PA-LR

From: "Gill, Jeanne" <jgill2@entergy.com>
To: <jgr@nrc.gov>
Date: Wed, Oct 18, 2006 11:48 AM
Subject: FW: LRA Amendment 16

Subject: LRA Amendment 16

<<BVY 06-091.pdf>>

Mr. Rowley,

Please find attached a copy of the Vermont Yankee Nuclear Power Station submittal of our License Renewal Application Supplement for Amendment 16. Mike Hamer isn't here this week, but the letter is going out today in the US Mail.

I believe he usually e-mails you a copy preceding or correlating with the mailing.

Any question, please contact me.

Thanks you,

Jeanne A. Gill
Licensing Secretary
Entergy North - Vermont Yankee
802 258-4108

Mail Envelope Properties (45364CB7.B37 : 17 : 47927)

Subject:	FW: LRA Amendment 16
Creation Date	Wed, Oct 18, 2006 11:47 AM
From:	"Gill, Jeanne" <jgill2@entergy.com>
Created By:	jgill2@entergy.com

Recipients
nrc.gov
TWGWPO03.HQGWDO01
JGR (Jonathan Rowley)

Post Office	**Route**
TWGWPO03.HQGWDO01	nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	506	Wednesday, October 18, 2006 11:47 AM
TEXT.htm	1957	
BVY 06-091.pdf	1566535	
Mime.822	1	

Options

Expiration Date:	None
Priority:	Standard
ReplyRequested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

Junk Mail Handling Evaluation Results
Message is eligible for Junk Mail handling
This message was not classified as Junk Mail

Junk Mail settings when this message was delivered
Junk Mail handling disabled by User
Junk Mail handling disabled by Administrator
Junk List is not enabled
Junk Mail using personal address books is not enabled
Block List is not enabled

Entergy

Entergy Nuclear Operations, Inc.
Vermont Yankee
P.O. Box 0500
185 Old Ferry Road
Brattleboro, VT 05302-0500
Tel 802 257 5271

October 17, 2006

Docket No. 50-271
BVY 06-091
TAC No. MC 9668

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

Reference:
1. Letter, Entergy to USNRC, "Vermont Yankee Nuclear Power Station, License No. DPR-28, License Renewal Application," BVY 06-009, dated January 25, 2006.
2. Letter, Entergy to USNRC, "Vermont Yankee Nuclear Power Station, License No. DPR-28, License Renewal Application," BVY 06-076, dated August 10, 2006

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
License Renewal Application, Amendment 16

On January 25, 2006, Entergy Nuclear Operations, Inc. and Entergy Nuclear Vermont Yankee, LLC (Entergy) submitted the License Renewal Application (LRA) for the Vermont Yankee Nuclear Power Station (VYNPS) as indicated by Reference 1. The following attachments are provided to address NRC requests received during the audit phase of the license renewal process.

- Attachment 1: VYNPS One-Time Inspection List, Rev. 0.
- Attachment 2: VYNPS Bolting Integrity Program, Rev. 0.
- Attachment 3: VYNPS Metal Enclosed Bus Inspection Program, Rev. 0.
- Attachment 4: RAI 2.1-2 Response Supplement.

This submittal does not contain new regulatory commitments. Should you have any questions concerning this letter, please contact Mr. James DeVincentis at (802) 258-4236.

I declare under penalty of perjury that the foregoing is true and correct, executed on October 17, 2006.

Sincerely,

Ted A. Sullivan
Site Vice President
Vermont Yankee Nuclear Power Station

Attachment 1, 2 and 3
cc: See next page

cc: Mr. James Dyer, Director
U.S. Nuclear Regulatory Commission
Office O5E7
Washington, DC 20555-00001

Mr. Samuel J. Collins, Regional Administrator
U.S. Nuclear Regulatory Commission, Region 1
475 Allendale Road
King of Prussia, PA 19406-1415

Mr. Jack Strosnider, Director
U.S. Nuclear Regulatory Commission
Office T8A23
Washington, DC 20555-00001

Mr. Jonathan Rowley, Senior Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
MS-O-11F1
Rockville, MD 20853

Mr. James J. Shea, Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop O8G9A
Washington, DC 20555

USNRC Resident Inspector
Entergy Nuclear Vermont Yankee, LLC
P.O. Box 157 *(for mail delivery)*
Vernon, Vermont 05354

Mr. David O'Brien, Commissioner
VT Department of Public Service
112 State Street – Drawer 20
Montpelier, Vermont 05620-2601

Diane Curran, Esq.
Harmon, Curran, Spielberg & Eisenberg, LLP
1726 M Street, N.W., Suite 600
Washington, D.C. 20036

Attachment 1

Vermont Yankee Nuclear Power Station

License Renewal Application Supplement

Amendment 16

One-Time Inspection List, Rev. 0

VERMONT YANKEE NUCLEAR POWER STATION
LICENSE RENEWAL APPLICATION, AMENDMENT 16
ATTACHMENT 1
One-Time Inspection Activities

As described in License Renewal Application (LRA) Section B.1.21, the One-Time Inspection Program at VYNPS is a new program that will be implemented prior to the period of extended operation. The program will be comparable to the program described in NUREG-1801, Section XI.M32, One-Time Inspection. The one-time inspection activity for small bore piping in the reactor coolant system and associated systems that form the reactor coolant pressure boundary, will also be comparable to the program described in NUREG-1801, Section XI.M35, *One-Time Inspection of ASME Code Class I Small-Bore Piping*. The VYNPS program will be consistent with the program elements described in NUREG-1801.

The program will include activities to verify effectiveness of aging management programs and activities to confirm the absence of aging effects as described below.

Water chemistry control programs	One-time inspection activity will verify the effectiveness of the water chemistry control aging management programs by confirming that unacceptable cracking, loss of material, and fouling is not occurring.
Oil analysis program	One-time inspection activity will verify the effectiveness of the oil analysis program by confirming that unacceptable cracking, loss of material, and fouling is not occurring.
Diesel fuel monitoring	One-time inspection activity will verify the effectiveness of the diesel fuel monitoring program by confirming that unacceptable cracking and loss of material is not occurring.
Internal carbon steel surfaces exposed to indoor air in the standby gas treatment system	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.
Internal surfaces of carbon steel and copper alloy components in the potable water containing untreated water	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.
Carbon steel retired in place (RIP) system components in the area around containment penetration X-21	One-time inspection activity will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted.

Small bore piping in the reactor coolant system and associated systems that form the reactor coolant pressure boundary	One-time inspection activity will confirm that cracking, loss of material, and reduction of fracture toughness are not occurring or are so insignificant that an aging management program is not warranted. The program includes destructive or non-destructive examination of one (1) socket welded connection using techniques proven by past industry experience to be effective for the identification of cracking in small bore socket welds. Should an inspection opportunity not occur (e.g., socket weld failure or socket weld replacement), a susceptible small-bore socket weld will be examined either destructively or non-destructively prior to entering the period of extended operation.
RV flange leakoff line	One-time inspection activity will confirm that cracking is not occurring or is so insignificant that an aging management program is not warranted.
Main steam flow restrictors (CASS)	One-time inspection activity will confirm that loss of material, cracking, and reduction of fracture toughness are not occurring or are so insignificant that an aging management program is not warranted.
Non-piping components without metal fatigue analysis; RHR heat exchanger shell, RHR pump casing, HPCI turbine casing, RCIC turbine casing	One-time inspection activity will confirm that cracking is not occurring or is so insignificant that an aging management program is not warranted.

Revisions to information presented in the LRA are the result of the following items.

Audit Items 224, 225, 226, 229, 293, 294, 315, 369 (Amendment 11, letter BVY 06-079, 8/22/06) state that the One-Time Inspection program will be revised to include activities to confirm the effectiveness of the Oil Analysis and Diesel Fuel Monitoring programs.

Audit Items 300 and 304 (Amendment 11, letter BVY 06-079, 8/22/06) and RAI 3.3.1-68-K-03 (Amendment 12, letter BVY 06-083, 9/5/06) state that the "untreated water" environment for the carbon steel and copper alloy radwaste system components in LRA Table 3.3.2-13-32 is originally treated water that may now contain contaminants that could result in an aggressive environment. Therefore, the aging management program will be changed from One-Time Inspection to Periodic Surveillance and Preventive Maintenance for managing loss of material for carbon steel and copper alloy components in the radwaste system exposed to untreated water (LRA Table 3.3.2-13-32).

Audit Item 330 and Commitment 16 (Amendment 11, letter BVY 06-079, 8/22/06) state that the One-Time Inspection program will also include destructive or non-destructive examination of one (1) socket welded connection using techniques proven by past industry experience to be effective for the identification of cracking in small bore socket welds. Should an inspection

opportunity not occur (e.g., socket weld failure or socket weld replacement), a susceptible small-bore socket weld will be examined either destructively or non-destructively prior to entering the period of extended operation.

Audit item 309 (Amendment 11, letter BVY 06-079, 8/22/06) indicates that a one-time inspection activity will be implemented for the RHR heat exchanger shell, RHR pump casing, HPCI turbine casing and RCIC turbine casing since they are non-piping components without metal fatigue analysis.

Attachment 2

Vermont Yankee Nuclear Power Station

License Renewal Application Supplement

Amendment 16

Bolting Integrity Program, Rev. 0

VERMONT YANKEE NUCLEAR POWER STATION
LICENSE RENEWAL APPLICATION, AMENDMENT 16
ATTACHMENT 2
Bolting Integrity Program

License Renewal Application, Appendices A.2.1.37 and B.1.31 are added to describe the Bolting Integrity Program. The program basis document that provides a ten-element comparison to NUREG-1801 is also included. This program applies to all bolting exposed to air with aging effects requiring management except reactor vessel closure studs.

LRA APPENDIX A (UFSAR Supplement)

A.2.1.37 Bolting Integrity Program

The Bolting Integrity Program relies on recommendations for a comprehensive bolting integrity program, as delineated in NUREG-1339, and industry recommendations, as delineated in the Electric Power Research Institute (EPRI) NP-5769, with the exceptions noted in NUREG-1339 for safety-related bolting. The program relies on industry recommendations for comprehensive bolting maintenance, as delineated in EPRI TR-104213 for pressure retaining bolting and structural bolting.

LRA APPENDIX B

B.1.33 Bolting Integrity

Program Description

The Bolting Integrity Program at VYNPS is comparable to the program described in NUREG-1801, Section XI.M18, Bolting Integrity.

The program relies on recommendations for a comprehensive bolting integrity program, as delineated in NUREG-1339, and industry recommendations, as delineated in the Electric Power Research Institute (EPRI) NP-5769, with the exceptions noted in NUREG-1339 for safety-related bolting. The program relies on industry recommendations for comprehensive bolting maintenance, as delineated in EPRI TR-104213 for pressure retaining bolting and structural bolting.

NUREG-1801 Consistency

The Bolting Integrity Program at VYNPS is consistent with the program described in NUREG-1801, Section XI.M18, Bolting Integrity.

Exceptions to NUREG-1801

None

Enhancements

The following enhancement will be implemented prior to the period of extended operation.

Attributes Affected	Enhancements
2. Preventive Actions	Enhance procedures to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC.

Operating Experience

Operating experience reviews did not identify cracking or loss of preload as aging effects requiring management for pressure boundary bolting. Although cracking and loss of preload are not aging effects requiring management for the period of extended operation, plant procedures implement the recommendations of NUREG-1339, "Resolution to Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," for pressure boundary bolting in the scope of license renewal. Plant procedures address material and lubricant selection, design standards, and good bolting maintenance practices in accordance with EPRI 5067, Good Bolting Practices.

Conclusion

The Bolting Integrity Program uses existing techniques with demonstrated capability and a proven industry record to provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

BOLTING INTEGRITY PROGRAM BASIS DOCUMENT

Program Description

The Bolting Integrity Program at VYNPS is comparable to the program described in NUREG-1801, Section XI.M18, Bolting Integrity. The program relies on recommendations for a comprehensive bolting integrity program, as delineated in NUREG-1339, and industry recommendations, as delineated in the Electric Power Research Institute (EPRI) NP-5769, with the exceptions noted in NUREG-1339 for safety-related bolting. The program relies on industry recommendations for comprehensive bolting maintenance, as delineated in EPRI TR-104213 for pressure retaining bolting and structural bolting.

This program is credited in the following.

AMRM-01, Standby Liquid Control System
AMRM-02, Residual Heat Removal System
AMRM-03, Core Spray System
AMRM-04, Automatic Depressurization System

AMRM-05, High Pressure Coolant Injection System
AMRM-06, Reactor Core Isolation Cooling and Condensate Storage and Transfer Systems
AMRM-07, Standby Gas Treatment System
AMRM-08, Primary Containment Atmosphere Control and Containment Atmosphere Dilution Systems
AMRM-11, Service Water System
AMRM-12, Reactor Building Closed Cooling Water System
AMRM-13, Emergency Diesel Generator System
AMRM-14, Fuel Pool Cooling Systems
AMRM-15, Fuel Oil System
AMRM-16, Instrument Air System
AMRM-17, Fire Protection – Water System
AMRM-18, Fire Protection – CO_2 System
AMRM-19, Heating, Ventilation and Air Conditioning System
AMRM-20, Primary Containment Penetrations
AMRM-21, John Deere Diesel
AMRM-26, Main Condenser and MSIV Leakage Pathway System
AMRM-30, Nonsafety-Related Systems and Components Affecting Safety-Related Systems
AMRM-33, Reactor Coolant System Pressure Boundary

Evaluation

Scope of Program

a. NUREG-1801, Scope

"This program covers bolting within the scope of license renewal, including: 1) safety-related bolting, 2) bolting for nuclear steam supply system (NSSS) component supports, 3) bolting for other pressure retaining components, including nonsafety-related bolting, and 4) structural bolting (actual measured yield strength ≥150 ksi). The aging management of reactor head closure studs is addressed by XI.M3, and is not included in this program. The staff's recommendations and guidelines for comprehensive bolting integrity programs that encompass all safety-related bolting are delineated in NUREG-1339, which include the criteria established in the 1995 edition through the 1996 addenda of ASME Code Section XI. The industry's technical basis for the program for safety-related bolting and guidelines for material selection and testing, bolting preload control, ISI, plant operation, and maintenance, and evaluation of the structural integrity of bolted joints, are outlined in EPRI NP-5769, with the exceptions noted in NUREG-1339. For other bolting, this information is set forth in EPRI TR-104213."

b. Comparison to VYNPS Scope

The Bolting Integrity Program applies to bolting and torquing practices of safety-related and nonsafety-related bolting for pressure retaining components, NSSS component supports, and structural joints. The program

addresses all bolting regardless of size (except the reactor vessel closure studs which are addressed by the Reactor Vessel Closure Studs Program). Guidance for the program is NUREG 1339 which refers to EPRI NP-5769 and EPRI NP-5067 for technical basis. For other (structural) bolting, guidelines of EPRI TR-104213 are followed.
(Ref. OP 0212)

VYNPS scope is consistent with NUREG-1801.

Preventive Actions

a. NUREG-1801, Preventive Actions

"Selection of bolting material and the use of lubricants and sealants is in accordance with the guidelines of EPRI NP-5769, and the additional recommendations of NUREG-1339, to prevent or mitigate degradation and failure of safety-related bolting (see element 10, below). NUREG-1339 takes exception to certain items in EPRI NP-5769, and recommends additional measures with regard to them. Bolting replacement activities include proper torquing of the bolts and checking for uniformity of the gasket compression after assembly. Maintenance practices require the application of an appropriate preload, based on EPRI documents."

b. Comparison to VYNPS Preventive Actions

Preventive actions include proper selection of bolting material, use of appropriate lubricants and sealants, and use of appropriate torque values and sequencing in accordance with guidelines of EPRI NP-5067, "Good Bolting Practices" as recommended by EPRI NP-5769 and NUREG-1339. Torque values are monitored when the bolted closure is assembled. Maintenance personnel visually inspect components used in bolted closures to assess their general condition prior to and during assembly along with verification of gasket compression following assembly.

Exceptions to EPRI NP-5769 noted in NUREG-1339 include 1) the indictment of MoS_2 as a lubricant deserves more emphasis than was given in NP-5769, and 2) actual yield strength should be used in lieu of specified minimum yield strength in selecting materials for low susceptibility to SCC. MoS_2 is prohibited as a lubricant for bolting at VYNPS and actual yield strength is considered in selecting bolting materials with low susceptibility to SCC.
(Ref. OP 0212, OP 1201; OP 4200; OP 4201; OP 4222; OP 5223; and RP 5289)

Enhancement: Procedures will be enhanced to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC.
(Ref. OP 0212)

VYNPS preventive actions are consistent with NUREG-1801.

Bolting Integrity Program

Parameters Monitored/Inspected

a. NUREG-1801, Parameters Monitored/Inspected

"This program monitors the effects of aging on the intended function of bolting. Specifically, bolting for safety-related pressure retaining components is inspected for leakage, loss of material, cracking, and loss of preload/loss of prestress. Bolting for other pressure retaining components is inspected for signs of leakage.

High strength bolts (actual yield strength >150 ksi) used in NSSS component supports are monitored for cracking. Structural bolts and fasteners are inspected for indication of potential problems including loss of material, cracking, loss of coating integrity, and obvious signs of corrosion, rust, etc."

b. Comparison to VYNPS Parameters Monitored/Inspected

This program monitors bolting by periodic inspections for leakage and loss of material. Bolting is also inspected for cracking and loss of preload/loss of prestress.
(Ref. Attachments 9.1 and 9.2, EN-DC-178; Section 4.3, PP 7030)

This program monitors the effects of aging on structural bolts and fasteners by periodic inspections for loss of material, loss of coating integrity, and obvious signs of corrosion. Structural bolts and fasteners are also inspected for cracking.
(Ref. Attachments 9.1 and 9.2, EN-DC-178; Section 4.3, PP 7030)

VYNPS parameters monitored and inspected are consistent with NUREG-1801.

Detection of Aging Effects

a. NUREG-1801, Detection of Aging Effects

"Inspection requirements are in accordance with the ASME Section XI, Tables IWB 2500-1, IWC 2500-1 and IWD 2500-1 editions endorsed in 10 CFR 50.55a(b)(2) and the recommendations of EPRI NP-5769. For Class 1 components, Table IWB 2500-1, Examination Category B-G-1, for bolts greater than 2-inches in diameter, specifies volumetric examination of studs and bolts and visual VT-1 examination of surfaces of nuts, washers, bushings, and flanges. Examination Category B-G-2, for bolts 2-inches or smaller, requires only visual VT-1 examination of surfaces of bolts, studs, and nuts. For Class 2 components, Table IWC 2500-1, Examination Category C-D, for bolts greater than 2-inches in diameter, requires volumetric examination of studs and bolts. Examination Categories B-P, C-H, and D-B require visual examination (IWA-5240) during system leakage testing of all pressure-retaining Class 1, 2 and 3 components, according to Tables IWB 2500-1, IWC 2500-1, and IWD 2500-1, respectively. In addition, degradation

of the closure bolting due to crack initiation, loss of prestress, or loss of material due to corrosion of the closure bolting would result in leakage. The extent and schedule of inspections, in accordance with Tables IWB 2500-1, IWC 2500-1, and IWD 2500-1, combined with periodic system walkdowns, assure detection of leakage before the leakage becomes excessive.

For other pressure retaining bolting, periodic system walkdowns assure detection of leakage before the leakage becomes excessive.

High strength structural bolts and fasteners (actual yield strength 150 ksi) for NSSS component supports, may be subject to stress corrosion cracking (SCC). For this type of high strength structural bolts that are potentially subjected to SCC, in sizes greater than 1- inch nominal diameter, volumetric examination comparable to that of Examination Category B-G-1 is required in addition to visual examination. This requirement may be waived with adequate plant-specific justification. Structural bolts and fasteners (actual yield strength < 150 ksi) both inside and outside containment are inspected by visual inspection (e.g., Structures Monitoring Program or equivalent). In addition to visual and volumetric examination, degradation of these bolts and fasteners may be detected and measured by removing the bolt/fastener, a *proof test by tension or torquing, in situ ultrasonic tests, or a hammer test.* If these bolts and fasteners are found cracked and/or corroded, a closer inspection is performed to assess extent of corrosion. An appropriate technique is selected on the basis of the bolting application and the applicable code."

b. Comparison to VYNPS Detection of Aging Effects

The VYNPS program includes periodic visual inspections of pressure-retaining components (including closure bolting) for signs of leakage that may be due to crack initiation, loss of prestress, or loss of material due to corrosion. Inspections are conducted in accordance with ASME Section XI requirements for Class 1, 2 and 3 bolted closures and the recommendations of EPRI NP-5769. Inspection of structural and component support bolting within the scope of license renewal is periodically performed.
(Ref. Section 5, EN-DC-178; Section 4, PP 7015; and PP 7030)

This program is credited with managing the following aging effects.

- loss of material for external bolting (AMRM-01, 02, 03, 04, 05, 06, 07, 08, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 26, 30, 33)

VYNPS detection of aging effects is consistent with NUREG-1801.

Monitoring and Trending

a. NUREG-1801, Monitoring and Trending

"The inspection schedules of ASME Section XI are effective and ensure timely detection of applicable aging effects. If bolting connections for pressure retaining components (not covered by ASME Section XI) is *(sic)* reported to be leaking, then it may be inspected daily. If the leak rate does not increase, the inspection frequency may be decreased to biweekly or weekly."

b. Comparison to VYNPS Monitoring and Trending

Inspections per ASME Section XI are conducted per the Inservice Inspection Program schedule. Operational, on-line, leakage control may be necessary with adjustments in torque values possible upon engineering evaluation. The VYNPS Corrective Action Program provides assurance that trends entailing repeat failures are identified, inspection frequencies adjusted, and other necessary corrective actions taken.
(Ref. OP 0212; PP 7015)

VYNPS monitoring and trending is consistent with NUREG-1801.

Acceptance Criteria

a. NUREG-1801, Acceptance Criteria

"Any indications of aging effects in ASME pressure retaining bolting are evaluated in accordance with Section XI of the ASME Code. For other pressure retaining bolting, NSSS component support bolting and structural bolting, indications of aging should be dispositioned in accordance with the corrective action process."

b. Comparison to VYNPS Acceptance Criteria

The effects of aging on ASME pressure retaining bolting are evaluated in accordance with Section XI of the ASME Code. Other pressure retaining and structural bolting is inspected and evaluated as part of the corrective action process.
(Ref. EN-DC-178, PP 7015, PP 7030)

VYNPS acceptance criteria are consistent with NUREG-1801.

Corrective Actions

a. NUREG-1801, Corrective Actions

"Replacement of ASME pressure retaining bolting is performed in accordance with appropriate requirements of Section XI of the ASME Code, as subject to the additional guidelines and recommendations of EPRI NP-5769.

Replacement of other pressure retaining bolting (i.e., non-Class 1 bolting) and disposition of degraded structural bolting is performed in accordance with the guidelines and recommendations of EPRI TR-104213. Replacement of NSSS component support bolting is performed in accordance with EPRI NP-5769. As discussed in the appendix to this report, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the corrective actions."

b. Comparison to VYNPS Corrective Actions

Repair and replacement criteria are specified in accordance with appropriate requirements of Section XI of the ASME Code, EPRI NP-5769, and EPRI TR-104213. The VYNPS Corrective Action Program is also applicable.
(Ref. OP 0212, PP 7015)

VYNPS corrective actions are consistent with NUREG-1801.

Confirmation Process

This attribute is discussed in Section 2.0, Background.

Administrative Controls

This attribute is discussed in Section 2.0, Background.

Operating Experience

a. NUREG-1801, Operating Experience

"Degradation of threaded bolting and fasteners in closures for the reactor coolant pressure boundary has occurred from boric acid corrosion, SCC, and fatigue loading (NRC IE Bulletin 82-02, NRC Generic Letter 91-17). SCC has occurred in high strength bolts used for NSSS component supports (EPRI NP-5769). The bolting integrity program developed and implemented in accordance with commitments made in response to NRC communications on bolting events have provided an effective means of ensuring bolting reliability. These programs are documented in EPRI NP-5769 and TR-104213 and represent industry consensus.

Degradation related failures have occurred in downcomer Tee-quencher bolting in BWRs designed with drywells (ADAMS Accession Number ML050730347). Leakage from bolted connections has been observed in reactor building closed cooling systems of BWRs. (LER 50-341/2005-001).

The applicant is to evaluate applicable operating experience to support the conclusion that the effects of aging are adequately managed."

b. Comparison to VYNPS Operating Experience

Operating experience reviews did not identify cracking or loss of preload as aging effects requiring management for pressure boundary bolting. Although cracking and loss of preload are not aging effects requiring management for the period of extended operation, plant procedures implement the recommendations of NUREG-1339, "Resolution to Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," for pressure boundary bolting in the scope of license renewal. Plant procedures address material and lubricant selection, design standards, and good bolting maintenance practices in accordance with EPRI 5769.

For more information on applicable operating experience, see VYNPS Report LRPD-05, Operating Experience Review Results.

References

EN-DC-178, Rev. 1, System Walkdowns

EPRI NP-5067, Good Bolting Practices

EPRI NP-5769, Degradation and Failure of Bolting in Nuclear Power Plants

EPRI TR-104213, Bolted Joint Maintenance and Applications Guide

OP 0212, Rev. 04, General Bolting Guidelines

OP 1201, Rev. 27, Assembly of the Reactor and Drywell Systems

OP 4200, Rev. 24, Main Steam Relief Valve Removal, Installation, Testing

OP 4201, Rev. 24, Removal, Installation, and Testing of Main Steam Safety Valves

OP 4222, Rev. 04, Disassembly and Inspection of Check Valves

OP 5223, Rev. 20, Emergency Diesel Generator Maintenance

PP 7015, Rev. 05, Vermont Yankee Inservice Inspection Program

PP 7030, Rev. 00, LPC 01, Structures Monitoring Program Procedure

RP 5289, Rev. 01, Removal/Installation of Condensate Demineralizer Powdex Vessel Cover, Gasket, and Filter Elements

Summary

The Bolting Integrity Program uses existing techniques with demonstrated capability and a proven industry record to provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their

intended functions consistent with the current licensing basis for the period of extended operation.

The Bolting Integrity Program at VYNPS is consistent with the program described in NUREG-1801, Section XI.M18, Bolting Integrity.

The following enhancement will be initiated prior to the period of extended operation.

Attributes Affected	Enhancement
2. Preventive Actions	Enhance procedures to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC.

Attachment 3

Vermont Yankee Nuclear Power Station

License Renewal Application Supplement

Amendment 16

Metal Enclosed Bus Inspection Program, Rev. 0

VERMONT YANKEE NUCLEAR POWER STATION
LICENSE RENEWAL APPLICATION, AMENDMENT 16
ATTACHMENT 3
Metal Enclosed Bus Inspection Program

The License Renewal Application (LRA) Appendices A.2.1.38 and B.1.32 are added describing the Metal-Enclosed Bus (MEB) Inspection Program. The program basis document that provides a ten-element comparison to NUREG-1801 is also included. This program applies to the isophase bus located between the main transformer and the unit auxiliary transformer.

LRA APPENDIX A (UFSAR Supplement)

A.2.1.38 Metal-Enclosed Bus Inspection Program

Under the Metal-Enclosed Bus Inspection Program, internal portions of the isophase bus which runs between the main transformer and the unit auxiliary transformer are inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. Internal bus supports are inspected for structural integrity and cracking. Enclosure assemblies are visually inspected for evidence of loss of material and, where applicable, enclosure assembly elastomers are inspected to manage cracking and change in material properties.

LRA APPENDIX B

B.1.32 Metal-Enclosed Bus Inspection

Program Description

The Metal-Enclosed Bus Inspection Program at VYNPS will be comparable to the program described in NUREG-1801, Section XI.E4, Metal Enclosed Bus.

Under the Metal-Enclosed Bus Inspection Program, internal portions of the isophase bus which runs between the main transformer and the unit auxiliary transformer are inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. Internal bus supports are inspected for structural integrity and signs of cracks. Enclosure assemblies are visually inspected for evidence of loss of material and, where applicable, enclosure assembly elastomers are inspected to manage cracking and change in material properties.

This program will be initiated prior to the period of extended operation.

NUREG-1801 Consistency

The Metal-Enclosed Bus Inspection Program at VYNPS will be comparable to the program described in NUREG-1801, Section XI.E4, Metal Enclosed Bus, with exceptions.

Exceptions to NUREG-1801

The Metal-Enclosed Bus Inspection Program at VYNPS will be comparable to the program described in NUREG-1801, Section XI.E4, Metal Enclosed Bus, with the following exceptions.

Attributes Affected	Exception
3. Parameters Monitored/Inspected 4. Detection of Aging Effects	MEB enclosure assemblies will be inspected in addition to internal surfaces. (Note 1)
3. Parameters Monitored/Inspected 4. Detection of Aging Effects	Bus insulation will not be inspected or monitored since the isophase bus which runs between the main transformer and the unit auxiliary transformer does not have bus insulation.

Exception Notes

1. Inspection of MEB enclosure assemblies under the Metal-Enclosed Bus Inspection Program assures that effects of aging will be identified prior to loss of intended function.

Enhancements

None.

Operating Experience

The Metal-Enclosed Bus Inspection Program at VYNPS is a new program. The program is based on the program described in NUREG-1801 which in turn is based on industry operating experience. Industry operating experience and plant operating experience will be considered during program implementation.

Conclusion

The Metal-Enclosed Bus Inspection Program will be effective for managing aging effects since it will incorporate appropriate monitoring techniques. The Metal-Enclosed Bus Inspection Program will provide reasonable assurance that the effects of aging will be managed such that the applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

Program Basis Document

Metal-Enclosed Bus Inspection Program

Program Description

The Metal-Enclosed Bus Inspection Program at VYNPS will be comparable to the program described in NUREG-1801, Section XI.E4, Metal Enclosed Bus.

Under the Metal-Enclosed Bus Inspection Program, internal portions of the isophase bus which runs between the main transformer and the unit auxiliary transformer are inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. Internal bus supports are inspected for structural integrity and

signs of cracks. Enclosure assemblies are visually inspected for evidence of loss of material and, where applicable, enclosure assembly elastomers are inspected to manage cracking and change in material properties.

This program will be implemented prior to the period of extended operation.

This program is credited in the following.

AMRE-01, Electrical Screening and Aging Management Reviews

Evaluation

Scope of Program

a. NUREG-1801, Rev. 01, Scope

"This program applies to MEBs within the scope of license renewal."

b. Comparison to VYNPS Scope

This program will apply to MEBs within the scope of license renewal; specifically, isophase bus which runs between the main transformer and the unit auxiliary transformer.

VYNPS scope will be consistent with NUREG-1801.

Preventive Actions

a. NUREG-1801, Rev. 01, Preventive Actions

"This is an inspection program and no actions are taken as a part of this program to prevent or mitigate aging degradation."

b. Comparison to VYNPS Preventive Actions

The VYNPS program will be an inspection program without preventive actions.

VYNPS preventive actions will be consistent with NUREG-1801.

Parameters Monitored/Inspected

a. NUREG-1801, Rev. 01, Parameters Monitored/Inspected

"A sample of accessible bolted connections will be checked for loose connection. Alternatively, bolted connections covered with heat shrink tape, sleeving, insulating boots, etc., may be visually inspected for insulation material surface anomalies. This program provides for the inspection of the internal portion of the MEBs for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation will be

inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. The internal bus supports will be inspected for structural integrity and signs of cracks."

b. Comparison to VYNPS Parameters Monitored/Inspected

Internal portions of the MEBs will be inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. Internal bus supports will be inspected for structural integrity and signs of cracks. During inspection, the isophase bus connections to the main transformer and to the unit auxiliary transformer are disconnected. The isophase bus that is in scope for license renewal has no bolted connections once the transformers have been disconnected.

Enclosure assemblies will be visually inspected for evidence of loss of material and, where applicable, enclosure assembly elastomers will be inspected to manage cracking and change in material properties.

VYNPS parameters monitored and inspected will be consistent with NUREG-1801 except for bus insulation. For isophase bus there is no bus insulation. Therefore, the MEB program will have an exception to NUREG-1801.

Detection of Aging Effects

a. NUREG-1801, Rev. 01, Detection of Aging Effects

"A sample of accessible bolted connections will be checked for loose connection by using thermography or by measuring connection resistance using a low range ohmmeter. MEB internal surfaces will be visually inspected for aging degradation of insulating material and for foreign debris and excessive dust buildup, and evidence of moisture intrusion. Bus insulation will be visually inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. Internal bus supports will be visually inspected for structural integrity and signs of cracks. This program will be completed before the period of extended operation and every 10 years thereafter provided visual inspection is not used to check bolted connections. A 10 year inspection interval will provide two data points during a 20-year period, which can be used to characterize the degradation rate. This is an adequate period to preclude failures of the MEBs since experience has shown that aging degradation is a slow process.

As an alternative to thermography or measuring connection resistance of bolted connections, for the accessible bolted connections that are covered with heat shrink tape, sleeving, insulating boots, etc., the applicant may use visual inspection of insulation material to detect surface anomalies, such as discoloration, cracking, chipping or surface contamination. When this alternative visual inspection is used to check bolted connections, the first

inspection will be completed before the period of extended operation and every five years thereafter."

b. Comparison to VYNPS Detection of Aging Effects

The isophase bus will be visually inspected. Internal portions of the bus enclosures will be inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. Internal bus supports will be inspected for structural integrity and signs of cracks.

Enclosure assemblies will be visually inspected for evidence of loss of material and, where applicable, enclosure assembly elastomers will be inspected to manage cracking and change in material properties.

An inspection will occur before the end of the initial 40-year license term and every 5 years thereafter.

VYNPS detection of aging effects will be consistent with NUREG-1801 except for bus insulation. For isophase bus there is no bus insulation. Therefore, this will be an exception to NUREG-1801.

Also, MEB enclosure assemblies will be inspected in addition to internal surfaces.

Monitoring and Trending

a. NUREG-1801, Rev. 01, Monitoring and Trending

"Trending actions are not included as part of this program because the ability to trend inspection results is limited. However, results that are trendable provide additional information on the rate of degradation."

b. Comparison to VYNPS Monitoring and Trending

Trending actions will not be a part of this program. This program will inspect and monitor for potential degradation of metal-enclosed bus.

VYNPS monitoring and trending will be consistent with NUREG-1801.

Acceptance Criteria

a. NUREG-1801, Rev. 01, Acceptance Criteria

"Bolted connections need to be below the maximum allowed temperature for the application when thermography is used or a low resistance value appropriate for the application when resistance measurement is used. MEBs are to be free from unacceptable visual indications of surface anomalies, which suggest that conductor insulation degradation exists. In addition no unacceptable indication of corrosion, cracks, foreign debris, excessive dust

buildup or evidence of moisture intrusion is to exist. An unacceptable indication is defined as a noted condition or situation that, if left unmanaged, could lead to a loss of intended function.

When the visual inspection alternative for bolted connections is used, the absence of discoloration, cracking, chipping or surface contamination will provide positive indication that the bolted connections are not loose."

b. Comparison to VYNPS Acceptance Criteria

MEBs will be free from unacceptable visual indications of surface anomalies. In addition, unacceptable indication of corrosion, cracks, foreign debris, excessive dust buildup or evidence of moisture intrusion will not exist. An unacceptable indication is defined as a noted condition or situation that, if left unmanaged, could lead to a loss of intended function.

Visual inspections of the isophase bus will provide positive indication that the phase bus, supports and bus enclosure are acceptable. The bolted connections at the main transformer and unit auxiliary transformer will be inspected and reconnected per the manufacturer's recommendations.

VYNPS acceptance criteria will be consistent with NUREG-1801.

Corrective Actions

a. NUREG-1801, Rev. 01, Corrective Actions

"Further investigation and evaluation are performed when the acceptance criteria are not met. Corrective actions may include but are not limited to cleaning, drying, increased inspection frequency, replacement, or repair of the affected MEB components. If an unacceptable condition or situation is identified, a determination is made as to whether the same condition or situation is applicable to other accessible or inaccessible MEBs. As discussed in the appendix to this report, the staff finds the requirement of 10 CFR Part 50, Appendix B, acceptable to address corrective actions."

b. Comparison to VYNPS Corrective Actions

Pursuant to 10 CFR Part 50, Appendix B, further investigation and evaluation will be performed when an acceptance criterion is not met. Corrective actions may include but are not limited to cleaning, drying, increased inspection frequency, replacement, or rework of the affected bus duct components. If an unacceptable condition or situation is identified, a determination will be made as to whether the same condition or situation is applicable to other accessible or inaccessible bus ducts.

VYNPS corrective actions will be consistent with NUREG-1801.

Metal Enclosed Bus Inspection Program

Confirmation Process

This attribute is discussed in Section 2.0, Background.

Administrative Controls

This attribute is discussed in Section 2.0, Background.

Operating Experience

a. NUREG-1801, Rev. 01, Operating Experience

"Industry experience has shown that failures have occurred on MEBs caused by cracked insulation and moisture or debris buildup internal to the MEB. Experience has also shown that bus connections in the MEBs exposed to appreciable ohmic heating during operation may experience loosening due to repeated cycling of connected loads."

b. Comparison to VYNPS Operating Experience

The Metal-Enclosed Bus Inspection Program at VYNPS is a new program. The program is based on the program described in NUREG-1801 which in turn is based on industry operating experience. Industry operating experience and plant operating experience will be considered during program implementation.

References

None

Summary

The Metal-Enclosed Bus Inspection Program will be effective for managing aging effects since it will incorporate appropriate monitoring techniques. The Metal-Enclosed Bus Inspection Program will provide reasonable assurance that the effects of aging will be managed such that the applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

The program attributes of the Metal-Enclosed Bus Inspection Program at VYNPS will be consistent with the program attributes described in NUREG-1801, Section XI.E4, Metal Enclosed Bus, with the following exceptions.

Attributes Affected	Exception
3. Parameters Monitored/Inspected 4. Detection of Aging Effects	MEB enclosure assemblies will be inspected in addition to internal surfaces. (Note 1)

Metal Enclosed Bus Inspection Program

Attributes Affected	Exception
3. Parameters Monitored/Inspected 4. Detection of Aging Effects	Bus insulation will not be inspected or monitored since the isophase bus which runs between the main transformer and the unit auxiliary transformer does not have bus insulation.

Exception Notes

1. Inspection of MEB enclosure assemblies under the Metal-Enclosed Bus Inspection Program assures that effects of aging will be identified prior to loss of intended function.

Attachment 4

Vermont Yankee Nuclear Power Station

License Renewal Application Supplement

Amendment 16

RAI 2.1-2 Response Supplement

VERMONT YANKEE NUCLEAR POWER STATION
LICENSE RENEWAL APPLICATION, AMENDMENT 16
ATTACHMENT 4

RAI 2.1-2 CLARIFICATION

The question and response provided below are the result of a follow-up question regarding issues discussed in RAI 2.1-2 [BVY 06-076, LRA Amendment 8] to clarify the VYNPS position on equipment retired in place.

Question:

Please provide a evaluation and technical basis for the exclusion of components in the Retired in Place (RIP) system for from 10CFR54.4(a)(2) scope for spatial interaction.

Response:

The components in this system are classified as "retired in place."
A discussion of each RIP system mechanical component located in spaces containing safety-related components is as follows:

RIP Components	Original classification	Physical location	Discussion
P-200-1B P-200-1C	Spray pond blow down pumps	North of west cooling tower	Piping to pumps has been removed.
V72-36A / B / C / D and associated piping	Service air	Drywell	Piping to these air valves has been capped.
V16-19-32A / B V16-19-53 / 54 V16-19-54A / B / C and associated piping	Atmosphere control	Reactor Bldg (CRD Pump Room)	These instrument air supply lines to the PCAC system are isolated with several closed valves.
V12-101 / 102 / 105 V12-106 / 109 / 110 V12-112 / 116 ECP Test Vessel DCP-1 / 2 / 3 / 4 / 5 and associated piping	Electrochemical Potential (ECP) Test system	Reactor Bldg (RWCU Pump Room)	Piping is cut and capped.
V70-197A / B / C V70-197D / E / F and associated piping	RBCCW Cooling supply to ECP Test Vessel	Reactor Bldg (RWCU Pump Room)	Piping is isolated with two closed valves on both the supply and return lines.

None of this equipment provides a source of spray since it is no longer pressurized. The only remaining concern would be leakage due to corrosion of the components.
As noted in *Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 2006 1010639 (The Mechanical Tools)*, oxygen and moisture are required for the corrosion of metals to occur. As can be seen by the information presented in the discussion columns above any residual fluid that may be

remaining in these lines has at a minimum has been isolated from potential makeup fluid sources such that there can be no replenishment of oxygen. When the components were initially isolated the oxygen in any residual fluid was removed by the buildup of an initial corrosion layer in these lines. Without a continuing source of oxygen no significant additional corrosion can occur. Also, with the absence of flow, there is no mechanism for removal of the initial corrosion layer which provides a layer of protection for the components in a stagnant deoxygenated environment.

Therefore, these components are not in scope for spatial interaction per 10CFR54.4(a)(2).