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TECHNICAL EVALUATION REPORT
FIRST INTERVAL INSERVICE INSPECTION PROGRAM
MILLSTONE NUCLEAR POWER STATION UNIT 3

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CONTENTS

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1. INTRODUCTION

Section 50.55a of 10 CFR Part 50 defines the requirements for the Inservice Inspection (ISI) program for light-water-cooled nuclear power facilities. Incorporated by reference in this regulation is Section XI of the Boiler and Pressure Vessel Code published by the American Society of Mechanical Engineers (ASME), which provides the basis for implementing inservice inspection.*

Two types of inspections are required: (1) a preservice inspection conducted before commercial operation to establish a baseline and (2) periodic inservice inspections conducted during 10-year intervals that normally start from the date of commercial operation. Separate plans for completing preservice inspection and each 10-year inservice inspection must be formulated and submitted to the U.S. Nuclear Regulatory Commission (NRC). The plan for each 10-year interval must be submitted at least six months before the start of the interval.

During the initial 10-year interval, inservice inspection examinations normally will comply with the requirements in the latest edition and addenda of Section XI incorporated in the regulation on the date 12 months before the date of issuance of the operating license. The effective Code for the first interval for Millstone 3, which began April 23, 1986, would be the 1980 Edition with addenda through Winter of 1981. The program, however, has been written to the 1983 Edition with addenda through Summer of 1983, which is permitted under the terms of 50.55a(g)(4)(iv).

Section 2 of this report evaluates the ISI Plan developed by the licensee, Northeast Nuclear Energy Company (NNECo), for Millstone 3 for (a) compliance with this edition of Section XI, (b) compliance with ISI-related commitments identified during the NRC's review before granting an operating license, (c) acceptability of examination sample, and (d) exclusion criteria.

Based on the date Millstone 3's construction permit was issued (August 9, 1974), the plant's Class 1 and 2 components (including supports) were to be designed and provided with access to enable performance of inservice examinations and tests and to meet the preservice examination requirements in Section XI Editions applied to the construction of the particular component (10 CFR 50.55a(g)(3)). The provisions of 10 CFR 50.55a(g)(3) also state that components (including supports) may meet

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*Specific inservice test programs for pumps and valves (IST programs) are being evaluated in other reports.

the requirements set forth in subsequent editions and addenda of this Code which are incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein. The current revision to 10 CFR 50.55a recognizes that the requirements of Section XI may not be practical to implement because of limitations of design, geometry, and materials of construction of components and systems that were designed to the older Code. The regulation therefore permits exceptions to impractical examination or testing requirements to be requested. Relief from these requirements may be granted, provided the health and safety of the public are not endangered, giving due consideration to the burden placed on the licensee if the requirements were imposed. Section 3 of this report evaluates requests for relief dealing with inservice examinations of components and with system pressure tests.

The current regulation also provides that ISI Programs may meet the requirements of subsequent Section XI Code editions and addenda, incorporated by reference in the Regulation, subject to approval by the NRC. Portions of such editions or addenda may be used, provided all related requirements of the respective editions or addenda are met. These instances are addressed on a case-by-case basis in Section 3 of this report. Likewise, Section XI provides that certain components and systems may be exempted from its requirements. In some instances, however, these exemptions are not acceptable to NRC or are acceptable only with restrictions. As appropriate, these instances are also discussed in Section 3 of this report.

The preservice inspection (PSI) program for Millstone Unit 3, a pressurized water reactor designed by Westinghouse, was submitted as attachments to letters dated June 1, 1983,(1) and March 20, 1984,(2) with relief requests submitted in preliminary form November 19, 1985,(3) and in final form December 23, 1985.(4) The NRC staff reviewed the PSI program and relief requests in the Safety Evaluation Report (SER), NUREG-1031, and supplements 2, 3, 4, and 5.(5) Additional correspondence regarding PSI was transmitted January 16, 1984,(6) May 1, 1984,(7) May 9, 1984,(8) December 13, 1984,(9) March 7, 1985,(10) May 7, 1985,(11) July 1, 1985,(12) July 2, 1985,(13) September 18, 1985,(14) and September 30, 1985.(15) Subsequent to completion of the review of relief requests in Supplemental Safety Evaluation Report (SSER) 5, the licensee submitted two revised PSI relief requests on April 1, 1986.(16)

By letter dated May 22, 1986,(17) the licensee submitted an inservice inspection program for the first 10-year inspection interval for Millstone 3. An additional first-interval relief request was submitted on March 18, 1987,(18) and revised August 5, 1988.(19) This relief request was evaluated by the NRC staff in a letter dated September 21, 1988.(20) The NRC staff requested additional information needed to complete the review of the ISI program on August 16, 1988.(21) The additional information requested was provided in a letter dated October 19, 1988,(22) which included Revision 1 to the ISI program as an attachment. In this submittal, the licensee added five new relief requests, revised three previously submitted relief requests, and withdrew one relief request.

2. EVALUATION OF INSERVICE INSPECTION PLAN

2.1 Introduction

The approach being taken in this evaluation is to review the applicable program documents to determine the adequacy of their response to Code requirements and any license conditions pertinent to ISI activities. The rest of this section describes the submittals reviewed, the basic requirements of the effective Code edition and the appropriate preservice inspection commitments. The results of the review are then described. Finally, conclusions and recommendations are given.

2.2 Documents Evaluated

A chronology of documents on Millstone Unit 3 is given in Section 1 of this report. Those documents that impact this evaluation are (1) the latest revision of the ISI program, (2) the SER and supplements, and (3) previous submittals concerning the PSI program.

2.3 Summary of Requirements

The requirements on which this review is focused include the following:

(1) Compliance with Applicable Code Editions. The Inservice Inspection Program shall be based on the Code editions defined in 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(b). The licensee for Millstone Unit 3 has written the program to the 1983 Edition with addenda through the Summer of 1983. These Code requirements are summarized in Section 2.3.1 and detailed Code requirements are given in Appendix A. The 1974 Edition, Summer 1975 Addenda is to be used for selecting Class 2 welds in systems providing the functions of residual heat removal, emergency core cooling, and containment heat removal. This is a requirement of 10 CFR 50.55a(b)(2)(iv)(A).

(2) Acceptability of the Examination Sample. Inservice volumetric, surface, and visual examinations shall be performed on ASME Code Class 1, 2, and 3 components and their supports using sampling schedules described in Section XI of the ASME Code and 10 CFR 50.55a(b). Sample size designations are identified as part of the Code requirements given in Appendix A.

(3) Exclusion Criteria. The criteria used to exclude components from examination shall be consistent with IWB-1220, IWC-1220, IWD-1220, and 10 CFR 50.55a(b).

(4) PSI Commitments. The Inservice Inspection Program should address all license conditions, qualified acceptance conditions, and other ISI-related commitments prescribed by the Safety Evaluation Report, its supplements, or by NUREG requirements.

2.3.1 Code Requirements

The following requirements are summarized from the 1983 Edition of Section XI with Addenda through Summer 1983. Many requirements call for inspection of all areas while other requirements are based on criteria such as representative percentage, components examined under other categories, material thickness, location relative to other welds or discontinuities, and component function and construction. For detailed requirements, see Appendix A of this report or the Code itself.

2.3.1.1 Class 1 Requirements. The following Class 1 components are to be examined in the first interval in accordance with Table IWB-2500-1:

(1) Pressure Retaining Welds in the Reactor Vessel

(2) Pressure Retaining Welds in Vessels Other than Reactor Vessels

(3) Full Penetration Welds of Nozzles in Vessels (Inspection Program B)

(4) Pressure Retaining Partial Penetration Welds in Vessels

(5) Pressure Retaining Dissimilar Metal Welds

(6) Pressure Retaining Bolting, Greater than 2 in. Diameter

(7) Pressure Retaining Bolting, 2 in. and Less in Diameter

(8) Integral Attachments for Vessels

(9) Pressure Retaining Welds in Piping

(10) Integral Attachments for Piping, Pumps, and Valves

(11) Pump Casings and Valve Bodies, including Pressure Retaining Welds

(12) Interior of Reactor Vessel, including Integrally Welded Core Support Structures, Interior Attachments, and Removable Core Support Structures

(13) Pressure Retaining Welds in Control Rod Housings

(14) All Pressure Retaining Components - Pressure Tests

(15) Steam Generator Tubing.

2.3.1.2 Class 2 Requirements. The following Class 2 components are to be examined in the first interval in accordance with Table IWC-2500-1:

(1) Pressure Retaining Welds in Pressure Vessels

(2) Pressure Retaining Nozzle Welds in Vessels

(3) Integral Attachments for Vessels, Piping, Pumps, and Valves

(4) Pressure Retaining Bolting Greater than 2 in. Diameter

(5) Pressure Retaining Welds in Piping

(6) Pressure Retaining Welds in Pumps and Valves

(7) All Pressure Retaining Components - Pressure Tests.

2.3.1.3 Class 3 Requirements. The following Class 3 reactor-connected and associated systems are to be examined in the first interval in accordance with Table IWD-2500-1:

(1) Systems in Support of Reactor Shutdown Function

(2) Systems in Support of Emergency Core Cooling (ECC), Containment Heat Removal (CHR), Atmosphere Cleanup, and Reactor Residual Heat Removal (RHR)

(3) Systems in Support of Residual Heat Removal from Spent Fuel Storage Pool.

2.3.1.4 Component Supports. The following component supports are to be examined in the first interval in accordance with Table IWF-2500-1:

(1) Plate and Shell Type Supports

(2) Linear Type Supports

(3) Component Standard Supports.

2.3.2 Preservice Inspection Commitments

Safety Evaluation Outstanding Item 12 required that a sample of welds in RHR, ECC, and CHR piping with a wall thickness less than 1/2 inch be volumetrically examined.

Safety Evaluation Confirmatory Item 7 required augmented ISI of welds in containment penetrations, or the break exclusion area.

Safety Evaluation Confirmatory Item 19 required demonstration of the adequacy of ultrasonic techniques used for examination of thick-wall centrifugally cast stainless steel piping. SSER 3 under this confirmatory item required selection of welds for Inservice Inspection such that those welds inspected have the best acoustic properties among all welds of this type.

2.4 Compliance with Requirements

2.4.1 Applicable Code Edition

NNECo has developed and implemented an Inservice Inspection Program using the 1983 Edition through Summer 1983 Addenda of Section XI, ASME Code subject to the limitations and modifications listed in Section 50.55a(b) of 10 CFR Part 50. The latest edition and addenda incorporated in 50.55a(b) on the date 12 months before the date of issuance of the operating license on January 31, 1986, was the 1980 Edition through Winter 1981 Addenda. The licensee notified NRC of its intent to update to the later Code edition in a letter dated April 27, 1986.(23) Under the terms of 50.55a(g)(4)(iv), ISI examinations may meet the requirements set forth in subsequent editions and addenda incorporated by reference in paragraph 50.55a(b) subject to Commission approval. The 1983 Edition through Summer 1983 Addenda was so incorporated in Federal Register Notice Vol. 50, No. 187, dated September 26, 1985. The NRC staff reviewed and accepted use of this Code edition for Millstone Unit 3 in a memorandum dated August 10, 1987.(24)

2.4.2 Code Requirements

The first interval program of record (exclusive of pump and valve testing) is contained in the submittal dated October 19, 1988.(22)

The program, including its attachments, was reviewed and determined to be acceptable. We have determined the following:

The Inservice Inspection Program for Millstone Unit 3 identifies appropriate Code classes for each component of the power plant.

The design of the Code Class 1 components of the reactor coolant pressure boundary in Millstone 3 incorporates provisions for access for inservice examination in accordance with Section XI of the ASME Code. Some design and access provisions could not be met and specific requests for relief were submitted and are evaluated in Section 3 of this report. SAIC's technical evaluation has not identified any practical method by which Millstone 3 can meet all the specific inservice inspection requirements of Section XI of the ASME Code. Thus, relief has been recommended where appropriate.

Examination instructions and procedures, including diagrams or system drawings identifying the extent of areas of components subject to examination, have been prepared. They are listed in the ISI program component tables, cross-referenced to weld and hanger isometrics and component identification drawings, and marked on pipe and instrument drawings (P&IDs).

Examinations and tests are to be performed and evaluated and the results recorded providing a basis for evaluation and comparison with the results of subsequent examinations as required by Code.

Visual, surface, and volumetric examinations are defined as specified by Code.

Exemptions from examination meet Code specifications IWB-1220, IWC-1220, and IWD-1220. Replacements are performed to IWA-7000.

The licensee stated in his letter dated October 19, 1988,(22) that the system pressure test program for Millstone 3 is in development and will be submitted to the NRC before the next refueling outage. Therefore, no conclusion can be made concerning the Code compliance of the pressure testing program at Millstone 3 as of the date of this report.

The licensee states in Section 1.4 of the ISI plan that examination scheduling will comply with IWA-2400, Program B. The examination listings provided in Section 5 of the ISI plan do not provide a breakdown by period. Therefore, no conclusion can be made concerning Code compliance of the examination scheduling program at Millstone 3 as of the date of this report.

Examination requirements, methods, acceptance standards, inspection intervals, deferrals, the selection of items to be examined, the number of items to be examined, and the examination fraction of each weld inspected meet the requirements of Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, and IWF-2500-2, or relief from Code as noted below has been requested and acceptable alternatives provided.

For licensees applying Editions through and including the 1983 Edition, Winter 1983 Addenda, 10 CFR 50.55a(b)(2)(iv)(A) requires examination of Class 2 piping welds in Residual Heat Removal (RHR) Systems, Emergency Core Cooling (ECC) Systems, and Containment Heat Removal (CHR) Systems in accordance with the requirements of paragraph IWC-1220, Table IWC-2520 Categories C-F and C-G, and paragraph IWC-2411 in the 1974 Edition and Addenda through the Summer 1975 Addenda of Section XI of the ASME Code. The licensee is not in compliance with this requirement. Rather, the licensee is performing examination of all Class 2 piping welds (including RHR, ECC, and CHR systems) in accordance with Code Case N-408. Use of Code Case N-408 results in a reduced number of welds inspected as compared with the 1974 Summer 1975 Code. In order to bring examination of RHR, ECC, and CHR systems into compliance, the licensee should do one of the following:

(1) use the 1974, Summer 1975 Code Edition for selection of welds examined in Class 2 RHR, ECC, and CHR systems as required by 10 CFR 50.55a(b)(2)(iv)(A), or

(2) per 10 CFR 50.55a(g)(4)(iv), the licensee should request permission to update inspection of all Class 2 piping welds to the 1983 Edition, Winter 1985 Addenda, or the 1986 Edition. In accordance with the latest update of 10 CFR 50.55a(b)(2)(iv)(A) in Federal Register Volume 53, No. 87, p. 16053, dated May 5, 1988, licensees applying these later Code Editions need not use the 1974 Summer 1975 Code for examination of RHR, ECC, and CHR Class 2 piping welds.

2.4.3 License Conditions

There are no license conditions related to ISI. However, there were one Outstanding Item and two Confirmatory Items in the Safety Evaluation Report related to ISI that have been resolved during the review of the PSI program.

Under Outstanding Item 12 in the SER,[5] the staff's main concerns were the lack of volumetric examinations planned on RHR, ECC, and CHR piping having a wall thickness of 1/2-inch or less and the absence of any volumetric examinations at all on the 4-inch nominal pipe size (NPS) HPSI system. The licensee responded to this Outstanding Item on December 13, 1984.[6]

RHR, ECC, and CHR systems contain approximately 1200 circumferential welds, of which about 200 have wall thickness of 1/2-inch or greater and were subject to both volumetric and surface examinations under ASME Code Section XI. The remaining 1000 welds have wall thickness less than 1/2-inch and were subject to surface examination only, according to the applicable Code. However, the licensee agreed to perform volumetric examinations on a 7.5 percent sample of these welds distributed among these three safety systems. The inspection did not include open-ended, dried-out, and vented portions of the quench spray system and recirculation spray system.

The licensee also agreed to perform volumetric and surface examination on a 7.5 percent sample of those portions of the HPSI system that are 4-inch NPS and a surface examination on a 7.5 percent sample of those portions of this system that are 3-inch NPS. These examinations are in excess of the requirements of the ASME Code.

In addition, because of the difficulties normally experienced when performing ultrasonic examination on thin-walled material, the licensee stated that it will develop a special non-Code examination procedure utilizing 70^0 longitudinal waves for these inspections. In SSER 2,[5] the staff found these commitments acceptable and considered the open item resolved.

Under Confirmatory Item 7, the staff required augmented inservice inspection for those portions of piping within the break exclusion region. The licensee committed to perform these inspections in a letter dated September 30, 1985.[5]

Confirmatory Item 19 required demonstration of ultrasonic examination techniques used on thick-wall centrifugally cast stainless steel piping. Site demonstrations were performed November 19, 1984, and June 6, 1985. The NRC requested additional information to complete its review on March 7, 1985. The licensee responded by letters dated May 7, 1985,[11] July 1, 1985,[12] and July 2, 1985.[13] The NRC reviewed and approved the examination techniques and calibration blocks in SSER 3.[5] In addition, this supplement required selection of welds for inservice inspection such that those welds inspected have the best acoustical properties among all welds of this type.

2.5 Conclusions and Recommendations

Based on the foregoing, we have determined that the ISI program proposed by Northeast Nuclear Energy Company for Millstone Unit 3 for the first 120-month inspection interval meets the applicable Code with three exceptions detailed below.

There are two requirements for which the licensee has not provided sufficient information to perform a complete review. First, the program for hydrostatic testing of Class 1, 2, and 3 pressure boundaries is in development, and the licensee has committed to provide documentation by the start of the next refueling outage. Second, insufficient information has been provided in the ISI plan to determine the method of compliance with examination scheduling requirements of IWB-2412-1 and IWC-2412-1.

Thirdly, the licensee is not in compliance with 10 CFR 50.55a(b)(2)(iv)(A), examination of Class 2 piping welds in RHR, ECC, and CHR welds in accordance with the 1974 Summer 1975 Code Edition. The licensee should do one of the following:

(1) use the 1974 Summer 1975 Code Edition for selection of welds examined in Class 2 RHR, ECC, and CHR systems as required by 10 CFR 50.55a(b)(2)(iv)(A)

(2) per 10 CFR 50.55a(g)(4)(iv), the licensee should request permission to update examination of all Class 2 piping welds to the 1983 Edition, Winter 1985 Addenda, or the 1986 Edition.

Therefore, Millstone 3 meets the requirements of the 1983 Edition through Summer 1983 Addenda of Section XI, except that a conclusion cannot be made concerning compliance with hydrostatic testing and examination scheduling requirements at this time, and that examination of Class 2 RHR, ECC, and CHR systems are not currently in compliance.

Specific requests for relief are addressed in the following section.

3. REQUESTS FOR RELIEF FROM ASME CODE SECTION XI EXAMINATION REQUIREMENTS

The licensee requested relief from specific inservice requirements for Millstone Unit 3 in the Inservice Inspection program submitted May 22, 1986,[17] as revised by letter dated October 19, 1988.[22] Eleven relief requests have been identified that require review. The following sections evaluate these pending relief requests.

Where relief is recommended in the following report section, it is done so on the assumption that the proposed alternative examination and all applicable Code examinations for which relief has not been requested will be performed on the subject component. Where additional examinations beyond proposed alternatives and Code requirements are deemed necessary, these are included as conditions for recommending relief.

The material included in the paragraphs titled Code Relief Request, Proposed Alternative Examination, and Licensee's Basis for Requesting Relief is quoted directly from the relief request except for minor editorial changes such as removing references to figures and tables not included in this report.

3.1 CLASS 1 COMPONENTS

3.1.1 Reactor Vessel

3.1.1.1 Relief Request IR-1, Pressure Retaining Welds in the Reactor Pressure Vessel, Category B-A, Items B1.12, B1.21, and B1.22

Code Requirement

Item B1.12 All pressure-retaining longitudinal welds in the beltline region of the reactor pressure vessel shall be volumetrically examined in accordance with Figure IWB-2500-2 over essentially 100% of their lengths during the first inspection interval. Examinations may be performed at or near the end of the interval.

Items B1.21 and B1.22 All pressure-retaining circumferential and meridional head welds in the reactor vessel bottom head shall be volumetrically examined in accordance with Figure IWB-2500-3 over the accessible portion up to 100% of the weld length during the first inspection interval. The bottom head welds may be examined at or near the end of the interval.

Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested from performing the inservice volumetric examination of the inaccessible portion of the subject vessel welds.

Proposed Alternative Examination

A. The subject welds will receive a volumetric examination on the accessible portions in accordance with Section XI (IWB-2500-1).

B. An inservice hydrostatic test will be conducted on the Class 1 pressure boundary of which these welds are part thereof (IWB-2500-1).

C. Inservice system leakage tests will be performed per Category B-P, IWB-2500-1.

Licensee's Basis for Requesting Relief

Geometric configuration and permanent obstructions affected the subject welds from performing a 100% volumetric examination.

The subject welds received both volumetric examination by radiography and surface examination during fabrication, in accordance with ASME Section III requirements which provide adequate assurance of the structural integrity of the welds.

Evaluation

The licensee has provided as an attachment to relief request IR-1 a matrix and drawings detailing the limitations encountered and estimating the percentage of examinations that can be completed for each weld in the reactor pressure vessel.

For the longitudinal welds, the licensee has given the limitation as nozzle geometry in the upper shell. There are no limitations to examination of longitudinal welds in the intermediate or lower shell, which are adjacent to the core and subject to radiation embrittlement. Since Millstone 3 is a four-loop Westinghouse PWR, there are eight nozzles in the upper shell. The licensee has estimated that 37% of longitudinal Weld 6 and 47% of longitudinal Welds 7 and 8 receive meaningful four-directional examination. The proposed alternative examination of an ultrasonic examination on the accessible portion will provide adequate assurance of structural integrity, along with the Code-required hydrostatic and system pressure tests.

For the lower head welds, the licensee has estimated 95% coverage of the Torus-to-Dollar plate weld, 98% coverage of three of the meridional welds, and 93% coverage of the fourth meridional weld using manual techniques. The limitations encountered are caused by instrument tubes and weld configuration. The Code acknowledges that accessibility may be limited with respect to volumetric examination of head welds. It is concluded that the proposed manual examination provides essentially 100% coverage, and that Code requirements are being met.

Therefore, relief is not required for the reactor vessel bottom head welds.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that

(a) For the reactor vessel upper shell longitudinal we the Code requirements are impractical. It is furt concluded that the proposed ultrasonic examinatior maximum extent practical, along with the Code-requ hydrostatic and system pressure tests, will provid necessary assurance of structural reliability. Th fore, relief is recommended as requested.

(b) For the reactor vessel bottom head welds, the prop examination meets the intent of the Code requireme Therefore, relief is not required for these welds.

References

References 17 and 22.

1. Weld No. 101-101 Head to Flange Weld

Access to this weld is limited to essentially one side only due to the forged flange configuration. Additional limitations from the top side of the weld are due to permanently attached head lifting lugs. Required volume not examinable: ~38%

2. Weld No. 103-101 Circumferential Head Weld

Permanently attached head lifting lugs prevent volumetric examination of ~7% of the WRV.

3. Weld No. 101-104D Meridional Head Weld

A 2.7-inch-diameter repair area (surface concavity) on the weld centerline prohibited sufficient coverage of the WRV in that area. Required volume not examinable: ~2%

The subject welds received both volumetric examination by radiography and surface examinations during fabrication in accordance with ASME Section III requirements which provide adequate assurance of the structural integrity of the welds.

Evaluation

For the head circumferential and meridional welds, a small percentage of the Code-required examination is rendered impractical by lifting lugs and a small repair area. The Code acknowledges that accessibility may be limited with respect to volumetric examination of head welds. Since the lugs and small repair area are the only obstructions to 100% examination, the intent of the Code of examining essentially 100% of the weld has been fulfilled.

For the reactor vessel head-to-flange weld, significant obstructions exist due to configuration and lifting lugs. The licensee has estimated that 62% of the Code-required examination can be completed. The licensee has not provided an estimate of the percentage of Code-required surface examination of this weld that can be completed. However, the limited Section XI ultrasonic examination, along with the Code-required surface and hydrostatic and system pressure tests, will provide necessary assurance of structural reliability.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that

(a) For the reactor vessel head circumferential and meridional welds, the proposed examination meets the intent of the Code requirements. Therefore, relief is not required for these welds.

(b) For the reactor vessel head-to-flange weld, the Code requirements are impractical. It is further concluded that the proposed ultrasonic examination to the maximum extent practical, along with the Code-required surface examination to the extent practical and hydrostatic and system pressure tests, will provide necessary assurance of structural reliability. Therefore, relief is recommended as requested.

References

References 17 and 22.

3.1.1.3 Relief Request IR-1, Reactor Vessel Nozzle-to-Vessel Welds and Nozzle Inside Radius Sections, Category B-D, Items B3.90 and B3.100

Code Requirement

All nozzle-to-vessel welds and inside radius sections in the reactor vessel shall be volumetrically examined in accordance with Figures IWB-2500-7(a) through (d) during the first interval of operation. Examinations shall include nozzles with full penetration welds to vessel shell (or head) and integrally cast nozzles, but exclude manways and handholes either welded to or integrally cast in vessel. At least 25% but not more than 50% (credited) of the nozzles shall be examined by the end of the first inspection period and the remainder by the end of the inspection interval. If examinations are conducted from inside the component and the nozzle weld is examined by straight beam ultrasonic method from the nozzle bore, the remaining examinations required to be conducted from the shell may be performed at or near the end of each inspection interval.

Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested from performing the inservice volumetric examination of the inaccessible portion of the subject vessel welds.

Proposed Alternative Examination

A. The subject welds will receive a volumetric examination on the accessible portions in accordance with Section XI (IWB-2500-1).

B. An inservice hydrostatic test will be conducted on the Class 1 pressure boundary of which these welds are a part thereof (IWB-2500-1).

C. Inservice system leakage tests will be performed per Category B-P, IWB-2500-1.

Licensee's Basis for Requesting Relief

Geometric configuration and permanent obstructions affected the subject welds from performing a 100% volumetric examination.

The subject welds received both volumetric examination by radiography and surface examinations during fabrication, in accordance with ASME Section III requirements which provide adequate assurance of the structural integrity of the welds.

Evaluation

For the nozzle-to-vessel welds, the licensee has estimated that 30% of the required volume for the outlet nozzles and 15% of the required volume for the inlet nozzles is not examinable. The basis given for the impracticality is nozzle radius configuration. A minimum of 70% of the code-required volume will be examined. This limited examination, along with hydrostatic and system pressure tests will provide necessary assurance of structural reliability.

For the nozzle inside radius examination, the licensee has committed in relief request IR-1 to attempt to perform the examination on a best-effort basis, and if the examination is found to be impractical, to request relief at that time. Therefore, relief should be delayed at this time pending the licensee's further review of this examination.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that

(a) For the nozzle-to-vessel weld discussed above, the Code requirements are impractical. It is further concluded that the proposed alternative examination will provide adequate assurance of structural reliability. Therefore, relief is recommended as requested.

(b) For the nozzle inside radius examination discussed above, there is not sufficient justification for declaring the Code requirements impractical at this time. The licensee should attempt the examination and request relief at that time, if required.

References

References 17 and 22.

3.1.2 Vessels Other Than Reactor Vessel

3.1.2.1 Relief Request IR-3, Pressure Retaining Welds in the Pressurizer, Category B-B, Item B2.11

Code Requirement

All circumferential shell-to-head welds in the pressurizer as shown in Figure IWB-2500-20(a) shall be volumetrically examined in accordance with Figure IWB-2500-1 over essentially 100% of their length during the first inspection interval.

Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested from performing the inservice volumetric examination of the inaccessible portions of the subject vessel welds.

Proposed Alternative Examination

A. The subject welds will receive a volumetric examination on the accessible areas in accordance with Section XI (IWB-2500-1).

B. A Section III hydrostatic test will be conducted on the Class I pressure boundary of which these welds are a part thereof (IWB-2500-1).

C. Inservice system leakage tests will be performed per Category B-P, IWB-2500-1.

Licensee's Basis for Requesting Relief

Geometric configuration and permanent obstructions limited the volumetric examination of the following listed welds. Examination data sheets and limitation sketches depict the affected areas. Relief is therefore requested on complying with the 100% WRV coverage of the welds.

Pressurizer

1. 03-007-SW-J: Shell-to-Upper Head Weld

   Permanently installed insulation support ring obstructed part of the required scanning area. Required volume not examinable: ~9%

2. 03-007-SW-F: Shell-to-Lower-Head Weld

Permanent obstructions (alignment target pads and instrumentation lines) and the geometric configuration--weld transition between plate thickness variations prohibited complete coverage. Required volume not examinable: ~30%

Evaluation

Geometric configuration and permanent obstructions prevent 100% volumetric examination of the subject welds. The licensee has provided percentages of examinations rendered impractical. Examination data sheets and sketches have been provided that detail the impracticality of performing the required examinations. In all cases, at least 70% of the Code-required volume will be examined. This examination, to the maximum extent practical, along with the Code-required hydrostatic and system pressure tests, will provide necessary assurance of structural reliability.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above the Code requirements are impractical. It is further concluded that the proposed alternative examination, along with the Code-required hydrostatic and system pressure tests, will provide necessary assurance of structural reliability.

References

References 17 and 22.

3.1.2.2 Relief Request IR-8, Full Penetration Nozzle-to-Vessel Welds in the Pressurizer and Steam Generators, Category B-D, Items B3.110 and B3.130

Code Requirement

All nozzle-to-vessel welds in the primary side of the steam generator and pressurizer shall be volumetrically examined in accordance with Figures IWB-2500-7(a) through (d) during the first interval of operation. Examinations shall include nozzles with full penetration welds to vessel shell (or head) and integrally cast nozzles, but exclude manways and handholes either welded to or integrally cast in vessel. At least 25% but not more than 50% (credited) of the nozzles shall be examined by the end of the first inspection period and the remainder by the end of the inspection interval.

Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested from performing the inservice volumetric examination on the inaccessible portions of the nozzle-to-shell welds of the steam generator and pressurizer.

Proposed Alternative Examination

1. Volumetric examination on the accessible portions will be performed as required by ASME Section XI (IWB-2500). Any advances in UT technology will be evaluated to determine its application for achieving maximum volume coverage and results.

2. A system hydrostatic test will be performed once each inspection interval as required by Table IWB-2500-1, Category B-P.

3. An inservice system leakage test will be performed once each refueling outage per Category B-P, IWB-2500-1.

Licensee's Basis for Requesting Relief

Geometric configuration of the below listed nozzle-to-shell welds and their close proximity to one another limits the volume that can be examined. Scanning is limited to one side only with a 1/2-V technique. Axial scan is restricted due to the close proximity of the welds to each other.

Pressurizer

1. 03-007-SW-A
2. 03-007-SW-B
3. 03-007-SW-C
4. 03-007-SW-D
5. 03-007-SW-E (Spray Nozzle)
6. 03-007-SW-S (Surge Nozzle)

Approximately 80% of the weld required volume (WRV) received an examination from one direction. Approximately 30% of the WRV was covered in two directions.

Steam Generators

Coverage is from both sides of weld with 1/2-V technique. Restriction on axial scan due to the steam generator supports integral extensions.

03-003-SW-V Inlet	03-005-SW-V Inlet
03-003-SW-LL Outlet	03-005-SW-LL Outlet
03-004-SW-V Inlet	03-006-SW-V Inlet
03-004-SW-LL Outlet	03-006-SW-LL Outlet

Required volume not examinable: ~10%

Evaluation

It is agreed that the limitations noted by the licensee could limit the examinations performed on these welds. Sketches have been provided which detail the impracticality of performing the required examinations. As indicated in a letter submitted December 1, 1988,[25] the subject nozzles have been analyzed for thermal fatigue mechanisms. The licensee has evaluated all available ultrasonic testing techniques and has found them to be impractical for performing these examinations. The licensee has additionally agreed to keep up with and use the most up-to-date ultrasonic technology available for these examinations. The proposed examination to the maximum extent practical, along with the Code-required hydrostatic and system pressure tests, provide necessary assurance of structural reliability for this interval.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the proposed alternative examination, along with the Code-required hydrostatic and system pressure tests, will provide necessary assurance of structural reliability. Therefore, relief is recommended as requested.

References

References 17, 22, and 25.

3.1.3 Piping Pressure Boundary

3.1.3.1 Relief Request IR-9, Pressure Retaining Welds and Dissimilar Metal Welds in Class 1 Piping, Categories B-J and B-F, Items B9.11 and B5.10

Code Requirements

Item B9.11. For circumferential welds and intersecting longitudinal welds in pipe of nominal pipe size 4 in. and greater, surface plus volumetric examinations shall be performed in accordance with Figure IWB-2500-8 over essentially 100% of the weld length during each inspection interval. The examinations shall include the following:

(a) All terminal ends in each pipe or branch run connected to vessels.

(b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed the following limits under loads associated with specific seismic events and operational conditions.

(1) primary plus secondary stress intensity of $2.4S_m$ for ferritic steel and austenitic steel, and

(2) cumulative usage factor U of 0.4.

(c) All dissimilar metal welds between combinations of

(a) carbon or low allow steels to high alloy steels;
(b) carbon or low alloy steels to high nickel alloys; and
(c) high alloy steels to high nickel alloys.

(d) Additional piping welds so that the total number of circumferential butt welds selected for examination equals 25% of the circumferential butt welds in the reactor coolant piping system. This total does not include welds excluded by IWB-1220. These additional welds may be located in one loop (one loop is currently defined for both PWR and BWR plants in the 1977 Edition).

For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need be examined for transverse reflectors.

Item B5.10. All nozzle-to-safe end butt welds in nominal pipe size 4 in. and greater in the reactor vessel shall be surface and volumetrically examined in accordance with Figure IWB-2500-8 during the first inspection interval. The examinations may be performed

coincident with the vessel nozzle examinations required by Examination Category B-D. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steels, (b) carbon or low alloy steels to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

Code Relief Request

Pursuant to 10CFR50.55a(g)(5)(iii), relief is requested from performing the inservice surface examination of the nozzle-to-safe end and safe-end to pipe butt welds greater than 4-inch NPS on the reactor vessel.

Proposed Alternative Examination

(a) The subject welds will receive a full volume volumetric examination from the ID surface in accordance with ASME Section XI and Section IWA-2240. This will include a 45-degree refracted longitudinal wave examination for the bottom 2/3 volume (from the ID surface). The near surface (ID) and upper 1/3 volume will be examined with a 65-degree refracted longitudinal wave examination.

(b) The OD surfaces shall be visually examined during the reactor coolant system hydrostatic test, in accordance with Category B-P, Table IWB-2500-1.

(c) Inservice system leakage tests will be performed per Category B-P, IWB-2500-1.

Licensee's Basis for Requesting Relief

The Millstone Unit 3 reactor vessel is a four-loop PWR. There are eight nozzle-to-safe ends and eight safe-end to pipe butt welds for Items B5.10 and B9.11 in the inservice inspection program. The purpose of this relief is to perform a full volumetric ultrasonic examination in lieu of a surface examination in order to reduce exposure.

The ultrasonic examination of these welds will be performed from the ID surface using the remote immersion method. NNECO believes that any failure of the weld will be induced from the ID surface and that the ultrasonic examination from this surface shall be sufficient to detect any indications.

NNECO believes that the proposed ultrasonic examination is adequate to detect flaws in the listed items. NNECO believes that the ultrasonic examination will assist in reducing the exposure rates, without losing the ability to detect flaws in the reactor vessel nozzle-to-safe end and safe-end to pipe welds.

Evaluation

The licensee has proposed to eliminate the surface examination but expand the required volumetric examination to cover 100% of the weld. This expanded volume would cover the cross-section bounded by ACFEDB shown in Figure IWB-2500-8 of the 1983 Edition, Summer 1983 Addenda, and the examination would be conducted from the inside diameter. This alternative volumetric examination from the inside diameter is not, however, sufficient in itself to provide the degree of assurance necessary that outside diameter (OD) flaws will be detected. The increase in safety achieved by performing the required surface examination, or an equivalent alternative, outweighs the impracticalities cited by the licensee.

The licensee should either (1) demonstrate by the next refueling outage that OD flaws can be detected using the proposed alternative volumetric examination or (2) perform the surface examination as required during the next refueling outage. If the licensee chooses the first option, he should clearly demonstrate that the actual procedure and instrument that would be used in the examination would detect OD flaws in the existing configuration. Relief from the surface examination should be granted for the subject welds only if either of the conditions above is met.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that interim relief should be granted but only if the licensee meets either of the following conditions:

(a) Demonstrates by the next refueling outage that the actual procedure and instrument used in the proposed examination would detect OD flaws in the existing configuration.

(b) Performs the surface examination requirement during the next refueling outage.

References

Reference 22.

3.1.3.2 Relief Request IR-10, Centrifugally Cast Stainless Steel (CCSS) Component-to Fitting Welds, Category B-J, Item B9.11

Code Requirement

For circumferential welds and intersecting longitudinal welds in pipe of nominal pipe size 4 in. and greater, surface plus volumetric examinations shall be performed in accordance with Figure IWB-2500-8 over essentially 100% of the weld length during each inspection interval. The examinations shall include the following:

(a) All terminal ends in each pipe or branch run connected to vessels.

(b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed the following limits under loads associated with specific seismic events and operational conditions.

(1) primary plus secondary stress intensity of $2.4S_m$ for ferritic steel and austenitic steel, and

(2) cumulative usage factor U of 0.4.

(c) All dissimilar metal welds between combinations of

(a) carbon or low allow steels to high alloy steels;
(b) carbon or low alloy steels to high nickel alloys, and
(c) high alloy steels to high nickel alloys.

(d) Additional piping welds so that the total number of circumferential butt welds selected for examination equals 25% of the circumferential butt welds in the reactor coolant piping system. This total does not include welds excluded by IWB-1220. These additional welds may be located in one loop (one loop is currently defined for both PWR and BWR plants in the 1977 Edition).

For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need be examined for transverse reflectors.

Code Relief Request

Pursuant to 10CFR50.55(a)(g)(5)(iii), relief is requested from performing the inservice volumetric examination of the inaccessible portions of welds LP4-EC-2-SW-B, RCS-20-FW-37, RCS-20-FW-38, and RCS-20-FW-39.

Proposed Alternative Examination

(a) Volumetric and surface examinations on the accessible portions will be performed as required by ASME Section XI, IWB-2500.

(b) An inservice hydrostatic test will be conducted on the Class 1 pressure boundary, of which these welds are a part thereof, per IWB-2500-1 requirements.

(c) Inservice system leakage tests were performed per Category B-P, IWB-2500-1.

Licensee's Basis for Requesting Relief

Geometric configuration or permanent obstructions prohibit 100% volumetric examination coverage of the Code required examination volume. Relief is therefore requested from performing inservice examination on the inaccessible portions of the volume required.

A 0-degree longitudinal beam examination was conducted on all CCSS welds, during preservice inspection, to map ID geometry contours. This was done in addition to Section XI requirements to aid in the performance and evaluation of angle beam examination results.

Evaluation

The four welds for which relief is requested are in reactor coolant loop 4 and are shown on drawing number 25212-20913. Along with Relief Request IR-10, the licensee provided a table indicating the weld identification numbers for the four welds for which relief is requested, detailing the impracticality and indicating the estimated percentage of the Code volumetric examination that can be completed. Between 75% and 93% of the Code-required volume can be examined using a 45 degree examination angle and a 1/2 V axial and circumferential technique. The proposed limited ultrasonic examination, along with the required surface examination and the hydrostatic and system pressure tests, will provide necessary assurance of structural reliability.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that the Code requirements are impractical. It is further concluded that the

proposed alternative examination, along with the Code required surface examination and hydrostatic and system pressure tests, will provide necessary assurance of structural reliability. Therefore, relief is recommended as requested.

References

Reference 22.

3.1.3.3 Relief Request IR-11, Pressure Retaining Weld in Class 1 Piping, Category B-J, Item B9.11

Code Requirement

For circumferential and intersecting longitudinal welds in pipe of nominal pipe size 4 in. and greater, surface plus volumetric examinations shall be performed in accordance with Figure IWB-2500-8 over essentially 100% of the weld length during each inspection interval. The examination shall include the following:

(a) All terminal ends in each pipe or branch run connected to vessels.

(b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed the following limits under loads associated with specific seismic events and operational conditions.

(1) primary plus secondary stress intensity of $2.4S_m$ for ferritic steel and austenitic steel, and

(2) cumulative usage factor U of 0.4.

(c) All dissimilar metal welds between combinations of

(1) carbon or low allow steels to high alloy steels;
(2) carbon or low alloy steels to high nickel alloys; and
(3) high alloy steels to high nickel alloys.

(d) Additional piping welds so that the total number of circumferential butt welds selected for examination equals 25% of the circumferential butt welds in the reactor coolant piping system. This total does not include welds excluded by IWB-1220. These additional welds may be located in one loop (one loop is currently defined for both PWR and BWR plants in the 1977 Edition).

For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need be examined for transverse reflectors.

Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested from performing the inservice volumetric examination of the inaccessible portion of one 8-in. Class 1 piping weld, SIL-6-6-SW-B.

Proposed Alternative Examination

A. The subject weld will receive both a volumetric and surface examination on the accessible portions inservice in accordance with ASME Section XI (IWB-2500-1).

B. An inservice hydrostatic test will be conducted successfully on the Class 1 Preservice Boundary, of which this weld is a part thereof, per IWB-2500-1 requirements.

C. Inservice System Leakage Tests will be performed per Category B-P, IWB-2500. Any advances in UT technology will be evaluated to determine its application for achieving maximum volume coverage and results.

Licensee's Basis for Requesting Relief

Permanent structural interferences prohibit 100% volumetric examination coverage of the Code Required Volume (CRV). Relief is therefore requested from performing inservice examinations on the inaccessible portions of the volume required. The subject weld received both volumetric examination by radiography and surface examinations during fabrication in accordance with ASME Section III requirements. Having met these requirements, adequate assurance of the structural integrity of the subject weld is provided.

Evaluation

Along with Relief Request IR-11 in the October 19, 1988,(22) submittal, the licensee provided a table which indicates the weld identification number for the weld for which relief is requested, details the structural interference, and indicates the estimated percentage of the Code volumetric examination that can be completed. The licensee has estimated that 90.5% of the Code-required volume can be examined using 45-degree examination angle with the 3/2 Vee shear technique. The proposed limited ultrasonic examination, along with the required surface examination to the maximum extent practical and the hydrostatic and system pressure tests, will provide necessary assurance of structural reliability.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that the Code requirements are impractical. It is further concluded that the proposed alternative examination, along with the Code-required

surface examination and hydrostatic and system pressure tests, will provide necessary assurance of structural reliability. Therefore, relief is recommended as requested.

References

References 17 and 22.

3.1.4 Pump and Valve Pressure Boundary

3.1.4.1 Relief Request IR-4, Internal Surfaces of Pump Casings and Valve Bodies, Categories B-L-2 and B-M-2, Items B12.20 and B12.40

Code Requirement

Item B12.20

The internal surfaces of at least one pump in each group of pumps performing similar functions in the system (e.g., recirculating coolant pumps) shall be visually examined (VT-3) during each inspection interval. The examination may be performed on the same pump selected for volumetric examination of welds. The examinations may be performed at or near the end of the inspection interval.

Item B12.40

The internal surfaces of at least one valve in each group of valves with the same construction design (e.g., globe, gate, or check valve) and manufacturing method that perform similar functions that exceed 4-in. diameter in the system (e.g., containment isolation and system overpressure protection) shall be visually examined (VT-3) during each inspection interval. The examination may be performed on the same valve selected for volumetric examination of welds. The examinations may be performed at or near the end of the inspection interval.

Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested from performing an inservice visual examination (VT-3) on the pumps and valves listed in relief request IR-4.

Proposed Alternative Examination

Class 1 pumps and valves will receive a visual examination (VT-3) when they are disassembled for maintenance or purposes other than ISI.

Licensee's Basis for Requesting Relief

For the reactor coolant pump casings and 35 valve bodies in the reactor coolant, pressurizer, safety injection, and residual heat removal systems, relief is requested from disassembly of an operable valve or pump for the performance of an inservice visual examination (VT-3).

The requirement to disassemble an operable valve or pump for the sole purpose of performing a visual examination (VT-3) of the internal pressure-retaining boundary is impractical and not commensurate with the increased safety achieved by this inspection. To disassemble these items would provide a very small potential for increasing plant safety margins with a disproportionate impact on expenditures of plant manpower and resources.

Class 1 valves and pumps are subjected to numerous types of nondestructive testing in accordance with ASME Section III and a rigorous quality assurance program during all stages of fabrication, storage, and installation. These valves and pumps have been found acceptable by the manufacturer, the ASME Authorized Nuclear Inspector, and Northeast Utilities' Quality Assurance.

Evaluation

The visual examination is to determine whether unanticipated severe degradation of the casing is occurring due to phenomena such as erosion, corrosion, or cracking. However, previous experience during examinations of pumps at other plants has not shown any significant degradation of casings.

Disassembly of large valves to the degree necessary to examine the internal pressure-retaining surfaces is a major effort, which may involve large personnel exposures. To do this disassembly solely to perform a visual examination of the internal body is impractical.

A list of all Class 1 pumps and valves has been provided with relief request IR-4. Although not all are required to be inspected, a significant number do require disassembly and inspection. The licensee has committed to the concept of visual examination if the pump or valve is disassembled for maintenance. The visual examination specified is to determine whether anticipated severe degradation of the body is occurring due to phenomena such as erosion or corrosion.

The alternate tests proposed by the licensee, along with visual examination for leakage during system pressure tests under Category B-P and periodic testing of pumps and valves in accordance with IWP and IWV, will provide an adequate level of safety.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the examinations discussed above, the Code requirements are impractical. It is further concluded that the proposed examinations, along with the Code-required hydrostatic and system pressure tests and pump and valve testing required by IWP and IWV, will provide necessary assurance of structural reliability. Therefore, relief is recommended as requested.

References

References 17 and 22.

3.2 CLASS 2 COMPONENTS

3.2.1 Pressure Vessels and Heat Exchangers

3.2.1.1 Relief Request IR-14, Shell-to-Flange Weld in the Residual Heat Exchanger, Category C-A, Item C1.10

Code Requirement

Essentially 100% of the shell circumferential welds at gross structural discontinuities shall be volumetrically examined in accordance with Figure IWC-2500-1 during each inspection interval. A gross structural discontinuity is defined in NB-3213.2. Examples are junctions between shells of different thicknesses, cylindrical shell-to-conical shell junctions, and shell- (or head)-to-flange welds, and head-to-shell welds. For multiple vessels with similar design, size, and service (such as steam generators and heat exchangers), the required examinations may be limited to one vessel or distributed among the vessels.

Code Relief Request

Pursuant to 10CFR50.50(a)(g)(5)(iii), relief is requested from performing the inservice volumetric examination of the inaccessible portion of the subject vessel weld.

Proposed Alternative Examination

(a) The subject weld will receive a volumetric examination on the accessible portion in accordance with Section XI (IWC-2500-1).

(b) The inaccessible area of the subject weld is accessible to a surface examination and will receive a liquid penetrant examination in accordance with Section XI, IWC-2500-1.

(c) An inservice hydrostatic test will be conducted on the Class 2 pressure boundary of which these welds are a part thereof (IWC-2500-1).

(d) Inservice system leakage tests will be performed per Category C-H, IWC-2500-1.

Licensee's Basis for Requesting Relief

Geometric configuration and permanent obstructions affected the referenced weld from performing a 100% volumetric examination.

The subject weld received both volumetric examination by radiography and surface examinations during fabrication, in accordance with ASME Section III requirements which provide adequate assurance of the structural integrity of the welds.

Evaluation

As shown on a sketch provided with Relief Request IR-14, pipe-to-vessel weld reinforcing saddle plates adjacent to the shell-to-flange weld restrict ultrasonic examination on 25-1/2 inches of the required length. The licensee has proposed to perform an ultrasonic examination on the accessible portion of the weld along with a surface examination on that portion not accessible to ultrasonic examination. The proposed alternative examination, along with the Code-required hydrostatic and system pressure tests, will provide necessary assurance of structural reliability.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the shell-to-flange weld discussed above, the Code requirements are impractical. It is further concluded that the proposed alternative examination will provide necessary assurance of structural reliability. Therefore, relief is recommended as requested.

References

Reference 22.

3.2.1.2 Relief Request IR-7, Full Penetration Nozzle-to-Vessel Welds in the Secondary Side of the Steam Generators, Category C-B, Item C2.21

Code Requirements

The nozzle-to-shell (or head) welds of all nozzles in vessels over 1/2 in. in nominal thickness at terminal ends of piping runs shall be surface and volumetrically examined in accordance with Figure IWC-2500-4(a) or (b) during each inspection interval. Terminal ends include nozzles welded to or integrally cast in vessels that connect to piping runs (manways and handholes are excluded). Only those piping runs selected for examination under Examination Category C-F are included.

Code Relief Request

Pursuant to 10CFR50.55a(g)(5)(iii), relief is requested from performing the inservice volumetric and surface examination and surface examination of the inaccessible portions of the subject vessel welds.

Proposed Alternative Examination

(a) The subject welds will receive a volumetric and surface examination on the accessible areas in accordance with Section XI (IWC-2500-1).

(b) A hydrostatic test will be conducted on the Class 2 pressure boundary, per Category C-H, of which these welds are part thereof (IWC-2500-1).

(c) Inservice system leakage tests will be performed per Category C-H, IWC-2500-1.

Licensee's Basis for Requesting Relief

Permanent obstructions limited the volumetric and surface examination of the following listed welds. Examination data sheets and limitation sketches depict the affected areas. Relief is therefore requested on complying with the 100% WRV coverage of the welds.

Steam Generators:

Weld	Examination	Required Volume Not Examinable
03-003-SW-R S/G A	UT	12%
	MT	19%
03-003-SW-T S/G A	UT	16%
	MT	0%

Permanent obstructions--permanent mounted insulation supports for the subject generator restricted scans.

Evaluation

It is agreed that the limitations noted by the licensee could limit the examinations performed on these welds. Sketches have been provided that detail the impracticality of performing the required examinations. The licensee has evaluated all available ultrasonic testing techniques and has found them to be impractical for performing these examinations. The licensee has additionally agreed to keep up with and use the most up-to-date ultrasonic technology available for these examinations. The proposed examination to the maximum extent practical, along with the Code-required hydrostatic and system pressure tests, provide necessary assurance of structural reliability for this interval.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the proposed alternative examination, along with the Code-required hydrostatic and system pressure tests, will provide necessary assurance of structural reliability. Therefore, relief is recommended as requested.

References

Reference 22.

3.2.2 Piping Pressure Boundary

3.2.2.1 Relief Request IR-13, Integrally Welded Attachments for Piping, Category C-C, Item C3.20

Code Requirements

The weld joints for integrally welded attachments to piping shall be surface examined over essentially 100% of their lengths in accordance with Figure IWC-2500-5 during the first interval. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 3/4-inch or greater; and (d) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component. Examinations are also limited to attachments of those components required to be examined under Examination Categories C-F and C-G.

Code Relief Request

Pursuant to 10CFR50.55a(g)(5)(iii), relief is requested from performing the surface examination of the inaccessible portions of the subject weld.

Proposed Alternative Examination

(a) The subject welds will receive a surface examination on the accessible portions in accordance with Section XI (IWC-2500-1).

(b) An inservice hydrostatic test will be conducted on the Class 2 pressure boundary of which these welds are part thereof (IWC-2500-1).

(c) Inservice system leakage tests will be performed per Category C-H, IWC-2500-1.

Licensee's Basis for Requesting Relief

Permanent obstruction limited the surface examination of the above listed weld. The examination data sheet depicts the affected areas. Relief is therefore requested on complying with the 100% weld required volume (WRV) coverage of this weld.

Weld No. 3-SIL-4-PSR 040:

Access to this weld allowed examination of essentially 100% of the weld volume. The heat affected zone for each welded attachment was partially inaccessible due to the snug fit of the pipe clamp about the pipe.

Evaluation

Weld No. 3-SIL-4-PSR 040 consists of eight pipe lugs that fit snug against a pipe clamp as shown on Drawing No. 25212-20865. Three of the four sides of the pipe lugs are accessible for surface examination, the side against the pipe clamp being not accessible.

The licensee calls the clamp a "permanent obstruction" in his basis for requesting relief; it is therefore assumed that the pipe clamp cannot be removed without great difficulty. Surface examination of three of the four sides of the subject lug-to-pipe welds would detect a service induced crack before failure occurred. Therefore, relief is recommended as requested.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the integrally welded attachments discussed above, the Code requirements are impractical. It is further concluded that the proposed alternative examination will provide necessary assurance of structural reliability. Therefore, relief is recommended as requested.

References

Reference 22.

3.2.3 Pump Pressure Boundary

No relief requests.

3.2.4 Valve Pressure Boundary

No relief requests.

3.3 CLASS 3 COMPONENTS

No relief requests.

3.4 COMPONENT SUPPORTS

No relief requests.

3.5 PRESSURE TESTS

No relief requests.

3.6 GENERAL

No relief requests.

4. REFERENCES

1. NNECo to NRC, June 1, 1983; preservice inspection program.

2. NNECo to NRC, March 20, 1984; preservice inspection program, Revision 2.

3. J. F. Opeka (NNECo) to B. J. Youngblood (N November 19, 1985; proposed requests for relief from preservi inspection.

4. J. F. Opeka (NNECo) to V. S. Noonan (NRC), December 23, 1985; formal submittal of requests for relief from preservice inspection.

5. U.S. Nuclear Regulatory Commission, Safety Evaluation Report Related to the Operation of Millstone Nuclear Power Station, Unit No. 3, NUREG-1031, July 1984; Supplement 2, September 1985; Supplement 3, November 1985; Supplement 4, November 1985; Supplement 5, January 1986.

6. B. J. Youngblood (NRC) to W. G. Counsil (NNECo), January 16, 1984; request for additional information.

7. W. G. Counsil (NNECo) to B. J. Youngblood (NRC), May 1, 1984; response to request for information concerning recording and investigation of crack indications.

8. W. G. Counsil (NNECo) to B. J. Youngblood (NRC), May 9, 1984; response to request for information concerning compliance with Regulatory Guide 1.150.

9. W. G. Counsil (NNECo) to B. J. Youngblood (NRC), December 13, 1984; response to request for information concerning volumetric examination of Class 2 piping welds.

10. B. J. Youngblood (NRC) to W. G. Counsil (NNECo), March 7, 1985; request for additional information.

11. J. F. Opeka (NNECo) to B. J. Youngblood (NRC), May 7, 1985; response to request for additional information concerning ultrasonic inspection technique for centrifugally cast pipe.

12. J. F. Opeka (NNECo) to B. J. Youngblood (NRC), July 1, 1985; provides additional information concerning ultrasonic inspection technique for centrifugally cast pipe.

13. J. F. Opeka (NNECo) to B. J. Youngblood (NRC), July 2, 1985; provides additional information concerning ultrasonic inspection technique for centrifugally cast pipe.

14. J. F. Opeka (NNECo) to B. J. Youngblood (NRC), September 18, 1985; request for exemption from Code volumetric examinations for embedded containment recirculation spray system piping.

15. J. F. Opeka (NNECo) to B. J. Youngblood (NRC), September 30, 1985; preservice inspection of piping welds in the break exclusion area.

16. J. F. Opeka (NNECo) to V. S. Noonan (NRC), April 1, 1986; revised preservice inspection relief requests PR-4 and PR-12 identifying additional welds requiring relief.

17. J. F. Opeka (NNECo) to V. S. Noonan (NRC), May 22, 1986; first interval inservice inspection program.

18. E. J. Mroczka (NNECo) to NRC, March 18, 1987; request for relief from inservice inspection requirements for integrally welded attachments to vessels.

19. E. J. Mroczka (NNECo) to NRC, August 5, 1988; revised request for relief from inservice inspection requirements for integrally welded attachments to vessels.

20. J. F. Stolz (NRC) to E. J. Mroczka (NNECo), September 21, 1988; Safety Evaluation of relief request from inservice inspection requirements for integrally welded attachments to vessels.

21. D. H. Jaffe (NRC) to E. J. Mroczka (NNECo), August 16, 1988; request for additional information on the inservice inspection program.

22. E. J. Mroczka (NNECo) to NRC, October 19, 1988; response to request for additional information, revised inservice inspection program attached.

23. J. F. Opeka (NNECo) to S. D. Ebneter (NRC), April 27, 1986; licensee's interpretation of 10 CFR 50.55a(g)(4)(iv) and clarification of use of the ASME 1983 Edition, Summer 1983 Addenda Code for the first interval at Millstone 3.

24. NRC Memo, C. Y. Cheng and L. B. March to J. P. Durr, August 10, 1987; review of licensee's interpretation of 10 CFR 50.55a(g)(4)(iv) in applying the ASME 1983 Edition, Summer 1983 Addenda Code to the first interval inservice inspection program for Millstone 3.

25. E. J. Mroczka (NNECo) to NRC, December 1, 1988; thermal fatigue mechanisms in steam generator and pressurizer nozzles.

APPENDIX A

Requirements of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code
1983 Edition with Addenda through Summer 1983

A.1 CLASS 1 REQUIREMENTS

A.1.1 CATEGORY B-A, PRESSURE-RETAINING WELDS IN REACTOR VESSEL

A.1.1.1 Shell Welds, Item B1.10

A.1.1.1.1 Circumferential and Longitudinal Welds, Items B1.11 and B1.12

All pressure-retaining circumferential and longitudinal shell welds in the reactor vessel shall be volumetrically examined in accordance with Figures IWB-2500-1 and -2 over essentially 100% of their lengths during the first inspection interval. Examinations may be performed at or near the end of the interval.

A.1.1.2 Head Welds, Item B1.20

A.1.1.2.1 Circumferential and Meridional Head Welds, Items B1.21 and B1.22

All pressure-retaining circumferential and meridional head welds in the reactor vessel head shall be volumetrically examined in accordance with Figure IWB-2500-3 over the accessible portion up to 100% of the weld length during the first inspection interval. The bottom head welds may be examined at or near the end of the interval.

A.1.1.3 Shell-to-Flange Weld, Item B1.30

Essentially 100% of the length of the shell-to-flange weld shall be volumetrically examined in accordance with Figure IWB-2500-4 during the first inspection interval. If the examinations are conducted from the flange face, the remaining examination required to be conducted from the vessel wall may be performed at or near the end of each inspection interval. The examination of the shell-to-flange weld may be performed during the first and third inspection periods in conjunction with the nozzle examinations of Examination Category B-D (Program B). At least 50% of shell-to-flange welds shall be examined by the end of the first inspection period, and the remainder by the end of the third inspection period.

A.1.1.4 Head-to-Flange Weld, Item B1.40

Essentially 100% of the length of the head-to-flange weld shall be volumetrically and surface examined in accordance with Figure IWB-2500-5 during the first inspection interval. If the examinations are conducted from the flange face, the remaining examination required to be conducted from the vessel wall may be performed at or near the end of each inspection interval.

A.1.1.5 Repair Welds, Item B1.50

A.1.1.5.1 Repair Welds in the Beltline Region, Item B1.51

All base metal weld repair areas in the beltline region where repair depth exceeds 10% nominal of the vessel wall shall be volumetrically examined in accordance with Figures IWB-2500-1 and -2 during the first inspection interval. Examinations may be performed at or near the end of the interval. The beltline region extends for the length of the vessel thermal shield, or in the absence of a thermal shield, the effective length of reactor fuel elements. If the location of the repair is not positively and accurately known, then the individual shell plate, forging, or shell course containing the repair shall be included.

A.1.2 CATEGORY B-B, PRESSURE-RETAINING WELDS IN VESSELS OTHER THAN REACTOR VESSELS

A.1.2.1 Shell-to-Head Welds in Pressurizer, Item B2.10

A.1.2.1.1 Circumferential Shell-to-Head Welds, Item B2.11

All circumferential shell-to-head welds in the pressurizer as shown in Figure IWB-2500-20(a) shall be volumetrically examined in accordance with Figure IWB-2500-1 over essentially 100% of their length during the first inspection interval.

A.1.2.1.2 Longitudinal Shell Weld, Item B2.12

One foot of all selected longitudinal shell welds in the pressurizer intersecting the examined circumferential shell-to-head weld as shown in Figure IWB-2500-20(a) shall be volumetrically examined in accordance with Figure IWB-2500-2 during the first inspection interval.

A.1.2.2 Head Welds in Pressurizer Vessels, Item B2.20

A.1.2.2.1 Circumferential and Meridional Head Welds, Items B2.21 and B2.22

All circumferential and meridional head welds in the pressurizer shall be volumetrically examined in accordance with Figure IWB-2500-3 over essentially 100% of their lengths during the first inspection interval.

A.1.2.3 Head Welds in the Primary Side of the Steam Generators, Item B2.30

A.1.2.3.1 Circumferential and Meridional Head Welds, Items B2.31 and B2.32

All circumferential and meridional head welds in the primary side of the steam generators as shown in Figure IWB-2500-20(c) shall be volumetrically examined in accordance with Figure IWB-2500-3 over essentially 100% of their length during the first inspection interval.

A.1.2.4 Tubesheet-to-Head Weld, Item B2.40

The tubesheet-to-head weld in the primary side of the steam generators shall be volumetrically examined in accordance with Figure IWB-2500-6 over essentially 100% of its length during the first inspection interval.

A.1.2.5 Head and Shell Welds in the Primary Side of the Heat Exchangers, Item B2.50

A.1.2.5.1 Circumferential and Meridional Head Welds, Items B2.51 and B2.52

All circumferential and meridional head welds in the primary side of the heat exchangers as shown in Figure IWB-2500-20(e) shall be volumetrically examined in accordance with Figures IWB-2500-1 and -3 for circumferential welds and Figure IWB-2500-3 for meridional welds over essentially 100% of their length during the first inspection interval.

A.1.2.5.2 Tubesheet-to-Head Welds, Item B2.60

The tubesheet-to-head welds as shown in Figure IWB-2500-20(g) shall be volumetrically examined in accordance with Figure IWB-2500-6 over essentially 100% of their length during the first interval.

A.1.2.5.3 Longitudinal Shell Welds, Item B2.70

One foot of all longitudinal welds in the primary side of the heat exchangers intersecting the examined circumferential tubesheet-to-shell weld at each end of the heat exchanger as shown in Figure IWB-2500-20(g) shall be volumetrically examined in accordance with Figure IWB-2500-2 during the first inspection interval.

A.1.2.5.4 Tubesheet-to-Shell Welds, Item B2.80

The tubesheet-to-shell welds at each end of the heat exchanger as shown in Figure IWB-2500-20(g) shall be volumetrically examined in accordance with Figure IWB-2500-6 over essentially 100% of their length during the first interval.

A.1.3 CATEGORY B-D, FULL PENETRATION WELDS OF NOZZLES IN VESSELS (INSPECTION PROGRAM B)

A.1.3.1 Reactor Vessel Nozzle-to-Vessel Welds, Items B3.90 and B3.100

All nozzle-to-vessel welds and inside radius sections in the reactor vessel shall be volumetrically examined in accordance with Figure IWB-2500-7(a) through (d) during the first interval of operation. Examinations shall include nozzles with full penetration welds to vessel shell (or head) and integrally cast nozzles, but exclude manways and handholes either welded to or integrally cast in vessel. At least 25% but not more than 50% (credited) of the nozzles shall be examined by the end of the first inspection period and the remainder by the end of the inspection interval. If examinations are conducted from inside the component and the nozzle weld is examined by straight beam ultrasonic method from the nozzle bore, the remaining examinations required to be conducted from the shell inside diameter may be performed at or near the end of each inspection interval.

A.1.3.2 Pressurizer Nozzle-to-Vessel Welds, Items B3.110 and B3.120

All nozzle-to-vessel welds and inside radius sections in the pressurizer shall be volumetrically examined in accordance with Figure IWB-2500-7(a) through (d) during the first interval of operation. Examinations shall include nozzles with full penetration welds to vessel shell (or head) and integrally cast nozzles, but exclude manways and handholes either welded to or integrally cast in vessel. At least 25% but not more than 50% (credited) of the nozzles shall be examined by the end of the first inspection period and the remainder by the end of the inspection interval. If examinations are conducted from inside the component and the nozzle weld is examined by straight beam ultrasonic method from the nozzle bore, the remaining examinations required to be conducted from the shell inside diameter may be performed at or near the end of each inspection interval.

A.1.3.3 Steam Generator Nozzle-to-Vessel Welds, Items B3.130 and B3.140

All nozzle-to-vessel welds and inside radius sections in the steam generator shall be volumetrically examined in accordance with Figure IWB-2500-7(a) through (d) during the first interval of operation. Examinations shall include nozzles with full penetration welds to vessel shell (or head) and integrally cast nozzles, but exclude manways and handholes either welded to or integrally cast in vessel. At least 25% but not more than 50% of the nozzles shall be examined by the end of the first inspection period and the remainder by the end of the inspection interval. If examinations are conducted from inside the component and the nozzle weld is examined by straight beam ultrasonic method from the nozzle bore, the remaining examinations required to be conducted from the shell inside diameter may be performed at or near the end of each inspection interval.

A.1.3.4 Heat Exchanger Nozzle-to-Vessel Welds, Items B3.150 and B3.160

All nozzle-to-vessel welds and inside radius sections in the primary side of the heat exchanger shall be volumetrically examined in accordance with Figure IWB-2500-7(a) through (d) during the first interval of operation. Examinations shall include nozzles with full penetration welds to vessel shell (or head) and integrally cast nozzles, but excludes manways and handholes either welded to or integrally cast in vessel. At least 25% but not more than 50% (credited) of the nozzles shall be examined by the end of the first inspection period and the remainder by the end of the inspection interval. If examinations are conducted from inside the component and the nozzle weld is examined by straight-beam ultrasonic method from the nozzle bore, the remaining examinations required to be conducted from the shell inside diameter may be performed at or near the end of each inspection interval.

A.1.4 CATEGORY B-E, PRESSURE-RETAINING PARTIAL PENETRATION WELDS IN VESSELS

A.1.4.1 Reactor Vessel Partial Penetration Welds, Item B4.10

A.1.4.1.1 Vessel Nozzles, Item B4.11

The external surfaces of partial penetration welds on 25% of reactor vessel nozzles shall be visually examined (VT-2) during the first inspection interval. The examinations shall cumulatively cover the specified percentage among each group of penetrations of comparable size and function. Examinations may be performed at or near the end of the interval.

A.1.4.1.2 Control Rod Drive Nozzles, Item B4.12

The external surfaces of partial penetration welds on 25% of the control rod drive nozzles shall be visually examined (VT-2) during the first inspection interval. The examinations shall cumulatively cover the specified percentage among each group of penetrations of comparable size and function. Examinations may be performed at or near the end of the interval.

A.1.4.1.3 Instrumentation Nozzles, Item B4.13

The external surfaces of partial penetration welds on 25% of the instrumentation nozzles shall be visually examined (VT-2) during the first inspection interval. The examinations shall cumulatively cover the specified percentage among each group of penetrations of comparable size and function. Examinations may be performed at or near the end of the interval.

A.1.4.2 Heater Penetration Welds on the Pressurizer, Item B4.20

The external surfaces of all heater penetration welds on the pressurizer shall be visually examined (VT-2) during the first inspection interval. Examinations may be performed at or near the end of the interval.

A.1.5 CATEGORY B-F, PRESSURE-RETAINING DISSIMILAR METAL WELDS

A.1.5.1 Reactor Vessel Nozzle-to-Safe End Butt Welds, Item B5.10

All nozzle-to-safe end butt welds in nominal pipe size 4 in. and greater in the reactor vessel shall be surface and volumetrically examined in accordance with Figure IWB-2500-8 during the first inspection interval. The examinations may be performed coincident with the vessel nozzle examinations required by Examination Category B-D. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steels, (b) carbon or low alloy steels to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.2 Reactor Vessel Nozzle-to-Safe End Butt Welds, Item B5.20

The surfaces of all nozzle-to-safe end butt welds in nominal pipe size less than 4 in. in the reactor vessel shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. The examinations may be performed coincident with the vessel nozzle examinations required by Examination Category B-D. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.3 Reactor Vessel Nozzle-to-Safe End Socket Welds, Item B5.30

The surfaces of all nozzle-to-safe end socket welds in the reactor vessel shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. The examinations may be performed coincident with the vessel nozzle examinations required by Examination Category B-D. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.4 Pressurizer Nozzle-to-Safe End Butt Welds, Item B5.40

All nozzle-to-safe end butt welds in nominal pipe size 4 in. and greater in the pressurizer shall be surface and volumetrically examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.5 Pressurizer Nozzle-to-Safe End Butt Welds, Item B5.50

The surfaces of all nozzle-to-safe end butt welds in nominal pipe size less than 4 in. in the pressurizer shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds

between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.6 Pressurizer Nozzle-to-Safe End Socket Welds, Item B5.60

The surfaces of all nozzle-to-safe end socket welds in the pressurizer shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.7 Steam Generator Nozzle-to-Safe End Butt Welds, Item B5.70

All nozzle-to-safe end butt welds in nominal pipe size 4 in. and greater in the pressurizer shall be surface and volumetrically examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.8 Steam Generator Nozzle-to-Safe End Butt Welds, Item B5.80

The surfaces of all nozzle-to-safe end butt welds in nominal pipe size less than 4 in. in the pressurizer shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.9 Steam Generator Nozzle-to-Safe End Socket Welds, Item B5.90

The surfaces of all nozzle-to-safe end socket welds in the steam generator shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.10 Heat Exchanger Nozzle-to-Safe End Butt Welds, Item B5.100

All nozzle-to-safe end butt welds in nominal pipe size 4 in. and greater in the heat exchangers shall be surface and volumetrically examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.11 Heat Exchanger Nozzle-to-Safe End Butt Welds, Item B5.110

The surfaces of all nozzle-to-safe end butt welds in nominal pipe size less than 4 in. in the heat exchangeers shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.12 Heat Exchanger Nozzle-to-Safe End Socket Welds, Item B5.120

The surfaces of all nozzle-to-safe end socket welds in the heat exchangers shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.13 Piping Dissimilar Metal End Butt Welds, Item B5.130

All dissimilar metal butt welds in piping 4 in. and greater shall be surface and volumetrically examined in accordance with Figure IWB-2500-8 during the first inspection interval. For reactor vessel nozzle safe ends, the examinations may be performed coincident with the vessel nozzle examinations required by Examination Category B-D. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.14 Piping Dissimilar Metal Butt Welds, Item B5.140

The surfaces of all dissimilar metal butt welds in piping less than 4 in. shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. For reactor vessel nozzle safe ends, the examinations may be performed coincident with the vessel nozzle examinations required by Examination Category B-D. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.5.15 Piping Dissimilar Metal Socket Welds, Item B5.150

The surfaces of all dissimilar metal socket welds in piping shall be examined in accordance with Figure IWB-2500-8 during the first inspection interval. For reactor vessel nozzle safe ends, the examinations may be performed coincident with the vessel nozzle examinations required by Examination Category B-D. Dissimilar metal welds between combinations of (a) carbon or low alloy steels to high alloy steel, (b) carbon or low alloy steel to high nickel alloys, and (c) high alloy steel to high nickel alloys are included.

A.1.6 CATEGORY B-G-1, PRESSURE-RETAINING BOLTING LARGER THAN 2 INCHES IN DIAMETER

A.1.6.1 Reactor Closure Head Nuts, Item B6.10

The surfaces of all reactor closure head nuts larger than 2 in. in diameter shall be examined during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. Examinations may be performed at or near the end of the inspection interval.

A.1.6.2 Reactor Closure Studs, in Placed or When Removed, Items B6.20 and B6.30

All closure studs in the reactor vessel larger than 2 in. in diameter shall be volumetrically examined in accordance with Figure IWB-2500-12 during the first inspection interval. A surface examination is also required when the studs are removed. Examinations may be performed at or near the end of the inspection interval.

A.1.6.3 Threads in the Flange in the Reactor Vessel, Item B6.40

All threads in the flange in the reactor vessel shall be volumetrically examined in accordance with Figure IWB-2500-12 during the first inspection interval. Examination includes threads in base metal and is required only when the connection is disassembled. Examinations may be performed at or near the end of the inspection interval.

A.1.6.4 Reactor Closure Washers and Bushings, Item B6.50

The surfaces of all closure washers and bushings on bolting larger than 2 in. in diameter in the reactor vessel shall be visually examined (VT-1) during the first inspection interval. Bushings in base material of flanges are required to be examined only when the connections are disassembled; bushings may be may be examined in place. The examinations may be performed at or near the end of the inspection interval.

A.1.6.5 Pressurizer Bolts, Studs, and Flange Surfaces, Items B6.60 and B6.70

All bolts and studs larger than 2 in. in diameter in the pressurizer shall be volumetrically examined in accordance with Figure IWB-2500-12 during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. The flange surfaces shall also be visually examined (VT-1) when the connection is disassembled. The examination includes 1 in. of the annular surface surrounding each stud. Examinations may be performed at or near the end of the inspection interval.

A.1.6.6 Pressurizer Nuts, Bushings, and Washers, Item B6.80

The surfaces of all nuts, bushings, and washers on bolting larger than 2 in. in diameter shall be visually examined (VT-1) during the first inspection interval. Bushings in the base material of flanges are required to be examined only when the connections are disassembled; bushings may be inspected in place. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. Bushings and threads in base material of flanges are required to be examined only when the connections are disassembled. Examinations may be performed at or near the end of the inspection interval.

A.1.6.7 Bolts, Studs, and Flange Surfaces in Steam Generators, Items B6.90 and B6.100

All bolts and studs larger than 2 in. in diameter in steam generators shall be volumetrically examined in accordance with Figure IWB- 2500-12 during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. The flange surfaces shall also be visually examined (VT-1) when the connection is disassembled. The examination includes 1 in. of the annular surface surrounding each stud. Examinations may be performed at or near the end of the inspection interval.

A.1.6.8 Nuts, Bushings, and Washers in Steam Generators, Item B6.110

The surfaces of all nuts, bushings, and washers in bolting larger than 2 in. in diameter in steam generators shall be visually examined (VT-1) during the first inspection interval. Bushings in the base material of flanges are required to be examined only when the connections are disassembled; bushings may be inspected in place. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. Bushings and threads in base materials of flanges are required to be examined only when the connections are disassembled. Examinations may be performed at or near the end of the inspection interval.

A.1.6.9 Bolts, Studs, and Flange Surfaces in Heat Exchangers, Items B6.120 and B6.130

All bolts and studs larger than 2 in. in diameter in heat exchangers shall be volumetrically examined in accordance with Figure IWB-2500-12 during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. The flange surfaces shall also be visually examined (VT-1) when the connection is disassembled. The examination includes 1 in. of the annular surface surrounding each stud. Examinations may be performed at or near the end of the inspection interval. Examinations are limited to bolts and studs on components selected for examination under Examination Categories B-B, B-J, B-L-1, and B-M-1, as applicable.

A.1.6.10 Nuts, Bushings, and Washers in Heat Exchangers, Item B6.140

The surfaces of all nuts, bushings, and washers on bolting larger than 2 in. in diameter in heat exchanges shall be visually examined (VT-1) during the first inspection interval. Bushings in the base material of flanges are required to be examined only when the connections are disassembled; bushings may be inspected in place. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. Examinations may be performed at or near the end of the inspection interval. Examinations are limited to bolts and studs on components selected for examination under Examination Categories B-B, B-J, B-L-1, and B-M-1, as applicable.

A.1.6.11 Bolts, Studs, and Flange Surfaces in Piping, Items B6.150 and B6.160

All bolts and studs larger than 2 in. in diameter in piping shall be volumetrically examined in accordance with Figure IWB-2500-12 during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. The flange surfaces shall also be visually examined (VT-1) when the connection is disassembled. The examination includes 1 in. of the annular surface surrounding each stud. Examinations may be performed at or near the end of the inspection interval. Examinations are limited to bolts and studs on components selected for examination under Examination Categories B-B, B-J, B-L-1, and B-M-1, as applicable.

A.1.6.12 Nuts, Bushings, and Washers in Piping, Item B6.170

The surfaces of all nuts, bushings, and washers on bolting larger than 2 in. in diameter in piping shall be visually examined (VT-1) during the first inspection interval. Bushings in the base material of flanges are required to be examined only when the connections are disassembled; bushings may be inspected in place. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. Examinations may be performed at or near the end of the inspection interval. Examinations are limited to bolts and studs on components selected for examination under Examination Categories B-B, B-J, B-L-1, and B-M-1, as applicable.

A.1.6.13 Bolts, Studs, and Flange Surfaces in Pumps, Items B6.180 and B6.190

All bolts and studs larger than 2 in. in diameter in pumps shall be volumetrically examined in accordance with Figure IWB-2500-12 during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. The flange surfaces shall also be visually examined (VT-1) when the connection is disassembled. The examination includes 1 in. of the annular surface surrounding each stud. Examinations may be performed at or near the end of the inspection interval. Examinations are limited to bolts and studs on components selected for examination under Examination Categories B-B, B-J, B-L-1, and B-M-1, as applicable.

A.1.6.14 Nuts, Bushings, and Washers in Pumps, Item B6.200

The surfaces of all nuts, bushings, and washers in bolting larger than 2 in. in diameter in pumps shall be visually examined (VT-1) during the first inspection interval. Bushings in the base material of flanges are required to be examined only when the connections are disassembled; bushings may be inspected in place. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. Examinations may be performed at or near the end of the inspection interval. Examinations are limited to bolts and studs on components selected for examination under Examination Categories B-B, B-J, B-L-1, and B-M-1, as applicable.

A.1.6.15 Bolts, Studs, and Flange Surfaces in Valves, Items B6.210 and B6.220

All bolts and studs larger than 2 in. in diameter in valves shall be volumetrically examined in accordance with Figure IWB-2500-12 during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. The flange surfaces shall also be visually examined (VT-1) when the connection is disassembled. The examination includes 1 in. of the annular surface surrounding each stud. Examinations may be performed at or near the end of the inspection interval. Examinations are limited to bolts and studs on components selected for examination under Examination Categories B-B, B-J, B-L-1, and B-M-1, as applicable.

A.1.6.16 Nuts, Bushings, and Washers in Valves, Item B6.230

The surfaces of all nuts, bushings, and washers on bolting larger than 2 in. in diameter in valves shall be visually examined (VT-1) during the first inspection interval. Bushings in the base material of flanges are required to be examined only when the connections are disassembled; bushings may be inspected in place. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed. Examinations may be performed at or near the end of the inspection interval. Examinations are limited to bolts and studs on comonents selected for examination under Examination Categories B-B, B-J, B-L-1, and B-M-1, as applicable.

A.1.7 CATEGORY B-G-2, PRESSURE-RETAINING BOLTING 2 INCHES AND SMALLER IN DIAMETER

A.1.7.1 Bolts, Studs, and Nuts in Reactor Vessel, Item B7.10

The surfaces of all bolts, studs, and nuts 2 in. or less in diameter in the reactor vessel shall be visually examined (VT-1) during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed.

A.1.7.2 Bolts, Studs, and Nuts in Pressurizer, Item B7.20

The surfaces of all bolts, studs, and nuts 2 in. or less in diameter in the pressurizer shall be visually examined (VT-1) during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed.

A.1.7.3 Bolts, Studs, and Nuts in Steam Generators, Item B7.30

The surfaces of all bolts, studs, and nuts 2 in. or less in diameter in the steam generators shall be visually examined (VT-1) during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed.

A.1.7.4 Bolts, Studs, and Nuts in Heat Exchangers, Item B7.40

The surfaces of all bolts, studs, and nuts 2 in. or less in diameter in the heat exchangers shall be visually examined (VT-1) during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed.

A.1.7.5 Bolts, Studs, and Nuts in Piping, Item B7.50

The surfaces of all bolts, studs, and nuts 2 in. or less in diameter in piping shall be visually examined (VT-1) during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed.

A.1.7.6 Bolts, Studs, and Nuts in Pumps, Item B7.60

The surfaces of all bolts, studs, and nuts 2 in. or less in diameter in pumps shall be visually examined (VT-1) during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed.

A.1.7.7 Bolts, Studs, and Nuts in Valves, Item B7.70

The surfaces of all bolts, studs, and nuts 2 in. or less in diameter in valves shall be visually examined (VT-1) during the first inspection interval. Bolting may be examined (a) in place under tension, (b) when the connection is disassembled, or (c) when the bolting is removed.

A.1.7.8 Bolts, Studs, and Nuts in Control Rod Drive Housings, Item B7.80

The surfaces of all bolts, studs, and nuts 2 in. or less in diameter in control rod drive housings shall be visually examined (VT-1) during the first inspection interval when disassembled.

A.1.8 CATEGORY B-H, INTEGRAL ATTACHMENTS FOR VESSELS

A.1.8.1 Integrally Welded Attachments in Reactor Vessel, Item B8.10

The weld joints for integrally welded attachments to the reactor vessel shall be surface or volumetrically examined as applicable over essentially 100% of their lengths in accordance with Figures IWB-2500-13, -14, and -15 during the first interval. For the configuration shown in Figure IWB-2500-14, a volumetric examination of volume A-B-C-D from one side (B-C) of the circumferential weld may be performed in lieu of the surface examination. Weld buildup on nozzles that is in compression under normal conditions and provides only component support is excluded from examination. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 5/8-in. or greater; and (d) the attachment weld joins the attachment either directly to the surface of the vessel, or to an integrally cast or forged attachment to the vessel.

A.1.8.2 Integrally Welded Attachments in Pressurizer, Item B8.20

The weld joints for integrally welded attachments to the pressurizer shall be surface or volumetrically examined as applicable over essentially 100% of their lengths in accordance with Figures IWB-2500-13, -14, and -15 during the first interval. For the configuration shown in Figure IWB-2500-14, a volumetric examination of volume A-B-C-D from one side (B-C) of the circumferential weld may be performed in lieu of the surface examination. Weld buildup on nozzles that is in compression under normal conditions and provides only component support is excluded from examination. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 5/8-in. or greater; and (d) the attachment weld joins the attachment either directly to the surface of the vessel, or to an integrally cast or forged attachment to the vessel.

A.1.8.3 Integrally Welded Attachments in Steam Generators, Item B8.30

The weld joints for integrally welded attachments to the steam generator shall be surface or volumetrically examined as applicable over essentially 100% of their lengths in accordance with Figures IWB-2500-13, -14, and -15 during the first interval. For the configuration shown in Figure IWB-2500-14, a volumetric examination of volume A-B-C-D from one side (B-C) of the circumferential weld may be performed in lieu of the surface examination. Weld buildup on nozzles that is in compression under normal conditions and provides only component support is excluded from examination. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 5/8-in. or greater; and (d) the attachment weld joins the attachment either directly to the surface of the vessel, or to an integrally cast or forged attachment to the vessel. In the case of multiple vessels of similar design, size, and service, the examination is limited to the attachment welds of one vessel.

A.1.8.4 Integrally Welded Attachments in Heat Exchangers, Item B8.40

The weld joints for integrally welded attachments to the heat exchangers shall be surface or volumetrically examined as applicable over essentially 100% of their lengths in accordance with Figures IWB-2500-13, -14, and -15 during the first interval. For the configuration shown in Figure IWB-2500-14, a volumetric examination of volume A-B-C-D from one side (B-C) of the circumferential weld may be performed in lieu of the surface examination. Weld buildup on nozzles that is in compression under normal conditions and provides only component support is excluded from examination. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 5/8-in. or greater; and (d) the attachment weld joins the attachment either directly to the surface of the vessel, or to an integrally cast or forged attachment to the vessel. In the case of multiple vessels of similar design, size, and service, the examination is limited to the attachment welds of one vessel.

A.1.9 CATEGORY B-J, PRESSURE-RETAINING WELDS IN PIPING

A.1.9.1 Nominal Pipe Size 4 In. and Greater, Item B9.10

A.1.9.1.1 Circumferential Welds, Item B9.11

For circumferential welds in pipe of nominal pipe size 4 in. and greater, surface plus volumetric examinations shall be performed in accordance with Figure IWB-2500-8 over essentially 100% of the weld length during each inspection interval. The examinations shall include the following:

(a) All terminal ends in each pipe or branch run connected to vessels.

(b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed the following limits under loads associated with specific seismic events and operational conditions.

(1) primary plus secondary stress intensity of $2.4S_m$ for ferritic steel and austenitic steel, and

(2) cumulative usage factor U of 0.4.

(c) All dissimilar metal welds between combinations of

(a) carbon or low alloy steels to high alloy steels;
(b) carbon or low alloy steels to high nickel alloys; and
(c) high alloys steels to high nickel alloys.

(d) Additional piping welds so that the total number of circumferential butt welds selected for examination equals 25% of the circumferential butt welds in the reactor coolant piping system. This total does not include welds excluded by IWB-1220. These additional welds may be located in one loop (one loop is currently defined for both PWR and BWR plants in the 1977 Edition).

For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need be examined for transverse reflectors.

A.1.9.1.2 Longitudinal Welds, Item B9.12

For longitudinal welds in pipe of nominal pipe size 4 in. and greater, surface plus volumetric examinations shall be performed in accordance with Figure IWB-2500-8 for at least a pipe-diameter length, but not more than 12 in. of each longitudinal weld intersecting the circumferential welds required to be examined by Examination Categories B-F and B-J. For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need be examined for transverse reflectors.

A.1.9.2 Nominal Pipe Size Less Than 4 In., Item B9.20

A.1.9.2.1 Circumferential Welds, Item B9.21

For circumferential welds in pipe of nominal pipe size less than 4 in., surface examinations shall be performed in accordance with Figure IWB-2500-8 over essentially 100% of the weld length during each inspection interval. The examinations shall include the following:

(a) All terminal ends in each pipe or branch run connected to vessels.

(b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed the following limits under loads associated with specific seismic events and operational conditions.

(1) primary plus secondary stress intensity of $2.4S_m$ for ferritic steel and austenitic steel, and

(2) cumulative usage factor U of 0.4.

(c) All dissimilar metal welds between combinations of

(a) carbon or low alloy steels to high alloy steels;
(b) carbon or low alloy steels to high nickel alloys; and
(c) high alloys steels to high nickel alloys.

(d) Additional piping welds so that the total number of circumferential butt welds selected for examination equals 25% of the circumferential butt welds in the reactor coolant piping system. This total does not include welds excluded by IWB-1220. These additional welds may be located in one loop (one loop is currently defined for both PWR and BWR plants in the 1977 Edition).

A.1.9.2.2 Longitudinal Welds, Item B9.22

For longitudinal welds in pipe of nominal pipe size less than 4 in., surface examinations shall be performed in accordance with Figure IWB-2500-8 for at least a pipe-diameter length, but not more than 12 in. of each longitudinal weld intersecting the circumferential welds required to be examined by Examination Categories B-F and B-J.

A.1.9.3 Branch Pipe Connection Welds, Item B9.30

A.1.9.3.1 Nominal Pipe Size 4 Inches and Greater, Item B9.31

For welds in branch connections 4 in. and greater, surface plus volumetric examinations shall be performed in accordance with Figures IWB-2500-9, -10 and -11 over essentially 100% of the weld length during each inspection interval. The examinations shall include the following:

(a) All terminal ends in each pipe or branch run connected to vessels.

(b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed the following limits under loads associated with specific seismic events and operational conditions.

(1) primary plus secondary stress intensity of $2.4S_m$ for ferritic steel and austenitic steel, and

(2) cumulative usage factor U of 0.4.

(c) All dissimilar metal welds between combinations of

(a) carbon or low alloy steels to high alloy steels;
(b) carbon or low alloy steels to high nickel alloys; and
(c) high alloys steels to high nickel alloys.

(d) Additional piping welds so that the total number of circumferential butt welds selected for examination equals 25% of the circumferential butt welds in the reactor coolant piping system. This total does not include welds excluded by IWB-1220. These additional welds may be located in one loop (one loop is currently defined for both PWR and BWR plants in the 1977 Edition).

For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need to examined for transverse reflectors.

A.1.9.3.2 Nominal Pipe Size Less Than 4 Inches, Item B9.32

For welds in branch pipe connections less than 4 in., surface examinations shall be performed in accordance with Figures IWB-2500-9, -10, and -11 over essentially 100% of the weld length during each inspection interval. The examinations shall include the following:

(a) All terminal ends in each pipe or branch run connected to vessels.

(b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed the following limits under loads associated with specific seismic events and operational conditions.

(1) primary plus secondary stress intensity of $2.4S_m$ for ferritic steel and austenitic steel, and

(2) cumulative usage factor U of 0.4.

(c) All dissimilar metal welds between combinations of

(a) carbon or low alloy steels to high alloy steels;
(b) carbon or low alloy steels to high nickel alloys; and
(c) high alloys steels to high nickel alloys.

(d) Additional piping welds so that the total number of circumferential butt welds selected for examination equals 25% of the circumferential butt welds in the reactor coolant piping system. This total does not include welds excluded by IWB-1220. These additional welds may be located in one loop (one loop is currently defined for both PWR and BWR plants in the 1977 Edition).

A.1.9.4 Socket Welds, Item B9.40

Socket welds shall be surface examined in accordance with Figure IWB-2500-8 over essentially 100% of the weld length during each inspection interval. The examinations shall include the following:

(a) All terminal ends in each pipe or branch run connected to vessels.

(b) All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed the following limits under loads associated with specific seismic events and operational conditions.

(1) primary plus secondary stress intensity of $2.4S_m$ for ferritic steel and austenitic steel, and

(2) cumulative usage factor U of 0.4.

(c) All dissimilar metal welds between combinations of

(a) carbon or low alloy steels to high alloy steels;
(b) carbon or low alloy steels to high nickel alloys; and
(c) high alloys steels to high nickel alloys.

(d) Additional piping welds so that the total number of circumferential butt welds selected for examination equals 25% of the circumferential butt welds in the reactor coolant piping system. This total does not include welds excluded by IWB-1220. These additional welds may be located in one loop (one loop is currently defined for both PWR and BWR plants in the 1977 Edition).

A.1.10 CATEGORY B-K-1, INTEGRAL ATTACHMENTS FOR PIPING, PUMPS, AND VALVES

A.1.10.1 Integrally Welded Attachments on Piping, Item B10.10

The weld joints for integrally welded attachments to piping shall be surface or volumetrically examined as applicable over essentially 100% of their lengths in accordance with Figures IWB-2500-13, -14, and -15 during the first interval. For the configuration shown in Figure IWB-2500-14, a volumetric examination of volume A-B-C-D from one side (B-C) of the circumferential weld may be performed in lieu of the surface examination. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 5/8-inch or greater; and (d) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component. Examinations include the welded attachments of piping required to be examined by Examination Category B-J.

A.1.10.2 Integrally Welded Attachments on Pumps, Item B10.20

The weld joints for integrally welded attachments to pumps shall be surface or volumetrically examined as applicable over essentially 100% of their lengths in accordance with Figures IWB-2500-13, -14, and -15 during the first interval. For the configuration shown in Figure IWB-2500-14, a volumetric examination of volume A-B-C-D from one side (B-C) of the circumferential weld may be performed in lieu of the surface examination. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 5/8-inch or greater; and (d) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component. Examinations include the welded attachments of the associated pumps integral to piping required to be examined by Examination Category B-J.

A.1.10.3 Integrally Welded Attachments on Valves, Item B10.30

The weld joints for integrally welded attachments to valves shall be surface or volumetrically examined as applicable over essentially 100% of their lengths in accordance with Figures IWB-2500-13, -14, and -15 during the first interval. For the configuration shown in Figure IWB-2500-14, a volumetric examination of volume A-B-C-D from one side (B-C) of the circumferential weld may be performed in lieu of the surface examination. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 5/8-inch or greater; and (d) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component. Examinations include the welded attachments of the associated valves integral to piping required to be examined by Examination Category B-J.

A.1.11 CATEGORIES B-L-1 and B-M-1, PRESSURE-RETAINING WELDS IN PUMP CASINGS AND VALVE BODIES, AND B-L-2 and B-M-2, PUMP CASINGS AND VALVE BODIES

A.1.11.1 Pump Casing Welds, Item B12.10

Essentially 100% of the pressure-retaining welds in at least one pump in each group of pumps performing similar functions in the system (e.g., recirculating coolant pumps) shall be volumetrically examined in accordance with Figure IWB-2500-16 during each inspection interval. Supplementary surface examinations may be performed on interior and/or exterior surfaces to assist in determining the location of indications detected by volumetric examinations [see IWB-3518.1(d)]. The examinations may be performed at or near the end of the inspection interval.

A.1.11.2 Pump Casings, Item B12.20

The internal surfaces of at least one pump in each group of pumps performing similar functions in the system (e.g., recirculating coolant pumps) shall be visually examined (VT-1) during each inspection interval. The examination may be performed on the same pump selected for volumetric examination of welds. The examinations may be performed at or near the end of the inspection interval.

A.1.11.3 Valve Body Welds Nominal Pipe Size Less than 4 in., Item B12.30

The surfaces of essentially 100% of the body welds (nominal pipe size less than 4 in.) in at least one valve in each group of valves with the same construction design (e.g., globe, gate, or check valve) and manufacturing method that perform similar functions in the system (e.g., containment isolation and system overpressure protection) shall be examined in accordance with Figure IWB-2500-17 during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

A.1.11.3.1 Valve Body Welds, Nominal Pipe Size 4 in. and Greater, Item B12.40

Essentially 100% of the body welds (nominal pipe size 4 in. and greater) in at least one valve in each group of valves with the same construction design (e.g., globe, gate, or check valve) and manufacturing method that perform similar functions in the system (e.g., containment isolation and system over-pressure protection) shall be volumetrically examined in accordance with Figure IWB-2500-17 during each inspection interval. Supplementary surface examiantion may be performed on interior and/or exterior surfaces to assist in determining the location of indications detected by volumetric examinations [see IWB-3518.1(d)]. The examinations may be performed at or near the end of the inspection interval.

A.1.11.4 Valve Body Exceeding 4 In. Nominal Pipe Size, Item B12.50

The internal surfaces of at least one valve in each group of valves with the same construction design (e.g., globe, gate, or check valve) and manufacturing method that perform similar functions that exceed 4 inch diameter in the system (e.g., containment isolation and system overpressure protection) shall be visually examined (VT-3) during each inspection interval. The examination may be performed on the same valve selected for volumetric examination of welds. The examinations may be performed at or near the end of the inspection interval.

A.1.12 CATEGORIES B-N-1, INTERIOR OF REACTOR VESSEL; B-N-2, INTEGRALLY WELDED CORE SUPPORT STRUCTURES AND INTERIOR ATTACHMENTS TO REACTOR VESSELS; and B-N-3, REMOVABLE CORE SUPPORT STRUCTURES

A.1.12.1 Reactor Vessel Interior, Item B13.10

The accessible areas of the reactor vessel interior, including the spaces above and below the reactor core that are made accessible by removing components during normal refueling outages, shall be visually examined (VT-3) during the first refueling outage and subsequent refueling outages at approximately 3-year intervals.

A.1.12.2 Boiling Water Reactor Vessel Interior Attachments Within Beltline Region, Item B13.20

The accessible welds in the reactor vessel interior attachments within the beltline region shall be visually examined (VT-1) during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

A.1.12.2.1 Boiling Water Reactor Vessel Interior Attachments Beyond Beltline Region, Item B13.30

The accessible welds in the reactor vessel interior attachments beyond the beltline region shall be visually examined (VT-3) during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

A.1.12.2.2 Boiling Water Reactor Core Support Structure, Item B13.40

The accessible surfaces of the core support structure shall be visually examined (VT-3) during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

A.1.12.3 Pressurized Water Reactor Interior Attachments Within Beltline Region, Item B13.50

The accessible welds in the reactor vessel interior attachments within the beltline region shall be visually examined (VT-1) during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

A.1.12.3.1 Pressurized Water Reactor Interior Attachments Beyond Beltline Region, Item B13.60

The accessible welds in the reactor vessel interior attachments beyond the beltline region shall be visually examined (VT-3) during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

A.1.12.3.2 Core Support Structure for Pressurized Water Reactor Vessels, Item B13.70

The accessible welds and surfaces of the core support structure shall be visually examined (VT-3) each inspection interval. The structure shall be removed from the reactor vessel for examination. The examinations may be performed at or near the end of the inspection interval.

A.1.13 CATEGORY B-O, PRESSURE-RETAINING WELDS IN CONTROL ROD HOUSINGS

A.1.13.1 Welds in Control Rod Drive Housings, Item B14.10

The welds in 10% of the peripheral control rod drive housings shall surface or volumetrically examined in accordance with Figure IWB-2500-18 during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

A.1.14 CATEGORY B-P, ALL PRESSURE-RETAINING COMPONENTS

A.1.14.1 Reactor Vessel Pressure-Retaining Boundary, Item B15.10

The reactor vessel pressure-retaining boundary shall be visually examined (VT-2) during the system leakage test performed in accordance with IWB-5221 during each refueling outage. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c). The pressure-retaining boundary during the system leakage test shall correspond to the reactor coolant system boundary with all valves in the normal position which is required for normal reactor operation startup. The VT-2 examination shall, however, extend to and include the second closed valve at the boundary extremity. A system hydrostatic test (IWB-5222) and the accompanying VT-2 examination are acceptable in lieu of the system leakage test (IWB-5221) and VT-2 examination.

A.1.14.1.1 Reactor Vessel Pressure-Retaining Boundary, Item B15.11

The reactor vessel pressure-retaining boundary shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWB-5222 once per inspection interval. The pressure-retaining boundary during the test shall include all Class 1 components within the system boundary. The examinations may be performed at or near the end of the inspection interval. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c).

A.1.14.2 Pressurizer Pressure-Retaining Boundary, Item B15.20

The pressurizer pressure-retaining boundary shall be visually examined (VT-2) during the system leakage test performed in accordance with IWB-5221 during each refueling outage. System pressure tests for the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c). The pressure-retaining boundary during the system leakage test shall correspond to the reactor coolant system boundary with all valves in the normal position which is required for normal reactor operation startup. The VT-2 examination shall, however, extend to and include the second closed valve at the boundary extremity. A system hydrostatic test (IWB-5222) and the accompanying VT-2 examination are acceptable in lieu of the system leakage test (IWB-5221) and VT-2 examination.

A.1.14.2.1 Pressurizer Pressure-Retaining Boundary, Item B15.21

The pressurizer pressure-retaining boundary shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWB-5222 once per inspection interval. The pressure-retaining boundary during the test shall include all Class 1 components within the system boundary. The examinations may be performed at or near the end of the inspection interval. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. Pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c).

A.1.14.3 Steam Generator Pressure-Retaining Boundary, Item B15.30

The steam generator pressure-retaining boundary shall be visually examined (VT-2) during the system leakage test performed in accordance with IWB-5221 during each refueling outage. System pressure tests for the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c). The pressure-retaining boundary during the system leakage test shall correspond to the reactor coolant system boundary with all valves in the normal position which is required for normal reactor operation startup. The VT-2 examination shall, however, extend to and include the second closed

valve at the boundary extremity. A system hydrostatic test (IWB-5222) and the accompanying VT-2 examination are acceptable in lieu of the system leakage test (IWB-5221) and VT-2 examination.

A.1.14.3.1 Steam Generator Pressure-Retaining Boundary, Item B15.31

The steam generator pressure-retaining boundary shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWB-5222 during each refueling outage. The examinations may be performed at or near the end of the inspection interval. The pressure-retaining boundary during the test shall include all Class I components within the system boundary. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c).

A.1.14.4 Heat Exchanger Pressure-Retaining Boundary, Item B15.40

The heat exchanger pressure-retaining boundary shall be visually examined (VT-2) during the system leakage test performed in accordance with IWB-5221 during each refueling outage. System pressure tests for the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c). The pressure-retaining boundary during the system leakage test shall correspond to the reactor coolant system boundary with all valves in the normal position which is required for normal reactor operation startup. The VT-2 examination shall, however, extend to and include the second closed valve at the boundary extremity. A system hydrostatic test (IWB-5222) and the accompanying VT-2 examination are acceptable in lieu of the system leakage test (IWB-5221) and VT-2 examination.

A.1.14.4.1 Heat Exchanger Pressure-Retaining Boundary, Item B15.41

The heat exchanger pressure-retaining boundary shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWB-5222 once per inspection interval. The pressure-retaining boundary during the test shall include all Class I components within the system boundary. The examinations may be performed at or near the end of the inspection interval. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c).

A.1.14.5 Piping Pressure-Retaining Boundary, Item B15.50

The piping pressure-retaining boundary shall be visually examined (VT-2) during the system leakage test performed in accordance with IWB-5221 during each refueling outage. System pressure tests for the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c). The pressure-retaining boundary during the system leakage test shall correspond to the reactor coolant system boundary with all valves in the normal position which is required for normal reactor operation startup. The VT-2 examination shall, however, extend to and include the second closed valve at the boundary extremity. A system hydrostatic test (IWB-5222) and the accompanying VT-2 examination are acceptable in lieu of the system leakage test (IWB-5221) and VT-2 examination.

A.1.14.5.1 Piping Pressure-Retaining Boundary, Item B15.51

The piping pressure-retaining boundary shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWB-5222 once per inspection interval. The pressure-retaining boundary during the test shall include all Class I components within the system boundary. The examinations may be performed at or near the end of the inspection interval. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c).

A.1.14.6 Pump Pressure-Retaining Boundary, Item B15.60

The pump pressure-retaining boundary shall be visually examined (VT-2) during the system leakage test performed in accordance with IWB-5221 during each refueling outage. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tets for repaired, replaced, or altered components shall be governed by IWA-5214(c). The pressure-retaining boundary during the system leakage test shall correspond to the reactor coolant system boundary with all valves in the normal position which is required for normal reactor operation startup. The VT-2 examination shall however, extend to and include the second closed valve at the boundary extremity. A system hydrostatic test (IWB-5222) and the accompanying VT-2 examination are acceptable in lieu of the system leakage test (IWB-5221) and VT-2 examination.

A.1.14.6.1 Pump Pressure-Retaining Boundary, Item B15.61

The pump pressure-retaining boundary shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWB-5222 once per inspection interval. The pressure-retaining boundary during the test shall include all Class I components within the system boundary. The examinations may be performed at or near the end of the inspection interval. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c).

A.1.14.7 Valve Pressure-Retaining Boundary, Item B15.70

The valve pressure-retaining boundary shall be visually examined (VT-2) during the system leakage test performed in accordance with IWB-5221 during each refueling outage. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tets for repaired, replaced, or altered components shall be governed by IWA-5214(c). The pressure-retaining boundary during the system leakage test shall correspond to the reactor coolant system boundary with all valves in the normal position which is required for normal reactor operation startup. The VT-2 examination shall however, extend to and include the second closed valve at the boundary extremity. A system hydrostatic test (IWB-5222) and the accompanying VT-2 examination are acceptable in lieu of the system leakage test (IWB-5221) and VT-2 examination.

A.1.14.7.1 Valve Pressure-Retaining Boundary, B15.71

The valve pressure-retaining boundary shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWB-5222 once per inspection interval. The pressure-retaining boundary during the test shall include all Class I components within the system boundary. The examinations may be performed at or near the end of the inspection interval. System pressure tests of the reactor coolant system shall be conducted in accordance with IWA-5000. System pressure tests for repaired, replaced, or altered components shall be governed by IWA-5214(c).

A.1.15 CATEGORY B-Q, STEAM GENERATOR TUBING

A.1.15.1 Steam Generator Tubing, Straight Tube Design, Item B16.10

The examination requirements, examination method, and the extent and frequency of examination shall be governed by the plant technical specifications.

A.1.15.2 Steam Generator Tubing, U-Tube Design, Item B16.20

The examination requirements, examination method, and the extent and frequency of examination shall be governed by the plant technical specifications.

A.2 CLASS 2 REQUIREMENTS

A.2.1 CATEGORY C-A, PRESSURE-RETAINING WELDS IN PRESSURE VESSELS

A.2.1.1 Shell Circumferential Welds, Item C1.10

Essentially 100% of the shell circumferential welds at gross structural discontinuities shall be volumetrically examined in accordance with Figure IWC-2500-1 during each inspection interval. A gross structural discontinuity is defined in NB-3213.2. Examples are junctions between shells of different thicknesses, cylindrical shell-to-conical shell junctions, and shell- (or head)-to-flange welds, and head-to-shell welds. For multiple vessels with similar design, size, and service (such as steam generators and heat exchangers), the required examinations may be limited to one vessel or distributed among the vessels.

A.2.1.2 Head Circumferential Weld, Item C1.20

Essentially 100% of the circumferential head-to-shell weld shall be volumetrically examined in accordance with Figure IWC-2520-1 during each inspection interval. For multiple vessels with similar design, size, and service (such as steam generators and heat exchangers), the required examinations may be limited to one vessel or distributed among the vessels.

A.2.1.3 Tubesheet-to-Shell Weld, Item C1.30

Essentially 100% of the tubesheet-to-shell weld shall be volumetrically examined in accordance with Figure IWC-2520-2 during each inspection interval. For multiple vessels with similar design, size, and service (such as steam generators and heat exchangers), the required examinations may be limited to one vessel or distributed among the vessels.

A.2.2 CATEGORY C-B, PRESSURE-RETAINING NOZZLE WELDS IN VESSELS

A.2.2.1 Nozzles in Vessels 1/2 In. or less in Nominal Thickness, Item C2.10

A.2.2.1.1 Nozzle-to-Shell (or Head) Weld, Item C2.11

All nozzles in vessels 1/2 in. or less in nominal thickness at terminal ends of piping runs shall be surface examined in accordance with Figure IWC-2520-3 during each inspection interval. Terminal ends include nozzles welded to or integrally cast in vessels that connect to piping runs (manways and handholes are excluded). Only those piping runs that connect to vessels. Only those piping runs selected for examination under Examination Category C-F are included.

A.2.2.2 Nozzles Without Reinforcing Plate in Vessels Over 1/2 In. in Nominal Thickness, Item C2.20

A.2.2.2.1 Nozzle-to-Shell (or Head) Weld, Item C2.21

The nozzle-to-shell (or head) welds of all nozzles in vessels over 1/2 in. in nominal thickness at terminal ends of piping runs shall be surface and volumetrically examined in accordance with Figure IWC-2500-4(a) or (b) during each inspection interval. Terminal ends include nozzles welded to or integrally cast in vessels that connect to piping runs (manways and handholes are excluded). Only those piping runs selected for examination under Examination Category C-F are included.

A.2.2.2.2 Nozzle Inside Radius Section, Item C2.22

The inside radius sections of all nozzles in vessels over 1/2 in. in nominal thickness at terminal ends of piping runs shall be volumetrically examined in accordance with Figure IWC-2500-4(a) or (b) during each inspection interval. Terminal ends include nozzles welded to or integrally cast in vessels that connect to piping runs (manways and handholes are excluded). Only those piping runs selected for examination under Examination Category C-F are included.

A.2.2.3 Nozzles With Reinforcing Plate in Vessels Over 1/2 In. Nominal Thickness, Item C2.30

A.2.2.3.1 Reinforcing Plate Welds to Nozzle and Vessel, Item C2.31

The reinforcing plate-to-nozzle and vessel welds of all nozzles in vessels over 1/2 in. in nominal thickness at terminal ends of piping runs shall be surface examined in accordance with Figure IWC-2500-4(c) during each inspection interval. Terminal ends include nozzles welded to or integrally cast in vessels that connect to piping runs (manways and handholes are excluded). Only those piping runs selected for examination under Examination Category C-F are included.

A.2.2.3.2 Nozzle-to-Shell (or Head) Welds, Item C2.32

If the nozzle bore in accessible from inside the vessel, the nozzle-to-shell (or head) welds in vessels over 1/2 in. nominal thickness at terminal ends of piping runs shall be volumetrically examined in accordance with Figure IWC-2500-4(c) during each inspection interval. If the nozzle bore is not accessible from inside the vessel, the telltale hole in the reinforcing plate shall be examined for evidence of leakage while the vessel is undergoing the system pressure test (IWC-5221 or IWC-5222) as required by Examination Category C-H. Terminal ends include nozzles welded to or integrally cast in vessels that connect to piping runs (manways and handholes are excluded). Only those piping runs selected for examination under Examination Category C-F are included.

A.2.3 CATEGORY C-C, SUPPORT MEMBERS

A.2.3.1 Integrally Welded Support Attachments in Pressure Vessels, Item C3.10

The weld joints for integrally welded attachments to pressure vessels shall be surface examined over essentially 100% of their lengths in accordance with Figure IWC-2500-5 during the first interval. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 3/4-inch or greater; and (d) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component. In the case of multiple vessels of similar design and service, the required examinations may be conducted on only one vessel. Where multiple vessels are provided with a number of similar attachments, the examination of the attachments may be distributed among the vessels.

A.2.3.2 Integrally Welded Attachments in Piping, Item C3.20

The weld joints for integrally welded attachments to piping shall be surface examined over essentially 100% of their lengths in accordance with Figure IWC-2500-5 during the first interval. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 3/4-inch or greater; and (d) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component. Examinations are also limited to attachments of those components required to be examined under Examination Categories C-F and C-G.

A.2.3.3 Integrally Welded Pump Attachments, Item C3.30

The weld joints for integrally welded attachments to pumps shall be surface examined over essentially 100% of their lengths in accordance with Figure IWC-2500-5 during the first interval. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 3/4-inch or greater; and (d) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component. Examinations are also limited to attachments of those components required to be examined under Examination Categories C-F and C-G.

A.2.3.4 Integrally Welded Valve Attachments, Item C3.40

The weld joints for integrally welded attachments to valves shall be surface examined over essentially 100% of their lengths in accordance with Figure IWC-2500-5 during the first interval. Examination is limited to those integrally welded attachments that meet the following conditions: (a) the attachment is on the outside surface of the pressure-retaining component; (b) the attachment provides component support as defined in NF-1110; (c) the attachment base material design thickness is 3/4-inch or greater; and (d) the attachment weld joins the attachment either directly to the surface of the component or to an integrally cast or forged attachment to the component. Examinations are also limited to attachments of those components required to be examined under Examination Categories C-F and C-G.

A.2.4 CATEGORY C-D, PRESSURE-RETAINING BOLTING GREATER THAN 2 INCHES IN DIAMETER

A.2.4.1 Bolts and Studs in Pressure Vessels, Item C4.10

For bolts and studs in pressure vessels, 100% of the bolts and studs at each bolted connection of components required to be inspected shall be volumetrically examined in accordance with Figure IWC-2500-6 during each inspection interval. Bolting may be examined on one vessel in each system required to be examined that is similar in design, size, function, and service. In addition, where the component contains a group of bolted connections of similar design and size (such as flange connections and manway covers), only one bolted connection among the group need be examined. Bolting may be examined in place under load or upon disassembly of the connection.

A.2.4.2 Bolts and Studs in Piping, Item C4.20

One hundred percent of the bolts and studs at each bolted piping connection shall be volumetrically examined in accordance with Figure IWC-2500-6. The examination of flange bolting in piping systems required to be examined may be limited to the flange connections in pipe runs selected for examination under Examination Category C-F. Bolting may be examined in place under load or upon disassembly of the connection.

A.2.4.3 Bolts and Studs in Pumps, Item C4.30

For pumps, 100% of the bolts and studs at each bolted connection of pumps shall be volumetrically examined in accordance with Figure IWC-2500-6. Bolting on only one pump among a group of pumps in each system required to be examined that have similar designs, sizes, functions, and service is required to be examined. In addition, where one pump contains a group of bolted connections of similar design and size (such as flange connections and manway covers), the examination may be conducted on one bolted connection among the group. Bolting may be examined in place under load or upon disassembly of the connection.

A.2.4.4 Bolts and Studs in Valves, Item C4.40

For valves, 100% of the bolts and studs at each bolted connection of valves shall be volumetrically examined in accordance with Figure IWC-2500-6. Bolting on only one valve among a group of valves in each system required to be examined that have similar designs, sizes, functions, and service is required to be examined. In addition, where the valve contains a group of bolted connections of similar design and size (such as flange connections and manway covers), the examination may be conducted on one bolted connection among the group. Bolting may be examined in place under load or upon disassembly of the connection.

A.2.5 CATEGORY C-F, PRESSURE-RETAINING WELDS IN PIPING

A.2.5.1 Piping Welds 1/2 In. or Less Nominal Wall Thickness, Item C5.10

A.2.5.1.1 Circumferential Welds, Item C5.11

One hundred percent of each circumferential weld 1/2 in. or less nominal wall thickness shall be surface examined in accordance with Figure IWC-2500-7 during each inspection interval. The welds selected for examination shall include

a. all welds at locations where the stresses under the loadings resulting from Normal and Upset plant conditions as calculated by the sum of Equations 9 and 10 in NC-3652 exceed the specified value;

b. all welds at terminal ends (see (e) below) of piping or branch runs;

c. all dissimilar metal welds;

d. additional welds, at structural discontinuities (see (f) below) such that the total number of welds selected for examination includes the following percentages of circumferential piping welds;

For boiling water reactors:

1. none of the welds exempted by IWC-1220;
2. none of the welds in residual heat removal and emergency core cooling systems (see (g) below);
3. 50% of the main steam system welds;
4. 25% of the welds in all other systems.

For pressurized water reactors:

1. none of the welds exempted by IWC-1220;
2. none of the welds in residual heat removal and emergency core cooling systems;

3. 10% of the main steam system welds 8 in. nominal pipe size and smaller;
4. 25% of the welds in all other systems.

e. terminal ends are the extremities of piping runs that connect to structures, components (such as, vessels, pumps, and valves) or pipe anchors, each of which act as rigid restraints or provide at least two degrees of restraint to piping thermal expansion;

f. structural discontinuities include pipe weld joints to vessel nozzles, valve bodies, pump casings, pipe fittings (such as, elbows, tees, reducers, and flanges conforming to ANSI Standard B16.9), and pipe branch connections and fittings;

g. examination requirements are under development.

For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need to be examined for transverse reflectors.

A.2.5.1.2 Longitudinal Welds, Item C5.12

Longitudinal welds 1/2 in. or less nominal wall thickness shall be surface examined in accordance with Figure IWC-2520-7 (2.5 t at the intersecting circumferential weld) during each inspection interval.

A.2.5.2 Piping Welds Over 1/2 In. Nominal Wall Thickness, Item C5.20

A.2.5.2.1 Circumferential Welds, Item C5.21

One hundred percent of each circumferential weld over 1/2 in. nominal wall thickness shall be surface and volumetrically examined in accordance with Figure IWC-2520-7 during each inspection interval. The welds selected for examination shall include

a. all welds at locations where the stresses under the loadings resulting from Normal and Upset plant conditions as calculated by the sum of Equations 9 and 10 in NC-3652 exceed the specified value;

b. all welds at terminal ends (see (e) below) of piping or branch runs;

c. all dissimilar metal welds;

d. additional welds, at structural discontinuities (see (f) below) such that the total number of welds selected for examination includes the following percentages of circumferential piping welds;

For boiling water reactors:

1. none of the welds exempted by IWC-1220;
2. none of the welds in residual heat removal and emergency core cooling systems (see (g) below)
3. 50% of the main steam system welds;
4. 25% of the welds in all other systems.

For pressurized water reactors:

1. none of the welds exempted by IWC-1220;
2. none of the welds in residual heat removal and emergency core cooling systems;
3. 10% of the main steam system welds 8 in. nominal pipe size and smaller;
4. 25% of the welds in all other systems.

e. terminal ends are the extremities of piping runs that connect to structures, components (such as, vessels, pumps, and valves) or pipe anchors, each of which act as rigid restraints or provide at least two degrees of restraint to piping thermal expansion;

f. structural discontinuities include pipe weld joints to vessel nozzles, valve bodies, pump casings, pipe fittings (such as, elbows, tees, reducers, and flanges conforming to ANSI Standard B16.9), and pipe branch connections and fittings;

g. examination requirements are under development.

For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need to be examined for transverse reflectors.

A.2.5.2.2 Longitudinal Welds, Item C5.22

Longitudinal welds over 1/2 in. nominal wall thickness shall be surface and volumetrically examined in accordance with Figure IWC-2520-7 (2.5 t at the intersecting circumferential weld) during each inspection interval.

A.2.5.3 Pipe Branch Connections Greater Than 4 In. Nominal Branch Pipe Size, Item C5.30

A.2.5.3.1 Circumferential Welds, Item C5.31

The surfaces of 100% of each circumferential weld in pipe branch connections shall be examined in accordance with Figure IWC-2520-9 to -13, inclusive, during each inspection interval. The welds selected for examination shall include

a. all welds at locations where the stresses under the loadings resulting from Normal and Upset plant conditions as calculated by the sum of Equations 9 and 10 in NC-3652 exceed the specified value;

b. all welds at terminal ends (see (e) below) of piping or branch runs;

c. all dissimilar metal welds;

d. additional welds, at structural discontinuities (see (f) below) such that the total number of welds selected for examination includes the following percentages of circumferential piping welds;

For boiling water reactors:

1. none of the welds exempted by IWC-1220;
2. none of the welds in residual heat removal and emergency core cooling systems (see (g) below);
3. 50% of the main steam system welds;
4. 25% of the welds in all other systems.

For pressurized water reactors:

1. none of the welds exempted by IWC-1220;
2. none of the welds in residual heat removal and emergency core cooling systems;
3. 10% of the main steam system welds 8 in. nominal pipe size and smaller;
4. 25% of the welds in all other systems.

e. terminal ends are the extremities of piping runs that connect to structures, components (such as, vessels, pumps, and valves) or pipe anchors, each of which act as rigid restraints or provide at least two degrees of restraint to piping thermal expansion;

f. structural discontinuities include pipe weld joints to vessel nozzles, valve bodies, pump casings, pipe fittings (such as, elbows, tees, reducers, and flanges conforming to ANSI Standard B16.9), and pipe branch connections and fittings;

g. examination requirements are under development.

For welds in carbon or low alloy steels, only those welds showing reportable preservice transverse indications need to be examined for transverse reflectors.

A.2.5.3.2 Longitudinal Welds, Item C5.32

Longitudinal welds in pipe branch connections shall be surface examined in accordance with Figures IWC-2500-12 and -13 (2.5 t at the intersecting circumferential weld) during each inspection interval.

A.2.6 CATEGORY C-G, PRESSURE-RETAINING WELDS IN PUMPS AND VALVES

A.2.6.1 Pump Casing Welds, Item C6.10

One hundred percent of all pump casing welds in each piping run examined under Examination Category C-F shall be surface examined in accordance with Figure IWC-2500-8 during each inspection interval. For multiple pumps of similar design, size, function, and service in a system, only one pump among each group of multiple pumps is required to be examined. The examination may be performed from either the inside or outside surface.

A.2.6.2 Valve Body Welds, Item C6.20

One hundred percent of all valve body welds in each piping run examined under Examination Category C-F shall be surface examined in accordance with Figure IWC-2500-8 during each inspection interval. For multiple valves of similar design, size, function, and service in a system, only one valve among each group of multiple valves is required to be examined. The examination may be performed from either the inside or outside surface.

A.2.7 CATEGORY C-H, ALL PRESSURE-RETAINING COMPONENTS

A.2.7.1 Pressure Vessels, Item C7.10

Pressure vessel pressure-retaining boundaries (other than open-ended portions of systems) shall be visually examined (VT-2) during the system leakage test performed in accordance with IWC-5221 during each inspection. No components within the pressure-retaining boundary are exempt or excluded from the examination requirements, except as specified in IWA-5214(c) for repairs and replacements. Where portions of a system are subject to system pressure tests associated with two different system functions, the VT-2 examination need only be performed during the test conducted at the higher of the test pressures of the respective system function. The pressure-retaining boundary includes only those portions of the system required to operate or support

the safety system function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required. A system hydrostatic test (IWC-5222) and accompanying VT-2 examination are acceptable in lieu of the system pressure test (IWC-5221) and VT-2 examination.

A.2.7.1.1 Pressure Vessels, Item C7.20

Pressure vessel pressure-retaining boundaries (other than open-ended portions of systems) shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWC-5222 during each inspection period. No components within the pressure-retaining boundary [as defined by Note (7)] are exempt or excluded from the examination requirements, except as specified in IWA-5214(c) for repairs and replacements. The system hydrostatic test (IWC-5222) shall be conducted at or near the end of each inspection interval or during the same inspection period of each inspection interval of Inspection Program B. The pressure-retaining boundary includes only those portions of the system required to operate or support the safety system function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required.

A.2.7.2 Piping, Item C7.30

Piping pressure-retaining boundaries (other than open-ended portions of systems) shall be visually examined (VT-2) during the system leakage test performed in accordance with IWC-5221 during each inspection period. No components within the pressure-retaining boundary are exempt or excluded from the examination requirements, except as specified in IWA-5214(c) for repairs and replacements. Where portions of a system are subject to system pressure tests associated with two different system functions, the VT-2 examination need only be performed during the test conducted at the higher of the test pressures of the respective system function. The pressure-retaining boundary includes only those portions of the system required to operate or support the safety system function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required. A system hydrostatic test (IWC-5222) and accompanying VT-2 examination are acceptable in lieu of the system pressure test (IWC-5221) and VT-2 examination.

A.2.7.2.1 Piping, Item C7.40

Piping pressure-retaining boundaries (other than open-ended portions of systems) shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWC-5222 during each inspection period. No components within the pressure-retaining boundary [as defined by Note (7)] are exempt or excluded from the examination requirements, except as specified in IWA-5214(c) for repairs and replacements. The system hydrostatic test (IWC-5222) shall be conducted at or near the end of each inspection interval or

during the same inspection period of each inspection interval of Inspection Program B. The pressure-retaining boundary includes only those portions of the system required to operate or support the safety system function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required.

A.2.7.3 Pumps, Item C7.50

Pump pressure-retaining boundaries (other than open-ended portions of systems) shall be visually examined (VT-2) during the system leakage test performed in accordance with IWC-5221 during each inspection period. No components within the pressure-retaining boundary are exempt or excluded from the examination requirements, except as specified in IWA-5214(c) for repairs and replacements. Where portions of a system are subject to system pressure tests associated with two different system functions, the VT-2 examination need only be performed during the test conducted at the higher of the test pressures of the respective system function. The pressure-retaining boundary includes only those portions of the system required to operate or support the safety system function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required. A system hydrostatic test (IWC-5222) and accompanying VT-2 examination are acceptable in lieu of the system pressure test (IWC-5221) and VT-2 examination.

A.2.7.3.1 Pumps, Item C7.60

Pump pressure-retaining boundaries (other than open-ended portions of systems) shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWC-5222 during each inspection period. No components within the pressure-retaining boundary [as defined by Note (7)] are exempt or excluded from the examination requirements, except as specified in IWA-5214(c) for repairs and replacements. The system hydrostatic test (IWC-5222) shall be conducted at or near the end of each inspection interval or during the same inspection period of each inspection interval of Inspection Program B. The pressure-retaining boundary includes only those portions of the system required to operate or support the safety system function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required.

A.2.7.4 Valves, Item C7.70

Valve pressure-retaining boundaries other than open-ended portions of systems) shall be visually examined (VT-2) during the system leakage test in accordance with IWC-5221 during each inspection period. No components within the pressure-retaining boundary are exempt or excluded from the examination requirements, except as specified in IWA-5214(c) for repairs and replacements. Where portions of a system are subject to system pressure tests associated

with two different system functions, the VT-2 examination need only be performed during the test conducted at the higher of the test pressures of the respective system function. The pressure-retaining boundary includes only those portions of the system required to operate or support the safety system function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required. A system hydrostatic test (IWC-5222) and accompanying VT-2 examination are acceptable in lieu of the system pressure test (IWC-5221) and VT-2 examination.

A.2.7.4.1 Valves, Item C7.80

Valve pressure-retaining boundaries (other than open-ended portions of systems) shall be visually examined (VT-2) during the system hydrostatic test performed in accordance with IWC-5222 during each inspection period. No components within the pressure-retaining boundary [as defined by Note (7)] are exempt or excluded from the examination requirements, except as specified in IWA-5214(c) for repairs and replacements. The system hydrostatic test (IWC-5222) shall be conducted at or near the end of each inspection interval or during the same inspection period of each inspection interval of Inspection Program B. The pressure-retaining boundary includes only those portions of the system required to operate or support the safety system function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required.

A.3 CLA REQUIREMENTS

A.3.1 CATEGORY D-A, SYSTEMS IN SUPPORT OF REACTOR SHUTDOWN FUNCTION

A.3.1.1 Pressure-Retaining Components, Item D1.10

Pressure-retaining components in the pressure-retaining boundary shall be visually examined (VT-2) during the system pressure test (IWA-5000/IWD-5221) each inspection period. A system hydrostatic test (IWD-5223) and accompanying VT-2 examination are acceptable in lieu of the system pressure test and VT-2 examination. The system hydrostatic test shall be conducted at or near the end of each inspection interval or during the same inspection period of each inspection interval for Inspection Program B. The system boundary extends up to and including the first normally closed valve or valve capable of automatic closure as required to perform the safety-related system function. There are no exemptions or exclusions from these requirements except as specified in IWA-5214(c).

A.3.1.2 Integral Attachment--Component Supports and Restraints, Item D1.20

Component supports and restraints shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.1.3 Integral Attachment--Mechanical and Hydraulic Snubbers, Item D1.30

Mechanical and hydraulic snubbers shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.1.4 Integral Attachment--Spring Type Supports, Item D1.40

Spring type supports shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.1.5 Integral Attachment--Constant Load Type Supports, Item D1.50

Constant load type supports shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.1.6 Integral Attachment--Shock Absorbers, Item D1.60

Shock absorbers shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.2 CATEGORY D-B, SYSTEMS IN SUPPORT OF EMERGENCY CORE COOLING, CONTAINMENT HEAT REMOVAL, ATMOSPHERIC CLEANUP, AND REACTOR RESIDUAL HEAT REMOVAL

A.3.2.1 Pressure-Retaining Components, Item D2.10

The pressure-retaining components in the pressure-retaining boundary shall be visually examined (VT-2) during the system pressure test (IWA-5000/IWD-5222) each inspection period. A system hydrostatic test (IWD-5223) and accompanying VT-2 examination are acceptable in lieu of the system pressure test and VT-2 examination. The system hydrostatic test shall be conducted at or near the end of each inspection interval or during the same inspection period of each inspection interval for Inspection Program B. The system boundary extends up to and including the first normally closed valve or valve capable of automatic closure as required to perform the safety-related system function. There are no exemptions or exclusions from these requirements except as specified in IWA-5214(c).

A.3.2.2 Integral Attachment--Component Supports and Restraints, Item D2.20

Component supports and restraints shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.2.3 Integral Attachment--Mechanical and Hydraulic Snubbers, Item D2.30

Mechanical and hydraulic snubbers shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.2.4 Integral Attachment--Spring Type Supports, Item D2.40

Spring type supports shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.2.5 Integral Attachment--Constant Load Type Supports, Item D2.50

Constant load type supports shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.2.6 Integral Attachment--Shock Absorbers, Item D2.60

Shock absorbers shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.3 CATEGORY D-C, SYSTEMS IN SUPPORT OF RESIDUAL HEAT REMOVAL FROM SPENT FUEL STORAGE POOL

A.3.3.1 Pressure-Retaining Components, Item D3.10

The pressure-retaining components in the pressure-retaining boundary shall be visually examined (VT-2) during the system pressure test IWA-5000/ IWD-5221 each inspection period. A system hydrostatic test (IWD-5223) and accompanying VT-2 examination are acceptable in lieu of the system pressure test and VT-2 examination. The system hydrostatic test shall be conducted at or near the end of each inspection interval or during the same inspection period of each inspection interval for Inspection Program B. The system

boundary extends up to and including the first normally closed valve or valve capable of automatic closure as required to perform the safety-related system function. There are no exemptions or exclusions from these requirements except as specified in IWA-5214(c).

A.3.3.2 Integral Attachment--Component Supports and Restraints, Item D3.20

Component supports and restraints shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.3.3 Integral Attachment--Mechanical and Hydraulic Snubbers, Item D3.30

Mechanical and hydraulic snubbers shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.3.4 Integral Attachment--Spring Type Supports, Item D3.40

Spring type supports shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.3.5 Integral Attachment--Constant Load Type Supports, Item D3.50

Constant load type supports shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.3.3.6 Integral Attachment--Shock Absorbers, Item D3.60

Shock absorbers shall be visually examined (VT-3) in accordance with Figure IWD-2500-1 during each inspection interval. For multiple components within a system of similar design, function, and service, the integral attachment of only one of the multiple components shall be examined. The integral attachments selected for examination shall correspond to those component supports selected by IWF-2510(b).

A.4 COMPONENT SUPPORTS

A.4.1 CATEGORY F-A, PLATE AND SHELL TYPE SUPPORTS

A.4.1.1 Mechanical Connections to Pressure-Retaining Components and Building Structure, Item F1.10

Mechanical connections to pressure-retaining components and the building structure shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For multiple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.1.2 Weld Connections to Building Structure, Item F1.20

Weld connections to the building structure shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For multiple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.1.3 Weld and Mechanical Connections at Intermediate Joints in Multi-connected Integral and Nonintegral Supports, Item F1.30

Weld and mechanical connections at intermediate joints in multiconnected integral and nonintegral supports shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For multiple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.1.4 Component Displacement Settings of Guides and Stops, Misalignment of Supports, Assembly of Support Items, Item F1.40

Component displacement settings of guides and stops, misalignment of supports, and assembly of support items shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For multiple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.2 CATEGORY F-B, LINEAR TYPE SUPPORTS

A.4.2.1 Mechanical Connections to Pressure-Retaining Components and Building Structure, Item F2.10

Mechanical connections to pressure-retaining components and the building structure shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.2.2 Weld Connections to Building Structure, Item F2.20

Weld connections to the building structure shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.2.3 Weld and Mechanical Connections at Intermediate Joints in Multi-connected Integral and Nonintegral Supports, Item F2.30

Weld and mechanical connections at intermediate joints in multiconnected integral and nonintegral supports shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.2.4 Component Displacement Settings of Guides and Stops, Misalignment of Supports, Assembly of Support Items, Item F2.40

Component displacement settings of guides and stops, misalignment of supports, and assembly of support items shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.3 CATEGORY F-C, COMPONENT STANDARD SUPPORTS

A.4.3.1 Mechanical Connections to Pressure-Retaining Components and Building Structure, Item F3.10

Mechanical connections to pressure-retaining components and the building structure shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.3.2 Weld Connections to Building Structure, Item 3.20

Weld connections to the building structure shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.3.3 Weld and Mechanical Connections at Intermediate Joints in Multi-connected Integral and Nonintegral Supports, Item F3.30

Weld and mechanical connections at intermediate joints in multiconnected integral and nonintegral supports shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.3.4 Component displacement Settings of Guides and Stops, Misalignment of Supports, Assembly of Support Items, Item F3.40

Component displacement settings of guides and stops, misalignment of supports, and assembly of support items shall be visually examined (VT-3) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

A.4.3.5 Spring Type Supports, Constant Load Type Supports, Shock Absorbers, Hydraulic and Mechanical Type Snubbers, Item F3.50

Spring type supports, constant load type supports, shock absorbers, and hydraulic and mechanical type snubbers shall be visually examined (VT-4) in accordance with Article IWF-1300 and Figure IWF-1300-1 during each inspection interval. Component supports selected for examination shall be the supports of those components that are required to be examined under IWB, IWC, IWD, and IWE during the first interval. For mutliple components within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.