Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

September 14, 2001

10 CFR 50.55a

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of)		Docket Nos.	50-260	50-296
Tennessee Valley Authority)			50-327	50-328
			50-390	

BROWNS FERRY NUCLEAR PLANT (BFN), UNITS 2 AND 3, SEQUOYAH NUCLEAR PLANT (SQN), UNITS 1 AND 2, AND WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM - REQUEST FOR RELIEF GISI-1, GISI-2, AND GISPT-1

This letter requests three generic relief requests for the subject TVA plants by proposing alternatives to certain aspects of TVA's ASME Code Programs through the use of Code Cases.

The subject relief requests are based on ASME Code Cases:

GISI-1 — N-574, *NDE Personnel Recertification Frequency, Section XI, Division 1*

GISI-2 — N-597, *Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1*

GISPT-1 — N-616, *Alternative Requirements for VT-2 Visual Examination of Classes 1, 2, and 3 Insulated Pressure Retaining Bolting Connections, Section XI, Division 1*

Enclosure 1 provides generic relief request GISI-1.

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Enclosure 2 provides generic relief request GISI-2. A similar request was approved for the Hope Creek and Salem plants by NRC's letter dated October 12, 2000. TVA's approach to GISI-2 was discussed with the NRC SQN Senior Project Manager on July 24, 2001.

Enclosure 3 provides generic relief request GISPT-1. A similar relief request was approved for Arkansas Nuclear One and Waterford by NRC's letter dated October 13, 2000. Also, GISPT-1 supplements relief request ISPT-08 approved for WBN Unit 1 by NRC's letter dated September 7, 2000. The primary difference is the broader scope of application.

As discussed with the NRC SQN Senior Project Manager, TVA requests that NRC review and approve GISI-2 the end of December 2001 to support work scheduling associated with the spring refueling outage for Sequoyah Unit 2. There is no specific schedule or need for the other two requests.

No new commitments have been made as a result of this letter.

If you should have any questions concerning this matter, please contact R. M. Brown at (423) 751-7228.

Sincerely,

Mark J. Burzynski
Manager
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Enclosures
cc : See page 3

cc (Enclosures):
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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY (TVA)
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
SECTION XI INSERVICE INSPECTION (ISI) PROGRAM

BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2, 3rd 10-YEAR INSPECTION INTERVAL
AND
UNIT 3, 2ND 10-YEAR INSPECTION INTERVAL

SEQUOYAH NUCLEAR PLANT (SQN), UNITS 1 AND 2
2ND 10-YEAR INSPECTION INTERVAL

WATTS BAR NUCLEAR PLANT (WBN), UNIT 1
1ST 10-YEAR INSPECTION INTERVAL

REQUEST FOR RELIEF GISI-1

EXECUTIVE SUMMARY:

TVA is requesting relief from the requalification and certification frequency requirements for Level II Nondestructive Examination (NDE) personnel as specified in Section XI, Division 1, Subsection IWA-2313 of the ASME Boiler and Pressure Vessel Code 1989 Edition. TVA is seeking approval to invoke the provisions of Code Case N-574, "NDE Personnel Recertification Frequency, Section XI, Division 1," in a limited manner to certain Level II NDE qualified TVA personnel. Code Case N-574 allows Level I and Level II personnel to be recertified by qualification examination every five years rather than every three years as specified by IWA-2313.

TVA's Procedures No. IEP-200, "Qualification and Certification Requirements for TVA Nuclear (TVAN) NDE Personnel," and IEP-300, "Qualification and Certification of Ultrasonic TVAN Personnel for Preservice and Inservice ASME XI Examinations," establish the requirements for qualification and certification of TVAN personnel who perform Ultrasonic (UT), Liquid Penetrant (PT), Magnetic Particle (MT), Radiography (RT), Visual (VT-1, VT-2, and VT-3), and Eddy Current (ET) NDE activities in accordance with the requirements of ASME Section XI. These procedures currently comply with the guidelines specified in American Society of Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A, 1984 Edition, as required by ASME Section XI, 1989 Edition, no Addenda, and with the guidelines specified in SNT-TC-1A, 1984 Edition, and/or ANSI/ASNT CP-189, 1991 Edition, as required by the ASME Section XI, 1995 Edition with addenda through the 1996 Addenda.

As a result of the rule change to 10 CFR 50.55a dated August 8, 1996, TVA incorporated the requirement for examination of ASME Section XI, Subsection IWE, Class MC components, specified in the 1992 Edition, with the 1992 Addenda. TVA Procedure IEP-200 requires TVAN personnel that perform containment ISI NDE activities in accordance with the requirements of ASME Section XI, 1992 Edition with 1992 Addenda, Subsection IWE, be certified to the requirements of ANSI/ASNT CP-189, 1991, as amended by the ASME Section XI, 1992 Edition with 1992 Addenda paragraph IWA-2300. Additionally, the rule change to 10 CFR 50.55a dated September 22, 1999, incorporated the requirement that personnel qualified for performing UT in accordance with Appendix VIII receive eight hours of annual hands-on training. This training must be completed no earlier than six months prior to performing UT examinations at a facility. TVA Procedure IEP-300 requires TVAN personnel who perform UT examinations in accordance with the requirements of ASME Code Section XI, Appendix VIII, 1995 Edition with 1996 Addenda, receive, on an annual basis, eight hours of hands-on training. This annual training is completed no earlier than six months prior to performing UT. In addition, the six-month time requirement will be satisfied by performance of UT when these examinations are performed within six months of the next performance. NDE annual training in accordance with Appendix VIII requirements is the subject of a previously submitted TVA generic relief request, PDI-1, submitted to NRC by letter dated February 23, 2001. TVA plans to integrate the provisions of this request, if granted, with the approved provisions of PDI-1, if it also is granted.

Pursuant to 10 CFR 50.55a, paragraph (a)(3)(i), NRC Staff approval of GISI-1 is requested based on the position that the proposed alternate use of Code Case N-574 on TVA Level II qualified NDE personnel, on a limited application basis, would provide an acceptable level of quality and safety.

SYSTEM/COMPONENT(S) FOR WHICH RELIEF IS REQUESTED:

Not Applicable

ASME SECTION XI CODE EDITION/ADDENDA:

The applicable plant- and unit-specific ISI Program ASME Section XI Code Editions and Addenda of Record (with incorporated ASME Code Cases, as approved) include:

BFN Unit 2:	1995 Edition with addenda through the 1996 Addenda (95A96)
BFN Unit 3:	1989 Edition, no Addenda
SQN Unit 1:	1989 Edition, no Addenda
SQN Unit 2:	1989 Edition, no Addenda
WBN Unit 1:	1989 Edition, no Addenda

Note: The requirements for the recertification frequency of the 95A96 ASME Section XI Code, Sub-article IWA-2314, are the same for the requirements shown in the 1989 Edition Sub-article IWA-2313. This request is intended to address the requirements in the two above Sub-articles, as appropriate, for the particular site program's ASME Code edition or addenda of record.

CODE REQUIREMENTS:

ASME Code Section XI, 1989 Edition, no Addenda, Subarticle IWA-2300, paragraph IWA-2313, "Certification and Recertification," states: "Personnel shall be qualified by examination and shall be certified in accordance with SNT-TC-1A. Level I and Level II personnel shall be recertified by qualification examinations every 3-years. Level III personnel shall be recertified by qualification examinations every 5-years."

For later Editions and Addenda paragraph IWA-2313 was revised and renumbered as IWA-2314. Hence, ASME Code Case N-574 specifically addresses paragraph IWA-2314. The requirement for recertification of Level I and II examiners every three years as shown in the applicable Code paragraphs and the approved alternative for the specific requirements remains the same. However, the personnel requalification requirements differ between the 1989 Edition Code requirements and the 95A96 Code requirements in that the 95A96 Code requires examination personnel currently certified by SNT-TC-1A to recertify in accordance with the industry standard ANSI/ASME CP-189. TVA is not proposing to request relief from these specific requirements and only seeks relief from the recertification time interval (of every three years) for certain TVA Level II qualified personnel in the limited application of the ASME Code Case N-574 alternative provisions.

REQUIREMENT FROM WHICH RELIEF IS REQUESTED:

Relief is requested from the requirement for Level II NDE personnel, who have been previously recertified on a three-year basis to be recertified every five years in accordance with ASME Code Case N-574. Under ASME Section XI, paragraph IWA-2313 (paragraph IWA-2314 in later editions), the Level II NDE personnel certified in UT, MT, PT, RT, VT, and ET methods are required to be recertified by qualification examination every three years. With the requirements of Code Case N-574, Level II personnel would be required to only be recertified every five years.

BASIS FOR RELIEF:

Use of Code Case N-574 will reduce the training burden upon the selected TVA NDE personnel and associated costs of the training and allow for increased availability of the individuals to perform the needed exams at TVA's sites. Code Case N-574 was approved by the ASME Code Committee as a consensus process. The Code committee is balanced to ensure that individuals from competent and concerned interests have had an opportunity to participate. In addition, the 1997 Addenda to ASME Section XI incorporated the Code Case requirements into paragraph IWA-2314 and extended Levels I and II recertification intervals to five years. TVA proposes to implement this Code Case in a limited manner and only apply its use to those NDE Level II certified individuals, employed by TVA, who have completed two previous Level II recertifications at the three-year interval.

ALTERNATIVE EXAMINATIONS:

TVA proposes to apply the five-year interval between recertification to NDE Level II examination personnel with a minimum of nine-years experience in a particular NDE method (i.e., individuals that have been recertified a minimum of two times by examination at the three-year intervals in the particular NDE method). Additionally, TVA proposes to ensure that the Level II examiners maintain continuity by performing a minimum of one examination annually in NDE methods for which the examiner is certified. The maximum duration of interrupted service shall not exceed one year and shall be documented. When annual use of a method cannot be confirmed through TVA records, the Level II examiner shall demonstrate capability by performing an examination using the applicable NDE procedure and completing the proper NDE data sheet to the satisfaction of the TVA NDE Level III examiner. Demonstration of capability shall occur prior to the Level II qualified examiner performing a Code required examination in that method. This documented demonstration shall reinstate the examiner's certification for the balance of the certification period. This relief applies only to TVA personnel qualified and certified in accordance with TVA's written practice Procedures No. IEP-200 or IEP-300 and will not apply to staff augmenting examination personnel (contract examiners). Documentation of these annual proficiency examinations is accomplished through the records management processes contained in TVA's NDE procedures.

JUSTIFICATION FOR GRANTING RELIEF:

TVA proposes to ensure that the Level II examiners maintain annual continuity in the methods (UT, MT, VT, PT, RT, and ET) for which certification is extended until recertification (five years). The maximum duration of interrupted service for these NDE methods shall not exceed one year and shall be documented. When annual use of the method cannot be confirmed, prior to the Level II examiner performing an examination in that method, the Level II examiner shall demonstrate capability by performing an examination using the applicable NDE procedure and completing the proper NDE data sheet to the satisfaction of the TVA NDE Level III examiner. This demonstration shall reinstate the examiner's certification.

Additionally, to comply with the 10 CFR 50.55a rule change issued September 22, 1999, as discussed in the *Federal Register* (FR) 64FR51378 (No. 183), paragraph 2.4.1.1.1(3), TVA Level II UT personnel are required to have eight-hour annual training consisting of hands-on practice. This training is required to be completed no earlier than six months prior to performing UT examinations at a site. Alternately, the six-month time requirement is satisfied by performance of UT when these examinations are performed within six-months of the next performance. This will apply to TVA personnel certified Level II in UT.

It should be noted that, although the provisions of Code Case N-574 have been incorporated into the later ASME Code Editions and Addenda, the NRC Staff has specifically proposed that the recertification frequency of the Level I and II remain at the three-year interval based upon the available industry experience data. This proposed limitation was published in the FR, Volume 66, No. 150, dated August 3, 2001, as a provision to the proposed approval for use of the 1998 Edition through the 2000 Addenda of Section XI of the ASME Code. (See the 66FR40630 (No. 150), paragraph 2.2.5, for specific details.) However, TVA's proposed alternative five-year frequency for recertification, on a limited basis, of experienced (minimum nine years) UT, MT, VT, PT, RT, and ET qualified NDE personnel (employed directly within TVA) coupled with the documented annual use of the NDE method, provides reasonable assurance that only highly qualified and experienced NDE personnel will be extended to five years between recertification. In addition, it should also be noted that TVA NDE examiners remain active in the performance of NDE and frequently use several methodologies (per their certifications) throughout the course of a year when performing various exams at the multiple TVA nuclear plant sites. This continued practical performance of various methodologies along with the use of structured NDE procedures assists in keeping the examiner informed and current with respect to the practical factors for the certified methodologies. Thus, an acceptable level of quality and safety is achieved and public health and safety is not endangered by allowing the use of the proposed alternative requirements of Code Case N-574 along with the additional requirements listed above.

Therefore, pursuant to 10 CFR 50.55a, paragraph (a)(3)(i), TVA requests that permission be granted for generic use of ASME Code Case N-574 on the basis that the limited application of the Code Case provisions for TVA's Level II examiners will provide an acceptable level of quality and safety.

IMPLEMENTATION SCHEDULE:

Upon approval by the NRC Staff, the provisions of this request will be implemented during the current ISI intervals for the applicable plant/unit (i.e., the 3rd ISI program interval for BFN Unit 2 and the 2nd ISI program interval for BFN Unit 3 and SQN Units 1 and 2; and the 1st interval for WBN Unit 1).

ATTACHMENT 1
(To Enclosure 1)

ASME Section XI Code Case N-574

"NDE Personnel Recertification Frequency, Section XI, Division 1"

Approval Date: August 14, 1997

See Numeric Index for expiration and any reaffirmation dates.

Case N-574
NDE Personnel Recertification Frequency
Section XI, Division 1

Inquiry: IWA-2314 requires Level I and Level II personnel to be recertified by qualification examination every 3 years. What alternative requirements may be used to recertify Level I and Level II personnel?

Reply: It is the opinion of the Committee that, as an alternative to the 3 year recertification requirements of IWA-2314, Level I and Level II personnel may be recertified by qualification examination every 5 years.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
SECTION XI INSERVICE INSPECTION (ISI) PROGRAM

BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2, 3rd 10-YEAR INSPECTION INTERVAL
AND
UNIT 3, 2ND 10-YEAR INSPECTION INTERVAL

SEQUOYAH NUCLEAR PLANT (SQN), UNITS 1 AND 2
2ND 10-YEAR INSPECTION INTERVAL

WATTS BAR NUCLEAR PLANT (WBN), UNIT 1
1ST 10-YEAR INSPECTION INTERVAL

REQUEST FOR RELIEF GISI-2

EXECUTIVE SUMMARY:

TVA is requesting generic relief from meeting the requirements of paragraph IWA-3100, "Evaluation," of ASME Section XI. Paragraph IWA-3100 requires the analytical evaluation of examination results be conducted and that the minimum allowable wall thickness for ASME Code Class 1, 2, and 3 piping meet the criteria identified in the specific applicable site's program Code of Record edition and addenda. In lieu of the evaluation requirement and acceptance criteria specified in ASME Section XI, TVA requests the use of ASME Section XI Code Case N-597, "Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1," in cases where the application of the Code Case is warranted.

The use of Code Case N-597 allows TVA to evaluate Class 1, 2, and 3 carbon and low-alloy steel piping and fittings which have experienced internal wall thinning as a result of corrosion, including flow-accelerated corrosion. These evaluations will provide for a determination of the continued acceptability and use of the degraded ASME Code Class piping and fittings under certain operating conditions. As an ASME Code approved alternative, Code Case N-597 evaluations provide additional options and acceptance margin for certain wall thinning situations resulting from the expected service induced degradation corrosion mechanisms. The use of this Code Case allows for the use of specific analytical methodologies that enable TVA to evaluate the effects of localized corrosion in the pipe wall and evaluate the resulting impact to the piping component's integrity. As an ASME Code Committee approved alternative Code Case, N-597 provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a, paragraph (a)(3)(i), TVA requests that relief be granted for generic use of ASME Code Case N-597.

Note that a similar request was granted for use by the NRC Staff at the Hope Creek and Salem Nuclear Generating Stations in a letter dated October 12, 2000.

SYSTEM/COMPONENT(S) FOR WHICH RELIEF IS REQUESTED:

The applicable piping addressed in this request includes the ASME Code Class 1, 2, and 3 (or equivalent) carbon and low-alloy steel piping and fittings, within TVA's nuclear power plants, that have experienced internal wall thinning as a result of corrosion, including flow-accelerated corrosion. The Code Case N-597 requirements will be applicable to non-planar flaws and areas of pressure boundary wall thickness degradation that occur in the piping and fittings.

ASME SECTION XI CODE EDITION/ADDENDA:

The applicable plant- and unit-specific ISI Program ASME Section XI Code Editions and Addenda of Record include:

BFN Unit 2:	1995 Edition with addenda through the 1996 Addenda (95A96)
BFN Unit 3:	1989 Edition, no Addenda
SQN Unit 1:	1989 Edition, no Addenda
SQN Unit 2:	1989 Edition, no Addenda
WBN Unit 1:	1989 Edition, no Addenda

Note: The requirements of the 95A96 ASME Section XI Code, Sub-article IWA-3100 for the evaluation of flaws and degraded pipe wall conditions are identical to the requirements shown in the 1989 Edition.

CODE REQUIREMENTS:

Sub-article IWA-3100 of the ASME Section XI Code requires licensees to evaluate and disposition examination results with indicated flaws that exceed the applicable ASME Code acceptance standards. These evaluations shall be made in accordance with the applicable requirements shown in Subsections; IWB for Class 1 pressure retaining components, IWC for Class 2 pressure retaining components, and IWD for Class 3 pressure retaining components, of the site/unit-specific ASME Section XI Repair and Replacements Program's applicable ASME Code Editions and Addenda. These subsections, in turn, provide specific flaw acceptance criteria tables, minimum allowed wall thickness, and evaluation processes which shall be used in the analysis of the acceptability of the degraded piping for continued use in plant operations. The subsections also specify the required disposition of the degraded conditions as to when the flaw must be removed and repaired.

In addition, in the absence of acceptance standards for a particular component examination category or examination methodology being specified in the applicable Code Division, the degraded areas and flaws that exceed the acceptance standards for materials and welds specified in the ASME Section III Edition applicable to the construction of the component shall be evaluated to determine a disposition. In these cases, the dispositions shall be subject to review by the regulatory and enforcement authorities having jurisdiction at the plant site.

REQUIREMENT FROM WHICH RELIEF IS REQUESTED:

Relief is requested from meeting the specific requirements of Sub-article IWA-3100. Sub-article IWA-3100 specifies the process for the disposition of flaw examination evaluations that result in degraded conditions. The flaws and indications are those that would exceed the acceptance criteria for the materials and welds in the ASME Code or other Code applicable to the original construction of the piping component. This basic requirement is identical for BFN, SQN, and WBN. This request seeks relief to use the evaluation processes and requirements of Code Case N-597 in lieu of the current applicable ASME Code requirements in those cases where application of the Code Case is warranted.

BASIS FOR RELIEF:

Compliance with the requirements of the applicable ASME Section XI Code Sub-article IWA-3100 and the associated flaw and degradation limitations in Subsections IWB, IWC, and IWD do not allow for the specialized analysis of localized areas of corrosion/erosion. The ASME Code acceptance criteria requires the repair of flaws or the replacement of piping items where any pipe wall deterioration results in the reduction of the wall thickness below the design basis allowable limits. These gross requirements result in unnecessary plant shutdowns and system outages in order to perform repairs or replacements when a localized analysis methodology would support the integrity of the degraded piping areas for continued operation. Acceptable margins of safety are maintained through the application of the Code Case N-597 analysis methodologies and acceptance criteria.

ALTERNATIVE EXAMINATIONS:

In lieu of the requirements of ASME Section XI Sub-article IWA-3100, TVA proposes to use the provisions of ASME Code Case N-597 for the analytical evaluation of Code Class 1, 2, and 3 (or equivalent) carbon and low-alloy steel piping items that have been subjected to degradation and wall thinning as a result of flow-accelerated or other corrosion phenomena. The provisions of Code Case N-597 may be used in lieu of immediate repair of the piping if the construction Code or the minimum design Code-of-Record allowed wall thickness has been reached in the areas of degradation and in cases where application of the Code Case requirements, in TVA's judgment, is warranted.

Code Case N-597 stipulates that the methods of predicting the rate of wall thickness loss and the predicted remaining wall thickness shall be the responsibilities of the Owner (TVA). TVA currently has detailed procedures in place which provide requirements for calculating remaining life, predicted remaining wall thickness, and calculating wear rates. These analysis and calculation methods for wear rates include processes for multiple examinations of piping or fittings (point-to-point) and single examinations of piping or fittings (band, area, and blanket) methodologies and employ industry standards such as the Electric Power Research Institute's (EPRI) CHECKWORKS, Flow Accelerated Corrosion (FAC) application computer program. TVA's analysis procedures are also based upon the Nuclear Energy Institute (NEI) guideline document NSAC-202L, "Recommendations for an Effective Flow Accelerated Corrosion Program," and incorporate the guidance of the NRC Generic Letter 89-08, "Erosion/Corrosion Induced Pipe Wall Thinning." NRC staff approval of the use of Code Case N-597 allows TVA to incorporate the provisions of N-597 into the analysis processes supporting the current TVA flow-accelerated corrosion procedures. Piping that exceeds the allowable acceptance criteria shown in Code Case N-597 is either repaired or replaced in accordance with TVA's ASME Section XI Repair and Replacements (R&R) Program. A process flow chart of TVA's implementation of the provisions of Code Case N-597 is shown in Attachment 1 of this Enclosure.

In the case of BFN, ASME Code Class 1 equivalent piping components were originally designed, constructed, and installed in accordance with the American National Standards Institute (ANSI) Standard B31.1. Some BFN Class 1 equivalent components contain carbon and low-alloy steel piping which may be subject to flow-accelerated corrosion. For BFN, in accordance with the requirements of Code Case N-597 paragraph -3223(a), the Owner specified evaluation methodology that applies to the Class 1 piping shall be an analysis methodology equivalent to that shown in N-597 paragraph -3600 (for the Class 2 and 3 components), except that the appropriate Class 1 acceptance criteria shall be applied for the specific analysis section, [e.g., in N-597 paragraph -3500(c)]. Because Class 1 piping elements at SQN and WBN are constructed of stainless steel materials, the scope of Code Case N-597 (as defined in N-597 paragraph -1000) does not apply to evaluations of wall thinning in the Class 1 (or equivalent) piping at these facilities.

For requirements of expanded samples and additional examinations, TVA follows the guidelines and procedures shown in TVA's Standard Program and Procedure (SPP) 9.7, "Corrosion Control Program." This TVA program procedure outlines generic processes for the establishment of areas in the plants' piping systems which are to be monitored for degradation as the result of corrosion phenomena.

JUSTIFICATION FOR GRANTING RELIEF:

The use of Code Case N-597 allows for local degradation analysis methods and acceptance criteria that would use predicted wear rates to support the determination that the piping items remain capable of performing their intended pressure boundary function for determined time-frames. In certain cases, these methodologies and their associated acceptance criteria allow for continued interim operation of plant piping systems until such time as ASME Code compliant repairs or replacements can be planned, materials procured, and restoration of the degraded items performed. The methodologies utilized in Code Case N-597 have been developed through industry experience and advanced analytical technologies that allow the analysis of certain types and amounts of erosion-corrosion degradation and the possible determination that the resulting conditions do not prevent the affected piping components from performing their intended safety functions. The accompanying industry guidelines and the allowed analytical processes in Code Case N-597 combine to ensure that sufficient margins of safety are maintained for the integrity of the piping systems, even with the presence of a certain amount of degradation.

TVA currently has detailed procedures in place which provide requirements for calculating remaining life, predicted remaining wall thickness, and wear rates. These analysis and calculation methods for wear rates include processes for point-to-point and band methodologies and employ industry standards such as the EPRI's CHECKWORKS erosion/corrosion analysis program. In addition, TVA's analysis procedures are based upon the NEI guideline document NSAC-202L and incorporate the guidance of the NRC Generic Letter 89-08. These procedures are found in SPP-9.7 and in TVA Metallurgical Engineering Design Standard, DS-M4.2.1, "Flow Accelerated Corrosion Program Methods." This SPP and DS contain specific requirements for additional samples of system piping based upon the examinations results and follows closely the NSAC-202L and NRC Generic Letter 89-08 guidelines. As part of these procedures, TVA has incorporated the guidelines shown in the EPRI standards. The EPRI standards contained wording which used the terms of "should" and "shall" in conjunction with certain requirements of the standard. Although this wording may have been carried over into the TVA procedures, their common meaning and understanding, with respect to the implementation of the requirements, were not. Specifically, the meaning and application of the word "should" in TVA's procedures is consistent with TVA administrative guidance, as shown in the TVA SPP-2.2, "Administration of Technical Procedures," and not with the common interpretation that may be shown in the EPRI NSAC-202L document. The terms "should" and "shall" are defined in TVA Nuclear (TVAN) administrative process for general usage as follows:

- **Shall, Should, and May -** The word "shall" is used to denote a requirement; the word "should" to denote a recommendation; and the word "may," to denote permission, neither a requirement nor a recommendation.

"Shall" is used for absolute requirements normally reserved for regulatory requirements, commitments, specific design based and configuration control requirements, or procedure steps required to be performed in a prescribed manner.

"Should" is used to indicate TVAN management expectations. Deviations from the expectation is a departure from the normal and requires supporting justification based upon the situation, and may require documentation and supervisory and/or management concurrence.

In practice, the use of the word "should" by TVA personnel carries much of the same weight as the word "shall." The procedure user is trained to not think of the use of the word "should" as an activity that can be casually dismissed or waived. In addition, TVA procedures are written to avoid the use of ambiguous terms in procedures and the procedure writer is cautioned to use the three terms carefully and ensure that the proper meaning and understanding is conveyed in the procedure step.

TVA also currently has a design standard for the structural evaluation of wall thinning in pipe. This TVA standard, DS-C1.2.5, "Structural Evaluation of Wall Thinning in Pipe Due to Flow Accelerated Corrosion," is based upon analytical evaluation methodologies and acceptance criteria designed to satisfy the current given system/component's base Code-of-Record allowable stress criteria. DS-C1.2.5 uses the Code Case N-597 evaluation methodologies for non-ASME Code Class piping and non-nuclear safety relating piping in TVA's plants because it is a recognized industry consensus standard. Evaluation methodologies in Code Case N-597 are based upon the precursor Code Case and the methodologies shown in ASME Code Case N-480, "Examination Requirements for Pipe Wall Thinning Due to Single Phase Erosion and Corrosion, Section XI, Division 1." In June 1990, the NRC endorsed the use of the Code Case N-480 analysis methodologies in Generic Letter 90-05, "Guidance for Performing

Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping." However, Code Case N-480 was never approved for use as a generic industry application by licensees, and relief to use the provisions of the generic letter on a limited scope of piping degradation had to be submitted to the NRC Staff on a specific case-by-case basis.

In addition, a similar process to that provided in Code Case N-597 for erosion/corrosion pipe wall thinning evaluations has been provided through the use of ASME Code Case N-513, "Evaluation Criteria for Temporary Acceptance of Flaws in Class 3 Piping." Code Case N-513 has been endorsed for use by the NRC provided Licensees incorporate certain limitations on its use. Code Case N-513 (with the NRC Staff limitations) was approved for generic application in the 10 CFR 50.55a Final Rule, effective September 22, 1999. TVA has incorporated the provisions of Code Case N-513, and the stated 10 CFR 50.55a limitations on its use, into TVA's program on repairs and replacement of ASME Code Class components in Part D of SPP-9.1, "ASME Section XI." As with Code Case N-513, N-597 is a ASME Code Committee consensus approved alternative to the published ASME Section XI Code requirements. In the Code Committee's view, Code Case N-597 is an acceptable method of evaluation. This approved alternative, therefore, provides an acceptable level of quality and safety comparable to the current ASME Section XI Code requirements.

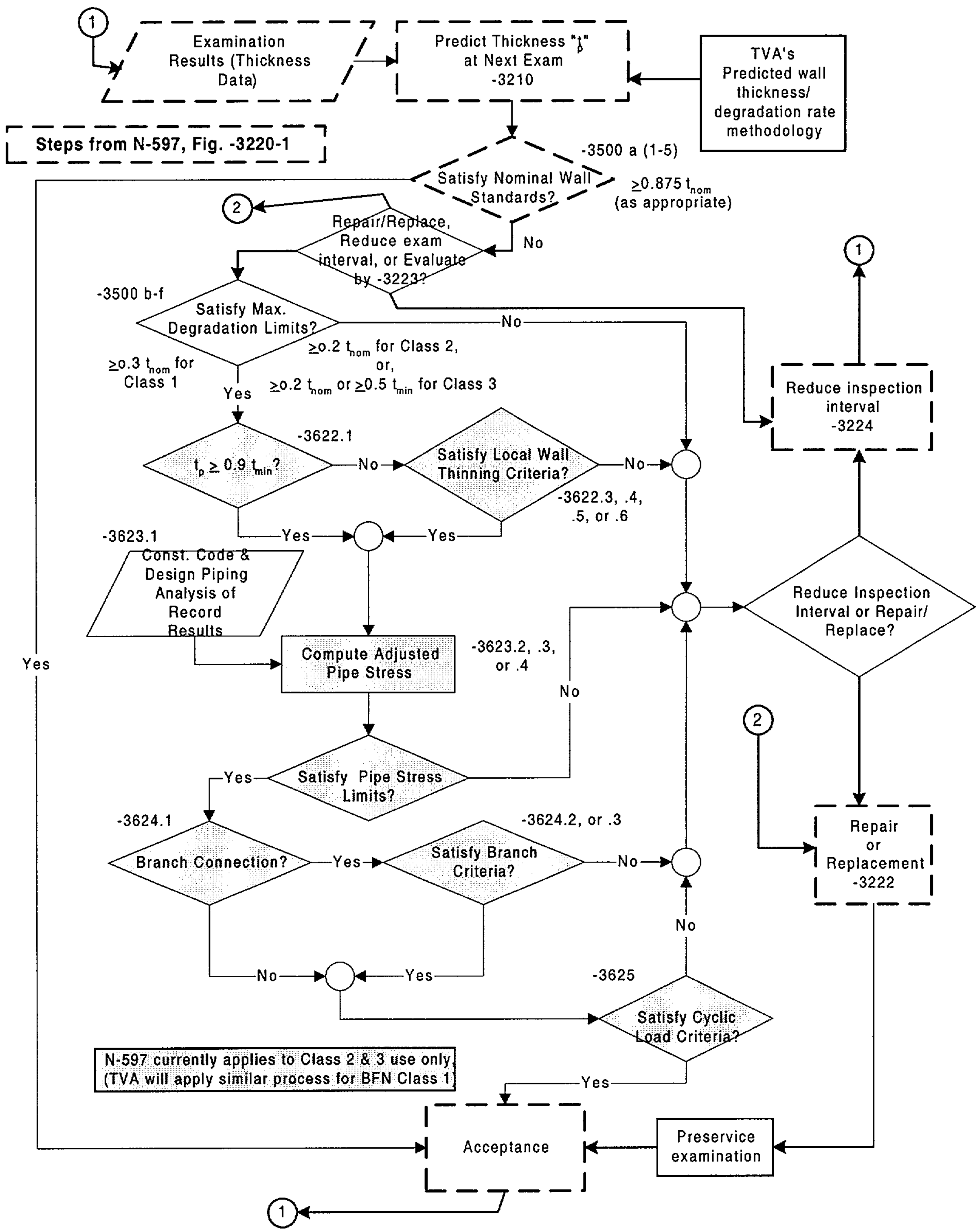
Note that a similar request was granted for use by the NRC Staff at the Hope Creek and Salem Nuclear Generating Stations in a letter dated October 12, 2000.

Accordingly, pursuant to 10 CFR 50.55a, paragraph (a)(3)(i), TVA requests that permission be granted for generic use of ASME Code Case N-597 on the basis that use of the Code Case provides an acceptable level of quality and safety.

IMPLEMENTATION SCHEDULE:

Upon approval by the NRC Staff, TVA will implement the provisions of this request during the current ISI intervals for the applicable plant/unit (i.e., the 3rd ISI program interval for BFN Unit 2 and the 2^{nd} ISI program interval for BFN Unit 3; and SQN Units 1 and 2; and the 1^{st} interval for WBN Unit 1) and perform the indicated evaluations as appropriate.

Attachment 1
(To Enclosure 2)
TVA'S ASME CODE CASE N-597 PROCESS FLOW



ATTACHMENT 2
(To Enclosure 2)

ASME Section XI Code Case
N-597

"Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1"

Approval Date: March 2, 1998

See Numeric Index for expiration and any reaffirmation dates.

Case N-597
Requirements for Analytical Evaluation of Pipe Wall Thinning
Section XI, Division 1

Inquiry: What requirements may be used for analytical evaluation of Class 1, 2, and 3 carbon and low-alloy steel piping items subjected to internal or external wall thinning as a result of flow-accelerated or other corrosion phenomena?

Reply: It is the opinion of the Committee that the following rules may be used.

-1000 SCOPE

This Subsection provides requirements for analytical evaluation of Class 1, 2, and 3 carbon and low-alloy steel piping items (e.g., piping and fittings) with internal or external wall thinning as a result of corrosion phenomena, including flow-accelerated corrosion. These requirements are applicable to nonplanar flaws.

-3000 ACCEPTABLE STANDARDS

-3100 Preservice Examination

Piping items examined prior to commercial service are acceptable for service when the measured wall thickness meets the requirements of the Construction Code.

-3200 Inservice Examination

-3210 General

Upon completion of pipe wall thickness examinations, the predicted remaining wall thickness, t_p, at the time of the next scheduled examination shall be calculated for piping items under evaluation. The predicted remaining wall thickness is the spatial distribution of wall thickness remaining throughout the piping item and may have a unique value at any given location on the piping item. Alternatively, the minimum predicted value, $t_{p\cdot min}$, may be used in determining acceptability for continued service. Methods of predicting the rate of wall thickness loss and the value of t_p shall be the responsibility of the Owner.

-3220 Acceptance

-3221 Acceptance By Examination

Piping items whose examination and evaluation results reveal that t_p meets the acceptance standards of -3500 or the Construction Code are acceptable for continued service. When these criteria are not met, the alternatives of -3222, -3223, and -3224 may be used. Fig. -3220-1 shows a flow chart of the acceptance alternatives.

-3222 Acceptance by Repair/Replacement Activity

Piping items whose thickness is less than that required by -3500, -3223, -3224 shall be corrected by a repair/replacement activity.

-3223 Acceptance by Engineering Evaluation

Piping items whose examination and evaluation results reveal that the criteria of -3221 are not satisfied may be accepted for continued service by engineering evaluation.

(a) For Class 1 piping items, this evaluation shall be conducted in accordance with evaluation methods and criteria developed by the Owner.

(b) For Class 2 and 3 piping items, an acceptable evaluation method and criteria are provided in -3600. Alternative evaluation methods and criteria may be specified by the Owner.

-3224 Acceptance by Reduction of Time to Next Examination

Piping items whose examination and evaluation results reveal that the criteria of -3221 are not satisfied, are acceptable for continued service when the time to the next examination for the affected piping items is reduced such that the acceptance criteria of -3221 or -3223 are met using the t_p for the reduced examination period.

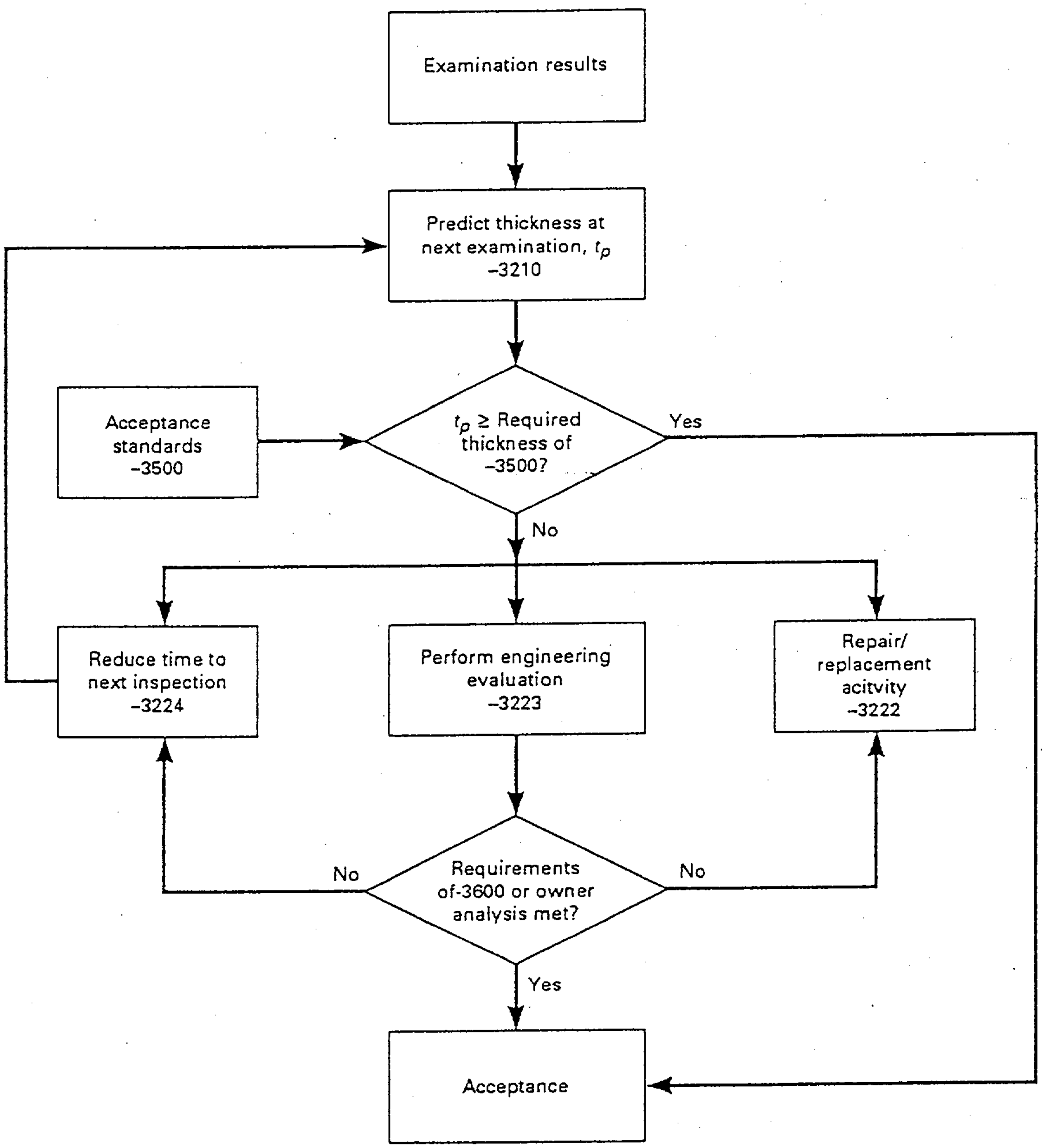
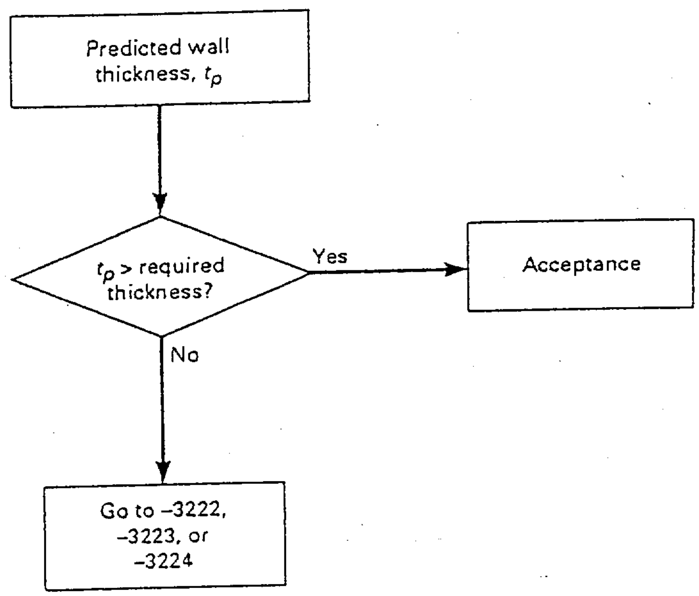


FIG. -3220-1 ACCEPTANCE FLOW CHART

Required Thickness	
Piping item	Reference
Straight pipe	-3500(a)(1)
Elbows	-3500(a)(1)
Reducers[1]	-3500(a)(2)
Tees[1]	-3500(a)(3)
Branch connections[1]	-3500(a)(3)
Designed item	-3500(a)(4)
Other items	-3500(b)

[1]Alternate of -3500(a)(5) may be used.



Thickness Limit	
Code class	Reference
1	-3500(c)
2	-3500(d)
3	-3500(e)[2]

[2]Alternate criteria may be developed in accordance with -3500(f).

FIG. -3500-1 WALL THICKNESS ACCEPTANCE STANDARD FLOW CHART

-3500 Wall Thickness Acceptance Standards

A flow chart for the acceptance standards is shown in Fig. -3500-1.

(a) A Class 1, 2, or 3 butt welded pipe, elbow, branch connection, or reducer piping item is acceptable for continued service without further evaluation when t_p at all locations on the piping item meets the following requirements.

(1) For straight pipe and elbows purchased to a nominal pipe specification with an allowable wall thickness undertolerance of 12.5%, t_p shall be not less than 0.875 t_{nom} except that, for Class 1 short radius elbows, an evaluation shall be conducted to show that the requirements of NB-3642.2 are met.

(2) For the small end of concentric and eccentric reducers, t_p shall be not less than 0.875 t_{nom} for the pipe size at the small end. For the large end, the large end transition and the conical portion, t_p shall not be less than 0.875 t_{nom} for the pipe size at the large end. For the small end transition, the required thickness shall be gradually reduced from that required at the large end to that required at the small end (see Fig. -3622-1).

(3) For tees and branch connections, t_p shall be not less than 0.875 t_{nom} for the same size pipe for regions outside the limits of reinforcement required by the Construction Code used in the evaluation. For regions within the limits of reinforcement, t_p shall be not less than the thickness required to

meet the branch reinforcement requirements of the Construction Code.

(4) For regions of piping items designed to specific wall thickness requirements, including designed weld counterbores and regions with integral reinforcement, t_p shall be not less than the minimum design thickness, including tolerances and excluding any corrosion allowances, specified in the original design analysis for the piping item.

(5) As an alternative to the requirements of -3500(a)(2) and -3500(a)(3), for reducers, tees, or branch connections purchased to fitting standards allowed in Table NB-3132-1 and for which baseline as-installed thickness measurements exist, t_p shall not be less than 0.875 times the as-installed thickness measurements, except that the thickness shall not be less than 0.875 t_{nom}.

(b) Acceptance criteria for Class 1, 2, and 3 pumps, valves, flanges, reducing elbows, socket weld fittings, and any other piping items not covered by -3500(a) shall be the responsibility of the Owner.

(c) For any Class 1 piping item, when t_p at any location is less than 0.3 t_{nom}, further evaluation is beyond the scope of this Case.

(d) For any Class 2 piping item, when t_p at any location is less than 0.2 t_{nom}, further evaluation is beyond the scope of this Case.

(e) Except as provided in *(f)* below, for any Class 3 piping item, when t_p at any location is less than 0.2 t_{nom} or 0.5 t_{min}, whichever is less, further evaluation is beyond the scope of this Case. The value of t_{min} shall be determined in accordance with -3600.

(f) As an alternative to -3500(e), decreased wall thickness, including local through-wall leakage in Class 3 piping items whose maximum operating temperature does not exceed 200°F and whose maximum operating pressure does not exceed 275 psi may be accepted. Evaluation methods and acceptance criteria shall be specified by the Owner.

-3600 Analytical Evaluation for Class 2 and Class 3 Piping Items

-3610 General Requirements

(a) Analytical evaluations shall be conducted in accordance with Construction Code. Later Code Editions and Addenda may be used. Use of later Code Editions and Addenda shall be reviewed for acceptability to the regulatory and enforcement authorities having jurisdiction at the plant site.

(b) Analytical evaluations shall be conducted using the predicted wall thickness, t_p, at the next examination of the piping item. The methods used to determine t_p are the responsibility of the Owner.

(c) A piping item is acceptable for continued service if the minimum pipe wall thickness, branch reinforcement requirements, and piping stress criteria of the Construction Code used in the evaluation are met for all specified loading conditions.

(d) As an alternative to -3610(c), butt welded pipe, elbow, branch connection, and reducer piping items may be evaluated in accordance with -3620.

(e) Alternative evaluation of pumps, valves, flanges, and other piping items are the responsibility of the Owner.

(f) Piping items under evaluation with t_p, exceeding the acceptance standards of -3500 and satisfying -3600 shall be monitored for continued degradation. The frequency and means of monitoring for degradation are the responsibility of the Owner.

-3620 Evaluation of Pipe, Elbows, Branch Connections, and Reducers

-3621 General Requirements

(a) The evaluation shall meet the requirements of -3622 and -3623.

(b) For a branch connection or tee, the region within the limits of reinforcement defined in the Construction Code shall meet the requirements of -3624.

(c) Evaluations shall be conducted using the appropriate piping equations, loadings, load combinations, allowable material properties, and other acceptance standards from the Construction Code used in the evaluation, except as specifically modified by this Case.

(d) When the ratio R/t_p is greater than 50, the potential for buckling of the thinned region shall be evaluated. Evaluation methods and acceptance criteria shall be specified by the Owner.

-3622 Thickness Evaluation

-3622.1 Evaluation for Minimum Wall Thickness

(a) Except as provided in -3622.1(b), the value of t_p at any location shall not be less than 90% of the minimum wall thickness of the piping item, t_{min}, required for design pressure, defined in the Construction Code used in the evaluation, exclusive of any additional corrosion allowance.

(1) For straight pipe, bends, and elbows, t_{min} shall be determined by:

$$t_{min} = \frac{PD_o}{2(S + yP)}$$

(2) For concentric and eccentric reducers, t_{min} at each end shall be equal to t_{min} of straight pipe of the same nominal size as the reducer end. For the conical portion of the reducer and the transition at the large diameter end, t_{min} shall be that of the large diameter end. A gradual transition in t_{min} shall be assumed for the transition at the small end (see Fig. -3622-1).

(3) For branch connections and tees, except at regions providing reinforcement of the opening required by the Construction Code used in the evaluation, t_{min} shall be as required for straight pipe.

(b) When t_p is less than 0.9 t_{min} at any location, additional evaluations may be conducted to determine the allowable local thickness, t_{aloc}, subject to the limitations in (c). The thinned region and the parameters that define the depth and extent of thinning are illustrated in Fig. -3622-2. The allowable local thickness shall be determined in accordance with any one of the methods in -3622.2, -3622.3, -3622.4, -3622.5, or -3622.6.

(c) Local thinning evaluation shall not be allowed for the following:

(1) A region adjacent to any branch connection on the run piping, unless the distance between the center of the branch connection and the edge of the thinned area predicted to be less than t_{min} exceeds D_i, where D_i is the nominal inside diameter of the branch connection and L_m is the maximum dimension of the thinned region less than t_{min}.

(2) At the small end transition of a reducer.

(3) Inner portion of elbows and pipe bends (Fig. -3622-3), excluding a region within $1.5\sqrt{R_{nom}t_{nom}}$ of the butt welds, unless the t_{min} in the evaluation of -3622.2, -3622.3, or -3622.4 is replaced by t'_{min}, defined by:

$$t'_{min} = \left(0.5 + \frac{0.5}{1 + \dfrac{\cos\theta}{(R_b/R_o = +)}}\right) t_{min.pipe}$$

-3622.2 Local Thinning — Limited Transverse Extent

(a) The evaluation procedure shall consider the depth and extent of the affected area and require that the wall thickness exceed t_{min} for a distance that is the greater of $2.5\sqrt{R_{nom}t_{nom}}$ or $2L_{m.avg}$ between adjacent thinned regions, where R_{nom} is the mean radius of the piping item based on nominal wall thickness and $L_{m.avg}$ is the average of the extent of L_m below t_{min} for the adjacent areas (see Fig. -3622-4). Alternatively, the adjacent thinned regions shall be considered a single thinned region in the evaluation.

(b) Provided that the transverse extent of wall thinning predicted to be less than t_{min}, $L_{m(t)}$, is less than or equal to $\sqrt{R_{min}t_{min}}$, the allowable local thickness, t_{aloc}, shall be determined from Table -3622-1, where R_{min} is the mean radius of the piping item based on the minimum wall thickness t_{min}. For straight pipe, Table -3622-1 may be used when $L_{m(t)}$ exceeds $\sqrt{R_{min}t_{min}}$, except that an additional thickness t_b shall be added to the value determined from Table -3622-1.

(c) This approach shall not be used to evaluate a reducer.

-3622.3 Local Thinning — Limited Axial and Transverse Extent

(a) When the maximum extent of wall thinning, L_m, for which thickness is predicted to be less than t_{min} is less than or equal to $2.65\sqrt{R_{min}t_{min}}$, and t_{nom} is greater than 1.13 t_{min}, t_{aloc} shall be determined by satisfying (b) below and (c) or (d) below. This approach requires that adequate reinforcement be available surrounding the thinned area in accordance with (c) or (d). This evaluation approach is not applicable for the following conditions:

(1) Thinned areas adjacent to branch connections, when the reinforcement zone for the thinned area would overlap the required reinforcement of the branch connection.

(2) Thinned areas for which any portion of the reinforcement zone would lie on the conical or small diameter transition zone of a reducer.

(3) Adjacent thinned areas qualified by this approach when the reinforcement zones associated with each area would overlap.

(b) The thickness of the remaining pipe wall at the thinned section is adequate if the following equation is satisfied.

$$\frac{t_{aloc}}{t_{min}} \geq \frac{0.353L_m}{\sqrt{R_{min}t_{min}}}$$

(c) If there is a surrounding reinforcement zone with predicted thickness of at least t_{nom} for a minimum

dimension of $L/2$ in all directions, reinforcement for the thinned area shall satisfy the following equation.

$$\frac{t_{aloc}}{t_{min}} \geq 1 - \left(\frac{1.5\sqrt{R_{min}t_{min}}}{L}\right)\left(\frac{t_{nom}}{t_{min}} - 1\right)$$

(d) As an alternative to (c), the reinforcement adjacent to the thinned area shall justify the following equation.

$$\frac{t_{aloc}}{t_{min}} \geq 1 - \left(\frac{0.935A_{rein}}{L_m t_{min}}\right)$$

-3622.4 Local Thinning — Unlimited Transverse Extent

(a) The evaluation shall include consideration of the depth and extent of the affected area less than t_{min}. The wall thickness shall exceed t_{min} for an axial distance the greater of $2.5\sqrt{R_{nom}t_{nom}}$ or 2 $L_{ma,max}$ between adjacent thinned regions at each circumferential location on the piping item (see Fig. -3622-5). Alternatively, the adjacent thinned regions shall be considered a single thinned region in the evaluation.

(b) Thickness t_{aloc} shall be determined from Table -3622-1.

(c) This approach shall not be used to evaluate a reducer.

-3622.5 Local Thinning — Elbows and Bent Pipe

(a) For locations farther than $\sqrt{R_{min}t_{min}}$ from welds to adjacent piping items, the predicted thickness on the outer portion of an elbow or bend may be less than t_{min} for straight pipe. The local allowable thickness at each location shall be determined by:

$$\frac{t_{aloc}}{t_{min.pipe}} \geq 0.5 + \frac{0.5}{1 + \frac{\cos\theta}{\left(\frac{R_b}{R_{min}}\right)}}$$

where

R_b/R_{min} = ratio of elbow bend radius to mean pipe radius, based on t_{min} for the same size pipe

-3622.6 Local Thinning — Central Portions of Concentric Reducers

(a) For the conical portion of concentric reducers, the local allowable thickness less than t_{min} shall satisfy the following equation:

$$\frac{t_{aloc}}{t_{min,1}} \geq \frac{d_o/D_1}{\cos\alpha}$$

(b) For the flared transition at the small end of a concentric reducer, the local allowable thickness shall be gradually reduced from the value determined at the conical end of the flare to t_{min} for the small end of the reducer.

(c) This approach shall not be used to evaluate eccentric reducers.

-3623 Piping Stress Evaluation

-3623.1 Evaluation Requirements

(a) The effects of piping stresses shall be evaluated in accordance with the equations of the Construction Code used in the evaluation. If the piping analysis is based on nominal piping thickness, allowable stresses may be multiplied by 1.143. Consideration shall be given to changes in the pipe metal area, pipe inside area, section modulus, and stress indices or stress intensification factors, as described in -3623.2, -3623.3 and -3623.4. The effects of cyclic operating conditions shall be addressed in accordance with -3625.

(b) The piping stress evaluation, shall be based on the predicted thickness at each cross section of the piping item that exhibits significant thinning or is affected by a change in stress index or stress intensification factor. Alternatively, the evaluation may be based on the limiting cross section.

-3623.2 Nominal Longitudinal Pressure Stresses

(a) The pipe metal area and the pipe inside area, for the thinned cross section might result in stresses different from those of the piping stress analysis of record.

(b) For simplified analysis, the piping item may be assumed to be uniformly thinned with a thickness of $t_{p.min}$. For this approach, the nominal longitudinal pressure stress shall be determined by:

$$S_p = \frac{PD_o}{4t_{p.min}}$$

When evaluating reducers, the large and small ends shall be evaluated separately. For the large end, $t_{p.min}$ shall be determined from all locations for the large end and conical section. For the small end, $t_{p.min}$ for the entire reducer shall be used.

(c) Detailed stress analysis may be conducted based on the complete set of measurements around the thinned cross-section of the piping item. The nominal longitudinal pressure stress, S_p, shall be determined by:

$$S_p = \frac{PA_i}{A_p}$$

(1) To evaluate piping at a branch connection beyond the limits of reinforcement, it shall be assumed that the entire region within limits of reinforcement is at thickness t_{min} for the unreinforced pipe section, with the outside surface at the pipe nominal outside radius. If excess reinforcement is available within the limits of reinforcement, the excess metal area may be included in A_p.

(2) When evaluating the longitudinal pressure stress in the central cone of a reducer, the stress shall be determined based on the local radius at the cross section and the local t_p at and adjacent to the cross section of interest, except that the resulting stress shall be multiplied by a factor of $1/\cos\alpha$.

(d) When using Code Editions and Addenda that require use of stress indices, the nominal longitudinal stress determined in accordance with (b) and (c) shall be doubled.

-3623.3 Nominal Longitudinal Bending Stresses

(a) Thinning of the piping item cross-sectional area might result in bending stresses different from those of the piping stress analysis of record. The nominal longitudinal bending stress, S_b, for the various loading conditions and load combinations shall be determined by:

$$S_b = \frac{M_b + PA_o\delta}{Z_{min}}$$

(b) For simplified analysis, the piping item section modulus may be based on a uniformly thinned section with thickness $t_{p.min}$. When evaluating reducers, the large and small ends shall be evaluated separately. For the large end, $t_{p.min}$ shall be determined from all locations for the large end and conical section. For the small end, $t_{p.min}$ for the entire reducer shall be used.

(c) Detailed stress analysis may be conducted based on a complete set of measurements around the thinned cross section of the piping item.

(d) When evaluating thinning at the cross section of a branch connection, the requirements of -3623.2(c)(1) shall be met.

-3623.4 Stress Intensification Factors and Stress Indices

The local piping item wall thickness could affect the stress indices or stress intensification factors used in determination of the effective piping stress at a branch connection. When reduced wall thickness could increase these factors, the effect shall be considered by using a reduced piping item thickness determined in accordance with (a), (b), or (c).

(a) Except as allowed in (b) or (c), stress intensification factors or stress indices for a piping item shall be based on the assumption of uniform wall thickness, using a value of $t_{p.min}$ and an associated mean pipe radius in the formula for these factors.

(b) As an alternative (a) above, the factors may be based on the average t_p of the piping item excluding branch reinforcement zones, except that predicted thickness at locations within a distance of twice the pipe nominal wall thickness from butt welds to adjacent components need not be considered. For reducers, the average t_p of the small end shall be used with the small end diameter to determine the factor.

(c) As an alternative to (a) or (b) above, stress analysis of thinned piping items may be conducted to show the effects of wall thinning and the distribution of stresses on an affected piping item.

-3624 Evaluation of Branch Connections

-3624.1 The region of branch connections and tees within limits of reinforcement of the Construction Code used in the evaluation shall be evaluated in accordance with -3624.2 or -3624.3.

-3624.2 Branch Connections Not Requiring Reinforcement

(a) The region on the piping run shall be evaluated in accordance with the requirements of -3622 and -3623, without consideration of the branch connection, except that t_p within a region of radius of D_i of the branch pipe from the center of the branch connection shall not be less than t_{min} for the pipe run.

(*b*) The branch piping shall be evaluated in accordance with the requirements of -3622 and -3623.

-3624.3 Branch Connections Requiring Reinforcement

(*a*) Branch reinforcement requirements shall be determined in accordance with the Construction Code used in the evaluation.

(*b*) For the region of the piping run that provides branch reinforcement, the value of t_p at any location shall not be less than t_{min} for the nominal pipe run plus any required reinforcement at that location.

(*c*) For the region of the branch pipe that provides branch reinforcement, t_p shall not be less than t_{min} for the branch pipe plus any required reinforcement.

-3625 Evaluation for Cyclic Operation

(*a*) For piping items with $t_{p.min}$ not less than 0.75 t_{nom} and subject to no more than 150 equivalent full temperature cycles at the time of the next examination, in accordance with the Construction Code used in the evaluation, piping stress equations that include thermal expansion and anchor movement stresses need not be evaluated.

(*b*) For piping items not meeting the requirements of -3625(a), when the design includes consideration of thermal expansion stresses, the allowable stress range for expansion stress shall be determined in accordance with the Construction Code used in the evaluation, except that the stress intensification factor, *i*, shall be revised to take into account the geometry of the thinned region. As an alternative to establishing a revised stress intensification factor, the stress range reduction factors of Table -3625-1, which are based on an increase in the stress intensification factor by a factor of 2 over the life of the component, may be used.

(*c*) The potential for local overstrain in the thinned region for the combination of maximum sustained plus thermal expansion stresses shall be considered. Sustained loads include pressure, weight, and other sustained mechanical loads. Local overstrain is defined in NC-3672.6(b). Evaluation methods and acceptance criteria shall be specified by the Owner.

-3626 Nomenclature/Definitions

A_o = total cross-sectional area of pipe based on nominal outside diameter, $\frac{\pi D_o^2}{4}$, in.^{2}

A_i = predicted inside cross-sectional area for a pipe that has experienced wall thinning, in.^{2}

A_m = predicted metal cross-sectional area for a pipe that has experienced wall thinning, in.^{2}

A_p = predicted metal cross-sectional area of pipe, in.^{2}

A_{rein} = the reinforcement area available in the pipe wall based on the predicted thickness distribution in excess of t_{min} and within the limits of reinforcement of the Construction Code for an opening with diameter L_m at the region of local thinning, in.^{2}

D_o = nominal outside diameter of piping item (e.g., 10.75 for NPS 10 pipe), in.

d_o = maximum outside diameter of a reducer at the thinned location, in.

D_l = outside diameter at the large end of the reducer, in.

D_i = nominal inside diameter of a branch connection, in.

f = stress range reduction factor

i = stress intensification factor of the Construction Code (not less than 1.0)

I_{min} = predicted minimum moment of inertia of the thinned pipe about the neutral axis of the pipe section, considering all orientations of the section neutral axis, in.^{4}

L = maximum extent of a local thinned area with wall thickness less than t_{nom}, in.

L_m = maximum extent of a local thinned area with wall thickness less than t_{min}, in.

$L_{m(a)}$ = maximum axial extent of a local thinned area with wall thickness less than t_{min}, in.

$L_{ma.max}$ = maximum of the axial extents of two adjacent local thinned areas with wall thickness less than t_{min}, in.

$L_{m(t)}$ = maximum transverse extent of a local thinned area with wall thickness less than t_{min}, in.

$L_{m.avg}$ = average of the extents of thickness less than t_{min} for two adjacent thinned areas, in.

M_b = resulting bending moment from the design analysis of record for each loading condition under consideration, in-lb

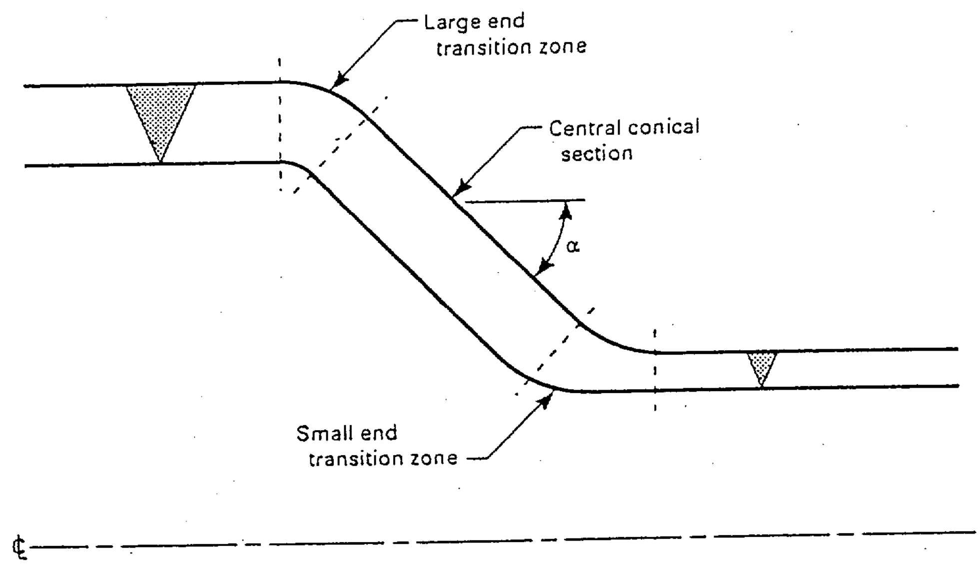
P = design pressure, psi

R_b = bend radius of an elbow to the elbow center line, in.

R_o = nominal outside radius (e.g., 2.25 for NPS 4 pipe), in.

R_{max} = radius to the nominal outside surface of the pipe plus the nominal distance between the center of the pipe and the neutral axis, in.

R_{min} = mean radius of piping item based on the



GENERAL NOTE:
Transition zones extend from the point on the ends where the diameter begins to change to the point on the central cone where the cone angle is constant.

FIG. -3622-1 ZONES OF REDUCER

nominal outside radius and the minimum wall thickness (e.g., 7.85 for NPS 16 pipe with t_{min} = 0.30 in.), in.

R_{nom} = mean radius of piping item based on the nominal radius and thickness (e.g., 6.75 for NPS 14 XS pipe with t_{nom} = 0.5 in.), in.

S = allowable stress for piping item, including joint efficiency factor, E, if applicable, psi.

S_b = maximum nominal bending stress at the thinned section, psi.

S_p = nominal longitudinal pressure stress, psi.

t_{aloc} = allowable local thickness, in.

t_b = uniform thickness, of piping item, required by the Construction Code, to withstand sustained and occasional bending loadings in the absence of pressure, thermal expansion, and anchor movement loadings, in.

t_{min} = minimum wall thickness required by the Construction Code to sustain pressure, exclusive of tolerances and any allowances for corrosion, in.

$t_{min.l}$ = t_{min} for large end of a reducer, in.

$t_{min.pipe}$ = t_{min} for straight pipe, in.

t'_{min} = adjusted minimum thickness for inner portion of an elbow, in.

t_{nom} = nominal thickness of pipe or fitting specified in the applicable industry standard for the piping item. For items designed to specified minimum thickness, the nominal thickness is the design thickness, including corrosion allowance and excluding tolerances, in.

t_p = distribution of predicted local thickness of a piping item at the next scheduled examination, in.

$t_{p.min}$ = minimum predicted local thickness of a piping item at the next scheduled examination, in.

y = factor required by the Construction Code used in the evaluation

Z_{min} = predicted minimum section modulus for the thinned section, including consideration of the shift of the neutral axis of the thinned pipe section, I_{min}/R_{max}, in.^{3}

α = maximum cone angle at the center of a reducer, degree

θ = maximum angle from the center of the outer

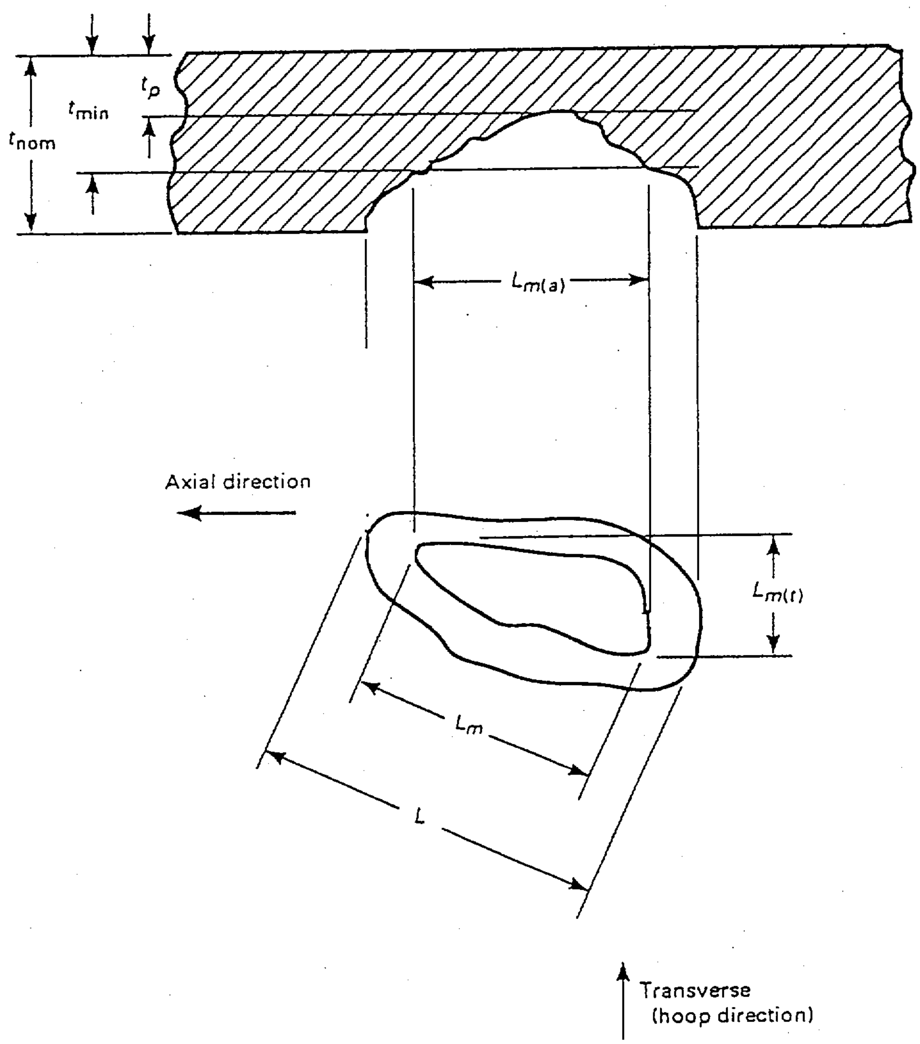


FIG. -3622-2 ILLUSTRATION OF FLOW-ACCELERATED-CORROSION WALL THINNING

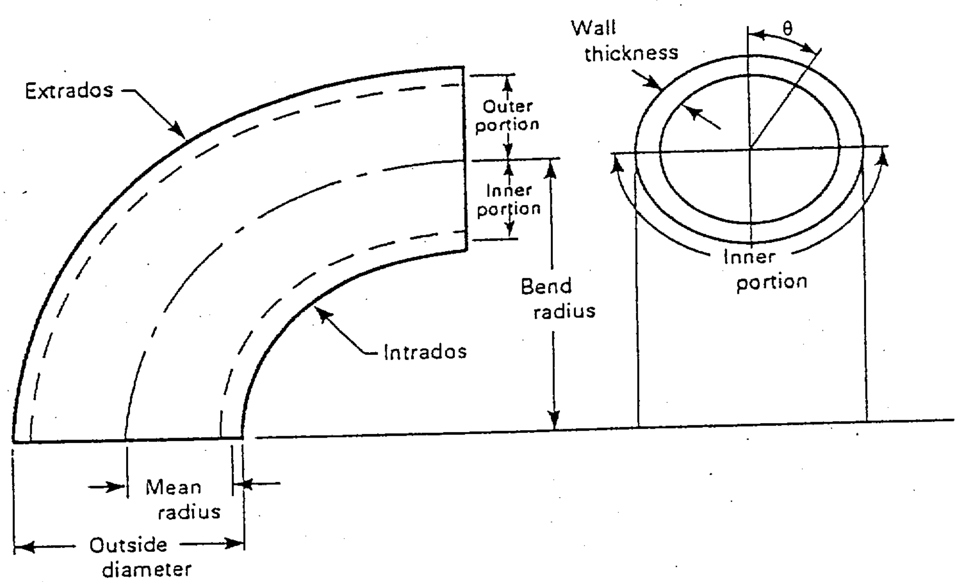
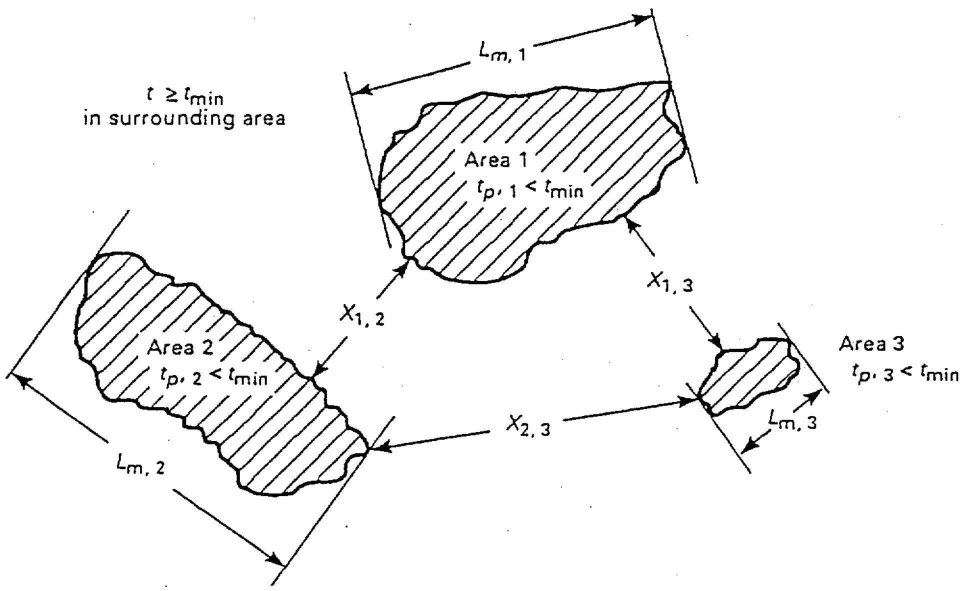


FIG. -3622-3 ELBOW AND NOMENCLATURE



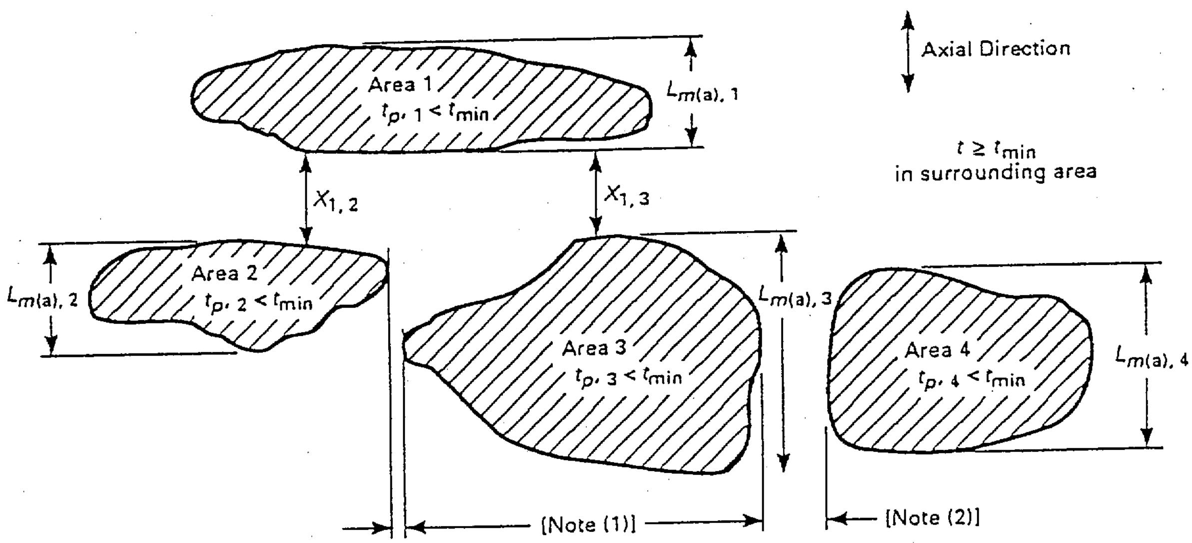
X_{ij} = minimum distance between areas i and j

$L_{m,i}$ = maximum extent of thinned area i

$L_{m,\text{avg}}$ = $0.5\ L_{m,i} + L_{m,j}$

GENERAL NOTE:
Combination of adjacent areas into an equivalent single area shall be based on dimensions and extents prior to combination.

FIG. -3622-4 SEPARATION REQUIREMENTS FOR ADJACENT THINNED AREAS



X_{ij} = minimum distance between areas i and j at any circumferential location on pipe

$L_{m(a),i}$ = maximum extent of thinned area i in axial direction

L_{max} = maximum of the extents $L_{m(a),i}$ and $L_{m(a),j}$ of two adjacent areas

NOTES:

(1) Areas need not be combined into single areas based on separation in the transverse direction, provided that transverse extents of individual adjacent thinned areas do not overlap.

(2) Combination of adjacent areas into an equivalent single area shall be based on dimensions and extents prior to any combination of adjacent areas.

FIG. -3622-5 SEPARATION REQUIREMENTS FOR ADJACENT THINNED AREAS

TABLE -3622-1

$\frac{L_{m(a)}}{\sqrt{R_{min} t_{min}}}$	Allowable Local Thickness t_{aloc}/t_{min}	
	-3622.2	-3622.4
0	0.100	0.100
0.20	0.100	0.261
0.23	0.100	0.300
0.26	0.100	0.375
0.32	0.100	0.477
0.38	0.100	0.551
0.45	0.100	0.616
0.50	0.100	0.651
0.60	0.100	0.703
0.70	0.182	0.742
0.83	0.300	0.778
0.85	0.315	0.782
0.90	0.349	0.794
1.00	0.410	0.813
1.20	0.505	0.841
1.40	0.572	0.860
1.60	0.622	0.873
1.80	0.659	0.883
2.00	0.687	0.891
2.25	0.714	0.897
2.50	0.734	0.900
2.75	0.750	0.900
3.00	0.763	0.900
3.50	0.787	0.900
4.00	0.811	0.900
4.50	0.834	0.900
5.00	0.858	0.900
5.50	0.882	0.900
6.00	0.900	0.900
>6.00	0.900	0.900

GENERAL NOTE:
Interpolation may be used for intermediate values.

one-half of the elbow to the location of the thinned area being evaluated, as measured in the pipe cross section, degree

δ = nominal distance between the center of the pipe and the neutral axis of the thinned piping section, in.

TABLE -3625-1
MODIFIED STRESS RANGE REDUCTION FACTORS

Number of Equivalent Full Temperature Cycles[1], N	Stress Range Reduction Factor[2], f
650 or less	1.0
>650 to 1100	0.9
>1100 to 2000	0.8
>2000 to 3900	0.7
>3900 to 8500	0.6
>8500 to 21,000	0.5
over 21,000	0.4

NOTES:
(1) Cycles to next scheduled inspection or repair/replacement activity.
(2) The modified stress range reduction factors are based on an increase in the stress intensification factor, i, by a factor of 2 over the life of the component.

ENCLOSURE 3
TENNESSEE VALLEY AUTHORITY
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
SECTION XI INSERVICE SYSTEM PRESSURE TEST (ISPT) PROGRAM

BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2, 3rd 10-YEAR INSPECTION INTERVAL AND
UNIT 3, 2ND 10-YEAR INSPECTION INTERVAL

SEQUOYAH NUCLEAR PLANT (SQN), UNITS 1 AND 2
2ND 10-YEAR INSPECTION INTERVAL

WATTS BAR NUCLEAR PLANT (WBN), UNIT 1
1ST 10-YEAR INSPECTION INTERVAL

REQUEST FOR RELIEF GISPT-1

EXECUTIVE SUMMARY:

TVA is requesting relief to use ASME Section XI Code Case N-616, "Alternative Requirements for VT-2 Visual Examination of Classes 1, 2, and 3 Insulated Pressure Retaining Bolted Connections, Section XI, Division 1," for generic application at three TVA operating nuclear plant sites and with its five operating units (BFN Units 2 and 3, SQN Units 1 and 2, and WBN Unit 1). The proposed alternative will be applicable to TVA's ASME Section XI ISPT Programs during the conduct of periodic system pressure tests. Code Case N-616 provides an alternative to the ASME Code requirements shown in paragraph IWA-5242(a), "Insulated Components," requiring the removal of insulation at bolted connections, in piping systems that contain borated water during the conduct of system pressure tests and performance of the associated VT-2. Code Case N-616 allows the conduct of the visual examination, without the removal of insulation from the bolted flange, but limits the application of this alternative to cases in which the flange bolting material is resistant to boric acid degradation. In the performance of VT-2 of the piping flange connections with bolting that is resistant to boric acid corrosion, removal of the insulation is not warranted. Examination with the insulation removed is not expected to result in a significant increase in the detection of degradation of the bolting due to corrosion. Therefore, pursuant to 10 CFR 50.55a, paragraph (a)(3)(i), TVA requests that relief be granted on the basis that the use of the provisions of Code Case N-616 provides an equivalent level of quality and safety.

SYSTEM/COMPONENT(S) FOR WHICH RELIEF IS REQUESTED:

This relief request applies to ASME Code Class 1, 2, or 3 (or equivalent) bolted connections in piping systems containing borated water and which use bolting materials that are resistant to boric acid corrosion.

ASME SECTION XI CODE EDITION/ADDENDA:

The applicable plant- and unit-specific ISPT Program ASME Section XI Code Editions and Addenda of Record include:

BFN Unit 2:	1995 Edition with addenda through the 1996 Addenda (95A96)
BFN Unit 3:	1989 Edition
SQN Unit 1:	1989 Edition
SQN Unit 2:	1989 Edition
WBN Unit 1:	1989 Edition

CODE REQUIREMENTS:

ASME Section XI paragraph, IWA-5242(a) states: "For systems borated for the purpose of controlling reactivity, insulation shall be removed from pressure retaining bolted connections for visual examination VT-2."

REQUIREMENT FROM WHICH RELIEF IS REQUESTED:

This relief request, GISPT-1, seeks relief from meeting the requirement of removing insulation from bolted pressure-retaining flange connections in borated water systems for the connections where the flange bolting material is resistant to boric acid corrosion. In lieu of meeting the stated paragraph IWA-5242(a) requirement for insulation removal, this request seeks permission to use the provisions of ASME Code Case N-616 for bolted connections which utilize corrosion resistant bolting materials.

In the case of WBN, this request, when approved, supplements the existing system pressure test program relief request ISPT -08, previously approved and granted in a letter dated September 7, 2000.

Background:

At TVA's operating nuclear plant sites, several System Pressure Testing Program relief requests concerning the inspection of bolted connections exist which have been reviewed and approved by the NRC Staff. These requests pertain to the examination of the connections and the response and disposition of leakage that is identified at bolted connections. These include relief requests 2-SPT-11, for BFN Unit 2; 3-SPT-4, for BFN Unit 3; requests ISPT-08 and ISPT-07, common for both SQN Units 1 and 2; and ISPT-03, ISPT-06, and ISPT-08, for WBN Unit 1. SQN's request ISPT-08 covers the disposition of leakage encountered at Class 1, 2, and 3 bolted connections and calls for the performance of VT-3 visual examinations on the bolt(s) most effected by the leakage and an evaluation of the bolting for degradation. BFN's requests 2-SPT-11 and 3-SPT-4 and WBN's relief request ISPT-03 also cover the disposition of leakage at Class 1, 2, and 3 bolted connections but differ slightly in that the relief requires the performance of a VT-1 visual exam on the most effected bolt(s). SQN relief request ISPT-07 allows for the examination of Class 1 and 2 bolted connections inside containment without the removal of insulation from around the connections during the system pressure test VT-2 visual examinations (at system operating temperature and pressure conditions) provided the insulation is later removed and the connection examined when the component is cold and depressurized during a refueling outage. WBN's ISPT-06 provides for this same process but limits its application to Class 1 bolted connections. WBN also has an additional approved request (ISPT-08) which allows the insulation not to be removed for the performance of system pressure tests from Class 1 bolted connections within systems that contain borated water for the purposes of reactivity control. WBN's ISPT-08 is allowed provided the bolting materials are resistant to boric acid corrosion. WBN's request ISPT-08 is similar to this request (GISPT-01), in that it allows for the use of the provisions of ASME Code Case N-616 but limits its scope of application to ASME Class 1 bolted connections inside the crane wall in the Reactor Building. GISPT-1 requests the generic application of Code Case N-616 provisions at the three TVA sites and is to be integrated with the other existing approved relief requests. The allowed provisions of the already approved requests (identified above) will remain in place. The implementation of GISPT-1, if approved, applies to Class 1, 2, and 3 bolted connections at the three sites in systems which contain borated water and have corrosion resistant bolting. GISPT-1, consequently, extends the scope of application of the provisions of Code Case N-616 at WBN to the appropriate Class 1, 2, and 3 components. For SQN, ASME Class 1 and 2 (equivalent) bolted connections, inside containment (but outside the scope of Code Case N-616), continue to be tested in accordance with the approved relief request ISPT-07 (i.e., in accordance with Code Case N-533). For WBN, Class 1 bolted connections, inside containment (but outside the scope of Code Case N-616), continue to be tested in accordance with the approved relief request ISPT-06 (i.e., per Code Case N-533).

BASIS FOR RELIEF:

The Code requirement to remove insulation during system pressure tests at bolted connections in borated water systems was based upon the industry experience with the degradation of pressure-retaining bolting. Industry experience had shown that the predominant degradation mechanism of the pressure boundary integrity at flange connections in borated water systems was the result of the corrosion of the non-resistant materials in the flange bolting. Subsequent licensee repairs and replacements have resulted in the replacement of much of this bolting with materials that are compatible with the system design and flange materials and that are also resistant to degradation from the boric acid corrosion. Bolting materials resistant to boric acid corrosion which have an alloy chromium content greater than ten percent, such as SA-564, Grade 630 H1100, greatly reduce the possible failures of flanged connections in borated water systems. As a result, removal of the insulation, during system pressure tests, from around the flanges with boric acid corrosion resistant bolting has become unnecessary because the likelihood of failure is reduced and would approximately be the same as for other types of flange bolting in non-borated water systems. In addition, the use of Code Case (CC) N-616 allows TVA to conduct pressure tests on borated water system piping during plant operations and during plant startup and shutdown activities without requiring plant support personnel to remove or replace the flange insulation under hazardous conditions. The use of CC N-616, in the cases where boric acid corrosion resistant material is present, provides a comparable level of quality and safety during system pressure tests to that provided where flange bolting insulation is not required to be removed (e.g., in non-borated systems).

ALTERNATIVE EXAMINATIONS:

During the conduct of system pressure tests in accordance with the requirements of IW(X)-5000, TVA proposes to perform the tests without the removal of insulation on the bolted flanges in the borated water systems in accordance with the requirements of ASME Code Case N-616. TVA proposes to remove the insulation at flanges and perform the system pressure test VT-2 visual examinations of pressure-retaining bolted connections in borated water systems only in cases where the bolting is not a boric acid corrosion-resistant material. TVA also proposes to conduct the VT-2 of the flanges with the corrosion resistant material in the same manner as non-borated water system piping with pressure retaining bolted connections. In cases where the removal of insulation is required, system pressure testing in accordance with paragraph IWA-5242(a) will continue until such time as the flange bolting may be replaced with corrosion resistance materials.

If evidence of leakage is detected during the conduct of the system pressure test, either by discovery of active leakage or by evidence of boric acid crystals in the immediate region of the bolted flange connections, the insulation is to be removed and the bolted connection examined by personnel, qualified as VT-2 examiners. TVA's response and disposition of leakage encountered at these connections follow the provisions of the existing approved relief requests 2-SPT-11 and 3-SPT-4 at BFN; ISPT-08 at SQN; and ISPT-03 at WBN. The evidence of leakage encountered is to be evaluated for the effects of corrosion and the impact to the component's structural integrity with consideration of the following factors:

A. Size of leak
B. Duration of leak
C. The cause of the leak
D. Bolting and flange material
E. Visual evidence of corrosion with the connection assembled
F. Corrosive properties of the fluid in relation to the bolting and flange material
G. Experience with similar bolting material in similar environments
H. Location of the leak, including degradation of other components in the vicinity of the leakage
I. History of leakage at this location

When the evaluation of the above variables determines that the leaking condition has not degraded the fasteners and the bolted connection possesses sufficient strength to maintain the structural integrity of the joint, then no further action is necessary. However, reasonable attempts to stop the leakage shall be made. If the evaluation of the above variables indicate the need for further evaluation, or, if no evaluation is performed, then the bolt(s) most affected by the leakage are removed and examined. The bolt(s) receive a VT-1 for BFN and WBN; VT-3 for SQN) in accordance with IWA-2211 or IWA-2213, "Visual Examinations VT-2/VT-3," as appropriate, and are evaluated in accordance with IWB-3140 or IWC-3130, "Inservice Inspection Visual Examinations," as necessary. This visual examination (VT-1 or VT-3) may be deferred to the next scheduled outage if the evaluation supports continued service. When the removed bolting shows evidence of rejectable degradation, the remaining bolts shall be removed and receive a visual examination in accordance with the approved relief requests and evaluation in accordance with IWB-3140 or IWC-3130.

TVA also plans to develop a list of the bolted flanges where the provisions of Code Case N-616 are applied. This list is planned to be compiled as the periodic system pressure tests are developed, scheduled, and performed. The flange connection bolting and flange materials are identified and reviewed as part of this process. This list is maintained in the system test data packages. However, this list, at the discretion of the individual site system pressure test program specialist, may be maintained in a retrievable system data file. TVA plans to make this information available at each site for review and examination as it is developed over the inspection interval and documented in the individual site ISPT programs.

JUSTIFICATION FOR GRANTING RELIEF:

System pressure tests performed in accordance with the ASME Section XI Code paragraph IWA-5242(a) require the removal of insulation around bolted connections in piping systems that contain borated water. Removal of the insulation from bolted connections in non-borated water systems is not required by Section XI. Code Case N-616 allows the conduct of the VT-2 examination, without the removal of insulation from bolted connections, but limits the application of this alternative requirement to cases where the bolting material is resistant to boric acid degradation. Industry experience has shown that the removal of the insulation from bolted connections in borated water systems where the flange bolting is resistant to boric acid corrosion is not necessary. Removal of the insulation from these connections is unnecessary because the likelihood of failure is reduced by material controls and maintenance practices to the point of being approximately the same as for other types of flange bolting in non-borated water systems.

A degradation mechanism in bolting, of lesser predominance than the boric acid corrosion degradation, is the occurrence of stress corrosion cracking (SCC) in bolting materials that are resistant to boric acid corrosion but which usually have an alloy chromium content of greater than ten percent. However, industry mitigation measures for this problem have resulted in preventive maintenance and cleanliness criteria that reduced the occurrence of this type of degradation in bolted connections. TVA has employed available industry information, such as that found in the Electric Power Research Institute (EPRI) technical report TR-111472, "Assembling Bolted Connections Using Spiral-Wound Gaskets," in its development of materials control and maintenance and installation practices for pressure boundary bolting. TVA employs the use of thread lubricants and insulation materials, and maintenance practices and installation procedures that maintain control of the flange connection configurations and bolting materials. These programs are structured to ensure that impurities are not present in concentrations or levels that would promote the development of stress corrosion cracking in stainless steel bolted connections.

In addition, TVA design, construction, and installation specifications and maintenance practices, such as bolt elongation measurements and applied torque limits, restrict the amount of pre-load stresses from the torque applied to the bolt during the installation and tightening processes. These practices are designed to limit the bolt pre-load stress due to tightening to less than the recommended limits above which SCC is promoted. Currently, TVA General Engineering Specification G29, Welding, Materials, and Nondestructive Examination," Part B, Process Specification (P.S.)4.M.4.4, limits the amount of preload tensile stress on bolted connections to 45,000 psi, except in cases where vendor recommended torque values for bolt tightening are higher, and in specifically allowed cases where high-strength bolting materials are installed. At BFN and SQN, only, this limiting value of applied preload tensile stress may, in general, be extended to 52,500 psi for bolting, with materials tensile strength of equal to, or greater than, 125,000 psi, with use of proper lubricants, and when additional torque is needed to achieve leak tightness in a given component. This provision of P.S.4.M.4.4 is not allowed for general application at WBN because of the commitment made by TVA and the approval provided in the Safety Evaluation Report (SER) provided by the NRC Staff for the WBN site-specific relief request ISPT-08, as discussed above, except where recommended by component vendor specifications. At WBN, the application of bolt pre-load tensile stresses greater than 45,000 psi that are based upon vendor recommended values are utilized. Industry experience has shown that corrosion-resistant bolting with pre-load stresses below the value of 100,000 psi have a greatly reduced number of failures. The resulting reduction of the failures of bolted connections with corrosion-resistant materials supports the deletion of the requirement to remove the insulation in these areas of borated water systems during system pressure tests. In addition, TVA materials specification, procurement, and installation controls and application processes incorporate industry experience to avoid the use of bolting with material properties which may be susceptible to service condition induced failures. These processes include specific material requirements and procurement controls of critical characteristics for high-strength materials, such as 17-4 precipitation-hardenable (PH) and type 410 stainless steel bolting materials, for application in TVA systems.

One area of concern identified by regulatory agencies is that the long-term operation of systems with bolted connections without the removal of insulation might create environmental conditions under which the degradation of the pressure boundary integrity may be accelerated with system safety function failure occurring before early evidence can be identified. However, such occurrences have been limited by industry practices in the areas of material control, maintenance, and control of system operating environments. Most incidents of pressure boundary leakage have been discovered during normal plant operating conditions by system unit operators during their normal plant operation activities when the insulation is in place and not during periodic system pressure tests. In addition, in most cases where such leakage has been discovered, engineering evaluation has shown that this leakage can be tolerated with little or no impact to the functionality of the system in support of its intended safety function, nor in harm to the surrounding equipment. Industry experience has shown that pressure boundary leakage, if present, can be readily discovered during the periodic system pressure tests under normal plant operating conditions of temperature and pressure and where the insulation is installed. The normal plant routine of startup of the various borated water containing systems usually results in periods of sufficient length that any such pressure boundary leakage is readily revealed. TVA procedures for system pressure tests follow the hold-time requirements in the 1989 Edition of Section XI of the ASME Code. ASME Code requirements dictate that the ASME Class 1 (or equivalent) piping and components undergo a system leakage test following each refueling outage. In Pressurized Water Reactors (SQN and WBN) these components include a major portion of the borated water systems.

Conduct of system pressure tests on the borated water systems frequently must occur during plant operating conditions when the system components are also accessible by personnel performing the component walkdowns. For the system piping within the primary containment areas, and inaccessible during normal plant operations, system pressure tests usually occur during plant start-up or shutdown evolutions when the system piping components are at the required system operating temperatures and pressures. The removal and/or replacement of the insulation, with the frequently required support activities, such as placement and removal of scaffolding in areas to be inspected, results in unnecessary exposure of the craft personnel to the unsafe high temperatures and hazardous working conditions and high radiation areas when the removal of bolted connection insulation is not warranted. The recovery from the inspection process under these conditions also frequently occurs during critical path periods and could substantially increase the outage duration with no added level of quality and safety. The resulting delays unnecessarily impact the cost of plant operation.

Supporting this evaluation are the strong guidelines described in the maintenance practices and the activities that TVA follows upon the discovery of evidence of bolted flange connection degradation. During maintenance activities associated with bolted connections, maintenance craft personnel routinely visually inspect removed bolting for evidence of degradation. Any such degradation is evaluated for the need to repair or replace the bolting material and corrective actions documented in the work process data package. In keeping with the agreed upon provisions of the WBN System Pressure Test Program relief request ISPT-03 and the BFN relief requests 2-SPT-11 and 3-SPT-04, a VT-1 visual examination is performed on any bolting that is removed as the result of the discovery of leakage at a flange connection during the conduct of system pressure tests. In accordance with the SQN relief request ISPT-08, a VT-3 examination is performed on the bolting most effected by the discovered leakage. The performance of a VT-1 exam or a VT-3 exam, ensures that actual detrimental bolt degradation is readily discovered. In the case of the BFN and WBN relief requests, the VT-1 examination required by the associated SERs on the approved relief requests is more stringent than the required corrective actions shown in Section XI paragraph IWA-5250(a)(2), "Corrective Measures."

Note that this request is similar to other requests from TVA and other utilities previously approved for use by the NRC Staff. These approved requests include request CEP-ISI-002 from Entergy Operations, Inc. for use at the Arkansas Nuclear One, Units 1 and 2; and the Waterford Steam Electric Station, Unit 3, as approved in a letter dated October 13, 2000.

The combined effects of TVA's aggressive maintenance practices, strong materials and configuration management procedures, and careful observations of system components during routine plant operation and periodic system pressure tests, make the removal of insulation on flange connections in borated water systems with corrosion-resistant bolting unnecessary. The resulting program provides a sufficient level of quality and safety comparable to the current program. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested from meeting the specific requirements of the ASME Boiler and Pressure Vessel Code, Section XI, paragraph IWA-5242(a) and substituting the use of the provisions of ASME Code Case N-616.

IMPLEMENTATION SCHEDULE:

Upon approval by the NRC Staff, TVA will implement the provisions of this request during the current ISI Program intervals for the applicable plant/unit (i.e., the 3rd ISI program interval for BFN Unit 2 and the 2^{nd} ISI program interval for BFN Unit 3 and SQN Units 1 and 2; and the 1^{st} interval for WBN Unit 1) and conduct the next scheduled examinations accordingly.

ATTACHMENT 1
(To Enclosure 3)

ASME Section XI Code Case

N-616
"Alternative Requirements for VT-2 Visual Examination of Classes 1, 2, and 3 Insulated Pressure Retaining Bolting Connections, Section XI, Division 1"

Approval Date: May 7, 1999
See Numeric Index for expiration and any reaffirmation dates.

Case N-616
Alternative Requirements for VT-2 Visual Examination of Classes 1, 2, and 3 Insulated Pressure Retaining Bolted Connections
Section XI, Division 1

Inquiry: What alternative requirements may be used in lieu of those of IWA-5242(a) for removal of the insulation from Classes 1, 2, and 3 pressure retaining bolted connections to perform a VT-2 visual examination, when the bolting material is resistant to boric acid degradation?

Reply: It is the opinion of the Committee that when corrosive resistant bolting material that is used has a chromium content greater than or equal to 10%, such as SA-564 Grade 630 H1100, SA-453 Grade 660, SB-637 UNS N07718 or SB-637 UNS N07750, it is permissible to perform the VT-2 examination without insulation removal.