Enclosure 1 to SERIAL: HNP-08-038

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
THIRD INTERVAL INSERVICE INSPECTION PROGRAM SUBMITTAL

ISI PROGRAM PLAN
THIRD TEN-YEAR INSPECTION INTERVAL
(170 pages)

Progress Energy

Harris Nuclear Plant

ISI Program Plan
Third Ten-Year Inspection Interval

Commercial Service Date:

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REVISION APPROVAL SHEET

TITLE: ISI Program Plan
~~Third Ten-Year Inspection Interval~~
Harris Nuclear Plant

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Harris Nuclear Plant

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Each time this document is revised, the Revision Approval Sheet will be signed and the following Revision Control Sheet should be completed to provide a detailed record of the revision history. The signatures above apply only to the changes made in the revision noted. Signatures for superseded revisions should be retrievable through Harris Nuclear Plant archives.

REVISION CONTROL SHEET

Major changes should be outlined within the table below. Minor editorial and formatting revisions are not required to be logged.

REVISION	DATE	REVISION SUMMARY
0	05/02/07	Initial issuance. (This ISI Program Plan was developed by Alion Science and Technology Corporation as part of the Third Interval ISI Program update.) Prepared: S. Coleman Reviewed: K. Johnson Approved: D. Lamond

Notes: 1. This ISI Program Plan (Sections 1 - 9 inclusive) is controlled by the Harris Nuclear Plant, Engineering Technical Services Group.

2. Revision 0 of this document was issued as the Third Interval ISI Program Plan and was submitted to the USNRC for review, including approval of the initial Third ISI Interval Relief Requests. Future revisions of this document made within the Third ISI Interval will be maintained and controlled at Harris Nuclear Plant; however, they are not required to be and will not be submitted to the USNRC for approval. The exception to this is that new or revised Relief Requests shall be submitted to the USNRC for safety evaluation and approval.

REVISION SUMMARY

SECTION	EFFECTIVE PAGES	REVISION	DATE
Preface	i to vi	0	05/02/07
1.0	1-1 to 1-18	0	05/02/07
2.0	2-1 to 2-35	0	05/02/07
3.0	3-1 to 3-2	0	05/02/07
4.0	4-1 to 4-2	0	05/02/07
5.0	5-1 to 5-2	0	05/02/07
6.0	6-1 to 6-2	0	05/02/07
7.0	7-1 to 7-21	0	05/02/07
8.0	8-1 to 8-2	0	05/02/07
9.0	9-1 to 9-3	0	05/02/07

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1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

This Inservice Inspection (ISI) Program Plan details the requirements for the examination and testing of ISI Class 1, 2, 3, MC, and CC pressure retaining components, supports, and containment structures at Harris Nuclear Plant (HNP). This ISI Program Plan also includes Containment Inservice Inspection (CISI), Risk-Informed Inservice Inspection (RISI), Augmented Inservice Inspections (AUG), and System Pressure Testing (SPT) requirements imposed on or committed to by HNP. At HNP, the Inservice Testing (IST) Program is maintained and implemented separately from the ISI Program. The IST Basis Document and Program Plan contain all applicable inservice testing requirements.

The Third ISI Interval is effective from May 2, 2007 through May 1, 2017 for Class 1, 2, and 3 components, including their supports. The Second CISI Program is effective from September 9, 2008 through September 8, 2018 for Class MC and CC components. This update will enable all of the ISI and CISI Program components / elements to be based on the same effective Edition and Addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI. The common ASME Code of Record for the Third ISI Interval and the Second CISI Interval is the 2001 Edition through the 2003 Addenda. This ISI Program Plan is controlled and revised in accordance with the requirements of ISI-100 "Control of Inservice Inspection and Testing Activities".

Paragraph IWA-2430(d)(1) of ASME Section XI allows an inspection interval to be extended or decreased by as much as one year, and Paragraph IWA-2430(e) allows an inspection interval to be extended when a unit is out of service continuously for six months or more. The extension may be taken for a period of time not to exceed the duration of the outage. See Tables 1.1-1, 1.1-2, and 1.1-3 for intervals, periods, and extensions that apply to HNP's Third ISI Interval and Second CISI Interval.

The Third ISI Interval and Second CISI Interval are divided into two or three inspection periods as determined by calendar years within the intervals. Tables 1.1-1, 1.1-2, and 1.1-3 identify the period start and end dates for the Third ISI Interval and the Second CISI Interval as defined by Inspection Program B. In accordance with Paragraph IWA-2430(d)(3), the inspection periods specified in these Tables may be decreased or extended by as much as 1 year to enable inspections to coincide with HNP's refueling outages.

TABLE 1.1-1

THIRD ISI INTERVAL/PERIOD/OUTAGE MATRIX
(FOR ISI CLASS 1, 2, AND 3 COMPONENT EXAMINATIONS)

Interval	Period	Outages	
Start Date to End Date	**Start Date to End Date**	**Projected Outage Start Date or Outage Duration**	**Outage Number**
3rd 05/02/07 to 05/01/17	1st 05/02/07 to 05/01/10	Scheduled Fall 2007	R14
		Scheduled Spring 2009	R15
	2nd 05/02/10 to 05/01/14	Scheduled Fall 2010	R16
		Scheduled Spring 2012	R17
		Scheduled Fall 2013	R18
	3rd 05/02/14 to 05/01/17	Scheduled Spring 2015	R19
		Scheduled Fall 2016	R20

TABLE 1.1-2

SECOND CISI INTERVAL/PERIOD/OUTAGE MATRIX
(FOR CISI CLASS MC COMPONENT EXAMINATIONS)

Interval	Period	Outages	
Start Date to End Date[1]	**Start Date to End Date**	**Projected Outage Start Date or Outage Duration**	**Outage Number**
2nd 09/09/08 to 09/08/18	1st 09/09/08 to 09/08/11	Scheduled Spring 2009	R15
		Scheduled Fall 2010	R16
	2nd 09/09/11 to 09/08/15	Scheduled Spring 2012	R17
		Scheduled Fall 2013	R18
		Scheduled Spring 2015	R19
	3rd 09/09/15 to 09/08/18	Scheduled Fall 2016	R20
		Scheduled Spring 2018	R21

TABLE 1.1-3

SECOND CISI INTERVAL/PERIOD/OUTAGE MATRIX
(FOR CISI CLASS CC COMPONENT EXAMINATIONS)

Interval	5-Year Period	Outages	
Start Date to End Date	**Rolling Exam # - Date (2 Year Window)**	**Projected Outage Start Date or Outage Duration**	**Outage Number**
2nd 09/09/08 to 09/08/18	No Section XI Exams	Scheduled Spring 2009	R15
	3rd – 09/07/11 (09/07/10 to 09/06/12)[1]	Scheduled Fall 2010	R16
	No Section XI Exams	Scheduled Spring 2012	R17
	No Section XI Exams	Scheduled Fall 2013	R18
	No Section XI Exams	Scheduled Spring 2015	R19
	4th – 09/07/16 (09/07/15 to 09/06/17)[1]	Scheduled Fall 2016	R20
	No Section XI Exams	Scheduled Spring 2018	R21

Note 1: The CISI Interval for Class CC components parallels the CISI Interval for Class MC components. The actual inspection schedule however is based on a rolling 5 year frequency (+/- 1 year) from the date of completion of the original examinations (09/07/01) performed during the initial September 9, 1996 - September 8, 2001 Rulemaking implementation period. The rolling 5 year inspection schedule for containment concrete is in accordance with the Inservice Inspection Schedule specified in IWL-2400 as modified by the initial regulatory rulemaking.

1.2 Background

The Carolina Power & Light (CP&L) Company, now known commercially as Progress Energy Service Company, LLC, obtained Construction Permit CPPR-18 to build HNP on January 27, 1978. The Docket Number assigned to HNP is 50-400. After satisfactory plant construction and preoperational testing was completed, HNP was granted a full power operating license on January 12, 1987, NPF-63, and subsequently commenced commercial operation on May 2, 1987.

HNP's systems and components were designed and constructed to the requirements of ASME Section III and some to USAS B31.1.0-1967 Edition, the Power Piping Standard. During the design and construction phase, systems and components were classified in accordance with ANSI N18.2-1973 and ANSI N18.2a-1975 as referenced in FSAR Section 3.2.1.1. The Nuclear Steam Supply System (NSSS) was furnished by Westinghouse Electric Corporation and has three Reactor Coolant loops. The Architect Engineer for HNP during construction was Ebasco Services, Incorporated.

Certain limitations are likely to occur due to conditions such as accessibility, geometric configuration, and/or metallurgical characteristics. For some inspection categories, an alternate component may be selected for examination and the code statistical and distribution requirements can still be maintained. If Code required examination criteria cannot be met, a relief request will be submitted in accordance with 10CFR50.55a.

1.3 First Interval ISI Program

Pursuant to the Code Of Federal Regulations (CFR), Title 10, Part 50, Section 55a, *Codes and standards*, (10CFR50.55a), HNP was required to meet the requirements of Paragraph (g), *Inservice inspection requirements*, of that section.

Specifically, Paragraph 10CFR50.55a(g)(4)(i) calls for the inservice inspection requirements of the initial 120 month inspection interval to comply with the requirements of the latest Edition and Addenda of ASME Section XI referenced in Paragraph (b) of 10CFR50.55a on the date 12 months prior the date of issuance of the operating license, subject to the limitations and modifications listed in 10CFR50.55a(b).

HNP was issued an operating license on January 12, 1987. The version of 10CFR50.55a in effect 12 months prior to this date referenced the 1983 Edition with Addenda through the Summer 1983 (83S83) of the ASME Boiler and Pressure Vessel (B&PV) Code, ASME Section XI, titled Rules for Inservice Inspection of Nuclear Power Plant Components. The inservice inspection requirements applicable to nondestructive examination and system pressure testing for the First Inservice Inspection Program were based on these rules. Where portions of other Codes were implemented, as allowed by 10CFR50.55a, those specific Codes were applied. For example, Class 1 piping welds (Examination Category B-J), the extent of examinations complied with the requirements of the ASME Section XI (Tables IWB-2500 and -2600), 1974 Edition with all Addenda through Summer 1975, as permitted by 10CFR50.55a(b)(2)(ii) for those facilities whose application for a construction permit was docketed prior to July 1, 1978.

The HNP First ISI Interval started on May 2, 1987 and was scheduled to end on May 1, 1997. Due to an extended outage (RFO7) and to accommodate an orderly transition to the Second ISI Interval, the First ISI Interval end date was extended to February 1, 1998 as permitted by ASME Section XI.

1.4 Second Interval ISI Program

Pursuant to 10CFR50.55a(g), HNP was required to update the ISI Program at the end of the first ten-year inspection interval. The ISI Program was required to comply with the latest Edition and Addenda of ASME Section XI incorporated by reference in 10CFR50.55a twelve months prior to the start of the Second ISI Interval per 10CFR50.55a(g)(4)(ii).

This ISI Program Plan was developed in accordance with the requirements of 10CFR50.55a and the 1989 Edition, No Addenda of ASME Section XI. Where portions of other Codes were implemented, as allowed by 10CFR50.55a, those specific Codes were applied. This ISI Program Plan addressed Subsections IWA, IWB, IWC, IWD, and IWF of ASME Section XI, and complied with the requirements of Inspection Program B as defined therein.

The HNP Second ISI Interval started on February 2, 1998 due to the First Interval extension and was scheduled to end on May 1, 2007 in accordance with the original pattern of intervals. As allowed by IWA-2430(d)(1), a 1 year extension was taken for the Second ISI Interval until May 1, 2008. This extension will not affect the start of the Third ISI Interval. HNP extended the Second ISI Interval in order to complete the Second ISI Interval examinations. Third ISI Interval examinations may also be performed during this time period, but in no case will a single examination be credited for both intervals.

The HNP Second ISI Interval was effective from February 2, 1998 through May 1, 2008.

1.5 Third Interval ISI Program

Pursuant to 10CFR50.55a(g), licensees are required to update their ISI Programs to meet the requirements of ASME Section XI once every ten years or inspection interval. The ISI Program is required to comply with the latest Edition and Addenda of ASME Section XI incorporated by reference in 10CFR50.55a twelve months prior to the start of the interval per 10CFR50.55a(g)(4)(ii). The start of the Third ISI Interval is May 2, 2007 for HNP in accordance with the original pattern of intervals. Based on this date, the latest Edition and Addenda of ASME Section XI referenced in 10CFR50.55a(b)(2) twelve months prior was the 2001 Edition through the 2003 Addenda.

The HNP Third Interval ISI Program Plan was developed in accordance with the requirements of 10CFR50.55a and the 2001 Edition through the 2003 Addenda of ASME Section XI, subject to the limitations and modifications contained within Paragraph (b) of the regulation. These limitations and modifications are detailed in Table 1.8-1 of this section. This ISI Program Plan addresses Subsections IWA, IWB, IWC, IWD, IWF, Mandatory Appendices, approved ASME Code Cases, approved alternatives through relief requests and Safety Evaluation Reports (SER's), and utilizes Inspection Program B as defined therein.

HNP adopted the EPRI Topical Report TR-112657, Rev. B-A methodology, which was supplemented by Code Case N-578-1, for implementing risk-informed inservice inspections. The RISI Program will be in effect for the entire Third ISI Interval. This approach replaces the categorization, selection, and examination volume requirements for portions of ASME Section XI Examination Categories B-F, B-J, C-F-1, and C-F-2 applicable to HNP with Examination Category R-A as defined in Code Case N-578-1. Implementation of the RISI Program is in accordance with Relief Request I3R-02.

HNP has also adopted the EPRI Topical Report TR-1006937, Rev. 0-A, methodology for additional guidance for adaptation of the RISI evaluation process to Break Exclusion Region (BER) piping, also referred to as the High Energy Line Break (HELB) region. This change to the BER program was made under 10CFR50.59 evaluation criteria. The RISI evaluation for BER piping be in effect for the entire Third ISI Interval.

1.6 First Interval CISI Program

CISI examinations were originally invoked by amended regulations contained within a Final Rule issued by the USNRC. The amended regulation incorporated the requirements of the 1992 Edition through the 1992 Addenda of the ASME Section XI, Subsections IWE and IWL, subject to specific modifications that were included in Paragraphs 10CFR50.55a(b)(2)(ix) and 10CFR50.55a(b)(2)(x).

The final rulemaking was published in the Federal Register on August 8, 1996 and specified an effective date of September 9, 1996. Implementation of the Subsection IWE and IWL Program from a scheduling standpoint was driven by the five year expedited implementation period per 10CFR50.55a(g)(6)(ii)(B), which specified that the examinations required to be completed by the end of the first period of the First CISI Interval (per Table IWE-2412-1) be completed by the effective date (by September 9, 2001).

ASME Section XI Subsections IWE, IWL, Mandatory Appendices, approved ASME Code Cases, and approved alternatives through relief requests and SER's were developed to implement these requirements. The First CISI Interval for HNP was effective from September 9, 1998 through September 8, 2008. As allowed by IWA-2430(d)(1), a 1 year extension was taken for the First CISI Interval until September 8, 2009. This extension will not affect the start of the Second CISI Interval. HNP extended the First CISI Interval in order to complete the First CISI Interval examinations. Second CISI Interval examinations will be performed during this period, but in no case will a single examination be credited for both intervals.

1.7 Second Interval CISI Program

Pursuant to 10CFR50.55a(g), licensees are required to update their CISI Programs to meet the requirements of ASME Section XI once every ten years or inspection interval. The CISI Program is required to comply with the latest Edition and Addenda of ASME Section XI incorporated by reference in 10CFR50.55a twelve months prior to the start of the interval per 10CFR50.55a(g)(4)(ii). The start of the Second CISI Interval is September 9, 2008. Based on this date, the latest Edition and Addenda of ASME Section XI referenced in 10CFR50.55a(b)(2) twelve months prior was the 2001 Edition through the 2003 Addenda.

The HNP Second CISI Interval will be effective from September 9, 2008 through September 8, 2018.

The HNP Second Interval CISI Program Plan was developed in accordance with the requirements of 10CFR50.55a and the 2001 Edition through the 2003 Addenda of ASME Section XI, subject to the limitations and modifications contained within Paragraph (b) of the regulation. These limitations and modifications are detailed in Table 1.8-1 of this section.

This CISI Program Plan addresses Subsections IWE, IWL, Mandatory Appendices, approved ASME Code Cases, approved alternatives through relief requests and SER's, and utilizes Inspection Program B as defined therein.

1.8 Code of Federal Regulations 10CFR50.55a Requirements

There are certain Paragraphs in 10CFR50.55a that list the limitations, modifications, and/or clarifications to the implementation requirements of ASME Section XI. These Paragraphs in 10CFR50.55a that are applicable to HNP are detailed in Table 1.8-1.

TABLE 1.8-1
CODE OF FEDERAL REGULATIONS 10CFR50.55a REQUIREMENTS

10CFR50.55a Paragraphs	Limitations, Modifications, and Clarifications
10CFR50.55a(b)(2)(viii)(E)	**(CISI)** *Examination of concrete containments:* For Class CC applications, the licensee shall evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of or result in degradation to such inaccessible areas. For each inaccessible area identified, the licensee shall provide the following in the ISI Summary Report required by IWA-6000: (*1*) A description of the type and estimated extent of degradation, and the conditions that led to the degradation; (*2*) An evaluation of each area, and the result of the evaluation, and; (*3*) A description of necessary corrective actions.
10CFR50.55a(b)(2)(viii)(F)	**(CISI)** *Examination of concrete containments:* Personnel that examine containment concrete surfaces and tendon hardware, wires, or strands must meet the qualification provisions in IWA-2300. The "owner-defined" personnel qualification provisions in IWL-2310(d) are not approved for use.
10CFR50.55a(b)(2)(ix)(A)	**(CISI)** *Examination of metal containments and the liners of concrete containments:* For Class MC applications, the licensee shall evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of or result in degradation to such inaccessible areas. For each inaccessible area identified, the licensee shall provide the following in the ISI Summary Report as required by IWA-6000: (*1*) A description of the type and estimated extent of degradation, and the conditions that led to the degradation; (*2*) An evaluation of each area, and the result of the evaluation, and; (*3*) A description of necessary corrective actions.

TABLE 1.8-1
CODE OF FEDERAL REGULATIONS 10CFR50.55a REQUIREMENTS

10CFR50.55a Paragraphs	Limitations, Modifications, and Clarifications
10CFR50.55a(b)(2)(ix)(B)	**(CISI)** *Examination of metal containments and the liners of concrete containments:* When performing remotely the visual examinations required by Subsection IWE, the maximum direct examination distance specified in Table IWA-2210-1 may be extended and the minimum illumination requirements specified in Table IWA-2210-1 may be decreased provided that the conditions or indications for which the visual examination is performed can be detected at the chosen distance and illumination.
10CFR50.55a(b)(2)(ix)(F)	**(CISI)** *Examination of metal containments and the liners of concrete containments:* VT-1 and VT-3 examinations must be conducted in accordance with IWA-2200. Personnel conducting examinations in accordance with the VT-1 or VT-3 examination method shall be qualified in accordance with IWA-2300. The "owner-defined" personnel qualification provisions in IWE-2330(a) for personnel that conduct VT-1 and VT-3 examinations are not approved for use.
10CFR50.55a(b)(2)(ix)(G)	**(CISI)** *Examination of metal containments and the liners of concrete containments:* The VT-1 examination method must be used to conduct the examination in Item E4.11 of Table IWE-2500-1. An examination of the pressure-retaining bolted connections in Item E1.11 of Table IWE-2500-1 using the VT-3 examination method must be conducted once each interval. The "owner-defined" visual examination provisions in IWE-2310(a) are not approved for use for VT-1 and VT-3 examinations.

TABLE 1.8-1
CODE OF FEDERAL REGULATIONS 10CFR50.55a REQUIREMENTS

10CFR50.55a Paragraphs	Limitations, Modifications, and Clarifications
10CFR50.55a(b)(2)(ix)(H)	**(CISI)** *Examination of metal containments and the liners of concrete containments:* Containment bolted connections that are disassembled during the scheduled performance of the examinations in Item E1.11 of Table IWE-2500-1 must be examined using the VT-3 examination method. Flaws or degradation identified during the performance of a VT-3 examination must be examined in accordance with the VT-1 examination method. The criteria in the material specification or IWB-3517.1 must be used to evaluate containment bolting flaws or degradation. As an alternative to performing VT-3 examinations of containment bolted connections that are disassembled during the scheduled performance of Item E1.11, VT-3 examinations of containment bolted connections may be conducted whenever containment bolted connections are disassembled for any reason.
10CFR50.55a(b)(2)(ix)(I)	**(CISI)** *Examination of metal containments and the liners of concrete containments:* The ultrasonic examination acceptance standard specified in IWE-3511.3 for Class MC pressure-retaining components must also be applied to metallic liners of Class CC pressure-retaining components.
10CFR50.55a(b)(2)(xi)	**(ISI)** *Class 1 piping:* Licensees may not apply IWB-1220, "Components Exempt from Examination," of Section XI, 1989 Addenda through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, and shall apply IWB-1220, 1989 Edition.
10CFR50.55a(b)(2)(xii)	**(ISI)** *Underwater Welding:* The provisions in IWA-4660, "Underwater Welding," of Section XI, 1997 Addenda through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, are not approved for use on irradiated material.
10CFR50.55a(b)(2)(xviii)(A)	**(ISI)** *Certification of NDE personnel:* Level I and II nondestructive examination personnel shall be recertified on a 3-year interval in lieu of the 5-year interval specified in the 1997 Addenda and 1998 Edition of IWA-2314, and IWA-2314(a) and IWA-2314(b) of the 1999 Addenda through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section.

TABLE 1.8-1
CODE OF FEDERAL REGULATIONS 10CFR50.55a REQUIREMENTS

10CFR50.55a Paragraphs	Limitations, Modifications, and Clarifications
10CFR50.55a(b)(2)(xviii)(B)	**(ISI)** *Certification of NDE personnel:* Paragraph IWA-2316 of the 1998 Edition through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, may only be used to qualify personnel that observe for leakage during system leakage and hydrostatic tests conducted in accordance with IWA-5211(a) and (b), 1998 Edition through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section.
10CFR50.55a(b)(2)(xviii)(C)	**(ISI)** *Certification of NDE personnel:* When qualifying visual examination personnel for VT-3 visual examinations under Paragraph IWA-2317 of the 1998 Edition through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, the proficiency of the training must be demonstrated by administering an initial qualification examination and administering subsequent examinations on a 3-year interval.
10CFR50.55a(b)(2)(xix)	**(ISI)** *Substitution of alternative methods:* The provisions for the substitution of alternative examination methods, a combination of methods, or newly developed techniques in the 1997 Addenda of IWA-2240 must be applied. The provisions in IWA-2240, 1998 Edition through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, are not approved for use. The provisions in IWA-4520(c), 1997 Addenda through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, allowing the substitution of alternative examination methods, a combination of methods, or newly developed techniques for the methods specified in the Construction Code are not approved for use.

TABLE 1.8-1
CODE OF FEDERAL REGULATIONS 10CFR50.55a REQUIREMENTS

10CFR50.55a Paragraphs	Limitations, Modifications, and Clarifications
10CFR50.55a(b)(2)(xxi)(A)	**(ISI)** *Table IWB-2500-1 examination requirements:* The provisions of Table IWB-2500-1, Examination Category B-D, Full Penetration Welded Nozzles in Vessels, Items B3.120 and B3.140 (Inspection Program B) in the 1998 Edition must be applied when using the 1999 Addenda through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section. A visual examination with enhanced magnification that has a resolution sensitivity to detect a 1-mil width wire or crack, utilizing the allowable flaw length criteria in Table IWB-3512-1, 1997 Addenda through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, may be performed in place of an ultrasonic examination.
10CFR50.55a(b)(2)(xxii)	**(ISI)** *Surface Examination:* The use of the provision in IWA-2220, "Surface Examination," of Section XI, 2001 Edition through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, that allow use of an ultrasonic examination method is prohibited.
10CFR50.55a(b)(2)(xxiii)	**(ISI)** *Evaluation of Thermally Cut Surfaces:* The use of the provisions for eliminating mechanical processing of thermally cut surfaces in IWA-4461.4.2 of Section XI, 2001 Edition through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section are prohibited.
10CFR50.55a(b)(2)(xxiv)	**(PDI)** *Incorporation of the Performance Demonstration Initiative and Addition of Ultrasonic Examination Criteria:* The use of Appendix VIII and the supplements to Appendix VIII and Article I-3000 of Section XI of the ASME BPV Code, 2002 Addenda through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section, is prohibited.
10CFR50.55a(b)(2)(xxv)	**(ISI)** *Mitigation of Defects by Modification:* The use of the provisions in IWA-4340, "Mitigation of Defects by Modification," Section XI, 2001 Edition through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section are prohibited.

TABLE 1.8-1
CODE OF FEDERAL REGULATIONS 10CFR50.55a REQUIREMENTS

10CFR50.55a Paragraphs	Limitations, Modifications, and Clarifications
10CFR50.55a(b)(2)(xxvi)	**(SPT)** *Pressure Testing Class 1, 2, and 3 Mechanical Joints:* The repair and replacement activity provisions in IWA-4540(c) of the 1998 Edition of Section XI for pressure testing Class 1, 2, and 3 mechanical joints must be applied when using the 2001 Edition through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of this section.
10CFR50.55a(b)(2)(xxvii)	**(SPT)** *Removal of Insulation:* When performing visual examinations in accordance with IWA-5242 of Section XI, 2003 Addenda through the latest Edition and Addenda incorporated by reference in Paragraph (b)(2) of the section, insulation must be removed from 17-4 PH or 410 stainless steel studs or bolts aged at a temperature below 1100 °F or having a Rockwell Method C hardness value above 30, and from A-286 stainless steel studs or bolts preloaded to 100,000 pounds per square inch or higher.
10CFR50.55a(b)(3)(v)	**(ISI)** *Subsection ISTD:* Article IWF-5000, "Inservice Inspection Requirements for Snubbers," of the ASME BPV Code, Section XI, provides inservice inspection requirements for examinations and tests of snubbers at nuclear power plants. Licensees may use Subsection ISTD, "Inservice Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Power Plants," ASME O&M Code, 1995 Edition through the latest Edition and Addenda incorporated by reference in paragraph (b)(3) of this section, in place of the requirements for snubbers in Section XI, IWF-5200(a) and (b) and IWF-5300(a) and (b), by making appropriate changes to their technical specifications or licensee-controlled documents. Preservice and inservice examinations must be performed using the VT-3 visual examination method described in IWA-2213.

TABLE 1.8-1
CODE OF FEDERAL REGULATIONS 10CFR50.55a REQUIREMENTS

10CFR50.55a Paragraphs	Limitations, Modifications, and Clarifications
10CFR50.55a(b)(5)	**(ISI)** *Inservice Inspection Code Cases:* Licensees may apply the ASME Boiler and Pressure Vessel Code Cases listed in Regulatory Guide 1.147 through Revision 15, without prior USNRC approval subject to the following: (i) When a licensee initially applies a listed Code Case, the licensee shall apply the most recent version of that Code Case incorporated by reference in this paragraph. (ii) If a licensee has previously applied a Code Case and a later version of the Code Case is incorporated by reference in this paragraph, the licensee may continue to apply, to the end of the current 120-month interval, the previous version of the Code Case as authorized or may apply the later version of the Code Case, including any USNRC-specified conditions placed on its use. (iii) Application of an annulled Code Case is prohibited unless a licensee previously applied the listed Code Case prior to it being listed as annulled in Regulatory Guide 1.147. Any Code Case listed as annulled in any Revision of Regulatory Guide 1.147 which a licensee has applied prior to it being listed as annulled, may continue to be applied by that licensee to the end of the 120-month interval in which the Code Case was implemented.

TABLE 1.8-1
CODE OF FEDERAL REGULATIONS 10CFR50.55a REQUIREMENTS

10CFR50.55a Paragraphs	Limitations, Modifications, and Clarifications
10CFR50.55a(b)(6)	**(ISI)** *Operation and Maintenance of Nuclear Power Plants Code Cases:* Licensees may apply the ASME Operation and Maintenance Nuclear Power Plants Code Cases listed in Regulatory Guide 1.192 without prior USNRC approval subject to the following: (i) When a licensee initially applies a listed Code Case, the licensee shall apply the most recent version of that Code Case incorporated by reference in this paragraph. (ii) If a licensee has previously applied a Code Case and a later version of the Code Case is incorporated by reference in this paragraph, the licensee may continue to apply, to the end of the current 120-month interval, the previous version of the Code Case as authorized or may apply the later version of the Code Case, including any USNRC-specified conditions placed on its use. (iii) Application of an annulled Code Case is prohibited unless a licensee previously applied the listed Code Case prior to it being listed as annulled in Regulatory Guide 1.192. If a licensee has applied a listed Code Case that is later listed as annulled in Regulatory Guide 1.192, the licensee may continue to apply the Code Case to the end of the current 120-month interval.

1.9 Code Cases

Per 10CFR50.55a(b)(5) and (b)(6), ASME Code Cases that have been determined to be suitable for use in ISI Program Plans by the USNRC are listed in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability-ASME Section XI, Division 1". The approved Code Cases in Regulatory Guide 1.147, which are being utilized by HNP, are included in Section 2.1.1. The most recent version of a given Code Case incorporated in the revision of Regulatory Guide 1.147 referenced in 10CFR50.55a(b)(5)(i) at the time it is applied within the ISI Program shall be used. The latest version of Regulatory Guide 1.147 incorporated into this document is Revision 15. As this guide is revised, newly approved Code Cases should be assessed for plan implementation at HNP.

The use of other Code Cases (other than those listed in Regulatory Guide 1.147) may be authorized by the Director of the office of Nuclear Reactor Regulation upon request pursuant to 10CFR50.55a(a)(3). Code Cases not approved for use in Regulatory Guide 1.147, which are being utilized by HNP through associated relief requests, are included in Section 8.0.

This ISI Program Plan will also utilize Regulatory Guide 1.192, "Operation and Maintenance Code Case Acceptability, ASME O&M Code". The approved Code Cases in Regulatory Guide 1.192, which are being utilized by HNP, are included in Section 2.1.2. The latest version of Regulatory Guide 1.192 incorporated into this document is Revision 0. As this guide is revised, newly approved Code Cases should be assessed for plan implementation at HNP.

1.10 Relief Requests

In accordance with 10CFR50.55a, when a licensee either proposes alternatives to ASME Section XI requirements which provide an acceptable level of quality and safety, determines compliance with ASME Section XI requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, or determines that specific ASME Section XI requirements for inservice inspection are impractical, the licensee shall notify the USNRC and submit information to support the determination.

The submittal of this information will be referred to in this document as a "Relief Request". Relief requests for the Third ISI Interval and the Second CISI Interval are included in Section 8.0 of this document. The text of the relief requests contained in Section 8.0 will demonstrate one of the following: the proposed alternatives provide an acceptable level of quality and safety per 10CFR50.55a(a)(3)(i), compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety per 10CFR50.55a(a)(3)(ii), or the code requirements are considered impractical per 10CFR50.55a(g)(5)(iii).

Per 10CFR50.55a Paragraphs (a)(3) and (g)(6)(i), the Director of the Office of Nuclear Reactor Regulation will evaluate relief requests and "may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility".

2.0 BASIS FOR INSERVICE INSPECTION PROGRAM

2.1 ASME Section XI Examination Requirements

As required by the Code Of Federal Regulations, Title 10, Part 50, Section 55a, (10CFR50.55a), this Program was developed in accordance with the requirements detailed in the 2001 Edition through the 2003 Addenda, of the ASME Boiler and Pressure Vessel Code, Section XI, Division 1, Subsections IWA, IWB, IWC, IWD, IWE, IWF, IWL, Mandatory Appendices, and Inspection Program B of IWA-2432, approved ASME Code Cases, and approved alternatives through relief requests and SER's.

The ISI Program implements Appendix VIII "Performance Demonstration for Ultrasonic Examination Systems," ASME Section XI 2001 Edition, No Addenda as required by 10CFR50.55a(b)(2)(xxiv). Appendix VIII requires qualification of the procedures, personnel, and equipment used to detect and size flaws in piping, bolting, and the reactor pressure vessel (RPV). Each organization (e.g., owner or vendor) will be required to have a written program to ensure compliance with the requirements. These requirements were initially implemented through the Performance Demonstration Initiative (PDI) Program according to the schedule defined in 10CFR50.55a(g)(6)(ii)(C).

For the Third ISI Interval, HNP's inspection program for ASME Section XI Examination Categories B-F, B-J, C-F-1, and C-F-2 will be governed by risk-informed regulations. The RISI program methodology is described in the EPRI Topical Report TR-112657, Rev. B-A. To supplement the EPRI Topical Report, Code Case N-578-1 (as applicable per Relief Request I3R-02) is also being used for the classification of piping structural elements under the RISI program. The RISI program scope has been implemented as an alternative to the ASME Section XI Code examination program for the Class 1 B-F and B-J welds and Class 2 C-F-1 and C-F-2 welds in accordance with 10CFR50.55a(a)(3)(i). The basis for the resulting Risk Categorizations of the piping within the RISI Program is defined and maintained in the RISI Program Evaluation Documents as referenced in Section 9.0.

For the Third ISI Interval, the RISI program scope has been expanded to include welds in the BER piping, also referred to as the HELB region, which includes several non-class welds that fall within the BER augmented inspection program. The BER program methodology is described in EPRI Topical Report TR-1006937, Rev. 0-A, which has been used to define the inspection scope in lieu of the volumetric and surface examinations of all piping welds in the previous BER augmented inspection program. Therefore, all welds in the original augmented inspection program for BER were evaluated under the RISI Program using an integrated risk-informed approach.

2.1.1 ASME Section XI Code Cases

As referenced by 10CFR50.55a(b)(5) and allowed by USNRC Regulatory Guide 1.147, Revision 15, the following Code Cases are being incorporated into the HNP ISI Program.

N-432-1 — Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique

N-460 — Alternative Examination Coverage for Class 1 and Class 2 Welds

N-504-3 — Alternative Rules for Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping

Code Case N-504-3 is acceptable subject to the following condition specified in Regulatory Guide 1.147, Revision 15:

> The provisions of Section XI, Nonmandatory Appendix Q, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," must also be met.

N-508-3 — Rotation of Serviced Snubbers and Pressure Relief Valves for the Purpose of Testing

N-513-2 — Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping

N-516-3 — Underwater Welding

Code Case N-516-3 is acceptable subject to the following condition specified in Regulatory Guide 1.147, Revision 15:

> Licensee must obtain USNRC approval in accordance with 10CFR50.55a(a)(3) regarding the technique to be used in the weld repair or replacement of irradiated material underwater.

N-517-1 — Quality Assurance Program Requirements for Owners

Code Case N-517-1 is acceptable subject to the following condition specified in Regulatory Guide 1.147, Revision 15:

> The Owner's Quality Assurance (QA) Program that is approved under Appendix B to 10CFRPart 50 must address the use of this Code Case and any unique QA requirements identified by the Code Case that are not contained in the owner's QA Program description. This would include the activities performed in accordance with this Code Case that are subject to monitoring by the Authorized Nuclear Inspector.

N-526 — Alternative Requirements for Successive Inspections of Class 1 and 2 Vessels

N-528-1 — Purchase, Exchange, or Transfer of Material Between Nuclear Plant Sites

Code Case N-528-1 is acceptable subject to the following condition specified in Regulatory Guide 1.147, Revision 15:

> The requirements of 10CFRPart 21 are to be applied to the nuclear plant site supplying the material as well as to the nuclear plant site receiving the material that has been purchased, exchanged, or transferred between sites.

N-532-4 — Alternative Requirements to Repair and Replacement Documentation Requirements and Inservice Summary Report Preparation and Submission as Required by IWA-4000 and IWA-6000

N-552 — Alternative Methods - Qualification for Nozzle Inside Radius Section from the Outside Surface

Code Case N-552 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

> To achieve consistency with the 10CFR50.55a rule change published September 22, 1999 (64 FR 51370), incorporating Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," to ASME Section XI, add the following to the specimen requirements:
>
> "At least 50 percent of the flaws in the demonstration test set must be cracks and the maximum misorientation

must be demonstrated with cracks. Flaws in nozzles with bore diameters equal to or less than 4 inches may be notches."

Add to detection criteria, "The number of false calls must not exceed three."

N-566-2 Corrective Action for Leakage Identified at Bolted Connections

N-569-1 Alternative Rules for Repair by Electrochemical Deposition of Class 1 and 2 Steam Generator Tubing

Code Case N-569-1 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

Note: Steam Generator tube repair methods require prior USNRC approval through the Technical Specifications. This Code Case does not address certain aspects of this repair, e.g., the qualification of inspection and plugging criteria necessary for staff approval of the repair method. In addition, if the user plans to "reconcile," as described in the footnote, the reconciliation is to be performed in accordance with IWA-4200 in the 1995 Edition through the 1996 Addenda of ASME Section XI.

N-576-1 Repair of Class 1 and 2 SB-163, UNS N06600 Steam Generator Tubing

Code Case N-576-1 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

Note: Steam Generator tube repair methods require prior USNRC approval through the Technical Specifications. This Code Case does not address certain aspects of this repair, e.g., the qualification of inspection and plugging criteria necessary for staff approval of the repair method. In addition, if the user plans to "reconcile," as described in the footnote, the reconciliation is to be performed in accordance with IWA-4200 in the 1995 Edition through the 1996 Addenda of ASME Section XI.

N-586-1 Alternative Additional Examination Requirements for Classes 1, 2, and 3 Piping, Components, and Supports

N-593 Alternative Examination Requirements for Steam Generator Nozzle to Vessel Welds

Code Case N-593 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

Essentially 100 percent (not less than 90 percent) of the examination volume A-B-C-E-F-G-H must be inspected.

N-597-2 Requirements for Analytical Evaluation of Pipe Wall Thinning

Code Case N-597-2 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

(1) Code Case must be supplemented by the provisions of EPRI Nuclear Safety Analysis Center Report 202L-R2, April 1999, "Recommendations for an Effective Flow Accelerated Corrosion Program," for developing the inspection requirements, the method of predicting the rate of wall thickness loss, and the value of the predicted remaining wall thickness. As used in NSAC-202L-R2, the terms "should" and "shall" have the same expectation of being completed.
(2) Components affected by flow-accelerated corrosion to which this Code Case are applied must be repaired or replaced in accordance with the construction code of record and Owner's requirements or a later USNRC approved edition of Section III of the ASME Code prior to the value of t_p reaching the allowable minimum wall thickness, t_{min}, as specified in -3622.1(a)(1) of this Code Case. Alternatively, use of the Code Case is subject to USNRC review and approval.
(3) For Class 1 piping not meeting the criteria of -3221, the use of evaluation methods and criteria is subject to USNRC review and approval.
(4) For those components that do not require immediate repair or replacement, the rate of wall thickness loss is to be used to determine a suitable inspection frequency so that repair or replacement occurs prior to reaching allowable minimum wall thickness, t_{min}.

(5) For corrosion phenomenon other than flow accelerated corrosion, use of the Code Case is subject to USNRC review and approval. Inspection plans and wall thinning rates may be difficult to justify for certain degradation mechanisms such as MIC and pitting.

N-600 Transfer of Welder, Welding Operator, Brazer, and Brazing Operator Qualifications Between Owners

N-613-1 Ultrasonic Examination of Full Penetration Nozzles in Vessels, Examination Category B-D, Item Nos. B3.10 and B3.90, Reactor Nozzle-to-Vessel Welds, Figs. IWB-2500-7(a), (b), and (c)

N-624 Successive Inspections

N-629 Use of Fracture Toughness Test Data to Establish Reference Temperature for Pressure Retaining Materials

N-638-1 Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique

Code Case N-638-1 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

UT examinations shall be demonstrated for the repaired volume using representative samples, which contain construction type flaws. The acceptance criteria of NB-5330 of Section III edition and addenda approved in 10CFR50.55a apply to all flaws identified within the repaired volume.

N-639 Alternative Calibration Block Material

Code Case N-639 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

Chemical ranges of the calibration block may vary from the materials specification if (1) it is within the chemical range of the component specification to be inspected, and (2) the phase and grain shape are maintained in the same ranges produced by the thermal process required by the material specification.

N-641 Alternative Pressure-Temperature Relationship and Low Temperature Overpressure Protection System Requirements

N-643-2 Fatigue Crack Growth Rate Curves for Ferritic Steels in PWR Water Environment

N-648-1 Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles

Code Case N-648-1 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

> In place of a UT examination, licensees may perform a visual examination with enhanced magnification that has a resolution sensitivity to detect a 1-mil width wire or crack, utilizing the allowable flaw length criteria of Table IWB-3512-1 with limiting assumptions on the flaw aspect ratio. The provisions of Table IWB-2500-1, Examination Category B-D, continue to apply except that, in place of examination volumes, the surfaces to be examined are the external surfaces shown in the figures applicable to this table.

N-649 Alternative Requirements for IWE-5240 Visual Examination

N-651 Ferritic and Dissimilar Metal Welding Using SMAW Temper Bead Technique Without Removing the Weld Bead Crown of the First Layer

N-661 Alternative Requirements for Wall Thickness Restoration of Classes 2 and 3 Carbon Steel Piping for Raw Water Service

Code Case N-661 is acceptable subject to the following conditions specified in Regulatory Guide 1.147, Revision 15:

(a) If the root cause of the degradation has not been determined, the repair is only acceptable for one cycle.
(b) Weld overlay repair of an area can only be performed once in the same location.
(c) When through-wall repairs are made by welding on surfaces that are wet or exposed to water, the weld

overlay repair is only acceptable until the next refueling outage.

N-663	Alternative Requirements for Classes 1 and 2 Surface Examinations
N-664	Performance Demonstration Requirements for Examination of Unclad Reactor Pressure Vessel Welds, Excluding Flange Welds
N-686	Alternative Requirements for Visual Examinations, VT-1, VT-2, and VT-3
N-695	Qualification Requirements for Dissimilar Metal Piping Welds
N-696	Qualification Requirements for Appendix VIII Piping Examinations Conducted from the Inside Surface
N-697	Pressurized Water Reactor (PWR) Examination Requirements for Pressure Retaining Welds in Control Rod Drive and Instrument Nozzle Housings
N-700	Alternative Rules for Selection of Classes 1, 2, and 3 Vessel Welded Attachments for Examination
N-706	Alternative Examination Requirements of Table IWB 2500 1 and Table IWC-2500-1 for PWR Stainless Steel Residual and Regenerative Heat Exchangers

Additional Code Cases invoked in the future shall be in accordance with those approved for use in the latest published revision of Regulatory Guide 1.147 at that time.

2.1.2 O&M Code Cases

As referenced by 10CFR50.55a(b)(6) and allowed by USNRC Regulatory Guide 1.192, Revision 0, the following Code Cases are being incorporated into the HNP ISI Program:

OMN-13, Rev. 0	Requirements for Extending Snubber Inservice Visual Examination Interval at LWR Power Plants

Additional Code Cases invoked in the future shall be in accordance with those approved for use in the latest published revision of Regulatory Guide 1.192 at that time.

2.2 Augmented Inspection Requirements

Augmented inspection requirements are those inspections that are performed above and beyond the requirements of ASME Section XI. Below is a summary of those inspections performed by HNP that are not specifically addressed by ASME Section XI, or the inspections that will be performed in addition to the requirements of ASME Section XI on a routine basis during the Third Inspection Interval.

2.2.1 Commitment 1 - RG1.14 / BORE and FLYWHL

Plant Technical Specification Amendment No. 119 Section 4.4.10 requires that each Reactor Coolant Pump Motor Flywheel be inspected per the recommendations of Regulatory Position C.4.b of Regulatory Guide 1.14, Revision 1, August, 1975.

In lieu of Position C.4.b(1) and C.4.b(2), a qualified in-place UT examination over the volume from the inner bore of the flywheel to the circle one-half of the outer radius or a surface examination (MT and /or PT) of exposed surfaces of the removed flywheels may be conducted at 20 year intervals.

Refer to ISI Program Change No. 05-005.

2.2.2 Commitment 2 - SER / 250.1S and 250.1V

In 1979, the USNRC published IE Bulletin 79-17, "Pipe Cracks in Stagnant Borated Water Systems at PWR Plants", which mandated that nuclear plants implement an augmented program for piping connected to the Refueling Water Storage Tank (RWST). This piping had been previously exempted from most ISI Programs. The basis for the Bulletin was IE Circular 76-06 which documented the chemical contamination of certain nuclear plants with sodium thiosulfate in the early 1970s. The USNRC Bulletin was performed at HNP. However, the Bulletin has not been used as an augmented program on a continuing basis since the piping in question has already been included in another augmented ISI program as a result of SER Question 250.1. This SER commitment added piping from the Charging (CS), Containment Spray (CT), Residual Heat Removal (RH), Safety Injection (SI) systems. Pipe sizes 2-inch and above are included. Either Volumetric or Surface exams are performed, based on size and wall thickness. The "V" and "S" suffix on the Item Number is utilized to differentiate the NDE method performed. The percentages of the welds examined are determined per the 74S75 ASME Code.

With the implementation of the RISI Program, the SER / 250.1S and 250.1V augmented inspection commitment will no longer be required at

HNP. The RISI Program completely subsumes this requirement. Thus, these piping welds will be categorized and selected for examination in accordance with the EPRI Topical Report TR-112657, Rev. B-A and Code Case N-578-1 in lieu of the original commitment to SER / 250.1S and 250.1V.

2.2.3 Commitment 3 - FSAR / 6.6.8B

Paragraph B of FSAR Section 6.6.8, "Augmented Inservice Inspection To Protect Against Postulated Piping Failures", requires the volumetric examination once during each 10-year interval of 100% of the following welds: All Class 2 piping welds greater than 4-inch diameter from the Containment penetrations M8, M108, M109, and M110 to the Containment Isolation Valve. Descriptions of these penetrations are as follows:

M8 - CVCS, Normal Charging

M108 - Aux FW to Steam Gen "A"

M109 - Aux FW to Steam Gen "B"

M110 - Aux FW to Steam Gen "C"

These welds were selected for examination due to an USNRC concern, first published in the early 1970s, about High Energy Line Breaks outside containment which could challenge safety systems by rapidly over-cooling the RCS. These concerns are addressed in FSAR Section 3.6.2 and Standard Review Plan Section 3.6.2 with the accompanying USNRC Branch Technical position MEB 3-1 (both located in NUREG-0800). These resulting FSAR inspection requirements contained in FSAR Section 6.6.8 have been added to this ISI Program Plan as an augmented program.

This commitment was previously maintained in accordance with FSAR Section 6.6.8. With the implementation of the RISI-BER Program, all BER augmented welds were evaluated under the RISI methodology and were integrated into the RISI Program. The RISI Program will also include several non-class welds that fall within the BER augmented inspection program. Welds in the RISI-BER Program are currently identified in the ISI Database with Item Number R1.30 (see site NTM 263009). Additional guidance for adaptation of the RISI evaluation process to BER piping is given in EPRI TR-1006937 Rev. 0-A.

2.2.4 Commitment 4 - FSAR / 6.6.8C (Portions downstream of the Main Steam Isolation Valves and portions upstream of the Main Feedwater Check Valves.)

Paragraph C of FSAR Section 6.6.8, "Augmented Inservice Inspection To Protect Against Postulated Piping Failures", requires the volumetric examination once during each 10-year interval of 100% of the following welds: All piping welds greater than 4-inch diameter in the Break Exclusion Region of Main Steam and Feedwater shown in FSAR Figure 3.6.2-1. Penetration numbers are as follows:

Main Steam - M1, M2, and M3

Main Feedwater - M4, M5, and M6

These welds were selected for examination due to an USNRC concern, first published in the early 1970s, about High Energy Line Breaks outside containment which could challenge safety systems by rapidly over-cooling the RCS. These concerns are addressed in FSAR Section 3.6.2 and Standard Review Plan Section 3.6.2 with the accompanying USNRC Branch Technical position MEB 3-1 (both located in NUREG-0800). These resulting FSAR inspection requirements contained in FSAR Section 6.6.8 have been added to this ISI Program Plan as an augmented program.

This commitment was previously maintained in accordance with FSAR Section 6.6.8. With the implementation of the RISI-BER Program, all BER augmented welds were evaluated under the RISI methodology and were integrated into the RISI Program. The RISI Program will also include several non-class welds that fall within the BER augmented inspection program. Welds in the RISI-BER Program are currently identified in the ISI Database with Item Number R1.30 (see site NTM 263009). Additional guidance for adaptation of the RISI evaluation process to BER piping is given in EPRI TR-1006937 Rev. 0-A.

2.2.5 Commitment 5 - FSAR / 6.6.8D (Portions downstream of the Main Steam Isolation Valves and portions upstream of the Main Feedwater Check Valves.)

Paragraph D of FSAR Section 6.6.8, "Augmented Inservice Inspection To Protect Against Postulated Piping Failures", requires the surface examination once during each 10-year interval of 100% of the following welds: All piping welds greater than 1-inch diameter and less than or equal to 4-inch diameter in the Break Exclusion Region of Main Steam and Feedwater shown in FSAR Figure 3.6.2-1. Penetration numbers are as follows:

Main Steam - M1, M2, and M3

Main Feedwater - M4, M5, and M6

These welds were selected for examination due to an USNRC concern, first published in the early 1970s, about High Energy Line Breaks outside containment which could challenge safety systems by rapidly over-cooling the RCS. These concerns are addressed in FSAR Section 3.6.2 and Standard Review Plan Section 3.6.2 with the accompanying USNRC Branch Technical position MEB 3-1 (both located in NUREG-0800). These resulting FSAR inspection requirements contained in FSAR Section 6.6.8 have been added to this ISI Program Plan as an augmented inspection program.

This commitment was previously maintained in accordance with FSAR Section 6.6.8. With the implementation of the RISI-BER Program, all BER augmented welds were evaluated under the RISI methodology and were integrated into the RISI Program. The RISI Program will also include several non-class welds that fall within the BER augmented inspection program. Welds in the RISI-BER Program are currently identified in the ISI Database with Item Number R1.30 (see site NTM 263009). Additional guidance for adaptation of the RISI evaluation process to BER piping is given in EPRI TR-1006937 Rev. 0-A.

2.2.6 Commitment 6 - FSAR / 6.6.8E

Paragraph E of FSAR Section 6.6.8, "Augmented Inservice Inspection To Protect Against Postulated Piping Failures", requires the surface examination once during each 10-year interval of 100% of the following welds: All welds at Containment penetrations M7, M9, M10, M11, M51, M52, and M53 between the Containment Isolation Valves. The closure-plate-to-pipe welds located outside the Reactor Containment Building need not be examined.

Descriptions of these penetrations are as follows:

M7 - CVCS, Normal Letdown

M9 - CVCS, Seal Water to RCP "A"

M10 - CVCS, Seal Water to RCP "B"

M11 - CVCS, Seal Water to RCP "C"

M51 - Blowdown, Steam Gen "A"

M52 - Blowdown, Steam Gen "B"

M53 - Blowdown, Steam Gen "C"

These welds were selected for examination due to an USNRC concern, first published in the early 1970s, about High Energy Line Breaks outside containment which could challenge safety systems by rapidly over-cooling the RCS. These concerns are addressed in FSAR Section 3.6.2 and Standard Review Plan Section 3.6.2 with the accompanying USNRC Branch Technical position MEB 3-1 (both located in NUREG-0800). These resulting FSAR inspection requirements contained in FSAR Section 6.6.8 have been added to this ISI Program Plan as an augmented inspection program.

This commitment was previously maintained in accordance with FSAR Section 6.6.8. With the implementation of the RISI-BER Program, all BER augmented welds were evaluated under the RISI methodology and were integrated into the RISI Program. The RISI Program will also include several non-class welds that fall within the BER augmented inspection program. Welds in the RISI-BER Program are currently identified in the ISI Database with Item Number R1.30 (see site NTM 263009). Additional guidance for adaptation of the RISI evaluation process to BER piping is given in EPRI TR-1006937 Rev. 0-A.

2.2.7 Commitment 7 - FSAR / 6.6.8F

Paragraph F of FSAR Section 6.6.8, "Augmented Inservice Inspection To Protect Against Postulated Piping Failures", requires the surface examination once during each 10-year interval of 100% of the welded attachments within the boundaries defined in FSAR Sections 6.6.8(b) through (e).

Only the Blowdown piping (Penetrations M51, M52, and M53), which is inspected per FSAR Section 6.6.8(e), have any welded attachments.

These welded attachments were selected for examination due to an USNRC concern, first published in the early 1970s, about High Energy Line Breaks outside containment which could challenge safety systems by rapidly over-cooling the RCS. These concerns are addressed in FSAR Section 3.6.2 and Standard Review Plan Section 3.6.2 with the accompanying USNRC Branch Technical Position MEB 3-1 (both located in NUREG-0800). These resulting FSAR inspection requirements contained in FSAR Section 6.6.8 have been added to this ISI Program Plan as an augmented inspection program.

2.2.8 Commitment 8 - IE or B-J / 88-08 or various Item Numbers within Examination Category B-J

In response to IE Bulletin 88-08, Supplement 2 "Thermal Stresses in Piping Connected to Reactor Coolant Systems", an augmented inspection program was added to the ISI Program Plan during the First Interval. The examinations were performed at various piping weld locations in the Charging (CS) and Safety Injection (SI) systems using an enhanced UT technique specially designed for the detection of cracking in austenitic stainless steel piping systems. The specific welds that were inspected during the First Interval have been instrumented by HNP to detect the thermal variations that caused the cracking problems in other plants. If the temperature changes are sufficient to warrant additional examinations, the ISI Program Plan will be modified to include a scheduled outage in which the examinations are to be performed. The welds previously examined are included in the tables contained in this ISI Inspection Plan; however, they are not scheduled for examination.

With the implementation of the RISI Program, the IE Bulletin 88-08 augmented inspection commitment will no longer be required at HNP. The RISI Program completely subsumes this requirement based on the fact that the Degradation Mechanism assessment and Risk Categorization involve full assessment for Thermal Transients and Thermal Stratification, Cycling, and Striping. Thus, these piping structural elements will be categorized and selected for examination in accordance with the EPRI Topical Reports TR-112657, Rev. B-A, TR-1006937, Rev. 0-A, and Code Case N-578-1 in lieu of the original commitment to IE Bulletin 88-08.

2.2.9 Commitment 9 - Augmented / Alloy 600 and USNRC Bulletin 2004-01

In response to USNRC interim order issued February 11, 2003 an augmented inspection program was added to the ISI Program Plan. This order describes the examination requirements for the Bare Metal Visual (BMV) examination of the RPV head and CRDMs. In addition, the order describes the NDE requirements for UT, ET, or PT of the CRDMs. On February 20, 2004 the USNRC issued EA-03-009, the First Revised Order. The Augmented Inspection Plan meets the requirements of this revision.

In response to USNRC Bulletin 2004-01 regarding PZR Steam Space Alloy 600 welds, if circumferential cracking is observed in either the pressure boundary or non-pressure boundary portions of the PZR steam space, HNP will develop plans to perform an adequate extent of condition evaluation and will discuss those plans with the cognizant USNRC technical staff prior to restarting the unit.

NOTE: HNP will continue to monitor industry experience, Code changes, and MRP recommendations to ensure that our inspection plans are prudent based on the knowledge available in order to ensure that the structural and leakage integrity of the pressurizer penetrations and associated piping is maintained.

2.2.10 Eddy Current Examination of Steam Generator Tubing

The HNP U-Tube Steam Generator Tubing is examined using the Eddy Current method in accordance with the requirements of the ASME Section XI, 2001 Edition through the 2003 Addenda, and Examination Category B-Q (Item Number B16.20), "Steam Generator Tubing in U-Tube Design" in accordance with 10CFR50.55a(b)(2)(iii). ASME Section XI defers the examination of the tubes to plant Technical Specifications. HNP Technical Specification 3/4.4.5, "Steam Generators", contains the applicable requirements for the inspection of Steam Generator Tubes.

2.2.11 USNRC NUREG-0737, dated November 1980

This document discusses TMI Action Plan Requirements, and includes requirements in Item III.D.1.1 for leak testing and periodic visual examinations of systems outside of primary containment which could contain highly radioactive fluids during a serious transient or accident. HNP has committed to the requirements of this item as discussed in FSAR - TMI Appendix. Commitments made concerning NUREG-0737 are maintained outside of the ISI and Pressure Testing Programs and are implemented per procedures EPT-220, TMI III.D.1.1 Inservice System Leak Tests and OST-1814, TMI III D.1.1 Inservice Liquid Systems Leak Test Refueling Outage Interval at All Times.

2.2.12 USNRC Regulatory Guide 1.150, Revision 1, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examination"

This Regulatory Guide includes inspection requirements for the ultrasonic examination of RPV welds during preservice and inservice examinations. The applicable RPV weld examinations will be performed in compliance with these requirements.

2.2.13 The following documents have been reviewed and used as a basis for the HNP augmented inspection programs.

A) USNRC Standard Review Plan, Section 3.6.1, "Plant Design for Protection Against Postulated Piping Failures In Fluid Systems Outside Containment" (NUREG-0800), and HNP FSAR Section 3.6.1.

B) USNRC Standard Review Plan, Section 3.9.3, "ASME Code Class 1, 2 and 3 Components, Component Supports, and Core Support Structures" (NUREG-0800), and HNP FSAR Section 3.9.3.

C) USNRC Standard Review Plan, Section 5.2.4, "Reactor Coolant Pressure Boundary Inservice Inspection and Testing" (NUREG-0800), and HNP FSAR Section 5.2.4.

D) USNRC Standard Review Plan, Section 5.4.1.1, "Pump Flywheel Integrity" (NUREG-0800), and HNP FSAR Section 5.4.1.1, and USNRC Regulatory Guide 1.14, Rev 1, "Reactor Coolant Pump Flywheel Integrity." This inspection requirement is required by HNP Technical Specification 4.4.10.

E) USNRC Standard Review Plan, Section 6.6 "Inservice Inspection of Class 2 and 3 components" (NUREG-0800), and HNP FSAR Section 6.6. The HNP FSAR, in Section 6.6.8, requires high-energy system piping between isolation valves, or from the Containment to the first valve outside Containment for piping without an isolation valve inside Containment, and piping in the break exclusion region, receive an augmented inspection.

Note: With the implementation of the RISI-BER Program, all BER augmented welds will be evaluated under the RISI methodology and will be integrated into the RISI Program. Additional guidance for adaptation of the RISI evaluation process for BER piping is given in EPRI TR-1006937 Rev. 0-A.

F) USNRC Order EA-03-009 modifying licenses issued by letter February 11, 2003 and revised February 20, 2004 establishes inspection requirements for RPV heads at pressurized water reactors. This order requires additional examinations of the RPV head and CRDM penetrations.

2.3 System Classifications and S-Series Simplified Flow Diagrams

The ISI Classification Basis Document details those systems that are ISI Class 1, 2, 3, or MC which fall within the ISI scope of examinations. The concrete containment structure is CISI Class CC and is shown on the CISI Reference Drawings. Below is a summary of the classification criteria used within the ISI Classification Basis Document.

Each safety related, fluid system containing water, steam, air, oil, etc. included in the HNP FSAR was reviewed to determine which safety functions they perform during all modes of system and plant operation. Based on these safety functions, the systems and components were evaluated per classification documents. The systems were then designated as ISI Class 1, 2, 3, or non-classed accordingly.

When a particular group of components is identified as performing an ISI Class 1, 2, or 3 safety function, the components are further reviewed to assure the interfaces (boundary valves and boundary barriers) meet the criteria set by 10CFR50.2, 10CFR50.55a(c)(1), 10CFR50.55a(c)(2), and ANSI N18.2a. SRP 3.2.2 and ANSI/ANS-58.14-1993 (HNP is not committed to or licensed in accordance with these documents) were also used for guidance in determining the classification boundaries where 10CFR and the Regulatory Guide did not address a given situation.

According to 10CFR50.55a, Paragraph (g)(4), the ISI requirements of ASME Section XI are assigned to these components, within the constraints of existing plant design. The HNP ISI Class 1, 2, and 3 components that are exempt from examination are those which meet the criteria of ASME Section XI, Subarticles IWB-1220, IWC-1220, and IWD-1220. Supports which meet the criteria of Subarticle IWF-1230 are also exempt from examination. For Containment, Class MC components which meet IWE-1220 are exempt from examination, and Class CC components which meet IWL-1220 are exempt from examination. HNP's ISI Program, including the ISI Database, basis document, selection document, and schedule, addresses those components which may require examination and testing. These components are referred to throughout this document as *"Nonexempt"*, meaning they are potentially subject to examination and testing in accordance with ASME Section XI.

The systems and components (piping, pumps, valves, vessels, etc.), which are subject to the examinations of Articles IWB-2000, IWC-2000, IWD-2000, and IWF-2000 are identified on the S-Series Simplified Flow Diagrams with ISI classification color coding. These drawings are listed in Table 2.3-1.

TABLE 2.3-1
SIMPLIFIED FLOW DIAGRAMS

Simplified Flow Diagrams	Title
2165-S-0542	Main Steam System
2165-S-0544	Feedwater and Auxiliary Feedwater Systems
2165-S-0545	Condensate and Air Evacuation Systems
2165-S-0547	Circulating and Service Water Systems
2165-S-0550	Containment Spray System
2165-S-0551	Steam Generator Blowdown System
2165-S-0552	Sampling System
2165-S-0561	Fuel Pools Clean-up System
2165-S-0563	Diesel Generator Fuel Oil System
2165-S-0605	Radiation Monitor and Hydrogen Analyzer Systems
2165-S-0633 S01	Diesel Generator Air Intake and Exhaust, Lube Oil
2165-S-0633 S02	Diesel Generator Jacket Water Cooling
2165-S-0633 S03	Diesel Generator Fuel Oil and Drainage
2165-S-0633 S04	Diesel Generator Starting Air System
2165-S-0666	Containment Penetration Pressurization System
2165-S-0685	Containment, Turbine Building, Tank Area & Security Building Drainage System
2165-S-0799	Primary & Demineralizer Water Systems
2165-S-0800	Service Air System
2165-S-0801	Instrument Air System
2165-S-0805	Fuel Pools Cooling System
2165-S-0807	Fuel Pools Cooling System
2165-S-0808	Cooling Tower Blowdown, Makeup, & Intake Structures Screen Wash
2165-S-0888	Fire Protection System
2166-S-0916	Containment Integrated Leakage Detection System
2165-S-0936	Intake Structures Pump Seal Bearing Lubricant and Motor Cooling Water Systems

TABLE 2.3-1
SIMPLIFIED FLOW DIAGRAMS

Simplified Flow Diagrams	Title
2165-S-0998	Chilled Water Distribution System Unit 1-SA
2165-S-0998 S02	Chilled Water Condenser System Unit 1-SA
2165-S-0998 S03	Chilled Water System AHUs Unit 1-SA
2165-S-0998 S04	Chilled Water System AHUs Unit 1-SA
2165-S-0999	Chilled Water Distribution System Unit 1-SB
2165-S-0999 S02	Chilled Water Condenser System Unit 1-SB
2165-S-0999 S03	Chilled Water AHUs Unit 1-SB
2165-S-0999 S04	Chilled Water AHUs Unit 1-SB
2165-S-1017	HVAC Air Flow – Containment Building, FHB, RAB & Cont. Room
2165-S-1300	Reactor Coolant System
2165-S-1301	Reactor Coolant System Sheet 2
2165-S-1303	Chemical and Volume Control System
2165-S-1303 S01	Chemical and Volume Control System
2165-S-1303 S02	Chemical and Volume Control System
2165-S-1304	Chemical and Volume Control System
2165-S-1305	Chemical and Volume Control System
2165-S-1306	Chemical and Volume Control System
2165-S-1307	Chemical and Volume Control System
2165-S-1308	Safety Injection System
2165-S-1309	Safety Injection System Sheet 2
2165-S-1310	Safety Injection System Sheet 3
2165-S-1311	Boron Recycle System
2165-S-1312	Boron Recycle System Sheet 2
2165-S-1313	Containment Building Waste Processing System
2165-S-1317	Waste Processing System – Gas Decay Storage
2165-S-1318	Waste Processing System – Waste Gas Compr and Recombiner
2165-S-1319	Component Cooling Water System Sheet 1

TABLE 2.3-1
SIMPLIFIED FLOW DIAGRAMS

Simplified Flow Diagrams	Title
2165-S-1320	Component Cooling Water System Sheet 2
2165-S-1321	Component Cooling Water System
2165-S-1322	Component Cooling Water System Sheet 4
2165-S-1322 S01	Component Cooling Water System Sheet 5
2165-S-1324	Residual Heat Removal System
2165-S-1329	Filter Backwash System
2165-S-1344	Reactor Vessel Level Instrumentation

2.4 ISI Isometric Piping Drawings for Nonexempt ISI Class Components and Supports

ISI Isometric Piping Drawings were developed to detail the ISI Class 1, 2, and 3 components (welds, bolting, etc.) and support locations at HNP. These ISI component and support locations are identified on the ISI Isometric Piping Drawings listed in Table 2.4-1. The CISI Class MC and CC components are identified on the CISI Reference Drawings listed in Table 2.4-2. Calibration Block Drawings are identified on the ASME Section XI UT Calibration Block Drawings listed in Table 2.4-3.

HNP's ISI Program, including the ISI Database, ISI Classification Basis Document, and ISI Selection Document, addresses the nonexempt components, which require examination and testing.

A summary of HNP ASME Section XI nonexempt components and supports is included in Section 7.0.

TABLE 2.4-1
ISI ISOMETRIC PIPING DRAWINGS

Number	Title
1-ISI-ACC-1	S. I. Accumulator Tank A (In the course of preparation)
1-ISI-ACC-2	S. I. Accumulator Tank B (In the course of preparation)
1-ISI-ACC-3	S. I. Accumulator Tank C (In the course of preparation)
1-ISI-AF-5	Auxiliary Feedwater System
1-ISI-AF-6	Auxiliary Feedwater System
1-ISI-AF-7	Auxiliary Feedwater System
1-ISI-AF-8	Auxiliary Feedwater System
1-ISI-AF-9	Auxiliary Feedwater System
1-ISI-AF-10	Auxiliary Feedwater System
1-ISI-BD-1	Blowdown System
1-ISI-BD-2	Blowdown System
1-ISI-BD-3	Blowdown System
1-ISI-BD-7	Blowdown System
1-ISI-BD-8	Blowdown System
1-ISI-BD-9	Blowdown System
1-ISI-BD-10	Blowdown and Sampling (Nuclear) Systems
1-ISI-BD-11	Blowdown and Sampling (Nuclear) Systems
1-ISI-BD-12	Blowdown and Sampling (Nuclear) Systems
1-ISI-BIT-1	Boron Injection Tank
1-ISI-CS-1	Chemical and Volume Control, Containment Spray, and Residual Heat Removal Systems
1-ISI-CS-2	Residual Heat Removal and Chemical and Volume Control Systems
1-ISI-CS-4	Chemical and Volume Control System
1-ISI-CS-6	Chemical and Volume Control System
1-ISI-CS-7	Chemical and Volume Control and Safety Injection Systems
1-ISI-CS-21	Chemical and Volume Control and Residual Heat Removal Systems
1-ISI-CS-22	Chemical and Volume Control System

TABLE 2.4-1
ISI ISOMETRIC PIPING DRAWINGS

Number	Title
1-ISI-CS-26	Chemical and Volume Control System
1-ISI-CS-27	Chemical and Volume Control System
1-ISI-CS-33	Chemical and Volume Control System
1-ISI-CS-88	Chemical and Volume Control System
1-ISI-CS-89	Chemical and Volume Control System
1-ISI-CS-92	Chemical and Volume Control System
1-ISI-CS-93	Chemical and Volume Control and Reactor Coolant Systems
1-ISI-CS-94	Chemical and Volume Control and Reactor Coolant Systems
1-ISI-CS-97	Chemical and Volume Control and Reactor Coolant Systems
1-ISI-CS-102	Chemical and Volume Control and Reactor Coolant Systems
1-ISI-CS-103	Chemical and Volume Control System
1-ISI-CS-106	Chemical and Volume Control and Reactor Coolant Systems
1-ISI-CS-107	Chemical and Volume Control System
1-ISI-CSIP-1	Charging / Safety Injection Pumps (A, B, or C)
1-ISI-CT-1	Containment Spray System
1-ISI-CT-2	Containment Spray System
1-ISI-CT-7	Containment Spray System
1-ISI-CT-8	Containment Spray System
1-ISI-CT-14	Containment Spray System
1-ISI-CT-16	Containment Spray System
1-ISI-CTP-1	Containment Spray Pumps (A or B)
1-ISI-ELHEX-1	Excess Letdown Heat Exchanger
1-ISI-FW-MS-RC-1	Feedwater, Main Steam, and Reactor Coolant Systems (In the course of preparation)
1-ISI-FW-MS-RC-2	Feedwater, Main Steam, and Reactor Coolant Systems (In the course of preparation)
1-ISI-FW-MS-RC-3	Feedwater, Main Steam, and Reactor Coolant Systems (In the course of preparation)
1-ISI-FW-1	Feedwater System

TABLE 2.4-1
ISI ISOMETRIC PIPING DRAWINGS

Number	Title
1-ISI-FW-2	Feedwater and Auxiliary Feedwater Systems
1-ISI-FW-3	Feedwater and Auxiliary Feedwater Systems
1-ISI-FW-4	Feedwater and Auxiliary Feedwater Systems
1-ISI-MS-1	Main Steam System
1-ISI-MS-2	Main Steam System
1-ISI-MS-7	Main Steam System
1-ISI-MS-9	Main Steam System
1-ISI-PZR-1	Pressurizer
1-ISI-RC-8	Reactor Coolant System
1-ISI-RC-9	Reactor Coolant System
1-ISI-RC-10	Reactor Coolant System
1-ISI-RC-11	Reactor Coolant System
1-ISI-RC-17	Reactor Coolant System
1-ISI-RC-22	Reactor Coolant System
1-ISI-RC-23	Reactor Coolant System
1-ISI-RC-24	Reactor Coolant System
1-ISI-RC-25	Reactor Coolant System
1-ISI-RC-27	Reactor Coolant System
1-ISI-RCP-1	Reactor Coolant Pump (In the course of preparation)
1-ISI-RCP-2	Reactor Coolant Pump Motor Flywheel (In the course of preparation)
1-ISI-RH-1	Residual Heat Removal, Safety Injection, and Containment Spray Systems
1-ISI-RH-2	Residual Heat Removal, Safety Injection, and Containment Spray Systems
1-ISI-RH-4	Residual Heat Removal System
1-ISI-RH-9	Residual Heat Removal and Reactor Coolant Systems
1-ISI-RH-10	Residual Heat Removal and Reactor Coolant Systems
1-ISI-RHEX-1	Regenerative Heat Exchanger
1-ISI-RHR-1	Residual Heat Removal Heat Exchangers (A & B)

TABLE 2.4-1
ISI ISOMETRIC PIPING DRAWINGS

Number	Title
1-ISI-RHRP-1	Residual Heat Removal Pumps (A or B)
1-ISI-RV-1	Reactor Vessel (In the course of preparation)
1-ISI-RV-2	Reactor Vessel (In the course of preparation)
1-ISI-SG-1	Steam Generator (In the course of preparation)
1-ISI-SG-2	Steam Generator (In the course of preparation)
1-ISI-SG-3	Steam Generator (In the course of preparation)
1-ISI-SI-3	Safety Injection System
1-ISI-SI-4	Safety Injection System
1-ISI-SI-8	Safety Injection and Residual Heat Removal Systems
1-ISI-SI-9	Safety Injection and Containment Spray Systems
1-ISI-SI-10	Safety Injection System
1-ISI-SI-11	Safety Injection System
1-ISI-SI-16	Safety Injection System
1-ISI-SI-17	Safety Injection System
1-ISI-SI-18	Safety Injection System
1-ISI-SI-19	Safety Injection System
1-ISI-SI-20	Safety Injection System
1-ISI-SI-21	Safety Injection and Reactor Coolant Systems
1-ISI-SI-22	Safety Injection and Reactor Coolant Systems
1-ISI-SI-23	Safety Injection and Reactor Coolant Systems
1-ISI-SI-24	Safety Injection and Reactor Coolant Systems
1-ISI-SI-25	Safety Injection and Reactor Coolant Systems
1-ISI-SI-26	Safety Injection System
1-ISI-SI-27	Safety Injection and Reactor Coolant Systems
1-ISI-SI-28	Safety Injection and Reactor Coolant Systems
1-ISI-SI-29	Safety Injection System
1-ISI-SI-30	Safety Injection System

TABLE 2.4-1
ISI ISOMETRIC PIPING DRAWINGS

Number	Title
1-ISI-SI-31	Safety Injection System
1-ISI-SI-32	Safety Injection System

TABLE 2.4-2
CISI REFERENCE DRAWINGS

Number	Title
ISI/IWL-001	General Elevation View of Containment
ISI/IWE-002	Liner 0-90, 221' to 376'
ISI/IWE-003	Liner 90-180, 221' to 376'
ISI/IWE-004	Liner 180-270, 221' to 376'
ISI/IWE-005	Liner 270-360, 221' to 376'
ISI/IWE-006	Dome Liner 0-180
ISI/IWE-007	Dome Liner 180-360
ISI/IWE-008	Typical Type I and II Penetrations
ISI/IWE-009	Typical Type III Penetrations
ISI/IWE-010	Typical Recirculating Sump
ISI/IWE-011	Electrical Penetration Detail
ISI/IWE-012	MS, FW, and AF Penetrations
ISI/IWE-013	Specific FW and MS Penetrations
ISI/IWE-014	Personnel Airlock (PAL)
ISI/IWE-015	Emergency Airlock (EAL)
ISI/IWE-016	Equipment Hatch
ISI/IWE-017	M-57 and M-58 Penetrations
ISI/IWE-018	M-61 and M-63 Penetrations
ISI/IWE-019	M-59 and M-98 Penetrations

TABLE 2.4-3
ASME SECTION XI UT CALIBRATION BLOCKS

Cal. Block Number	Size	Material	Pipe Schedule	Thickness	Heat Number
UT-001-1	VESS. BLK.	CS CLAD	N/A	9”	R2304-1
UT-002-1	VESS. BLK.	CS CLAD	N/A	8.25”	124S447
UT-003-1	VESS. BLK.	CS CLAD	N/A	5”	C4533-1
UT-004-1	NOZZLE	CS CLAD	N/A	15”	123Y317
UT-005-1	VESS. HEAD	CS CLAD	N/A	7”	C4533-1
UT-006-1	NOZZLE	SS SA351	32”	2.5”	28841-6
UT-007-1	NOZ. SAFE	SS A508	16”	2.5”	15812
UT-007-2	NOZ. SAFE	SS A508	16”	2.5”	15812
UT-008-1	RC PIPE	SS SA376	N/A	2.5”	L1286
UT-010-1	2.5”	CS SA106	80	.276”	N76472
UT-010-2	2.5”	CS SA106	80	.276”	N76472
UT-011-1	3.0”	SS SA312	40	.216”	M4563
UT-011-2	3.0”	SS SA312	40	.216”	M4563
UT-012-1	3.0”	CS SA106	80	.300”	165044
UT-012-2	3.0”	SA SA106	80	.300”	165044
UT-013-1	3.0”	CS SA106	160	.438”	X5489
UT-013-2	3.0”	CS SA106	160	.438”	X5489
UT-014-1	3.0”	SS SA376	160	.438”	M2760
UT-014-2	3.0”	SS SA376	160	.438”	M2760
UT-015-1	4.0”	CS SA106	40	.237”	N16094
UT-015-2	4.0”	CS SA106	40	.237”	N16094
UT-016-1	4.0”	CS SA106	80	.337”	L25198
UT-016-2	4.0”	CS SA106	80	.337”	L25198
UT-017-1	4.0”	SS SA376	160	.531”	C7199
UT-017-2	4.0”	SS SA376	160	.531”	C7199
UT-018-1	6.0”	CS SA106	80	.432”	264788

TABLE 2.4-3
ASME SECTION XI UT CALIBRATION BLOCKS

Cal. Block Number	Size	Material	Pipe Schedule	Thickness	Heat Number
UT-018-2	6.0”	CS SA106	80	.432”	264788
UT-019-1	6.0”	CS SA106	120	.562”	N73583
UT-019-2	6.0”	CS SA106	120	.562”	N73583
UT-020-1	6.0”	SS SA376	160	.719”	630-13-3
UT-020-2	6.0”	SS SA376	160	.719”	630-13-3
UT-021-1	8.0”	SS SA312	40	.322”	11-430
UT-021-2	8.0”	SS SA312	40	.322”	11-430
UT-022-1	8.0”	CS SA106	80	.500”	917335
UT-022-2	8.0”	CS SA106	80	.500”	917335
UT-023-1	10.0”	SS SA376	140	1.0”	1081-2-2-1
UT-023-2	10.0”	SS SA376	140	1.0”	1081-2-2-1
UT-024-1	12.0”	SS SA312	STD.	.375”	7-105/1210-40-2
UT-024-2	12.0”	SS SA312	STD.	.375”	7-105/1210-40-2
UT-025-1	12.0”	CS SA106	60	.562”	26590
UT-025-2	12.0”	CS SA106	60	.562”	26590
UT-026-1	12.0”	SS SA376	140	1.125”	534193
UT-026-2	12.0”	SS SA376	140	1.125”	534193
UT-027-1	14.0”	SS SA358	STD.	.375”	30190
UT-027-2	14.0”	SS SA358	STD.	.375”	30190
UT-028-1	14.0”	SS SA376	160	1.406”	J2619
UT-028-2	14.0”	SS SA376	160	1.406”	J2619
UT-029-1	16.0”	CS SA106	.688”/.750”	.851”	L4517
UT-029-2	16.0”	CS SA106	.688”/.750”	.851”	L4517
UT-030-1	16.0”	CS SA106	13.750” ID	1.006”	L4489
UT-030-2	16.0”	CS SA106	13.750”ID	1.006”	L4489
UT-031-1	32.0”	CS SA106	1.052”/1.267”	1.340”	L4497
UT-031-2	32.0”	CS SA106	1.052:/1.267”	1.340”	L4497

TABLE 2.4-3
ASME SECTION XI UT CALIBRATION BLOCKS

Cal. Block Number	Size	Material	Pipe Schedule	Thickness	Heat Number
UT-033-1	44.0"	CS SA106	1.447"/1.765"	1.790"	J7371
UT-033-2	44.0"	CS SA106	1.447"/1.765"	1.790"	J7371
UT-034-1	50.0"	CS A155	SPEC.	3.40"	D20265-J848
UT-035-1	50.0"	CS A155	SPEC.	1.71"	D20265-J848
UT-036-1	12.0"	CS SA106	80	.562"	61868
UT-037-1	14.0"	SS SA376	160	1.406"	636144
UT-037-2	14.0"	SS SA376	160	1.406"	636144
UT-038-1	N/A	SS SA516	N/A	1.250"	66987
UT-039-1	N/A	SS SA240	N/A	1.125"	26220
UT-040-1	N/A	SS SA376	N/A	.375"	M5914
UT-040-2	N/A	SS SA376	N/A	.375"	M5914
UT-041-1	30.0"	CS A106	SPEC.	1.886"	L4484
UT-042-1	10.0"	SS SA376	140	1.0"	11-956
UT-050-1	PRESS.	SS SA533	N/A	3.50"	D8366
UT-051-1	STM.GEN.	SS SA533	N/A	5.00"	D8366
UT-052-1	STM.GEN.	SS SA533	N/A	3.50"	D8366
UT-053-1	SPEC.BLK.	SS SA351	N/A	.900"	28841-6
UT-054-1	N/A	SS SA204	N/A	.800"	803145
UT-055-1	10.0"	SS SA312	SPEC.	.740"	1080-14-1
UT-056-1	N/A	SS SA204	N/A	2.00"	895101
UT-057-1	8.0"	CS SA106	40	.322"	N16583
UT-058-1	6.0"	P22 SA-335	120	.562"	218698
UT-059-1	2.0	SS SA 312	160	.344'	MS022
2-UT-060-1	6.0"	P22 SA-335	NA	.500"	21337
UT-61	RPV STUD	SA 540	NA	NA	81874
UT-62-1	RCP Bolt	SA-540	NA	NA	123123
UT-63-1	STM. GEN	SA-508	NA	5.5	A2181/A2182

TABLE 2.4-3
ASME SECTION XI UT CALIBRATION BLOCKS

Cal. Block Number	Size	Material	Pipe Schedule	Thickness	Heat Number
UT-64-1	St. Gen	SA-533 GR B	NA	3.88	4102
UT-65-1	St. Gen	SA-533 GR B	NA	3.25	4102
UT-66-1	St. Gen IR	SA-598 Cl 3A	NA	10.5	96B145-1-14
FPC003	Alt. ASME	SA 316	NA	.5 – 2”	171722
CPL-77	Alt ASME	304 SS	NA	.5 – 2”	A13979
CPL-78	Alt ASME	A516-70 CS	NA	.5 – 2”	1H924
CPL-79	Alt ASME	316 SS	NA	.5 – 2”	1S146
CB-02-52	Alt. ASME	516 Gr70 CS	NA	.5 – 2”	R7961

2.5 Technical Approach and Positions

When the requirements of ASME Section XI are not easily interpreted, HNP has reviewed general licensing/regulatory requirements and industry practice to determine a practical method of implementing the Code requirements. The Technical Approach and Position (TAP) documents contained in this section have been provided to clarify HNP's implementation of ASME Section XI requirements. An index which summarizes each technical approach and position is included in Table 2.5-1. This section is reserved for site specific issues. Corporate Policy statements will be tracked and maintained by the Corporate Staff.

TABLE 2.5-1
TECHNICAL APPROACH AND POSITIONS INDEX

Position Number	Revision Date[2]	Status[1]	(Program) Description of Technical Approach and Positions
I3T-01	0 05/02/07	Active	**(SPT)** System Leakage Testing of Non-Isolable Buried Components.
I3T-02	0 05/02/07	Active	**(SPT)** Valve Seats as Pressurization Boundaries.

Note 1: Technical Approach and Position Status Options: Active - Current ISI Program technical approach and position is being utilized at HNP; Deleted - Technical approach and position is no longer being utilized at HNP.

Note 2: The revision listed is the latest revision of the subject technical approach and position. The date noted in the second column is the date of the ISI Program Plan revision when the technical approach and position was incorporated into the document.

TECHNICAL APPROACH AND POSITION NUMBER I3T-01
Revision 0

COMPONENT IDENTIFICATION:

Code Class:	2 and 3
Reference:	IWA-5244(b)(2)
Examination Category:	C-H, D-B
Item Number:	C7.10, D2.10
Description:	System Leakage Testing of Non-Isolable Buried Components
Component Number:	Non-Isolable Buried Pressure Retaining Components

CODE REQUIREMENT:

IWA-5244(b)(2) requires non-isolable buried components be tested to confirm that flow during operation is not impaired.

POSITION:

Article IWA-5000 provides no guidance in setting acceptance criteria for what can be considered "adequate flow". In lieu of any formal guidance provided by the Code, HNP has established the following acceptance criteria:

- For opened ended lines on systems that require Inservice Testing (IST) of pumps, adherence to IST acceptance criteria is considered as reasonable proof of adequate flow through the lines.

- For lines in which the open end is accessible to visual examination while the system is in operation, visual evidence of flow discharging the line is considered as reasonable proof of adequate flow through the open ended line.

- For open ended portions of systems where the process fluid is pneumatic, evidence of gaseous discharge shall be considered reasonable proof of adequate flow through the open ended line. Such test may include passing smoke through the line, hanging balloons or streamers, using a remotely operated blimp, using thermography to detect hot air, etc.

This acceptance criteria will be utilized in order to meet the requirements of IWA-5244(b)(2).

HNP's position is that proof of adequate flow is all that is required for testing these open ended lines and that no further visual examination is necessary. This is consistent with the requirements for buried piping, which is not subject to visual examination.

TECHNICAL APPROACH AND POSITION NUMBER I3T-02
Revision 0

COMPONENT IDENTIFICATION:

Code Class:	1, 2, and 3
Reference:	IWA-5221
	IWA-5222
Examination Category:	B-P, C-H, D-B
Item Number:	B15.10, C7.10, D2.10
Description:	Valve Seats as Pressurization Boundaries
Component Number:	All Pressure Testing Boundary Valves

CODE REQUIREMENT:

IWA-5221 requires the pressurization boundary for system leakage testing extend to those pressure retaining components under operating pressures during normal system service.

POSITION:

HNP's position is that the pressurization boundary extends up to the valve seat of the valve utilized for isolation. For example, in order to pressure test the Class 1 components, the valve that provides the Class break would be utilized as the isolation point. In this case the true pressurization boundary, and Class break, is actually at the valve seat.

Any requirement to test beyond the valve seat is dependent only on whether or not the piping on the other side of the valve seat is ISI Class 1, 2, or 3.

In order to simplify examination of classed components, HNP will perform a VT-2 visual examination of the entire boundary valve body and bonnet (during pressurization up to the valve seat).

3.0 COMPONENT ISI PLAN

The HNP Component ISI Plan includes ASME Section XI nonexempt pressure retaining welds, piping structural elements, pressure retaining bolting, attachment welds, pump casings, valve bodies, reactor pressure vessel interior, reactor pressure vessel welded core support structures, and reactor pressure vessel interior attachments of ISI Class 1, 2, and 3 components that meet the criteria of IWA-1300. The term "Nonexempt" is used here to mean components which are not exempt per ASME Section XI Subarticles IWB(C)(D)-1220. All Class 1, 2, and 3 components are identified on the S-Series Simplified Flow Diagrams listed in Section 2.3, Table 2.3-1. This Component ISI Plan also includes component augmented inservice inspection program information specified by documents other than ASME Section XI.

3.1 Nonexempt ISI Class Components

The HNP ISI Class 1 components subject to examination are those which are not exempted under the criteria of Subarticle IWB-1220 in the 1989 Edition, No Addenda of ASME Section XI (see Section 3.1.2 below). The ISI Class 2 and 3 components identified on ISI Isometric Piping Drawings are those not exempted under the criteria of Subarticles IWC-1220 and IWD-1220 of ASME Section XI. A summary of HNP ASME Section XI nonexempt components is included in Section 7.0.

3.1.1 Identification of ISI Class 1, 2, and 3 Nonexempt Components

ISI Class 1, 2, and 3 components are identified on the ISI Isometric Piping Drawings listed in Section 2.4, Table 2.4-1. Welded attachments are also identified by controlled HNP support drawings.

3.1.2 10CFR50.55a(b)(2)(xi) specifies that the 1989 Edition, No Addenda of ASME Section XI, Subarticle IWB-1220 shall be used in lieu of the 2001 Edition through the 2003 Addenda of ASME Section XI, Subarticle IWB-1220.

<u>*IWB-1220, Components Exempt from Examination*</u> - *The following components (or parts of components) are exempted from the volumetric and surface examination requirements of IWB-2500* per the Code paragraph referenced:

(a) *Components that are connected to the reactor coolant system and part of the reactor coolant pressure boundary, and that are of such a size and shape so that upon postulated rupture the resulting flow of coolant from the reactor coolant system under normal plant operating conditions is within the capacity of makeup systems which are operable from on-site emergency power;*

(b)(1) piping of Nominal Pipe Size (NPS) 1 and smaller, except for steam generator tubing;

(b)(2) components and their connections in piping of NPS 1 and smaller;

(c) reactor pressure vessel head connections and associated piping, NPS 2 and smaller, made inaccessible by control rod drive penetrations.

3.2 Risk-Informed Examination Requirements

Piping structural elements that fall under RISI Examination Category R-A are risk ranked as High (1, 2, and 3), Medium (4 and 5), and Low (6 and 7). Per the EPRI Topical Reports TR-112657, Rev. B-A, TR-1006937, Rev. 0-A, and Code Case N-578-1, piping structural elements ranked as High or Medium Risk are subject to examination while piping structural elements ranked as Low Risk are not subject to examinations (except for pressure testing). Thin wall welds that were excluded from volumetric examination under ASME Section XI rules per Table IWC-2500-1 are included in the element scope that is potentially subject to RISI examination at HNP. These include welds previously identified under Examination Category C-F-1, Item Numbers C5.11 and C5.21.

Piping structural elements may be excluded from examination (other than pressure testing) under the RISI Program if the only degradation mechanism present for a given location is inspected for cause under certain other HNP programs such as the Flow Accelerated Corrosion (FAC) Program. These piping structural elements will remain part of the FAC programs which already perform "for cause" inspections to detect these degradation mechanisms. Piping structural elements susceptible to FAC along with another degradation mechanism (e.g., thermal fatigue) are retained as part of the RISI scope and are included in the element selection for the purpose of performing exams to detect the additional degradation mechanism. The RISI Program piping structural element examinations are performed in accordance with Relief Request I3R-02.

4.0 SUPPORT ISI PLAN

The HNP Support ISI Plan includes the supports of ASME Section XI nonexempt ISI Class 1, 2, and 3 components as described in Section 3.0. The term "Nonexempt" is used here to mean components which are not exempt per ASME Section XI Subarticle IWF-1230.

4.1 Nonexempt ISI Class Supports

The HNP ISI Class 1, 2, and 3 nonexempt supports are those which do not meet the exemption criteria of Subarticle IWF-1230 of ASME Section XI. A summary of HNP ASME Section XI nonexempt supports is included in Section 7.0.

4.1.1 Identification of ISI Class 1, 2, and 3 Nonexempt Supports

ISI Class 1, 2, and 3 supports are identified on the ISI Isometric Piping Drawings listed in Section 2.4, Table 2.4-1. Supports are identified by controlled HNP individual support detail drawings.

4.2 Snubber Examination and Testing Requirements

4.2.1 ASME Section XI Paragraphs IWF-5200(a) and (b) and IWF-5300(a) and (b) require VT-3 Visual Examination and Inservice Tests of snubbers to be performed in accordance with the Operation and Maintenance of Nuclear Power Plants (O&M), Standard ASME/ANSI O&M, Part 4. As allowed by 10CFR50.55a(b)(3)(v), HNP will use Subsection ISTD, "Inservice Testing of Dynamic Restraints (Snubbers) In Light Water Reactor Power Plants," ASME O&M Code, 2001 Edition through the 2003 Addenda, to meet the requirements in ASME Section XI Paragraphs IWF-5200(a) and (b) and IWF-5300(a) and (b).

The ASME Section XI ISI Program uses Subsection IWF to define support inspection requirements. The ISI Program maintains the Code Class snubbers in the populations subject to inspection per Subsection IWF. This is done to accommodate scheduling and inspection requirements of the related attachment hardware per Paragraphs IWF-5200(c) and IWF-5300(c). (See Section 4.2.2 below.)

4.2.2 ASME Section XI Paragraphs IWF-5200(c) and IWF-5300(c) require integral and non-integral attachments for snubbers to be examined in accordance with Subsection IWF of ASME Section XI. This results in VT-3 visual examination of the snubber attachment hardware including the bolting, pins, and their interface to the clamp, but does not include the component-to-clamp interface.

The ASME Section XI ISI Program uses Subsection IWF to define the inspection requirements for all Class 1, Class 2, and Class 3 supports, regardless of type. The ISI Program maintains the Code Class snubbers in the support populations subject to inspection per Subsection IWF. This is done to facilitate scheduling and inspection requirements of the snubber attachment hardware (e.g., bolting and pins) per Paragraphs IWF-5200(c) and IWF-5300(c).

It should be noted that the examination of snubber welded attachments will be performed in accordance with the ASME Section XI Subsections IWB, IWC, and IWD welded attachment examination requirements (e.g.; Examination Categories B-K, C-C, and D-A).

5.0 SYSTEM PRESSURE TESTING ISI PLAN

The HNP System Pressure Testing ISI Plan includes all pressure retaining ASME Section XI ISI Class 1, 2, and 3 components, with the exception of those specifically exempted by Paragraphs IWA-5110(c), IWC-5222(b), and IWD-5240(b). All RISI piping structural elements, regardless of risk classification, are subject to pressure testing as part of the current ASME Section XI program.

The SPT ISI Plan performs system pressure tests and visual inspections on the ISI Class 1, 2, and 3 pressure retaining components to verify system and component structural integrity. This program conducts both Periodic and Interval (10-Year frequency) pressure tests as defined in ASME Section XI Inspection Program B. In addition to the ASME Section XI requirements, HNP's SPT ISI Plan also includes augmented examination commitments.

5.1 ISI Class Systems

All Class 1 pressure retaining components, typically defined as the reactor coolant pressure boundary, are required to be tested. Those portions of Class 2 and 3 systems that are required to be tested include the pressure retaining boundaries of components required to operate or support the system safety functions. Class 2 and 3 open ended discharge piping and components are excluded from the examination requirements per Paragraphs IWC-5222(b) and IWD-5240(b).

5.1.1 Identification of Class 1, 2, and 3 Components

All components subject to ASME Section XI System Pressure Testing and augmented pressure testing are shown on the S-Series Simplified Flow Diagrams listed in Section 2.3, Table 2.3-1.

5.1.2 Identification of System Pressure Tests

Individual tests and test segments are identified and maintained in the HNP ISI Database.

5.2 Risk-Informed Examinations of Socket Welds

Socket welds selected for examination under the RISI Program are to be inspected with a VT-2 visual examination <u>each</u> refueling outage per ASME Code Case N-578-1 (footnote 12 in Table 1 of the Code Case) as discussed in Relief Request I3R-02 alternative to use Category R-A. To facilitate this, socket welds selected for inspection under the RISI Program shall be pressurized each refueling outage during a system pressure test in accordance with Paragraph IWA-5211(a).

5.3 Buried Components

ISI Classed components required to be tested per Section 5.1 above that are buried components as defined in Article IWA-9000 shall be tested in accordance with IWA-5244. If the buried component is surrounded by an annulus, a VT-2 visual examination shall be performed. Otherwise, isolable buried components require a pressure decay or change-in-flow test, while nonisolable buried components require an unimpaired flow test.

Note: For the purpose of determining if a component is isolable or not, the valves on both ends of the buried section(s) must be designed for and capable of maintaining a pressure tight (leak tight) boundary. (This position is supported by the ASME Code consensus body through Interpretation IN07-09.) HNP utilizes this methodology based on design, type, and function of any boundary valves present. Failure of a valve or valve internal component, which would impact the performance of its intended function, is not utilized as justification for determining if it is isolable or not. All nonisolable buried components shall receive a test to confirm that flow during operation is not impaired.

6.0 CONTAINMENT ISI PLAN

The HNP Containment ISI Plan includes nonexempt ASME Section XI CISI Class MC pressure retaining components and their integral attachments, and Class CC components and structures that meet the criteria of Subarticle IWA-1300. The term "Nonexempt" is used here to mean components which are not exempt per Section XI Subarticles IWE(L)-1220. This Containment ISI Plan also includes information related to augmented examination areas, component accessibility, and examination review.

6.1 Nonexempt CISI Class Components

The HNP CISI Class MC and CC components identified on the CISI Reference Drawings are those not exempted under the criteria of Subarticles IWE-1220 and IWL-1220 in the 2001 Edition through the 2003 Addenda of ASME Section XI. A summary of HNP's ASME Section XI nonexempt CISI components is included in Section 7.0.

The process for scoping HNP components for inclusion in the Containment ISI Plan is included in the containment sections of the ISI Classification Basis Document. These sections include a listing and detailed basis for inclusion of containment components.

Components that are classified as Class MC and CC must meet the requirements of ASME Section XI in accordance with 10CFR50.55a(g)(4). Supports of IWE components are not required to be examined in accordance with 10CFR50.55a(g)(4).

6.1.1 Identification of CISI Class MC and CC Nonexempt Components

CISI Class MC and CC components are identified on the CISI Reference Drawings listed in Section 2.4, Table 2.4-2.

6.1.2 Identification of CISI Class MC and CC Exempt Components

Certain containment components or parts of components may be exempted from examination based on design and accessibility per the requirements of Subarticles IWE-1220 and IWL-1220.

6.2 Augmented Examinations Areas

Metal containment components potentially subject to augmented examination per Subarticle IWE-1240 have been evaluated in the containment sections of the ISI Classification Basis Document. These sections define the areas that are subjected to augmented examination.

Similarly, concrete surfaces may be subject to Detailed Visual examination in accordance with Subarticle IWL-2310, if declared to be 'Suspect Areas' by the examiner or the Responsible Engineer.

No significant conditions were identified in the First CISI Interval and no significant conditions are currently identified in the Second Interval as requiring application of additional augmented examination requirements under Subarticles IWE-1240 or IWL-2310.

6.3 Component Accessibility

Class MC pressure retaining components subject to examination shall remain accessible for either direct or remote visual examination from at least one side per the requirements of ASME Section XI, Subarticle IWE-1230.

6.4 Responsible Individual and Engineer

ASME Section XI Subsection IWE requires the Responsible Individual to be involved in the development, performance, and review of the CISI examinations. The Responsible Individual shall meet the requirements of ASME Section XI, Subarticle IWE-2320.

ASME Section XI Subsection IWL requires the Responsible Engineer to be involved in the development, approval, and review of the CISI examinations. The Responsible Engineer shall meet the requirements of ASME Section XI, Subarticle IWL-2320.

7.0 COMPONENT SUMMARY TABLES

7.1 Inservice Inspection Summary Tables

The following Table 7.1 provides a summary of the ASME Section XI pressure retaining components, supports, containment structures, system pressure testing, and augmented program components for the Third ISI Interval and the Second CISI Interval at HNP.

The format of the Inservice Inspection Summary Tables is as depicted below and provides the following information:

Examination Category (with Examination Category Description)	Item Number (or Risk Category Number or Augmented Number)	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
(1)	(2)	(3)	(4)	(5)	(6)	(7)

(1) Examination Category (with Examination Category Description):

Provides the Examination Category and description as identified in ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWE-2500-1, IWF-2500-1, and IWL-2500-1.

Examination Category "R-A" from Code Case N-578-1 is used in lieu of ASME Section XI Examination Categories B-F, B-J, C-F-1, and C-F-2 to identify Class 1 and 2 piping structural elements for the RISI program. Only those Examination Categories applicable to HNP are identified.

Examination Category "AUG" is used to identify Augmented ISI examinations and other HNP commitments.

(2) Item Number (or Risk Category Number or Augmented Number):

Provides the Item Number as identified in ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWE-2500-1, IWF-2500-1, and IWL-2500-1. Only those Item Numbers applicable to HNP are identified.

For piping structural elements under the RISI program, the Risk Category Number (1-5) is used in place of the Item Number.

Specific abbreviations such as 6.6.8B, 6.6.8C, 6.6.8D, 6.6.8F, RG1.14, and AUG have been developed to identify Augmented ISI examinations and other HNP commitments.

(3) Item Number (or Risk Category Number or Augmented Number) Description:

Provides the description as identified in ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWE-2500-1, IWF-2500-1 and IWL-2500-1.

For Risk-Informed piping examinations, a description of the Risk Category Number is provided.

For augmented inspection commitments, a description of the augmented requirement is provided.

(4) Examination Requirements:

Provides the examination methods required by ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWE-2500-1, IWF-2500-1, and IWL-2500-1.

Provides the examination requirements for piping structural elements under the RISI Program that are in accordance with the EPRI Topical Reports TR-112657, Rev. B-A, TR-1006937, Rev. 0-A, and Code Case N-578-1.

Provides the examination requirements for augmented components from HNP commitments or relief requests.

(5) Total Number Of Components by System

Provides the system designator (abbreviations). See Section 2.3, Table 2.3-1 for a list of these systems.

This column also provides the number of components within a particular system for that ASME Section XI Item Number, Risk Category Number, or Augmented Number.

Note that the total number of components by system are subject to change after completion of plant modifications, design changes, and ISI system classification updates.

(6) Relief Request/Technical Approach & Position Number

Provides a listing of Relief Request/TAP Numbers applicable to specific components, the ASME Section XI Item Number, Risk Category Number, or Augmented Number. Relief requests and TAP numbers that generically apply to all components, or an entire class are not listed. If a Relief Request/TAP Number is identified, see the corresponding relief request in Section 8.0 or the TAP number in Section 2.5.

(7) Notes

Provides a listing of program notes applicable to the ASME Section XI Item Number, Risk Category Number, or Augmented Number. If a program note number is identified, see the corresponding program note in Table 7.1-2.

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
B-A Pressure Retaining Welds in Reactor Vessel	B1.11	Circumferential Shell Welds (Reactor Vessel)	Volumetric	RC: 3		
	B1.12	Longitudinal Shell Welds (Reactor Vessel)	Volumetric	RC: 6		
	B1.21	Circumferential Head Welds (Reactor Vessel)	Volumetric	RC: 1		
	B1.22	Meridional Head Welds (Reactor Vessel)	Volumetric	RC: 6		
	B1.30	Shell-to-Flange Weld (Reactor Vessel)	Volumetric	RC: 1		
	B1.40	Head-to-Flange Weld (Reactor Vessel)	Volumetric & Surface	RC: 1		
B-B Pressure Retaining Welds in Vessels Other Than Reactor Vessels	B2.11	Circumferential Shell-To-Head Welds (Pressurizer)	Volumetric	RC: 2		
	B2.12	Longitudinal Shell-To-Head Welds (Pressurizer)	Volumetric	RC: 2		
	B2.40	Tube Sheet-To-Head Weld (Steam Generator)	Volumetric	RC: 3		
B-D Full Penetration Welds of Nozzles in Vessels	B3.90	Nozzle-to-Vessel Welds (Reactor Vessel)	Volumetric	RC: 6		9
	B3.100	Nozzle Inside Radius Section (Reactor Vessel)	Volumetric	RC: 6		10
	B3.110	Nozzle-to-Vessel Welds (Pressurizer)	Volumetric	RC: 6		
	B3.120	Nozzle Inside Radius Section (Pressurizer)	Volumetric	RC: 6		8
	B3.140	Nozzle Inside Radius Section (Steam Generator)	Volumetric or Enhanced Visual	RC: 6		8

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
B-G-1 Pressure Retaining Bolting, Greater Than 2 in. In Diameter	B6.10	Closure Head Nuts (Reactor Vessel)	Visual, VT-1	RC: 58		
	B6.20	Closure Studs (Reactor Vessel)	Volumetric	RC: 58		
	B6.40	Threads in Flange (Reactor Vessel)	Volumetric	RC: 58		
	B6.50	Closure Washers (Reactor Vessel)	Visual, VT-1	RC: 58		
	B6.180	Bolts & Studs (Pumps)	Volumetric	RC: 72		
	B6.190	Flange Surface, when connection disassembled (Pumps)	Visual, VT-1	RC: 72		

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
B-G-2 Pressure Retaining Bolting, 2 in. and Less In Diameter	B7.10	Bolts, Studs, & Nuts (Reactor Vessel)	Visual, VT-1	RC: 4		
	B7.20	Bolts, Studs, & Nuts (Pressurizer)	Visual, VT-1	RC: 2		
	B7.30	Bolts, Studs, & Nuts (Steam Generator)	Visual, VT-1	RC: 12		
	B7.50	Bolts, Studs, & Nuts (Piping)	Visual, VT-1	CS: 3 RC: 3		
	B7.60	Bolts, Studs, & Nuts (Pumps)	Visual, VT-1	RC: 6		
	B7.70	Bolts, Studs, & Nuts (Valves)	Visual, VT-1	RC: 3 RH: 4 SI: 17		

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
B-J Pressure Retaining Welds in Piping	B9.21	Circumferential Welds in Piping Less than NPS 4 (other than PWR high pressure safety injection systems)	Surface	RC: 1		15
	B9.40	Socket Welds	Surface	RC: 11		15

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
B-K Welded Attachments for Vessels, Piping, Pumps, and Valves	B10.10	Welded Attachments (Pressure Vessels)	Surface or Volumetric	RC 13		11
	B10.20	Welded Attachments (Piping)	Surface	RC: 4 RH: 2 SI: 10		

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
B-L-1 Pressure Retaining Welds In Pump Casings	B12.10	Pump Casing welds (Pumps)	Visual, VT-1	RC: 3		
B-L-2 Pump Casings	B12.20	Pump Casings (Pumps)	Visual, VT-3	RC: 3		
B-M-2 Valve Bodies	B12.50	Valve Bodies (Exceeding NPS 4) (Valves)	Visual, VT-3	RC: 3 RH: 4 SI: 17		
B-N-1 Interior of Reactor Vessel	B13.10	Vessel Interior (Reactor Vessel)	Visual, VT-3	RC: 1		
B-N-2 Welded Core Support Structures and Interior Attachments to Reactor Vessels	B13.60	Interior Attachments Beyond Beltline Region (Reactor Vessel)	Visual, VT-3	RC: 4		
B-N-3 Removable Core Support Structures	B13.70	Core Support Structure (Reactor Vessel)	Visual, VT-3	RC: 1		

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
B-O Pressure Retaining Welds in Control Rod Housings	B14.10	Welds in CRD Housing (Reactor Vessel) (10% of Peripheral CRD Housings)	Volumetric or Surface	RC: 24		
B-P All Pressure Retaining Components	B15.10	System Leakage Test (IWB-5220)	Visual, VT-2	CS RC SI	I3R-04 I3T-02	

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
C-A Pressure Retaining Welds in Pressure Vessels	C1.10	Shell Circumferential Welds (Pressure Vessels)	Volumetric	CS: 1 RH: 3		12
	C1.20	Head Circumferential Welds (Pressure Vessels)	Volumetric	CS 2 RC: 3 RH: 2 SI: 2		12
	C1.30	Tubesheet-to-Shell-Weld Welds (Pressure Vessels)	Volumetric	RC: 3		
C-B Pressure Retaining Nozzle Welds in Vessels	C2.21	Nozzle-to-Shell (Nozzle to Head or Nozzle to Nozzle) Welds Without Reinforcing Plate, Greater Than 1/2" Nominal Thickness (Pressure Vessels)	Volumetric & Surface	RC: 6 SI: 2		
	C2.22	Nozzle Inside Radius Section Without Reinforcing Plate, Greater Than 1/2" Nominal Thickness (Pressure Vessels)	Volumetric	RC: 3		
	C2.31	Reinforcing Plate Welds to Nozzle and Vessel (Pressure Vessels)	Surface	RH: 4		12
	C2.33	Nozzle-to-Shell (Nozzle to Head or Nozzle to Nozzle) Welds When Inside of Vessel Is Inaccessible (Pressure Vessels)	Visual, VT-2	RH: 4		12
C-C Welded Attachments for Vessels, Piping, Pumps, and Valves	C3.10	Welded Attachments (Pressure Vessels)	Surface	RH: 2		11
	C3.20	Welded Attachments (Piping)	Surface	AF: 5 CS: 8 CT: 26 FW: 5 MS: 9 RH: 18 SI: 19		
	C3.20	Welded Attachments (Pumps)	Surface	CS: 12 CT: 6 RH: 6		

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
C-H All Pressure Retaining Components	C7.10	System Leakage Test (IWC-5220)	Visual, VT-2	AFW BD CB CCW CM CS CT CVCS DW FP IA LT MD MS RAD MON. SAMP RC RHR RVLIS SA SI SP SW WASTE LIQUID WG	I3R-03 I3T-01 I3T-02	

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
D-A Welded Attachments for Vessels, Piping, Pumps, and Valves	D1.20	Welded Attachments (Piping)	Visual, VT-1	CC: 68 CE: 3 CH: 3 CX: 4 EA: 4 MS: 7 SF: 18 SW: 58		11
D-B All Pressure Retaining Components	D2.10	System Leakage Test (IWD-5221)	Visual, VT-2	AFW AS BD CCW CE CS CVCS CW CX EA EF ESW FO FW HYD. ANALYZER MS NI PM RC SFC SI SW WL	I3T-01 I3T-02	

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components	Relief Request/ TAP Number	Notes
E-A Containment Surfaces	E1.11	Containment Vessel Pressure Retaining Boundary - Accessible Surface Areas	General Visual	7		5
	E1.11	Containment Vessel Pressure Retaining Boundary - Bolted Connections, Surfaces	Visual, VT-3	13		5
	E1.30	Moisture Barriers	General Visual	1		
E-C Containment Surfaces Requiring Augmented Examination	E4.11	Containment Surface Areas - Visible Surfaces	Visual, VT-1	0		6
	E4.12	Containment Surface Areas - Surface Area Grid Grid Line Intersections and Minimum Wall Thickness Locations	Volumetric (Thickness)	0		7

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System			Relief Request/ TAP Number	Notes
				A Anchor/Rod	B Restraint	C Spring/ Snubber		
F-A Supports	F1.10	Class 1 Piping Supports	Visual, VT-3	CS: 9 RC: 14 RH: 11 SI: 42	RC: 5 RH: 2 SI: 7	CS: 9 RC: 83 RH: 12 SI: 74		1
	F1.20	Class 2 Piping Supports	Visual, VT-3	AF: 34 CS: 17 CT: 45 FW: 20 MS: 13 RH: 55 SI: 61	AF: 8 CS: 14 CT: 22 FW: 2 MS: 3 RH: 6 SI: 12	AF: 43 CS: 9 CT: 20 FP: 2 FW: 33 MS: 32 RH: 36 SG: 9 SI: 123 SW: 11		1
	F1.30	Class 3 Piping Supports	Visual, VT-3	AF: 7 CC: 186 CE: 20 CH: 71 CX: 94 EA: 4 MS: 14 SF: 59 SW: 278	AF: 1 CC: 85 CE: 2 CH: 15 CX: 13 EA: 14 MS: 4 SF: 22 SW: 182	CC: 40 CE: 4 CH: 1 MS: 25 SF: 10 SW: 20		1

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
F-A Supports	F1.40	Supports Other Than Piping Supports (Class 1, 2, and 3)	Visual, VT-3	AF: 3 AH: 8 BR: 1 CC: 6 CE: 1 CH: 2 CS: 26 CT: 3 DFO: 2 ED: 1 RC: 5 RH: 6 SC: 2 SF: 6 SG: 30 SI: 3 SW: 8 WC: 2		1

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Item Number	Description	Exam Requirements	Total Number of Components	Relief Request/ TAP Number	Notes
L-A Concrete Surfaces	L1.11	Concrete Surfaces - All Accessible Surface Areas	General Visual	6		
	L1.12	Concrete Surfaces - Suspect Areas	Detailed Visual	----		

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Risk Category Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
R-A Risk-Informed Piping Examinations	2	Risk Category 2 Elements	See Notes	CS: 2 RC: 62 SI: 5	I3R-01 I3R-02	2 3 4
	3	Risk Category 3 Elements	See Notes	FW: 2	I3R-01 I3R-02	2 3 4
	4	Risk Category 4 Elements	See Notes	CS: 29 CT: 15 RC: 278 MS: 25 RH: 17 SI: 221	I3R-01 I3R-02	2 3 4
	5	Risk Category 5 Elements	See Notes	AF: 6 CS: 8 FW: 6 RH: 6 SI: 36	I3R-01 I3R-02	2 3 4

TABLE 7.1-1
INSERVICE INSPECTION SUMMARY TABLE

Examination Category (with Examination Category Description)	Aug Number	Description	Exam Requirements	Total Number of Components by System	Relief Request/ TAP Number	Notes
AUG Augmented Components	6.6.8B	Augmented Piping Weld Volumetric Examination Per FSAR Section 6.6.8B (Commitment 3)	Volumetric	NA		4
	6.6.8C	Augmented Piping Weld Volumetric Examination Per FSAR Section 6.6.8C (Commitment 4)	Volumetric	NA		4
	6.6.8D	Augmented Piping Weld Volumetric Examination Per FSAR Section 6.6.8D (Commitment 5)	Surface	NA		4
	6.6.8E	Augmented Piping Weld Volumetric Examination Per FSAR Section 6.6.8E (Commitment 6)	Surface	NA		4
	6.6.8F	Augmented Piping Weld Volumetric Examination Per FSAR Section 6.6.8F (Commitment 7)	Surface	BD: 2		14
	RG1.14	Reactor Coolant Pump Flywheel Integrity Examination (Commitment 1)	Volumetric or Surface	RC: 6		13
	A600	Successive or Owner Required Examinations (Alloy 600 Regulatory Commitment) (Commitment 9)	Bare Metal Visual (BMV)/ Volumetric	RC: 14		

TABLE 7.1-2
INSERVICE INSPECTION SUMMARY TABLE PROGRAM NOTES

Note #	Note Summary
1	ISI snubber visual examinations and functional testing are performed in accordance with the ASME O&M Code, Subsection ISTD Program. The number of HNP supports identified, include snubbers for the visual examination and functional testing of the integral and nonintegral attachments per Paragraphs IWF-5200(c), IWF-5300(c), and IWF-2500(a). The snubbers are scheduled and administratively tracked in the ISI Program; however, the ASME O&M Code, Subsection ISTD Program will be the mechanism for actually performing the visual examinations and functional testing scheduled within the ISI Program. For a detailed discussion of the snubber program, see Section 4.2.
2	For the Third Inspection Interval, HNP's Class 1 and 2 piping inspection program will be governed by risk-informed regulations. The RISI Program methodology is described in the EPRI Topical Reports TR-112657, Rev. B-A, TR-1006937, Rev. 0-A, and Code Case N-578-1. The RISI Program scope has been implemented as an alternative to the 2001 Edition through the 2003 Addenda of the ASME Section XI examination program for Class 1 Examination Category B-F and B-J welds and Class 2 C-F-1 and C-F-2 welds in accordance with 10CFR50.55a(a)(3)(i).
3	Examination requirements within the RISI Program are determined by the various degradation mechanisms present at each individual piping structural element. See EPRI Topical Reports TR-112657, Rev. B-A, TR-1006937, Rev. 0-A, and Code Case N-578-1 for specific exam method requirements.
4	For the Third Inspection Interval, the RISI Program scope has been expanded to include welds in the BER piping, also referred to as the HELB region, which includes several non-class welds that fall within the BER augmented inspection program. All BER augmented welds have been evaluated under the RISI methodology and have been integrated into the RISI Program under the 10CFR50.59 change process. Welds in the RISI-BER Program are currently identified in the ISI Database with Item Number R1.30. Additional guidance for adaptation of the RISI evaluation process to BER piping is given in EPRI TR-1006937 Rev. 0-A. Thus, these welds have been categorized and selected for examination in accordance with the EPRI Topical Reports TR-112657, Rev. B-A, TR-1006937, Rev. 0-A, and Code Case N-578-1 in lieu of the original commitment to NUREG 0800 in FSAR Section 6.6.8.
5	Bolted connections examined per Item Number E1.11 require a VT-3 visual examination once per interval and each time the connection is disassembled during a scheduled Item Number E1.11 exam. Additionally, a VT-1 visual examination shall be performed if degradation or flaws are identified during the VT-3 visual examination. These modifications are required by 10CFR50.55a(b)(2)(ix)(G) and 10CFR50.55a(b)(2)(ix)(H).
6	Item Number E4.11 requires VT-1 visual examination in lieu of Detailed Visual examination, as modified by 10CFR50.55a(b)(2)(ix)(G).
7	The ultrasonic examination acceptance standard specified in IWE-3511.3 for Class MC pressure-retaining components must also be applied to metallic liners of Class CC pressure-retaining components, as modified by 10CFR50.55a(b)(2)(ix)(I).
8	Per 10CFR50.55a(b)(2)(xxi)(A), *Table IWB-2500-1 examination requirements*, the provisions of Table IWB-2500-1, Examination Category B-D, Items B3.120 and B3.140 in the 1998 Edition must be applied when using the 1999 Addenda through the latest Edition and Addenda, and requires that a visual examination with enhanced magnification may be performed on the inside radius section in place of an ultrasonic examination.
9	As allowed by Code Case N-613-1, HNP will perform a volumetric examination using a reduced examination volume (A-B-C-D-E-F-G-H) of Figures 1, 2, and 3 of the Code Case in lieu of the previous examination volumes of ASME Section XI, Figures IWB-2500-7(a), (b), and (c).
10	As allowed by Code Case N-648-1, HNP will perform a visual examination with enhanced magnification (EVT-1) in lieu of a volumetric examination in ASME Section XI.
11	As allowed by Code Case N-700, HNP will select only one welded attachment of only one of the multiple vessels for examination. For single vessels, only one welded attachment will be selected for examination.

TABLE 7.1-2
INSERVICE INSPECTION SUMMARY TABLE PROGRAM NOTES

Note #	Note Summary
12	As allowed by Code Case N-706, HNP will perform a visual examination (VT-2) in lieu of the volumetric and/or volumetric and surface examinations of ASME Section XI. Note that the alternative requirements detailed in Table 1 of the Code Case apply only to the residual and regenerative heat exchanger components.
13	HNP Technical Specification Amendment No. 119 requires that each Reactor Coolant Pump Motor Flywheel be inspected per the recommendations of USNRC Regulatory Guide 1.14, Reactor Coolant Pump Flywheel Integrity.
14	Paragraph F of FSAR Section 6.6.8, "Augmented Inservice Inspection To Protect Against Postulated Piping Failures", requires the surface examination once during each 10-year interval of 100% of the welded attachments within the boundaries defined in the High Energy Line Break boundaries.
15	These Examination Category B-J, Item Number B9.21 and B9.40 welds will be examined per ASME Section XI requirements until such time as they are evaluated and ranked accordingly per the Risk Informed evaluation process that includes the Consequence Evaluation, Degradation Mechanism Assessment, Risk Ranking, and Element Selection.

8.0 RELIEF REQUESTS FROM ASME SECTION XI

This section contains relief requests written per 10CFR50.55a(a)(3)(i) for situations where alternatives to ASME Section XI requirements provide an acceptable level of quality and safety; per 10CFR50.55a(a)(3)(ii) for situations where compliance with ASME Section XI requirements results in a hardship or an unusual difficulty without a compensating increase in the level of quality and safety; and per 10CFR50.55a(g)(5)(iii) for situations where ASME Section XI requirements are considered impractical.

The following USNRC guidance was utilized to determine the correct 10CFR50.55a paragraph citing for HNP relief requests. 10CFR50.55a(a)(3)(i) and 10CFR50.55a(a)(3)(ii) provide alternatives to the requirements of ASME Section XI, while 10CFR50.55a(g)(5)(iii) recognizes situational impracticalities.

10CFR50.55a(a)(3)(i): Cited in relief requests when alternatives to the ASME Section XI requirements which provide an acceptable level of quality and safety are proposed. Examples are relief requests which propose alternative NDE methods and/or examination frequency.

10CFR50.55a(a)(3)(ii): Cited in relief requests when compliance with the ASME Section XI requirements is deemed to be a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Examples of hardship and/or unusual difficulty include, but are not limited to, excessive radiation exposure, disassembly of components solely to provide access for examinations, and development of sophisticated tooling that would result in only minimal increases in examination coverage.

10CFR50.55a(g)(5)(iii): Cited in relief requests when conformance with ASME Section XI requirements is deemed impractical. Examples of impractical requirements are situations where the component would have to be redesigned, or replaced to enable the required inspection to be performed.

An index for HNP relief requests is included in Table 8.0-1. The "I3R-XX" relief requests are applicable to ISI, CISI, SPT, and PDI.

The following relief requests are subject to change throughout the inspection interval.

TABLE 8.0-1
RELIEF REQUEST INDEX

Relief Request	Status	(Program) Description/Revision
I3R-01	Authorized 10/10/2007	(ISI) Alternative to ASME Code Requirements For Weld Overlay Repairs. Revision 0
I3R-02	Submitted	(ISI) Alternate Risk-Informed Selection and Examination Criteria for Examination Category B-F, B-J, C-F-1, and C-F-2 Pressure Retaining Piping Welds. Revision 0
I3R-03	Submitted	(SPT) Pressure Testing of the RPV Head Flange Seal Leak Detection System. Revision 0
I3R-04	Submitted	(SPT) Piping and Valves Within the Class 1 Pressure Boundary Including Reactor Coolant, Charging, Safety Injection, and Residual Heat Removal Systems. Revision 0

Note 1: The USNRC grants relief requests pursuant to 10CFR50.55a(g)(6)(i) when Code requirements cannot be met and proposed alternatives do not meet the criteria of 10CFR50.55(a)(3). The USNRC authorizes relief requests pursuant to 10CFR50.55a(a)(3)(i) if the proposed alternatives would provide an acceptable level of quality and safety or under (3)(ii) if compliance with the specified requirements would result in hardship or unusual difficulties without a compensating increase in the level of safety.

Note 2: Relief Request Status Options: Authorized - Approved for use in an USNRC SER (See Note 1); Granted - Approved for use in an USNRC SER (See Note 3); Authorized Conditionally - Approved for use in an USNRC SER which imposes certain conditions; Denied - Use denied in an USNRC SER; Expired - Approval for relief has expired; Withdrawn - Relief has been withdrawn by Harris Nuclear Plant; Not Required - The USNRC has deemed the relief unnecessary in an SER or RAI; Cancelled - Relief has been cancelled by Harris Nuclear Plant prior to issue; Submitted - Relief has been submitted to the USNRC by the station and is awaiting approval.

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Request for Relief I3R-01 for Alternative to ASME Code Requirements for Weld Overlay Repairs in Accordance with 10CFR50.55a(a)(3)(i)

1.0 ASME CODE COMPONENTS AFFECTED:

System:	Reactor Coolant System
Code Class:	1
Description:	Pressurizer Nozzle Dissimilar Metal Welds Category B-F, Item number B5.40
Identifiers:	14" Pressurizer Surge Line Nozzle to Safe End weld (II-PZR-01NSEW-15) 4" Pressurizer Spray Line Nozzle to Safe End weld (II-PZR-01NSEW-16) 6" Pressurizer A Safety Line Nozzle to Safe End weld (II-PZR-01NSEW-17) 6" Pressurizer B Safety Line Nozzle to Safe End weld (II-PZR-01NSEW-18) 6" Pressurizer C Safety Line Nozzle to Safe End weld (II-PZR-01NSEW-19) 6" Pressurizer Relief Line Nozzle to Safe End weld (II-PZR-01NSEW-20)
Description:	Pipe to Safe-end weld Numbers Category B-J, Item number B9.11
Identifiers:	14" Pressurizer Surge Line Safe End to RCS pipe weld (1-RC-FW-3) 4" Pressurizer Spray Line Safe End to RCS pipe weld (1-RC-FW-328) 6" Pressurizer A Safety Line Safe End to RCS pipe weld (1-RC-FW-330) 6" Pressurizer B Safety Line Safe End to RCS pipe weld (1-RC-FW-334) 6" Pressurizer C Safety Line Safe End to RCS pipe weld (1-RC-FW-329) 6" Pressurizer Relief Line Safe End to RCS pipe weld (1-RC-FW-456)

2.0 APPLICABLE CODE EDITION AND ADDENDA:

ASME Section XI, 2001 Edition with Addenda through 2003

ASME Section XI, 2001 Edition, Appendix VIII, Supplement 11

Shearon Harris Nuclear Power Plant, Unit 1 will be in its Third ISI 10-Year Inspection Interval for Refueling Outage 14 in the Fall of 2007

3.0 APPLICABLE CODE REQUIREMENT:

ASME Code Section XI, Article IWA-4221 requires that repairs and the installation of replacement items be performed in accordance with the Owner's Requirements and the original Construction Code of the component or system. Alternatively, IWA-4221 allows for use of later Editions/Addenda of the Construction Code or ASME Section III. IWA-4420 and IWA-4600 provide defect removal and alternative welding methods when

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the requirements of IWA-4221 cannot be met. IWA-4530 requires the performance of preservice examinations based on IWB-2200 for Class 1 components. Table IWB-2500, Categories B-F and B-J, prescribes preservice and inservice inspection requirements for Class 1 butt welds. Appendix VIII, Supplement 11 of ASME Section XI specifies performance demonstration requirements for ultrasonic examination of weld overlays. Attachment 6 addresses the implementation of ASME Section XI, Appendix VIII, Supplement 11 requirements, through the use of the Performance Demonstration Initiative (PDI) Program.

4.0 REASON FOR REQUEST:

Pursuant to 10CFR50.55a(a)(3)(i), relief is requested on the basis that the proposed alternative will provide an acceptable level of quality and safety.

Primary water stress corrosion cracking (PWSCC) of Alloy 600 components and welds exposed to pressurized water reactor (PWR) primary coolant has become a growing concern in the nuclear industry over the past decade. In particular, dissimilar metal welds (DMWs) made with Nickel Alloy 82 and 182 weld metal exposed to elevated operating temperatures, such as Pressurizer nozzle/safe end DMWs, are believed to pose a heightened propensity to PWSCC. Due to this concern, the Harris Nuclear Plant (HNP) has concluded that the application of preemptive, full structural weld overlays to the Pressurizer nozzle to safe end DMWs is the most appropriate course of action to ensure Reactor Coolant System (RCS) pressure boundary integrity and improve the ability to inspect these welds in the future.

Structural weld overlays have been used for several years on piping of both boiling water reactors (BWRs) and PWRs to arrest the growth of existing flaws while establishing a new structural pressure boundary. No evidence of PWSCC has been found in the subject Pressurizer nozzle to safe end DMWs at HNP. However, PWSCC is difficult to detect except when the inspection is performed in accordance with the stringent requirements of ASME Section XI, Appendix VIII. The DMWs included in this request have been evaluated and do not meet the surface or geometric requirements of Appendix VIII. Therefore, inspection of these welds cannot be performed to Appendix VIII without modifying the weld geometry or configuration.

Currently, there are no generically accepted Code-approved criteria for a licensee to preemptively apply a full structural weld overlay to DMWs constructed of Alloy 82/182 weld material. Although HNP will perform repair/replacement activities in accordance with the 2001 Edition with 2003 Addenda of ASME Section XI, this edition of ASME Section XI does not include requirements for application of a preemptive, full structural weld overlay. For that matter, preemptive, full structural weld overlay requirements are

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not presently included in any Edition/Addenda of ASME Section XI (including Code Cases) approved by the NRC.

Nozzle-to-safe end weld overlays have been applied as repairs to other plants in accordance with ASME Code Cases N-504-2 and N-638-1, which are "conditionally accepted" for use in Regulatory Guide 1.147. Application of these code cases to nozzle DMWs requires a series of relief requests since Code Case N-504-2 was written specifically for stainless steel pipe-to-pipe welds and Code Case N-638-1 contains some restrictions and requirements that are not applicable to weld overlays. Code Case N-740 has recently been approved by the ASME Code Committee to specifically address weld overlays on DMWs. However, Code Case N-740 does not specifically address preemptive weld overlays and has not yet been accepted by the NRC in Regulatory Guide 1.147. Attachments 2, 3, 4, 5, and 6 are provided to further define the acceptability of the alternative proposed by this relief request.

This relief request is specific to the six (6) DMWs and six (6) stainless steel welds described in Section I, Components. The Pressurizer nozzles are carbon steel (P-No. 3) welded to a stainless steel (P-No. 8) safe end, which is, in turn, welded to stainless steel (P-No. 8) pipe. The weld joining the nozzle to safe end is an 82/182 DMW and the weld joining the safe end to pipe is stainless steel. Because of the close proximity of the two (2) welds, a single weld overlay will be installed across both welds. See Attachment 1 for additional details.

ASME Section XI, Appendix VIII, Supplement 11 contains the Qualification Requirements For Full Structural Overlaid Wrought Austenitic Piping Welds. The Performance Demonstration Initiative (PDI) has addressed this qualification requirement with a qualification program that uses Tri-party (USNRC/BWROG/EPRI) samples. These samples have a flaw population density greater than allowed by the current Code requirements. Attachment 6 addresses the differences between the Code requirements and the qualification program.

5.0 PROPOSED ALTERNATIVE:

Pursuant to 10CFR50.55a(a)(3)(i), Progress Energy proposes the following as alternatives to the Code requirements specified in Section III above. The proposed alternatives are applicable to the welds identified in Section I above.

A. Install preemptive full structural weld overlays in accordance with the proposed alternatives specified in Attachments 2 and 3. These alternatives are based on the methodology of ASME Section XI Code Case N-740.

- Attachment 2 specifies an alternative applicable to the design, fabrication,

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examination, pressure testing, and preservice and inservice inspection of preemptive full structural weld overlays.

- Attachment 3 specifies an alternative applicable to ambient temperature temperbead welding. Attachment 3 will be applied to the nozzles at the six (6) DMWs identified in Section I as an alternative to the post-weld heat treatment requirements of ASME Section III.

B. Perform ultrasonic examinations of the proposed preemptive full structural weld overlays in accordance with Appendix VIII, Supplement 11 of the 2001 Edition of ASME Section XI as modified by the Performance Demonstration Initiative (PDI) Program. The proposed PDI alternatives to Appendix VIII, Supplement 11 are specified in Attachment 6.

6.0 BASIS FOR USE:

A. Proposed Alternative for Preemptive Structural Weld Overlays

Progress Energy intends to install preemptive full structural weld overlays to the six (6) DMWs (Inconel 82/182) identified in Section III of this request in accordance with proposed alternative of Attachment 2. A tabular comparison of the proposed alternative of Attachment 2 with Code Case N-504-2 and Appendix Q of ASME Section XI has been performed and is provided in Attachment 4.

NOTE
ASME Code Case N-504-2 has been conditionally approved by the USNRC in Regulatory Guide 1.147 with the condition that the provisions of ASME Section XI, Appendix Q be met when using the Case.

This proposed alternative provides an acceptable methodology for preventing potential failures due to PWSCC based on the use of filler metals that are resistant to PWSCC (e.g., Alloy 52M), procedures that create compressive residual stress profiles in the original weld, and post-overlay preservice and inservice inspection requirements that ensure structural integrity for the life of the plant. The proposed weld overlays will also meet the applicable stress limits from ASME Section III. Crack growth evaluations for PWSCC and fatigue of any conservatively postulated flaws will demonstrate that structural integrity will be maintained.

As stated above, preemptive weld overlays will be installed using Alloy 52M filler metal in accordance with Attachment 2. However, Alloy 52M weld metal has demonstrated sensitivity to certain impurities, such as sulfur, when deposited onto

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austenitic stainless steel base materials. This is not anticipated at HNP however, should this condition exist, a butter (transitional) layer of austenitic stainless steel filler metal will be applied across the austenitic stainless steel base material. A welding process qualified in accordance with ASME Section IX for the applicable base material, filler metal, and welding variables will be used. Since the thermal expansion coefficient of austenitic weld metal, Alloy 52M, and the austenitic base metal are essentially the same there will be no adverse impact caused by weld shrinkage as a result of buttering the austenitic base metal with austenitic weld metal. The austenitic stainless steel butter layer will not be included in the structural weld overlay design thickness as defined in Attachment 2. If applied, the effect of the stainless steel butter layer over stainless steel base metal will be reconciled in the weld overlay design and residual stress analyses.

1. <u>Weld Overlay Design and Verification</u>

The fundamental design basis for full structural weld overlays is to maintain the original design margins with no credit taken for the underlying PWSCC-susceptible weldments. The assumed design basis flaw for the purpose of structural sizing the weld overlays is 360° and 100% through the original wall thickness of the DMWs. Regarding the crack growth analysis for the preemptive full structural weld overlay, a flaw originating from the inside diameter with a depth of 75% and a circumference of 360° will be assumed. A 75% through-wall flaw is the largest flaw that could remain undetected. A preservice volumetric examination will be performed after application of the weld overlay using an ASME Section XI, Appendix VIII (as implemented through PDI) examination procedure. This examination will verify that there is no cracking in the upper 25% of the original weld and base material. The preservice examination will also demonstrate that the assumption of a 75% through-wall crack is conservative. However, if any crack-like flaws are identified in the upper 25% of the original weld or base material by the preservice examination, then the as-found flaw (postulated 75% through-wall flaw <u>plus</u> the portion of the flaw in the upper 25%) will be used in the crack growth analysis.

The specific analyses and verifications to be performed are summarized below.

- Nozzle-specific stress analyses will be performed to establish a residual stress profile in each nozzle. Severe internal diameter weld repairs will be assumed in these analyses that effectively

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bound any actual weld repairs that may have occurred in the nozzles. The analyses will then simulate application of the weld overlays to determine the final residual stress profiles. Post-weld overlay residual stresses at normal operating conditions will be shown to result in beneficial compressive stresses on the inside surface of the components, assuring that further crack initiation due to PWSCC is highly unlikely.

- Fracture mechanics analyses will also be performed to predict crack growth for postulated flaws. Crack growth due to PWSCC and fatigue will be analyzed for the original DMW. The crack growth analyses will consider all design loads and transients, plus the post-weld overlay and through-wall residual stress distributions. It will demonstrate that the postulated cracks will not grow beyond the design basis for the weld overlays.

- The analyses will demonstrate that applying the weld overlays does not impact the conclusions of the existing nozzle stress reports. The ASME Code, Section III stress and fatigue criteria will be met for regions of the overlays remote from assumed cracks.

- Shrinkage will be measured following the overlay application. Shrinkage stresses at other locations in the piping systems arising from the weld overlays will be demonstrated not to have an adverse effect on the systems. Clearances of affected support and restraints will be checked after the overlay repair, and will be reset within the design ranges as required.

- The total added weight on the piping systems due to the overlays will be evaluated for potential impact on piping system stresses and dynamic characteristics.

- The as-built dimensions of the weld overlays will be measured and evaluated to demonstrate that they meet or exceed the minimum design dimensions of the overlays.

2. <u>Suitability of Proposed Ambient Temperature Temperbead Technique</u>

An ambient temperature temperbead welding technique will be used when welding on the ferritic base materials of the nozzles in lieu of the post-weld heat treatment requirements of ASME Section III. Research by the Electric Power Research Institute (EPRI) and other organizations on the

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use of an ambient temperature temperbead process using the machine gas tungsten arc welding (GTAW) process is documented in EPRI Report GC-111050 (Ref. 7). According to the EPRI report, repair welds performed with an ambient temperature temperbead procedure utilizing the machine GTAW welding process exhibit mechanical properties equivalent to or better than those of the surrounding base material. Laboratory testing, analysis, successful procedure qualifications, and successful repairs have all demonstrated the effectiveness of this process.

a. Suitability of Ambient Temperature Temperbead Welding

The effects of the ambient temperature temperbead welding process of Attachment 3 on mechanical properties of welds, hydrogen cracking, and cold restraint cracking are addressed in the following paragraphs:

- Mechanical Properties

  The principal reasons to preheat a component prior to repair welding is to minimize the potential for cold cracking. The two cold cracking mechanisms are hydrogen cracking and restraint cracking. Both of these mechanisms occur at ambient temperature. Preheating slows down the cooling rate resulting in a ductile, less brittle microstructure thereby lowering susceptibility to cold cracking. Preheat also increases the diffusion rate of monatomic hydrogen that may have been trapped in the weld during solidification.

  As an alternative to preheat, the ambient temperature temperbead welding process utilizes the tempering action of the welding procedure to produce tough and ductile microstructures. Because precision bead placement and heat input control are utilized in the machine GTAW process, effective tempering of weld heat affected zones (HAZ) is possible without applying preheat. According to Section 2-1 of EPRI Report GC-111050, "the temperbead process is carefully designed and controlled such that successive weld beads supply the appropriate quantity of heat to the untempered HAZ such that the desired degree of carbide precipitation (tempering) is achieved. The resulting microstructure is very tough and ductile."

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Attachment 3 establishes detailed welding procedure qualification requirements for base materials, filler metals, restraint, impact properties, and other procedure variables. The qualification requirements contained in Attachment 3 provide assurance that the mechanical properties of repair welds will be equivalent to or superior to those of the surrounding base material.

- <u>Hydrogen Cracking</u>

Hydrogen cracking is a form of cold cracking. It is produced by the action of internal tensile stresses acting on low toughness HAZs. The internal stresses are produced from localized build-ups of monatomic hydrogen. Monatomic hydrogen forms when moisture or hydrocarbons interact with the welding arc and molten weld pool. The monatomic hydrogen can be entrapped during weld solidification and tends to migrate to transformation boundaries or other microstructure defect locations. As concentrations build, the monatomic hydrogen will recombine to form molecular hydrogen, thus generating localized internal stresses at these internal defect locations. If these stresses exceed the fracture toughness of the material, hydrogen-induced cracking will occur. This form of cracking requires the presence of hydrogen and low toughness materials. It is manifested by intergranular cracking of susceptible materials and normally occurs within 48 hours of welding.

The machine GTAW process is inherently free of hydrogen. GTAW filler metals do not rely on flux coverings, which may be susceptible to moisture absorption from the environment. Conversely, the GTAW process utilizes dry inert shielding gases that cover the molten weld pool from oxidizing atmospheres. Any moisture on the surface of the component being welded will be vaporized ahead of the welding torch. The vapor is prevented from being mixed with the molten weld pool by the inert shielding gas that blows the vapor away before it can be mixed. Furthermore, modern filler metal manufacturers produce wires having very low residual hydrogen. This is important because

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filler metals and base materials are the most realistic sources of hydrogen for automatic or machine GTAW temperbead welding. Therefore, the potential for hydrogen-induced cracking is greatly reduced by using the machine GTAW process.

Nondestructive examination (NDE) of the weld surface following completion of the third weld layer will be performed after the 48-hour hold requirement described in section VI.A.3.f is met. This assures that hydrogen cracking of the weld will be identified if present.

- Cold Restraint Cracking

  Cold cracking generally occurs during cooling at temperatures approaching ambient temperature. As stresses build under a high degree of restraint, cracking may occur at defect locations. Brittle microstructures with low ductility are subject to cold restraint cracking. However, the ambient temperature temperbead process is designed to provide a sufficient heat inventory so as to produce the desired tempering for high toughness. Because the machine GTAW temperbead process provides precision bead placement and control of heat, the toughness and ductility of the HAZ will typically be superior to the base material. Therefore, the resulting structure will be appropriately tempered to exhibit toughness sufficient to resist cold cracking.

b. Exceptions to ASME Code Case N-638-1 Conditions

The ambient temperature temperbead technique of Code Case N-638-1 was conditionally approved by the USNRC in Regulatory Guide 1.147. The proposed ambient temperature temperbead welding technique of Attachment 3 is identical to Code Case N-638-1 with the following exceptions:

- Code Case N-638-1, paragraph 1.0(a) limits the maximum area of an individual weld to 100 square inches. The proposed alternative limits the surface area to 300 square inches. The technical basis for this change is provided in Attachment 5.

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- Code Case N-638-1, paragraph 1.0(a) states that "the depth of the weld shall not be greater than one-half of the ferritic base metal thickness". Because the proposed alternative applies to deposition of weld overlays for which there are no weld or base material excavations, this limitation does not apply and is not included in Attachment 3.

- When welding is to be performed in a pressurized environment (e.g., an enclosed environment that is pressurized to prevent leakage so that welding can be performed), Code Case N-638-1, paragraph 2.1(b) requires that the pressurized environment be duplicated in the procedure qualification test assembly. Because this condition does not exist when applying weld overlays in the request, this requirement is not included in Attachment 3.

- When welding is performed in the core beltline region of the reactor pressure vessel, Code Case N-638-1, paragraph 2.1(c) requires that the effects of irradiation on the properties of the materials be considered. Because weld overlays will not be applied to the core beltline region of the reactor pressure vessel, this requirement is not included in Attachment 3.

- Code Case N-638-1, paragraph 2.1(h) requires the performance of Charpy V-notch testing of the ferritic weld metal of the procedure qualification test coupon. Because austenitic weld metal (i.e., Inconel Alloy 52M) will be used to fabricate the proposed weld overlays, this requirement does not apply and is not included in Attachment 3.

- Code Case N-638-1, paragraph 2.1(j) specifies acceptance criteria for Charpy V-notch tests of the HAZ. According to paragraph 2.1(j), the "average values of the three HAZ impact tests shall be equal to or greater than the average values of the three unaffected base metal tests". Although not explicitly stated, the average values referred to in paragraph 2.1(j) are the *average lateral expansion values* of the HAZ and base material specimens. Because this is the case, the acceptance criteria for Charpy V-notch testing of the HAZ is also based on *average lateral expansion values* in the proposed alternative. The technical basis for this

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change is provided in Attachment 5.

- Code Case N-638-1, paragraph 3.0(c) requires the deposition and removal of at least one weld reinforcement layer for "similar materials" (i.e., ferritic materials). This requirement is only applicable when welding is performed using ferritic filler weld metal. When temperbead welding is performed with ferritic filler metal, each ferritic weld layer must be tempered by the heat supplied from a subsequent weld layer. Because the last layer of a weld or weld repair would be untempered without the deposition of one additional weld layer, paragraph 3.0(c) requires the deposition and removal of a reinforcement layer to provide the required tempering. Since only austenitic filler metal (i.e., Alloy 52M) will be used to fabricate the proposed weld overlays, depositing and removing a weld reinforcement layer is not required. Therefore, this requirement is not included into Attachment 3.

- Code Case N-638-1, paragraph 3.0 does not specifically address monitoring or verification of welding interpass temperatures. Because this is the case, interpass temperature controls are specified in Attachment 3. The proposed interpass temperature controls are based on field experience with depositing weld overlays. Interpass temperature beyond the third layer has no impact on the metallurgical properties of the low alloy steel HAZ.

- As an alternative to the examination requirements of Section 4.0 of Code Case N-638-1, the weld overlay will be examined in accordance with the examination and inspection requirements of Attachment 2, Section 3.0. The suitability of the proposed examinations is described in Section VI.A.3, below.

3. <u>Suitability of Proposed NDE</u>

The length, surface finish, and flatness requirements of the weld overlay will be specified in the design to provide for examination of the weld overlay as shown in Attachment 2, Figures 1 and 2. Furthermore, the examinations and inspections specified in this proposed alternative will

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provide adequate assurance of structural integrity for the following reasons:

a. Weld overlays have been used for repair and mitigation of cracking in BWRs since the early 1980s. In Generic Letter 88-01, *USNRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping*, the USNRC approved the use of Section XI acceptance standards for determining the acceptability of installed weld overlays.

b. The ultrasonic examinations performed in accordance with the proposed alternative are in accordance with ASME Section XI, Appendix VIII, Supplement 11 as implemented through the PDI. These examinations are considered more sensitive for detecting flaws than the ASME Section III radiographic or ultrasonic examination methods. Furthermore, construction-type flaws have been included in the PDI qualification sample sets for evaluating procedures and personnel. Radiography will not be used for the weld overlay examinations

c. Per Section 3.0(a)(3) of Attachment 2, any planar flaws found during either the acceptance or preservice examination are required to meet the requirements of Table IWB-3514-2. This approach was previously determined to be acceptable in the USNRC Safety Evaluation Report (SER) dated July 21, 2004 for Three Mile Island, Unit 1. However, within the same SER, the USNRC had issues regarding the application of Table IWB-3514-3 to laminar flaws in a weld overlay. The SER stated, "Applying Table IWB-3514-3 to a weld overlay exposes several inherent oversights. For instance, the acceptance of a laminar flaw size is independent of the weld overlay size, and the acceptance criteria are silent on the inaccessible volume beneath the lamination which may hide other flaws beneath the lamination." These issues are addressed, as follows:

   - Per Section 3.0(a)(3)(i) of Attachment 2, Table IWB-3514-3 has been restricted so that the total laminar flaw shall not exceed 10% of the weld surface area and no linear dimension of the laminar flaw shall exceed 3 inches.

   - Per Section 3.0(a)(3)(ii) of Attachment 2, the reduction in coverage due to laminar flaws shall be less than 10%. The

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dimensions of the un-inspectable volume are based on the coverage obtained by angle beam examinations of the weld overlay.

- Per Section 3.0(a)(3)(iii) of Attachment 2, any un-inspectable volume in the weld overlay shall be assumed to contain the largest radial planar flaw that could exist within that volume. This assumed flaw shall meet the inservice examination standards of Table IWB-3514-2. Both axial and circumferential planar flaws shall be assumed.

d. Weld overlays for repair of cracks in piping are not addressed by ASME Section III. Section III utilizes NDE procedures and techniques with flaw detection capabilities that are well within the practical limits of workmanship standards for welds. These standards are most applicable to volumetric examinations conducted by radiographic examination. Radiography (RT) of weld overlays is not appropriate because of the potential for radioactive material in the Reactor Coolant System and water in piping and components to reduce inspection sensitivity. Section III acceptance standards are written for a range of fabrication flaws including lack of fusion, incomplete penetration, cracking, slag inclusions, porosity, and concavity. However, experience and fracture mechanics have demonstrated that many of the flaws that are rejected using Section III acceptance standards do not have a significant effect on the structural integrity of the component. Furthermore, utilizing ASME Section III acceptance standards on weld overlays would be inconsistent with years of USNRC precedence and is without justification given the evidence of past USNRC approvals and operating experience.

e. Regarding hydrogen cracking concerns, NDE required by paragraphs 3.0(a)(2) and 3.0(a)(3) of Attachment 2 is more than capable of detecting hydrogen cracking in ferritic materials. If hydrogen cracking were to occur, it would occur in the HAZ of the ferritic base material either below or immediately adjacent to the weld overlay. Therefore, it is unnecessary to examine the entire 1.5T band defined in paragraph 1.0(e) of Attachment 3. Hydrogen cracking is not a concern in austenitic materials. If it occurs in the ferritic base material below the weld overlay, it will be detected by the ultrasonic examination which will interrogate the entire weld

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overlay including the interface and HAZ beneath the weld overlay. If it occurs in the ferritic base material immediately adjacent to the weld overlay, it will be detected by the liquid penetrant examination which is performed at least ½ inch on each side of the weld overlay. Finally, when ambient temperature temperbead welding is performed over ferritic materials, the liquid penetrant and ultrasonic examinations will not be performed until at least 48 hours after completing of the third layer of the weld overlay. Technical justification for initiating the 48-hour hold after completing the third layer is provided in paragraph VI.A.3.f.

f. Based on Code Case N-740, the 48-hour hold for performing NDE starts after the weld overlay cools to ambient temperature when performing ambient temperature temperbead welding. This 48-hour hold is specified to allow sufficient time for hydrogen cracking to occur (if it is to occur) in the HAZ of ferritic materials prior to performing final NDE. However, based on extensive research and industry experience, the Electric Power Research Institute (EPRI) has provided a technical basis for starting the 48-hour hold after completing the third temperbead weld layer rather than waiting for the weld overlay to cool to ambient temperature (Weld layers beyond the third layer are not designed to provide tempering to the ferritic HAZ when performing ambient temperature temperbead welding). EPRI has documented their technical basis in technical report 1013558, *Temper Bead Welding Applications – 48 Hour Hold Requirements for Ambient Temperature Temper Bead Welding* (Ref. 13). The technical data provided by EPRI in their report is based on testing performed on SA-508, Class 2 low alloy steels and other P-Number 3, Group 3 materials, which is the nozzle material at HNP. This point is important because the HNP Pressurizer nozzles are manufactured from SA-508, Class 2 or 2a (P3, Group 3) carbon steel. After evaluating the issues relevant to hydrogen cracking such as microstructure of susceptible materials, availability of hydrogen, applied stresses, temperature, and diffusivity and solubility of hydrogen in steels, EPRI concluded the following on page 5-2 of the report, "There appears to be no technical basis for waiting 48 hours after cooling to ambient temperature before beginning the NDE of the completed weld. There should be no hydrogen present, and even if it were present, the temper bead welded component should be very tolerant of the moisture." Page 5-2 of the report

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also notes that over 20 weld overlays and 100 repairs have been performed using temper bead techniques on low alloy steel components over the last 20 years. During this time, there has never been an indication of hydrogen cracking detected by the nondestructive examination performed after the 48-hour hold or by subsequent inservice inspection.

In addition, the ASME Section XI Committee approved Revision 4 to Code Case N-638 (i.e., N-638-4) in October 2006 to allow the 48-hour hold to begin after completing the third weld layer when using austenitic filler metals. Paragraph 4(a)(2) of the code case states in part: "When austenitic materials are used, the weld shall be nondestructively examined after the three tempering layers (i.e., layers 1, 2, and 3) have been in place for at least 48 hours." The ASME Section XI technical basis for this change is documented in the White Paper in ASME C&S Connect for Code Case N-638-4. The ASME White Paper points out that introducing hydrogen to the ferritic HAZ is limited to the first weld layer since this is the only weld layer that makes contact with the ferritic base material. While the potential for introducing hydrogen to the ferritic HAZ is negligible during subsequent weld layers, these layers provide a heat source that accelerates the dissipation of hydrogen from the ferritic HAZ in non-water backed applications. Furthermore, the solubility of hydrogen in austenitic materials such as Alloy 52M is much higher than that of ferritic materials while the diffusivity of hydrogen in austenitic materials is lower than that of ferritic materials. As a result, hydrogen in the ferritic HAZ tends to diffuse into the austenitic weld metal which has a much higher solubility for hydrogen. This diffusion process is enhanced by heat supplied in subsequent weld layers. Like the EPRI report, the ASME White Paper concludes that there is sufficient delay time to facilitate detecting potential hydrogen cracking when NDE is performed 48 hours after completing the third weld layer.

g. The successive examination requirements of Attachment 2, paragraph 3.0(c) ensure that cracks identified by inservice inspections are appropriately monitored. According to paragraph 3.0(c) of Attachment 2, the weld overlay "shall be reexamined during the first or second refueling outage following discovery of the growth or new cracking." If additional crack growth or a new crack is discovered during a successive examination, then the

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successive examination of the weld overlay would be re-performed within the next two refueling outages. However, if the successive examination of the weld overlay reveals no additional indication of crack growth or new cracking, the weld overlay shall be placed into a population to be examined on a sample basis. Twenty-five percent (25%) of this population shall be examined once every ten (10) years. This successive examination schedule is identical to that specified in paragraph Q-4300 of ASME Section XI, Appendix Q, which has been imposed as a condition to using Code Case N-504-2 by the USNRC in Regulatory Guide 1.147.

h. The examination and inspection requirements in Attachment 2, Section 3.0 are equivalent to or more conservative than the examination and inspection requirements of Appendix Q of ASME Section XI as demonstrated in the comparison provided in Attachment 4 of this request.

4. <u>USNRC Submittals</u>

a. HNP will submit the following information to the USNRC within fourteen (14) days from completing the final ultrasonic examinations of the completed weld overlays:

- Weld overlay examination results including a listing of indications detected.[1]
- Disposition of indications using the standards of ASME Section XI, IWB-3514-2 and/or IWB-3514-3 criteria and, if possible, the type and nature of the indications.[2]
- A discussion of any repairs to the weld overlay material and/or base metal and the reason for the repairs.

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1 The recording criteria of the ultrasonic examination procedure to be used for the examination of the HNP-1 pressurizer overlays requires that all indications, regardless of amplitude, be investigated to the extent necessary to provide accurate characterization, identity, and location. Additionally, the procedure requires that all indications, regardless of amplitude, that cannot be clearly attributed to the geometry of the overlay configuration be considered flaw indications.

2 The ultrasonic examination procedure requires that all suspected flaw indications are to be plotted on a cross-sectional drawing of the weld and that the plots should accurately identify the specific origin of the reflector.

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b. HNP will also submit to the USNRC a stress analysis summary demonstrating that the pressurizer nozzles will perform their intended design functions after the weld overlay installation. The stress analysis report will include results showing that the requirements of NB-3200 and NB-3600 of the ASME Code, Section III are satisfied. The stress analysis will also include results showing that the requirements of IWB-3000 of the ASME Code, Section XI, are satisfied. The results will show that the postulated crack including its growth in the nozzles will not adversely affect the integrity of the overlaid welds. This information will be submitted to the USNRC prior to entry into Mode 4 start-up from HNP's fourteenth refueling outage.

B. Proposed Alternative to ASME Section XI Appendix VIII, Supplement 11

Appendix VIII, Supplement 11 of the 2001 Edition of ASME Section XI specifies requirements for performance demonstration of ultrasonic examination procedures, equipment, and personnel used to detect and size flaws in full structural overlays of wrought austenitic piping welds. The PDI modifies the Appendix VIII, Supplement 11 qualification requirements by the proposed alternatives in the Performance Demonstration Initiative (PDI) Program as indicated in Attachment 6 of this request because the industry cannot meet the requirements of Appendix VIII, Supplement 11. Therefore, the PDI initiatives to ASME Section XI Appendix VIII, Supplement 11 as described in Attachment 6 will be used for qualification of ultrasonic examinations used to detect and size flaws in the preemptive full structural weld overlays of this request.

7.0 CONCLUSION:

10CFR50.55a(a)(3)(i) states:

"Proposed alternatives to the requirements of (c), (d), (e), (f), (g), and (h) of this section or portions thereof may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. The applicant shall demonstrate that:

(i) The proposed alternatives would provide an acceptable level of quality and safety, or

(ii) Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

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HNP requests approval of this proposed alternative pursuant to 10CFR50.55a(3)(i) because the proposed alternative of this request would provide an acceptable level of quality and safety. The preemptive weld overlays will be installed using Nickel Alloy 52M filler metal that is resistant to PWSCC. While this is the case, the overlays will also create compressive residual stresses along the inside diameter of the original weld, which prevents the initiation of new PWSCC. Finally, preservice and inservice inspection of the weld overlays will be performed to ensure structural integrity is maintained.

8.0 DURATION OF PROPOSED ALTERNATIVE:

Relief is requested for the Third Ten-Year Inspection Interval for Harris Nuclear Plant. HNP also requests approval of this proposed alternative by September 29, 2007 to support the upcoming refueling outage 14 (RFO-14) at HNP in the fall 2007.

9.0 PRECEDENTS:

Similar relief requests have been approved for:

This proposed alternative is based on a similar one submitted by Entergy Operations, Inc., for Arkansas Nuclear One, Unit 1 (TAC No. MD4019), which was approved by the USNRC on April 6, 2007. HNP has also reviewed the additional information requested by the USNRC during its review of Entergy's submittal and addressed those requests for additional information, which are applicable to HNP, in this relief request.

10.0 REFERENCES:

1. ASME Code, Section XI, 2001 Edition with the 2003 Addenda
2. ASME Code, Section XI, 2001 Edition, Appendix VIII, Supplement 11 Qualification Requirements For Full Structural Overlaid Wrought Austenitic Piping Welds
3. ASME Section III, Subsection NB, 1971 Edition, Summer 1972 Addenda (Original Construction Code for Pressurizer)
4. ASME Section III, Subsection NB, 2001 with 2003 Addenda Edition
5. Shearon Harris *Inservice Inspection Program Plan*
6. EPRI Report 1011898, *Justification for the Removal of the 100 Square Inch Temperbead Weld Repair Limitation*
7. EPRI Report GC-111050, *Ambient Temperature Preheat for Machine GTAW*

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Temperbead Applications

8. EPRI Report IR-2005-81 PDI Program Code Comparison to ASME Section XI, Appendix VIII, 2001 Edition and 10CFR50.55a Year 2004

9. EPRI Report 1006696, *Crack Growth Rates for Evaluating PWSCCC of Alloy 82, 182, and 132 Welds (MRP-115)*

10. ASME Code Case N-740

11. ASME Code Case N-504-2

12. ASME Code Case N-638-1

13. EPRI Report 1013558, Temper Bead Welding Applications – 48 hour Hold for Ambient Temperature Temper Bead Welding

14. ASME Section IX

11.0 ATTACHMENTS:

Attachment 1: Dissimilar Metal Weld Details and Figures

Attachment 2: Proposed Alternative for Preemptive Full Structural Weld Overlays

Attachment 3: Proposed Ambient Temperature Temperbead Technique

Attachment 4: Comparison of ASME Code Case N-504-2 and Appendix Q of ASME Section XI with the Proposed Alternative of Attachment 2 for Preemptive Full Structural Weld Overlays

Attachment 5: Technical Basis for Alternatives to ASME Code Case N-638-1, *Ambient Temperature Temperbead Welding*

Attachment 6: Appendix VIII, Supplement 11 requirements as implemented by the Performance Demonstration Initiative.

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ATTACHMENT 1

DISSIMILAR METAL WELD DETAILS AND FIGURES

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DISSIMILAR METAL WELD DETAILS

Nozzle Type	Material Identification					Pipe Size	Figure No.
	Nozzle	ISI Welds	Safe End (SE)	ISI Weld	Pipe/Fitting		
PZR Surge Line	A-508, Cl 2[1] w/SST Clad	DMW 82/1822 ID: II-PZR-01NSEW-15	SA-182 Gr F316L	P8-P8 Weld 3 ID: 1-RC-FW-3	A-376, TP304 (Pipe)	14" NPS	1
PZR Spray Line	A-508, Cl 2 or 2a[1] w/SST Clad	DMW 82/1822, 3 ID: II-PZR-01NSEW-16	SA-182 Gr F316L	P8-P8 Weld 3 ID: 1-RC-FW-328	A-376, TP304 (Pipe)	4" NPS	1
PZR Safety Valve A	A-508, Cl 2 or 2a[1] w/SST Clad	DMW 82/1822 ID: II-PZR-01NSEW-17	SA-182 Gr F316L	P8-P8 Weld 3 ID: 1-RC-FW-330	A-376, TP304 (Pipe)	6" NPS	1
PZR Safety Valve B	A-508, Cl 2 or 2a[1] w/SST Clad	DMW 82/1822 ID II-PZR-01NSEW-18	SA-182 Gr F316L	P8-P8 Weld[3] ID: 1-RC-FW-334	A-376, TP304 (Pipe)	6" NPS	1
PZR Safety Valve C	A-508, Cl 2 or 2a[1] w/SST Clad	DMW 82/1822 ID II-PZR-01NSEW-19	SA-182 Gr F316L	P8-P8 Weld[3] ID: 1-RC-FW-329	A-376, TP304 (Pipe)	6" NPS	1
PZR Relief Valve	A-508, Cl 2 or 2a[1] w/SST Clad	DMW 82/1822 ID II-PZR-01NSEW-20	SA-182 Gr F316L	P8-P8 Weld[3] ID: 1-RC-FW-456	A-376, TP304 (Pipe)	6" NPS	1

Notes:
1. Nozzle material is carbon steel.
2. DMW includes butter and weld.
3. One full structural overlay will be applied over both the DMW (82/182 weld) and the P8-P8 weld. See Figure 1.

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HNP Pressurizer Nozzle Weld Overlay Configuration

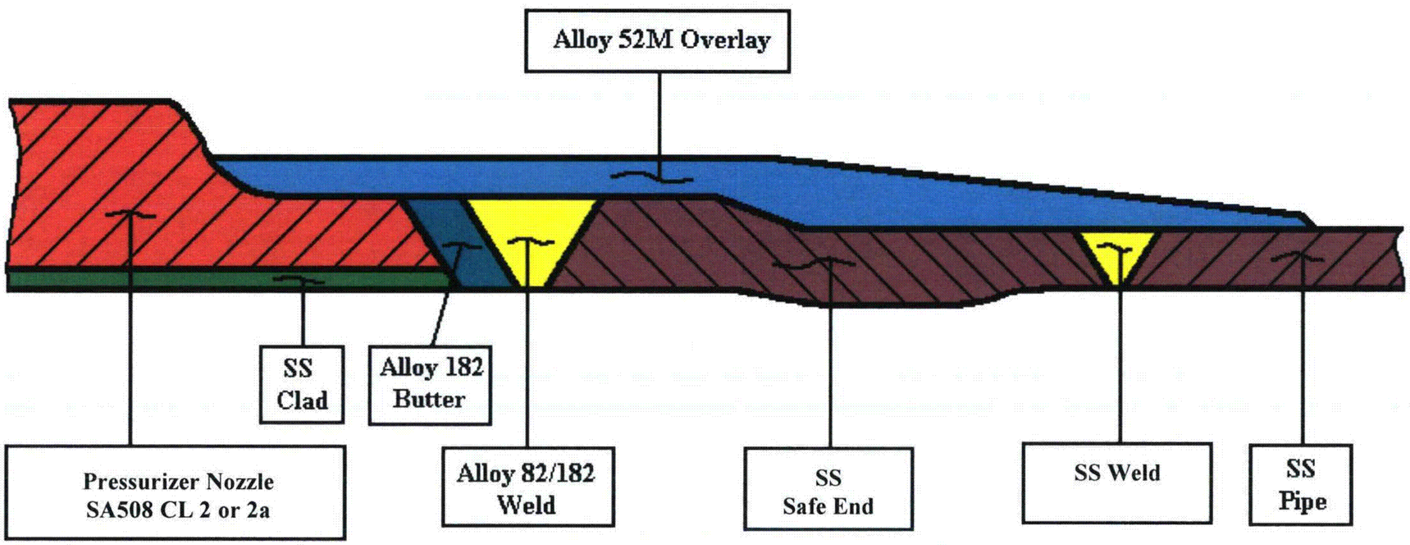

FIGURE 1

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ATTACHMENT 2

PROPOSED ALTERNATIVE FOR PREEMPTIVE FULL STRUCTURAL WELD OVERLAYS

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PROPOSED ALTERNATIVE FOR PREEMPTIVE FULL STRUCTURAL WELD OVERLAYS

1.0 GENERAL REQUIREMENTS

(a) Weld overlays will be applied to the 82/182 dissimilar metal welds joining the materials listed below.

- Carbon steel (P-No. 3) to stainless steel (P-No. 8) materials

(b) Weld overlay filler metal shall be austenitic Nickel Alloy 52M (ERNiCrFe-7A) filler metal having a chromium content of at least 28%. The weld overlay is applied 360° around the circumference of the item, and shall be deposited using a Welding Procedure Specification (WPS) for groove welding, qualified in accordance with the Construction Code and Owner's Requirements, and identified in the Repair/Replacement Plan. As an alternative to the post-weld heat treatment requirements of the Construction Code and Owner's requirements, the provisions for "Ambient Temperature Temperbead Welding" may be used on the ferritic nozzle as described in Attachment 3.

(c) Prior to deposition of the weld overlay, the surface to be repaired shall be examined by the liquid penetrant method. Indications larger than 1/16 inch (1.5 mm) shall be removed, reduced in size, or corrected in accordance with the following requirements.

(1) One or more layers of weld metal shall be applied to seal unacceptable indications in the area to be repaired with or without excavation. The thickness of these layers shall not be used in meeting weld reinforcement design thickness requirements. Peening the unacceptable indication prior to welding is permitted.

(2) If correcting indications identified in 1.0(c) is required, the area where the weld overlay is to be deposited, including any local repairs or initial weld overlay layer, shall be examined by the liquid penetrant method. The area shall contain no indications greater than 1/16 in. (1.5 mm) prior to applying the structural layers of the weld overlay.

(d) Weld overlay deposits shall meet the following requirements:

The austenitic nickel alloy weld overlay shall consist of at least two weld layers deposited with a filler material such as identified in 1.0(b) above. The first layer of weld metal deposited may not be credited toward the required thickness.

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Alternatively, a diluted layer may be credited toward the required thickness, provided the portion of the layer over the austenitic base material, austenitic weld, and the associated dilution zone from an adjacent ferritic base material contains at least 24% chromium. The chromium content of the deposited weld metal may be determined by chemical analysis of the production weld or from a representative coupon taken from a mockup prepared in accordance with the WPS for the production weld.

(e) A new weld overlay shall not be installed on top of an existing weld overlay that has been in service.

2.0 CRACK GROWTH CONSIDERATIONS AND DESIGN

(a) Crack Growth

Because the full structural weld overlays are being installed preemptively, a flaw with a depth of 75% and a circumference of 360° will be assumed. The size of the assumed flaws shall be projected to the end of the design life of the overlay. Crack growth, including both stress corrosion and fatigue crack growth, shall be evaluated in the materials in accordance with IWB-3640. If the flaw is at or near the boundary of two different materials, evaluation of flaw growth in both materials will be performed.

(b) Structural Design

The design of the weld overlay shall be analyzed and shown to satisfy the following:

(1) The axial length and end slope of the weld overlay shall cover the weld and the heat affected zones (HAZs) on each side of the weld, and shall provide for load redistribution from the item into the weld overlay and back into the item without violating applicable stress limits of NB-3200. Any laminar flaws in the weld overlay shall be evaluated in the analysis to ensure that load redistribution complies with the above. These requirements will usually be satisfied if the weld overlay full thickness length extends axially beyond the projected flaw by at least $0.75\sqrt{Rt}$, where "R" is the outer radius of the item and "t" is the nominal wall thickness of the item.

(2) Unless specifically analyzed in accordance with 2.0(b)(1) above, the end transition slope of the overlay shall not exceed 45°. A slope of not more than 1:3 is recommended.

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(3) Because the full structural weld overlays are being installed preemptively, flaws shall be assumed to be 100% through the original wall thickness for the entire circumference.

(4) The overlay design thickness of items meeting 2.0(b)(3) above shall be based on the measured diameter using only the weld overlay thickness conforming to the deposit analysis requirements of 1.0(d) above. The combined wall thickness at the weld overlay, any planar flaws in the weld overlay, the flaw size assumptions of 2.0(b)(3) above, and the effects of any discontinuity (e.g., another weld overlay or reinforcement for a branch connection) within a distance of $2.5\sqrt{Rt}$ from the toes of the weld overlay, shall be evaluated and shall meet the requirements of IWB-3640.

NOTE
Although planar flaws are considered in the IWB-3640 evaluation of the combined wall thickness in paragraph 2.0(b)(4), these planar flaws must first meet the acceptance standards of IWB-3500 as required by Attachment 2, paragraphs 3.0(a) and (b) of HNP ISI Relief Request 1.

(5) The effects of any changes in applied loads, as a result of weld shrinkage from the entire overlay, on other items in the piping system (e.g., support loads and clearances, nozzle loads, changes in system flexibility and weight due to the weld overlay) shall be evaluated. Existing flaws previously accepted by analytical evaluation shall be evaluated in accordance with IWB-3640.

3.0 EXAMINATION AND INSPECTION

In lieu of all other examination requirements, the examination requirements proposed herein shall be met. Nondestructive examination (NDE) methods shall be in accordance with IWA-2200, except as specified herein. NDE personnel shall be qualified in accordance with IWA-2300. Ultrasonic examination procedures and personnel shall be qualified in accordance with Appendix VIII, Section XI. Radiography will not be used for the weld overlay examinations.

(a) Acceptance Examination

(1) The weld overlay shall have a surface finish of 250 micro-inch (6.3 micrometers) RMS or better and a flatness that is sufficient to allow for adequate examination in accordance with procedures qualified per Appendix VIII. The weld overlay shall be examined to verify acceptable

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configuration.

(2) The weld overlay and the adjacent base material for at least ½ inch (13 mm) from each side of the weld shall be examined using the liquid penetrant method. The weld overlay shall satisfy the surface examination acceptance criteria for welds of the Construction Code or ASME Section III, NB-5300. The adjacent base metal shall satisfy the surface examination acceptance criteria for base material of the Construction Code or ASME Section III, NB-2500. If ambient temperature temperbead welding is used, liquid penetrant examination shall be conducted at least 48 hours after completing the third layer of the weld overlay.

(3) The examination volume A-B-C-D in Figure 1 (below) shall be ultrasonically examined to assure adequate fusion (i.e., adequate bond) with the base metal and to detect welding flaws, such as inter-bead lack of fusion, inclusions, or cracks. The interface C-D shown between the overlay and the weld includes the bond and the HAZ from the overlay. If ambient temperature temperbead welding is used, the ultrasonic examination shall be conducted at least 48 hours after completing the third layer of the weld overlay. Planar flaws in the overlay shall meet the preservice examination standards of Table IWB-3514-2. In applying the acceptance standards, wall thickness "t_w" shall be the thickness of the weld overlay. Laminar flaws shall meet the following:

(i) Laminar flaws shall meet the acceptance standards of Table IWB-3514-3 with the additional limitation that the total laminar flaw shall not exceed 10% of the weld surface area and that no linear dimension of the laminar flaw area exceeds 3.0 inches (76 mm).

(ii) The reduction in coverage of the examination volume in Figure 1 due to laminar flaws shall be less than 10%. The dimensions of the un-inspectable volume are dependent on the coverage achieved with the angle beam examination of the overlay.

(iii) Any un-inspectable volume in the weld overlay shall be assumed to contain the largest radial planar flaw that could exist within that volume. This assumed flaw shall meet the inservice examination standards of Table IWB-3514-2. Alternately, the assumed flaw shall be evaluated and shall meet the requirements of IWB-3640. Both axial and circumferential planar flaws shall be assumed.

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(4) After completing welding activities, affected restraints, supports, and snubbers shall be VT-3 visually examined to verify that design tolerances are met.

(b) Preservice Inspection

(1) The examination volume A-B-C-D in Figure 2 shall be ultrasonically examined. The angle beam shall be directed perpendicular and parallel to the piping axis, with scanning performed in four directions to locate and size any cracks that might have propagated into the upper 25% of the base material or into the weld overlay. If ambient temperature temperbead welding is used, the ultrasonic examination shall be conducted at least 48 hours after completing the third layer of the weld overlay.

(2) The preservice examination acceptance standards of Table IWB-3514-2 shall be met for the weld overlay. In applying the acceptance standards, wall thickness, t_w, shall be the thickness of the weld overlay. Cracks in the outer 25% of the base metal shall meet the design analysis requirements of 2.0 above.

(c) Inservice Inspection

(1) The weld overlay examination volume A-B-C-D in Figure 2 shall be added to the inspection plan and shall be ultrasonically examined during the first or second refueling outage following application.

(2) The weld overlay examination volume in Figure 2 shall be ultrasonically examined to determine if any new or existing cracks have propagated into the upper 25% of the base material or into the overlay. The angle beam shall be directed perpendicular and parallel to the piping axis, with scanning performed in four directions.

(3) The acceptance standards for the ultrasonic examination of the weld overlay are specified in Table IWB-3514-2. If the weld overlay fails to meet the acceptance standards of Table IWB-3514-2, it can be accepted based on an analytical evaluation meeting the requirements and acceptance criteria of IWB-3600. However, flaws identified as primary water stress corrosion cracking (PWSCC) in the weld overlay cannot be accepted by an IWB-3600 analytical evaluation. Cracks in the outer 25% of the base metal shall meet the design analysis requirements of 2.0 above.

(4) Weld overlay examination volumes that show no indication of crack

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growth or new cracking shall be placed into a population to be examined on a sample basis. Twenty-five percent of this population shall be examined once every ten years.

(5) If inservice examinations reveal crack growth, or new cracking, meeting the acceptance standards, the weld overlay examination volume shall be reexamined during the first or second refueling outage following discovery of the growth or new cracking.

(6) For weld overlay examination volumes that fail to meet the acceptance criteria as described in 3.0(c)(3) above, the weld overlay shall be removed, including the original defective weld, and the item shall be corrected by a repair/replacement activity in accordance with IWA-4000.

(d) Additional Examinations

If inservice examinations reveal an unacceptable indication, crack growth into the weld overlay design thickness, or axial crack growth beyond the specified examination volume, additional weld overlay examination volumes, equal to the number scheduled for the current inspection period, shall be examined prior to return to service. If additional unacceptable indications are found in the second sample, 50% of the total population of weld overlay examination volumes shall be examined prior to operation. If additional unacceptable indications are found, the entire remaining population of weld overlay examination volumes shall be examined prior to return to service.

4.0 PRESSURE TESTING

A system leakage test shall be performed in accordance with IWA-5000.

5.0 DOCUMENTATION

Use of this alternative shall be documented on Form NIS-2. Alternatively, it may be documented on Form NIS-2A as described in the approved revision of Code Case N-532 based on appropriate NRC approval.

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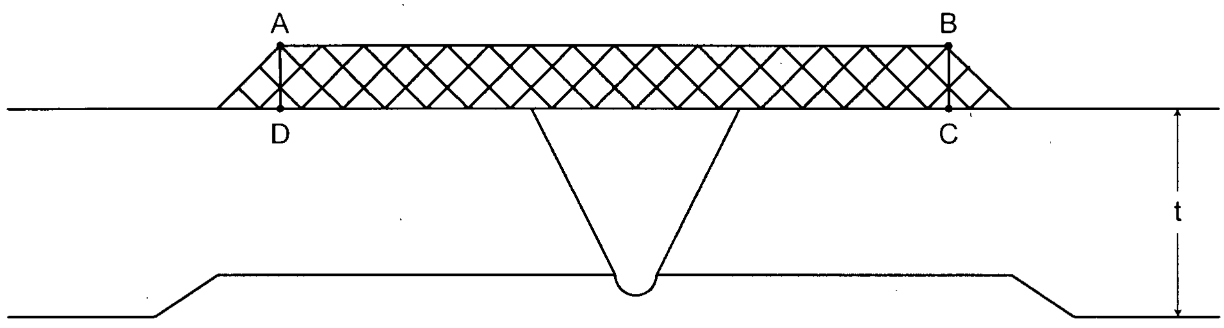

Examination Volume A-B-C-D

FIGURE 1

ACCEPTANCE EXAMINATION VOLUME

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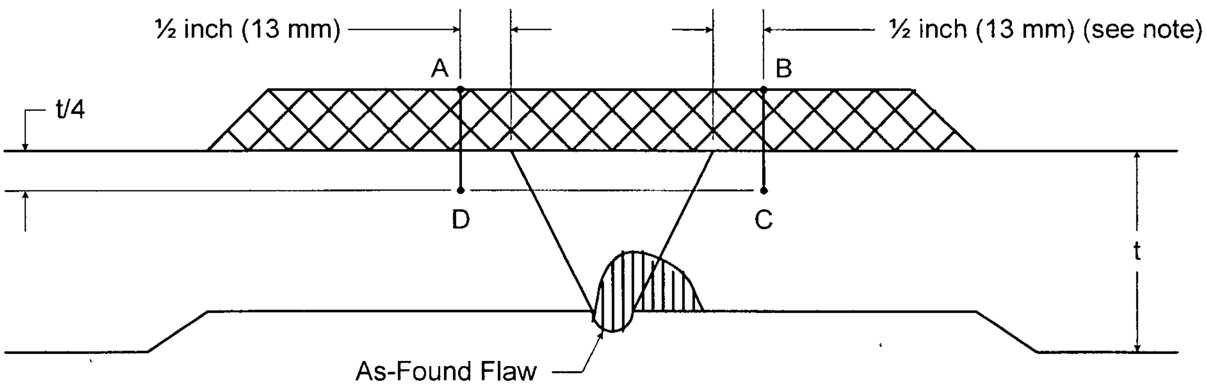

Examination Volume A-B-C-D

NOTE
For axial or circumferential flaws, the axial extent of the examination volume shall extend at least ½ inch (13 mm) beyond the as-found flaw and at least ½ inch (13 mm) beyond the toes of the original weld, including weld end butter, where applied.

FIGURE 2

PRESERVICE AND INSERVICE EXAMINATION VOLUME

ATTACHMENT 3

PROPOSED AMBIENT TEMPERATURE TEMPERBEAD TECHNIQUE

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PROPOSED AMBIENT TEMPERATURE TEMPERBEAD TECHNIQUE

1.0 GENERAL REQUIREMENTS

(a) This appendix applies to dissimilar austenitic filler metal welds joining P-No. 8 or 43 material to P-No. 3 material.

(b) The maximum area of an individual weld overlay based on the finished surface over the ferritic base material shall be 300 square inches.

(c) Repair/replacement activities on a dissimilar-metal weld in accordance with this attachment are limited to those along the fusion line of a nonferritic weld to ferritic base material on which 1/8 inch, or less of nonferritic weld deposit exists above the original fusion line.

(d) If a defect penetrates into the ferritic base material, repair of the base material, using a nonferritic weld filler material, may be performed in accordance with this attachment, provided the depth of repair in the base material does not exceed 3/8 inch.

(e) Prior to welding the area to be welded and a band around the area of at least 1-1/2 times the component thickness or 5 inches, whichever is less, shall be at least 50°F (10°C).

(f) Welding materials shall meet the Owner's Requirements and the Construction Code and Cases specified in the Repair/Replacement Plan. Welding materials shall be controlled so that they are identified as acceptable until consumed.

(g) Peening may be used, except on the initial and final layers.

2.0 WELDING QUALIFICATIONS

Welding procedures and welding operators shall be qualified in accordance with ASME Section IX and the requirements of Sections 2.1 and 2.2 below.

2.1 Procedure Qualification

(a) The base materials for the welding procedure qualification shall be of the same P-Number and Group Number, as the materials to be welded. The materials shall be post-weld heat treated to at least the time and temperature that was applied to the materials being welded.

(b) The root width and included angle of the cavity in the test assembly shall be

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no greater than the minimum specified for the repair.

(c) The maximum interpass temperature for the first three layers of the test assembly shall be 150°F (66°C).

(d) The test assembly cavity depth shall be at least 1 inch (25 mm). The test assembly thickness shall be at least twice the test assembly cavity depth. The test assembly shall be large enough to permit removing the required test specimens. The test assembly dimensions surrounding the cavity shall be at least the test assembly thickness and at least 6 inches (150 mm). The qualification test plate shall be prepared in accordance with Figure 1-1.

(e) Ferritic base material for the procedure qualification test shall meet the impact test requirements of the Construction Code and Owner's Requirements. If such requirements are not in the Construction Code and Owner's Requirements, the impact properties shall be determined by Charpy V-notch impact tests of the procedure qualification base material at or below the lowest service temperature of the item to be repaired. The location and orientation of the test specimens shall be similar to those required in (f) below, but shall be in the base metal.

(f) Charpy V-notch tests of the ferritic heat-affected zone (HAZ) shall be performed at the same temperature as the base metal test of (e) above. Number, location, and orientation of test specimens shall be as follows:

(1) The specimens shall be removed from a location as near as practical to a depth of one-half the thickness of the deposited weld metal. The coupons for HAZ impact specimens shall be taken transverse to the axis of the weld and etched to define the HAZ. The notch of the Charpy V-notch specimen shall be cut approximately normal to the material surface in such a manner as to include as much HAZ as possible in the resulting fracture. Where the material thickness permits, the axis of a specimen shall be inclined to allow the root of the notch to be aligned parallel to the fusion line.

(2) If the test material is in the form of a plate or a forging, the axis of the weld shall be oriented parallel to the principal direction of rolling or forging.

(3) The Charpy V-notch test shall be performed in accordance with SA-370. Specimens shall be in accordance with SA-370, Fig. 11, Type A. The test shall consist of a set of three full-size 10 mm X

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10 mm specimens. The lateral expansion, percent shear, absorbed energy, test temperature, orientation and location of all test specimens shall be reported in the Procedure Qualification Record.

(g) The average lateral expansion value of the three HAZ Charpy V-notch specimens shall be equal to or greater than the average lateral expansion value of the three unaffected base metal specimens.

2.2 Performance Qualification

Welding operators shall be qualified in accordance with ASME Section IX.

3.0 WELDING PROCEDURE REQUIREMENTS

The welding procedure shall include the following requirements.

(a) The weld metal shall be deposited by the automatic or machine gas tungsten arc welding (GTAW) process.

(b) Dissimilar metal welds shall be made using F-No. 43 weld metal (QW-432) for P-No. 8 or 43 to P-No. 3 weld joints.

(c) The area to be welded shall be buttered with a deposit of at least three layers to achieve at least 1/8 inch (3mm) overlay thickness with the heat input for each layer controlled to within ±10% of that used in the procedure qualification test. Particular care shall be taken in the placement of the weld layers of the austenitic overlay filler material at the toe of the overlay to ensure that the HAZ and ferritic base metal are tempered. Subsequent layers shall be deposited with a heat input not exceeding that used for layers beyond the third layer in the procedure qualification.

(d) The maximum interpass temperature for field applications shall be 350°F (180°C) for all weld layers regardless of the interpass temperature used during qualification.

(e) The preheat and interpass temperatures will be measured using a contact pyrometer. In the first three layers, the interpass temperature will be measured every three to five passes. After the first three layers, interpass temperature measurements will be taken every six to ten passes for the subsequent layers. Contact pyrometers will be calibrated in accordance with approved calibration and control program documents.

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(f) Particular care shall be given to ensure that the weld region is free of all potential sources of hydrogen. The surfaces to be welded, filler metal, and shielding gas shall be suitably controlled.

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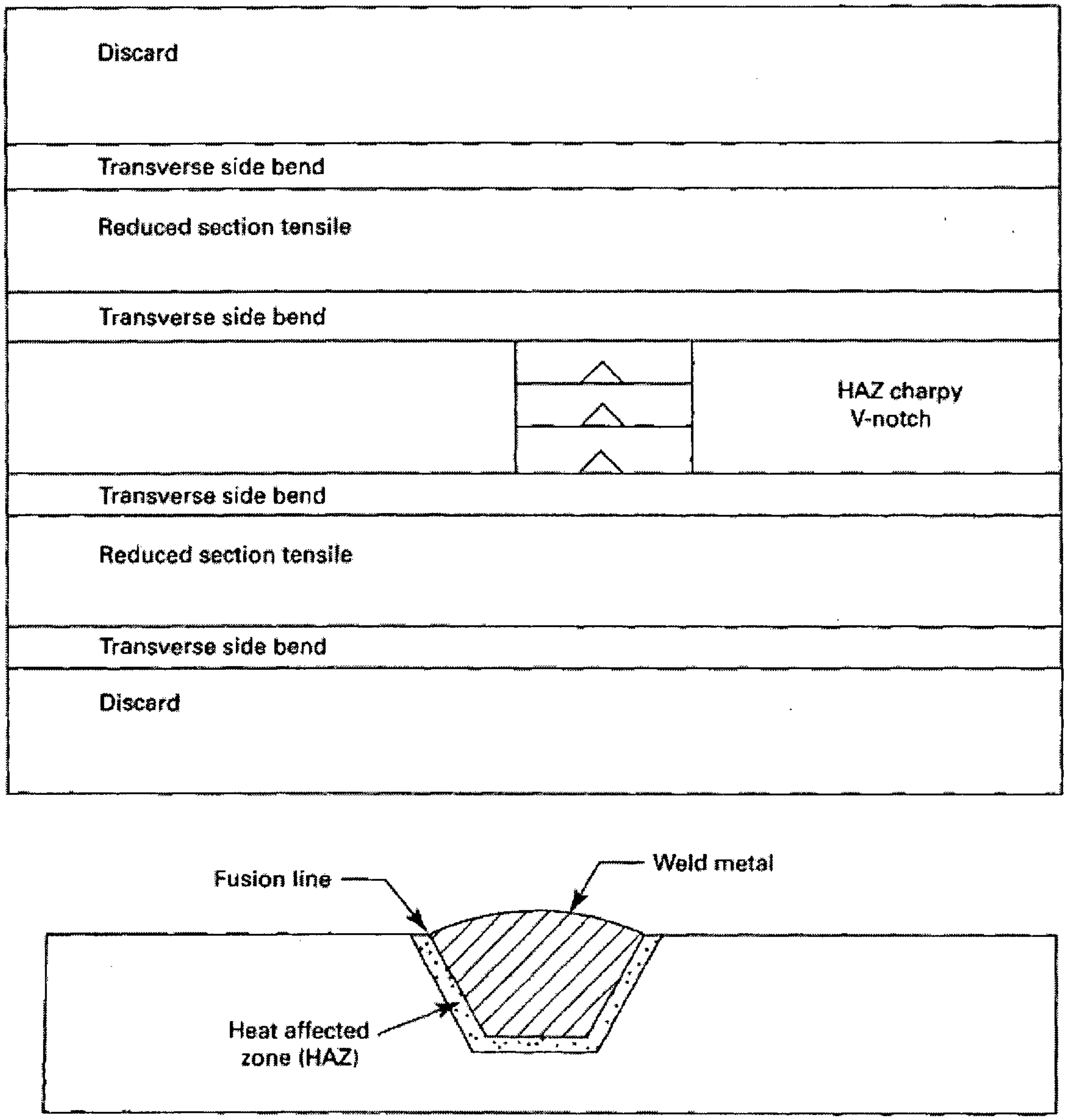

NOTE
Base metal Charpy impact specimens are not shown.

FIGURE 1-1

QUALIFICATION TEST PLATE

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ATTACHMENT 4

COMPARISON OF ASME CODE CASE N-504-2 AND APPENDIX Q OF ASME SECTION XI WITH THE PROPOSED ALTERNATIVE OF ATTACHMENT 2 FOR PREEMPTIVE FULL STRUCTURAL WELD OVERLAYS

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COMPARISON OF ASME CODE CASE N-504-2 AND APPENDIX Q OF ASME SECTION XI WITH THE PROPOSED ALTERNATIVE OF ATTACHMENT 2 FOR PREEMPTIVE FULL STRUCTURAL WELD OVERLAYS

Code Case N-504-2 and Appendix Q of ASME Section XI	Proposed Alternative of Attachment 2
Code Case N-504-2 provides requirements for reducing a defect to a flaw of acceptable size by deposition of weld reinforcement (weld overlay) on the outside surface of the pipe using austenitic stainless steel filler metal as an alternative to defect removal. Code Case N-504-2 is applicable to austenitic stainless steel piping only. According to Regulatory Guide 1.147, the provisions of Non-mandatory Appendix Q of ASME Section XI must also be met when using this Case. Therefore, the Code Case N-504-2 requirements presented below have been supplemented by Appendix Q of ASME Section XI.	The proposed alternative of Attachment 2 provides requirements for installing a preemptive full structural weld overlay by deposition of weld reinforcement (weld overlay) on the outside surface of the item using Nickel Alloy 52M filler metal. Attachment 2 is applicable to dissimilar metal welds associated with ferritic, stainless steel, and nickel alloy materials. It is also applicable to similar metal welds in austenitic stainless steels. The proposed alternative of Attachment 2 is based on Code Case N-740.
General Requirements	**1.0 General Requirements**
Code Case N-504-2 and Appendix Q are only applicable to P-No. 8 austenitic stainless steels.	As specified in paragraph 1.0(a) of Attachment 2, the proposed alternative is applicable to dissimilar metal 82/182 welds joining P-No. 3 to P-No. 8 or 43 materials and P-No. 8 to P-No. 43 materials. It is also applicable to austenitic stainless steel welds joining P-No. 8 materials. **Basis**: Code Case N-504-2 and Appendix Q are applicable to austenitic weld overlays of P-No. 8 austenitic stainless steel materials. Based on Code Case N-740, the proposed alternative of Attachment 2 was specifically written to address the application of weld overlays over dissimilar metal welds and austenitic stainless steel welds.
According to paragraph (b) of Code Case N-504-2 as supplemented by Appendix Q, weld overlay filler metal shall be low carbon (0.035% max.) austenitic stainless steel applied 360 degrees around the circumference of the pipe, and shall be deposited using a Welding Procedure Specification for groove welding, qualified in accordance with the Construction Code and	The weld filler metal and procedure requirements of Attachment 2, paragraph 1.0(b) are equivalent to Code Case N-504-2 and Appendix Q except as noted below: • Weld overlay filler metal shall be austenitic Nickel Alloy 52M (ERNiCrFe-7A)

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Code Case N-504-2 and Appendix Q of ASME Section XI	Proposed Alternative of Attachment 2
Owner's Requirements and identified in the Repair/Replacement Plan.	filler metal which has a chromium content of at least 28%. As an alternative to post-weld heat treatment, the provisions for "Ambient Temperature Temperbead Welding" may be used on the ferritic nozzle as described in Attachment 3. **Basis**: The weld overlay will be deposited with ERNiCrFe-7 (Alloy 52M) filler metal. It has been included into ASME Section IX as F-No. 43 filler metals. Containing 28.0 – 31.5% chromium (roughly twice the chromium content of 82/182 filler metal), this filler metal has excellent resistance to PWSCC. This point has been clearly documented in EPRI Technical Report MRP-115, Section 2.2. Regarding the WPS, paragraph 1.0(b) of Attachment 2 provides clarification that the WPS used for depositing weld overlays must be qualified as a groove welding procedure to ensure that mechanical properties of the WPS are appropriately established. Where welding is performed on ferritic nozzles, an ambient temperature temperbead WPS will be used. Suitability of an ambient temperature temperbead WPS is addressed in Section VI.A.2 of this Request.
According to paragraph (e) of Code Case N-504-2 as supplemented by Appendix Q, the weld reinforcement shall consist of at least two weld layers having as-deposited delta ferrite content of at least 7.5 FN. The first layer of weld metal with delta ferrite content of at least 7.5 FN shall constitute the first layer of the weld reinforcement that may be credited toward the required thickness. Alternatively, first layers of at least 5 FN provided the carbon content is determined by chemical analysis to be less than 0.02%.	The weld overlay Attachment 2 is deposited using Nickel Alloy 52M filler metal instead of austenitic stainless steel filler metals. Therefore, the basis for crediting the first layer towards the required design thickness will be based on the chromium content of the nickel alloy filler metal. According to paragraph 1.0(d) of Attachment 2, the first layer of Nickel Alloy 52M deposited weld metal may be credited toward the required thickness provided the portion of the layer over the austenitic base material, austenitic weld, and the associated dilution zone from an adjacent ferritic base material contains at least 24% chromium. The chromium content of the deposited weld metal may be determined by chemical analysis of the production weld or from a representative coupon taken from a mockup prepared in accordance with the WPS for the production weld. **Basis**: The weld overlay will be deposited with ERNiCrFe-7 (Alloy 52M) filler metal. Credit for the first weld layer may not be taken toward the required thickness

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Code Case N-504-2 and Appendix Q of ASME Section XI	Proposed Alternative of Attachment 2
	unless it has been shown to contain at least 24% chromium. This is a sufficient amount of chromium to prevent PWSCC. Section 2.2 of EPRI Technical Report MRP-115 states the following: "The only well explored effect of the compositional differences among the weld alloys on PWSCC is the influence of chromium. Buisine, et al. evaluated the PWSCC resistance of nickel-based weld metals with various chromium contents ranging from about 15% to 30% chromium. Testing was performed in doped steam and primary water. Alloy 182, with about 14.5% chromium, was the most susceptible. Alloy 82 with 18-20% chromium took three or four times longer to crack. For chromium contents between 21 and 22%, no stress corrosion crack initiation was observed..."
Design and Crack Growth Considerations	**2.0 Design and Crack Growth Considerations**
The design and flaw characterization provisions of Code Case N-504-2, paragraphs (f) and (g) as supplemented by Appendix Q are summarized below: (i) Flaw characterization and evaluation are based on the as-found flaw. Flaw evaluation of the existing flaws is based on IWB-3640 for the design life. • Multiple circumferential flaws shall be treated as one flaw of length equal to the sum of the lengths of the individual flaws. • Circumferential flaws are postulated as 100% through-wall for the entire circumference with one exception. When the combined length of circumferential flaws does not exceed 10% of the circumference, the flaws are only assumed to be 100% through-wall for the combined length of the flaws. • For axial flaws 1.5 inches or longer, or for five or more axial flaws of any length, the flaws shall be assumed to be 100% through-wall for the axial length of the flaw and entire circumference of the pipe.	The design and flaw evaluation provisions in the proposed alternative of Attachment 2, Section 2.0 are the same as Code Case N-504-2 as supplemented in Appendix Q with the exceptions below. Note that the design and flaw evaluation provisions of Attachment 2 are based on postulated flaws instead of as-found flaws since the structural weld overlays are being installed preemptively. • For crack growth evaluations, a flaw with a depth of 75% and a circumference of 360° will be assumed. The size of the assumed flaws shall be projected to the end of the design life of the overlay. Crack growth, including both stress corrosion and fatigue crack growth, shall be evaluated in the materials in accordance with IWB-3640. If the flaw is at or near the boundary of two different materials, evaluation of flaw growth in both materials is required. • For design, flaws shall be assumed to be 100% through the original wall thickness for the entire circumference. **Basis**: Preemptive, full structural overlay welds are being installed in accordance with Attachment 2 to proactively address and mitigate any future PWSCC issues with the subject welds. Because these weld overlays are being installed preemptively and

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Code Case N-504-2 and Appendix Q of ASME Section XI	Proposed Alternative of Attachment 2
(ii) For four or fewer axial flaws less than 1.5 inches in length, the weld overlay thickness need only consist of two or more layers of weld metal meeting the deposit analysis requirements. (iii) The axial length and end slope of the weld overlay shall cover the weld and HAZs on each side of the weld, and shall provide for load redistribution from the item into the weld overlay and back into the item without violating applicable stress limits of the Construction Code. Any laminar flaws in the weld overlay shall be evaluated in the analysis to ensure that load redistribution complies with the above. These requirements are usually met if the weld overlay extends beyond the projected flaw by at least $0.75\ (Rt)^{1/2}$. (iv) Unless specifically analyzed, the end transition slope of the overlay shall not exceed 45°, and a slope of not more than 1:3 is recommended. (v) The overlay design thickness of items shall be based on the measured diameter, using only the weld overlay thickness conforming to the deposit analysis requirements. The combined wall thickness at the weld overlay, any planar flaws in the weld overlay, and the effects of any discontinuity (e.g., another weld overlay or reinforcement for a branch connection) within a distance of $0.75\ (Rt)^{1/2}$ from the toes of the weld overlay, shall be evaluated and meet the requirements of IWB-, IWC-, or IWD-3640. (vi) The effects of any changes in applied loads, as a result of weld shrinkage or existing flaws previously accepted by analytical evaluation shall be evaluated in accordance with IWB-3640, IWC-3640, or IWD-3640, as applicable.	not as a repair, postulated flaws are being assumed. Regarding the crack growth analysis, a flaw originating from the inside diameter, with a depth of 75%, and a circumference of 360 degrees will be assumed. A 75% through-wall flaw is the largest flaw that could remain undetected. A pre-service volumetric examination will be performed after application of the weld overlay using an ASME Section XI, Appendix VIII [as implemented through PDI] examination procedure. This examination will verify that there is no cracking in the upper 25% of the original weld and base material. The preservice examination will also demonstrate that the assumption of a 75% through-wall crack is conservative. However, if any crack-like flaws are identified in the upper 25% of the original weld or base material by the preservice examination, then the as-found flaw (postulated 75% through-wall flaw plus the portion of the flaw in the upper 25%) will be used for the crack growth analysis. With regard to design, flaws are considered to be 100% through the original weld and no structural credit is taken for the weld. All other requirements are equivalent to Code Case N-504-2 as supplemented by Appendix Q.
Examination and Inspection	**3.0 Examination and Inspection**

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Code Case N-504-2 and Appendix Q of ASME Section XI	Proposed Alternative of Attachment 2
Code Case N-504-2 does not include requirements for acceptance examination or inservice examination of weld overlays. Preservice examination is addressed. However, Appendix Q, Article Q-4000 does specify requirements applicable to weld acceptance examinations, preservice examinations, and inservice examinations.	Attachment 2, Section 3.0 of the proposed alternative specifies requirements applicable to weld acceptance examinations, preservice examinations, and inservice examinations.
Acceptance Examination	**3.0(a) Acceptance Examination**
<u>**Acceptance Examination**</u> Q-4100(c) states that the examination volume in Figure Q-4100-1 shall be ultrasonically examined to assure adequate fusion (i.e., adequate bond) with the base metal and to detect welding flaws, such as inter-bead lack of fusion, inclusions, or cracks. Planar flaws shall meet the preservice examination standards of Table IWB-3514-2. Laminar flaws shall meet the following:	The acceptance standards in paragraph 3.0(a)(3) of Attachment 2 are identical to those of paragraph Q-4100(c) except that paragraph 3.0(a)(3) includes requirements and clarifications that are not included in Appendix Q. First, it specifies that the ultrasonic examination shall be conducted at least 48 hours after completing the third layer of the weld overlay when ambient temperature temperbead welding is used. Secondly, it provides the following clarifications: • The interface C-D between the weld overlay and the weld includes the bond and the HAZ from the weld overlay. • In applying the acceptance standards, wall thickness "t_w" shall be the thickness of the weld overlay. **Basis:** Appendix Q is applicable to austenitic stainless steel materials only; therefore, ambient temperature temperbead welding would not be applicable. It is applicable to welding performed in the proposed alternative. When ambient temperature temperbead welding is performed, nondestructive examinations must be performed at least 48 hours after completing the third layer of the weld overlay to allow sufficient time for hydrogen cracking to occur (if it is to occur). Technical justification for starting the 48 hours after completion of the third layer of the weld overlay is provided in paragraph VI.A.3.f of the Relief Request. The other two changes are simply clarifications that were added to ensure that the examination requirements were appropriately performed.

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Code Case N-504-2 and Appendix Q of ASME Section XI	Proposed Alternative of Attachment 2
Q-4100(c)(1) states that laminar flaws shall meet the acceptance standards of Table IWB-3514-3.	*The acceptance standards in paragraph 3.0(a)(3)(i) of Attachment 2 are identical to paragraph Q-4100(c)(1) except that paragraph 3.0(a)(3)(i) includes the additional limitation that the total laminar flaw shall not exceed 10% of the weld surface area and that no linear dimension of the laminar flaw area exceeds 3.0 in.* **Basis**: These changes were made to provide additional conservatism to the weld overlay examination and to reduce the size of the un-inspectable volume beneath a laminar flaw. See paragraph VI.A.3.c of this Relief Request for additional information.
Q-4100(c)(4) allows the performance of radiography in accordance with the Construction Code as an alternative to Q-4100(c) (3).	The acceptance standards in paragraph 3.0(a)(3) of Attachment 2 do not include the radiographic alternative of paragraph Q-4100(c)(4). **Basis**: The UT examinations performed in accordance with the proposed alternative are in accordance with ASME Section XI, Appendix VIII, Supplement 11 as implemented through the PDI. These examinations are considered more sensitive for detection of defects, either from fabrication or service-induced, than either ASME Section III radiographic or ultrasonic methods. Furthermore, construction type flaws have been included in the PDI qualification sample sets for evaluating procedures and personnel. See Section VI.A.3 of this Relief Request for additional justification.
Preservice Inspection	**3.0(b) Preservice Inspection**
Q-4200(b) states that the preservice examination acceptance standards of Table IWB-3514-2 shall be met for the weld overlay. Cracks in the outer 25% of the base metal shall meet the design analysis requirements of Q-3000.	The acceptance standards in paragraph 3.0(b)(2) of Attachment 2 are identical to paragraph Q-4200(b) except paragraph 3.0(b)(2) includes the following statement: "In applying the acceptance standards, wall thickness, t_w, shall be the thickness of the weld overlay." **Basis**: This provision is actually a clarification that the nominal wall thickness of Table IWB-3514-2 shall be considered the thickness of the weld overlay. It must be remembered that the acceptance standards were originally written for the welds identified in IWB-2500. Because IWB-2500 does not address weld overlays, this

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Code Case N-504-2 and Appendix Q of ASME Section XI	Proposed Alternative of Attachment 2
	clarification was provided to avoid any potential confusion. However, defining the weld overlay thickness as the nominal wall thickness of Table IWB-3514-2 has always been the practice since it literally becomes the new design wall of the piping or component nozzle.
Pressure Testing	**4.0 Pressure Testing**
(h) The completed repair shall be pressure tested in accordance with IWA-5000. A system hydrostatic test is required if the flaw penetrated the pressure boundary. A system leakage test may be performed if pressure boundary is not penetrated.	The pressure testing requirements of Attachment 2, Section 4.0, are similar to paragraph (h) of Code Case N-504-2. A system leakage test shall be performed in accordance with IWA-5000.

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ATTACHMENT 5

TECHNICAL BASIS FOR ALTERNATIVES TO ASME CODE CASE N-638-1, *AMBIENT TEMPERATURE TEMPERBEAD WELDING*

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TECHNICAL BASIS FOR PROPOSED ALTERNATIVES TO ASME CODE CASE N-638-1, *AMBIENT TEMPERATURE TEMPERBEAD WELDING*

1. BASIS FOR AREA LIMITATION CHANGE TO 300 SQUARE INCHES

IWA-4600 and versions of ASME Code Case N-638 prior to Revision 3 contained a limit of 100 square inches for the surface area of a temperbead weld over ferritic base metal. The area limitation in Attachment 3 is 300 square inches. It is anticipated that some overlays applied under this alternative will be greater than 100 square inches but less than 300 square inches.

NOTE

Code Case N-740 was approved with a temperbead surface area limitation of 500 square inches over the ferritic base metal. However, the proposed alternative has reduced this surface area limitation to 300 square inches to be consisted with the NRC's position on surface area.

Technical justification for allowing weld overlays on ferritic materials with surface areas up to 500 square inches is provided in the white paper supporting the changes in ASME Code Case N-638-3 and EPRI Report 1011898 (Ref. 6). The ASME white paper notes that the original limit of 100 square inches in Code Case N-638-1 was arbitrary. It cites evaluations of a 12-inch diameter nozzle weld overlay to demonstrate adequate tempering of the weld heat affected zone (HAZ) (Section 2a of the white paper), residual stress evaluations demonstrating acceptable residual stresses in weld overlays ranging from 100 to 500 square inches (Section 2b of the white paper), and service history in which weld repairs exceeding 100 square inches were NRC approved and applied to DMW nozzles in several BWR and PWR (Section 3c of the white paper) applications. Some of the cited repairs are greater than 15 years old, and have been inspected several times with no evidence of any continued degradation.

It is important to note that the above theoretical arguments and empirical data have been verified in practice by extensive field experience with temperbead weld overlays, with ferritic material coverage ranging from less than 10 square inches up to and including 325 square inches. The table below provides a partial list of such applications.

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Date	Plant	Component	Nozzle Diameter (in)	Approx. LAS Coverage (in^2)
November 2006	SONGS Unit 3	PZR spray nozzle Safety/relief nozzles PZR surge nozzle	5.1875 8 12.75	40 60 110
November 2006	Catawba Unit 1	PZR spray nozzle Safety/relief nozzles PZR surge nozzle	4 6 14	30 50 120
November 2006	Oconee Unit 1	PZR spray nozzle Safety/relief nozzles PZR surge nozzle Hot leg surge nozzle	4.5 4.5 10.875 10.75	30 30 105 70
October 2006	McGuire Unit 2	PZR spray nozzle Safety/relief nozzles PZR surge nozzle	4 6 14	30 50 120
April 2006	Davis-Besse	Hot leg drain nozzle	4	16
February 2006	SONGS Unit 2	PZR spray nozzle Safety/relief nozzles	8 6	50 28
November 2005	Kuosheng Unit 2	Recirc. outlet nozzle	22	250
April 2004	Susquehanna Unit 1	Recirc. inlet nozzle Recirc. outlet nozzle	12 28	100 325
November 2003	TMI Unit 1	Surge line nozzle	11.5	75
October 2003	Pilgrim	Core spray nozzle CRD return nozzle	10 5	50 20
October 2002	Peach Bottom Units 2 & 3	Core spray nozzle Recirc. outlet nozzle CRD return nozzle	10 28 5	50 325 20
October 2002	Oyster Creek	Recirc. outlet nozzle	26	285
December 1999	Duane Arnold	Recirc. inlet nozzle	12	100
June 1999	Perry	Feedwater nozzle	12	100
June 1998	Nine Mile Point Unit 2	Feedwater nozzle	12	100
March 1996	Brunswick Units 1 & 2	Feedwater nozzle	12	100
February 1996	Hatch Unit 1	Recirc. inlet nozzle	12	100

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Date	Plant	Component	Nozzle Diameter (in)	Approx. LAS Coverage (in^2)
January 1991	River Bend	Feedwater nozzle	12	100
March 1986	Vermont Yankee	Core spray nozzle	10	50

It can be seen from the information above that the original DMW weld overlay was applied over 20 years ago, and weld overlays with low alloy steel coverage in the 100-square inch range have been in service for 5 to 15 years. Several overlays have been applied with low alloy steel coverage significantly greater than the 100 square inches. These overlays have been examined with PDI qualified techniques, in some cases multiple times, and none have shown any signs of new cracking or growth of existing cracks.

2. Clarification of Charpy V-Notch Acceptance Criteria

Paragraph 2.1(j) of Code Case N-638-1 states, "The average of the three HAZ impact tests shall be equal to or greater than the average values of the three unaffected base metal tests." However, the Charpy V-notch test acceptance criteria in Code Case N-638-1 is misleading and inconsistent with the specified acceptance criteria in Section XI applicable to other Class 1 components, since it implies that all three parameters - lateral expansion, absorbed energy, and percent shear fracture – must be equal to or exceed the base material values.

Code Case N-638-2 corrected paragraph 2.1(j) to state that Charpy V-notch acceptance criteria is based on the *average lateral expansion values* rather than the average of all three values. This change clarified the intent of the code case and aligned its Charpy V-notch acceptance criteria with that of Sections III and XI as demonstrated in the Code references provided below.

- ASME Section III – NB-4330, *Impact Test Requirements*
- ASME Section XI – IWA-4620, *Temperbead Welding of Similar Materials*
- ASME Section XI – IWA-4630, *Temperbead Welding of Dissimilar Materials*

The Attachment 3 acceptance criteria for Charpy V-notch testing of the weld HAZ is as specified in Code Case N-638-2. The ASME Section XI basis for this change is documented in the White Paper in ASME C&S Connect for Code Case N-638-2.

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ATTACHMENT 6

APPENDIX VIII, SUPPLEMENT 11 REQUIREMENTS AS IMPLEMENTED BY THE PERFORMANCE DEMONSTRATION INITIATIVE (PDI).

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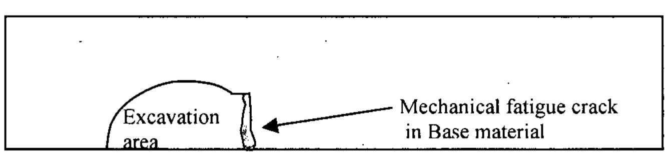
APPENDIX VIII, SUPPLEMENT 11 REQUIREMENTS AS IMPLEMENTED BY THE PERFORMANCE DEMONSTRATION INITIATIVE

CODE REQUIREMENTS

The Code requirements for which relief is requested are all contained within Appendix VIII, Supplement 11. For example, paragraph 1.1(d)(1), requires that all base metal flaws be cracks. Paragraph 1.1(e)(1) requires that at least 20% but less than 40% of the flaws shall be oriented within ±20 deg. of the pipe axial direction. Paragraph 1.1(e)(1) also requires that the rules of IWA-3300 shall be used to determine whether closely spaced flaws should be treated as single or multiple flaws. Paragraph 1.1(e)(2)(a)(1) requires that a base grading unit shall include at least 3 in. of the length of the overlaid weld. Paragraph 1.1(e)(2)(b)(1) requires that a overlay grading unit shall include the overlay material and the base metal-to-overlay interface of at least 6 sq. in. The overlay grading unit shall be rectangular, with minimum dimensions of 2 in. Paragraph 3.2(b) requires that all extensions of base metal cracking into the overlay material by at least 0.1 in. are reported as being intrusions into the overlay material.

BASIS FOR PDI PROGRAM

Paragraph 1.1(d)(1), requires that all base metal flaws be cracks. As illustrated below, implanting a crack requires excavation of the base material on at least one side of the flaw. While this may be satisfactory for ferritic materials, it does not produce a useable axial flaw in austenitic materials because the sound beam, which normally passes only through base material, must now travel through weld material on at least one side, producing an unrealistic flaw response. To resolve this issue, the PDI program revised this paragraph to allow use of alternative flaw mechanisms under controlled conditions. For example, alternative flaws shall be limited to when implantation of cracks precludes obtaining an effective ultrasonic response, flaws shall be semielliptical with a tip width of less than or equal to 0.002 inches, and at least 70 percent of the flaws in the detection and sizing test shall be cracks and the remainder shall be alternative flaws.



The existing specimens used to date for qualification to the Tri-party (NRC/BWROG/EPRI) agreement have a flaw population density greater than allowed by the current Code requirements. These samples have been used successfully for all previous qualifications under the Tri-party agreement program. To facilitate their use and provide continuity from the Tri-party agreement program to Supplement 11, the PDI Program has merged the Tri-party test specimens into their

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weld overlay program. For example: the requirement for using IWA-3300 for proximity flaw evaluation in paragraph 1.1(e)(1) was excluded, instead indications will be sized based on their individual merits; paragraph 1.1(d)(1) includes the statement that intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the base metal flaws; paragraph 1.1(e)(2)(a)(1) was modified to require that a base metal grading unit include at least 1 in. of the length of the overlaid weld, rather than 3 inches; paragraph 1.1(e)(2)(a)(3) was modified to require sufficient unflawed overlaid weld and base metal to exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws, rather than the 1 inch requirement of Supplement 11; paragraph 1.1(e)(2)(b)(l) was modified to define an overlay fabrication grading unit as including the overlay material and the base metal-to-overlay interface for a length of at least 1 in, rather than the 6 sq. in. requirement of Supplement 11; and paragraph 1.1(e)(2)(b)(2) states that overlay fabrication grading units designed to be unflawed shall be separated by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 in. at both ends, rather than around its entire perimeter.

Additionally, the requirement for axially oriented overlay fabrication flaws in paragraph 1.1(e)(1) was excluded from the PDI Program as an improbable scenario. Weld overlays are typically applied using automated gas tungsten arc welding techniques with the filler metal being applied in a circumferential direction. Because resultant fabrication induced discontinuities would also be expected to have major dimensions oriented in the circumferential direction axial overlay fabrication flaws are unrealistic.

The PDI Program revised paragraph 2.0 allowing the overlay fabrication and base metal flaw tests to be performed separately. The requirement in paragraph 3.2(b) for reporting all extensions of cracking into the overlay is omitted from the PDI Program because it is redundant to the RMS calculations performed in paragraph 3.2(c) and its presence adds confusion and ambiguity to depth sizing as required by paragraph 3.2(c). This also makes the weld overlay program consistent with the Supplement 2 depth sizing criteria.

A comparison between the ASME Section XI, Appendix VIII, Supplement 11, 2001 Edition, 10CFR50.55a and the PDI Program, PDI-QPI-304 as supporting documentation is located in Reference 8.

These changes have been captured in Code Case N-653. There are however some additional changes that were inadvertently omitted from the Code Case and therefore CC N-653 is not being used. The most important change is paragraph 1.1(e)(2)(a)(1) where the phrase "and base metal on both sides", was inadvertently included in the description of a base metal grading unit. The PDI program intentionally excludes this requirement because some of the qualification samples include flaws on both sides of the weld. To avoid confusion several instances of the term "cracks" or "cracking" were changed to the term "flaws" because of the use of alternative flaw mechanisms. Additionally, to avoid confusion, the overlay thickness tolerance contained in paragraph 1.1(b) last sentence, was reworded and the phrase "and the remainder shall be

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alternative flaws" was added to the next to last sentence in paragraph 1.1(d)(1). Additional editorial changes were made to the PDI program to address an earlier RAI.

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ENCLOSURE 2

REGULATORY COMMITMENTS

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REGULATORY COMMITMENTS

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
1. HNP will submit the following information to the NRC within fourteen (14) days from completing the final ultrasonic examinations of the completed weld overlays: • Weld overlay examination results including a listing of indications detected. • Disposition of all indications using the standards of ASME Section XI, IWB-3514-2 and/or IWB-3514-3 criteria and, if possible, the type and nature of the indications • A discussion of any repairs to the weld overlay material and/or base metal and the reason for the repairs.	✓		Within fourteen (14) days from completing the final ultrasonic examinations of the completed weld overlays
2. HNP will also submit to the NRC a stress analysis summary demonstrating that the pressurizer nozzles will perform their intended design functions after the weld overlay installation. The stress analysis report will include results showing that the requirements of NB-3200 and NB-3600 of the ASME Code, Section III are satisfied. The stress analysis will also include results showing that the requirements of IWB-3000 of the ASME Code, Section XI, are satisfied. The results will show that the postulated crack including its growth in the nozzles will not adversely affect the integrity of the overlaid welds. This information will be submitted to the NRC prior to entry into Mode 4 start-up from HNP's Refueling Outage 14.	✓		Prior to entry into Mode 4 start-up from Refueling Outage 14

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Request for Relief I3R-02 for Alternate Risk-Informed Selection and Examination Criteria for Examination Category B-F, B-J, C-F-1, and C-F-2 Pressure Retaining Piping Welds In Accordance with 10CFR50.55a(a)(3)(i)

1.0 ASME CODE COMPONENTS AFFECTED:

Code Class:	1 and 2
Examination Category:	B-F, B-J, C-F-1, and C-F-2
Item Number:	B5.10, B5.40, B5.70, B9.11, B9.21, B9.22, B9.31, B9.32, B9.40, C5.11, C5.21, C5.30, C5.51, C5.61, and C5.81
Description:	Alternate Risk-Informed Selection and Examination Criteria for Examination Category B-F, B-J, C-F-1, and C-F-2 Pressure Retaining Piping Welds
Component Number:	Pressure Retaining Piping

2.0 APPLICABLE CODE EDITION AND ADDENDA:

The Inservice Inspection program is based on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, 2001 Edition through the 2003 Addenda.

3.0 APPLICABLE CODE REQUIREMENT:

Table IWB-2500-1, Examination Category B-F, requires volumetric and surface examinations on all welds for Item Numbers B5.10, and B5.40.

Table IWB-2500-1, Examination Category B-J, requires volumetric and surface examinations on a sample of welds for Item Numbers B9.11 and B9.31, volumetric examinations on a sample of welds for Item Number B9.22, and surface examinations for a sample of welds for Item Numbers B9.21, B9.32, and B9.40. The weld population selected for inspection includes the following:

1. All terminal ends in each pipe or branch run connected to vessels.

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

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a. primary plus secondary stress intensity range of $2.4S_m$ for ferritic steel and austenitic steel.

b. cumulative usage factor *U* of 0.4.

3. All dissimilar metal welds not covered under Examination Category B-F.

4. Additional piping welds so that the total number of circumferential butt welds, branch connections, or socket welds selected for examination equals 25% of the circumferential butt welds, branch connection, or socket welds in the reactor coolant piping system. This total does not include welds exempted by IWB-1220 or welds in Item Number B9.22.

5. A 10% sample of PWR high pressure safety injection system circumferential welds in piping ≥ NPS 1½ and < NPS 4 shall be selected for examination. This sample shall be selected from locations determined by the Owner as most likely to be subject to thermal fatigue.

Table IWC-2500-1, Examination Categories C-F-1 and C-F-2 require volumetric and surface examinations on a sample of welds for Item Numbers C5.11, C5.21, C5.51, and C5.61 and surface examinations on a sample of welds for Item Numbers C5.30, C5.51, and C5.81. The weld population selected for inspection includes the following:

1. Welds selected for examination shall include 7.5%, but not less than 28 welds, of all dissimilar metal, austenitic stainless steel and high alloy welds (Examination Category C-F-1) or of all carbon and low alloy steel welds (Examination Category C-F-2) not exempted by IWC-1220. (Some welds not exempted by IWC-1220 are not required to be nondestructively examined per Examination Categories C-F-1 and C-F-2. These welds, however, shall be included in the total weld count to which the 7.5% sampling rate is applied.) The examinations shall be distributed as follows:

   a. the examinations shall be distributed among the Class 2 systems prorated, to the degree practicable, on the number of nonexempt dissimilar metal, austenitic stainless steel and high alloy welds (Examination Category C-F-1) or carbon and low alloy welds (Examination Category C-F-2) in each system;

   b. within a system, the examinations shall be distributed among terminal ends, dissimilar metal welds, and structural discontinuities prorated, to the degree practicable, on the number of nonexempt terminal ends, dissimilar metal welds, and structural discontinuities in the system; and

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c. within each system, examinations shall be distributed between line sizes prorated to the degree practicable.

4.0 REASON FOR REQUEST:

Pursuant to 10CFR50.55a(a)(3)(i), relief is requested on the basis that the proposed alternative utilizing Reference 1 along with two enhancements from Reference 4 will provide an acceptable level of quality and safety.

As stated in "Safety Evaluation Report Related to EPRI Risk-Informed Inservice Inspection Evaluation Procedure (EPRI TR-112657, Revision B, July 1999)" (Reference 2):

> "The staff concludes that the proposed RISI program as described in EPRI TR-112657, Revision B, is a sound technical approach and will provide an acceptable level of quality and safety pursuant to 10CFR50.55a for the proposed alternative to the piping ISI requirements with regard to the number of locations, locations of inspections, and methods of inspection."

The initial Harris Nuclear Plant RISI Program was submitted during the Third Period of the Second Inspection Interval. This initial RISI program was developed in accordance with EPRI TR-112657, Revision B-A, as supplemented by Code Case N-578. The program was approved for use by the USNRC via a Safety Evaluation as transmitted to Progress Energy on March 8, 2006 (Reference 5).

The transition from the 1989 Edition to the 2001 Edition through the 2003 Addenda of ASME Section XI for Harris Nuclear Plant's Third Inspection Interval does not impact the currently approved Risk-Informed ISI evaluation process used in the Second Inspection Interval, and the requirements of the new Code edition/addenda will be implemented as detailed in the Harris Nuclear Plant ISI Program Plan.

The Risk Impact Assessment completed as part of the original baseline RISI Program was an implementation/transition check on the initial impact of converting from a traditional ASME Section XI program to the new RISI methodology. For the Third Interval ISI update, there is no transition occurring between two different methodologies, but rather, the currently approved RISI methodology and evaluation will be maintained for the new interval. As such, the original risk impact assessment process is not impacted by the new interval and does not require update.

As an added measure of assurance, any new systems, portions of systems, or components being included in the RISI Program for the Third Inspection Interval will be added to the Risk Impact Assessment performed during the previous interval. These components will

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be addressed within the evaluation at the start of the new interval to assure that the new Third Inspection Interval RISI element selection provides an acceptable overall change-in-risk when compared to the old ASME Section XI population of exams which existed prior to the implementation of the first RISI Program.

The actual "evaluation and ranking procedure" including the Consequence Evaluation and Degradation Mechanism Assessment processes of the currently approved (Reference 5) RISI Program remain unchanged and are continually applied to maintain the Risk Categorization and Element Selection methods of EPRI TR-112657, Revision B-A. These portions of the RISI Program have been and will continue to be reevaluated and revised as major revisions of the site PRA occur and modifications to plant configuration are made. The Consequence Evaluation, Degradation Mechanism Assessment, Risk Ranking, and Element Selection steps encompass the complete *living program* process applied under the Harris Nuclear Plant RISI Program.

5.0 PROPOSED ALTERNATIVE AND BASIS FOR USE:

The proposed alternative originally implemented in the Initial Risk-Informed Inservice Inspection Program Plan, Harris Nuclear Plant (Reference 3), along with the two enhancements noted below, provide an acceptable level of quality and safety as required by 10CFR50.55a(a)(3)(i). This original program along with these same two enhancements is currently approved for the Harris Nuclear Plant Second Inspection Interval as documented in Reference 5.

The Third Inspection Interval RISI Program will be a continuation of the current application and will continue to be a living program as described in the Reason For Request section of this relief request. No changes to the evaluation methodology as currently implemented under EPRI TR-112657, Revision B-A, are required as part of this interval update. The following two enhancements will continue to be implemented.

> In lieu of the evaluation and sample expansion requirements in Section 3.6.6.2, "RISI Selected Examinations" of EPRI TR-112657, Harris Nuclear Plant will utilize the requirements of Subarticle -2430, "Additional Examinations" contained in Code Case N-578-1 (Reference 4). The alternative criterion for additional examinations contained in Code Case N-578-1 provides a more refined methodology for implementing necessary additional examinations.
>
> To supplement the requirements listed in Table 4-1, "Summary of Degradation-Specific Inspection Requirements and Examination Methods" of EPRI TR-112657, Harris Nuclear Plant will utilize the provisions listed in Table 1, Examination Category R-A, "Risk-Informed Piping Examinations" contained in Code Case N-578-1 (Reference 4). To implement Note 10 of this table,

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paragraphs and figures from the 2001 Edition through the 2003 Addenda of ASME Section XI (Harris Nuclear Plant code of record for the Third Inspection Interval) will be utilized which parallel those referenced in the Code Case for the 1989 Edition. Table 1 of Code Case N-578-1 will be used as it provides a detailed breakdown for examination method and categorization of parts to be examined.

The Harris Nuclear Plant RISI Program, as developed in accordance with EPRI TR-112657, Rev. B-A (Reference 1), requires that 25% of the elements that are categorized as "High" risk (i.e., Risk Category 1, 2, and 3) and 10% of the elements that are categorized as "Medium" risk (i.e., Risk Categories 4 and 5) be selected for inspection. For this application, the guidance for the examination volume for a given degradation mechanism is provided by the EPRI TR-112657 while the guidance for the examination method and categorization of parts to be examined are provided by the EPRI TR-112657 as supplemented by Code Case N-578-1.

In addition to this risk-informed evaluation, selection, and examination procedure, all ASME Section XI piping components, regardless of risk classification, will continue to receive Code required pressure testing as part of the current ASME Section XI program. VT-2 visual examinations are scheduled in accordance with the Harris Nuclear Plant pressure testing program, which remains unaffected by the RISI program.

The RISI program has been updated consistent with the intent of NEI 04-05 (Reference 6) and continues to meet EPRI TR-112657 and Reg. Guide 1.174 risk acceptance criteria.

With respect to PRA technical adequacy, the HNP PRA is being used to support HNP's transition to NPFA-805. It has undergone a gap analysis against Reg. Guide 1.200 with respect to the NFPA-805 application. Identified gaps have been closed, except for one open item. Some Human Error probability pre-initiator events have not been updated to use a mean value verses a median value, which should have no impact on this RI-ISI submittal. The updated model is expected to be issued in the 2nd quarter of 2008.

Given the nature of the EPRI RI-ISI methodology, the living program component of the HNP RI-ISI program and that the HNP RI-ISI program has been previously approved for use by the NRC, reflecting revisions to the PRA are not expected to significantly impact the RI-ISI program.

It is also acknowledged that industry and NRC are in dialogue as to the applicability of Reg. Guide 1.200 to RI-ISI programs. As part of the living program component of the HNP RI-ISI program, HNP intends to update the RI-ISI program based up the outcome of this dialogue, as applicable.

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6.0 DURATION OF PROPOSED ALTERNATIVE:

Relief is requested for the Third Ten-Year Inspection Interval for Harris Nuclear Plant.

7.0 PRECEDENTS:

Similar relief requests have been approved for:

Harris Nuclear Plant Second Inspection Interval Relief Request 2RG-010 was authorized per SER dated March 8, 2006. The Third Inspection Interval Relief Request utilizes an identical RISI methodology as was previously approved.

Susquehanna Steam Electric Station Third Inspection Interval Relief Request 3RR-01 was authorized per SER dated July 28, 2005.

Quad Cities Station Fourth Inspection Interval Relief Request I4R-02 was authorized per SER dated January 28, 2004.

Dresden Station Fourth Inspection Interval Relief Request I4R-02 was authorized per SER dated September 4, 2003.

8.0 REFERENCES:

1) Electric Power Research Institute (EPRI) Topical Report (TR) 112657 Rev. B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure", December 1999

2) W. H. Bateman (USNRC) to G. L. Vine (EPRI) letter dated October 28, 1999 transmitting "Safety Evaluation Report Related to EPRI Risk-Informed Inservice Inspection Evaluation Procedure (EPRI TR-112657, Revision B, July 1999)"

3) Initial Risk-Informed Inservice Inspection Program Plan - Harris Nuclear Plant, Revision A (Letter HNP-05-049 from T.C. Morton (HNP) to the USNRC, dated April 27, 2005)

4) American Society of Mechanical Engineers (ASME) Code Case N-578-1, "Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method B"

5) USNRC Safety Evaluation Report for HNP RISI Relief Request (Letter from M. L. Marshall (USNRC) to C. J. Gannon, dated March 8, 2006)

6) NEI 04-05, "Living Program Guidance to Maintain Risk-Informed Inservice Inspection Programs for Nuclear Plant Piping Systems" dated April 2004

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Request for Relief I3R-03 for Inservice Inspection Impracticality of Pressure Testing the RPV Head Flange Seal Leak Detection System In Accordance with 10CFR50.55a(g)(5)(iii)

1.0 ASME CODE COMPONENTS AFFECTED:

Code Class:	2
Reference:	Table IWC-2500-1 IWC-5200
Examination Category:	C-H
Item Number:	C7.10
Description:	Pressure Testing the RPV Head Flange Seal Leak Detection System
Component Number:	Class 2 RPV Head Flange Seal Leak Detection System
Drawing Number:	2165-S-1300

2.0 APPLICABLE CODE EDITION AND ADDENDA:

The Inservice Inspection program is based on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, 2001 Edition through the 2003 Addenda.

3.0 APPLICABLE CODE REQUIREMENT:

Table IWC-2500-1, Examination Category C-H, Item Number C7.10, requires all Class 2 pressure retaining components be subject to a system leakage test with a VT-2 visual examination in accordance with IWC-5220. This pressure test is to be conducted once each inspection period.

4.0 IMPRACTICALITY OF COMPLIANCE:

Pursuant to 10CFR50.55a(g)(5)(iii), relief is requested on the basis that pressure testing the RPV Flange Leak Detection Line is deemed impractical.

The Reactor Vessel Head Flange Leak Detection Line is separated from the reactor pressure boundary by one passive membrane, a silver-plated O-ring located on the vessel flange. A second O-ring is located on the opposite side of the tap in the vessel flange (See Figure I3R-03.1). This line is required during plant operation and will indicate failure of the inner flange seal O-ring. Failure of the O-ring would result in a High Pressure Alarm in the Main Control Room.

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The configuration of this system precludes manual testing while the vessel head is removed. As figure I3R-03.1 portrays, the configuration of the vessel tap, combined with the small size of the tap and the high test pressure requirement (approximately 1045 psig), prevents the tap from being temporarily plugged. Also, when the vessel head is installed, an adequate pressure test cannot be performed due to the fact that the inner O-ring is designed to withstand pressure in one direction only. Due to the groove that the O-ring sits in and the pin/wire clip assembly (See Figure I3R-03.2), pressurization in the opposite direction into the recessed cavity and retainer clips would likely damage the O-ring and thus result in further damage to the O-ring.

5.0 BURDEN CAUSED BY COMPLIANCE:

Pressure testing of this line during the Class 2 System Leakage Test is precluded because the line will only be pressurized in the event of a failure of the inner O-ring. Purposely failing the inner O-ring to perform the Code Required test would require purchasing a new set of O-rings, additional time and radiation exposure to detension the reactor vessel head, install the new O-rings, and then reset and retension the reactor vessel head. This is considered to impose an undue hardship and burden on Harris Nuclear Plant.

Based on the above, Harris Nuclear Plant requests relief from the ASME Section XI requirements for system leakage testing of the Reactor Vessel Head Flange Seal Leak Detection System.

6.0 PROPOSED ALTERNATIVE AND BASIS FOR USE:

A VT-2 visual examination on the Class 2 portion of the RPV Flange Leak Detection Line will be performed during each refueling outage when the RPV head is off and the head cavity is flooded above the vessel flange. The static head developed with the leak detection line filled with water will allow for the detection of any gross indications in the line. This examination will be performed each refueling outage as per the frequency specified by Table IWC-2500-1.

7.0 DURATION OF PROPOSED ALTERNATIVE:

Relief is requested for the Third Ten-Year Inspection Interval for Harris Nuclear Plant.

8.0 PRECEDENTS:

Similar relief requests have been approved for:

Susquehanna Steam Electric Station Third Inspection Interval Relief Request 3RR-07 was authorized per SER dated September 24, 2004.

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FIGURE I3R-03.1

FLANGE SEAL LEAK DETECTION LINE DETAIL

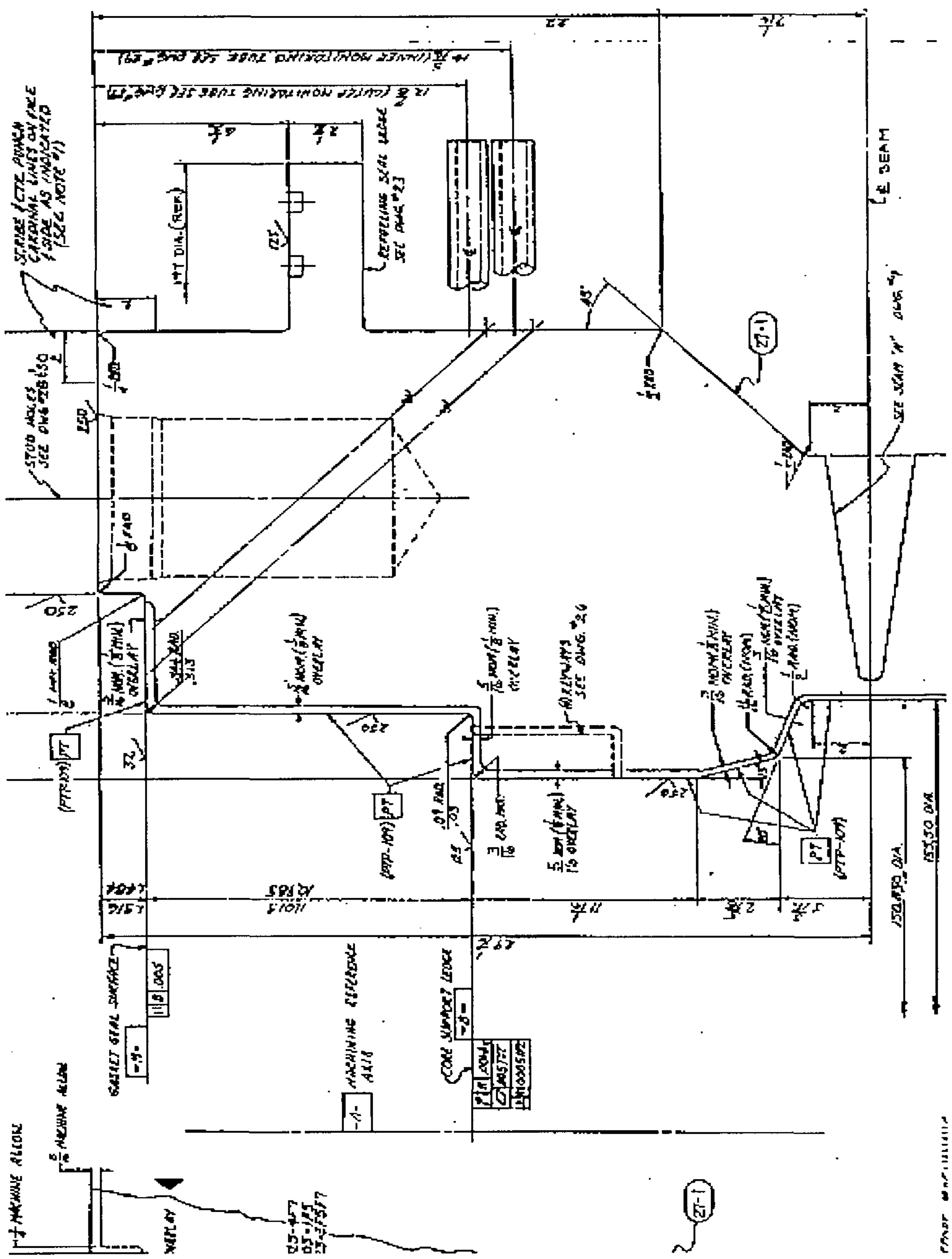

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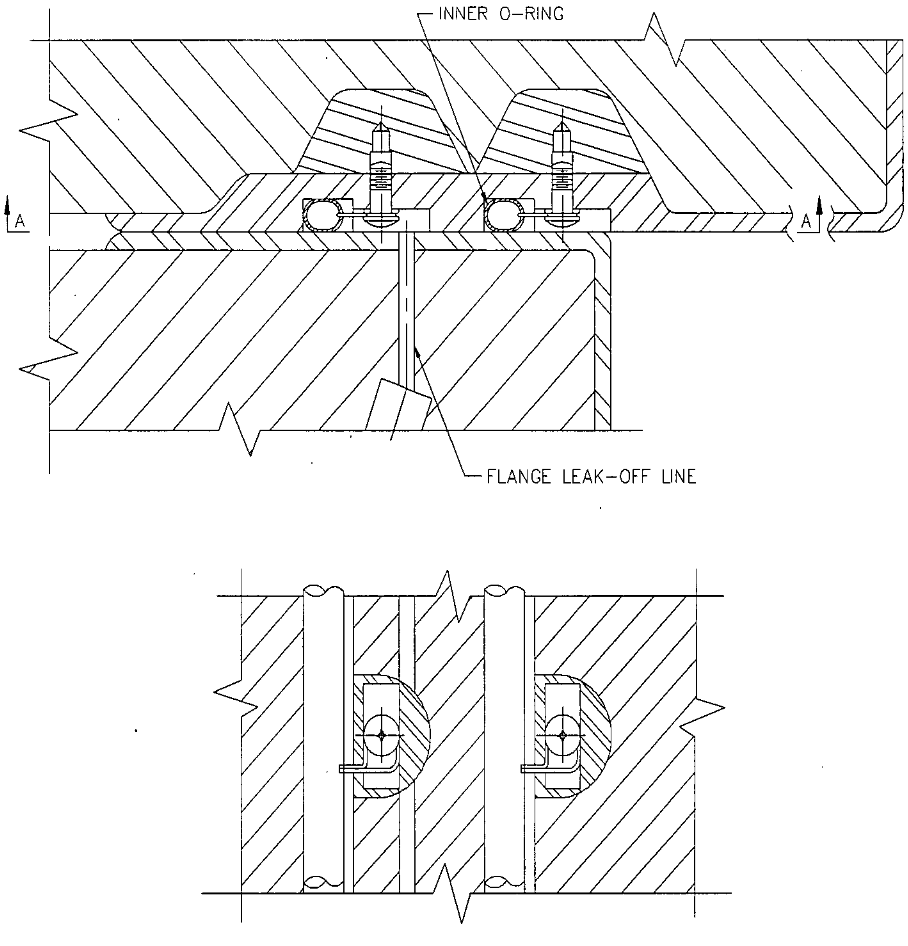
FIGURE I3R-03.2

TYPICAL O-RING CONFIGURATION



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Request for Relief I3R-04 for Hardship or Unusual Difficulty Without Compensating Increase in Level of Quality or Safety for Piping and Valves Within the Class 1 Pressure Boundary Including Reactor Coolant, Charging, Safety Injection, and Residual Heat Removal Systems.
In Accordance with 10CFR50.55a(a)(3)(ii)

1.0 ASME CODE COMPONENTS AFFECTED:

Code Class:	1
Reference:	IWB-5222(b)
Examination Category:	B-P
Item Number:	B15.10
Description:	Piping and Valves within the Class 1 Pressure Boundary Including Reactor Coolant, Charging, Safety Injection, and Residual Heat Removal Systems
Component Number:	Process piping, drains, vent, test, and fill lines within the Class 1 pressure boundary
Drawing Number:	Various

2.0 APPLICABLE CODE EDITION AND ADDENDA:

The Inservice Inspection program is based on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, 2001 Edition through the 2003 Addenda.

3.0 APPLICABLE CODE REQUIREMENT:

Table IWB-2500-1, Examination Category B-P, Item Number B15.10, requires all Class 1 pressure retaining components be subject to a system leakage test with a VT-2 visual examination in accordance with IWB-5220. This pressure test is to be conducted prior to plant startup following each reactor refueling outage. The pressure retaining boundary for the test conducted at or near the end of each inspection interval shall be extended to all Class 1 pressure retaining components per IWB-5222(b).

4.0 REASON FOR REQUEST:

Pursuant to 10CFR50.55a(a)(3)(ii), relief is requested on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

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Relief is requested from ASME Section XI, IWB-5222(b), regarding extension of the pressure retaining boundary during system pressure tests conducted at or near the end of each inspection interval to all Class 1 pressure retaining components within the system boundary.

Table 1 identifies the Class 1 pressure retaining components that are associated with the requested relief.

The Class 1 drains, vent, test, and fill lines are equipped with isolation valves, which provide double isolation of the Reactor Coolant Pressure Boundary (RCPB). These valves are generally maintained in the closed position during normal plant operation. The piping outboard of the first isolation valve is not normally pressurized. Under normal operating conditions, the piping and connections are subjected to reactor coolant system pressure and temperature only if leakage through the inboard valves occurs. To perform the ASME Section XI required pressure test, it would be necessary to manually open the inboard valves to pressurize the piping and connections. Pressurization by this method defeats the double isolation and reduces the margin of personnel safety for those performing the test. Furthermore, performing the test with the inboard isolation valves open requires several man-hours to position the valves for the test and restore the valves to their closed positions once the test is completed. These valves are located in close proximity to the RCS loop piping and thus would require personnel entry into high radiation areas within the containment and a consequent increase in radiation exposure. Since this test would be performed near the end of an outage when all RCS work has been completed, the time required to open and close these valves would impact the outage schedule. Thus, compliance with this specific Code requirement results in unnecessary hardship pursuant to 10CFR50.55a(a)(3)(ii) without a compensating increase in the level of quality and safety.

Also, HNP design of Class 1 process piping requires substantial effort to extend the Class 1 system boundary where check valves or non-redundant components serve as the first system isolation from the reactor coolant system. Such configurations may require check valve disassembly or other temporary configurations to achieve test pressures at upstream piping and valves. Since the Class 1 system pressure testing is performed in Mode 3, these temporary configurations could conflict with Technical Specification requirements. Establishing and restoring such temporary configurations could also result in an unwarranted increase in worker radiation exposure.

Based on the above, extension of the pressure-retaining boundary during system leakage tests to Class 1 pressure retaining components within the system boundary represents a hardship and unusual difficulty that does not provide a compensating increase in the level of quality and safety.

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The following is specific information pertaining to the various pipe segments for which relief has been requested.

Small Size Class 1 Vent, Drain, Test, and Fill Lines

Relief is requested from fully pressurizing piping between the first and second isolation device on small size vent, drain, test, and fill lines. HNP does not have any small size vent, drain, test, or fill lines that are configured with a cap or blind flange that represents the second containment isolation valve. All small size vent, drain, test, or fill lines at HNP are configured with two small isolation valves in series. There are twenty-six vent, drain, test and fill lines in the Reactor Coolant System (RCS) ranging in size from 0.5 inch to two inches. The configurations are two small isolation valves in series. The piping segments provide the design-required double isolation barrier for the reactor coolant pressure boundary. The Code-required leakage test would be performed in MODE 3 at the normal operating pressure of 2235 psig and at a nominal temperature of about 557°F.

Leakage testing of these piping segments at nominal operating pressure in MODE 3 would require the opening of the inboard isolation valve at the normal operating RCS temperature and pressure conditions. In so doing, the design requirement for two primary coolant pressure boundary isolation devices would be violated. Additionally, opening these valves introduces the potential risk for spills and personnel contamination.

These piping segments are VT-2 visually inspected through the entire length as part of the Class 1 system inspection at the conclusion of each refueling outage. The leakage test will not specifically pressurize past the first isolation valve for the end of interval test. No external or visible leakage will be allowed for a test to be successful. The increase in safety achieved from the Code-required leakage test is not commensurate with the hardship of performing such testing.

Larger Size Class 1 Piping Segments

12 Inch Residual Heat Removal Motor Operated Valves

This piping segment consists of two 86-foot run of piping between Residual Heat Removal (RHR) inlet valves 1RH-39 & 40, and 1RH-1 & 2. These valves are interlocked at a required setpoint of <363 psig to avoid over-pressurization of the RHR system. The interlock prevents manual opening of the valves from the Control Room with RCS pressure above the setpoint.

The piping segment is VT-2 visually inspected through the entire length as part of the Class 1 system inspection at the conclusion of each refueling outage. The proposed

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system pressure test will not specifically pressurize past the first isolation valve for the end of interval test. It is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. No external or visible leakage will be allowed for the test to be successful.

Safety Injection Loops Low Head Check Valves 1SI-250, 252, & 254, and Upstream Piping

These three piping segments each consist of a 26-28 foot run of piping along with a short 1.00 inch connection. These lines are for injecting low head Emergency Core Cooling System (ECCS) water from the accumulators and the low head safety injection system (i.e., RHR system in ECCS configuration). The primary isolation and secondary isolation devices for the 12 inch lines are check valves oriented to flow into the RCS. The piping segments provide the design-required double isolation barrier for the reactor coolant pressure boundary.

Leakage testing in MODE 3 would require a pressure source be connected at each segment location. In so doing, the design requirement for two primary coolant pressure boundary isolation devices would be violated. For test locations located overhead and away from normal personnel access areas, ladders or scaffolding would have to be installed to provide access to the piping segment and to open the valve. This process would lead to additional occupational radiation dose for testing these lines.

These lines are located in areas involving occupational radiation exposure, and leakage testing of these lines would increase occupational radiation dose.

The leakage test will not specifically pressurize past the first isolation valve for the end of interval test. It is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. Otherwise, the pressure in the segment will be at least at the operating pressure of the cold leg accumulators, which are pressurized to between 585 and 665 psig. No external or visible leakage will be allowed for the test to be successful. Since this test will assure that the combined first and second isolation devices are effective in maintaining the reactor coolant pressure boundary at normal operating temperature and pressure, the increase in safety achieved from the Code-required leakage test is not commensurate with the hardship of performing such testing.

The Safety injection Low Head Check Valves 1SI-250, 1SI-252, and 1SI-254 will check normal RCS pressure upstream. The Safety Injection Accumulators are aligned to the subject piping during Mode 3, thus the piping segments between the first and second isolation valves will be exposed to the Safety Injection accumulator pressure which is 585 to 665 psig. The temperature will be at ambient containment temperature and is maintained below 120°F.

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Safety Injection Loops High Head Check Valves 1SI-81, 82, 83, 136, 137 & 138, and Upstream Piping

These six piping segments each consist of a 2-inch and 6-inch piping span between two check valves oriented toward the RCS. These lines are for injecting high head ECCS water into the hot and cold legs after an accident. The primary and secondary isolation devices are check valves oriented to flow into the RCS. The piping segments provide the design-required double isolation barrier for the reactor coolant pressure boundary. Leakage testing of these piping segments at nominal operating pressure in MODE 3 would require a modification to allow pressurizing to the normal operating RCS temperature and pressure conditions.

The leakage tests will not specifically pressurize past the first isolation valve for this inspection. It is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. No external or visible leakage will be allowed for the test to be successful. This test will assure that the combined first and second isolation valves are effective in maintaining the reactor coolant pressure boundary at normal operating temperature and pressure.

Prior to the Mode 3 pressure test, the RHR system will have been in service. When RHR is removed from service prior to reaching Mode 3, the piping will be at an elevated temperature and pressure condition. This is the condition of the piping and valves 1SI-81, 1SI-82, and 1SI-83 in normal system configuration for Mode 3 and the proposed alternate pressure test. The expected pressures and temperatures are 325-360 psig and 300-350°F.

For valves 1SI-136, 1SI-137, and 1SI-138, flow is not established through the piping of these check valves during ascension to Mode 3 and/or Mode 3. Thus, the piping is at elevated head pressure and ambient containment temperature which is maintained below 120°F.

Pumps

There are no pumps associated with any of the piping segments in this relief request.

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5.0 PROPOSED ALTERNATIVE AND BASIS FOR USE:

The Class 1 system boundary during the ten-year interval leakage test will be maintained in a normal, operational alignment with items identified within Table 1 constituting exceptions to the Code-required boundary. The VT-2 visual examination will extend to the Class 1 pressure boundary.

Items within Table 1 will be visually examined for evidence of leakage during system leakage testing without being pressurized.

6.0 DURATION OF PROPOSED ALTERNATIVE:

Relief is requested for the Third Ten-Year Inspection Interval for Harris Nuclear Plant.

7.0 PRECEDENTS:

Similar relief requests have been approved for:

Harris Nuclear Plant Second Inspection Interval Relief Request 2R1-015 was authorized per SER dated April 17, 2006. The Third Inspection Interval Relief Request utilizes an identical RISI methodology as was previously approved.

Cooper Nuclear Station Fourth Inspection Interval Relief Request PR-11 was authorized per SER dated October 2, 2006.

Fitzpatrick Nuclear Power Plant Third Inspection Interval Relief Request was authorized per SER dated November 1, 2005.

Note that ASME Section XI has recently approved Code Case N-731, Alternative Class 1 System Leakage Test Pressure Requirements. The Code Case allows "for portions of Class 1 Safety Injection systems that are continuously pressurized during an operating cycle, the pressure associated with a statically-pressurized passive Safety Injection system of a pressurized water reactor may be used."

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TABLE 1: RELIEF REQUEST NUMBER I3R-04
AFFECTED CLASS 1 PRESSURE RETAINING COMPONENTS – EXAMINATION CATEGORY B-P

AFFECTED LINE OR COMPONENT	PIPE DIAM. (IN.)	PIPE MATERIAL/ SCHEDULE	APPROX LENGTH (FT.)	DRAWING NO.	BOUNDARY EXCEPTION(S)
Loop Drain Line Isolation Valve	2	SCH 160, A-376 TP304	≤ 1 ft.	2165-S-1300 2165-G-800 2165-G-129	Valve 1RC-7 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-8
Loop Drain Line Isolation Valve	2	SCH 160, A-376 TP304	≤ 1 ft.	2165-S-1300 2165-G-800 2165-G-129	Valve 1RC-16 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-17
Loop Drain Line Isolation Valve	2	SCH 160, A-376 TP304	≤ 1 ft.	2165-S-1300 2165-G-800 2165-G-129	Valve 1RC-28 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-29
Pressurizer PORV Vent Line on Primary Sample Path off Pressurizer	0.75	SCH 160, A-376 TP304	0.5 ft.	2165-S-1301 2165-G-801 2165-G-148	Valve 1RC-110 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-111
Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-459	0.5	SCH 160, A-376 TP304	0.5 ft.	2165-S-1301 2165-G-801 2165-G-147	Valve 1RC-984 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-985
Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-460	0.5	SCH 160, A-376 TP304	0.5 ft.	2165-S-1301 2165-G-801 2165-G-147	Valve 1RC-986 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-987
Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-461	0.5	SCH 160, A-376 TP304	0.5 ft.	2165-S-1301 2165-G-801 2165-G-147	Valve 1RC-988 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-989
CVCS Pressurizer Spray Downstream CV and Test Connection Isolation Valve	2	SCH 160, A-376 TP304	≤ 1 ft.	2165-S-1303 2165-G-803 2165-G-137 2165-G-139	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-491 and 1CS-488
	1		1.5 ft.		Valve 1CS-489 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-490

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TABLE 1: RELIEF REQUEST NUMBER I3R-04
AFFECTED CLASS 1 PRESSURE RETAINING COMPONENTS – EXAMINATION CATEGORY B-P

AFFECTED LINE OR COMPONENT	PIPE DIAM. (IN.)	PIPE MATERIAL/ SCHEDULE	APPROX LENGTH (FT.)	DRAWING NO.	BOUNDARY EXCEPTION(S)
Norm Charging Line Upstream CV and Test Connection Isolation Valve	3	SCH 160, A-376 TP304	≤ 1 ft.	2165-S-1303 2165-G-803 2165-G-137 2165-G-139	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-500 and 1CS-497
	1		1.5 ft.		Valve 1CS-498 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-499
Alt Charging Line Upstream CV and Test Connection Isolation Valve	3	SCH 160, A-376 TP304	≤ 1 ft.	2165-S-1303 2165-G-803 2165-G-137 2165-G-139	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-486 and 1CS-483
	1		1.5 ft.		Valve 1CS-484 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-485
Excess Letdown Upstream Isolation Valve	1	SCH 160, A-376 TP304	1.5 ft.	2165-S-1303 2165-G-803 2165-G-138	Valve 1CS-460 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-461
Between Accumulator 1A-SA Discharge Check Valve and SI to RCS Loop "A" Check Valve	12	SCH 140, A-376 TP316	26	2165-S-1309 2165-G-809 2165-G-154 2165-G-155	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-249 and 1SI-250
	1	SCH 160, A-376 TP304	2		Valve 1SI-273 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-274
Between Accumulator 1B-SB Discharge Check Valve and SI to RCS Loop "B" Check Valve	12	SCH 140, A-376 TP316	28	2165-S-1309 2165-G-809 2165-G-154 2165-G-155	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-251 and 1SI-252
	1	SCH 160, A-376 TP304	2		Valve 1SI-275 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-276

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TABLE 1: RELIEF REQUEST NUMBER I3R-04
AFFECTED CLASS 1 PRESSURE RETAINING COMPONENTS – EXAMINATION CATEGORY B-P

AFFECTED LINE OR COMPONENT	PIPE DIAM. (IN.)	PIPE MATERIAL/ SCHEDULE	APPROX LENGTH (FT.)	DRAWING NO.	BOUNDARY EXCEPTION(S)
Between Accumulator 1C-SA Discharge Check Valve and SI to RCS Loop "C" Check Valve	12	SCH 140, A-376 TP316	26	2165-S-1309 2165-G-809 2165-G-154 2165-G-155	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-253 and 1SI-254
	1	SCH 160, A-376 TP304	2		Valve 1SI-277 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-278
RCS Loop to RHR Pump "B" Isolation and Drain Line	12	SCH 140S, A-376 TP316	86	2165-S-1324 2165-G-824 2165-G-155	Valves 1RH-39 and 1RH-40 remain closed to avoid over-pressurization of the RHR system
	1	SCH 160S, A-376 TP304	2		Valve 1RH-41 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RH-42
RCS Loop to RHR Pump "A" Isolation and Drain Line	12	SCH 140S, A-376 TP316	86	2165-S-1324 2165-G-824 2165-G-155	Valves 1RH-1 and 1RH-2 remain closed to avoid over-pressurization of the RHR system
	1	SCH 160S, A-376 TP304	2		Valve 1RH-3 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RH-4
RCS Cold Leg Loop 1 SIS, Boron injection, and CVCS paths	6	SCH 160, A-376 TP304	38	2165-S-1310 2165-G-810 2165-S-1308 2165-G-808 2165-G-154 2165-G-155 2165-G-156	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-81, 1SI-356, 1SI-8, and 1SI-72
	2		68		
	2		3		
	1		1.5		Valve 1SI-27 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-28
	1		1.5		Valve 1SI-79 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-80

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TABLE 1: RELIEF REQUEST NUMBER I3R-04
AFFECTED CLASS 1 PRESSURE RETAINING COMPONENTS – EXAMINATION CATEGORY B-P

AFFECTED LINE OR COMPONENT	PIPE DIAM. (IN.)	PIPE MATERIAL/ SCHEDULE	APPROX LENGTH (FT.)	DRAWING NO.	BOUNDARY EXCEPTION(S)
Class 1 piping from Residual Heat Exchanger to RCS Cold Leg Loop 2	6	SCH 160, A-376 TP304	33	2165-S-1310 2165-G-810 2165-S-1308 2165-G-808 2165-G-154 2165-G-155 2165-G-156	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-82, 1SI-357, 1SI-9, and 1SI-73
	2		83		
	2		7		
	1		1.5		Valve 1SI-33 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-34
	1		1.5		Valve 1SI-75 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-76
Class 1 piping from Residual Heat Exchanger to RCS Cold Leg Loop 3	6	SCH 160, A-376 TP304	25.5	2165-S-1310 2165-G-810 2165-S-1308 2165-G-808 2165-G-154 2165-G-155 2165-G-156	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-83, 1SI-358, 1SI-10, and 1SI-74
	2		49.5		
	2		1.5		
	1		1.5		Valve 1SI-39 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-40
	1		1.5		Valve 1SI-77 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-78
Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 1	6	SCH 160, A-376 TP304	43	2165-S-1308 2165-G-808 2165-G-154 2165-G-156	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-136, 1SI-134, 1SI-104, and 1SI-127
	2		2.5		
	2		2.5		
	1		1.5		Valve 1SI-376 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-377
Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 2	6	SCH 160, A-376 TP304	44.5	2165-S-1308 2165-G-808 2165-G-154 2165-G-156	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-137, 1SI-135, 1SI-105, and 1SI-128
	2		2.5		
	2		2.5		

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<table>
<tr><th colspan="6">TABLE 1: RELIEF REQUEST NUMBER I3R-04
AFFECTED CLASS 1 PRESSURE RETAINING COMPONENTS – EXAMINATION CATEGORY B-P</th></tr>
<tr><th>AFFECTED LINE OR COMPONENT</th><th>PIPE DIAM. (IN.)</th><th>PIPE MATERIAL/ SCHEDULE</th><th>APPROX LENGTH (FT.)</th><th>DRAWING NO.</th><th>BOUNDARY EXCEPTION(S)</th></tr>
<tr><td></td><td>1</td><td></td><td>1.5</td><td></td><td>Valve 1SI-132 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-133</td></tr>
<tr><td rowspan="5">Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 3</td><td>6</td><td rowspan="5">SCH 160,
A-376 TP304</td><td>1</td><td rowspan="5">2165-S-1308
2165-G-808
2165-G-154
2165-G-156</td><td rowspan="4">Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-138, 1SI-106, and 1SI-129</td></tr>
<tr><td>2</td><td>42.5</td></tr>
<tr><td>2</td><td>1</td></tr>
<tr><td>2</td><td>1</td></tr>
<tr><td>1</td><td>1.5</td><td>Valve 1SI-130 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-131</td></tr>
</table>

9.0 REFERENCES

The references used to develop this Inservice Inspection Program Plan include:

1) Code of Federal Regulations, Title 10, Energy.
- Part 50, Paragraph 2, "Definitions", the definition of "Reactor Coolant Pressure Boundary".
- Part 50, Paragraph 50.55a, "Codes and Standards".
- Part 50, Appendix J, Primary Reactor Containment Testing for Water Cooled Power Reactors.

2) ASME Boiler and Pressure Vessel Code, Section XI, Division 1, "Inservice Inspection of Nuclear Power Plant Components."
- 1974 Edition through the Summer 1975 Addenda.
- 1983 Edition through the Summer 1983 Addenda.
- 1989 Edition, No Addenda.
- 1992 Edition through the 1992 Addenda.
- 2001 Edition through the 2003 Addenda.

3) ASME Boiler and Pressure Vessel Code, Section III, Division 1, "Rules For Construction of Nuclear Power Plant Components", the 2001 Edition through the 2003 Addenda.

4) ASME O&M Code, Code For Operation and Maintenance of Nuclear Power Plants, 2001 Edition through the 2003 Addenda.

5) USNRC Regulatory Guide 1.14, Revision 1, "Reactor Coolant Pump Flywheel Integrity".

6) USNRC Regulatory Guide 1.26, Revision 3, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive Waste- Containing Components of Nuclear Power Plants".

7) USNRC Regulatory Guide 1.147 "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1".

8) USNRC Regulatory Guide 1.150, Revision 1, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examination".

9) USNRC Regulatory Guide 1.192, Operation and Maintenance Code Case Acceptability, ASME O&M Code.

10) Branch Technical Position MEB 3-1, dated November 24, 1975, High Energy Fluid Systems, Protection Against Postulated Piping Failures in Fluid Systems Outside Containment.

11) USNRC NUREG-0737, dated November 1980, "TMI Action Plan Requirements".

12) Harris Nuclear Plant Final Safety Analysis Report (FSAR).

13) Harris Nuclear Plant Technical Specifications (TS).

14) Harris Nuclear Plant Procedures ISI-100, "Control Of Inservice Inspection and Testing Activities", ISI-102, "Inservice Inspection Drawing Preparation and Control", ISI-103, "Receiving Inspection and Control of Inservice Inspection Calibration Standards", EST-201, "ASME System Pressure Tests", EST-213, "ASME System Pressure Tests for Fuel Oil Piping", ISI-202, "Safety-Related Component Support (Hangers and Snubbers) Examination and Testing Program", NW-04, "Permanent Marking of Plant Materials, Components, and Weld Joints", NDEP-1011, "Weld Joint Identification Marking of Datum Points and Identification", PLP-605, "ASME Boiler and Pressure Vessel Code Section XI Repair and Replacement Program", EPT-220, "TMI III.D.1.1 Inservice System Leak Tests", and OST-1814, "TMI III D.1.1 Inservice Liquid Systems Leak Test Refueling Outage Interval at All Times".

15) Harris Nuclear Plant ISI Classification Basis Document (PEN02.G04), Third Ten-Year Inspection Interval.

16) Harris Nuclear Plant ISI Selection Document (PEN02.G05), Third Ten-Year Inspection Interval.

17) Progress Energy Risk-Informed Inservice Inspection Program Plan, Harris Nuclear Plant.

18) EPRI Topical Report TR-112657, Rev. B-A, Final Report, "Revised Risk-Informed Inservice Inspection Evaluation Procedure", December 1999.

19) USNRC SER related to EPRI Topical Report TR-112657, Rev. B, Final Report, "Revised Risk-Informed Inservice Inspection Evaluation Procedure, July 1999", dated October 28, 1999.

20) ASME Code Case N-578-1, "Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1".

21) EPRI Topical Report TR-1006937, Rev. 0-A, "Extension of the EPRI Risk-Informed Inservice Inspection (RI-ISI) Methodology to Break Exclusion Region (BER) Programs", August 2002.

22) USNRC SER related to EPRI Topical Report TR-1006937, Rev. 0, "Extension of the EPRI Risk-Informed Inservice Inspection (RI-ISI) Methodology to Break Exclusion Region (BER) Programs", dated June 27, 2002.

23) Regulatory Guide 1.174, Revision 1, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis", November 2002.

24) Regulatory Guide 1.178, Revision 1, "An Approach for Plant-Specific Risk-Informed Decision Making Inservice Inspection of Piping", September 2003.

25) HNP-01Q-301, "Degradation Mechanism Evaluation for the Class 1 and Class 2 Piping at Harris Nuclear Plant", Revision 1.

26) HNP-01Q-302, "Consequence Evaluation for Harris Nuclear Plant", Revision 1.

27) HNP-01Q-303, "Risk Ranking for Harris Nuclear Plant", Revision 0.

28) HNP-01Q-304, "Minutes of the Element Selection Meeting for the RISI Project at Harris Nuclear Plant", Revision 0.

29) HNP-01Q-305, "Risk Impact for Harris Nuclear Plant", Revision 0.

30) AR-133830-01, "Service History Review for Harris Nuclear Plant", Revision 0.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
THIRD INTERVAL INSERVICE INSPECTION PROGRAM SUBMITTAL

ISI SELECTION DOCUMENT
THIRD TEN-YEAR INSPECTION INTERVAL

(636 pages)

Including:

Attachment 1 – Welds and Supports Schedule
Attachment 2 – Pressure Test Schedule
Attachment 3 – IWE/IWL Schedule

Progress Energy

Harris Nuclear Plant

ISI Selection Document
Third Ten-Year Inspection Interval

Commercial Service Date:

May 2, 1987

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SCIENCE AND TECHNOLOGY

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PROGRAM ACCEPTANCE

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Each time this document is revised, the Revision Approval Sheet will be signed and the following Revision Control Sheet should be completed to provide a detailed record of the revision history. The signatures above apply only to the changes made in the revision noted. Signatures for superseded revisions should be retrievable through Harris Nuclear Plant archives.

REVISION CONTROL SHEET

Major changes should be outlined within the table below. Editorial and formatting revisions are not required to be logged.

Revision	Date	Revision Summary
0	02/28/08	Initial Issuance. (This ISI Selection Document was prepared by Alion Science and Technology Corporation to support HNP's Third Inservice Inspection Interval and Second Containment Inservice Inspection Interval.) Prepared: S. Coleman Reviewed: K. Johnson Approved: D. Lamond

Note: This ISI Selection Document (Sections 1 - 8, Reports and Tables, inclusive) is controlled by the Harris Nuclear Plant, Engineering Technical Services Group.

REVISION SUMMARY

SECTION	EFFECTIVE PAGES	REVISION	DATE
Preface	i to vii	0	02/28/08
1.0	1-1 to 1-4	0	02/28/08
2.0	2-1 to 2-8	0	02/28/08
3.0	3-1 to 3-4	0	02/28/08
4.0	4-1 to 4-4	0	02/28/08
5.0	5-1 to 5-4	0	02/28/08
6.0	6-1 to 6-5	0	02/28/08
7.0	7-1 to 7-4	0	02/28/08
8.0	8-1 to 8-2	0	02/28/08

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REPORTS AND TABLES

1.0 SCHEDULING AND SELECTION PROCESS

1.1 Introduction and Overview

The purpose of this Inservice Inspection (ISI) Selection Document is to define the selection methodology, basis for selection, and components selected for examination during the Third Ten-Year ISI Interval (Second Containment Inspection Interval (CISI)) at Harris Nuclear Plant (HNP). Examinations at HNP are performed in accordance with the 2001 Edition through the 2003 Addenda of ASME Section XI, and the HNP Third Interval ISI Program Plan. Class MC and CC component examinations are performed in accordance with the 2001 Edition through the 2003 Addenda of Subsections IWE and IWL of ASME Section XI for the CISI Program (Second CISI Interval). Relief Request I3R-02 allows HNP to examine Class 1 B-F and B-J welds and Class 2 C-F-1 and C-F-2 welds in accordance with the EPRI Topical Report TR-112657, Rev. B-A along with guidance from Code Case N-578-1. EPRI Topical Report TR-1006937, Rev. 0-A has since incorporated similar requirements for BER components. The Risk Informed Inservice Inspection (RISI) evaluation for HNP is contained in the Risk Informed Inservice Inspection Program Plan.

All references to ASME Section XI in this ISI Selection Document are taken from the ASME Boiler and Pressure Vessel Code, Section XI, Division 1, "Rules for Inservice Inspection of Nuclear Power Plant Components," the 2001 Edition through the 2003 Addenda, unless otherwise stated.

This ISI Selection Document addresses all ISI Class 1, Class 2, Class 3, Class MC, and Class CC components. The attachment to this document (database generated report) provides an actual listing of those components scheduled for examination in HNP's Third ISI Interval (Second CISI Interval).

Sections 2 through 8 of this document detail specific requirements, interpretations, and links to other HNP programs for those components with a particular selection criteria or methodology other than 100% scheduling. If a certain category of components requires examination of the entire population to be distributed across the interval, Sections 2 through 8 of the document do not give any further details, as no specific selection methodology or interpretations are utilized.

The report that is a part of this document addresses all required inspections including standard 100% distributions.

1.2 Content and Revision

1.2.1 This ISI Selection Document is comprised of the following segments:

Selection Document - provides the criteria and methodology for selecting components and supports for examination.

Interval Schedule and Exam Status Report - details each examination required to be performed during the inspection interval, including those that have been completed to date.

1.2.2 This ISI Selection Document shall be maintained and updated throughout the inspection interval.

In the event that this document, or any of its sections or attachments, require revision during the Third Inspection Interval due to plant modifications, changes that alter the number of nonexempt components, or ten-year schedule updates, all affected sections shall be revised to reflect the updated components and/or schedules.

When an examination substitution is required, the selection and scheduling requirements of this document shall be met. Substitutions should be made within the same inspection period whenever practical to minimize impact on the existing selection distribution and schedule. When the substitution is made, the selection distribution shall be maintained in accordance with Inspection Program B and/or the governing requirement for augmented examinations.

The following questions/guidelines should be addressed prior to selection of substitutions for selected components:

- Does the selection criteria allow for selection substitutions?

- What was the criteria utilized in the selection of the component being substituted? The substituted component shall meet all of the ASME Section XI selection criteria utilized in selection of the original component.

- Does the change in selection of a component affect the selection of other components?

- Was the alternative component to be substituted examined during previous inspection intervals? Consideration should be given to the examination history of the component to be scheduled.

- Are there any augmented examination requirements for the component being substituted? That is, will the component have to be examined anyway to satisfy an augmented examination requirement? If so, selection of a substitute component should be reconsidered before proceeding.

1.3 Inspection Schedule

For Class 1, 2, and 3 components and their supports subject to examination per ASME Section XI, Subsections IWB, IWC, IWD, and IWF, the required examinations in each examination category shall be completed during the inspection interval in accordance with Tables IWB(C)(D)-2412-1 and IWF-2410-2. Examinations required by Subsection IWB that may be deferred until the end of an inspection interval, as specified in Table IWB-2500-1, are not required to meet the distribution requirements of Table IWB-2412-1.

For Class MC components, the examination requirements are provided in ASME Section XI, Subsection IWE. The examinations required by Examination Category E-A are performed each inspection period (100%) or are deferrable to the end of the interval. However, deferral of any Augmented Examinations required by Examination Category E-C is not permissible. Therefore, the distribution requirements of Table IWE-2412-1 are not applicable.

Class CC concrete surface examinations are performed on a 5 year frequency in accordance with the examination requirements provided in ASME Section XI, Subsection IWL. Deferral of these examinations is not applicable.

For Class 1, 2, and 3 piping supports and Class 1, 2, and 3 supports other than piping supports, the examination requirements are provided in Table IWF-2410-2. 10CFR50.55a(g)(4)(v) does not require examination of Code Class MC supports.

For risk ranked piping structural elements, the examination requirements of Code Case N-578-1 are provided in Paragraph -2410.

All Subsection IWB, IWC, IWD, IWF, and Code Case N-578-1 examinations, except as noted above for deferrable exams, shall meet the following:

Inspection Interval	Inspection Period	Minimum Examinations Scheduled, %	Maximum Examinations Scheduled, %
3rd - ISI	1	16	50
&	2	50(1)	75
2nd - CISI	3	100	100

Note 1: If the first period completion percentages for any examination category exceeds 34%, at least 16% of the required examinations shall be performed in the second period.

Exceptions to the above distribution percentages and examination requirements of items or welds added to the Inspection Program shall meet the requirements of ASME Section XI, Paragraphs IWB(C)(D)-2412 and IWF-2410.

For system pressure testing (SPT) Class 1, 2, and 3 pressure retaining components, subject to VT-2 visual examination per ASME Section XI, Subsections IWB, IWC, and IWD, the required examinations in each examination category shall be completed during the inspection period in accordance with Tables IWB(C)(D)-2500-1.

1.4 Ten-Year Interval Schedule and Examination Status Report

The Ten-Year Interval Schedule and Examination Status Report is generated from the ISI Database. This report lists all the components scheduled for ASME Section XI credit during the Third Inspection Interval and includes component information, period and outage scheduled, examinations required, the basis for selection, and completion date and examination results (if performed). This report also lists augmented examinations and alternative examinations required by specific relief requests. These types of examinations are listed under specific Examination Categories and specific Item Numbers to identify the commitments.

Similar reports also exist for Containment and System Pressure Testing including the Ten-Year Interval Schedule and Examination Status Containment Inspection (CISI-IWE), Schedule and Examination Status Containment Inspection (CISI-IWL), and Ten-Year Interval Schedule and Examination Status System Pressure Testing (SPT). These reports are also generated from the ISI Database and list all the components scheduled for ASME Section XI and Augmented credit during the Third Inspection Interval (Second Inspection Interval for CISI-IWE, and any CISI-IWL examinations that fall within the CISI Second Inspection Interval) and include component information, period and outage/year scheduled, examinations required, the basis for selection, and completion date and examination results (if performed).

Components are grouped by Examination Category and Item Number (for Examination Category R-A components, risk category number is used instead of Item Number), then sorted by the period and outage they are being inspected in, then the isometric and component number.

2.0 ISI CLASS 1 COMPONENTS

2.1 Introduction and Overview

The purpose of this section is to provide the specific examination criteria for ISI Class 1 components at HNP for the Third Ten-Year Inspection Interval. A detailed methodology for selection and scheduling of Examination Category B-K welded attachments for vessels, piping, pumps, and valves, Examination Categories B-G-1 and B-G-2 pressure retaining valve bolting, and Examination Category B-M-2 valve bodies has been developed to address applicable sampling requirements.

The specific examination criteria for RISI Examination Category R-A piping structural elements (which has been implemented as an alternative to the ASME Section XI Examination Categories B-F and B-J) are outlined in Section 7.0 of this document.

Section 2.2 of this document contains a summary of the selection and scheduling requirements for ISI Class 1 welded attachments. The selection criteria and methodology used are provided.

Section 2.3 of this document contains a summary of the selection and scheduling requirements for ISI Class 1 valve bolting and bodies.

Section 2.4 describes the requirements for ISI Class 1 pump bolting and casings selection and examination. Pump grouping criteria and methodologies are also detailed.

Section 2.5 describes the code requirements for ISI Class 1 piping bolting selection and examination. The selection criteria and methodology used are provided.

Section 2.6 defines the Reactor Pressure Vessel Inspection requirements for both vessel welds and vessel interior components.

Section 2.7 includes rules for successive inspections of ISI Class 1 components for subsequent intervals and for inservice inspections that detected flaws or relevant conditions evaluated as acceptable for continued service.

Section 2.8 includes rules for additional examinations of ISI Class 1 components in the event that initial inservice examinations reveal indications exceeding the acceptance standards of Table IWB-3410-1.

2.2 Selection and Scheduling Methodology of Class 1 Welded Attachments

2.2.1 Selection Requirements

Selection of welded attachments for Class 1 vessels, piping, pumps, and valves is based upon Table IWB-2500-1, Examination Category B-K requirements. Welded attachments to be examined shall be the welds of attachments to those vessels, piping, pumps, and valves that are required to be examined under Table IWB-2500-1 that are not exempted per Subarticle IWB-1220.

Per Table IWB-2500-1 Examination Category B-K, Class 1 welded attachments shall be examined each interval per the following criteria:

a. 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 welded attachments that meet the following conditions:

    1. The attachment is on the outside surface of the pressure retaining component.

    2. The attachment provides component support as defined in ASME Section III Subsection NF-1110.

    3. 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.

    4. The attachment weld is full penetration fillet, partial penetration fillet, continuous or intermittent.

b. For multiple vessels of similar design, function, and service, only one welded attachment of only one of the multiple vessels shall be selected for examination. When more than one type of welded attachment exists on a vessel, one of each type of welded attachment on the vessel will be examined (e.g., if a vessel has a support skirt and four welded lugs, the skirt weld or one of the four lugs would be examined). Per Code Case N-700, HNP will select only one welded attachment of only one of the multiple vessels for examination. For single vessels, only one welded attachment will be selected for examination.

c. For piping, pumps, and valves, a sample of 10% of the welded attachments associated with the supports selected for examination under Paragraph IWF-2510 shall be examined. This requirement is conservatively interpreted to mean that 10% of the total Class 1 welded attachments shall be examined. The interpretation is consistent with the previous United States Nuclear Regulatory Commission (USNRC) condition on the use of Code Case N-509.

d. Examination is required whenever associated component support member deformation is identified during operation, refueling, maintenance, examination, inservice inspection, or testing.

2.3 Selection and Scheduling Methodology of Class 1 Valve Bolting and Bodies

2.3.1 Selection Requirements

The following criteria shall apply when selecting ISI Class 1 Valve Bolting as required by Table IWB-2500-1 Examination Category B-G-2:

a. Examination is required *only* when a connection is disassembled or bolting is removed. Examinations are limited to the components requiring examination under Examination Category B-M-2 as detailed in a. and b. below.

The following criteria shall apply when selecting ISI Class 1 Valve Bodies as required by Table IWB-2500-1 Examination Category B-M-2:

a. Examination is required *only* when a valve is disassembled for maintenance, repair, or volumetric examination. Examination of the internal pressure boundary shall include the internal pressure retaining surfaces made accessible for examination by disassembly. If a partial examination is performed and a subsequent disassembly of that valve allows a more extensive examination, an examination shall be performed during the subsequent disassembly. A complete examination is required only once during the inspection interval.

b. Examinations are limited to at least one valve within each group of valves that are of the same size, constructional design (such as globe, gate, or check valves), and manufacturing method, and that perform similar functions in the system (such as containment isolation and system overpressurization protection).

2.4 Selection and Scheduling Methodology of Class 1 Pump Bolting and Casings

2.4.1 Selection Requirements

The following criteria shall apply when selecting ISI Class 1 Pump Bolting as required by Table IWB-2500-1 Examination Categories B-G-1 and B-G-2:

a. Volumetric examination under Examination Category B-G-1 (or surface examination if disassembled) is required on one pump among each group of pumps that are similar in design, type, and function. If the single pump to be examined contains multiple connections of similar design and size, the examination may be limited to one of the similar connections on that pump.

b. VT-1 visual examination under Examination Categories B-G-1 or B-G-2 is required *only* when a connection is disassembled or bolting is removed. Examinations are limited to those components requiring examination under Examination Category B-L-2 as detailed in a. and b. below.

The following criteria shall apply when selecting ISI Class 1 Pump Casings as required by Table IWB-2500-1, Examination Category B-L-2.

a. Examinations are limited to at least one pump in each group of pumps performing similar functions in the system (e.g., reactor coolant pumps.)

b. Examination is required only when a pump is disassembled for maintenance, repair, or volumetric examination. Examination of the internal pressure boundary shall include the internal pressure retaining surfaces made accessible for examination by disassembly. If a partial examination is performed and a subsequent disassembly of that pump allows a more extensive examination, then an examination shall be performed during the subsequent disassembly. A complete examination is required only once during the interval.

2.4.2 Pump Grouping

For pump bolting and casings, only the bolting and casing of one pump in each group of pumps performing similar functions in the system is required. In the case of Examination Category B-G-1 pump bolting and Examination Category B-L-2 pump casings at HNP, only one type of pump within the ISI Class 1 boundaries exists that contains bolting greater than 2" in diameter. These are the A, B, and C Reactor Coolant Pumps.

The Examination Categories B-G-1 and B-L-2 grouping is thus made up of one group with four components. Volumetric examination (or surface examination if disassembled) of the bolting is required on one of these four pumps. Also, if any one of these pumps is disassembled, the flange, nuts, bushings, washers, and casing of that pump will be required to be visually inspected. Examination is required on only one pump per group once per interval.

2.5 Selection and Scheduling Methodology of Class 1 Piping Bolting

2.5.1 Selection Requirements

The following criteria shall apply when selecting ISI Class 1 Piping Bolting as required by Table IWB-2500-1 Examination Category B-G-2:

a. Examination is required only when a connection is disassembled or bolting is removed. Examination of a bolted connection is required only once during the inspection interval.

b. Examinations are limited to at least one bolted connection within each group of bolted connections that are of similar design (such as welded, long neck, or slip-on), size, function, and service (such as in-line, blind flange, or orifice).

2.6 Selection and Scheduling Methodology of Reactor Pressure Vessel Inspections

The Reactor Pressure Vessel welds, vessel interior surfaces and attachments, and core support structure require examination per ASME Section XI Examination Categories B-A/B-D and B-N-1, B-N-2, and B-N-3.

2.6.1 Reactor Pressure Vessel Welds

The head-to-flange and shell-to-flange welds are scheduled and examined in accordance with ASME Section XI, Examination Category B-A (Note 5), as deferrable exams provided no welded repair/replacement activities have been performed and flaws or relevant conditions have been identified. The shell and head circumferential welds are also deferrable. The reactor pressure vessel nozzle-to-vessel welds and nozzle inner radius sections are scheduled and examined in accordance with Examination Category B-D. These examinations are deferrable to the end of the interval for PWRs if no repair/replacement activities have been performed and no flaws or relevant conditions exist. The majority of the reactor pressure vessel shell and nozzle welds are inaccessible from the outside surface, and are thus inspected during an examination conducted from the inside of the vessel.

2.6.2 Reactor Pressure Vessel Interior

ASME Section XI Examination Categories B-N-1, B-N-2, and B-N-3 require visual examinations of the vessel interior, interior attachments, and core support structure. The vessel interior is selected for examination once per inspection period, while the interior attachments and core support structure are each selected once per interval.

Per Interpretation XI-81-12, interior surfaces of the reactor pressure vessel head are not considered to be under Examination Category B-N-1, Item Number B13.10.

2.7 Successive Inspections

2.7.1 The sequence of component examinations established during the First Inspection Interval shall be repeated during each successive inspection interval, to the extent practical.

As permitted by Code Case N-624, the sequence of component examinations established during the First Inspection Interval may be modified to optimize scaffolding, radiological, insulation removal, or other considerations provided the percentage requirements of Inspection Program B (Tables IWB-2412-1, IWC-2412-1, IWD-2412-1, IWE-2412-1, and IWF-2410-2) are maintained.

2.7.2 If a component is accepted for continued service in accordance with Paragraphs IWB-3132.3 or IWB-3142.4, the areas containing flaws or relevant conditions shall be reexamined during the next three inspection periods.

For Class 1 vessels, Code Case N-526 may be applied in lieu of performing successive examinations.

2.7.3 If the reexaminations required by 2.7.2 above reveal that the flaw indications remain essentially unchanged for three successive inspection periods, the component examination schedule may revert to the original schedule of successive inspections.

2.7.4 If welded attachments are examined as a result of identified component support deformation and the results of these examinations exceed the acceptance standards of Table IWB-3410-1, successive examinations shall be performed, if determined necessary based on an evaluation by HNP.

2.8 Additional Examinations

2.8.1 Examinations performed in accordance with Table IWB-2500-1, except for Examination Category B-P, that reveal flaws or relevant conditions exceeding the acceptance standards of Table IWB-3410-1 shall be extended to include additional examinations during the current outage. The additional examinations shall include an additional number of welds, areas, or parts included in the inspection item equal to the number of welds, areas, or parts included in the inspection item that were scheduled to be performed during the present inspection period. The additional examinations shall be selected from welds, areas, or parts of similar material and service. This additional selection may require inclusion of piping systems other than the one containing the flaws or relevant conditions.

2.8.2 If the additional examinations required by 2.8.1 above reveal flaws or relevant conditions exceeding the acceptance standards of Table IWB-3410-1, the examinations shall be further extended to include additional examinations during the current outage. These additional examinations shall include the remaining number of welds, areas, or parts of similar material and service subject to the same type of flaws or relevant conditions.

2.8.3 For the inspection period following the period in which the examinations of 2.8.1 or 2.8.2 above were completed, the examinations shall be performed as originally scheduled in accordance with IWB-2400.

2.8.4 If welded attachments are examined as a result of identified component support deformation, and the results of these examinations exceed the acceptance standards of Table IWB-3410-1, additional examinations shall be performed, if determined necessary, based on an evaluation by HNP.

2.8.5 The alternative additional examination provisions of Code Case N-586 may be utilized.

a. When the applicable ASME Section XI acceptance criteria are exceeded, an engineering evaluation shall be performed during this outage. Topics to be addressed in the engineering evaluation shall include the following:

1. A determination of the root cause of the flaws or relevant conditions.

2. An evaluation of applicable service conditions and degradation mechanisms to establish that the affected welds, areas, or supports will perform their intended safety functions during subsequent operation.

3. A determination of which additional welds, areas, or supports could be subject to the same root cause conditions and degradation mechanisms.

b. Additional examinations shall be performed during this outage on those welds, areas, or supports subject to the same root cause conditions and degradation mechanisms, up to the number of examinations required by Subarticles IWB-2430, IWC-2430, IWD-2430, or IWF-2430. No additional examinations are required if the engineering evaluation concludes that either:

1. there are no additional welds, areas, or supports subject to the same root cause conditions, or;

2. no degradation mechanism exists.

c. If the additional examinations performed under Item (b.) reveal indications exceeding the applicable acceptance criteria of ASME Section XI, the engineering evaluations and the examinations shall be further extended to include additional evaluations and examinations at this outage.

d. The engineering evaluation shall be retained in accordance with Article IWA-6000.

3.0 ISI CLASS 2 COMPONENTS

3.1 Introduction and Overview

The purpose of this section is to provide the specific examination criteria for ISI Class 2 components at HNP for the Third Ten-Year Inspection Interval. A detailed methodology for selection and scheduling of Examination Categories C-F-1 and C-F-2, pressure retaining piping welds, and Examination Category C-C welded attachments for vessels, piping, pumps, and valves has been developed to address applicable sampling requirements.

The specific examination criteria for RISI Examination Category R-A piping structural elements (which has been implemented as an alternative to the ASME Section XI Examination Categories C-F-1 and C-F-2) are outlined in Section 7.0 of this document.

Section 3.2 of this document contains a summary of the selection and scheduling requirements for ISI Class 2 welded attachments.

Section 3.3 includes rules for successive inspections of ISI Class 2 components for subsequent intervals and for inservice inspections that detected flaws evaluated as acceptable for continued service.

Section 3.4 includes rules for additional examination of ISI Class 2 components in the event that initial inservice examinations reveal indications exceeding the allowable standards of Table IWC-3410-1.

3.2 Selection and Scheduling Methodology of Class 2 Welded Attachments

3.2.1 Selection Requirements

Selection of welded attachments for Class 2 vessels, piping, pumps and valves is based upon Table IWC-2500-1, Examination Category C-C requirements. Welded attachments to be examined shall be the welds of those attachments to vessels, piping, pumps, and valves that are required to be examined under Table IWC-2500-1 that are not exempted per Subarticle IWC-1220.

Per Table IWC-2500-1 of ASME Section XI, Examination Category C-C, Class 2 welded attachments shall be examined each interval per the following criteria:

a. Examination is limited to those welded attachments that meet the following conditions:

   1. The attachment is on the outside surface of the pressure retaining component.

2. The attachment provides component support as defined in ASME Section III Subsection NF-1110.

3. 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.

4. The attachment weld is full penetration fillet, partial penetration fillet, continuous or intermittent.

b. For multiple vessels of similar design, function, and service, only one welded attachment of only one of the multiple vessels shall be selected for examination. When more than one type of welded attachment exists on a vessel, one of each type of welded attachment on the vessel will be examined (e.g., if a vessel has a support skirt and four welded lugs, the skirt weld or one of the four lugs would be examined). Per Code Case N-700, HNP will select only one welded attachment of only one of the multiple vessels for examination. For single vessels, only one welded attachment will be selected for examination.

c. For piping, pumps, and valves, a sample of 10% of the welded attachments associated with the supports selected for examination under Paragraph IWF-2510 shall be examined. This requirement is conservatively interpreted to mean that 10% of the total Class 2 welded attachments shall be examined. The interpretation is consistent with the previous USNRC condition on the use of Code Case N-509.

d. Examination is required whenever associated component support member deformation, e.g., broken, bent, or pulled out parts, is identified during operation, refueling, maintenance, examination, inservice inspection, or testing.

3.3 Successive Inspections

3.3.1 The sequence of component examinations established during the First Inspection Interval shall be repeated during each successive inspection interval, to the extent practical.

As permitted by Code Case N-624, the sequence of component examinations established during the First Inspection Interval may be modified to optimize scaffolding, radiological, insulation removal, or other considerations provided the percentage requirements of Inspection Program B (Tables IWB-2412-1, IWC-2412-1, IWD-2412-1, IWE-2412-1, and IWF-2410-2) are maintained.

3.3.2 If a component is accepted for continued service in accordance with Paragraphs IWC-3122.3 or IWC-3132.3, the areas containing flaws or relevant conditions shall be reexamined during the next inspection period.

For Class 2 vessels, Code Case N-526 may be applied in lieu of performing successive examinations.

3.3.3 If the reexaminations required by 3.3.2 above reveal that the flaws or relevant conditions remain essentially unchanged for the next inspection period, the component examination schedule may revert to the original schedule of successive inspections.

3.3.4 If welded attachments are examined as a result of identified component support deformation and the results of these examinations exceed the acceptance standards of Table IWC-3410-1, successive examinations shall be performed, if determined necessary based on an evaluation by HNP.

3.4 Additional Examinations

3.4.1 Examinations performed in accordance with Table IWC-2500-1, except for Examination Category C-H, that reveal flaws or relevant conditions exceeding the acceptance standards of Table IWC-3410-1 shall be extended to include additional examinations during the current outage. The additional examinations shall include an additional number of welds, areas, or parts included in the inspection item equal to 20% of the number of welds, areas, or parts included in the inspection item that are scheduled to be performed during the interval. The additional examinations shall be selected from welds, areas, or parts of similar material and service. This additional selection may require inclusion of piping systems other than the one containing the flaws or relevant conditions.

3.4.2 If the additional examinations required by 3.4.1 above, reveal flaws or relevant exceeding the acceptance standards of Table IWC-3410-1, the examinations shall be further extended to include additional examination during the current outage. These additional examinations shall include the remaining number of welds, areas, or parts of similar material and service subject to the same type of flaws or relevant conditions.

3.4.3 For the inspection period following the period in which the examinations of 3.4.1 or 3.4.2 above were completed, the examinations shall be performed as originally scheduled in accordance with Subarticle IWC-2400.

3.4.4 If welded attachments are examined as a result of identified component support deformation and the results of these examinations exceed the acceptance standards of Table IWC-3410-1, successive examinations shall be performed, if determined necessary based on an evaluation by HNP.

3.4.5 The alternative additional examination provisions of Code Case N-586 may be utilized.

a. When the applicable ASME Section XI acceptance criteria are exceeded, an engineering evaluation shall be performed during this outage. Topics to be addressed in the engineering evaluation shall include the following:

1. A determination of the root cause of the flaws or relevant conditions.

2. An evaluation of applicable service conditions and degradation mechanisms to establish that the affected welds, areas, or supports will perform their intended safety functions during subsequent operation.

3. A determination of which additional welds, areas, or supports could be subject to the same root cause conditions and degradation mechanisms.

b. Additional examinations shall be performed during this outage on those welds, areas, or supports subject to the same root cause conditions and degradation mechanisms, up to the number of examinations required by Subarticles IWB-2430, IWC-2430, IWD-2430, or IWF-2430. No additional examinations are required if the engineering evaluation concludes that either

1. there are no additional welds, areas, or supports subject to the same root cause conditions, or;

2. no degradation mechanism exists.

c. If the additional examinations performed under Item (b.) reveal indications exceeding the applicable acceptance criteria of ASME Section XI, the engineering evaluations and the examinations shall be further extended to include additional evaluations and examinations at this outage.

d. The engineering evaluation shall be retained in accordance with Article IWA-6000.

4.0 ISI CLASS 3 COMPONENTS

4.1 Introduction and Overview

The purpose of this section is to provide the specific examination criteria for ISI Class 3 components at HNP for the Third Ten-Year Inspection Interval. A detailed methodology for selection and scheduling of Examination Category D-A welded attachments for vessels, piping, pumps, and valves has been developed to address applicable sampling requirements.

Section 4.2 of this document contains a summary of the selection and scheduling requirements for ISI Class 3 welded attachments.

Section 4.3 includes rules for successive inspections of ISI Class 3 components for subsequent intervals and for inservice inspections that detected flaws evaluated as acceptable for continued service.

Section 4.4 includes rules for additional examination of ISI Class 3 components in the event that initial inservice examinations reveal indications exceeding allowable standards.

4.2. Selection and Scheduling Methodology of Class 3 Welded Attachments

4.2.1 Selection Requirements

Selection of welded attachments for Class 3 vessels, piping, pumps, and valves is based upon Table IWD-2500-1, Examination Category D-A requirements. Welded attachments to be examined shall be the welds of those attachments to vessels, piping, pumps, and valves that are required to be examined under Table IWD-2500-1 that are not exempted per Subarticle IWD-1220.

Per Table IWD-2500-1 of ASME Section XI, Examination Category D-A, Class 3 welded attachments shall be examined each interval per the following criteria:

a. Examination is limited to those welded attachments that meet the following conditions:

   1. The attachment is on the outside surface of the pressure retaining component.

   2. The attachment provides component support as defined in ASME Section III Subsection NF-1110.

   3. 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.

4. The attachment weld is full penetration fillet, partial penetration fillet, continuous or intermittent.

b. All welded attachments selected for examination shall be those most subject to corrosion, as determined by HNP.

c. For multiple vessels of similar design, function, and service, the welded attachments of only one of the multiple vessels shall be selected for examination. When more than one type of welded attachment exists on a vessel, one of each type of welded attachment on the vessel will be examined (e.g., if a vessel has a support skirt and four welded lugs, the skirt weld or one of the four lugs would be examined). Per Code Case N-700, HNP will select only one welded attachment of only one of the multiple vessels for examination. For single vessels, only one welded attachment will be selected for examination.

d. For welded attachments of piping, pumps, and valves, a 10% sample shall be selected for examination. This percentage sample shall be proportional to the total number of nonexempt welded attachments connected to the piping, pumps, and valves in each system subject to these examinations. This requirement is conservatively interpreted to mean that 10% of the total Class 3 welded attachments shall be examined. The interpretation is consistent with the previous USNRC condition on the use of Code Case N-509.

e. Examination is required whenever associated component support member deformation, e.g., broken, bent, or pulled out parts, is identified during operation, refueling, maintenance, examination, inservice inspection, or testing.

4.3 Successive Inspections

4.3.1 The sequence of component examinations, which was established during the First Inspection Interval, shall be repeated during each successive inspection interval, to the extent practical.

As permitted by Code Case N-624, the sequence of component examinations established during the First Inspection Interval may be modified to optimize scaffolding, radiological, insulation removal, or other considerations provided the percentage requirements of Inspection Program B (Tables IWB-2412-1, IWC-2412-1, IWD-2412-1, IWE-2412-1, and IWF-2410-2) are maintained.

4.3.2 If components are accepted for continued service by evaluation in accordance with Article IWD-3000, the areas containing flaws or relevant conditions shall be reexamined during the next inspection period.

4.3.3 If the reexaminations required by 4.3.2 above reveal that the flaws or relevant conditions remain essentially unchanged for the next inspection period, the component examination schedule may revert to the original schedule of successive inspections.

4.3.4 If welded attachments are examined as a result of identified component support deformation and the results of these examinations exceed the acceptance standards of Article IWD-3000, successive examinations shall be performed, if determined necessary based on an evaluation by HNP.

4.4 Additional Examinations

4.4.1 Examinations performed in accordance with Table IWD-2500-1, except for Examination Category D-B, that reveal flaws or relevant conditions exceeding the acceptance standards of Article IWD-3000 shall be extended to include additional examinations during the current outage. The additional examinations shall include an additional number of welds, areas, or parts included in the inspection item equal to 20% of the number of welds, areas, or parts included in the inspection item that are scheduled to be performed during the interval. The additional examinations shall be selected from welds, areas, or parts of similar material and service. This additional selection may require inclusion of piping systems other than the one containing the flaws or relevant conditions.

4.4.2 If the additional examinations required by 4.4.1 above, reveal flaws or relevant exceeding the acceptance standards of Article IWD-3000, the examinations shall be further extended to include additional examination during the current outage. These additional examinations shall be determined by HNP based upon an engineering evaluation of the root cause of the flaws or relevant conditions. HNP's corrective actions shall be documented in accordance with Article IWA-6000.

4.4.3 If welded attachments are examined as a result of identified component support deformation and the results of these examinations exceed the acceptance standards of Article IWD-3000, successive examinations shall be performed, if determined necessary based on an evaluation by HNP.

4.4.4 For the inspection period following the period in which the examinations of 4.4.1 or 4.4.2 above were completed, the examinations shall be performed as originally scheduled in accordance with Subarticle IWD-2400.

4.4.5 The alternative additional examination provisions of Code Case N-586 may be utilized.

a. When the applicable ASME Section XI acceptance criteria are exceeded, an engineering evaluation shall be performed during this outage. Topics to be addressed in the engineering evaluation shall include the following:

1. A determination of the root cause of the flaws or relevant conditions.

2. An evaluation of applicable service conditions and degradation mechanisms to establish that the affected welds, areas, or supports will perform their intended safety functions during subsequent operation.

3. A determination of which additional welds, areas, or supports could be subject to the same root cause conditions and degradation mechanisms.

b. Additional examinations shall be performed during this outage on those welds, areas, or supports subject to the same root cause conditions and degradation mechanisms, up to the number of examinations required by Subarticles IWB-2430, IWC-2430, IWD-2430, or IWF-2430. No additional examinations are required if the engineering evaluation concludes that either

1. there are no additional welds, areas, or supports subject to the same root cause conditions, or;

2. no degradation mechanism exists.

c. If the additional examinations performed under Item (b.) reveal indications exceeding the applicable acceptance criteria of ASME Section XI, the engineering evaluations and the examinations shall be further extended to include additional evaluations and examinations at this outage.

d. The engineering evaluation shall be retained in accordance with Article IWA-6000.

5.0 ISI CLASS MC AND CC COMPONENTS

All references to ASME Section XI in this section are taken from the ASME Boiler and Pressure Vessel Code, Section XI, Division 1, "Rules for Inservice Inspection of Nuclear Power Plant Components," the 2001 Edition through the 2003 Addenda, unless otherwise stated.

This portion of the ISI Selection Document represents the Second Ten-Year Inspection Interval for Class MC and Class CC components as discussed in 5.2 below.

5.1 Introduction and Overview

The purpose of this section is to provide the specific examination criteria for CISI Class MC and Class CC components at HNP for the Second CISI Interval. The methodology for selection and scheduling of Examination Categories E-A and E-C components is in accordance with ASME Section XI Table IWE-2500-1. Similarly, the methodology for selection and scheduling of Examination Category L-A components is in accordance with ASME Section XI Table IWL-2500-1. Therefore, a detailed selection methodology is not required.

Section 5.2 of this document contains a summary of the scheduling requirements for CISI Class MC and Class CC components.

Section 5.3 includes rules for successive inspections of Class MC components for subsequent intervals and for inservice inspections that detected flaws evaluated as acceptable for continued service. For Class CC components, the Responsible Engineer specifies any successive examination requirements.

Section 5.4 includes rules for additional examination of Class MC components in the event that initial inservice examinations reveal indications exceeding acceptance standards.

Section 5.5 includes rules for successive inspections and additional examinations of Class CC components in the event that initial inservice examinations reveal indications exceeding acceptance standards.

5.2 Selection and Scheduling Methodology for Class MC and Class CC Components

5.2.1 IWE Selection Requirements

Selection of Class MC components is based upon Table IWE-2500-1, Examination Category E-A requirements. Components to be examined shall be the containment surfaces that are required to be examined under Table IWE-2500-1 that are not exempted per Subarticle IWE-1220.

Per Table IWE-2500-1, Examination Category E-A, Class MC components shall be examined each interval per the following criteria:

a. Examination shall include all accessible interior and exterior surfaces of Class MC components, parts, and appurtenances, and metallic shell and penetration liners of Class CC components. The following items shall be considered for examination:

1. integral attachments and structures that are parts of reinforcing structure, such as stiffening rings, manhole frames, and reinforcement around openings.

2. surfaces of attachment welds between structural attachments and the pressure retaining boundary or reinforcing structure, except for nonstructural or temporary attachments as defined in NE-4435 and minor permanent attachments as defined in CC-4543.4.

3. surfaces of containment structural and pressure boundary welds, including longitudinal welds (Category A), circumferential welds (Category B), flange welds (Category C), and nozzle-to-shell welds (Category D) as defined in N-3351 for Class MC and CC-3840 for Class CC; and surfaces of Flued Head and Bellows Seal Circumferential Welds joined to the Penetration.

4. pressure-retaining bolted connections, including bolts, studs, nuts, bushings, washers, and threads in base material and flange ligaments between fastener holes. Bolted connections need not be disassembled for performance of examinations, and bolting may remain in place under tension.

b. Includes flow channeling devices within containment vessels

c. Examination shall include moisture barrier materials intended to prevent intrusion of moisture against inaccessible areas of the pressure retaining metal containment shell or liner at concrete-to-metal interfaces and at metal-to-metal interfaces which are not seal-welded. Containment moisture barrier materials include caulking, flashing, and other sealants used for this application.

5.2.2 IWL Selection Requirements

Selection of Class CC components is based upon Table IWL-2500-1, Examination Category L-A requirements. Components to be examined shall be the concrete surfaces that are specified under Table IWL-2500-1. Inaccessible portions of concrete surfaces are exempt from examination per Subarticle IWL-1220.

Examination requirements for concrete surfaces shall be in accordance with Subarticle IWL-2510. These examinations shall be performed every 5 years.

5.3 Successive Inspections (Class MC Components)

5.3.1 The sequence of component examinations established during the First CISI Interval shall be repeated during each successive inspection interval, to the extent practical. Successive Examination Category E-C examinations previously tracked under the First CISI Interval must be examined during the First Period of the Second CISI Interval. Any areas that do not remain essentially unchanged from the First CISI Interval examinations must be recategorized as Examination Category E-C for the Second CISI Interval.

As permitted by Code Case N-624, the sequence of component examinations established during the First Inspection Interval may be modified to optimize scaffolding, radiological, insulation removal, or other considerations provided the percentage requirements of Inspection Program B (Tables IWB-2412-1, IWC-2412-1, IWD-2412-1, IWE-2412-1, and IWF-2410-2) are maintained.

5.3.2 When examination results require evaluation of flaws or areas of degradation in accordance with Article IWE-3000, and the component is acceptable for continued service, the areas containing such flaws or areas of degradation shall be reexamined during the next inspection period in accordance with Table IWE-2500-1, Examination Category E-C. 10CFR50.55a(b)(2)(ix)(G) and (H) require a VT-1 visual examination under Item Number E4.11 and when flaws or degradation are identified during a VT-3 visual examination of a bolted connection.

5.3.3 When the reexaminations required by 5.3.2 above reveal that flaws or areas of degradation remain essentially unchanged for the next inspection period, these areas no longer require augmented examination in accordance with Table IWE-2500-1, Examination Category E-C.

5.4 Additional Examinations (Class MC Components)

The Subarticle for Additional Examinations (IWE-2430) was removed from the 2001 Edition through the 2003 Addenda of ASME Section XI. The changes to Table IWE-2500-1 eliminate several examination categories. The categories that remain require 100% examination. Therefore, no items are available for additional examinations.

5.5 Additional Examinations (Class CC Components)

5.5.1 ASME Section XI does not contain a Subarticle for IWL successive and additional examinations (typically -2420 and -2430). Subarticle IWL-3310 does however require HNP to perform an evaluation for items with examination results that do not meet the acceptance standards of Subarticles IWL-3100 or IWL-3200. Paragraph IWL-3310(e) specifically requires HNP to determine the extent, nature, and frequency of additional examinations.

6.0 ISI CLASS 1, 2, AND 3 SUPPORTS

6.1 Introduction and Overview

The purpose of this section is to provide the specific examination criteria for ISI Class 1, 2, and 3 Supports at HNP for the Third Ten-Year Inspection Interval. A detailed methodology for selection and scheduling of Examination Category F-A supports has been developed to address applicable sampling requirements.

Section 6.2 contains a summary of the specific selection and scheduling requirements.

Section 6.3 addresses how snubbers are selected for examination in accordance with the ASME O&M Code and how the HNP snubber program relates to the ISI Program and performs the appropriate visual examinations and functional testing.

Section 6.4 includes rules for successive inspections of supports for subsequent intervals and for inservice inspections that detected flaws evaluated as acceptable for continued service.

Section 6.5 includes rules for additional examination of supports in the event that initial inservice examinations reveal indications exceeding acceptance standards of Article IWF-3000.

6.2 Selection and Scheduling Methodology of Class 1, 2, and 3 Supports

6.2.1 Selection Requirements

a. Supports to be examined shall be piping supports and supports other than piping supports that are required to be examined under Table IWF-2500-1 Examination Category F-A that are not exempted per Subarticle IWF-1230.

Per Table IWF-2500-1, Examination Category F-A, Class 1, 2, and 3 Piping and Non-Piping supports shall be examined each interval per the following criteria:

Examination Category	Item Number	Support Type	Extent Of Examination
F-A	F1.10	Class 1 Piping	25% of Class 1
F-A	F1.20	Class 2 Piping	15% of Class 2
F-A	F1.30	Class 3 Piping	10% of Class 3
F-A	F1.40	Class 1, 2, and 3 Non-Piping	100% of Supports

b. Per Examination Category F-A, a "Support Type" is defined as Class 1, Class 2, Class 3, or Non-piping based on the Item Numbers assigned.

1. Item Numbers shall be categorized to identify support types by component "support function" (e.g., A = supports such as one directional rod hangers; B = supports such as multidirectional restraints; and C = supports that allow thermal movement such as springs).

   Thus, within each Class, HNP will group by support function based on Support Functional Categories A, B, and C.

   Note that the HNP ISI Program maintains the ISI Class snubbers in the support populations subject to inspection per Subsection IWF.

2. The total percentage sample for piping supports shall be comprised of supports for each system (such as Main Steam, Feedwater, or RHR), where the individual sample sizes are proportional to the total number of non-exempt supports of each type (i.e., Class 1, 2, 3, or Non-piping Supports) and function (i.e., Support Functional Category) within each system.

3. For multiple components other than piping, within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined.

4. To the extent practical, the same supports selected for examination during the First Inspection Interval shall be examined during each successive inspection interval.

c. In addition to Table IWF-2500-1 requirements, for selection of supports, the following guidelines may be utilized to further define selections within the parameters of b. above:

1. Representative samples from each system should be selected, however within a multiple loop system, selections within each individual loop are not required.

2. Consideration shall be given to other factors including radiation exposure, accessibility, scaffolding, etc.

6.3 Selection and Scheduling Methodology for Snubbers

ASME Section XI, Subarticle IWF-5300 requires three examinations of Code Class snubbers - (1) a VT-3 visual examination of the snubbers in accordance with the Operation and Maintenance of Nuclear Power Plants (O&M), Part 4, ASME/ANSI O&M, Part 4, (2) functional testing of the snubbers in accordance with ASME/ANSI O&M-4, Part 4, and (3) a VT-3 visual examination of the integral and nonintegral attachments per Subsection IWF.

HNP will use Subsection ISTD, "Inservice Testing of Dynamic Restraints (Snubbers) In Light Water Reactor Power Plants," ASME O&M Code, 2001 Edition up to and including 2003 Addenda, in lieu of the requirements for snubbers in ASME Section XI, Paragraphs IWF-5300(a) and (b) as allowed by 10CFR50.55a(b)(3)(v).

The ASME Section XI ISI Program uses Subsection IWF to define support inspection requirements. While the ASME O&M Code, Subsection ISTD drives the visual inspection of the snubbers, the ISI Program still maintains the Code Class snubbers in the populations subject to inspection per Subsection IWF. This is done to facilitate scheduling, preparation, and inspection of the snubber attachment hardware including bolting, pins, and their interface with the clamp. A list of all snubbers and associated attachments scheduled for inspection in the ISI Program should be provided to the snubber coordinator for preparation and completion of the required inspections. Once the inspections are complete, the results should be fed back to the ISI Program coordinator for reporting and tracking.

Refer to Section 4.2 of the ISI Program Plan for a detailed discussion of the applicable snubber examination and testing requirements including how they are implemented at HNP.

6.4 Successive Inspections

6.4.1 The sequence of component support examinations established during the First Inspection Interval shall be repeated during each successive inspection interval, to the extent practical.

As permitted by Code Case N-624, the sequence of component examinations established during the First Inspection Interval may be modified to optimize scaffolding, radiological, insulation removal, or other considerations provided the percentage requirements of Inspection Program B (Tables IWB-2412-1, IWC-2412-1, IWD-2412-1, IWE-2412-1, and IWF-2410-2) are maintained.

6.4.2 When a component support is accepted for continued service in accordance Paragraphs IWF-3112.2 or IWF-3122.2, the component support shall be reexamined during the next inspection period.

6.4.3 When the additional examinations required by 6.4.2 above do not require additional corrective measures during the next inspection period, the inspection schedule may revert to the requirements of 6.4.1 above.

6.5 Additional Examinations

6.5.1 Component support examinations performed in accordance with Table IWF-2500-1 that reveal flaws or relevant conditions exceeding the acceptance standards of Subarticle IWF-3400 shall be extended to include the supports immediately adjacent to those supports for which corrective action is required. The additional examinations shall be extended to include additional supports within the system (i.e., plant system and *not* to be interpreted as subsystem, loop, train, or other partial system), equal in number and of the same type (i.e., Class 1, 2, 3, or Non-Piping Supports) and function (i.e., Support Functional Category) as those scheduled for examination during the inspection period. (Note that the original Interval selections may be conservatively prorated at the subsystem or train level, but additional examinations for sample expansion must be determined at the system level.)

6.5.2 When the additional examinations required by 6.5.1 reveal flaws or relevant conditions exceeding the acceptance standards of Subarticle IWF-3400, the examinations shall be further extended to include additional examinations during the current outage. These additional examinations shall include the remaining supports within the system of the same type and function. (System, type, and function are defined above in 6.5.1.)

6.5.3 When the additional examinations required by 6.5.2 reveal flaws or relevant conditions exceeding the acceptance standards of Subarticle IWF-3400, examinations shall be extended to include all nonexempt supports potentially subject to the same failure modes that required corrective measures in accordance with 6.5.1 and 6.5.2 above. Also, these additional examinations shall include nonexempt supports in other systems when support failures requiring corrective measures indicate non-system-related support failure modes.

6.5.4 When the additional examinations required by 6.5.3 reveal flaws or relevant conditions exceeding the acceptance standards of Subarticle IWF-3400, HNP shall examine those exempt supports that could be affected by the same observed failure modes and could affect nonexempt components.

6.5.5 The alternative additional examination provisions of Code Case N-586 may be utilized.

a. When the applicable ASME Section XI acceptance criteria are exceeded, an engineering evaluation shall be performed during this outage. (The term "this outage" comes from the USNRC condition in RG 1.147, and is interpreted to mean the same time period as when the original flaw or relevant condition was found.) Topics to be addressed in the engineering evaluation shall include the following:

1. A determination of the root cause of the flaws or relevant conditions.

2. An evaluation of applicable service conditions and degradation mechanisms to establish that the affected welds, areas, or supports will perform their intended safety functions during subsequent operation.

3. A determination of which additional welds, areas, or supports could be subject to the same root cause conditions and degradation mechanisms.

b. Additional examinations shall be performed during this outage on those welds, areas, or supports subject to the same root cause conditions and degradation mechanisms, up to the number of examinations required by Subarticles IWB-2430, IWC-2430, IWD-2430, or IWF-2430. No additional examinations are required if the engineering evaluation concludes that either

1. there are no additional welds, areas, or supports subject to the same root cause conditions, or;

2. no degradation mechanism exists.

c. If the additional examinations performed under Item (b.) reveal indications exceeding the applicable acceptance criteria of ASME Section XI, the engineering evaluations and the examinations shall be further extended to include additional evaluations and examinations at this outage.

d. The engineering evaluation shall be retained in accordance with Article IWA-6000.

7.0 RISK-INFORMED ISI PIPING STRUCTURAL ELEMENTS

7.1 Introduction and Overview

The purpose of this section is to provide the specific examination criteria for RISI Examination Category R-A (which has been implemented as an alternative to ASME Section XI Examination Categories B-F, B-J, C-F-1, and C-F-2) piping structural elements (elements) at HNP for the Third Ten-Year Inspection Interval. A detailed methodology for selection and scheduling of Examination Category R-A elements has been developed to select elements based on a prioritization scheme that takes into account such things as risk, accessibility, radiological conditions, and previous examination data. The RISI evaluation for HNP is contained in the Risk Informed Inservice Inspection Program Plan.

Section 7.2 of this document contains a summary of the selection and scheduling requirements for RISI elements.

Section 7.3 of this document contains a summary of the PWSCC Program. The PWSCC Program is being addressed within the RISI section of this document since the two programs deal with similar component populations and joint treatment of these programs need to be addressed.

Section 7.4 includes rules for successive inspections of RISI elements for subsequent intervals and for inservice inspections that detected flaws or relevant conditions evaluated as acceptable for continued service.

Section 7.5 includes rules for additional examinations of RISI elements in the event that initial inservice examinations reveal flaws or relevant conditions exceeding the acceptance standards of Article -3000 of Code Case N-578-1.

7.2 Selection and Scheduling Methodology of RISI Piping Structural Elements

7.2.1 Selection Requirements

The EPRI TR-112657 Rev. B-A, USNRC Safety Evaluation Report (SER) for EPRI TR-112657, Rev. B, EPRI TR-1006937 Rev. 0-A, USNRC SER for EPRI TR-1006937 Rev. 0, and Code Case N-578-1 require that 25% of the elements in each High Risk Category (1, 2, and 3) and 10% of the elements in each Medium Risk Category (4 and 5) be selected for inspection during the interval. Low Risk Category (6 or 7) elements are not required to receive NDE examinations as part of the RISI Program. These same requirements apply to the entire RISI and BER combined weld populations; and per the EPRI BER Tropical Report TR-1006937, Rev. 0-A, also must be met for the stand-alone BER weld population. In addition to selecting elements based on risk category, high and medium ranked element selections also should prorate, where practical, 25% or

10% of the elements from each system within the individual Risk Category.

7.2.2 Selection Methodology

To determine which elements should be inspected, several factors are taken into consideration. These factors are listed below in order of weighted importance. The factors as a whole are considered when making an individual selection, and generally no one factor is to drive the selection of a particular location.

a. Coverage Limitation: Elements known to have coverage limitations (less than or equal to 90% coverage possible) are avoided in the RISI selection where possible. Considerations should be given to the weld configuration and component accessibility to account for examination from both sides in order to obtain full coverage under PDI rules (i.e., valve, tee, flange, penetration, etc.)

b. Weld Type: Welds which were ASME Section XI Item Numbers B9.21, B9.32, and C5.81 are typically not selected due to the difficulty of performing volumetric exams on these weld configurations.

c. Past Recordable Indication Detected: If a past inspection found a recordable indication that suggested a flaw in the element, a higher priority is given for RISI selection.

d. Inspected in a Prior Interval under ASME Section XI or RISI: If an element has already been inspected in the previous interval, high priority is given for the RISI selection.

e. Radiation Level: Elements known to be located in high radiation areas are given a lower priority for RISI selection.

f. Scaffolding: If scaffolding is required to inspect a given element, the location is assigned a lower priority for RISI selection.

g. Insulation: If insulation removal is required for inspection, the element is given a lower priority for RISI selection.

h. High Stress: Elements known to have high stress levels are to be given priority for RISI selection, especially when the given element has no degradation mechanism identified (i.e., Risk Category 4).

i. Impact on Core Damage Frequency (CDF): Elements with higher contribution to the overall risk impact as measured by the incremental change in CDF are given higher priority for RISI selection.

j. Socket Weld: Selected socket welds are to be inspected with a VT-2 visual examination each outage per Code Case N-578-1 (see footnote 12 in Table 1 of the Code Case). To facilitate this, only socket welds that will be pressurized each outage during a system pressure test should be selected for inspection.

k. Degradation Mechanism: Selections should be made such that each degradation mechanism type present in the given risk category/system combination is represented where practical.

7.3 PWSCC Susceptible Welds

HNP maintains an independent program to address concerns with Primary Water Stress Corrosion Cracking (PWSCC) of Austenitic Stainless Steel Piping in accordance with MRP-139. The specific guidance is the MRP-139, EPRI Materials Reliability Program, "Primary System Piping Butt Weld Inspection and Evaluation Guideline". This program governs the examination methods, examination frequency, and sample expansion of those components that fall under these PWSCC requirements. (Section 2.2.9 of the ISI Program Plan identifies the PWSCC licensing commitment.)

Specifically, each weld subject to examination under ASME Section XI (RISI) that is also in the PWSCC Program has the associated PWSCC category listed. When a weld is scheduled for inspection per ASME Section XI, the augmented category information should be reviewed to determine if the weld is also in the PWSCC Program under Categories A through K. If dual credit can be taken, any additional examination requirements of the PWSCC Program will also need to be performed.

7.4 Successive Inspections

7.4.1 The sequence of element examinations established during the First Inspection Interval using the risk-informed process can be repeated during each successive inspection interval.

As permitted by Code Case N-624, the sequence of component examinations established during the First Inspection Interval may be modified to optimize scaffolding, radiological, insulation removal, or other considerations provided the percentage requirements of Inspection Program B (Tables IWB-2412-1, IWC-2412-1, IWD-2412-1, IWE-2412-1, and IWF-2410-2) are maintained.

7.4.2 If elements are accepted for continued service by analytical evaluation in accordance with ASME Section XI, Subarticle IWB-3600, the areas containing the flaws or relevant conditions shall be reexamined during the next three inspection periods.

7.4.3 If the reexaminations required by 7.4.2 above reveal that the flaws or relevant conditions remain essentially unchanged for three successive inspection periods, the element examination schedule may revert to the original schedule of successive inspections.

7.5 Additional Examinations

7.5.1 Examinations performed in accordance with Subarticle -2500 Examination Category R-A of Code Case N-578-1 that reveal flaws or relevant conditions exceeding the acceptance standards of Article -3000 of Code Case N-578-1 shall be extended to include additional examinations. The additional examinations shall include piping structural elements with the same RISI item number and an equal or higher failure potential. The number of additional elements shall be the number of elements with the same postulated failure mode originally scheduled for that fuel cycle. The scope of the additional examinations may be limited to those high safety-significant elements (Risk Categories 1 through 5) within systems whose materials and service conditions are determined by an evaluation to have the same postulated failure mode as the element that contained the original flaw or relevant condition.

7.5.2 If the additional examinations required by 7.5.1 above reveal flaws or relevant conditions exceeding the acceptance standards of Article -3000 of Code Case N-578-1, the examinations shall be further extended to include additional examinations. The additional examinations shall include all remaining elements whose postulated failure modes are the same as the elements originally examined in 7.5.1. An evaluation, which considers failure mode and potential, shall be conducted to determine when these examinations shall be conducted.

7.5.3 For the inspection period following the period in which the examinations of 7.5.1 or 7.5.2 above were completed, the examinations shall be performed as normally scheduled in accordance with Subarticle IWB-2400.

8.0 SYSTEM PRESSURE TESTING

8.1 Introduction and Overview

The purpose of this section is to provide the specific examination criteria for ASME Section XI, Examination Categories B-P, C-H, and D-B, All Pressure Retaining Components at HNP for the Third Ten-Year Inspection Interval.

Section 8.2 of this document contains a summary of the scheduling requirements for ISI Class 1 pressure retaining components subject to a periodic System Leakage Test.

Section 8.3 of this document contains a summary of the scheduling requirements for ISI Class 2 pressure retaining components subject to a periodic System Leakage Test.

Section 8.4 of this document contains a summary of the scheduling requirements for ISI Class 3 pressure retaining components subject to a periodic System Leakage Test.

8.2 Selection and Scheduling Methodology of Class 1 System Pressure Test

8.2.1 A system leakage test and visual examination shall be conducted prior to plant startup following each reactor refueling outage. Pressure retaining components within the system boundary shall be subject to a System Leakage Test in accordance with Article IWB-5000 under which conditions a VT-2 visual examination is performed in accordance with Subarticle IWA-5240.

8.2.2 System Boundaries

The pressure retaining boundary during the system leakage test shall correspond to the reactor coolant boundary, with all valves in the position for normal reactor startup. The visual examination shall, however, extend to and include the second closed valve at the boundary extremity.

The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components.

8.3 Selection and Scheduling Methodology of Class 2 System Pressure Test

8.3.1 A system leakage test and visual examination shall be conducted each inspection period. Pressure retaining components within the system boundary shall be subject to a System Leakage Test in accordance with Article IWC-5000 under which conditions a VT-2 visual examination is performed in accordance with Subarticle IWA-5240.

8.3.2 Piping that penetrates the containment vessel is exempt from all periodic system pressure tests when the piping and isolation valves perform a containment function, and where the balance of the piping system is outside the scope of ASME Section XI.

8.3.3 System Boundaries

The pressure retaining boundary includes only those portions of the system required to operate or support the safety 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. Items outside the boundaries and open ended discharge piping, are excluded from the examination requirements.

The VT-2 visual examination shall include all components within the boundaries identified above.

8.4 Selection and Scheduling Methodology of Class 3 System Pressure Test

8.4.1 A system leakage test and visual examination shall be conducted each inspection period. Pressure retaining components within the system boundary shall be subject to a System Leakage Test in accordance with Article IWD-5000 under which conditions a VT-2 visual examination is performed in accordance with Subarticle IWA-5240.

8.4.2 System Boundaries

The pressure retaining boundary during the periodic System Leakage Test shall include only those portions of the system required to operate or support the safety 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. Items outside the boundaries and open ended discharge piping are excluded from the examination requirements.

The VT-2 visual examination shall include all components within the boundaries identified above.