Docket No. 50-271
BVY 03-28

Attachment 1

Vermont Yankee Nuclear Power Station

Fourth-Interval Inservice Inspection Program Plan, Fourth-Interval Inservice Inspection Pressure Test Program and Request for Approval of ISI Relief Requests

List of Commitments

SUMMARY OF VERMONT YANKEE COMMITMENTS

BVY NO.: 03-28

The following table identifies commitments made in this document by Vermont Yankee. Any other actions discussed in the submittal represent intended or planned actions by Vermont Yankee. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Licensing Manager of any questions regarding this document or any associated commitments.

COMMITMENT	COMMITTED DATE OR "OUTAGE"
None	N/A

Docket No. 50-271
BVY 03-28

Attachment 2

Vermont Yankee Nuclear Power Station

Fourth-Interval Inservice Inspection Program Plan, Fourth-Interval Inservice Inspection Pressure Test Program and Request for Approval of ISI Relief Requests

ISI Program Plan

VERMONT YANKEE NUCLEAR POWER STATION

PROGRAM PROCEDURE

PP 7015

REVISION 3

VERMONT YANKEE INSERVICE INSPECTION PROGRAM

USE CLASSIFICATION: **INFORMATION**

LPC No.	Effective Date	Affected Pages

Implementation Statement: Due to the extent of the changes in this revision, no revision bars have been used.

Issue Date:_____

TABLE OF CONTENTS

1.0 PURPOSE, SCOPE, AND DISCUSSION

1.1. Purpose

The purpose of the Entergy Nuclear Vermont Yankee Inservice Inspection (ENVYISI) Program Procedure is to identify safety class systems, sub-systems, and components required to be examined, outline the examination requirements, and increase or expand examination scope as required such that the requirements of 10CFR50.55a are satisfied.

1.2. Scope

The scope of this procedure is to identify, plan, and schedule components for examination as required by the Code of Federal Regulations, 10CFR50.55a and the ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda. This program procedure scope does not include the examination requirements for metal containment (Subsection IWE), which are found in PP 7024, reactor internals (Subsection IWB, Categories B-N-1 and B-N-2), which are found in PP 7027 and pressure testing (Subsections IWB, Category B-P, IWC, Category C-H, Subsection IWD, Category D-B, and Articles IWX-5000), which are found in PP 7034. Inservice Testing requirements are controlled by the IST Program Procedure. The scope of this program procedure is focused on the requirements of ASME Section XI, Subsections IWA, IWB, IWC, IWD, and IWF. Appendix A contains relief requests that address alternative examination requirements.

1.3. Discussion

Background:

Vermont Yankee is a General Electric designed 1593 Mwt boiling water reactor (BWR) power plant built in accordance with the ANSI B31.1 Construction Code, 1967 Edition. The safety class boundaries used by this program are based on the assignment of safety classifications as designated in the VY Safety Classification Manual. The primary reference document for the Safety Classification Manual is ANS-22, Draft 4, Revision 1.

The ENVY ISI Program is designed to ensure that the structural integrity of all Class 1, 2, and 3 systems and associated supports are maintained at the level required by the Code of Federal Regulations, 10CFR50.55a, and augmented by the ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda. A preservice, or baseline, inspection of program components was performed to assure freedom from defects greater than code-allowable. This baseline data also provides a basis for evaluating subsequent inspection results. Since plant startup, additional inspection criteria for Class 2 and 3 components have been imposed by the Code of Federal Regulations, 10CFR50.55a for which baseline data has also been obtained. Current results are compared, as appropriate, to baseline data, other previous test results, and acceptance criteria of the ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda, for evaluation of any evidence of degradation.

Vermont Yankee utilizes Inspection Program B for schedule determination of all components requiring inspection per Subsections IWB, IWC, IWD and IWF.

All inspection results, associated procedures and documentation, and calibration standards are maintained on-site for the life of the plant.

Governing Codes

The fourth interval inservice inspection (ISI) requirements are outlined in this program procedure. The requirements of Title 10 Code of Federal Regulations, Part 50, Section 50.55a, Codes and Standards (10CFR50.55a), and, by reference, the American Society for Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," are satisfied in this program procedure. The Code Edition and Addenda used for the Fourth Interval is the 1998 Edition with 2000 Addenda as addressed by Relief Request ISI-01.

Code Cases

This program incorporates alternative inspection and examination requirements for components governed by certain Code Cases as outlined in Regulatory Guide 1.147 Revision 13. In particular, this program utilizes the alternative requirements of the following Code Cases:

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

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

N-532, 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 - Qualifications for Nozzle Inside Radius Section from the Outside Surface

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

This program also incorporates alternative inspection and examination requirements for components governed by the following Code Cases for which relief has been sought from the USNRC:

N-560, Alternative Examination Requirements for Class 1, Category B-J Piping Welds

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

N-652, Alternative Requirements to Categories B-G-1, B-G-2, and C-D Bolting Examination Methods and Selection Criteria

N-663, Alternative Requirements for Class 1 and 2 Surface Examinations

Specific requirements relative to these Code Cases have been incorporated into applicable implementing procedures and the requirements provided in Table 8, the ISI Database.

Requests for Relief

The below listed Requests for Relief from existing regulatory requirements are part of this Program:

ISI-01) Not utilized

ISI-02) Use of Code Case N-560 as an alternative to ASME Section XI, Category B-J for Examination of Piping Welds

ISI-03) Use of Code Case N-652 as an alternative to ASME Section XI, Categories B-G-1, B-G-2, and C-D for Examination of Bolting

ISI-04) Use of N-663 as an alternative to ASME Section XI, Class 1, Categories B-F, C-F-1, and C-F-2 for Surface Examinations

ISI-05) Alternative Requirements to ASME Section XI, Appendix VIII, Supplement 10 for Examination of Dissimilar Metal Welds

ISI-06) On hold

ISI-07) Use of BWRVIP-75 as an alternative to GL 88-01 for Frequency of Overlay Examinations

ISI-08) Use of RMS for Grading Purposes as an alternative to ASME Section XI, Appendix VIII, Supplement 4, Paragraph 3.2.c for Examination of RPV Shell Welds

ISI-09) Use of Code Case N-613 as an alternative to ASME Section XI, Appendix VIII, Supplement 7 for Examination of RPV Nozzle-to-Shell Welds

ISI-010) Alternative Requirements to ASME Section XI, Appendix VIII, Supplement 11 for Examination of Overlaid Piping

ISI-011) Use of Appendix VIII of ASME Section XI, as modified by 10CFR50.55a(b)(2), for Examination of RPV Flange-to-Shell Weld

NRC Commitments

The following items constitute commitments to NRC that are not addressed by customary regulatory documents:

1. BVY 2001-002_03, "Perform Ultrasonic Inspections of Feedwater Nozzles In Accordance With GE-NE-523-A71-0594, Revision 1"

Interval Schedule:

The fourth inspection interval for VY began on September 1, 2003 and extends to August 31, 2013. Schedule 1, below outlines the inspection interval dates as well as the starting and ending dates of each period within the intervals. VY's ISI Program is based on ASME Inspection Program B (IWA-2432), which has four 10-year inspection intervals.

Schedule 1:

	Period 1	**Period 2**	**Period 3**
Interval 1	On-line Dec. 1, 1972[1]	To	April 30, 1983[2]
Interval 2	May 1, 1983 To Aug. 31, 1986[3]	Sept. 1, 1986 To Aug. 31, 1990	Sept. 1990 To Aug. 31, 1993
Interval 3	Sept. 1, 1993 To Aug. 31, 1996[4]	Sept. 1, 1996 To Aug. 31, 2000	Sept. 1, 2000 To Aug. 31, 2003
Interval 4	Sept. 1, 2003 To Aug. 31, 2006	Sept. 1, 2006 To Aug. 31, 2010	Sept. 1, 2010 To Aug. 31, 2013[4]

Notes:

1 The 1st Interval was five years long, due to the delay in the development and implementation of ASME Section XI.

2 The end date of the 1st Interval was extended by five months, in accordance with IWA-2430(c), to permit inspections concurrent with a plant refueling outage. Consequently, all subsequent intervals were adjusted back (later) five months.

3 In the 2nd Interval, the end date of Period 1 was extended by four months to reflect the 1985-86 pipe replacement/refueling outage (nine months duration), in accordance with IWA-2430(e). Consequently, all subsequent intervals were adjusted back (later) four months.

4 Vermont Yankee's operating license expires March 21, 2012.

Components scheduled by percentage to complete for each period in the 4th Interval are given below:

Code Category	Scheduled Components and Percentages by Period						
	Total Scheduled	Period 1	Percentage Min. = 16% Max. = 50%	Period 2	Percentage Min. = 50% Max. = 75%	Period 3	Percentage Min. = 100%
B-A	28	9	32%	11	71%	8	100%
B-D	58	18	31%	24	72%	16	100%
B-F	23	8	35%	7	54%	8	100%
B-G-1	208	44	21%	88	63%	76	100%
B-G-2	135	Performed when disassembled					100%
B-J	65	22	34%	24	71%	19	100%
B-K	3	1	33%	1	67%	1	100%
B-L-2	2	Performed when disassembled					100%
B-M-2	43	Performed when disassembled					100%
B-O	6	2	33%	2	67%	2	100%
C-A	4	1	25%	2	50%	1	100%
C-B	2	1	50%	0	50%	1	100%
C-C	5	1	17%	3	67%	1	100%
C-F-2	63	22	35%	23	71%	18	100%
D-A	10	2	20%	4	60%	4	100%
F-A	109	37	34%	45	75%	27	100%

ISI Program Revisions

Revisions to the ISI Program shall be implemented to reflect changes in code requirements (additions or reductions in scope), augmented exams, or regulatory requirements. Changes will be initiated by the Inservice Inspection Program Coordinator (ISIPC) or designee. When additions or deletions to the Program are identified, they shall be promptly revised to reflect the current requirements. Revisions shall be processed in accordance with the requirements of AP 0095, Plant Procedures.

Drawing Revisions:

The ISI drawings are coordinated to the Vermont Yankee seismic isometric drawings and controlled by AP 6802. Both drawings are very similar in content, however, different information is contained on each. The ISI drawings contain information specific to the ISI program, such as component numbers, support identification numbers, weld locations, etc. When the seismic isometric drawings are revised for design changes, corrective update, or for any other reason, the companion ISI drawings are flagged for revision, and revised as necessary. This ensures that the ISI drawings remain accurate and updated.

Summary of Organizational Responsibilities:

The ISI Program is organized under the System Engineering Department, Code Programs Group. The Inservice Inspection Program Coordinator (ISIPC) is the designated owner and central information point regarding ISI. The ISIPC reports to the System Engineering Programs Supervisor (SEPS). The ISIPC shall report any examination results that could have an adverse affect on plant equipment or operation. The SEPS will keep Plant Management informed of examination progress, discrepancies, or any other aspects related to ISI. Design Engineering will support the ISI Program, as necessary, to evaluate and make recommendations on examination discrepancies. QAD is responsible for periodically auditing the ISI Program for code compliance and adherence.

Plant procedures, i.e. AP 0048, AP 0021, AP 0070, OP 4101, can affect and implement portions of this program as reflected in each procedure. The EMPAC data base identifies equipment and components to which ASME Section XI, ISI applies and is utilized to determine if the requirements of this program apply.

2.0 DEFINITIONS

2.1. Authorized Nuclear Inservice Inspector - a person who is employed and has been qualified by an Authorized Inspection Agency to verify that examinations, test, and repairs are performed in accordance with the rules and requirements of Section XI.

2.2. Component - an item in a nuclear power plant such as a vessel, pump, valve, piping system, or component support.

2.3. Evaluation - the process of determining the significance of examination or test results, including the comparison of examination or test results with applicable acceptance criteria or previous results.

2.4. Examination Category - a grouping of items to be examined or tested.

2.5. Inservice Inspection - methods and actions for assuring the structural and pressure-retaining integrity of safety-related nuclear power plant components in accordance with Section XI.

2.6. Inspection Program - the plan and schedule for performing examinations or tests.

2.7. Nondestructive Examination - an examination by the visual, surface, or volumetric method.

3.0 PRIMARY RESPONSIBILITIES

3.1. Inservice Inspection Program Coordinator (ISIPC) Responsibilities

> **NOTE**
>
> At the discretion of the SEPS, selected ISIPC responsibilities may be delegated to qualified Entergy or contracted personnel.

The detailed responsibilities of the ISIPC are as follows:

3.1.1. Provide for overall maintenance, review and coordination of the ISI Program.

3.1.2. Review the Examination procedures for compliance with regards to the applicable edition of ASME section XI and Plant Tech. Specs.

3.1.3. Prepare the ISI Program per applicable regulatory requirements and Plant Technical Specifications. This shall include planning and scheduling of the ISI efforts.

3.1.4. Ensure components scheduled for examination are properly prepared and accessible.

3.1.5. Ensure components examined are properly restored.

3.1.6. Interface with the cognizant department, as needed, to ensure all repair/replacement ISI examination requirements are satisfied.

3.1.7. Ensure the ISI records are permanently stored per AP 6807, Collection, Temporary Storage and Retrieval of QA Records.

3.1.8. Prepare and submit the NIS-1 Summary Report to the regulatory authorities and answer all inquiries.

3.1.9. Keep the SEPS informed on the progress of the ISI task(s).

3.1.10. Ensure changes or additions to Class 1, Class 2, and Class 3 pressure boundaries and component support classifications are incorporated into the ISI Program.

3.1.11. Review design changes and maintenance documents, as necessary, to assess the impact of the proposed task upon the ISI Program, and recommend action when appropriate.

3.1.12. Review outstanding AP 0028 commitment items prior to each outage and the end of each 10-yr ISI interval.

NOTE

Unacceptable inspection results shall be reported to the ISIPC by the examination agency or cognizant department for resolution. The Authorized Nuclear Inservice Inspector (ANII) shall be informed of the resolution.

3.1.13. Determine any additional examinations made necessary by discovery of unacceptable indications during scheduled inspections in accordance with DP 4027.

3.1.14. Periodically review each Relief Request for continued applicability.

3.1.15. Provide technical advice on all aspects of the program.

3.1.16. Arrange for on-site services as requested by the Level III.

3.1.17. Prepare diagrams or drawings delineating the scope of the ISI Program.

3.1.18. Ensure that cognizant departments are informed of unacceptable conditions to facilitate completion of appropriate paperwork (ERs, WRs, etc.).

3.1.19. Ensure that the ISI Examination Database (Table 8) is properly maintained.

3.1.20. Maintain a history of all ISI examinations (scheduled and unscheduled).

3.1.21. Maintain the calibration blocks, examination tool(s), and their associated documentation. The calibration blocks (with a few exceptions due to size) are stored in locked cabinets located in the Reactor Building and are maintained for the life of the plant. The examination tools are also stored in secured lockers.

3.2. NDE Level III/ISI Supervisor

The detailed responsibilities of the contracted Level III/ISI Supervisor are as follows:

3.2.1. Review the ISI Program for compliance to the applicable edition and addenda of ASME section XI and the Plant Tech. Specs.

3.2.2. Initiate changes to ISI Program and Examination procedures, as necessary, to ensure code compliance is maintained.

3.2.3. Ensure appropriate selection of Examination Personnel.

3.2.4. Review and ensure all NDE Personnel qualifications are current.

3.2.5. Ensure ANII has reviewed all NDE procedures and personnel qualifications, and any other applicable ASME Section XI documents.

3.2.6. Resolve any ANII comments regarding review of NDE procedures, personnel qualifications, or other ASME Section XI related issues as applicable.

3.2.7. Oversee NDE personnel indoctrination and performance demonstration.

3.2.8. Advise ISIPC of scheduling conflicts, staffing needs, and resource availability.

3.2.9. Review all NDE documentation to ensure ISI examinations have been properly documented.

3.2.10. Provide input, as necessary , to the ISIPC and Design Engineering regarding examination findings.

3.2.11. Provide input, as necessary, to aid in completion of the Summary Report (NIS-1).

3.2.12. Notify the ISIPC of any unacceptable inspection results in a timely manner.

3.3. Quality Assurance Department (QAD)

The detailed responsibilities of the QAD are as follows:

3.3.1. Surveillance of documentation pertinent to the Inservice Inspection and Test Program.

3.4. Examination Agency

The examination agency shall provide NDE personnel as specified in the specific purchase order.

3.5. Design Engineering

Design Engineering will support the ISI Program, as needed, by evaluating unacceptable examination results. The specific task(s) associated with evaluating the examination results and the specific duties of the Design Engineer are outlined in DP 4027.

3.6. Maintenance Department

Perform Visual, or Surface examination requirements of this procedure as they pertain to repairs and replacement activities and as may be required for specific work activities.

3.7. RIMS

Ensure the ISI records are permanently stored and available for the plant lifetime.

4.0 PROCEDURE

4.1. Class 1 Scope, Examination Requirements, and Exemptions

4.1.1. Scope:

4.1.1.1. All Class 1 pressure retaining components and their welded attachments are included in the inspection program, except for those items exempted from examination by ASME Section XI, 1989 Edition, no addenda, Subsection IWB, Article IWB-1000, paragraph IWB-1220. For Class 1 components, Appendix B, Table 1 identifies: the code categories, the code item numbers, the number of components scheduled for examination within each code category and item, and notes clarifying various code requirements. Unique Feedwater Nozzle Inner Radius examination requirements are addressed in paragraph 4.1.2.2 below.

4.1.2. Examination Requirements:

4.1.2.1. Examination and schedule requirements are identified for Class 1 components in Appendix C, Table 5.

4.1.2.2. Feedwater nozzle inner radius examinations as required by Code Category B-D shall be performed in accordance with VY Calculation VYC-1005, Revision 1 and GE Nuclear Energy document GE-NE-523-A71-0594-A, Revision 1, DRF 137-0010-7 Class II, May 2000, entitled "Alternate BWR Feedwater Nozzle Inspection Requirements." (BVY 2001-002_03)

4.1.2.3. Magnetic particle and liquid penetrant examinations may be used interchangeably without revision to this program for ferritic steel components requiring surface exams (reference ASME Section XI, subsection IWA, paragraph IWA-2220).

4.1.2.4. Category B-J piping welds are selected and examined in accordance with Code Case N-560 and Relief Request ISI-02.

4.1.2.5. Categories B-G-1 and B-G-2 bolting selection and examinations are performed in accordance with Code Case N-652 and Relief Request ISI-03.

4.1.2.6. Surface examinations for Category B-F dissimilar-metal piping welds are selected and examined in accordance with Code Case N-663 and Relief Request ISI-04.

4.1.2.7. Category B-A, Code Item No. B1.11 reactor vessel circumferential shell welds are selected and examined in accordance with Relief Request ISI-06.

4.1.2.8. The core spray overlays (Category B-F - GL 88-01 Category E) are selected and examined in accordance with Relief Request ISI-07.

4.1.2.9. Category B-D reactor vessel nozzle-to-shell welds are examined in accordance with Code Case N-613 and Relief Request ISI-09.

4.1.3. Exemptions:

4.1.3.1. Exemptions are in accordance with ASME Section XI, 1989 Edition, no addenda, Subsection IWB, Article IWB-1000, paragraph IWB-1220. Selected specific exemptions are identified in paragraphs 4.1.3.2 through 4.1.3.3 below.

4.1.3.2. ASME Section XI, subsection IWB, paragraph IWB-1220(a) exempts Class 1 components connected to the reactor coolant system, that are of size and shape such that a postulated rupture is within the capacity of the make-up systems. Vermont Yankee Calculation No. VYC-1118 justifies exempting the following components by determining that a line break on a 1.455" ID pipe for saturated water or on a 2.375" ID pipe for saturated steam could be made up by systems operable from on-site emergency power. The following pipe lines are exempted:

- 2" head vent line off the N7 reactor nozzle (nominal 1.687" ID steam)
- 2" MSD2A, B, C, and D main steam drain lines (nominal 1.687" ID steam)
- 1.5" MSD420, MSD421, MSD422 main steam drain lines (nominal 1.338" ID steam)
- 1.5" reactor vessel instrumentation lines off the N11A, N11B, N12A, and N12B nozzles (nominal 1.338" ID water)

4.1.3.3. ASME Section XI, subsection IWB, paragraph IWB-1220(c) exempts vessel head connection 2 inch N.P.S. and smaller made inaccessible due to control rod drive penetrations. Thus, vessel drain nozzle, N15, and piping welds, CU400-F1 (terminal end), CU400-FW1 (dissimilar metal weld), CU400-FW2, CU400-FW3, and CU400-FW4, are exempted from examination due to CRD penetrations making these welds inaccessible.

4.2. Class 2 Scope, Examination Requirements, and Exemptions

4.2.1. Scope:

4.2.1.1. All Class 2 pressure retaining components and their welded attachments are included in the inspection program, except for those lines exempted from examination by ASME Section XI, 1998 Edition, 2000 addenda, Article IWC-1000, paragraph IWC-1220. For Class 2 components, Appendix B, Table 2 identifies: the code categories, the code item numbers, the number of components scheduled for examination within each code category and item, and notes clarifying various code requirements.

4.2.1.2. Category C-D bolting selection and examination are performed in accordance with Code Case N-652 and Relief Request ISI-03.

4.2.1.3. Surface examinations for Category C-F-1 and C-F-2 piping welds are selected and examined in accordance with Code Case N-663 and Relief Request ISI-04.

4.2.2. Examination Requirements:

4.2.2.1. Examination and schedule requirements are identified for Class 2 components in Appendix C, Table 6.

4.2.2.2. Magnetic particle and liquid penetrant examinations may be used interchangeably without revision to this program for ferritic steel components requiring surface exams (reference ASME Section XI, subsection IWA, paragraph IWA-2220).

4.2.3. Exemptions:

4.2.3.1. ASME Section XI, subsection IWC, paragraph IWC-1221(a) and (c) or IWC-1222(a) and (b) exempts components that are 4 inch N.P.S. or less for boiling water reactor plants. Exemptions are in accordance with ASME Section XI, 1998 Edition, 2000 addenda, Subsection IWC, Article IWC-1000, paragraph IWC-1220. Selected specific exemptions are identified in paragraphs 4.2.3.2 through 4.2.3.3 below.

4.2.3.2. ASME Section XI, subsection IWC, paragraph IWC-1222(c) exempts components that are not part of the RHR, ECC, or CHR systems, have design pressure less than 275 psig and design temperature less than 200°F. Thus, pipe line CT-3 of the Condensate Transfer System and pipe lines AC-14A, AC-14B and AC-22 of the primary containment and atmospheric control system are exempt from examination.

4.2.3.3. The Condensate Storage Tank (TK-4-1A) is not included in the program. ASME Section XI, subsection IWA, paragraph IWA-1310 addresses storage tanks, however, the tank is not a pressure vessel and therefore is not addressed by any Code Category. This examination exemption is supported by ASME Section XI Code Interpretation XI-1-89-51.

4.3. Class 3 Scope, Examination Requirements, and Exemptions

4.3.1. Scope:

4.3.1.1. All Class 3 components and systems greater than 4 inch N.P.S. are included in the Program, excepted for those items exempted below. All Class 3 pressure retaining components and their welded attachments in support of the below listed functions are included in the program except for those items exempted from examination by ASME Section XI, 1998 Edition, 2000 addenda, Subsection IWD, Article IWD-1000, paragraph IWD-1220.

- reactor shutdown
- emergency core cooling
- containment heat removal
- atmosphere cleanup
- reactor residual heat removal
- residual heat removal from spent fuel storage pool

For Class 3 components, Appendix B, Table 3 identifies: the Code Categories, the code item numbers, the number of components scheduled for examination within each code category and item, and notes clarifying various code requirements.

4.3.2. Examination Requirements:

4.3.2.1. Examination and schedule requirements are identified for Class 3 components in Appendix C, Table 7.

4.3.3. Exemptions:

4.3.3.1. Exemptions are in accordance with ASME Section XI, 1998 Edition, 2000 addenda, Subsection IWD, Article IWD-1000, paragraph IWD-1220 which exempts integral attachments and supports of SC3 components that are 4 inch N.P.S. or less within the bounds of examination Categories D-A, D-B, and D-C, from visual examination (VT-3).

4.3.3.2. ASME Section XI, subsection IWD, paragraph IWD-1220.2 exempts integral attachments to components exceeding 4 inch N.P.S provided: the components are not required in support of reactor residual heat removal, or containment heat removal, or emergency core cooling, and operate at a pressure less than 275 psig and at a temperature less than 200°F. Thus, the fuel pool cooling system is exempted from examination.

4.4. Component Supports Scope, Examination Requirements, and Exemptions

4.4.1. Scope:

4.4.1.1. All Class 1, 2, 3 and MC component supports are included in the program except for those items exempted from examination by ASME Section XI, 1998 Edition, 2000 addenda, Subsection IWF, Article IWF-1000, paragraph IWF-1220.

4.4.1.2. Appendix B, Table 4 identifies: the code categories, the code item numbers, the number of components scheduled for examination within each code category and item, and notes clarifying various code requirements.

4.4.2. Examination Requirements:

4.4.2.1. Examination and schedule requirements are identified for component supports in Appendix C, Table 8.

4.4.3. Exemptions:

4.4.3.1. Support exemptions are in accordance with ASME Section XI, 1998 Edition, 2000 addenda, Subsection IWF, Article IWF-1000, paragraph IWF-1220. Selected specific exemptions are identified in paragraphs 4.4.3.2 through 4.4.3.7 below.

4.4.3.2. By ASME Section XI, subsection IWB, paragraph IWB-1220(a) the following lines are exempted. These exemptions are supported by VY Calculation No. VYC-1118, which determines that a line break on a 1.46" ID pipe for saturated water or a 2.38" ID pipe for saturated steam could be made up by systems operable from on-site emergency power.

- 2" head vent line off the N7 reactor nozzle (nominal 1.687" ID steam)
- 2" MSD2A, B, C, and D main steam drain lines (nominal 1.687" ID steam)
- 1.5" MSD420, MSD421, MSD422 main steam drain lines (nominal 1.338" ID steam)
- 1.5" reactor vessel instrumentation lines off the N11A, N11B, N12A, and N12B nozzles (nominal 1.338" ID water)

4.4.3.3. By ASME Section XI, subsection IWB, paragraph IWB-1220(b) components on systems 1 inch N.P.S. and smaller are exempt from examination.

4.4.3.4. By ASME Section XI, subsection IWC, paragraph IWC-1221(a) and (c) or IWC-1222(a) and (b), components that are 4 inch N.P.S. or less are exempt from examination.

4.4.3.5. ASME Section XI, subsection IWC, paragraph IWC-1222(c) exempts components from examination that are not part of RHR, ECC, or CHR systems and they have design pressures less than 275 psig and design temperatures less than 200°F. Thus, pipeline CT-3 of the Condensate Transfer System and pipelines AC-14A and AC-14B of the primary containment and atmospheric control system are exempted from examination.

4.4.3.6. By ASME Section XI, subsection IWD, paragraph IWD-1220.1, components that are 4 inch N.P.S. or less are exempt from examination.

4.4.3.7. By ASME Section XI, subsection IWD, paragraph IWD-1220.2, the fuel pool cooling system is exempted from examination due to the system not being required to support reactor residual heat removal, containment heat removal, or emergency core cooling, and the system operates at a pressure less than 275 psig and at a temperature less than 200°F.

4.5. Successive Inspections (Follow-up Examinations)

4.5.1. If flaws or relevant conditions in Class 1 components are accepted by analytical evaluation, the areas containing such flaws shall be reexamined during the next three inspection periods. Alternatively, acoustic emission may be used to monitor growth of existing flaws in accordance with paragraph IWA-2234 of the ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda. If flaws or relevant conditions remain essentially unchanged for three successive inspection periods, the component examination schedule may revert to the original schedule of successive inspections. 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 of the ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda, successive examinations shall be performed, if determined necessary, based on an evaluation by the Vermont Yankee Design Engineering Department.

4.5.2. If flaws or relevant conditions in Class 2 components are accepted by analytical evaluation, the areas containing such flaws shall be reexamined during the next inspection period. Alternatively, acoustic emission may be used to monitor growth of existing flaws in accordance with IWA-2234 of ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda. If 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. 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 of the ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda, successive examinations shall be performed, if determined necessary, based on an evaluation by the Vermont Yankee Design Engineering Department.

4.5.3. If flaws or relevant conditions in Class 3 components are accepted by analytical evaluation, the areas containing such flaws shall be reexamined during the next inspection period. If 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. If welded attachments are examined as a result of identified component support deformation, and the results of these examinations exceed the acceptance standards of IWD-3000 of the ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda, successive examinations shall be performed, if determined necessary, based on an evaluation by the Vermont Yankee Design Engineering Department.

4.5.4. If flaws or relevant conditions in component supports are accepted by analytical evaluation, the component support shall be reexamined during the next inspection period. If flaws or relevant conditions do not require additional corrective measures during the next inspection period, the component examination schedule may revert to the original schedule of successive inspections.

4.6. Additional Examinations (Expansions)

4.6.1. Component examinations with the exception of Examination Categories B-P, C-H and D-B, that reveal flaws or relevant conditions that exceed applicable acceptance standards, shall be extended to include additional examinations as required by IWB-2430, IWC-2430, IWD-2430 or IWF-2430 as applicable.

4.7. Implementing Procedures and Documents

4.7.1. ASME Section XI, 1998 Edition, 2000 Addenda

Section XI outlines the rules and requirements for performing inservice inspection and inservice testing at nuclear power plants. ASME Section XI identifies as a minimum rules and requirements for areas subject to inspection, responsibilities, provisions for accessibility, examination methods, frequency of inspections, procedures, personnel qualification, and examination documentation. This code is not only applicable to existing components but also new construction, repairs, and replacements.

4.7.2. DP 4026 Pressure Boundary Repair Procedure

The purpose of this procedure is to provide written instruction for the removal of surface indications detected during ISIs conducted in accordance with Section XI of the ASME Code. This document is limited to the removal or reduction in size of indications detected by any of the visual examination techniques in ferritic or austenitic piping.

4.7.3. DP 4027 Inspection Discrepancy Reports

The purpose of this procedure is to provide timely response to inservice inspection findings (indications, flaws, discrepancies, and deficiencies) identified during implementation of the ISI program procedure. ISI discrepancies could affect system operability and/or jeopardize plant safety. As such, timely evaluation, notification, and disposition of findings are necessary.

4.7.4. The following Nondestructive Examination (NDE) Procedures are used to implement ISI NDE inspection requirements:

NE 8042, Training for Contract NDE Personnel
NE 8043, Training, Qualification and Certification of NDE Personnel
NE 8044, Preparation of Examination Surfaces and Reference Marking of Welds for Nondestructive Examination
NE 8045, Visual Examination Procedure for VT-1
NE 8046, Visual Examination Procedure for VT-2
NE 8047, Visual Examination Procedure for VT-3 and General Visual
NE 8048, In-Vessel Visual Inspection
NE 8049, Liquid Penetrant Examination - Solvent Removable, Visible Dye Technique
NE 8050, Magnetic Particle Examination

NE 8052, Ultrasonic System Performance Checks
NE 8053, Ultrasonic Thickness Measurement
NE 8054, Procedure for Ultrasonic Examination of Ferritic Piping Welds
NE 8055, Procedure for Ultrasonic Examination of Austenitic Piping Welds
NE 8056, Manual Ultrasonic Exam of Overlaid Austenitic Piping Welds
NE 8057, Manual Ultrasonic Through-wall Sizing of Surface Connected Planar Flaws
NE 8058, Ultrasonic Testing of Components
NE 8059, Procedure for Straight Beam Ultrasonic Examination of Studs and Bolts
NE 8060, Ultrasonic Exam of Class 1 Reactor Pressure Vessel Threads in Flange Area
NE 8061, Ultrasonic Examination of Reactor Pressure Vessel Nozzle to Shell Welds per USNRC Regulatory Guide 1.150
NE 8064, Non-Code Visual Examination Methods as Good Maintenance Practice
NE 8066, Required Volumetric Coverage for Ultrasonic Testing of Category B-J Butt Welds
NE 8067, Reactor Vessel Internals Inspection Details

5.0 REFERENCES AND COMMITMENTS

5.1. Technical Specifications and Site Documents

5.1.1. T.S. Section 3.6.E
5.1.2. T.S. Section 4.6.E
5.1.3. UFSAR Section 4.2.6
5.1.4. VOQAM, Vermont Yankee Operational Quality Assurance Manual

5.2. Administrative Limits

5.2.1. None

NOTE

AP 6024, Plant Housekeeping requirements, are established via the AP 0021, Work Order process. (INPO93ES41MEC5)

5.3. Codes, Standards, and Regulations

5.3.1. Code of Federal Regulations, 10CFR50.55a
5.3.2. ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition, 2000 Addenda
5.3.3. ASME Boiler and Pressure Vessel Code, Section XI, 1974 Edition, including the Summer 1975 Addenda
5.3.4. Regulatory Guide 1.58, Rev. 1, "Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel"
5.3.5. Regulatory Guide 1.147, Rev. 13, "Inservice Inspection Code Case Applicability"
5.3.6. Regulatory Guide 1.150, Rev. 1, "Ultrasonic Testing of Reactor Vessel Welds During Inservice Inspection"

5.4. Commitments

5.4.1. None

5.5. Supplemental References

5.5.1. Vermont Yankee Calculation VYC-1118, "Line Size Exemptions From ISI Section XI, IWB-1220 Examination Requirements"
5.5.2. GE Nuclear Energy Document GE-Ne-523-A71-0594-A, Revision 1, DRF 137-0010-7 Class II, May 2000, Titled "Alternate BWR Feedwater Nozzle Inspection Requirements"
5.5.3. Vermont Yankee Calculation VYC-1005, Revision 1 Entitled "Crack Growth evaluation of the Vermont Yankee FW Nozzles"
5.5.4. AP 0009, Event Reports
5.5.5. AP 0021, Work Orders
5.5.6. AP 0048, Work Planning

5.5.5. AP 0021, Work Orders
5.5.6. AP 0048, Work Planning
5.5.7. AP 0070, ASME Section XI Repair and Replacement Procedure
5.5.8. AP 0095, Plant Procedures
5.5.9. DP 4027, Disposition of Inservice Inspection Findings
5.5.10. OP 4101, RPV Operational System Leakage Test
5.5.11. AP 6024, Plant Housekeeping and Foreign Material Exclusion/Cleanliness Control
5.5.12. AP 6807, Collection, Temporary Storage and Retrieval of QA Records
5.5.13. PP 7024, Containment Inservice Inspection Program (IWE)
5.5.14. PP 7034, Inservice Inspection Pressure Test Program

6.0 FINAL CONDITIONS

6.1. Final ISI Report Preparation

The ISIPC is responsible for preparation, review, and submittal to the NRC and ANII of form NIS-1, Owner's Report for Inservice Inspection.

6.2. Records

All ISI records including personnel certifications, equipment certifications, calibration sheets, examination data sheets, records of repairs, radiographic film, pertinent correspondence and form NIS-1 shall be submitted to the ISIPC for filing.

6.3. ISI Closeout

The following conditions must be verified after each outage and prior to ISI closeout:

6.3.1. All required examinations have been completed.

6.3.2. Final inspection results, supporting documentation, and resolution of nonconformance have been compiled, reviewed, and retained.

6.3.3. All Indication Discrepancy Reports (DP 4027 forms) have been closed.

6.3.4. The NIS-1 form has been approved by the Plant Manager or designee and the ANII.

NOTE
Additional copies of the Final ISI Report may be issued as "Unofficial" copies by the plant.

6.3.5. The ISIPC has received the approved copy of the Final ISI Report for retention.

7.0 ATTACHMENTS

7.1.	Appendix A	Relief Requests
7.2.	Appendix B	Selection and Bases Tables
7.3.	Appendix C	Examination and Schedule Tables
7.4.	Appendix D	Calibration Block Index
7.5.	Appendix E	Deleted
7.6.	Appendix F	Deleted
7.7.	Appendix G	Deleted

APPENDIX A

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-01

NOT UTILIZED

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-02

Information to Support NRC Re-Approval of a 10CFR50.55a Request for Use During a New 10-Year Interval

1. **Previous 10CFR50.55a Request Approved by NRC**

Request proposed in Reference 1 and approved as agreed to in Reference 9. Applicable items are ASME Section XI, Class 1, Examination Categories B-J, Code Item Nos. B9.10, B9.20, and B9.30, Pressure Retaining Welds in Piping

2. **Changes to the Applicable ASME Code Section**

For Examination Category B-J, the differences between the 1986 Edition (Third Interval) and the 1998 Edition with Addenda through 2000 (Fourth Interval) are as follows:

1) The requirement for examination of longitudinal welds has been eliminated, except as noted in Notes (4), (5), and (6) at the intersections of circumferential welds.

2) Note (1)(c) clarifies which Category B-J dissimilar metal welds are included (no technical change).

These changes do not affect the use of Code Case N-560. There are no longitudinal welds in the Category B-J population at Vermont Yankee.

3. **Component Aging Factors**

Component aging factors are addressed in Code Case N-560, (a)(7), which states, "Modifications to the selected examination zones may be made based on relevant industry experience, changes in plant design or operation, new metallurgical knowledge, or prior examination results." None of the above input factors has resulted in a change to the original examination sample selection.

At the present time, injection of hydrogen water chemistry has been delayed at Vermont Yankee. However, Vermont Yankee still intends to assure that each of the stainless steel welds in the Category B-J population has been mitigated against IGSCC by two methods, or addressed by other means, as stated in Reference 12. As promised in Reference 12, an evaluation was conducted by Structural Integrity Associates to determine the effectiveness of induction heating stress improvement (IHSI) applied to certain welds (Reference 13) in order to possess two mitigating methods under all scenarios of HWC and NMCA injection. Based on the decision and timing of the use of hydrogen water chemistry, Vermont Yankee will expand the population of welds to receive such an evaluation.

4. Changes in Technology for Inspecting the Affected ASME Code Components

Use of Code Case N-560 resulted in a change to the examination zones for each weld; however, Code Case N-560 governs selection of welds and areas for inspection, and does not address the means necessary to perform the inspection. Therefore, changes in technology are not applicable to use of this Code Case.

5. Confirmation of Renewed Applicability

The relief granted for Vermont Yankee's Third Interval is still applicable for the Fourth Interval. The use of risk-informed methodology for selection of components for examination embodies Vermont Yankee's philosophy for Class 1 piping inspection.

6. Duration of Re-Approved 10CFR50.55a Request

It is proposed to use the alternative for the duration of the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

7. References

1. BVY 97-99, dated August 6, 1997, "Implementation of ASME Code Case N-560 at Vermont Yankee Nuclear Power Station"
2. BVY 97-105, dated August 15, 1997, "Implementation of ASME Code Case N-560 at Vermont Yankee Nuclear Power Station"
3. NVY 97-137, dated September 5, 1997, "Meeting with Vermont Yankee Nuclear Power Corporation"
4. NVY 97-163, dated October 9, 1997 "Summary of September 17, 1997, Meeting and September 23, 1997, Telecon Regarding the American Society of Mechanical Engineers Code Case N-560"
5. BVY 97-137, dated October 23, 1997, "Implementation of ASME Code Case N-560 at Vermont Yankee Nuclear Power Station – Response to NRC Questions"
6. NVY 98-32, dated March 11, 1998, "Request for Additional Information Regarding Implementation of ASME Code Case N-560 at Vermont Yankee Nuclear Power Station (TAC No. M99389)"
7. BVY 98-114, dated July 31, 1998, "Request for Additional Information Regarding Implementation of ASME Code Case N-560 at Vermont Yankee Nuclear Power Station"
8. BVY 98-138, dated September 4, 1998, "Submittal of Additional Information Regarding Implementation of ASME Code Case N-560 at Vermont Yankee Nuclear Power Station"
9. NVY 98-155, dated November 9, 1998, "Request to Use Code Case N-560 As an Alternative to the Requirements of ASME Code, Section XI, Table IWB-2500-1 at Vermont Yankee Nuclear Power Station"
10. NVY 98-168, dated December 30, 1998, "Request for Information Concerning Use of Code Case N-560 – Vermont Yankee Nuclear Power Station"
11. BVY 99-26, dated March 19, 1999, "Response to Request for Information Concerning Use of Code Case N-560 – Vermont Yankee Nuclear Power Station"
12. BVY 00-74, dated August 28, 2000, "Follow-up to Request for Information Concerning Use of Code Case N-560"

13. Structural Integrity Report No. SIR-01-161, Revision A, dated "November 19, 2002", Evaluation of Effectiveness of Induction Heating Stress Improvement of Austenitic Stainless Steel Piping Welds at Vermont Yankee"

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-03

Proposed Alternative
In Accordance with 10CFR50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. **ASME Code Component(s) Affected**

ASME Section XI, Class 1, Examination Category B-G-1, Code Item Nos. B6.120, B6.150, B6.160, and B6.170; Examination Category B-G-2, Code Item Nos. B7.10, B7.40, B7.50, B7.60, and B7.70; and Examination Category C-D, Code Item No. C4.20

2. **Applicable Code Edition and Addenda**

1998 Edition with Addenda through 2000

3. **Applicable Code Requirements**

1. ASME Section XI, Category B-G-1, Code Item Nos. B6.120, B6.150, B6.180, and B6.210 requires volumetric examination of bolts and studs in heat exchangers, piping, pumps, and valves regardless of whether the bolts or studs are examined in place or removed.

2. For ASME Section XI, Category B-G-1, Code Item Nos. B6.150, B6.180, and B6.210, volumetric examinations of bolting on heat exchangers, pumps, and valves are limited to components selected for examination under Examination Categories B-B, B-J, B-L-2, and B-M-2.

3. ASME Section XI, Category B-G-1, Code Item Nos. B6.150, B6.160, and B6.170; Category B-G-2, Code Item No. B7.50; and Category C-D, Code Item No. C4.20 require inspection of 100% of bolts and studs at each bolted connection in piping selected for examination under Code Categories B-J and C-F.

4. ASME Section XI, Category B-G-2, Code Item Nos. B7.10, B7.40, B7.50, B7.60, and B7.70 require visual examination of all Class 1 bolts, studs, and nuts 2 inches and less in diameter in place under tension, when the connection is disassembled, or when the bolting is removed.

4. **Reason for Request**

To avoid unnecessary inspections and to conserve radiological dose, while still maintaining an adequate level of quality and safety for examination of the affected bolting.

5. **Proposed Alternative**

Bolting will be selected and examined in accordance with Code Case N-652. Specifically:

1. In accordance with Code Case N-652, Category B-G-1, Note 2, a surface examination of bolts and studs in heat exchangers, piping, pumps, and valves may be substituted for volumetric examination when the bolts or studs are removed.

2. In accordance with Code Case N-652, Category B-G-1, Note 4, volumetric examinations may be conducted on one heat exchanger, one pump, or one valve among a group of heat exchangers, pumps, or valves that are similar in design, type, and function. In addition, when the component to be examined contains a group of bolted connections of similar design and size, such as flanged connections, examination may be conducted on one bolted connection among the group.

3. In accordance with Code Case N-652, Category B-G-1, Note 6; Category B-G-2, Note 3; and Category C-D, Note 4, examination of flanged piping bolting may be limited to one connection of a group of connections similar in design, size, function, and service.

4. In accordance with Code Case N-652, Category B-G-2, Note 1, bolting will only be examined when a connection is disassembled or the bolting is removed. (Effectively, the alternative only applies to piping bolting.)

Basis for Use

The service experience of bolting throughout the industry is exemplary. Degradation is only associated with leakage and other provisions address examination of bolting at leaking connections.

1. New notes (Note 2 of Category B-G-1 and Note 5 of Category C-D in Code Case N-652) were added to Categories B-G-1 and C-D to allow surface examination to be substituted for volumetric examination when bolting is removed for the examination. This recognizes that bolting failures initiate from the OD surface and that a surface exam is an acceptable technique for detection of such defects.

   The existing examination methods require volumetric examination of removed bolting greater than two inches, even when surface examination is at least an equal, and possibly a more appropriate, examination.

Code Case 307-2, in which examination of the borehole surfaces of bolts and studs was eliminated, demonstrates that cracking initiates on the outside surfaces of bolts and studs. For this reason, a qualified surface examination meeting the acceptance standards of IWB-3515 would provide at least the sensitivity for flaw detection that an end shot ultrasonic examination would provide on bolts and studs that have been removed for examination. Consequently, when bolts or studs are removed for examination, either a surface or volumetric examination should be allowed.

2. Note 3 of Section XI Category B-G-1 was changed (Note 4 in Code Case N-652 Category B-G-1) to require heat exchangers, pumps, and valves to be grouped based on design, type, and function, and then one component among the group to be volumetrically examined during the interval. In addition, if the component selected for examination included more than one bolted connection, then only one of those bolted connections is required to be examined. The note was also revised to apply only to volumetric examination as a new note was added to address visual examination of bolting for heat exchangers, pumps, and valves. Reference to examination of bolting for piping was also removed as a new note was added to address this.

   Previously, the Code only required bolting for heat exchangers, pumps and valves to be examined when the component was selected for examination under Categories B-B, B-L-2, or B-M-2. These Categories require the components to be selected for examination only when the component is disassembled. There appears to be no technical justification to tie volumetric examination of bolting to component disassembly. This change makes the Class 1 requirements for volumetric examination of bolting on these type components identical to the existing Class 2 requirements.

   Under existing Section XI examination rules, Category B-G-1 volumetric examination of bolted connections in heat exchangers, pumps, and valves is required only when the major component is disassembled for maintenance, repair, or volumetric examination. This is inconsistent with, and actually less stringent than, the requirements of Category C-D, wherein volumetric examination of a sample of bolted connections in vessels, pumps and valves is required regardless of whether the component is disassembled for maintenance or repair.

   Therefore, even though bolting inspection will be performed under a sample program (one connection of like connections), the change made by Code Case N-652 is more restrictive in that it will require examination of Category B-G-1 bolting regardless of whether the connection is disassembled.

3. A new note (Note 6 in Code Case N-652, Category B-G-1) was added in Category B-G-1 to clarify the requirements for examination of flange bolting in piping systems. It requires examination of one bolted connection among a group of bolted connections that are similar to design, type, function, and service.

A new Note 3 was added in Code Case N-652, Category B-G-2 to clarify the requirements for examination of flange bolting in piping systems. It requires examination of one bolted connection among a group of bolted connections that are similar to design, type, function, and service.

Note 2 of Category C-D was editorially revised to clarify the language. No technical changes were made to this note.

Note 3 of Category C-D was revised to clarify the requirements for examination of flange bolting in piping systems. It requires examination of one bolted connection among a group of bolted connections that are similar to design, type, function, and service.

The current code requires examination of bolting for piping when the component is selected for examination under Categories B-J or C-F, which is very difficult to comprehend. For bolting Categories B-G-1 and B-G-2 the existing notes require the examination of bolted connections in piping to be tied to components selected for examination under piping examination Category B-J. For bolting Category C-D, examination of bolted connections in piping is tied to piping examination Category C-F. These notes are confusing since it is difficult to limit examination of flange bolting in piping based on the piping welds selected for examination.

Therefore, even though bolting inspection will be performed under a sample program (one connection of like connections), the change made by Code Case N-652 is more restrictive in that it will require examination of piping bolting regardless of when the piping is selected under other Categories.

4. Note 1 of Category B-G-2 was revised to state that visual examination of bolting is required only when the connection is disassembled or removed.

Note 2 of Category B-G-2 was revised to clarify that visual examination of bolting for vessels, pumps, and valves is required only when the component is examined under Category B-B, B-L-2, or B-M-2. Reference to examination of bolting for piping was also removed as a new note (Note 6 in Code Case N-652) was added to address this.

The existing Section XI requires visual examination of this bolting when the component is "selected" for examination. Note 1 for Category B-G-2 of Code Case N-652 clarifies that examination is only required when the component is disassembled. It also clarifies that examination of any given bolted connection is required only once during the interval.

The existing Section XI Category B-G-2 Note 1 states that bolting may be examined in place under tension, when connection is disassembled, or when bolting is removed. This revision recognizes the fact that visual examination on bolting in place and under tension is not meaningful. Furthermore, the existing Section XI Category B-G-2 rules for piping do not tie the examination to disassembly of the connection as they do for heat exchangers, pumps, and valves.

Unlike volumetric examination, performing visual examinations of bolting while in place and under tension does not provide any meaningful information on the integrity of the bolting. Typically, the only portion of the bolting visible is the nuts and stud ends or the bolt head. Also, the only real degradation mechanism for flange bolting occurs when the connection is leaking. All Class 1 piping is subjected to a leakage test after each refueling outage and IWA-5000 already requires leaking flanges to be partially disassembled and the bolting to be examined for degradation. Performing a visual examination of bolting in place and under tension once every 10 years adds little value. This requirement is also inconsistent with the Class 1 rules for visual examination of bolting associated with heat exchangers pumps and valves, wherein the examination is tied to disassembly of the component. For these reasons it is more appropriate to tie the examination of bolted connections in piping to disassembly of the flange.

Compliance with the proposed alternatives described above will provide an adequate level of quality and safety for examination of the affected welds, and will not adversely impact the health and safety of the public.

6. Duration of Proposed Alternative

It is proposed to use the alternative for the duration of the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-04

Proposed Alternative
In Accordance with 10CFR50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. **ASME Code Component(s) Affected**

ASME Section XI, Class 1, Examination Categories B-F, C-F-1, and C-F-2, Code Item Nos. B5.10, C5.11, C5.41, C5.51, and C5.81, Pressure Retaining Dissimilar Metal Welds in Reactor Vessel Nozzle-to-Safe-End Butt Welds 4 inch NPS and larger; Pressure Retaining Circumferential Welds and Branch Connection Welds in Austenitic Stainless Steel or High Alloy Piping 4 inch NPS and larger; and Pressure Retaining Circumferential Welds and Branch Connection Welds in Carbon or Low Alloy Steel Piping 4 inch NPS and larger

2. **Applicable Code Edition and Addenda**

1998 Edition with Addenda through 2000

3. **Applicable Code Requirements**

Surface examination of essentially 100% of each weld requiring examination must be performed. All Category B-F welds 4 inch NPS and larger require surface examination. Of the total population of non-exempt Category C-F-1 and C-F-2 piping welds greater than 4 inch NPS, 7.5%, but not less than 28 welds, require surface examination.

4. **Reason for Request**

To avoid unnecessary inspections and to conserve radiological dose, while still maintaining an adequate level of quality and safety for examination of the affected welds.

5. **Proposed Alternative**

Surface examination of the subject welds (Categories B-F, C-F-1, and C-F-2 4 inch NPS and larger) shall be conducted in accordance with Code Case N-663. All areas of the subject welds identified as susceptible to outside surface attack shall be surface examined during the Vermont Yankee Fourth Ten-Year Interval in accordance with Code Case N-663. [Code Case N-663 also includes Category B-J, but Vermont Yankee will examine Category B-J in accordance with Relief Request ISI-02.]

Basis for Use

The subject item numbers in ASME Section XI require a volumetric and/or surface exam on selected piping welds to ensure that generic degradation mechanisms are not active on either the inside diameter (I.D.) or the outside diameter (O.D.). However, these welds are selected using a deterministic set of requirements that are un-informed as to any possible degradation mechanisms. ASME Code Case N-663 provides an alternative to the current ASME Section XI requirements for defining the number and location of surface examinations for piping components.

The ASME Section XI Task Group on ISI Optimization, Report No. 92-01-01, *Evaluation of Inservice Inspection Requirements for Class 1, Category B-J Pressure Retaining Welds in Piping*, dated July 1995, concluded (with 50 units responding with a total of 9333 welds inspected) only 2 welds (0.02%) were found to have flaws detected by Section XI surface examinations. These flaws were determined to be fabrication-induced. In parallel with the above, several risk-informed Code cases have been developed for use on piping welds (e.g., ASME Code Cases N-560, N-577, and N-578). One of the methods for risk-informing piping examinations is via use of EPRI TR-112657, Rev. B-A, *Revised Risk-Informed Inservice Inspection Evaluation Procedure (NRC SER dated 10/28/99).* Table 4-1, *Summary of Degradation-Specific Inspection Requirements and Examination Methods*, of the EPRI report lists the required degradation mechanisms to be evaluated in Class 1, 2, and 3 piping. It also identifies the risk-informed examination method required for each of these degradation mechanisms. The only degradation mechanism that requires a surface examination is O.D. chloride cracking. These two initiatives led ASME to investigate the value of surface examinations.

Code Case N-663 incorporates lessons learned from the risk-informed initiatives and industry examination experience into Section XI by requiring that an evaluation be conducted to identify locations, if any, where a surface examination would be of benefit from a generic piping degradation perspective. The results of this evaluation identify where O.D. degradation is most likely to occur by reviewing plant-specific programs and practices, and operating experience. If the potential for degradation is identified, Code Case N-663 defines examination techniques, volumes, and frequencies. As such, implementing Code Case N-663 will identify appropriate locations for surface examination, if any, and eliminate unnecessary examinations.

Other ASME Section XI examination requirements for the subject piping welds, including volumetric examinations and pressure testing, will continue to be performed. Examination requirements for other components, including Class 1 piping less than NPS 4, will continue to meet all Section XI requirements and are not subject to this request.

Code Case N-663 was approved by the ASME Boiler and Pressure Vessel Code Committee on September, 17, 2002, but has not yet been included in the most recent listing of NRC approved code cases provided in Revision 12 of Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability – ASME Section XI Division 1."

Compliance with the proposed alternatives described above will provide an adequate level of quality and safety for examination of the affected welds, and will not adversely impact the health and safety of the public.

6. Duration of Proposed Alternative

It is proposed to use the alternative for the duration of the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-05

Proposed Alternative
In Accordance with 10CFR50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. **ASME Code Component(s) Affected**

Pressure Retaining Piping Welds subject to examination using procedures, personnel, and equipment qualified to ASME Section XI, Appendix VIII, Supplement 10 criteria.

2. **Applicable Code Edition and Addenda**

1998 Edition with Addenda through 2000

3. **Applicable Code Requirements**

The following paragraphs or statements are from ASME Section XI, Appendix VIII, Supplement 10 and identify the specific requirements that are included in this request for relief:

Item 1 - Paragraph 1.1(b) states in part - Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent.

Item 2 - Paragraph 1.1(d) states - All flaws in the specimen set shall be cracks.

Item 3 - Paragraph 1.1(d)(1) states - At least 50% of the cracks shall be in austenitic material. At least 50% of the cracks in austenitic material shall be contained wholly in weld or buttering material. At least 10% of the cracks shall be in ferritic material. The remainder of the cracks may be in either austenitic or ferritic material.

Item 4 - Paragraph 1.2(b) states in part - The number of unflawed grading units shall be at least twice the number of flawed grading units.

Item 5 - Paragraph 1.2(c)(1) and 1.3(c) state in part - At least 1/3 of the flaws, rounded to the next higher whole number, shall have depths between 10% and 30% of the nominal pipe wall thickness. Paragraph 1.4(b) distribution table requires 20% of the flaws to have depths between 10% and 30%.

Item 6 - Paragraph 2.0 first sentence states - The specimen inside surface and identification shall be concealed from the candidate.

Item 7 - Paragraph 2.2(b) states in part - The regions containing a flaw to be sized shall be identified to the candidate.

Item 8 - Paragraph 2.2(c) states in part - For a separate length-sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate.

Item 9 - Paragraph 2.3(a) states - For the depth sizing test, 80% of the flaws shall be sized at a specific location on the surface of the specimen identified to the candidate.

Item 10 - Paragraph 2.3(b) states - For the remaining flaws, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.

Item 11 - Table VIII-S2-1 provides the false call criteria when the number of unflawed grading units is at least twice the number of flawed grading units.

4. **Reason for Request**

Section XI, Appendix VIII, Supplement 10 has not kept pace with the experience gained administering the Performance Demonstration Initiative. The proposed alternative is based on forthcoming Code action and was generated from a PDI model prepared by EPRI.

5. **Proposed Alternative**

In lieu of the requirements of ASME Section XI, 1998 Edition, 2000 Addenda, Appendix VIII, Supplement 10, the proposed alternative described in the enclosure shall be used. The proposed alternative will be implemented through the PDI Program.

A copy of the proposed revision to Supplement 10 is attached. It identifies the proposed alternatives and allows them to be viewed in context. It also identifies additional clarifications and enhancements for information. It has been submitted to the ASME Code for consideration and as of December 2002 had been approved by the NDE Subcommittee.

Basis for Use

Item 1 - The proposed alternative to Paragraph 1.1(b) states:

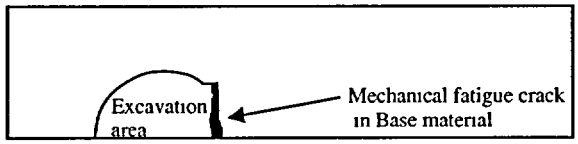
"The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Pipe diameters within a range of **1/2 in. (13 mm) of the** nominal diameter shall be considered equivalent. Pipe diameters larger than 24 in. **(610 mm)** shall be considered to be flat. When a range of thicknesses is to be examined, a thickness tolerance of $\pm$25% is acceptable."

Technical Basis - The change in the minimum pipe diameter tolerance from 0.9 times the diameter to the nominal diameter minus 0.5 inch provides tolerances more in line with industry practice. Though the alternative is less stringent for small pipe diameters they typically have a thinner wall thickness than larger diameter piping. A thinner wall thickness results in shorter sound path distances that reduce the detrimental effects of the curvature. This change maintains consistency between Supplement 10 and the recent revision to Supplement 2.

Item 2 - The proposed alternative to Paragraph 1.1(d) states:

"At least 60% of the flaws shall be cracks; the remainder shall be alternative flaws. Specimens with IGSCC shall be used when available. Alternative flaws, if used, shall provide crack-like reflective characteristics and shall be limited to the case where implantation of cracks produces spurious reflectors that are uncharacteristic of actual flaws. Alternative flaw mechanisms shall have a tip width of less than or equal to 0.002 in. (.05 mm). Note, to avoid confusion the proposed alternative modifies instances of the term "cracks" or "cracking" to the term "flaws" because of the use of alternative flaw mechanisms."

Technical Basis - 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. In addition, it is important to preserve the dendritic structure present in field welds that would otherwise be destroyed by the implantation process. To resolve these issues, the proposed alternative allows the use of up to 40% fabricated flaws as an alternative flaw mechanism under controlled conditions. The fabricated flaws are isostatically compressed which produces ultrasonic reflective characteristics similar to tight cracks.



Item 3 - The proposed alternative to Paragraph 1.1(d)(1) states:

"At least **80%** of the **flaws** shall be contained wholly in weld or buttering material. At least **one and a maximum of** 10% of the **flaws** shall be in ferritic **base** material. **At least one and a maximum of 10% of the flaws shall be in austenitic base material."**

Technical Basis - Under the current Code, as few as 25% of the flaws are contained in austenitic weld or buttering material. Recent experience has indicated that flaws contained within the weld are the likely scenarios. The metallurgical structure of austenitic weld material is ultrasonically more challenging than either ferritic or austenitic base material. The proposed alternative is therefore more challenging than the current Code.

Item 4 - The proposed alternative to Paragraph 1.2(b) states:

"Detection sets shall be selected from Table VIII-S**10**-1. The number of unflawed grading units shall be at least **one and a half** times the number of flawed grading units."

Technical Basis - Table S10-1 provides a statistically based ratio between the number of unflawed grading units and the number of flawed grading units. The proposed alternative reduces the ratio to 1.5 times to reduce the number of test samples to a more reasonable number from the human factors perspective. However, the statistical basis used for screening personnel and procedures is still maintained at the same level with competent personnel being successful and less skilled personnel being unsuccessful. The acceptance criteria for the statistical basis are in Table VIII-S10-1.

Item 5 - The proposed alternative to the flaw distribution requirements of Paragraph 1.2(c)(1) (detection) and 1.3(c) (length) is to use the Paragraph 1.4(b) (depth) distribution table (see below) for all qualifications.

Flaw Depth (% Wall Thickness)	**Minimum** Number of Flaws
10-30%	20%
31-60%	20%
61-100%	20%

Technical Basis - The proposed alternative uses the depth sizing distribution for both detection and depth sizing because it provides for a better distribution of flaw sizes within the test set. This distribution allows candidates to perform detection, length, and depth sizing demonstrations simultaneously utilizing the same test set. The requirement that at least 75% of the flaws shall be in the range of 10 to 60% of wall thickness provides an overall distribution tolerance yet the distribution uncertainty decreases the possibilities for testmanship that would be inherent to a uniform distribution. It must be noted that it is possible to achieve the same distribution utilizing the present requirements, but it is preferable to make the criteria consistent.

Item 6 - The proposed alternative to Paragraph 2.0 first sentence states:

"For **qualifications from the outside surface, the specimen inside surface and identification shall be concealed from the candidate. When qualifications are performed from the inside surface, the flaw location and specimen identification shall be obscured to maintain a "blind test"**."

Technical Basis - The current Code requires that the inside surface be concealed from the candidate. This makes qualifications conducted from the inside of the pipe (e.g., PWR nozzle to safe end welds) impractical. The proposed alternative differentiates between ID and OD scanning surfaces, requires that they be conducted separately, and requires that flaws be concealed from the candidate. This is consistent with the recent revision to Supplement 2.

Items 7 and 8 - The proposed alternatives to Paragraph 2.2(b) and 2.2(c) state:

"... containing a flaw to be sized **may** be identified to the candidate."

Technical Basis - The current Code requires that the regions of each specimen containing a flaw to be length sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region (Note, that length and depth sizing use the term "regions" while detection uses the term "grading units" - the two terms define different concepts and are not intended to be equal or interchangeable). To ensure security of the samples, the proposed alternative modifies the first "shall" to a "may" to allow the test administrator the option of not identifying specifically where a flaw is located. This is consistent with the recent revision to Supplement 2.

Items 9 and 10 - The proposed alternative to Paragraph 2.3(a) and 2.3 (b) states:

"... regions of each specimen containing a flaw to be sized **may** be identified to the candidate."

Technical Basis - The current Code requires that a large number of flaws be sized at a specific location. The proposed alternative changes the "shall" to a "may" which modifies this from a specific area to a more generalized region to ensure security of samples. This is consistent with the recent revision to Supplement 2. It also incorporates terminology from length sizing for additional clarity.

Item 11 - The proposed alternative modifies the acceptance criteria of Table VIII-S2-1 as follows:

10

TABLE VIII-S2-1
PERFORMANCE DEMONSTRATION DETECTION TEST
ACCEPTANCE CRITERIA

Detection Test Acceptance Critera		False Call Test Acceptance Criteria	
No. of Flawed Grading Units	Minimum Detection Criteria	No. of Unflawed Grading Units	Maximum Number of False Calls
~~5~~	~~5~~	~~10~~	~~0~~
~~6~~	~~6~~	~~12~~	~~1~~
~~7~~	~~6~~	~~14~~	~~1~~
~~8~~	~~7~~	~~16~~	~~2~~
~~9~~	~~7~~	~~18~~	~~2~~
10	8	~~20~~ 15	~~3~~ 2
11	9	~~22~~ 17	~~3~~ 3
12	9	~~24~~ 18	~~3~~ 3
13	10	~~26~~ 20	~~4~~ 3
14	10	~~28~~ 21	~~5~~ 3
15	11	~~30~~ 23	~~5~~ 3
16	12	~~32~~ 24	~~6~~ 4
17	12	~~34~~ 26	~~6~~ 4
18	13	~~36~~ 27	~~7~~ 4
19	13	~~38~~ 29	~~7~~ 4
20	14	~~40~~ 30	~~8~~ 5

Technical Basis - The proposed alternative is identified as new Table S10-1 above. It was modified to reflect the reduced number of unflawed grading units and allowable false calls. As a part of ongoing Code activities, PNNL has reviewed the statistical significance of these revisions and offered the revised Table S10-1.

Compliance with the proposed alternatives described above in Items 1 through 10 will provide an adequate level of quality and safety for examination of the affected welds, and will not adversely impact the health and safety of the public.

6. Duration of Proposed Alternative

It is proposed to use the alternative for the duration of the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

7. Precedents

This proposed alternative is essentially identical to the model provided by the Performance Demonstration Initiative on the EPRI website.

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	1.0 SCOPE	
	Supplement 10 is applicable to dissimilar metal piping welds examined from either the inside or outside surface. Supplement 10 is not applicable to piping welds containing supplemental corrosion resistant clad (CRC) applied to mitigate Intergranular Stress Corrosion Cracking (IGSCC).	A scope statement provides added clarity regarding the applicable range of each individual Supplement. The exclusion of CRC provides consistency between Supplement 10 and the recent revision to Supplement 2 (Reference BC 00-755). Note, an additional change identifying CRC as "in course of preparation" is being processed separately.
1.0 SPECIMEN REQUIREMENTS	**2.0 SPECIMEN REQUIREMENTS**	Renumbered
Qualification test specimens shall meet the requirements listed herein, unless a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure (e.g., pipe size, weld joint configuration, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.	Qualification test specimens shall meet the requirements listed herein, unless a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure (e.g., pipe size, weld joint configuration, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.	No Change
1.1 General. The specimen set shall conform to the following requirements.	**2.1 General.** The specimen set shall conform to the following requirements.	Renumbered
	(a) The minimum number of flaws in a test set shall be ten.	New, changed minimum number of flaws to 10 so sample set size for detection is consistent with length and depth sizing.
(a) Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.	(b) Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.	Renumbered

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(b) The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent. Pipe diameters larger than 24 in. shall be considered to be flat. When a range of thicknesses is to be examined, a thickness tolerance of ±25% is acceptable.	(c) The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Pipe diameters within a range of **1/2 in. (13 mm) of the** nominal diameter shall be considered equivalent. Pipe diameters larger than 24 in. **(610 mm)** shall be considered to be flat. When a range of thicknesses is to be examined, a thickness tolerance of ±25% is acceptable.	Renumbered, metricated, the change in pipe diameter tolerance provides consistency between Supplement 10 and the recent revision to Supplement 2. (Reference BC 00-755)
(c) The specimen set shall include examples of the following fabrication condition:	(**d**) The specimen set shall include examples of the following fabrication conditions:	Renumbered, changed "condition" to "conditions"
(1) geometric conditions that normally require discrimination from flaws (e.g., counterbore or weld root conditions, cladding, weld buttering, remnants of previous welds, adjacent welds in close proximity);	(1) geometric **and material** conditions that normally require discrimination from flaws (e.g., counterbore or weld root conditions, cladding, weld buttering, remnants of previous welds, adjacent welds in close proximity**, and weld repair areas**);	Clarification, some of the items listed relate to material conditions rather than geometric conditions. Weld repair areas were added as a result of recent field experiences.
(2) typical limited scanning surface conditions (e.g., diametrical shrink, single-side access due to nozzle and safe end external tapers).	(2) typical limited scanning surface conditions (e.g., **weld crowns,** diametrical shrink, single-side access due to nozzle and safe end external tapers **for outside surface examinations; and internal tapers, exposed weld roots, and cladding conditions for inside surface examinations). Qualification requirements shall be satisfied separately for outside surface and inside surface examinations.**	Differentiates between ID and OD scanning surface limitations. Requires that ID and OD qualifications be conducted independently (Note, new paragraph 2.0 (identical to old paragraph 1.0) provides for alternatives when "a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure.").

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(d) All flaws in the specimen set shall be cracks.		Deleted this requirement, because new paragraph 2.3 below provides for the use of "alternative flaws" in lieu of cracks.
(1) At least 50% of the cracks shall be in austenitic material. At least 50% of the cracks in austenitic material shall be contained wholly in weld or buttering material. At least 10% of the cracks shall be in ferritic material. The remainder of the cracks may be in either austenitic or ferritic material.	**2.2 Flaw Location.** At least **80%** of the **flaws** shall be contained wholly in weld or buttering material. At least **one and a maximum of** 10% of the **flaws** shall be in ferritic **base** material. **At least one and a maximum of 10% of the flaws shall be in austenitic base material.**	Renumbered and re-titled. Flaw location percentages redistributed because field experience indicates that flaws contained in weld or buttering material are probable and represent the more stringent ultrasonic detection scenario.
(2) At least 50% of the cracks in austenitic base material shall be either IGSCC or thermal fatigue cracks. At least 50% of the cracks in ferritic material shall be mechanically or thermally induced fatigue cracks.	**2.3 Flaw Type.** **(a) At least 60% of the flaws shall be cracks, the remainder shall be alternative flaws. Specimens with IGSCC shall be used when available. Alternative flaws, if used, shall provide crack-like reflective characteristics and shall be limited to the case where implantation of cracks produces spurious reflectors that are uncharacteristic of actual flaws. Alternative flaw mechanisms shall have a tip width of less than or equal to 0.002 in. (.05 mm).**	Renumbered and re-titled. Alternative flaws are required for placing axial flaws in the HAZ of the weld and other areas where implantation of a crack produces metallurgical conditions that result in an unrealistic ultrasonic response. This is consistent with the recent revision to Supplement 2 (Reference BC 00-755). The 40% limit on alternative flaws is needed to support the requirement for up to 70% axial flaws. Metricated
(3) At least 50% of the cracks shall be coincident with areas described in (c) above.	**(b)** At least 50% of the **flaws** shall be coincident with areas described in **2.1(d)** above.	Renumbered. Due to inclusion of "alternative flaws", use of "cracks" is no longer appropriate.

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	2.4 Flaw Depth. All flaw depths shall be greater than 10% of the nominal pipe wall thickness. Flaw depths shall exceed the nominal clad thickness when placed in cladding. **Flaws in the sample set shall be distributed as follows:** Flaw Depth (% Wall Thickness) / Minimum Number of Flaws **10-30% — 20%** **31-60% — 20%** **61-100% — 20%** **At least 75% of the flaws shall be in the range of 10 to 60% of wall thickness.**	Moved from old paragraph 1.3(c) and 1.4 and re-titled. Consistency between detection and sizing specimen set requirements (e.g., 20% vs. 1/3 flaw depth increments, e.g., original paragraph 1.3(c))
1.2 Detection Specimens. The specimen set shall include detection specimens that meet the following requirements.		Renumbered and re-titled and moved to paragraph 3.1(a). No other changes
(a) Specimens shall be divided into grading units. Each grading unit shall include at least 3 in. of weld length. If a grading unit is designed to be unflawed, at least 1 in. of unflawed material shall exist on either side of the grading unit. The segment of weld length used in one grading unit shall not be used in another grading unit. Grading units need not be uniformly spaced around the pipe specimen.		Renumbered to paragraph 3.1(a)(1). No other changes.

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(b) Detection sets shall be selected from Table VIII-S2-1. The number of unflawed grading units shall be at least twice the number of flawed grading units.		Moved to new paragraph 3.1(a)(2).
(c) Flawed grading units shall meet the following criteria for flaw depth, orientation, and type.		Flaw depth requirements moved to new paragraph 2.4, flaw orientation requirements moved to new paragraph 2.5, flaw type requirements moved to new paragraph 2.3, "Flaw Type".
(1) All flaw depths shall be greater than 10% of the nominal pipe wall thickness. At least 1/3 of the flaws, rounded to the next higher whole number, shall have depths between 10% and 30% of the nominal pipe wall thickness. However, flaw depths shall exceed the nominal clad thickness when placed in cladding. At least 1/3 of the flaws, rounded to the next whole number, shall have depths greater than 30% of the nominal pipe wall thickness.		Deleted, for consistency in sample sets the depth distribution is the same for detection and sizing.
(2) At least 30% and no more than 70% of the flaws, rounded to the next higher whole number, shall be oriented axially. The remainder of the flaws shall be oriented circumferentially.	**2.5 Flaw Orientation.** **(a)** At least 30% and no more than 70% of the flaws, rounded to the next higher whole number, shall be oriented axially. The remainder of the flaws shall be oriented circumferentially.	Note, this distribution is applicable for detection and depth sizing. Paragraph 2.5(b)(1) requires that all length- sizing flaws be oriented circumferentially.
1.3 Length Sizing Specimens. The specimen set shall include length-sizing specimens that meet the following requirements.		Renumbered and re-titled and moved to new paragraph 3.2

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
(a) All length sizing flaws shall be oriented circumferentially.		Moved, included in new paragraph 3.2(a)
(b) The minimum number of flaws shall be ten.		Moved, included in new paragraph 2.1 above
(c) All flaw depths shall be greater than 10% of the nominal pipe wall thickness. At least l/3 of the flaws, rounded to the next higher whole number, shall have depths between 10% and 30% of the nominal pipe wall thickness. However, flaw depth shall exceed the nominal clad thickness when placed in cladding. At least 1/3 of the flaws, rounded to the next whole number, shall have depths greater than 30% of the nominal pipe wall thickness.		Moved, included in new paragraph 2.4 above after revision for consistency with detection distribution
1.4 Depth Sizing Specimens. The specimen set shall include depth-sizing specimens that meet the following requirements.		Moved, included in new paragraphs 2.1, 2.3, 2.4
(a) The minimum number of flaws shall be ten.		Moved, included in new paragraph 2.1
(b) Flaws in the sample set shall not be wholly contained within cladding and shall be distributed as follows:		Moved, potential conflict with old paragraph 1.2(c)(1); "However, flaw depths shall exceed the nominal clad thickness when placed in cladding.". Revised for clarity and included in new paragraph 2.4

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
Flaw Depth (% Wall Thickness) / **Minimum** Number of Flaws 10-30% — 20% 31-60% — 20% 61-100% — 20% The remaining flaws shall be in any of the above categories.		Moved, included in paragraph 2.4 for consistent applicability to detection and sizing samples.
	(b) Sizing Specimen sets shall meet the following requirements.	Added for clarity
	(1) All length-sizing flaws shall be oriented circumferentially.	Moved from old paragraph 1.3(a)
	(2) Depth sizing flaws shall be oriented as in 2.5(a).	Included for clarity. Previously addressed by omission (i.e., length, but not depth had a specific exclusionary statement)
2.0 CONDUCT OF PERFORMANCE DEMONSTRATION	**3.0 CONDUCT OF PERFORMANCE DEMONSTRATION**	Renumbered
The specimen inside surface and identification shall be concealed from the candidate. All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited.	**For qualifications from the outside surface, the specimen inside surface and identification shall be concealed from the candidate. When qualifications are performed from the inside surface, the flaw location and specimen identification shall be obscured to maintain a "blind test".** All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited.	Differentiate between qualifications conducted from the outside and inside surface.

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
2.1 Detection Test. Flawed and unflawed grading units shall be randomly mixed	**3.1 Detection Qualification.**	Renumbered, moved text to paragraph 3.1(a)(3)
	(a) The specimen set shall include detection specimens that meet the following requirements.	Renumbered, moved from old paragraph 1.2.
	(1) Specimens shall be divided into grading units. Each grading unit shall include at least 3 in. **(76 mm)** of weld length. If a grading unit is designed to be unflawed, at least 1 in. **(25 mm)** of unflawed material shall exist on either side of the grading unit. The segment of weld length used in one grading unit shall not be used in another grading unit. Grading units need not be uniformly spaced around the pipe specimen.	Renumbered, moved from old paragraph 1.2(a). Metricated. No other changes.
	(2) Detection sets shall be selected from Table VIII-S10-1. The number of unflawed grading units shall be at least **one and a half** times the number of flawed grading units.	Moved from old paragraph 1.2(b). Table revised to reflect a change in the minimum sample set to 10 and the application of equivalent statistical false call parameters to the reduction in unflawed grading units. Human factors due to large sample size.
	(3) flawed and unflawed grading units shall be randomly mixed.	Moved from old paragraph 2.1

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	(b) Examination equipment and personnel are qualified for detection when **personnel demonstrations** satisfy the acceptance criteria of Table **VIII S10-1** for both detection and false calls.	Moved from old paragraph 3.1. Modified to reflect the 100% detection acceptance criteria of procedures versus personnel and equipment contained in new paragraph 4.0 and the use of 1.5X rather than 2X unflawed grading units contained in new paragraph 3.1(a)(2). Note, the modified table maintains the screening criteria of the original Table VIII-S2-1.
2.2 Length Sizing Test	**3.2 Length Sizing Test**	Renumbered
(a) The length-sizing test may be conducted separately or in conjunction with the detection test.	(a) **Each reported circumferential flaw in the detection test shall be length sized.**	Provides consistency between Supplement 10 and the recent revision to Supplement 2 (Reference BC 00-755).
(b) When the length-sizing test is conducted in conjunction with the detection test, and less than ten circumferential flaws are detected, additional specimens shall be provided to the candidate such that at least ten flaws are sized. The regions containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.	(b) When the length-sizing test is conducted in conjunction with the detection test, and less than ten circumferential flaws are detected, additional specimens shall be provided to the candidate such that at least ten flaws are sized. The regions containing a flaw to be sized **may** be identified to the candidate. The candidate shall determine the length of the flaw in each region.	Change made to ensure security of samples, consistent with the recent revision to Supplement 2 (Reference BC 00-755). Note, length and depth sizing use the term "regions" while detection uses the term "grading units". The two terms define different concepts and are not intended to be equal or interchangeable.
(c) For a separate length-sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.	(c) For a separate length-sizing test, the regions of each specimen containing a flaw to be sized **may** be identified to the candidate. The candidate shall determine the length of the flaw in each region.	Change made to ensure security of samples, consistent with the recent revision to Supplement 2 (Reference BC 00-755).

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	(d) Examination procedures, equipment, and personnel are qualified for length sizing **when** the RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 in. **(19 mm).**	Moved from old paragraph 3.2(a) includes inclusion of "when" as an editorial change. Metricated.
2.3 Depth Sizing Test	**3.3 Depth Sizing Test**	Renumbered
(a) For the depth-sizing test, 80% of the flaws shall be sized at a specific location on the surface of the specimen identified to the candidate.	(a) **The depth-sizing test may be conducted separately or in conjunction with the detection test. For a separate depth-sizing test, the regions of each specimen containing a flaw to be sized may be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.**	Change made to ensure security of samples, consistent with the recent revision to Supplement 2 (Reference BC 00-755).
(b) For the remaining flaws, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.	(b) **When the depth-sizing test is conducted in conjunction with the detection test, and less than ten flaws are detected, additional specimens shall be provided to the candidate such that at least ten flaws are sized.** The regions of each specimen containing a flaw to be sized **may** be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.	Change made to be consistent with the recent revision to Supplement 2 (Reference BC 00-755). Changes made to ensure security of samples, consistent with the recent revision to Supplement 2 (Reference BC 00-755).
	(c) Examination procedures, equipment, and personnel are qualified for depth sizing when the RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 in. **(3 mm).**	Moved from old paragraph 3.2(b). Metricated.

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
3.0 ACCEPTANCE CRITERIA		Delete as a separate category. Moved to new paragraph detection (3.1) and sizing 3.2 and 3.3
3.1 Detection Acceptance Criteria. Examination procedures, equipment, and personnel are qualified for detection when the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls.		Moved to new paragraph 3.1(b), reference changed to Table S10 from S2 because of the change in the minimum number of flaws and the reduction in unflawed grading units from 2X to 1.5X.
3.2 Sizing Acceptance Criteria		Deleted as a separate category. Moved to new paragraph on length 3.2 and depth 3.3
(a) Examination procedures, equipment, and personnel are qualified for length sizing the RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 inch.		Moved to new paragraph 3.2(d), included word "when" as an editorial change.
(b) Examination procedures, equipment, and personnel are qualified for depth sizing when the RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 in.		Moved to new paragraph 3.3(c)

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**
	4.0 PROCEDURE QUALIFICATION	New
	Procedure qualifications shall include the following additional requirements. **(a) The specimen set shall include the equivalent of at least three personnel sets. Successful personnel demonstrations may be combined to satisfy these requirements.** **(b) Detectability of all flaws within the scope of the procedure shall be demonstrated. Length and depth sizing shall meet the requirements of paragraph 3.2 and 3.3.** **(c) At least one successful personnel demonstration has been performed.** **(d) To qualify new values of essential variables, at least one personnel qualification set is required.**	New. Based on experience gained in conducting qualifications, the equivalent of 3 personnel sets (i.e., a minimum of 30 flaws) is required to provide enough flaws to adequately test the capabilities of the procedure. Combining successful demonstrations allows a variety of examiners to be used to qualify the procedure. Detectability of each flaw within the scope of the procedure is required to ensure an acceptable personnel pass rate. The last sentence is equivalent to the previous requirements and is satisfactory for expanding the essential variables of a previously qualified procedure

SUPPLEMENT 10 – QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS		
Current Requirement	**Proposed Change**	**Reasoning**

10

TABLE VIII-S2-1
PERFORMANCE DEMONSTRATION DETECTION TEST
ACCEPTANCE CRITERIA

Detection Test Acceptance Critera		False Call Test Acceptance Criteria	
No. of Flawed Grading Units	Minimum Detection Criteria	No. of Unflawed Grading Units	Maximum Number of False Calls
~~5~~	~~5~~	~~10~~	~~0~~
~~6~~	~~6~~	~~12~~	~~1~~
~~7~~	~~6~~	~~14~~	~~1~~
~~8~~	~~7~~	~~16~~	~~2~~
~~9~~	~~7~~	~~18~~	~~2~~
10	8	~~20~~ 15	~~3~~ 2
11	9	~~22~~ 17	~~3~~ 3
12	9	~~24~~ 18	~~3~~ 3
13	10	~~26~~ 20	~~4~~ 3
14	10	~~28~~ 21	~~5~~ 3
15	11	~~30~~ 23	~~5~~ 3
16	12	~~32~~ 24	~~6~~ 4
17	12	~~34~~ 26	~~6~~ 4
18	13	~~36~~ 27	~~7~~ 4
19	13	~~38~~ 29	~~7~~ 4
20	14	~~40~~ 30	~~8~~ 5

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-06

On hold

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-07

Information to Support NRC Re-Approval of a 10CFR50.55a Request for Use During a New 10-Year Interval

1. **Previous 10CFR50.55a Request Approved by NRC**

Vermont Yankee letter to USNRC, BVY 00-102, dated October 31, 2000, (Reference 3 below) requested approval to use an alternate inspection frequency for Category E Weld Repair Overlays (ASME Section XI, Class 1, Examination Category B-F, Code Item No. B5.10, Pressure Retaining Dissimilar Metal Welds in Vessel Nozzles) in accordance with BWRVIP-75 (Reference 1 below) and the NRC's SE on that document (Reference 2 below). USNRC letter to Vermont Yankee, NVY 01-21, dated March 22, 2001 (Reference 4 below), reviewed and approved that request.

In the Final SE of BWRVIP-75, dated May 14, 2001, (Reference 5 below) the USNRC only stipulated that for Category E welds the licensee include a note stating which welds are made of non-resistant materials. Per the original submittal (BVY 00-102 – Reference 3), the overlays were installed using Inconel 82, which is considered material resistant to IGSCC, as stated in Appendix A of the original USNRC SE to BWRVIP-75 (Reference 2).

2. **Changes to the Applicable ASME Code Section**

Neither the ASME Section XI, 1986 Edition nor the Section XI, 1998 Edition with 2000 Addenda addresses structural overlays.

3. **Component Aging Factors**

Component aging factors are addressed in the NRC's SE of BWRVIP-75, dated September 15, 2000 (Reference 2).

4. **Changes in Technology for Inspecting the Affected ASME Code Components**

Ultrasonic inspection of overlaid components has been conducted in accordance with techniques qualified under the auspices of the three-party NDE Coordination Plan, which the NRC endorsed in GL 88-01. These techniques have been generally improved since their initial use and help support the basis as offered in BWRVIP-75 (Reference 1).

5. Confirmation of Renewed Applicability

The relief granted for Vermont Yankee's Third Interval is still applicable for the Fourth Interval. BWRVIP-75, published in October 1999, and the NRC's Safety Evaluation of BWRVIP-75 are still the current applicable guidance documents for inspection of structurally overlaid components.

6. Duration of Re-Approved 10CFR50.55a Request

It is proposed to use the alternative for the duration of the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

7. References

1. BWRVIP-75, dated October 1999, "Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules"
2. Letter, USNRC to BWRVIP, dated September 15, 2000, "Safety Evaluation of the 'BWRVIP Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (BWRVIP-75)' EPRI Report TR-113932, October 1999"
3. Vermont Yankee letter to USNRC, BVY 00-102, dated October 31, 2000, "Request for Alternate Inspection Frequency for Weld Repair Overlays"
4. USNRC letter to Vermont Yankee, NVY 01-21, dated March 22, 2001,"Vermont Yankee Nuclear Power Station, Review of a Request for an Alternate Inspection Frequency for Overlay Repaired Welds"
5. Letter, USNRC to BWRVIP, dated May 14, 2002, "Final Safety Evaluation of the 'BWRVIP Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (BWRVIP-75)' EPRI Report TR-113932, October 1999"

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-08

Proposed Alternative
In Accordance with 10CFR50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. **ASME Code Component(s) Affected**

ASME Section XI, Class 1, Examination Category B-A, Item No. B1.10 Longitudinal and Circumferential Shell Welds and B1.20 Head Welds subject to Appendix VIII, Supplement 4, examination.

2. **Applicable Code Edition and Addenda**

1998 Edition with Addenda through 2000

3. **Applicable Code Requirements**

10CFR50.55a(b)(2) was amended to reference Section XI of the Code through the 1998 Edition with the 2000 Addenda. 10CFR50.55a(b)(2)(xv)(C)(1) requires a depth sizing acceptance criteria of 0.15 inch root mean square (RMS) be used in lieu of the requirements of ASME Section XI, 1998 Edition with the 2000 Addenda, Appendix VIII, Supplement 4, Subparagraph 3.2(b). However, Supplement 4, Subparagraph 3.2(c) contains additional criteria for performance demonstration depth sizing and requires that results be plotted and certain statistical parameters be satisfied.

4. **Reason for Request**

Section XI, Appendix VIII, Supplement 4 has not kept pace with the experience gained administering the Performance Demonstration Initiative. The NRC recognized this and provided extensive verbiage in 10CFR50.55a(b)(2) to correct this shortcoming. However, this request for an alternative corrects what is perceived to be a publishing mistake in the rule. It is based on a model prepared by EPRI for the PDI.

5. **Proposed Alternative**

In lieu of the depth sizing requirements of ASME Section XI, 1998 Edition, 2000 Addenda, Appendix VIII, Supplement 4, Subparagraph 3.2(c), a depth sizing qualification criteria of 0.15 RMSE will be used [as stated in 10CFR50.55a(b)(2)(xv)(C)(1)]. The proposed alternative will be implemented through the PDI Program.

Basis for Use

In a public meeting on October 11, 2000 at NRC offices in White Flint, MD (Reference 1), the PDI identified the discrepancy between the Subparagraph 3.2(c) and the PDI program. The NRC agrees that Paragraph 10CFR50.55a(b)(2)(xv)(C)(1) should have excluded Subparagraph 3.2(c) as a requirement.

The U.S. nuclear utilities created the PDI to implement demonstration requirements contained in Appendix VIII. PDI developed a performance demonstration program for qualifying UT techniques. In 1995, the NRC staff performed an assessment of the PDI program and reported that there were differences between Appendix VIII and the way PDI was implementing the program, but did not take exception to PDI's implementation. The staff requested that the differences between PDI and the Code be resolved.

The solution for resolving the differences between the PDI program and the Code was for PDI to participate in development of a Code case that reflected PDI's program. The Code Case was presented to ASME for discussion and consensus building. NRC representatives participated in this process. ASME approved the Code Case and published it as Code Case N-622, "Ultrasonic Examination of RPV and Piping, Bolts and Studs, Section XI, Division 1."

Operating in parallel with the actions of PDI, the staff incorporated most of Code Case N-622 criteria in the rule published in the Federal Register, 64 FR 51370. 10CFR 50.55a(b)(2)(xv) was subsequently revised in Federal Register, 67FR187. Appendix IV to Code Case N-622 contains the proposed alternative sizing criteria, which has been authorized by the staff. The staff agrees that the inclusion of the statistical sizing parameters of Paragraph 3.2(c) of Supplement 4 to Appendix VII was an oversight.

Compliance with the proposed alternatives described above will provide an adequate level of quality and safety for examination of the affected welds, and will not adversely impact the health and safety of the public.

6. Duration of Proposed Alternative

It is proposed to use the alternative for the duration of the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

7. Precedents

This proposed alternative is derived from the model provided by the Performance Demonstration Initiative on the EPRI website.

8. References

1. USNRC Letter from D. G. Naujock to E. J. Sullivan, dated November 13, 2000, "Summary of Public Meeting Held On October 11, 2000, with PDI Representatives"

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-09

Proposed Alternative
In Accordance with 10CFR50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. **ASME Code Component(s) Affected**

ASME Section XI, Class 1, Examination Category B-D, Item B3.90 – Pressure Retaining Nozzle-to-Vessel Welds

2. **Applicable Code Edition and Addenda**

1998 Edition with Addenda through 2000

3. **Applicable Code Requirements**

Section XI, Figure IWB-2500-7(b) specifies the examination volume for nozzle-to-vessel welds.

4. **Reason for Request**

To decrease the amount of time performing examination of unnecessary weld volume and to conserve radiological dose, while still maintaining an adequate level of quality and safety for examination of the affected welds.

5. **Proposed Alternative**

In lieu of the requirements of ASME Section XI, 1998 Edition, 2000 Addenda, Figure IWB-2500-7(b), it is proposed to use the alternative examination volume requirements of Code Case N-613 and its Figure 2.

Basis for Use

The examination volume for the reactor vessel pressure retaining nozzle-to-vessel welds extends far beyond the weld into the base metal, and is unnecessarily large. This prolongs the examination time significantly, and results in no net increase in safety, as the area being examined is a base metal region which is not prone to in-service cracking and has been extensively examined before the vessel was put into service, in addition to the first, second, and third interval examinations.

Code Case N-613 reduces the examination volume next to the widest part of the weld from half of the vessel wall thickness to one-half (1/2) inch. This removes examination of the base metal that was extensively examined during construction and in three subsequent in-service inspections. This region is not in the high residual stress region associated with the weld; cracks, should they initiate, occur in the high-stressed areas of the weld. These high-stressed areas are contained in the volume that is defined by Code Case N-613 and are subject to examination.

Code Case N-613 also eliminates the requirement to detect flaws perpendicular to the weld-base metal interface; however, relief for this aspect of Code Case N-613 is not being sought.

Compliance with the proposed alternatives described above in the above items will provide an adequate level of quality and safety for examination of the affected welds, and will not adversely impact the health and safety of the public.

6. Duration of Proposed Alternative

It is proposed to use the alternative for the duration of the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

7. Precedents

This proposed alternative is essentially identical to the model provided by the Performance Demonstration Initiative on the EPRI website.

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-10

Proposed Alternative
In Accordance with 10CFR50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. **ASME Code Component(s) Affected**

ASME Section XI, Class 1, Pressure Retaining Welds in Piping, subject to Appendix VIII, Supplement 11, examination.

2. **Applicable Code Edition and Addenda**

1998 Edition with Addenda through 2000

3. **Applicable 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 an 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.

4. **Reason for Request**

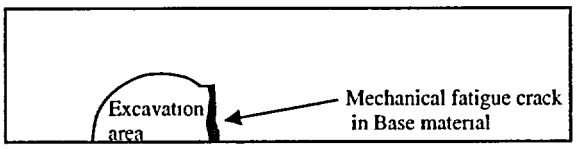
Section XI, Appendix VIII, Supplement 11 has not kept pace with the experience gained administering the Performance Demonstration Initiative. The proposed alternative is based on forthcoming Code action and was generated from a PDI model prepared by EPRI.

5. **Proposed Alternative**

In lieu of the requirements of ASME Section XI, 1998 Edition, 2000 Addenda, Appendix VIII, Supplement 11, the proposed alternative described in the enclosure shall be used. The proposed alternative will be implemented through the PDI Program.

Basis for Use

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 semi-elliptical 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.



Relief is requested to allow closer spacing of flaws provided they didn't interfere with detection or discrimination. 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 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 I 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 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.

PDI has submitted these changes as a Code Case and they have been approved, but the Code Case will not be published until later in 2002. A detailed comparison matrix between Supplement 11, the proposed ASME Section XI Code Case N-654, and the PDI Program is enclosed as supporting documentation. The first column identifies the current requirements in the 95 Edition and 96 Addenda of Supplement 11, while the second (middle) column identifies the changes made by the Code Case.

There are however some additional changes that were inadvertently omitted from the Code Case. The most important change is paragraph 1.1(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 alternative flaws*" was added to the next to last sentence in paragraph 1.1(d)(1). These changes are identified by **bold** print in the third column of the enclosure.

Compliance with the proposed alternatives described above in the above items will provide an adequate level of quality and safety for examination of the affected welds, and will not adversely impact the health and safety of the public.

6. Duration of Proposed Alternative

It is proposed to use the alternative for the duration of the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

7. Precedents

This proposed alternative is essentially identical to the model provided by the Performance Demonstration Initiative on the EPRI website.

1.0 SPECIMEN REQUIREMENTS	CC N-654	PDI Program
Qualification test specimens shall meet the requirements listed herein, unless a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure (e.g., pipe size, weld joint configuration, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.	**No Change**	**No Change**
1.1 General. The specimen set shall conform to the following requirements.	**No Change**	**No Change**
(a) Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.	**No Change**	**No Change**
(b) The specimen set shall consist of at least three specimens having different nominal pipe diameters and overlay thicknesses. They shall include the minimum and maximum nominal pipe diameters for which the examination procedure is applicable. Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent. If the procedure is applicable to pipe diameters of 24 in. or larger, the specimen set must include at least one specimen 24 in. or larger but need not include the maximum diameter. The specimen set must include at least one specimen with overlay thickness within -0.1 in. to +0.25 in. of the maximum nominal overlay thickness for which the procedure is applicable.	**No Change**	*(b)* The specimen set shall consist of at least three specimens having different nominal pipe diameters and overlay thicknesses. They shall include the minimum and maximum nominal pipe diameters for which the examination procedure is applicable. Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent. If the procedure is applicable to pipe diameters of 24 in. or larger, the specimen set must include at least one specimen 24 in. or larger but need not include the maximum diameter. **The specimen set shall include specimens with overlays not thicker than 0.1 in. more than the minimum thickness, nor thinner than 0.25 in. of the maximum nominal overlay thickness for which the examination procedure is applicable.**

(c) The surface condition of at least two specimens shall approximate the roughest surface condition for which the examination procedure is applicable.	**No Change**	**No Change**
(d) Flaw Conditions		**PDI Program**
(1) Base metal flaws. All flaws must be cracks in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75% through the base metal wall. Flaws may extend 100% through the base metal and into the overlay material; in this case, intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the cracking. Specimens containing IGSCC shall be used when available.	**(1) Base metal flaws. All flaws must be in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75% through the base metal wall. Intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the cracking. Specimens containing IGSCC shall be used when available. At least 70 percent of the flaws in the detection and sizing tests shall be cracks. Alternative flaw mechanisms, if used, shall provide crack-like reflective characteristics and shall be limited by the following:** **(a) Flaws shall be limited to when implantation of cracks precludes obtaining a realistic ultrasonic response.** **(b) Flaws shall be semielliptical with a tip width of less than or equal to 0.002 inches.**	(1) Base metal flaws. All flaws must be in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75% through the base metal wall. Intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the **base metal flaws**. Specimens containing IGSCC shall be used when available. At least 70 percent of the flaws in the detection and sizing tests shall be cracks **and the remainder shall be alternative flaws**. Alternative flaw mechanisms, if used, shall provide crack-like reflective characteristics and shall be limited by the following: (a) Flaws shall be limited to the cases where implantation of cracks **produces spurious reflectors that are uncharacteristic of actual flaws.** (b) Flaws shall be semielliptical with a tip width of less than or equal to 0.002 inches.

(2) Overlay fabrication flaws. At least 40% of the flaws shall be non-crack fabrication flaws (e.g., sidewall lack of fusion or laminar lack of bond) in the overlay or the pipe-to-overlay interface. At least 20% of the flaws shall be cracks. The balance of the flaws shall be of either type.	**No Change**	**No Change**
(e) Detection Specimens		**PDI Program**
(1) At least 20% but less than 40% of the flaws shall be oriented within ±20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access. The rules of IWA-3300 shall be used to determine whether closely spaced flaws should be treated as single or multiple flaws.	**(1) At least 20% but less than 40% of the base metal flaws shall be oriented within ±20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.**	**(1) At least 20% but less than 40% of the base metal flaws shall be oriented within ±20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.**
(2) Specimens shall be divided into base and over-lay grading units. Each specimen shall contain one or both types of grading units.	(2) Specimens shall be divided into base metal and overlay fabrication grading units. Each specimen shall contain one or both types of grading units. Flaws shall not interfere with ultrasonic detection or characterization of other flaws.	**(2) Specimens shall be divided into base metal and overlay fabrication grading units. Each specimen shall contain one or both types of grading units. Flaws shall not interfere with ultrasonic detection or characterization of other flaws.**
(a)(1) A base grading unit shall include at least 3 in. of the length of the overlaid weld. The base grading unit includes the outer 25% of the overlaid weld and base metal on both sides. The base grading unit shall not include the inner 75% of the overlaid weld and base metal overlay material, or base metal-to-overlay interface.	*(a)(1)* A base metal grading unit shall include at least 1 in. of the length of the overlaid weld. The base metal grading unit includes the outer 25% of the overlaid weld and base metal on both sides. The base metal grading unit shall not include the inner 75% of the overlaid weld and base metal overlay material, or base metal-to-overlay interface.	(a)(1) **A base metal grading unit includes the overlay material and the outer 25% of the original overlaid weld. The base metal grading unit shall extend circumferentially for at least 1 in. and shall start at the weld centerline and be wide enough in the axial direction to encompass one half of the original weld crown and a minimum of 0.50" of the adjacent base material.**

(a)(2) When base metal cracking penetrates into the overlay material, the base grading unit shall include the overlay metal within 1 in. of the crack location. This portion of the overlay material shall not be used as part of any overlay grading unit.	(a)(2) When base metal cracking penetrates into the overlay material, the base metal grading unit shall not be used as part of any overlay fabrication grading unit.	(a)(2) When base metal **flaws penetrate** into the overlay material, the base metal grading unit shall not be used as part of any overlay fabrication grading unit.
(a)(3) When a base grading unit is designed to be unflawed, at least 1 in. of unflawed overlaid weld and base metal shall exist on either side of the base grading unit. The segment of weld length used in one base grading unit shall not be used in another base grading unit. Base grading units need not be uniformly spaced around the specimen.	(a)(3) Sufficient unflawed overlaid weld and base metal shall exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws.	(a)(3) Sufficient unflawed overlaid weld and base metal shall exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws.
(b)(l) An 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.	*(b)*(l) An overlay fabrication grading unit shall include the overlay material and the base metal-to-overlay interface for a length of at least 1 in.	*(b)*(l) An overlay fabrication grading unit shall include the overlay material and the base metal-to-overlay interface for a length of at least 1 in.

(b)(2) An overlay grading unit designed to be unflawed shall be surrounded by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 in. around its entire perimeter. The specific area used in one overlay grading unit shall not be used in another overlay grading unit. Overlay grading units need not be spaced uniformly about the specimen.	(b)(2) 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. Sufficient unflawed overlaid weld and base metal shall exist on both sides of the overlay fabrication grading unit to preclude interfering reflections from adjacent flaws. The specific area used in one overlay fabrication grading unit shall not be used in another overlay fabrication grading unit. Overlay fabrication grading units need not be spaced uniformly about the specimen.	(b)(2) 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. Sufficient unflawed overlaid weld and base metal shall exist on both sides of the overlay fabrication grading unit to preclude interfering reflections from adjacent flaws. The specific area used in one overlay fabrication grading unit shall not be used in another overlay fabrication grading unit. Overlay fabrication grading units need not be spaced uniformly about the specimen.
(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base grading units, ten unflawed base grading units, five flawed overlay grading units, and ten unflawed overlay grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units.	(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base metal grading units, ten unflawed base metal grading units, five flawed overlay fabrication grading units, and ten unflawed overlay fabrication grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units. For initial procedure qualification, detection sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.	(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base metal grading units, ten unflawed base metal grading units, five flawed overlay fabrication grading units, and ten unflawed overlay fabrication grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units. For initial procedure qualification, detection sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.

(f) Sizing Specimen		**PDI Program**
(1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws shall be cracks open to the inside surface.	**(1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws shall be cracks open to the inside surface. For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.**	(1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws **shall be open** to the inside surface. **Sizing sets shall contain a distribution of flaw dimensions to assess sizing capabilities.** For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.
(2) At least 20% but less than 40% of the flaws shall be oriented axially. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.	**No Change**	**No Change**
(3) Base metal cracking used for length sizing demonstrations shall be oriented circumferentially.	**No Change**	**(3) Base metal flaws used for length sizing demonstrations shall be oriented circumferentially.**
(4) Depth sizing specimen sets shall include at least two distinct locations where cracking in the base metal extends into the overlay material by at least 0.1 in. in the through-wall direction.	**No Change**	**(4) Depth sizing specimen sets shall include at least two distinct locations where** flaws **in the base metal** extend **into the overlay material by at least 0.1 in. in the through-wall direction.**

2.0 CONDUCT OF PERFORMANCE DEMONSTRATION	CC N-654	PDI Program
The specimen inside surface and identification shall be concealed from the candidate. All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited.	The specimen inside surface and identification shall be concealed from the candidate. All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited. The overlay fabrication flaw test and the base metal flaw test may be performed separately.	The specimen inside surface and identification shall be concealed from the candidate. All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited. The overlay fabrication flaw test and the base metal flaw test may be performed separately.
2.1 Detection Test.		**PDI Program**
Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (base or overlay) that are present for each specimen.	Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (base metal or overlay fabrication) that are present for each specimen.	Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (base metal or overlay fabrication) that are present for each specimen.
2.2 Length Sizing Test		**PDI Program**
(a) The length sizing test may be conducted separately or in conjunction with the detection test.	**No Change**	

(b) When the length sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements of 1.1(f), additional specimens shall be provided to the candidate. The regions containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.	**No Change**	**No Change**
(c) For a separate length sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.	**No Change**	**No Change**
(d) For flaws in base grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25% of the base wall thickness.	***(d)* For flaws in base metal grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25% of the base metal wall thickness.**	***(d)* For flaws in base metal grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25% of the base metal wall thickness.**

2.3 Depth Sizing Test.		PDI Program
For the depth sizing test, 80% of the flaws shall be sized at a specific location on the surface of the specimen identified to the candidate. For the remaining flaws, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.	The candidate shall determine the depth of the flaw in each region.	**2.3 Depth Sizing Test** **(a) The depth sizing test may be conducted separately or in conjunction with the detection test.** **(b) When the depth sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements of 1.1(f), additional specimens shall be provided to the candidate. The regions containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.** **(c) For a separate depth sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.**

3.0 ACCEPTANCE CRITERIA		
3.1 Detection Acceptance Criteria.	**CC N-654**	**PDI Program**
Examination procedures, equipment, and personnel are qualified for detection when the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls. The criteria shall be satisfied separately by the demonstration results for base grading units and for overlay grading units.	Examination procedures are qualified for detection when all flaws within the scope of the procedure are detected and the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for false calls. Examination equipment and personnel are qualified for detection when the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls. The criteria shall be satisfied separately by the demonstration results for base metal grading units and for overlay fabrication grading units.	a) Examination procedures are qualified for detection when; All flaws within the scope of the procedure are detected and the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for false calls. At least one successful personnel demonstration has been performed meeting the acceptance criteria defined in (b). b) Examination equipment and personnel are qualified for detection when the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls. (c) The criteria in (a), (b) shall be satisfied separately by the demonstration results for base metal grading units and for overlay fabrication grading units.
3.2 Sizing Acceptance Criteria.		**PDI Program**
Examination procedures, equipment, and personnel are qualified for sizing when the results of the performance demonstration satisfy the following criteria.	**No Change**	**No Change**
(a) The RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 inch. The length of base metal cracking is measured at the 75% through-base-metal position.	**No Change**	*(a)* The RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 inch. The length of base metal flaws is measured at the 75% through-base-metal position.

(b) 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.	**This requirement is omitted.**	**This requirement is omitted.**
(c) The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 in.	*(b)* The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 in.	*(b)* The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 in.

LICENSEE/UTILITY NAME – Entergy Nuclear Operations, Inc.
PLANT NAME, UNIT – Vermont Yankee
10-YEAR INTERVAL – Fourth Interval
REQUEST FOR RELIEF No. ISI-11

Proposed Alternative
In Accordance with 10CFR50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. **ASME Code Component(s) Affected**

ASME Section XI, Class 1, Examination Category B-A, Code Item No. B1.30

2. **Applicable Code Edition and Addenda**

1998 Edition with Addenda through 2000

3. **Applicable Code Requirements**

ASME Section XI, 1998 Edition with Addenda through 2000, Appendix I, Subparagraph I-2110(b) requires that ultrasonic examination (UT) of reactor vessel flange-to-shell welds be conducted in accordance with Article 4 of ASME Section V, supplemented by the requirements of Table I-2000-1. In addition, Regulatory Guide 1.150, Revision 1, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations," serves as regulatory guidance for the UT examination of RPV welds.

4. **Reason for Request**

To gain ultrasonic technique and requirement synergy with the examination of the other RPV shell welds and to conserve radiological dose, while still maintaining an adequate level of quality and safety for examination of the affected weld.

5. **Proposed Alternative**

It is proposed to use a Performance Demonstration Initiative (PDI) qualified procedure to complete the UT of the RPV vessel-to-flange weld in accordance with ASME Section XI, 1998 Edition with Addenda through 2000, Appendix VIII Supplements 4 and 6 as amended by the Federal Register Notice 67FR187, dated September 26, 2002.

Basis for Use

Federal Register Notice 67FR187, dated September 26, 2002, requires that ASME Section XI, Appendix VIII, Supplement 4, "Qualification Requirements for the Clad/Base Metal Interface of Reactor Vessel", and Supplement 6, "Qualification Requirements for Reactor Vessel Welds other than Clad/Base Metal Interface", be implemented for most of the RPV welds, starting November 22, 2000. Per ASME Section XI, Appendix I, Subparagraph I-2110(b), reactor vessel-to-flange and head-to-flange welds are the only reactor vessel pressure boundary welds not included in Appendix VIII.

During the upcoming ten-year RPV weld examinations [due during the First Period of the Fourth Interval per 10CFR50.55a(g)], Vermont Yankee will be employing personnel, procedures, and equipment, demonstrated and qualified by the PDI and in accordance with ASME Code, Section XI, 1998 Edition, with Addenda through 2000, Appendix VIII, Supplements 4 and 6 as amended by the Federal Register Notice 67FR187, dated September 26, 2002 for examination of RPV shell welds.

Appendix VIII was developed to ensure the effectiveness of UT examinations within the nuclear industry by means of a rigorous item-specific performance demonstration. The performance demonstration is conducted on an RPV mockup containing flaws of various sizes and locations. The demonstration establishes the capability of equipment, procedures, and personnel to find flaws that could be detrimental to the integrity of the RPV.

Although Appendix VIII is not a requirement for this weld, the qualification process to Appendix VIII criteria demonstrates that the examination and evaluation techniques are equal or surpass the requirements of Appendix I, Subparagraph 2110(b), ASME Section V, Article 4, and the guidance in RG 1.150.

A comparison between the ASME Section V, Article 4 based UT methods and the procedures developed to satisfy the PDI and Appendix VIII can be best described as a comparison between a compliance-based procedure (ASME Section V, Article 4) and a results-based procedure (PDI/Appendix VIII). ASME Section V, Article 4 procedures use an amplitude-based technique and a known reflector. The proposed alternate UT method was established independently from the acceptance standards for flaw size found in ASME Section XI.

A PDI-qualified sizing method is considered more accurate than the method used in ASME Code, Section V, Article 4. The proposed alternate UT examination technique provides an acceptable level of quality and examination repeatability as compared to the Article 4 requirements.

Vermont Yankee will obtain the examination vendor's Performance Demonstration Qualification Sheet (PDQS), which will attest that their procedure is in compliance with the detection and sizing tolerance requirements of Appendix VIII. The PDI qualification method is based on a group of samples, which validate the acceptable flaw sizes in ASME Section XI. The sensitivity necessary to detect these flaws is considered to be equal to or better than the sensitivity obtained through ASME Section V, Article 4, because sensitivity necessary to detect implanted cracks is generally better than that necessary to calibrate on a machined notch.

The examination and sizing procedures for all potential qualified examination vendors use echo-dynamic motion and tip diffraction characteristics of the flaw instead of the amplitude characteristics required by ASME Section V, Article 4. The search units are required to interrogate the same examination volume as depicted by ASME Section XI, Figure IWB-2500-4 for the shell-to-flange weld joint.

Procedures used for satisfying the requirements of ASME Section V, Article 4 for the UT examination of the RPV-to-flange weld has not undergone such a rigorous demonstration or received the same qualifications as a PDI qualified procedure.

The Vermont Yankee shell-to-flange geometry compares very favorably with the geometry of the PDI qualification specimens. The inside diameter surface (the scan surface) of the shell-to-flange weld and adjacent base material is theoretically a cylinder; there is no taper associated with this joint on the RPV ID at Vermont Yankee. The shell base material thickness (excluding clad) is 5 5/16". The flange thickness (excluding clad) within the extremity of the required examination volume is 10 5/8". Vermont Yankee will require that the vendor's PDQS bound this thickness range. It is expected that an examination will be able to be performed from both the shell and the flange sides of the weld.

The shell-to-flange weld was examined radiographically and ultrasonically as a part of the RPV fabrication. During the second ten-year inservice inspection interval this weld was re-examined. In 1996, the weld was examined by remote automated inspection per 10CFR50a(g) during the first period of the third ten-year inservice inspection interval. This last examination was conducted in accordance with Appendix VIII using PDI-demonstrated procedures, even though Appendix VIII was not mandatory at the time.

If Vermont Yankee were to conduct examination of the RPV vessel-to-flange weld in accordance with ASME Section V, Article 4 and RG 1.150, it is expected that the examination would be performed using manual techniques from the vessel OD inside the drywell at the top of the bio-shield wall, and also from the vessel flange mating surface in the reactor refueling cavity. The use of Appendix VIII Supplements 4 and 6 for examination of this weld using remote automated inspection tooling is expected to significantly reduce personnel radiation exposure.

Compliance with the proposed alternatives described above will provide an adequate level of quality and safety for examination of the affected welds, and will not adversely impact the health and safety of the public.

6. Duration of Proposed Alternative

It is proposed to use the alternative for the Vermont Yankee Fourth Ten-Year Interval (September 1, 2003 through August 31, 2013).

7. Precedents

The NRC has granted similar relief to Salem Generating Station, Unit 1 (Reference 1), Comanche Peak Steam Electric Station, Unit 2 (Reference 2), Point Beach Unit 2 (Reference 3), Cooper Nuclear Station (Reference 4), and San Onofre Nuclear Generating Station, Unit 3 (Reference 5).

8. References

Letter from J. Clifford (NRC) to H. W. Keiser (PSEG Nuclear) dated May 3, 2001, "Salem Nuclear Generating Station, Unit No. 1-Relief from ASME Code Requirements Related to the Inservice Inspection Program, Second 10-Year Interval, Relief Request RR-B1 1 (TAC No. MB1234)

Letter from Robert A. Gramm (NRC) to C. Lance Terry (TXU Generation Company) dated April 16, 2002, "Comanche Peak Steam Electric Station (CPSES), Unit-2, Re: First 10-Year Inservice Inspection (ISI) Interval Request for Relief from the Requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) concerning Relief Requests A-4, Revision 1; A-5, Revision 2; A-6, A-7 and A-8 (TAC No. MB3039)

Table 1

Class 1 - Schedule Selection and Bases

Category	Item Number/Comments								Totals
B-A Pressure Retaining Welds In Reactor Vessel	B1.11	B1.12	B1.21	B1.22	B1.30	B1.40	B1.51	ASME Section XI, Table IWB-2500-1 and Vermont Yankee Request for Relief # ISI 05 bases. In accordance with the Final Safety Evaluation of BWRVIP-05 a volumetric examination of essentially 100% of the weld length of all axial pressure retaining shell welds, Item B1.12, including those portions of the circumferential shell welds that would be examined with the axial welds at their intersections, will be performed.	B-A 32
	4	8	2	16	1	1	0		
Basis	See Comment	100%	100%	100%	100%	100%	N/A		Scheduled 28
Scheduled	0	8	2	16	1	1	0		
B-B Pressure Retaining Welds In Vessels Other Than Reactor Vessels	B2.21	B2.22	B2.51	B2.52	B2.60	B2.70	B2.80	No B-B Category welds exist at Vermont Yankee	B-B See Comment
	See Comment								
B-D Full Penetration Welded Nozzles In Vessels	B3.90	B3.100	B3.150	B3.160	ASME Section XI, Table IWB-2500-1 bases. In accordance with Request for Relief # ISI 08 Code Case N-613 is used for examination of Item B3.90 welds in the axial direction only. Code Case N-552 is used for Item B3.100 nozzle inner radius modeling .				B-D 58
	29	29	0	0					
Basis	100%	100%	N/A	N/A					Scheduled 58
Scheduled	29	29	0	0					
B-F Pressure Retaining Dissimilar Metal Welds In Vessel Nozzles	B5.10	B5.20	B5.30	B5.100	B5.110	B5.120	ASME Section XI, Table IWB-2500-1 bases. and Vermont Yankee Request for Relief # ISI 04 which allows the use of Code Case N-662 which eliminates surface examination for Item B5.10 welds. Request for Relief # ISI 06 allows the use of BWRVIP-75 for examination frequency for overlaid piping. Request for Relief # ISI 10 grants the use of PDI for Supplement 10 qualification. Request for Relief # ISI 09 grants the use of PDI for Supplement 11 qualification.		B-F 23
	18	5	0	0	0	0			
Basis	100%	100%	N/A	N/A	N/A	N/A			Scheduled 23
Scheduled	18	5	0	0	0	0			

Table 1 (continued)

Class 1 - Schedule Selection and Bases

B-G-1 Pressure Retaining Bolting, Greater Than 2" In Diameter	B6.10	B6.20	B6.30	B6.40	B6 50	B6.180	B6.190	B6.200	Item numbers B6.120, B6.130, B6.140, B6.150, B6.160, B6.170, B2.10, B2.20 and B2.30 are not applicable to Vermont Yankee.	B-G-1
	64	64	See Comment	64	64	32	2	32		322
Basis	100%	100%		100%	100%	100%	100%	100%	In accordance with Request for Relief # ISI 03 Code Case N-652 is used for examination method and selection criteria. Item number B6.30 does not exist in Code Case N-652.	Scheduled
Scheduled Note 1, 2	64	64		When Removed	64	16	When Disass-embled	When Disass-embled		208
B-G-2 Pressure Retaining Bolting, 2" and Less In Diameter	B7.10	B7.40	B7.50	B7.60	B7.70	B7.80	ASME Section XI, Table IWB-2500-1 bases. The B7.80 Item is eliminated from the ASME Section XI 1998 Edition through 2000 Addenda, however, the VT-1 examination is required when the connection is disassembled by the 10CFR50.55a Rulemaking, Volume 66, No. 150. In accordance with Request for Relief # ISI 03 Code Case N-652 is used for examination method and selection criteria.			B-G-2
	0	0	3	0	43	89				135
Basis	N/A	N/A	100%	N/A	100%	100%				Scheduled
Scheduled	0	0	When Disass-embled	0	When Disass-embled	When Disass-embled				0
B-J Pressure Retaining Welds In Piping	B9.11	B9.18	None /	B9.32	B9.40	ASME Section XI, Table IWB-2500-1 bases. The Item B9.11, B9.18 and "None" selections are done in accordance with Code Case N-560 10% selection criteria. "None" are items that in accordance with Code Case N-560 no degradation mechanism was identified but are included in the selection population. Item B9.40, socket welds, are not included in the Code Case N-560 population, they are selected in accordance with the ASME Section XI, 1998 Edition through 2000 Addenda 25% selection criteria. Request for Relief # ISI 02 approves the use of Code Case N-560.			B-J
	432			3	82					514
Basis	10%			10%	25%					Scheduled
Scheduled	43			1	21					65

Table 1 (continued)						
Class 1 - Schedule Selection and Bases						
Category	**Item Number/Comments**					**Totals**
B-K	B10.10	B10.20	B10.30	B10.40	ASME Section XI, Table IWB-2500-1 bases. In accordance with ASME Section XI, 1998 Edition, through 2000 Addenda, Table IWB-2500-1, Category B-K, Item B10.10, Note 4 states: "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. Item B10.20, Note 5 states "For piping, pumps, and valves, a sample of 10% of the welded attachments associated with the component supports selected for examination under IWF-2510 shall be examined." Also, ASME Section XI, 1998 Edition through 2000 Addenda, Item # B10.10, allows single sided surface examination, however, the 10 CFR 50.55a Rulemaking, Vol. 66 requires both sides be examined.	B-K
Welded Attachments For Vessels, Piping, Pumps And Valves	5	7	0	0		12
Basis	See Comment	10%	N/A	N/A		Scheduled
Scheduled	2	1	0	0		3
B-L-1 Pressure Retaining Welds In Pump Casings	B12.10	No B-L-1 Category welds exist at Vermont Yankee				B-L-1
	See Comment					See Comment
B-L-2 Pump Casings	B12.20	In accordance with ASME Section XI, 1998 Edition, through 2000 Addenda, Table IWB-2500-1, Category B-L-2, Item B12.20, Notes 1 and 2 only one (1) pump in a group of pumps are required to be examined and then only when disassembled for maintenance, repair, or volumetric examination.				B-L-2
	2					2
Basis	100%					Scheduled
Scheduled	See Comment					See Comment

Table1 (continued)					
Class 1 - Schedule Selection and Bases					
B-M-1 Pressure Retaining Welds In Valve Bodies	B12.30	B12.40	No B-M-1 Category welds exist at Vermont Yankee		B-M-1 See Comment
	See Comment				
B-M-2 Valve Bodies	B12.50	In accordance with ASME Section XI, 1998 Edition, through 2000 Addenda, Table IWB-2500-1, Category B-M-2, Item B12.50 "Examination is required only when a pump or valve is disassembled for maintenance, repair, or volumetric examination."			B-M-2 43 Scheduled 0
Basis	100%				
Scheduled	0				
B-N-1 Interior Of Reactor Vessel	B13.10	The examination requirements for Category B-N-1 are defined in Program Procedure PP 7027 "Reactor Vessel Internals Inspection Program".			B-N-1 See Comment
	See Comment				
B-N-2 Welded Core Support Structures and Interior Attachments To Reactor Vessels	B13.20	B13.30	B13.40	The examination requirements for Category B-N-2 are defined in Program Procedure PP 7027 "Reactor Vessel Internals Inspection Program".	B-N-2 See Comment
	See Comment				
B-O Pressure Retaining Welds In Control Rod Housings	B14.10	ASME Section XI, Table IWB-2500-1 bases.			B-O 56 Scheduled 6
	56				
Basis	10%				
Scheduled	6				
B-P All Pressure Retaining Components	The examination selection and frequency for Category B-P is defined in Program Procedure PP 7034 "Inservice Inspection Pressure Test Program".				B-P See Note

Table 2 Class 2 - Schedule Selection and Bases								
Category	**Item Number/Comments**							**Totals**
C-A	C1.10	C1.20	C1.30	In accordance with ASME Section XI, 1998 Edition, through 2000 Addenda, Table IWC-2500-1, Category C-A examinations may be limited to one vessel or distributed among multiple similar vessels. Item C1.10 is limited to gross structural discontinuities only.				C-A
	6	2	0					8
Basis	See Comment	See Comment	N/A					Scheduled
Scheduled	3	1	0					4
C-B	C2.11	C2.21	C2.22	C2.31	C2.32	C2.33	In accordance with ASME Section XI, 1998 Edition, through 2000 Addenda, Table IWC-2500-1, Category C-B examinations may be limited to one vessel or distributed among multiple similar vessels. The two Item C2.33 examinations are performed in accordance with Program Procedure PP 7034 "Inservice Inspection Pressure Test Program".	C-B
	0	0	0	4	0	4		8
Basis	N/A	N/A	N/A	See Comment	N/A	See Comment		Scheduled
Scheduled	0	0	0	2	0	2		2
C-C	C3.10	C3.20	C3.30	C3.40	ASME Section XI, 1998 Edition, through 2000 Addenda, Table IWC-2500-1, Category C-C, Note 4 states: "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." Note 5 states: "For piping, pumps, and valves, a sample of 10% of the welded attachments associated with the component supports selected for examination under IWF-2510 shall be examined." Also, Note 6 states: "Examination is required whenever component support member deformation, e.g. broken, bent, or pulled out parts, is identified during operation, refueling, maintenance, examination or testing."			C-C
	9	15	2	0				26
Basis	See Comment	See Comment	See Comment	N/A				Scheduled
Scheduled	2	2	1	0				5

Table 2 (continued)						
Class 2 - Schedule Selection and Bases						
C-D	C4.10	C4.20	C4.30	C4.40	No Category C-D bolting exists at Vermont Yankee.	C-D
	See Comment					See Comment
C-F-1	C5.11	C5.21	C5.30	C5.41	No Category C-F-1 welds exist at Vermont Yankee.	C-F-1
	See Comment					See Comment
C-F-2	C5.51	C5.61	C5.70	C5.81	Section XI, Table IWC-2500-1 bases, including Vermont Yankee Request for Relief # ISI 04 which allows the use of Code Case N-662 which eliminates surface examination for Item C5.51 and C5.81 welds.	C-F-2
	820	0	0	15		835
Basis	7.5%	N/A	N/A	7.5%		Scheduled
Scheduled	62	0	0	1		63
C-G	C6.10	C6.20			No Category C-G welds exist at Vermont Yankee.	C-G
	See Comment					0
C-H	The examination selection and frequency for Category C-H is defined in Program Procedure PP 7034 "Inservice Inspection Pressure Test Program".					C-H
						See Comment

Table 3 Class 3 - Schedule Selection and Bases						
Category	**Item Number/Comments**					**Totals**
D-A	D1.10	D1.20	D1.30	D1.40	ASME Section XI, Table IWD-2500-1 bases. ASME Section XI, 1998 Edition, through 2000 Addenda, Table IWD-2500-1, Category D-A Note 3 states: :."All welded attachments selected for examination shall be those most subject to corrosion, as determined by the Owner, such as the welded attachments of the Service Water or Emergency Service Water systems. For multiple vessels of similar design, function and service, the welded attachments of only one of the multiple vessels shall be selected for examination. 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."	D-A
	2	76	6	0		84
Basis	10%	10%	10%	10%		Scheduled
Scheduled	1	8	1	0		10
D-B	The examination selection and frequency for Category D-B is defined in Program Procedure PP 7034 "Inservice Inspection Pressure Test Program".					D-B See Comment

Table 4 Supports - Schedule Selection and Bases						
Category	**Item Number**				**Comments**	**Totals**
F-A	F1.10	F1.20	F1.30	F1.40	Section XI, Table IWF-2500-1 bases. ASME Section XI, 1998 Edition, through 2000 Addenda, Table IWF-2500-1, Category F-A, Item F1.40, Note 3 states: "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."	F-A
	100	219	254	49		622
Basis	25%	15%	10%	See Comment		Scheduled
Scheduled	25	34	25	25		109