performed by licensees. Use of the alternative provisions of the Code Cases therefore, as a rule do not result in associated installation or continuing costs. Finally, since many Code Cases provide more effective examinations and tests, or were developed for the purpose of reducing occupational exposure, implementation of Code Cases overall results in reduced costs and occupational exposure.

8.1 Acceptable Code Cases

The NRC staff has reviewed the new Code Cases listed below and determined that they are acceptable alternatives to applicable parts of Section III, Section XI, and the OM Code (Note: revised Code Cases are included in this list because some change(s) in the provisions of these Code Cases were made).

8.1.1 Section III

CODE CASE NUMBER	TYPE	*TITLE*
N-20-4	Revised	*SB-163 Nickel-Chromium-Iron Tubing (Alloys 600 and 690) and Nickel-Iron-Chromium Alloy 800 at a Specified Minimum Yield Strength of 40.0 ksi and Cold Worked Alloy 800 at a Yield Strength of 47.0 ksi*
N-171	New	*Postweld Heat Treatment of P-No. 1 Material*
N-213	New	*SA-203, Grade E (Plate) and SA-350, Grade LF3 (Forging), 3.5% Ni Nominal Composition Used in Class 1 Construction*
N-319-3	New	*Alternate Procedure for Evaluation of Stresses in Butt Welding Elbows in Class 1 Piping*
N-373-1	New	*Alternative PWHT Time at Temperature for P-No. 5 Material*
N-387	New	*Certification of Level III NDE Examiner*
N-391-2	Revised	*Procedure for Evaluation of the Design of Hollow Circular Cross Section Welded Attachments on Class 1 Piping*
N-392-3	Revised	*Hollow Circular Cross Section Welded Attachments on Classes 2 and 3 Piping*
N-405-1	New	*Socket Welds*
N-438-1	Reinstated	*UNS N08367 Material*
N-439-1	Revised	*Use of 20Cr-19Ni-6Mo (Alloy UNS S31254) Forgings, Plate, Seamless and Welded Pipe, and Welded Tube, Class 2 and 3 Construction*
N-440-1	Revised	*Use of 20Cr-18Ni-6Mo (Alloy UNS J93254) Castings, Class 2 and 3 Construction*
N-441-2	Revised	*Use of 20Cr-18Ni-6Mo (Alloy UNS S31254) Fittings, Class 2 and 3 Construction*
N-443-2	New	*High Yield Strength Cr-Mo Steel, Class 1 Components, Division 1*
N-453-3	Revised	*Nickel-Chromium-Molybdenum-Copper Stainless Steel (UNS N08925) Welded Pipe for Class 2 and 3 Construction*
N-469-1	Revised	*Martensitic Stainless Steel for Class 1, 2, and 3 Components*

N-493	New	*Alternative Radiographic Acceptance Criteria for Vessels Used as Shipping Casks*
N-520-1	Revision	*Alternative Rules for Renewal of N-Type Certificates for Plants Not in Active Construction*
N-539	New	*UNS N08367 in Class 2 and 3 Valves*
N-548	New	*Air Cooling of SA-182 Grades F304, F304L, F316, F316L Forgings Instead of Liquid Quenching After Solution Heat Treatment, Class 1, 2, and 3*
N-550	New	*Alternative Rules for Examination of Welds in Instrument Tubing, Class 1 and 2*
N-558	New	*Stamping of Class 2 Vessels Fabricated to Subsection NB*
N-564-2	New	*UNS J93380, Alloy CD3MWCuN, Class 2 and 3 Construction*
N-570	New	*Alternative Rules for Linear Piping and Linear Standard Supports for Class 1, 2, 3, and MC*
N-572	New	*Use of SB-425 (UNS N08825) Bar and Rod for Class 1 Construction*
N-579	New	*Use of Nonstandard Nuts, Class 1, 2, and 3, MC, CS Components and Supports Construction*
N-580-1	New	*Use of Alloy 600 With Columbium Added*
N-594	New	*Repairs to P-4 and P-5A Materials for Pumps and Valves Without Postweld Heat Treatment*
N-596	New	*Use of Alternative Reference Specimens*
N-607	New	*Guidance on Implementation of NS Certificate of Accreditation*
N-608	New	*Applicable Code Edition and Addenda, NCA-1140(a)(2)*
N-610	New	*Alternative Reference Stress Intensity Factor (K_{1R}) Curve for Class 1 Components*
N-611	New	*Use of Stress Limits as an Alternate to Pressure Limits Subsection NC/ND-3500*
N-620	New	*Rules for Class 1 Type M Pumps*

N-621	New	*Ni-Cr-Mo Alloy (UNS N06022) Welded Construction to 800ºF*
N-625	New	*Ni-Cr-Mo Alloy (UNS N06059) Welded Construction to 800ºF*
N-631	New	*Use of Fracture Toughness Test Data to Establish Reference Temperature for Pressure Retaining Materials Other Than Bolting for Class 1 Vessels*
N-632	New	*Use of ASTM A 572, Grades 50 and 65 for Structural Attachments to Class CC Containment Liners*
N-635	New	*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*
N-636	New	*Use of 18Cr-13Ni-3Mo (Alloy UNS S31703), 19Cr-15Ni-4Mo (Alloy UNS S31725), and 18.5Cr-15.5Ni-4.5Mo-N (Alloy UNS S31726) Forgings, Seamless Tubing, Plate, Welded Tubing, Welded and Seamless Pipe, Welded Pipe With Addition of Filler Metal and Fittings, Classes 2 and 3*
N-637	New	*Use of 44Fe-25Ni-21Cr-Mo (Alloy UNS N08904) Plate, Bar, Fittings, Welded Pipe, and Welded Tube, Classes 2 and 3*
N-642	New	*Alternative Rules for Progressive Liquid Penetrant Examination of Groove Welds In P-No. 8 Materials 3/16 in. (5 mm) Thick and Less Made by Autogenous Machine or Automatic Welding*
N-644	New	*Weld Procedure Qualification for Procedures Exempt From PWHT in Class 1, 2, and 3 Construction*
N-646	New	*Alternative Stress Intensification Factors for Circumferential Fillet Welded or Socket Welded Joints for Class 2 or 3 Piping*

8.1.2 Section XI

CODE CASE NUMBER	TYPE	*TITLE*
N-198-1	New	*Exemption from Examination for ASME Class 1 and 2 Piping Located at Containment Penetrations*
N-307-2	Revised	*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*

N-334	New	*Examination Requirements for Integrally Welded or Forged Attachments to Class 2 Piping at Containment Penetrations*
N-458-1	Revised	*Magnetic Particle Examination of Coated Materials*
N-461-1	Reaffirmed	*Alternative Rules for Piping Calibration Block Thickness*
N-491-2	Revised	*Rules for Examination of Class 1, 2, 3, and MC Component Supports of Light-Water Cooled Power Plants*
N-494-3	Revised	*Pipe Specific Evaluation Procedures and Acceptance Criteria for Flaws in Class 1 Ferritic Piping that Exceed the Acceptance Standards of IWB-3514.2*
N-504-2	Revised	*Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping*
N-508-1	New	*Rotation of Serviced Snubbers and Pressure Relief Valves for the Purpose of Testing*
N-523-2	New	*Mechanical Clamping Devices for Class 2 and 3 Piping*
N-526	New	*Alternative Requirements for Successive Inspections of Class 1 and 2 Vessels*
N-534	New	*Alternative Requirements for Pneumatic Pressure Testing*
N-535	New	*Alternative Requirements for Inservice Inspection Intervals*
N-538	New	*Alternative Requirements for Length Sizing Performance Demonstration in Accordance with Appendix VIII, Supplements 2, 3, 10, 11, and 12*
N-543	New	*Alternative to Performing Periodic Calibration Checks*
N-544	New	*Repair/Replacement of Small Items*
N-545	New	*Alternative Requirements for Conduct of Performance*
N-553	New	*Inservice Eddy Current Surface Examination of Pressure Retaining Pipe Welds and Nozzle-to-Safe End Welds*
N-555	New	*Use of Section II, V, and IX Code Cases*
N-556	New	*Alternative Requirements for Verification of Acceptability of Replacements*
N-563	New	*Grading of Examinations, IWA-2320*

N-566-1	New	*Corrective Action for Leakage Identified at Bolted Connections*
N-573	New	*Transfer of Procedure Qualification Records Between Owners*
N-588	New	*Attenuation to Reference Flow Orientation of Appendix G for Circumferential Welds in Reactor Vessels*
N-592	New	*ASNT Central Certification Program*
N-598	New	*Alternative Requirements to Required Percentages of Examinations*
N-601	New	*Extent and Frequency of VT-3 Visual Examination for Inservice Inspection of Metal Containments*
N-603	New	*Alternative to the Requirements of IWL-2421, Sites with Two Plants*
N-604	New	*Alternative to Bolt Torque or Tension Test Requirements of Table IWE-2500-1, Category E-G, Item E8.20*
N-605	New	*Alternative to the Requirements of IWE-2500(c) for Augmented Examination of Surface Areas*
N-609	New	*Alternative Requirements to Stress-Based Selection Criteria for Category B-J Welds*
N-617	New	*Alternative Examination Distribution Requirements for Table IWE-2500-1, Examination Category C-G, Pressure Retaining Welds in Pumps and Valves*
N-623	New	*Deferral of Inspections of Shell-to-Flange and Head-to-Flange Welds of a Reactor Vessel*
N-624	New	*Successive Inspections*
N-627	New	*VT-1 Visual Examination in Lieu of Surface Examination for RPV Closure Nuts*
N-629	New	*Use of Fracture Toughness Data to Establish Reference Temperature for Pressure Retaining Materials*
N-638	New	*Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique*
N-640	New	*Alternative Reference Fracture Toughness for Development of P-T Limit Curves*

N-641	New	*Alternative Pressure-Temperature Relationship and Low Temperature Overpressure Protection System Requirements*
N-643	New	*Fatigue Crack Growth Rate Curves for Ferritic Steels in PWR Water Environment*

8.1.3 OM Code Cases

CODE CASE NUMBER	TYPE	*TITLE*
OMN-2	New	*Thermal Relief Valve Code Case*
OMN-5	New	*Testing of Liquid Service Relief Valves Without Insulation*
OMN-6	New	*Alternative Rules for Digital Instruments*
OMN-7	New	*Alternative Requirements for Pump Testing*
OMN-8	New	*Alternative Rules for Preservice and Inservice Testing of Power-Operated Valves That Are Used for System Control and Have a Safety Function per OM-10*
OMN-13	New	*Requirements for Extending Snubber Inservice Visual Examination Interval at LWR Power Plants*

8.2 Conditionally Acceptable Code Cases

The Code Cases listed below are acceptable to the NRC staff for application in the design, construction, ISI, and IST of components and their supports for water-cooled nuclear power plants 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. Notations have been made to indicate those conditions which have been carried over from previous versions of the regulatory guides.

8.2.1 Section III

- Code Case N-71-17
  Type: Revised
  Title: *Additional Materials for Subsection NF Class 1, 2, 3, and MC Component Supports Fabricated by Welding*

  Code Case N-17-16 was conditionally approved in RG 1.85, Revision 31. This revision (N-71-17) updates references to materials specifications. The NRC staff has determined that these changes are acceptable. Hence, the conditions that were contained in Revision 31 of RG 1.85 also apply to this revision and have not been modified.

- Code Case N-500-1
  Type: New
  Title: *Alternative Rules for Standard Supports for Class 1, 2, 3, and MC*

  The Code Case endorses the use of Manufacturers' Standardization Society Standard SP-58 (1988 Edition), "Pipe Hangers and Supports - Materials, Design and Manufacture," as an alternative to the requirements of the ASME Code which are normally used (i.e., Subsection NCA, Subsection NF). SP-58 does not address fatigue design considerations and design of bolting for bolted joints. These items are addressed in the requirements for ASME Code Class 1, Class 2, Class 3, and Class MC components. Thus, the following provisions shall be used when implementing the Code Case:

  (1) The Code Case would not require the consideration of high cycle fatigue loading for Class 1 Standard Supports. Hence, when implementing this Code Case for Class 1 Standard Supports, the provisions contained in NF-3330, "High Cycle Fatigue Design for Class 1," are to be met.

  (2) The Code Case would not require the use of the provisions contained in NF-3225, "Design of Bolting," nor in NF-3324.6, "Webs, Flanges, and Stiffeners," for bolted joints. Hence, when implementing the Code Case, the provisions contained in NF-3225 and NF-3324.6 are to be met for bolted joints.

- Code Case N-626
  Type: New
  Title: *Use of Plastic Analysis for the Design of Type B Containment Components for Nuclear Material Transportation Casks*

  For the acceptability of a design by analysis, the Code Case does not include provisions for protection against nonductile fracture. The NRC staff believes that it is essential to address nonductile fracture. In addition, there is a typographical error in the Code Case. Finally, an alternative for evaluation of puncture test loadings has been provided. Thus, the following limitations have been placed on the use of the Code Case:

  (1) For the acceptability of a design by analysis (i.e., protection against nonductile failure), Paragraph WB-3211, "Requirements for Acceptability," of Section III, Division 3, Subsection WB, "Class TP (Type B) Containment," Subparagraphs (a) through (d) must be applied.

  (2) There is a typographical error in the title of Paragraph (a)(2) of the Code Case, Paragraph WB-3277 does not exist. Paragraph WB-3227, "Applications of Inelastic Analysis Procedures," of Section III, Division 3, Subsection WB, "Class TP (Type B) Containment," is to be used.

  (3) The first paragraph of WB-3324, "Design for Local Puncture Associated with a Hypothetical Accident Condition," of Section III, Division 3, Subsection WB, "Class TP (Type B) Containment," must be applied. The second paragraph of WB-3324 may be applied. In lieu of the third paragraph of WB-3324, the following may be applied: "In lieu of the application of the equation for outer shell thickness (t_{req}) the response of the containment boundary to puncture test loadings may be evaluated using plastic analysis

according to the rules in Appendix F, “Rules for Evaluation of Service Loadings with Level D Service Limits.”

8.2.2 Section XI

- Code Case N-416-2
  Type: Revised
  Title: *Alternative Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2, and 3*

  The Code Case does address pressure testing hold times prior to the performance of the VT-2 visual examination. The NRC staff has determined that these hold times are essential because (1) the capability of detecting and locating a small leak is directly proportional to the hold time of a pressurized system, especially if the system is insulated; (2) system leakage tests, if performed without any hold times, may be insensitive to small leaks because of the time required for the leakage to become visible; and (3) small leaks might not be readily detected by any other means such as a quick system walkdown or installed leakage detection system. Leakage must be detected and prevented to resolve issues related to operability and structural integrity.

  The ASME Subcommittee on Inservice Inspection recently unanimously passed a revision to IWA-5213, “Test Condition Holding Times,” to reinstate the provisions of the 1989 Edition. This action will revise the holding time requirements after achieving test pressure for all system pressure tests required by Tables IWB-2500-1, IWC-2500-1, and IWD-2500-1. The basis for the reinstatement is that the holding time requirements for these tests in the current addenda are believed to be insufficient to ensure the detection of pressure boundary leakage. Thus, the NRC has adopted this position in the final guide. When implementing this Code Case, licensees would use IWA-5213 of the 1989 Edition.

  The 1989 Edition of Section XI requires a system leakage tests for the Class 1 boundary (no hold time as the system is pressurized during startup), system functional tests for Class 2 or 3 systems that are not normally in operation (10 minute hold time; these systems are normally uninsulated, and long hold times may damage components which have to be specially aligned to conduct the test), and system inservice tests for Class 2 or 3 systems that are normally in operation (4 hours for these insulated components).

- Code Case N-512-1
  Type: Revised
  Title: *Assessment of Reactor Vessels With Low Upper Shelf Charpy Impact Energy Levels*

  Code Case users are cautioned relative to compliance with Appendix G, “Fracture Toughness Requirements,” to 10 CFR Part 50. The material properties and transient selection should follow the guidance in Regulatory Guide 1.161, “Evaluation of Reactor Pressure Vessels with Charpy Upper-Shelf Energy Less Than 50 Ft-lb.” Regulatory Guide 1.161 provides criteria acceptable to the NRC staff for demonstrating that the margins of safety against ductile fracture are equivalent to those in nonmandatory Appendix G, “Protection Against Nonductile Failure,” to Section III of the ASME Code.

Following the provisions in the regulatory guide to determine the equivalent safety margins is one method of demonstrating compliance with Appendix G to 10 CFR Part 50.

- Code Case N-513
  Type: New
  Title: *Evaluation Criteria for Temporary Acceptance of Flaws in Class 3 Piping*

  Code Case N-513 has been endorsed in 10 CFR 50.55a. The use of Code Case N-513, with the limitations, in conjunction with Code Case N-523-1 obviates the need for licensees to request approval for deferring repairs, thus saving NRC and licensee resources. Prior to endorsement in 10 CFR 50.55a, licensees had to request NRC staff approval to defer Section XI Code repair for Class 3 moderate energy (200 EF, 275 psig) piping systems. Section XI contains repair methods for pipes with a flaw exceeding acceptable limits. These repairs restore the integrity of the flawed piping. There are certain cases, however, where 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). For many safety-related piping systems, immediate repair is required regardless of plant status. However, it was determined that under certain conditions, temporary acceptance of flaws, including through-wall leaking, of low and moderate energy Class 3 piping was acceptable provided that the conditions are met, and the repair is effected during the next outage. To ensure consistency with 10 CFR 50.55a(b)(2)(xiii), the same limitations have been placed on the use of the Code Case in the regulatory guide. Section 1.0(a) of the Scope to Code Case N-513 limits the use of the requirements to Class 3 piping. However, Section 1.0(c) would allow the flaw evaluation criteria to be applied to all sizes of ferritic steel and austenitic stainless steel pipe and tube. Without some limitation on the scope of the Code Case, the flaw evaluation criteria could be applied to components such as pumps and valves, original construction deficiencies, and pressure boundary leakage; applications for which the criteria should not be utilized. Thus, the NRC has determined that the Code Case shall not be applied to: (1) components other than pipe and tube, such as pumps, valves, expansion joints, and heat exchangers; (2) leakage through a flange gasket; (3) threaded connections employing nonstructural seal welds for leakage prevention (through seal weld leakage is not a structural flaw, thread integrity must be maintained); and (4) degraded socket welds.

  In addition to the above, the first paragraph of Section 4.0 of Code Case N-513 contains the flaw acceptance criteria. The criteria provide a safety margin based on service loading conditions. The second paragraph of Section 4.0, however, would permit a reduction of the safety factors based on a detailed engineering evaluation. No criteria or guidance is given for justifying a reduction, or limiting the amount of reduction. The acceptance criteria of the first paragraph are based on sound principles. The second paragraph would allow ever finer calculation until the available margins became unacceptably low. A limitation has been added to the Code Case requiring that the specific safety factors in the first paragraph of Section 4.0 be satisfied.

- Code Case N-516-2
  Type: Revised
  Title: *Underwater Welding*

  Code Case N-516 was conditionally approved in RG 1.147, Revision 12. The condition required that when welding was to be performed on high neutron fluence Class 1 material, then a mockup using material with similar fluence levels was to be welded to verify that adequate crack protection measures were used. Code Case N-516-1, added provisions for underwater welding of ferritic materials.

  The condition was included to address helium induced cracking. Nickel is a primary alloying component in stainless steels. Boron is typically present in stainless steels and nickel based alloys as an impurity. Helium is produced through the interaction of thermal neutrons with boron and nickel. Above a certain level, helium can result in widespread cracking during the welding process. The BWR Vessel and Internals Project has recently published guidance for utilities for welding repairs of irradiated components. Other methods and techniques and may be used by licensees. The Code Case does not of course address these proprietary methods and techniques. With the new guidelines for welding, many of the concerns that resulted in the original condition have been addressed. However, because the Code Case addresses the welding of critical Class 1 in-vessel components, there are a variety of methods and techniques which may be used in the weld repair, and the Code Case is not specific relative to the methods and techniques (i.e., proprietary information), the condition has been modified in the final guide to require NRC approval regarding the technique to be used in the weld repair or replacement of irradiated material underwater. The revisions resulting in Code Case N-516-2 are editorial in nature. Therefore, the final guide conditionally accepts the use of N-516-2.

- Code Case N-517-1
  Type: Revised
  Title" *Quality Assurance Program Requirements for Owners*

  Unconditional use of this Code Case would violate 10 CFR 50, Appendix B, in that it would permit the purchase of materials from sources which do not have approved QA programs. Hence, the material would not satisfy the requirements for commercial grade dedication (i.e., certain safety-related functions would not be verified during the manufacturing process). In addition, it is not clear that the Code Case requires QA program requirement verification by the Authorized Nuclear Inspector. Thus, to ensure compliance when implementing this Code Case, the Owner's NRC approved 10 CFR Part 50, Appendix B Quality Assurance (QA) Program shall address the use of this Code Case and any unique QA requirements identified by the Code Case that are not contained in the Owners QA Program description. This would include the activities performed in accordance with this Code Case that are subject to monitoring by the Authorized Nuclear Inspector.

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

  NRC acceptance of the Code Case without condition could be interpreted as relieving the site receiving the material from having to comply with the 10 CFR Part 21 requirement to notify the Commission of component defects which could create a substantial safety hazard. To avoid any misunderstanding, use of the Code Case is conditioned. The requirements of 10 CFR Part 21 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.

  10 CFR Part 50, Appendix B, requires that an organization receiving material Qualification Records (PQRs) and certifications needs to perform an audit or surveillance to ensure that the QA program controlling these activities meets applicable Appendix B requirements and is effectively implemented. There is no requirement in the Code Case to ensure that the end user of the PQRs and certification records confirms that such records/activities were accomplished in accordance with a QA program that met the requirements of IWA-1400, "Owner's Responsibility," and effectively implemented at the time the PQRs and certification activities were performed. Appendix B requires this.

  Thus, the organization using the procedure qualification records and certification needs to perform an audit or surveillance to ensure that the QA program controlling these activities meets applicable Appendix B requirements and is effectively implemented.

- Code Case N-532-1
  Type: New
  Title: *Alternative Requirements to Repair and Replacement Documentation Requirements and Inservice Summary Report Preparation and Submission as Requested by IWA-4000 and IWA-6000.*

  Code Case N-532 was developed to reduce the burden on licensees relative to the large amount of data required as part of the ISI 90-day Inservice Summary Report required by IWA-6000 (i.e., Form NIS-1, "Owner's Report for Inservice Inspections," and Form NIS-2, "Owner's Report for Repairs and Replacements,") upon completion of each refueling outage. Code Case N-532 states the following: "An Owner's Activity Report Form OAR-1 shall be prepared and certified upon completion of each refueling outage. Each Form OAR-1 prepared during an inspection period shall be submitted following the end of the inspection period." The OAR-1 would contain information such as an abstract of the applicable examinations and tests, a list of the items with flaws or relevant conditions that required evaluation to determine acceptability for continued service, and an abstract of repairs, replacements, and corrective measures performed. This Code Case applies to all component classes.

  IWA-6240(b) requires that "The inservice inspection summary report shall be submitted within 90 days of the completion of each refueling outage." The submittal of the inservice inspection report within 90 days of the end of the refueling outage ensures that the regulatory authorities having jurisdiction at the site (NRC, state, Authorized Inspection Agency) are notified in a timely manner of any notable results (i.e., aging and degradation of components not severe enough to be reportable under the regulations but provide

early warning indicators). The Code Case requires the OAR-1 to be completed and certified at the completion of the refueling outage, but it doesn't have to be submitted until the end of the inspection period. Refueling outages do not necessarily coincide with the end of an inspection period (an inspection period is approximately 3 years), and several years could pass between the end of the outage and end of the period. Based on the requirements for the submittal of the inservice inspection summary report and the need for timely notification following a refueling outage, the NRC believes that the OAR-1 report should be submitted within 90 days of each refueling outage. Since the report is required to be completed by the end of the outage, submitting it at that time does not result in any additional burden. Hence, the condition in the final guide has been modified to read, "Thus, the OAR-1 must be submitted within 90 calendar days of the completion of each refueling outage."

- Code Case N-533-1
  Type: New
  Title: *Alternative Requirements for VT-2 Visual Examination of Class 1 Insulated Pressure-Retaining Bolted Connections*

  IWA-5242(a) requires that the insulation be removed from Class 1 pressure-retaining bolted connections in order to perform a VT-2 visual examination. Further, for insulated components, IWA-5213 requires a system pressure test holding time after attaining system pressure and temperature. The Code Case would permit the system pressure test and VT-2 visual examination to be performed without removal of the insulation. In addition, the Code Case is not consistent with IWA-5213. The basis for putting forth the Code Case is economic; i.e., removal of insulation requires additional ISI personnel and hold times extend the test period. Considerable operational experience exists with regard to the rate and extent of boric acid corrosion. Performance of these tests with the insulation in place is acceptable to the NRC staff only if the hold time requirements are retained. Sufficient time must be given for any leakage to make its way through the insulation.

  The ASME Subcommittee on Inservice Inspection recently unanimously passed a revision to IWA-5213, "Test Condition Holding Times," to reinstate the provisions of the 1989 Edition. This action will revise the holding time requirements after achieving test pressure for all system pressure tests required by Tables IWB-2500-1, IWC-2500-1, and IWD-2500-1. The basis for the reinstatement is that the holding time requirements for these tests in the current addenda are believed to be insufficient to ensure the detection of pressure boundary leakage. Thus, the NRC has adopted this position in the final guide. When implementing this Code Case, licensees would use IWA-5213 of the 1989 Edition. (Also see N-416-2)

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

  VT-2 visual examinations are conducted to detect evidence of leakage from pressure retaining components, with and without leakage collection systems. The ASME Code requires that VT-2 examinations be conducted in accordance with IWA-5000, "System Pressure Tests," and that VT-2 examination personnel be qualified and certified to certain nondestructive personnel qualification requirements. The Code Case would permit any

individual to perform these duties if they have 40 hours of non-specific walkdown experience, 4 hours of training on Section XI requirements and plant procedures, and pass the ASME Code vision tests. Four hours of general training and 40 hours of non-specific experience are not sufficient to demonstrate that personnel have acquired adequate knowledge of VT-2 visual examination techniques or system pressure testing. VT-2 visual examiners conduct other tasks more complex than observing leakage during leakage tests. They also perform halogen diode leak and mass spectrometer tests which require the use of special equipment and examination techniques. Hence, the Code Case has been conditionally approved to require that personnel be qualified by examination to demonstrate knowledge of Section XI and plant specific procedures for VT-2 visual examination.

The elimination of the requirement for VT-2 examination personnel to meet the nondestructive personnel qualification requirements also means that VT-2 personnel no longer have to be recertified on a recurring basis. Studies have shown that skills begin to diminish within a relatively short time if capabilities are not maintained. System pressure tests are only conducted once each refueling outage unless there has been a welded repair on a pressure retaining boundary or installation of a replacement by welding. Thus, the Code Case has been conditionally approved to require that personnel be recertified as presently required by the ASME Code in IWA-2314, 1995 Edition.

With regard to the third condition, Code Case N-546 replaces the requirements for qualification of visual examination personnel contained in CP-189 with certain other lesser requirements. However, CP-189 has the requirements for Levels I, II, and III personnel for each of the NDE methods, including visual. Level III personnel have the skills and knowledge to interpret the codes, verify the adequacy of procedures, and conduct or direct the training and examining of NDT personnel. Because the Code Case eliminates the requirements for visual examination personnel to adhere to CP-189, there does not appear to be any prohibition against any VT-2 performing the functions of a Level III. To ensure that unqualified personnel do not perform Level III functions, the third condition limits the applicability of the Code Case to the performance of VT-2 examinations, and it may not be applied to other VT-2 functions such as verifying the adequacy of procedures and training VT-2 personnel.

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

  This purpose of the Code Case is to permit the use of computer models in lieu of some mockups, thereby reducing the total cost of reactor vessel nozzle examinations. Examining the nozzle inside radius from the outside surface, however, is addressed by Appendix VIII, “Performance Demonstration for Ultrasonic Examination Systems,” to Section XI. 10 CFR 50.55a, contains limitations on the use of Appendix VIII. To achieve consistency between the guide and 10 CFR 50.55a, the following conditions have been placed on the use of the Code Case regarding specimen requirements:

  "At least 50 percent of the flaws in the demonstration test set shall be cracks and the maximum misorientation shall 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 shall not exceed three.”

- Code Case N-554-2
  Type: New
  Title: *Alternative Requirements for Reconciliation of Replacement Items*

  The Code Case was developed as an alternative to the reconciliation requirements of IWA-4221 for replacement items and the addition of new systems. Section 2.0 would require that the technical requirements that could affect materials, design, fabrication, or examination of the pressure boundary, core support, or component supports to be reconciled, but not the administrative requirements such as quality assurance, certification, Code Symbol Stamping, Data Reports, and Authorized Inspection. The NRC believes that the provision relative to non-reconciliation of administrative requirements would permit a component produced in a commercial shop without a QA program to be used in an ASME Code safety-related application if only the technical requirements are reconciled. The lack of a QA program would bring into question whether or not the requirements that were reconciled were actually performed in the shop. Thus, the Code Case has been conditionally approved to require that the component used for repair/replacement is to be manufactured, procured, and controlled as a safety-related component under an NRC-approved Quality Assurance program meeting the requirements of Appendix B to 10 CFR Part 50.

- Code Case N-557-1
  Type: New
  Title: *In-Place Dry Annealing of a PWR Nuclear Reactor Vessel*

  This Code Case addresses the in-place dry annealing of a PWR reactor vessel. The Code Case permits a maximum stress of $3S_m$ during the anneal. As written however, the Code Case would permit a maximum stress range of $6S_m$ which would exceed the stress range permitted by the ASME Code for normal operation. The justification given is that this one-time event of $6S_m$ will not result in excessive distortion of the vessel or significant fatigue damage of the vessel. The NRC does not believe that the justification has been adequately technically supported. Thus, the Code Case has been conditionally approved to require that the secondary stress allowable of $3S_m$, shown in Figure 1 of the Code Case, is to be applied to the entire primary plus secondary stress range during the annealing process.

- Code Case N-567-1
  Type: New
  Title: *Alternative Requirements for Class 1, 2, and 3 Replacement Components*

  The Code Case was developed to provide an alternative to the reconciliation requirements of IWA-7210 to accept replacement components constructed to earlier editions and addenda than that of the component being replaced. The NRC believes that the Code Case would permit the use of replacement components which have not met all of the requirements of a licensee’s NRC-approved 10 CFR Part 50 Appendix B Quality Assurance (QA) Program, i.e., licensees would be able to purchase components from vendors that do not have approved QA programs. Thus, to ensure that the requirements of Appendix B are met, the Code Case has been conditionally approved to require that licensees use their NRC-approved Appendix B Quality Assurance (QA) Program in

conjunction with the QA provisions contained in their Section XI Code of Record. The more stringent provisions between the approved QA Program and ASME Section XI are to be used.

- Code Case N-569-1
  Type: New
  Title: *Alternative Rules for repair by Electrochemical Deposition of Class 1 and 2 Steam Generator Tubing*

  The Code Case was developed to permit electrochemical deposition of material on the inside surface of degraded steam generator tubes to restore wall thickness. The Code Case is generally acceptable to the NRC for tube repair, but it should be noted that steam generator tube repair methods require prior NRC approval through the Technical Specifications. In addition, the Code Case does not address certain aspects of these repair such as the inspection qualification and plugging criteria necessary for staff approval of the repair method. Finally, 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.

- Code Case N-576-1
  Type: New
  Title: *Repair of Class 1 and 2 SB-163, UNS N06600 Steam Generator Tubing*

  The Code Case was developed to permit the repair of steam generator tubes by applying a laser beam weld deposit on the inside surface of the tube. The Code Case is generally acceptable to the NRC for tube repair, but it should be noted that steam generator tube repair methods require prior NRC approval through the Technical Specifications. In addition, the Code Case does not address certain aspects of these repair such as the inspection qualification and plugging criteria necessary for staff approval of the repair method. Finally, 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.

- Code Case N-593
  Type: New
  Title: *Alternative Examination Requirements for Steam Generator Nozzle to Vessel Welds*

  Section XI presently requires that essentially 100 percent (not less than 90 percent) of a weld be examined. If at least 90 percent is not practical (e.g., obstructions), a lower percentage is permissible provided that approval is received from the regulatory authority. The Code Case would permit any percentage of the weld to be examined. Most of these welds are accessible, however. The issue has not been weld coverage, but rather due to the thickness of nozzles, the difficulty of performing meaningful ultrasonic examinations. In recent years, there have been advances in technology which have greatly improved the reliability of these examinations. Hence, there does not appear to be a basis for the open-ended relaxation of the percentage requirements. Thus, the Code Case is acceptable provided that essentially 100 percent (not less than 90 percent) of the examination volume A-B-C-D-E-F-G-H in Figure 1 of the Code Case is inspected.

- Code Case N-597-1
  Type: New
  Title: *Requirements for Analytical Evaluation of Pipe Wall Thinning*

  The ASME Code does not address wall thinning (i.e., there are no tables or criteria for wall thinning rates), and there are no inspection requirements relative to pipe which has experienced thinning through erosion-corrosion. The Code Case was developed for the analytical evaluation of carbon and low-alloy steel piping which has experienced wall thinning due to corrosion. The industry is using EPRI National Safety Analysis Center Report 202L, “Recommendations for an Effective Flow Accelerated Corrosion Program,” to develop methods for predicting the rate of wall thickness loss and the value of the predicted remaining wall thickness. Thus, under Condition 1 to the Code Case, acceptance of the Code Case is conditioned on the use of this report. Since this is a guideline report developed by EPRI and EPRI reports by nature contain suggestions rather than requirements, the term “should” rather than “shall” is used throughout the report. Thus, implementation of the Code Case requires that the terms "should" and "shall" have the same expectation of being completed.

  The ASME Code permits wall thinning up to 10% of the wall thickness. Once the erosion exceeds 10%, the Code requires the licensee to repair, replace, or perform an evaluation of the continued structural integrity the component. The Code Case provides a method for performing the analytical evaluation. The provisions of the Code Case would not prohibit a licensee from delaying repair or replacement by performing another more sophisticated evaluation as the erosion progresses. Thus, Condition 2 requires that prior to reaching the allowable minimum wall thickness as calculated through the Code Case, the component must be repaired or replaced in accordance with the construction code of record and owners requirements or a later approved edition of ASME Section III.

  As previously stated, neither the ASME Code or Code Case address wall thinning rates or inspection frequency. To ensure that the component is repaired or replaced prior to reaching the allowable minimum wall thickness, the rate of wall thickness loss is to be used to determine an appropriate inspection frequency.

  Condition (4) addresses several typographical errors in the published Code Case. These corrections have been approved by the cognizant ASME working group but are not yet published. Thus, the corrections are provided in the guide so that licensees may benefit from the use of this important Code Case.

  Finally, Condition (5) limits the generic use of this Code Case to flow accelerated corrosion. For other types of corrosion such as microbiological or pitting, accepted evaluation models are not yet generally available, and the erosion rates for these other phenomena is not linear. Thus, for corrosion phenomenon other than flow accelerated corrosion, use of the Code Case is subject to NRC review and approval.

- Code Case N-599
  Type: New
  Title: *Alternatives to Qualification of Nondestructive Examination Personnel for Inservice Inspection of Metal (Class MC) and Concrete (Class CC) Containments*

  The ASME Code updated the requirements for NDE personnel in 1992. These requirements were published as ANSI/ASNT CP-189, "Standard for Qualification and Certification of Nondestructive Testing Personnel." The ASME Code containment examinations (Class MC and Class CC) endorsed by the NRC require the use of CP-189. The ASME Code rules presently being used by licensees for the examination of Class 1, Class 2, and Class 3 components, however, require the use of the earlier NDE personnel requirements in SNT-TC-1A. While it is recognized that the later improved requirements incorporating operating experience should be used rather than the earlier outdated requirements, requiring two separate personnel qualification programs (i.e., one program for Class 1, Class 2, and Class 3 components and a second program for Class MC and Class CC programs would impose additional training burden on personnel. In addition, some confusion may result in the industry from having two programs for separate components. This will no longer be an issue when licensees update to the 1995 Edition with the 1996 Addenda. Thus, in the interim, licensees will be permitted to use the earlier requirements for the remainder of their ISI inspection interval. This Code Case may not be used when a licensee updates to a Section XI edition/addenda requiring the use of ANSI/ASNT CP-189.

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

  The Code Case was developed to permit the use of automatic or machine gas-tungsten arc welding on BWR control rod drive housing or stub tube repairs without the use of preheat or postweld heat treatment for specified materials where it is impractical to do so. The Code Case permits this activity, however, without requiring an examination or verification of the surfaces to be welded to ensure that the base metal has been properly prepared, and that the surface is properly contoured so that an acceptable weld can be produced. Thus, the Code Case is conditionally acceptable. An examination or verification of the surfaces to be welded and surfaces adjacent to the weld are to be conducted to ensure that the surfaces are free from contaminants, such as, rust, moisture, grease, and other foreign material or any other condition that would prevent proper welding and adversely affect the quality or strength of the weld. This verification is to be required in the welding procedures.

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

  IWA-5242 requires that the insulation be removed from pressure retaining bolted connections of borated systems to perform a VT-2 visual examination for evidence of leakage. The Code Case provides an alternative to IWA-5242. Under the Code Case, insulation would not have to be removed from Class 1, Class 2, and Class 3 pressure

retaining bolted connections to perform the VT-2 examination when the bolting material is resistant to boric acid degradation. The Code Case, however does not address the susceptibility to stress corrosion cracking of certain materials. To ensure that materials suitable for use in a reactor coolant environment are used, the Code Case has been conditionally approved to require that: (1) insulation is to 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 1100EF or with hardness above R_c 30, and (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. For nuts conforming to SA-194, removal of the insulation for visual inspection is not necessary.

In addition, similar to Code Cases N-416-2 and N-498-4, the Code Case does not address the issue of hold times for leakage testing. Thus, consistent with those Code Cases, Code Case N-616 will require the use of IWA-5213 of the 1989 Edition.

- Code Case N-630
  Type: New
  Title: *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*

The 1998 Edition and 1999 and 2000 Addenda permit the Owner to define qualification requirements for personnel who perform examinations of containments. This edition and addenda do not contain any criteria that licensees must use when developing their programs. The NRC published a final rule on September 26, 2002, (67 FR 60522) that took exception to this section of the ASME Code and requires continued use of the provisions contained in the Code prior to 1998 that define comprehensive and technically sound methods for qualification of personnel and containment inspection (i.e., Subsection IWL, IWA-2300, “Qualifications of Nondestructive Examination Personnel”).

As in the edition and addenda, the Code Case states that the Responsible Engineer (RE) is to define the qualification requirements for personnel performing examinations of concrete and anchorages. The Code Case does not provide any requirements or provide guidance to the RE. To ensure that adequate examinations are performed and to be consistent with the recently published final rule, the Code Case is conditionally accepted to require that the Responsible Engineer’s written practice defines 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. Limited certification in accordance with IWA-2350 will be permitted.

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

The Code Case provides an alternative for calibration block material when blocks of the original material specification, product form, and heat treatment are no longer available. Section V, “Nondestructive Examination,” permits the use of different P-number material

for calibration blocks. The Code Case, however, requires only that the material be of similar chemical analyses, tensile properties, and metallurgical structure. The Code Case does not, however, address microstructure. To ensure that examiners can detect indications in the material that they will be inspecting, the Code Case has been conditionally approved to require that the chemical ranges of the calibration block may vary from the materials specification if: (1) the calibration block material is produced under an accepted industry specification or standard, and (2) the phase and grain shape are maintained in the same ranges produced by the thermal process required by the material specification.

- Code Case N-647
  Type: New
  Title: *Alternative to Augmented Examination Requirements of IWE-2500, Section XI, Division 1*

  Similar to Code Case N-630, this Code Case would permit the Owner to define what is a "detailed visual examination," i.e., neither the 1998 Edition, 1999 Addenda, or 2000 Addenda, nor the Code Case provide any criteria for licensees to use when developing the requirements for these examinations. The VT-1 visual examination requirements contained in the ASME Code were required for these examinations up to the 1997 Addenda (rather than leaving it to the Owner). To ensure that adequate examinations are performed and for consistency with the recently published amendment to 10 CFR 50.55a (67 FR 60520), the Code Case has been conditionally approved to require that licensees continue to use the VT-1 examination requirements.

  In addition to the condition, there is notation to the Code Case. Note: Draft Regulatory Guide DG-1070, "Sampling Plans Used for Dedicating Simple Metallic Commercial Grade Items for Use in Nuclear Power Plants," provides acceptable guidelines for sampling criteria. The Code Case would permit the use of a sampling plan when large surface areas must be volumetrically examined. To assist users, it is noted that the NRC staff has issued some guidelines that would be acceptable should licensees choose to use them.

8.2.3 Conditionally Acceptable OM Code Cases

- Code Case OMN-1
  Type: New
  Title: *Alternative Rules for Preservice and Inservice Testing of Certain Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants*

  Code Case OMN-1 was conditionally approved in the September 22, 1999, amendment to 10 CFR 50.55a, paragraph (b)(3)(iii)(A). Approval of the Code Case permits licensees that have not updated to the 1996 Addenda to use these later Code provisions for motor-operated valves. The conditions placed on the use of the Code Case are identical to the limitations contained in 10 CFR 50.55a(b)(3)(iii).

- Code Case OMN-3
  Type: New
  Title: *Requirements for Safety Significance Categorization of Components Using Risk Insights for Inservice Testing of LWR Power Plants*

  The modifications placed on the use of the Code Case are consistent with guidance in Regulatory Guides 1.174 and 1.175. Current IST programs are performed in compliance with the requirements of 10 CFR 50.55a(f) and with Section XI of the ASME Boiler and Pressure Vessel Code, which are requirements for all plants. Regulatory Guides 1.174 and 1.175 describe an acceptable alternative approach applying risk insights from PRA to make changes to a nuclear power plant's IST program. Regulatory Guide 1.174 provides overall guidance on the technical aspects that are common to developing acceptable risk-informed (RI) programs, and Regulatory Guide 1.175 supplements Regulatory Guide 1.174 by providing application-specific details of a method acceptable to the NRC staff for developing RI-IST programs. The regulatory guides implement, in part, the Commission policy statement, "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities: Final Policy Statement" (Vol 60, FR 42622; August 16, 1995), and the NRC staff's framework for incorporating risk insights into the regulation of nuclear power plants. The five conditions attached to implementation of Code Case OMN-3 ensure that high-level safety principles will be maintained during all risk-informed plant design or operational changes.

- Code Case OMN-4
  Type: New
  Title: *Requirements for Risk Insights for Inservice Testing of Check Valves at LWR Power Plants*

  The modifications placed on the use of the Code Case are identical to those in the September 22, 1999, amendment to 10 CFR 50.55a, paragraph (b)(iii)(iv), for implementing Appendix II, "Check Valve Condition Monitoring Program," of the OM Code, 1995 Edition with the 1996 Addenda.

- Code Case OMN-9
  Type: New
  Title: *Use of a Pump Curve for Testing*

  The Code Case provides an alternative to the provisions of ISTB 4.3, 4.4, 4.5, 5.2, and 6.1 of the OM Code. When a pump has undergone maintenance, or even complete replacement, the Code Case requires that a new reference curve to be determined, or an existing reference curve to be reconfirmed. Section 4 of the Code Case provides a technique for determining a new reference curve or reconfirming the existing one by combining the methodology for determination of new reference curves (which utilize a minimum of three points) with the methodology for determining new reference values (which are single points). It is not feasible to develop a pump hydraulic performance curve based on the measurement of a single data point however. To address this oversight, the Code Case has been conditionally approved to require the use of the provisions in Section 3 rather than Section 4 of the Code Case for developing a new or reconfirmed reference curve.

Section 5 of the Code Case addresses situations outside of those in Section 4 (i.e., pump has not undergone maintenance or been replaced) for developing a new or reconfirmed curve. Section 5 would also permit the use of Section 4 to establish an additional reference curve or set of curves. As above, the Code Case has been conditionally approved to require the use of the provisions in Section 3 rather than Section 4 of the Code Case for developing a new or reconfirmed reference curve.

- Code Case OMN-11
  Type: New
  Title: *Motor Operated Valve Risk-Based Inspection Code Case*

  The conditions have been added to ensure that use of the Code Case is consistent with NRC guidelines for risk-based IST programs, i.e., Regulatory Guides 1.174 and 1.175, which implement, in part, the Commission policy statement, "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities: Final Policy Statement" (Vol. 60, FR 42622, August 16, 1995), and the NRC staff's framework for incorporating risk insights into the regulation of nuclear power plants. The conditions attached to implementation of Code Case OMN-11 ensure that high-level safety principles will be maintained during all risk-informed plant design or operational changes. In addition, the conditions ensure consistency between OMN-1 and OMN-11.

  Where a licensee is implementing Code Case OMN-1 as a justified alternative to the requirements for stroke-time testing of motor-operated valves (MOVs) in Subsection ISTC of the ASME OM Code, the licensee may apply risk insights to its MOV program as indicated in Paragraph 3.7, Risk-Based Criteria for MOV Testing, of OMN-1 and as supplemented by Code Case OMN-11.

- Code Case OMN-12
  Type: New
  Title: *Alternative Requirements for Inservice Testing Using Risk Insights for Pneumatically- and Hydraulically-Operated Valve Assemblies in Light-Water Reactor Power Plants, OM Code 1998, Subsection ISTC*

  The conditions have been added to ensure that use of the Code Case is consistent with NRC guidelines for risk-based IST programs, i.e., Regulatory Guides 1.174 and 1.175, which implement, in part, the Commission policy statement, "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities: Final Policy Statement" (Vol. 60, FR 42622, August 16, 1995), and the NRC staff's framework for incorporating risk insights into the regulation of nuclear power plants. The conditions attached to implementation of Code Case OMN-11 ensure that high-level safety principles will be maintained during all risk-informed plant design or operational changes.