Entergy

Entergy Nuclear Operations, Inc.
Pilgrim Station
600 Rocky Hill Road
Plymouth, MA 02360

July 19, 2006

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

SUBJECT: Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
Docket No. 50-293 License No. DPR-35

License Renewal Application Amendment 5

REFERENCE: Entergy letter, License Renewal Application, dated January 25, 2006 (2.06.003)

LETTER NUMBER: 2.06.064

Dear Sir or Madam:

In the referenced letter, Entergy Nuclear Operations, Inc. applied for renewal of the Pilgrim Station operating license.

During the weeks of May 22, 2006 and June 19, 2006, the NRC performed on-site audits of the License Renewal Application. As a result of these audits, clarifications to the License Renewal Application have been developed and are provided as Attachments B and C to this letter. Attachment A consists of the revised list of regulatory commitments. Attachment B consists of changes to the License Renewal Application. Attachment C consists of the Bolting Integrity Program that is added as a supplement to License Renewal Application Appendix A (UFSAR Supplement) and Appendix B (Aging Management Programs and Activities).

Please contact Mr. Bryan Ford, at (508) 830-8403, if you have any questions regarding this subject.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 19, 2006.

Bryan Ford
Acting Director, Nuclear Safety Assessment

DWE/bg

Attachments: (as stated)

cc: see next page

A119

cc: with Attachments

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ATTACHMENT A to Letter 2.06.064
(7 pages)

Revised List of Regulatory Commitments

Revised List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	Related LRA Section No./ Comments
1	Implement the Buried Piping and Tanks Inspection Program as described in LRA Section B.1.2.	June 8, 2012	Letter 2.06.003	B.1.2
2	Enhance the implementing procedure for ASME Section XI inservice inspection and testing to specify that the guidelines in Generic Letter 88-01 or approved BWRVIP-75 shall be considered in determining sample expansion if indications are found in Generic Letter 88-01 welds.	June 8, 2012	Letter 2.06.003	B.1.6
3	Inspect fifteen (15) percent of the top guide locations using enhanced visual inspection technique, EVT-1, within the first 18 years of the period of extended operation. Five (5) percent of the top guide locations will be inspected during the first six years of the period of extended operation, five (5) percent during the second six year period, and five (5) percent during the third six year period. Locations selected for examination will be areas that have exceeded the neutron fluence threshold.	Five (5) percent of the top guide locations will be inspected during the first six years of the period of extended operation, five (5) percent during the second six year period, and five (5) percent during the third six year period.	Letter 2.06.064	B.1.8/ Audit Item 155
4	Enhance the Diesel Fuel Monitoring Program to include periodic sampling of the security diesel generator fuel storage tank, near the bottom, to determine water content.	June 8, 2012	Letter 2.06.003	B.1.10
5	Enhance the Diesel Fuel Monitoring Program to install instrumentation to monitor for leakage between the two walls of the security diesel generator fuel storage tank to ensure that significant degradation is not occurring.	June 8, 2012	Letter 2.06.057	B.1.10/ Audit Item 155
6	Enhance the Diesel Fuel Monitoring Program to specify acceptance criterion for UT measurements of emergency diesel generator fuel storage tanks (T-126A&B).	June 8, 2012	Letter 2.06.003	B.1.10/ Audit Item 165

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	Related LRA Section No./ Comments
7	Enhance Fire Protection Program procedures to state that the diesel engine sub-systems (including the fuel supply line) shall be observed while the pump is running. Acceptance criteria will be enhanced to verify that the diesel engine did not exhibit signs of degradation while it was running; such as fuel oil, lube oil, coolant, or exhaust gas leakage. Also, enhance procedures to clarify that the diesel-driven fire pump engine is inspected for evidence of corrosion in the intake air, turbocharger, and jacket water system components as well as lube oil cooler. The jacket water heat exchanger is inspected for evidence of corrosion or buildup to manage loss of material and fouling on the tubes. Also, the engine exhaust piping and silencer are inspected for evidence of internal corrosion or cracking.	June 8, 2012	Letter 2.06.064	B.1.13.1/ Audit Item 378
8	Enhance the Fire Protection Program procedure for Halon system functional testing to state that the Halon 1301 flex hoses shall be replaced if leakage occurs during the system functional test.	June 8, 2012	Letter 2.06.003	B.1.13.1
9	Enhance Fire Water System Program procedures to include inspection of hose reels for corrosion. Acceptance criteria will be enhanced to verify no significant corrosion.	June 8, 2012	Letter 2.06.003	B.1.13.2
10	Enhance the Fire Water System Program to state that a sample of sprinkler heads will be inspected using guidance of NFPA 25 (2002 Edition) Section 5.3.1.1.1. NFPA 25 also contains guidance to repeat this sampling every 10 years after initial field service testing.	June 8, 2012	Letter 2.06.003	B.1.13.2
11	Enhance the Fire Water System Program to state that wall thickness evaluations of fire protection piping will be performed on system components using non-intrusive techniques (e.g., volumetric testing) to identify evidence of loss of material due to corrosion. These inspections will be performed before the end of the current operating term and at intervals thereafter during the period of extended operation. Results of the initial evaluations will be used to determine the appropriate inspection interval to ensure aging effects are identified prior to loss of intended function.	June 8, 2012	Letter 2.06.003	B.1.13.2
12	Implement the Heat Exchanger Monitoring Program as described in LRA Section B.1.15.	June 8, 2012	Letter 2.06.003	B.1.15

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	Related LRA Section No./ Comments
13	Enhance the Instrument Air Quality Program to include a sample point in the standby gas treatment and torus vacuum breaker instrument air subsystem in addition to the instrument air header sample points.	June 8, 2012	Letter 2.06.003	B.1.17
14	Implement the Metal-Enclosed Bus Inspection Program as described in LRA Section B.1.18.	June 8, 2012	Letter 2.06.003	B.1.18
15	Implement the Non-EQ Inaccessible Medium-Voltage Cable Program as described in LRA Section B.1.19. Include developing a formal procedure to inspect manholes for in-scope medium voltage cable.	June 8, 2012	Letter 2.06.003	B.1.19/Audit item 311
16	Implement the Non-EQ Instrumentation Circuits Test Review Program as described in LRA Section B.1.20.	June 8, 2012	Letter 2.06.003	B.1.20
17	Implement the Non-EQ Insulated Cables and Connections Program as described in LRA Section B.1.21.	June 8, 2012	Letter 2.06.003	B.1.21
18	Enhance the Oil Analysis Program to periodically change CRD pump lubricating oil. A particle count and check for water will be performed on the drained oil to detect evidence of abnormal wear rates, contamination by moisture, or excessive corrosion.	June 8, 2012	Letter 2.06.003	B.1.22
19	Enhance Oil Analysis Program procedures for security diesel and reactor water cleanup pump oil changes to obtain oil samples from the drained oil. Procedures for lubricating oil analysis will be enhanced to specify that a particle count and check for water are performed on oil samples from the fire water pump diesel, security diesel, and reactor water cleanup pumps.	June 8, 2012	Letter 2.06.003	B.1.22
20	Implement the One-Time Inspection Program as described in LRA Section B.1.23. This 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.	June 8, 2012	Letter 2.06.003	B.1.23/Audit Item 219

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	Related LRA Section No./ Comments
21	Enhance the Periodic Surveillance and Preventive Maintenance Program as necessary to assure that the effects of aging will be managed as described in LRA Section B.1.24.	June 8, 2012	Letter 2.06.003	B.1.24
22	Enhance the Reactor Vessel Surveillance Program to proceduralize the data analysis, acceptance criteria, and corrective actions described in LRA Section B.1.26.	June 8, 2012	Letter 2.06.003	B.1.26
23	Implement the Selective Leaching Program in accordance with the program as described in LRA Section B.1.27.	June 8, 2012	Letter 2.06.003	B.1.27
24	Enhance the Service Water Integrity Program procedure to clarify that heat transfer test results are trended.	June 8, 2012	Letter 2.06.003	B.1.28
25	Enhance the Structures Monitoring Program procedure to clarify that the discharge structure, security diesel generator building, trenches, valve pits, manholes, duct banks, underground fuel oil tank foundations, manway seals and gaskets, hatch seals and gaskets, underwater concrete in the intake structure, and crane rails and girders are included in the program. In addition, the Structures Monitoring Program will be revised to require opportunistic inspections of inaccessible concrete areas when they become accessible.	June 8, 2012	Letter 2.06.003	B.1.29.2/ Audit Item 238
26	Enhance Structures Monitoring Program guidance for performing structural examinations of elastomers (seals, gaskets, seismic joint filler, and roof elastomers) to identify cracking and change in material properties.	June 8, 2012	Letter 2.06.003	B.1.29.2
27	Enhance the Water Control Structures Monitoring Program scope to include the east breakwater, jetties, and onshore revetments in addition to the main breakwater.	June 8, 2012	Letter 2.06.003	B.1.29.3

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	Related LRA Section No./ Comments
28	Enhance System Walkdown Program guidance documents to perform periodic system engineer inspections of systems in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(1) and (a)(3). Inspections shall include areas surrounding the subject systems to identify hazards to those systems. Inspections of nearby systems that could impact the subject systems will include SSCs that are in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(2).	June 8, 2012	Letter 2.06.057	B.1.30/Audit Item 327
29	Implement the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program as described in LRA Section B.1.31.	June 8, 2012	Letter 2.06.003	B.1.31/Audit Item 257
30	Perform a code repair of the CRD return line nozzle to cap weld if the installed weld repair is not approved via accepted code cases, revised codes, or an approved relief request for subsequent inspection intervals.	June 30, 2015	Letter 2.06.057	B.1.3/Audit Item 141

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	Related LRA Section No./ Comments
31	At least 2 years prior to entering the period of extended operation, for the locations identified in NUREG/CR-6260 for BWRs of the PNPS vintage, PNPS will implement one or more of the following: (1) Refine the fatigue analyses to determine valid CUFs less than 1 when accounting for the effects of reactor water environment. This includes applying the appropriate Fen factors to valid CUFs determined in accordance with one of the following: 1. For locations with existing fatigue analysis valid for the period of extended operation, use the existing CUF to determine the environmentally adjusted CUF. 2. More limiting PNPS-specific locations with a valid CUF may be substituted for the NUREG/CR-6260 locations. 3. Representative CUF values from other plants, adjusted to or enveloping the PNPS plant specific external loads may be used if demonstrated applicable to PNPS. 4. An analysis using an NRC-approved version of the ASME code of NRC-approved alternative (e.g., NRC-approved code case) may be performed to determine a valid CUF. (2) Manage the effects of aging due to fatigue at the affected locations by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method acceptable to the NRC). (3) Repair or replace the affected locations prior to the period of extended operation and the location exceeding a CUF of 1.0. Should PNPS select the option to manage the aging effects due to environmental-assisted fatigue during the period of extended operation, details of the aging management program such as scope, qualification, method, and frequency will be submitted to the NRC at least 2 years prior to the period of extended operation.	June 8, 2012 June 8, 2010 for submitting the aging management program if PNPS selects the option of managing the affects of aging due to environmentally assisted fatigue.	Letter 2.06.064	4.3.3/ Audit Items 302 & 346
32	Enhance the Bolting Integrity Program in accordance with a license renewal application amendment.	June 8, 2012	Letter 2.06.057	Audit items 364, 373, 389, 390, 432, 443, & 470

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	Related LRA Section No./ Comments
33	PNPS will inspect the inaccessible jet pump thermal sleeve and core spray thermal sleeve welds if and when the necessary technique and equipment become available and the technique is demonstrated by the vendor, including delivery system.	As stated in the commitment	Letter 2.06.057	Audit Item 488
34	Within the first 6 years of the period of extended operation and every 12 years thereafter, PNPS will inspect the access hole covers with UT methods. Alternatively, PNPS will inspect the access hole covers in accordance with BWRVIP guidelines should such guidance become available.	June 8, 2018	Letter 2.06.057	Audit Item 461
35	At least 2 years prior to entering the period of extended operation, for reactor vessel components, including the feedwater nozzles, PNPS will implement one or more of the following: (1) Refine the fatigue analyses to determine valid CUFs less than 1. Determine valid CUFs based on numbers of transient cycles projected to be valid for the period of extended operation. Determine CUFs in accordance with an NRC-approved version of the ASME code or NRC-approved alternative (e.g., NRC-approved code case). (2) Manage the effects of aging due to fatigue at the affected locations by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method acceptable to the NRC). (3) Repair of replace the affected locations prior to the period of extended operation and the location exceeding a CUF of 1.0. Should PNPS select the option to manage the aging effects due to fatigue during the period of extended operation, details of the aging management program such as scope, qualification, method, and frequency will be submitted to the NRC at least 2 years prior to the period of extended operation.	June 8, 2012 June 8, 2010 for submitting the aging management program if PNPS selects the option of managing the affects of aging.	Letter 2.06.064	Audit Item 345
36	To ensure that significant degradation on the bottom of the condensate storage tank is not occurring, a one-time ultrasonic thickness examination in accessible areas of the bottom of the condensate storage tank will be performed. Standard examination and sampling techniques will be utilized.	June 8, 2012	Letter 2.06.057	Audit Item 363

ATTACHMENT B to Letter 2.06.064
(16 pages)
License Renewal Application Changes

LICENSE RENEWAL APPLICATION CHANGES

The following information supplements the previously submitted License Renewal Application:

Audit item 138: LRA Section B.1.1, Operating Experience, is revised to clarify that reactivity calculations performed after direct material surveillance (blackness testing) using bounding assumptions with regard to neutron attenuation capability of the boraflex demonstrated that the 5% subcriticality margin is maintained.

> Blackness testing was performed on Boraflex panels in the spent fuel storage racks during 1996 and 1998 to provide a baseline for development of the monitoring program. Results of the 1996 testing showed shrinkage and gapping in the Boraflex. Analysis of the criticality design of the fuel pool used bounding assumptions with regard to neutron attenuation capability of the Boraflex based on the observed gap sizes and locations and assumed levels of Boraflex erosion (thinning and edge loss). The analysis showed that the pool subcriticality margin was greater than 5%. Results of the 1998 testing showed about a 20% increase in average gap size, but overall shrinkage (gaps and end shortening) of the material was much less on a percentage change basis and was bounded by the criticality analysis assumptions. The report concluded that the Boraflex poison material in the spent fuel storage racks continues to perform its intended function.
>
> The Boraflex Monitoring Program (with areal density measurement) at PNPS has been instituted recently. Therefore, there is no additional plant-specific operating experience.

Audit item 140: LRA Table 3.3.2-13 line items for the component type neutron absorber with aging effects "loss of material" and "cracking" are revised to indicate that these aging effects are managed by the Water Chemistry Control – BWR Program. The line items will now use note H, "Aging effect not in NUREG-1801 for this component, material and environment combination."

Audit item 141: LRA Appendix B.1.3 is revised to remove the exception to the parameters monitored/inspected attribute pertaining to inspection volume. This reduction of the inspection volume for the adjacent base metal is now in accordance with ASME Code Case N-613-1, which has been approved for use by the NRC in Regulatory Guide 1.147 Rev. 14, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1".

Audit item 155: As indicated in LRA Section B.1.8 under Enhancements, ten (10) percent of the top guide locations will be inspected using enhanced visual inspection technique, EVT-1, within the first 12 years of the period of extended operation, with one-half of the inspections (50 percent of locations) to be completed within the first 6 years of the period of extended operation. This enhancement is revised to require inspection of at least 15% of the top guide locations during the first 18 years of the period of extended operation. License renewal commitment 3.

Audit item 163: LRA Section B.1.10 lists an enhancement to include periodic UT measurement on the bottom surface of the security diesel generator fuel storage tank. However, evaluation after submittal of the LRA determined that UT is not feasible for this tank due to geometry. Therefore, this enhancement is revised to specify monitoring for leakage between the two walls

of the tank. This enhancement will be implemented prior to the period of extended operation. License renewal commitment 5.

Audit item 165: LRA Section B.1.10 includes an enhancement to establish an acceptance criterion of "60% of nominal thickness." This is revised to read "Enhance the Diesel Fuel Monitoring Program to specify acceptance criterion for UT measurements of emergency diesel generator fuel storage tanks (T-126A&B)." This enhancement will be completed prior to the period of extended operation. License renewal commitment 6.

Audit item 169: Add the following text to LRA Section B.1.11 to include the "EQ Component Reanalysis Attributes" specified in NUREG-1801 Vol. 2 Section X.E1.

EQ Component Reanalysis Attributes

The reanalysis of an aging evaluation is normally performed to extend the qualification by reducing excess conservatism incorporated in the prior evaluation. Reanalysis of an aging evaluation to extend the qualification of a component is performed on a routine basis pursuant to 10 CFR 50.49(e) as part of an EQ program. While a component life limiting condition may be due to thermal, radiation, or cyclical aging, the vast majority of component aging limits are based on thermal conditions. Conservatism may exist in aging evaluation parameters, such as the assumed ambient temperature of the component, an unrealistically low activation energy, or in the application of a component (de-energized versus energized). The reanalysis of an aging evaluation is documented according to the station's quality assurance program requirements, which requires the verification of assumptions and conclusions. As already noted, important attributes of a reanalysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met). These attributes are discussed below.

Analytical Methods

The analytical models used in the reanalysis of an aging evaluation are the same as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose). For license renewal, one acceptable method of establishing the 60-year normal radiation dose is to multiply the 40-year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component. For cyclical aging, a similar approach may be used. Other models may be justified on a case-by-case basis.

Data Collection and Reduction Methods

Reducing excess conservatism in the component service conditions (for example, temperature, radiation, cycles) used in the prior aging evaluation is the chief method used for a reanalysis. Temperature data used in an aging evaluation is to be conservative and based on plant design temperatures or on actual plant temperature data. When used, plant temperature data can be obtained in several ways, including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors (while the motor is not running). A representative number of temperature

measurements are conservatively evaluated to establish the temperatures used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as (a) directly applying the plant temperature data in the evaluation, or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to material activation energy values as part of a reanalysis are to be justified on a plant-specific basis. Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations can be used for radiation and cyclical aging.

Underlying Assumptions

EQ component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

Acceptance Criteria and Corrective Actions

The reanalysis of an aging evaluation could extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component is to be refurbished, replaced, or re-qualified prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace, or re-qualify the component if the reanalysis is unsuccessful.

Pilgrim utilizes a reanalysis methodology in accordance with 10 CFR 50.49(e) that applies the important attributes in the GALL Report as appropriate. Reanalysis of aging evaluations in accordance with 10 CFR 50.49(e) is an acceptable AMP for license renewal under option 10 CFR 54.21(c)(1)(iii).

Audit item 196: LRA Section B.1.16.2, attribute 5 is revised to include the following clarification.

Results are compared, as appropriate, to baseline data and other previous test results. Indications are evaluated in accordance with ASME Section XI. If the component is qualified as acceptable for continued service, the area containing the indication is reexamined during subsequent inspection periods. Examinations that reveal indications that exceed the acceptance standards are extended to include additional examinations in accordance with ASME Section XI.

Audit item 203: LRA Section A.2.1.20 is revised to change the inspection frequency to at least once every "five years." LRA Section B.1.18 is revised to remove the exception to detection of aging effects in which a ten year inspection period is specified.

Audit item 208: LRA Section B.1.20 program description is revised to include the following clarification.

The first test of neutron monitoring system cables that are disconnected during instrument calibrations shall be completed before the period of extended operation and subsequent tests will occur at least once every 10 years. In accordance with the corrective action program, an engineering evaluation will be performed when test

acceptance criteria are not met and corrective actions, including modified inspection frequency, will be implemented to ensure that the intended functions of the cables can be maintained consistent with the current licensing basis for the period of extended operation.

LRA Section A2.1.22 is revised to include the following clarification.

The first test of neutron monitoring system cables that are disconnected during instrument calibrations shall be completed before the period of extended operation and subsequent tests will occur at least once every 10 years.

Audit item 211: LRA Section B.1.21 is revised as follows.

This program addresses cables and connections at plants whose configuration is such that most cables and connections installed in adverse localized environments are accessible. This program can be thought of as a sampling program. Selected cables and connections from accessible areas will be inspected and represent, with reasonable assurance, all cables and connections in the adverse localized environments. If an unacceptable condition or situation is identified for a cable or connection in the inspection sample, a determination will be made as to whether the same condition or situation is applicable to other accessible cables or connections. The sample size will be increased based on evaluation per the corrective action program.

Audit item 213: LRA Section B.1.22 exception note is revised as follows.

PNPS measures the % fuel dilution in diesel engine oils which is a more accurate method than flash point for identifying fuel leaks and oil dilution. Acceptance criterion is < 3% Wt based on ALCO diesel engine owners' group chemistry guidelines.

Audit item 238: LRA Section B.1.29.2 is revised to include an enhancement to require opportunistic inspections of inaccessible concrete areas when they become accessible. License renewal commitment 25.

Audit item 260: LRA Section B.1.32.3 is revised to indicate that the exception is applicable to both attribute 3, Parameters Monitored/Trended and attribute 4, Detection of Aging Effects.

Audit item 262: For each use of the phrase "Enhancement(s) will be initiated prior to the period of extended operation," in the LRA the intent is that the enhancements will be implemented prior to the period of extended operation.

Audit item 303: LRA Section B.1.12 is revised to apply the exception stating that the Fatigue Monitoring Program does not assess the impact of the reactor water environment on critical components to attribute 6, Acceptance Criteria in addition to attribute 2, Preventive Actions.

Audit item 309: LRA Section B.1.19 program description is revised to state that in-scope medium voltage cables include cables with operating voltage from 2kV to 35kV.

Audit item 316: LRA Section B.1.13.1 is revised to include the following exception to the detection of aging effects attribute.

The NUREG-1801 program recommends that functional testing and inspection of the Halon fire suppression system occur at least once every six months. However, while

PNPS performs inspections at least once every six months, functional testing is performed annually.

Exception note: The variation in functional test frequency is insignificant with respect to detection of aging effects because functional tests are designed to verify the operability of active system components. Since system inspections are performed at least once every six months, aging effects are identified prior to loss of passive component intended function.

Audit item 318: The exception for Detection of Aging Effects in LRA Section B.1.13.1 is revised to read as follows.

The NUREG-1801 program states that approximately 10% of each type of penetration seal should be visually inspected at least once every refueling outage. The PNPS program specifies inspection of approximately 20% of the seals, including at least one seal of each type, each operating cycle, with all accessible fire barrier penetration seals being inspected at least once every five operating cycles.

Audit item 320: LRA Appendix A is revised as follows to identify commitment numbers associated with new and enhanced programs.

Section A.2.1.2, Buried Piping and Tanks Inspection Program, add "License renewal commitment 1 governs implementation of this program."

Section A.2.1.3, BWR CRD Return Line Nozzle Program, add "License renewal commitment 30 specifies enhancement to this program."

Section A.2.1.6, BWR Stress Corrosion Cracking Program, add "License renewal commitment 2 specifies enhancement to this program."

Section A.2.1.8, BWR Vessel Internals Program, add "License renewal commitments 3 and 33 specify enhancements to this program."

Section A.2.1.10, Diesel Fuel Monitoring Program, add "License renewal commitments 4, 5, and 6 specify enhancements to this program."

Section A.2.1.13, Fire Protection Program, add "License renewal commitments 7 and 8 specify enhancements to this program."

Section A.2.1.14, Fire Water System Program, add "License renewal commitments 9, 10, and 11 specify enhancements to this program."

Section A.2.1.16, Heat Exchanger Monitoring Program, add "License renewal commitment 12 governs implementation of this program."

Section A.2.1.19, Instrument Air Quality Program, add "License renewal commitment 13 specifies enhancement to this program."

Section A.2.1.20, Metal-Enclosed Bus Inspection Program, add "License renewal commitment 14 governs implementation of this program."

Section A.2.1.21, Non-EQ Inaccessible Medium-Voltage Cable Program, add "License renewal commitment 15 governs implementation of this program."

Section A.2.1.22, Non-EQ Instrumentation Circuits Test Review Program, add "License renewal commitment 16 governs implementation of this program."

Section A.2.1.23, Non-EQ Insulated Cables and Connections Program, add "License renewal commitment 17 governs implementation of this program."

Section A.2.1.24, Oil Analysis Program, add "License renewal commitments 18 and 19 specify enhancements to this program."

Section A.2.1.25, One-Time Inspection Program, add "License renewal commitments 20 and 36 govern implementation of this program."

Section A.2.1.26, Periodic Surveillance and Preventive Maintenance Program, add "License renewal commitment 21 specifies enhancement to this program."

Section A.2.1.28, Reactor Vessel Surveillance Program, add "License renewal commitment 22 specifies enhancement to this program."

Section A.2.1.29, Selective Leaching Program, add "License renewal commitment 23 governs implementation of this program."

Section A.2.1.30, Service Water Integrity Program, add "License renewal commitment 24 specifies enhancement to this program."

Section A.2.1.32, Structures Monitoring – Structures Monitoring Program, add "License renewal commitments 25 and 26 specify enhancements to this program."

Section A.2.1.33, Structures Monitoring – Water Control Structures Monitoring Program, add "License renewal commitment 27 specifies enhancement to this program."

Section A.2.1.34, System Walkdown Program, add "License renewal commitment 28 specifies enhancement to this program."

Section A.2.1.35, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program, add "License renewal commitment 29 governs implementation of this program."

Audit item 324: LRA Section B.1.32.3, exception note 1 is revised as follows.

Passive intended functions of pumps, heat exchangers and other components will be adequately managed by the closed cooling water chemistry and one-time inspection programs through monitoring and control of water chemistry parameters and verification of the absence of aging effects.

Audit item 325: LRA Section B.1.32.1 attribute 6 is revised to correct the units of conductivity to µS/cm and delete the acceptance criteria for corrosion products.

LICENSE RENEWAL APPLICATION CHANGES

Audit item 327: LRA Section B.1.30 is revised to add the following enhancement. License renewal commitment 28.

Enhancements

Attributes Affected	Enhancement
1. Scope of Program	Periodic system engineer inspections of systems is to include those systems in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(1) and (a)(3). Inspections shall include areas surrounding the subject systems to identify hazards to those systems. Inspections of nearby systems that could impact the subject systems will include SSCs that are in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(2).

Audit item 328: LRA Section B.1.18 operating experience is revised as follows.

The Metal-Enclosed Bus Inspection Program at PNPS is a new program. Plant and industry operating experience will be considered when developing this program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. PNPS plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

The PNPS program is based on the program description in NUREG-1801, which in turn is based on industry operating experience. As such, operating experience provides reasonable assurance that implementation of the Metal-Enclosed Bus Inspection program will 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 extend operation.

LRA Section B.1.19 operating experience is revised as follows.

The Non-EQ Inaccessible Medium-Voltage Cable Program at PNPS is a new program. Industry and plant-specific operating experience will be considered in the development of this program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. PNPS plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

The PNPS program is based on the program description in NUREG-1801, which in turn is based on industry operating experience. As such, the operating experience used for implementation of the Non-EQ Inaccessible Medium-Voltage Cable program will provide reasonable assurance that the 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 extend operation.

LRA Section B.1.20 operating experience is revised as follows.

The Non-EQ Instrumentation Circuits Test Review Program at PNPS is a new program. Industry and plant-specific operating experience will be considered in the development of this program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. PNPS plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

The PNPS program is based on the program description in NUREG-1801, which in turn is based on industry operating experience. As such, the operating experience used for implementation of the Non-EQ Instrumentation Circuits Test Review program will provide reasonable assurance that the 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 extend operation.

LRA Section B.1.21 operating experience is revised as follows.

The Non-EQ Insulated Cables and Connections Program at PNPS is a new program. Industry and plant-specific operating experience will be considered in the development of this program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. PNPS plant-specific operating experience is consistent with the operating experience in the NUREG-1801 program description.

The PNPS program is based on the program description in NUREG-1801, which in turn is based on industry operating experience. As such, the operating experience used for implementation of the Non-EQ Insulated Cables and Connections program will provide reasonable assurance that the 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 extend operation.

Audit item 341: For clarification, LRA discussion column of Item 3.3.1-1 in Table 3.3.1 is revised to read as follows.

No PNPS calculation or analysis related to cumulative fatigue damage for steel cranes met the definition of TLAA in 10 CFR 54.3. The projected cycles for the PNPS reactor building crane are well below the cycle ranges given in CMAA-70. Steel cranes are evaluated as structural components in Section 3.5.

Audit item 343, 347: LRA Table 4.3-3 is revised to remove Note 1 and the generic (NUREG-6260) values for the core spray safe end, the RR outlet nozzle and the feedwater piping.

Audit item 344: LRA Section 4.3.1.3 is revised to add the following sentence at the end of Section 4.3.1.3.

The effects of the reactor coolant environment on fatigue are addressed in Section 4.3.3 of the LRA.

LICENSE RENEWAL APPLICATION CHANGES

LRA Section 4.3.1, page 4.3-4 is revised as follows.

The PNPS Fatigue Monitoring Program ensures that the numbers of transient cycles experienced by the plant remain within the allowable numbers of cycles, and hence the component CUFs remain below their analyzed values.

LRA Section 4.3.1.3, second sentence of the second paragraph is changed as follows.

The design transients are tracked and evaluated to ensure that cycle limits are not exceeded, thereby assuring that CUFs remain below their analyzed values.

Audit item 345: The extrapolation in LRA Section 4.3.1.4 is no longer valid such that this section is not required and can be deleted. PNPS will perform a new feedwater nozzle fatigue analysis prior to the period of extended operation. License renewal commitment 35.

Audit item 346: License renewal commitment 31. LRA Section 4.3.3 is revised to clarify the PNPS commitment to account for the effects of the reactor coolant environment on fatigue. Replace Paragraph (1) on Page 4.3-8 with the following.

Determine CUFs, incorporating the potential effects of reactor water environment by applying Fen factors to valid CUFs for the NUREG/CR-6260 locations as follows.

1. For locations with existing fatigue analysis, use the existing CUF.
2. More limiting PNPS-specific locations with a valid CUF may be substituted for the NUREG/CR-6260 locations.
3. Representative CUF values from other plants, adjusted to or enveloping the PNPS plant specific external loads, may be used if they are demonstrated applicable to PNPS.
4. An analysis using an NRC-approved version of the ASME code may be performed for the NUREG/CR-6260 location to determine a valid CUF.

Audit item 350: LRA Table 3.4.2-1 is revised to include Water Chemistry Control - BWR Program in addition to Periodic Surveillance and Preventive Maintenance Program to manage aging effects on internal environments of component type tank (condensate storage tanks).

Audit item 363: LRA Table 3.4.1, Item 3.4.1-20 is revised to specify the one-time inspection program to ensure that significant degradation on the bottom of the condensate storage tanks is not occurring. License renewal commitment 36.

LRA Section B.1.23 program description is revised to include a one-time inspection activity of an ultrasonic thickness examination on the bottom of the condensate storage tanks prior to the period of extended operation. Standard examination and sampling techniques will be utilized.

LRA Section A.2.1.25 is revised to include the one-time inspection activity of an ultrasonic thickness examination on the bottom of the condensate storage tanks.

Audit item 370: The following paragraph is added to LRA Section 3.6.1.

Some of the penetration assemblies at PNPS are not EQ. The non-EQ penetration assemblies are subject to aging management review. The aging management review is provided in Table 3.6.2-1 and the Aging Management Program for the penetration

assembly pigtails is the Non-EQ Insulated Cables and Connections Program which will manage the aging effects of the penetration assembly cables and connections. Table 3.6.2-1 includes the electrical penetration conductors and connections in the line item for electrical cables and connections not subject to 10 CFR 50.49 – EQ.

Audit item 372: The effectiveness of the Water Chemistry Control – Auxiliary Systems, BWR, and Closed Cooling Water programs is confirmed by the One-Time Inspection program. For further clarification, LRA Appendix A is revised for these three water chemistry control programs to include the sentence "The One-Time Inspection Program will confirm the effectiveness of the program".

Audit item 373: LRA Appendix A.2.1.39 and B.1.33 are added describing the Bolting Integrity Program. Refer to Attachment C of this letter for additional information and the program ten-element comparison to NUREG-1801. This program applies to all bolting exposed to air with aging effects requiring management except reactor vessel closure studs. License renewal commitment 32.

Audit item 378: License renewal commitment 7. LRA Section A.2.1.13 is revised to clarify inspection of the diesel-driven fire pump as follows.

The diesel-driven fire pump inspection requires that the pump be periodically tested and system components internally inspected to ensure that the fuel supply line and engine support systems can perform their intended function.

LRA Section B.1.13.1 is revised with the following enhancement.

Attributes Affected	Enhancements
3. Parameters Monitored/Inspected 6. Acceptance Criteria	Procedures will be enhanced to clarify that at least once every five years, the diesel-driven fire pump engine is inspected for evidence of corrosion to manage loss of material in carbon steel and gray cast iron components including the intake air, exhaust, jacket water, and lube oil sub-systems. The jacket water heat exchanger is inspected for evidence of fouling on the tubes. Also, the engine exhaust piping and silencer are inspected for evidence of cracking.

Audit item 388: LRA Table 3.3.1, item 3.3.1-40 is revised to remove reference to the system walkdown program as follows.

Not applicable. There are no steel tanks in the diesel fuel oil system exposed to air - outdoor (external).

LRA Table 3.3.2-7 line item with component type of tank exposed to air – outdoor (ext) is removed.

LICENSE RENEWAL APPLICATION CHANGES

Audit item 390: LRA Table 3.3.1, item 3.3.1-58 discussion is revised to read as follows.

The System Walkdown Program manages loss of material for external surfaces of steel components. For some fire protection system components, the Fire Protection Program will manage loss of material.

In LRA Table 3.3.2-10 the note for the line item with component type of tank exposed to air – indoor (ext) is changed from "B" to "E".

Audit item 391: LRA Table 3.5.2-6, pages 3.5-82 and 3.5-83 are revised as follows.

Delete line items:

Penetration sealant (fire rated, flood, radiation) // EN, FB, FLB, PB, SNS // Elastomer // Protected from weather // Cracking Change in material properties // Fire protection/Structures Monitoring // III.A6-12 (TP-7) // 3.5.1-44 // C

Seismic joint filler // FB, SNS // Elastomer // Protected from weather // Cracking Change in material properties // Structures Monitoring, Fire Protection // VII.G-1 (A-19) // 3.3.1-61 // C

Add line items:

Penetration sealant (fire rated) // EN, FB, PB, SNS // Elastomer // Protected from weather // Cracking Change in material properties // Fire Protection // VII.G-1(A-19) // 3.3.1-61 // B

Penetration sealant (flood, radiation) // EN, FLB, PB, SNS // Elastomer // Protected from weather// Cracking Change in material properties // Structures Monitoring // III.A6-12 (TP-7) // 3.5.1-44 // C

Seismic isolation joint // FB, SNS // Elastomer // Protected from weather // Cracking Change in material properties // Fire protection // VII.G-1 (A-19) // 3.3.1-61 // D

Seismic isolation joint // SNS // Elastomer // Protected from weather // Cracking Change in material properties // Structures monitoring // III.A6-12 (TP-7) // 3.5.1-44 // C

Audit item 392: LRA Table 3.3.2-7 is revised to add a line item crediting the fire protection program as follows.

Piping // Pressure boundary // Carbon steel // Fuel oil (int) // Loss of material // Fire Protection and Diesel Fuel Monitoring// VII.G-21 (A-28) // 3.3.1-64 // B

LRA Table 3.3.1, Item 3.3.1-64 discussion is revised as follows.

Consistent with NUREG-1801. The Fire Protection Program and Diesel Fuel Monitoring Program manage loss of material for internal surfaces of steel piping (fire pump diesel fuel supply line) components exposed to fuel oil.

Audit item 394: LRA Table 3.2.1, item 3.2.1-32 is revised to add the Fire Protection Program to the list of programs managing internal surfaces of steel components exposed to air-indoor.

LICENSE RENEWAL APPLICATION CHANGES

Audit item 400: LRA Table 3.3.2-14-27, last three columns for the carbon steel component type heat exchanger shell, in treated water environment with an aging effect of loss of material, are revised to VII.C2-14 (A-25), 3.3.1-47, and D.

Audit item 401: LRA Table 3.3.2-14-27, stainless steel component type orifice, in treated water environment with an aging effect of loss of material is revised to list Table 1 item number 3.3.1-24.

Audit item 407: LRA Table 2.4-1 is revised to remove the first line item, component "Bellows (reactor vessel and drywell)."

LRA Table 3.5.2-1 is revised to remove the first line item, for structure and/or component/commodity "Bellows (reactor vessel and drywell)."

Audit item 408: Table 3.5.1 Line Item 3.5.1-16 discussion is revised to read as follows.

The aging effects cited in the NUREG-1801 item are loss of sealing and leakage. Loss of sealing is a consequence of the aging effects cracking and change in material properties. For PNPS, the Containment Leak Rate Program manages cracking and change in material properties for the primary containment seal and gaskets. The Structures Monitoring Program manages cracking and change in material properties for the reactor building equipment lock doors. There is no moisture barrier where the drywell steel shell becomes embedded in the drywell concrete floor.

Audit item 409: In Table 3.5.2-6 on Page 3.5-83 of the LRA, for structure and/or component/commodity of seals and gaskets, material rubber in a protected from weather environment, Note "E" was used because it applies to the top half of the line item. The LRA will be clarified to indicate that Note "A" applies to the lower half of the line item.

Audit item 410: LRA Table 3.5.2-6, page 3.5-73, for structure and/or component/commodity of electrical and instrument panels and enclosures, material galvanized steel, environment protected from weather is revised to specify note "C".

Audit item 411: LRA Table 3.5.2-1, page 3.5-54, for structure and/or component/commodity of Torus shell, aging effect cracking-fatigue is revised to specify note "A".

Audit item 412: LRA Section 3.5.2.2.1.4, first paragraph, last sentence, is revised to read as follows to delete reference to "moisture barrier" since the PNPS drywell does not contain this commodity.

The drywell steel shell and the area where the drywell shell becomes embedded in the drywell concrete floor are inspected in accordance with the Containment Inservice Inspection (IWE) Program.

LRA Table 3.5.1, line item 3.5.1-5 discussion column is revised to read as follows.

The drywell steel shell and the area where the drywell shell becomes embedded in the drywell concrete floor are inspected in accordance with the Containment Inservice Inspection (IWE) Program.

LICENSE RENEWAL APPLICATION CHANGES

Audit item 413: LRA Table 3.5.2-1 is revised adding the following line item.

Torus mechanical penetrations // PB, SSR // Carbon steel // Protected from weather // Cracking // TLAA-metal fatigue // II.B4-4(C-13) // 3.5.1-9 // A

LRA Table 3.5.1, line item 3.5.1-8 discussion is revised to read as follows.

Fatigue analysis is a TLAA for the torus shell. Fatigue of the vent system is event-driven and the analysis is not a TLAA. See Section 3.5.2.2.1.6.

LRA Table 3.5.1, line item 3.5.1-9 discussion is revised to read as follows.

Fatigue analysis is a TLAA for the torus penetrations. See Section 3.5.2.2.1.6.

LRA Section 3.5.2.2.1.6 is revised to read as follows.

TLAA are evaluated in accordance with 10 CFR 54.21(c) as documented in Section 4. Fatigue TLAAs for the torus and associated penetrations are evaluated and documented in Section 4.6.

LRA Section 3.5.2.3 is revised to read as follows.

TLAA identified for structural components and commodities include fatigue analyses for the torus and torus penetrations. These topics are discussed in Section 4.6.

Audit item 414: LRA Table 3.5.1, line items 3.5.1-12 and 3.5.1-13 are revised to add a statement of "See section 3.5.2.2.1.8" in the discussion column

LRA Section 3.5.2.2.1.8 is revised to include the following statement.

Cyclic loading can lead to cracking of steel and stainless steel penetration bellows, and dissimilar metal welds of BWR containments and BWR suppression pool shell and downcomers.

Audit item 417: LRA Table 3.5.1, line item 3.5.1-34 discussion is revised to add "See Section 3.5.2.2.2.4(1)".

Audit item 418: LRA Table 3.5.1, line item 3.5.1-35 discussion is revised to add "See section 3.5.2.2.2.4(2)" and replace reference to "ACI-301" with "ACI 318".

Audit item 419: LRA Table 3.5.1, line item 3.5.1-36 discussion is revised to read as follows.

Reaction with aggregates is not an applicable aging mechanism for PNPS concrete components. See Section 3.5.2.2.2.1(5) (although for Groups 1-5, 7, 9 this discussion is also applicable for Group 6) and Section 3.5.2.2.2.4(3) additional discussion. Nonetheless, the Structures Monitoring Program will confirm the absence of aging effects requiring management for PNPS Group 6 concrete components.

The title of LRA Section 3.5.2.2.2.4 (3) is revised to begin with "Cracking Due to Expansion and Reaction with Aggregates...".

Audit item 420: LRA Table 3.5.1, line item 3.5.1-40 discussion is revised to add "See Section 3.5.2.2.2.6(1)".

Audit item 421: LRA Table 3.5.1, line item 3.5.1-50 discussion is revised to read as follows.

This aging effect is managed by the Structures Monitoring Program.

Audit item 422: LRA Table 3.5.1, line item 3.5.1-52 discussion is revised to read as follows.

Loss of mechanical function due to the listed mechanisms is not an aging effect. Such failures typically result from inadequate design or operating events rather than from the effects of aging. Failures due to cyclic thermal loads are rare for structural supports due to their relatively low temperatures.

Audit item 423: LRA Table 3.5.1, line item 3.5.1-54 discussion is revised to read as follows.

Loss of mechanical function due to distortion, dirt, overload, and fatigue due to vibratory and cyclic thermal loads is not an aging effect requiring management. Such failures typically result from inadequate design or events rather than the effects of aging. Loss of material due to corrosion, which could cause loss of mechanical function, is addressed under Item 3.5.1-53 for Groups B1.1, B1.2, and B1.3 support members.

Audit item 453: LRA Section 3.0, page 3.0-5 is revised to specify Appendix D rather than Appendix F of NEI 95-10, Revision 6.

Audit item 457: In LRA Table 3.1.2-3, the line item with component type piping and fittings <4" NPS (instrumentation, vent, and drains), intended function pressure boundary, material carbon steel, environment treated water > 220°F (int), aging effect loss of material is revised adding an additional line for aging management program Flow-Accelerated Corrosion, Volume 2 Item IV.C1-7, Table 1 Item 3.1.1-45, and Note "A".

Audit items 459, 460, and 512: LRA Table 3.1.1, line item 3.1.1-48 discussion is revised to read as follows. (Bold words are additions and strike-outs are deletions.)

Cracking in **carbon and** stainless steel components of the reactor coolant pressure boundary exposed to reactor coolant is managed by the Water Chemistry Control – BWR Program Program. The One-Time-Time Inspection Program, which is consistent with the NUREG-1801 programs XI.M32, One-Time Inspection, and XI.M35, One-Time Inspection of ASME Code Class 1 Small-bore Piping, will verify the effectiveness of the water chemistry program and will manage cracking in piping and fittings <4" NPS. ~~Cracking in steel components due to thermal and mechanical loading is not directly dependent on water chemistry, so only the One-Time Inspection Program is credited.~~ ~~T~~he Inservice Inspection Program is also credited for those components > 4" NPS that are compared to this line item. ~~Inservice inspection is not applicable to components < 4" NPS.~~ Lines that reference this item use either One-Time Inspection or Inservice Inspection but not both as listed in NUREG-1801, so note E is used.

The following two line items are added to LRA Table 3.1.2-3.

Piping and fittings < 4" NPS (instrumentation, vent, and drains) // Pressure boundary // Carbon steel // Treated water > 220°F (int) // Cracking // One-Time Inspection // IV.C1-1 (R-03) // 3.1.1-48 // E, 103

Piping and fittings < 4" NPS (instrumentation, vent, and drains) // Pressure boundary // Carbon steel // Treated water // Cracking // One-Time Inspection // IV.C1-1 (R-03) // 3.1.1-48 // E, 103

Audit item 463: LRA Table 3.1.2-2, is revised replacing the program "Thermal Aging Embrittlement of CASS" with "Thermal Aging and Neutron Irradiation Embrittlement of CASS" in each occurrence.

LRA Table 3.1.1, line item 3.1.1-51 discussion is revised replacing "Thermal Aging Embrittlement of CASS" with "Thermal Aging and Neutron Irradiation Embrittlement of CASS"

Audit item 474: LRA Table 3.1.2-1, page 3.1-50, component type supports is revised to provide separate line items for the stabilizer pads and support skirt as follows.

Supports – stabilizer pads//support for criterion (a)(1) equipment//low alloy steel//air – indoor (ext) // Cracking – fatigue // TLAA – metal fatigue // IV.A1-6 (R-70) // 3.1.1-1 // A

Supports – support skirt//support for criterion (a)(1) equipment//carbon steel//air – indoor (ext) // Loss of material // Inservice Inspection // // // H

Supports – support skirt//support for criterion (a)(1) equipment//low alloy steel//air – indoor (ext) // Cracking – fatigue // TLAA – metal fatigue // IV.A1-6 (R-70) // 3.1.1-1 // A

Audit item 501: LRA Table 3.3.2-7 line item for component bolting, material stainless steel, environment air – outdoor is revised as follows.

Bolting// Pressure boundary//stainless steel//air – outdoor (ext) // Loss of material // Bolting Integrity // // // G

Audit item 507: LRA Section 4.3.1.2 is revised as follows.

A review of the design basis document reveals that the only internals component for which there is a fatigue analysis is the core shroud stabilizer (tie rods), the result of a repair to structurally replace circumferential shroud welds surrounding the core. This analysis is a TLAA. The maximum CUF identified for the shroud for 40 years of operation is 0.33. The CUF is included in Section 4.3.1. The Fatigue Monitoring Program ensures the fatigue analyses remain valid by monitoring the actual numbers of cycles and evaluating them against the design values for numbers of allowable cycles. Time-limited aging analyses (fatigue analyses) for the core shroud stabilizer will remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i) or the effects of aging on the intended function(s) will be adequately managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii)."

LICENSE RENEWAL APPLICATION CHANGES

Audit item 509: LRA Section 3.6.2.2.2, fourth paragraph is replaced by the following.

> Mechanical wear is an aging mechanism for strain and suspension insulators in that they are subject to movement. Wear has not been apparent during routine inspections. If left unmanaged for the period of extended operation, surface contamination would not cause a loss of intended function and thus, is not a significant concern.

Audit item 513: LRA Table 3.2.2-7, line items with components piping and valve body exposed to raw water (int) managed by Containment Leak Rate Program are revised to credit Periodic Surveillance and Preventive Maintenance Program for management of aging effects.

> LRA Table 3.2.1, line item 3.1.1-35 discussion is revised as follows.
>
> The Periodic Surveillance and Preventive Maintenance Program manages loss of material for steel components exposed to raw water.
>
> LRA Section B.1.24 Program Description is revised to specify program activities for primary containment penetrations including visual or other NDE techniques to inspect internal surfaces of carbon steel penetration components.

ATTACHMENT C to Letter 2.06.064
(9 pages)

Bolting Integrity Program

Bolting Integrity Program

LRA Appendix A (UFSAR Supplement)

A.2.1.39 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.

License renewal commitment 32 specifies enhancement to this program.

LRA Appendix B

B.1.33 Bolting Integrity

Program Description

The Bolting Integrity Program at PNPS 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

NUREG-1801 Consistency

The Bolting Integrity Program at PNPS 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 verify gasket compression if applicable following assembly. Enhance procedures to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC and to clarify the prohibition on use of lubricants containing MoS_2 for bolting at PNPS.

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.

Program Basis Document

Bolting Integrity Program

Program Description

The Bolting Integrity Program at PNPS 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 System
- AMRM-07, Standby Gas Treatment System
- AMRM-08, Primary Containment Atmosphere Control System
- AMRM-11, Salt Service Water System
- AMRM-12, Reactor Building Closed Cooling Water System
- AMRM-13, Emergency Diesel Generator System
- AMRM-14, Station Blackout Diesel Generator System
- AMRM-15, Fuel Oil System
- AMRM-16, Instrument Air System
- AMRM-17, Fire Protection Water System
- AMRM-18, Halon System
- AMRM-19, Heating, Ventilation and Air Conditioning Subsystems
- AMRM-20, Primary Containment Penetrations
- AMRM-21, Fuel pool Cooling and Fuel Handling and Storage Systems
- AMRM-22, Security Diesel
- AMRM-26, Main Condenser and MSIV Leakage Pathway
- AMRM-27, Condensate Storage 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 PNPS Scope

The Bolting Integrity Program applies to bolting and torquing practices of safety- and nonsafety-related bolting for pressure retaining components,

NSSS component supports, and structural joints. The program addresses all bolting regardless of size. 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. 3.M.4-92)

PNPS 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 PNPS Preventive Actions

Preventive actions include proper selection of bolting material, use of appropriate lubricants and sealants, and use of appropriate torque values 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.
(Ref. 3.M.4-92, V-0412)

Enhancement: Procedures will be enhanced to verify gasket compression if applicable following assembly.
(Ref. 3.M.4-92)

Enhancement: Procedures will be enhanced to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC and to clarify the prohibition on use of lubricants containing MoS_2 for bolting at PNPS.
(Ref. 3.M.4-92, V-0412)

PNPS preventive actions will be consistent with NUREG-1801.

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 PNPS Parameters Monitored/Inspected

This program monitors the effects of aging on the intended function of 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, ENN-DC-178; NE8.02; 2.1.8.3)

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, ENN-DC-178; NE8.02; 2.1.8.3)

PNPS parameters monitored/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 PNPS Detection of Aging Effects

The PNPS 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. Attachments 9.1 and 9.2, ENN-DC-178; NE8.02; NOP92M2; PNPS-RPT-05-001; 2.1.8.3)

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, 22, 26, 27, 30, 33)

PNPS 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 PNPS 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 through engineering evaluation. The Corrective Action Program provides assurance that trends entailing repeat failures are identified, inspection frequencies adjusted, and other necessary corrective actions taken.
(Ref. Attachments 9.1 and 9.2, ENN-DC-178; NE8.02; NOP92M2; PNPS-RPT-05-001; 2.1.8.3)

PNPS 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 PNPS Acceptance Criteria

Indications of aging 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. Attachments 9.1 and 9.2, ENN-DC-178; NE8.02; NOP92M2; PNPS-RPT-05-001; 2.1.8.3)

PNPS 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 PNPS 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 PNPS Corrective Action Program is also applicable.
(Ref. NOP83M1)

PNPS 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 PNPS 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.

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

References

2.1.8.3, Rev. 15, Visual Examination for Leakage During System Pressure Testing

3.M.4-92, Rev. 13, Bolting and Torquing Guidelines

ENN-DC-178, Rev. 0, 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

NE8.02, Rev. 3, Structure Inspection and Condition Monitoring

NE15.03, Rev. 0, Performing, Reporting, and Controlling ISI Activities

NOP83M1, Rev. 08, ASME Code Repairs and Replacements

NOP92M2, Rev. 04, ASME Code Inservice Inspection and Inservice Testing

PNPS-RPT-05-001, Rev. 0, ASME Section XI Fourth Ten-Year Interval Inservice Inspection Program Plan

V-0412, Rev. 5, BWR Operations Manual for Materials and Processes

Summary

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

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

Attributes Affected	Enhancements
2. Preventive Actions	Enhance procedures to verify gasket compression if applicable following assembly. Enhance procedures to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC and to clarify the prohibition on use of lubricants containing MoS_2 for bolting at PNPS. ***(Ref. 3.M.4-92)***