Safety Evaluation Report

Related to the License Renewal of Pilgrim Nuclear Power Station

Supplement 2

Docket No. 50-293

Entergy Nuclear Operations, Inc.

United States Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

June 2011

ABSTRACT

This document is a supplemental document, Supplement 2, to the safety evaluation report (SER) for the license renewal application for Pilgrim Nuclear Power Station (PNPS) as filed by Entergy Nuclear Operations, Inc. (ENO or the applicant). By letter dated January 25, 2006, ENO submitted its application to the U.S. Nuclear Regulatory Commission (NRC) for renewal of the PNPS operating license for an additional 20 years.

The staff issued an SER in June 2007, which summarized the results of its safety review of the renewal application for compliance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." The staff issued Supplement 1 to the SER in September 2007 which documented the safety review results of the applicant's program to deal with the effects of reactor water environments on the fatigue life of reactor components. Subsequently, the staff issued NUREG-1891, "Safety Evaluation Report Related to the License Renewal of Pilgrim Nuclear Power Station," in November 2007, which included both the June 2007 SER and Supplement 1.

This SER, Supplement 2, documents the staff's review of information provided by the applicant since the issuance of NUREG-1891. This information includes annual updates required by 10 CFR 54.21(b) and updated information and commitments in response to recent industry operating experience. This document provides only the changes and additions to NUREG-1891.

TABLE OF CONTENTS

ABBREVIATIONS

ACI	American Concrete Institute
AERM	aging effect requiring management
AMP	aging management program
AMR	aging management review
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	America Water Works Association
BWR	boiling-water reactor
BWRVIP	Boiling Water Reactor Vessel and Internals Project
CASS	cast austenitic stainless steel
CFR	*Code of Federal Regulations*
CII	containment inservice inspection
CLB	current licensing basis
CRD	control rod drive
CS	carbon steel
CUF	cumulative usage factor
ENO	Entergy Nuclear Operations, Inc.
EPRI	Electric Power Research Institute
EQ	environmental qualification
F_{en}	environmental fatigue life correction factor
GALL	Generic Aging Lessons Learned
GL	generic letter
HPCI	high-pressure coolant injection
ISI	inservice inspection
kV	kilovolt(s)
LRA	license renewal application
mg/l	milligram per liter
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association
NRC	U.S. Nuclear Regulatory Commission

PNPS	Pilgrim Nuclear Power Station
PWR	pressurized-water reactor
RCIC	reactor core isolation cooling
RG	regulatory guide
SBO	station blackout
SER	safety evaluation report
SRP-LR	Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants
SSC	system, structure, and component
TLAA	time-limited aging analysis
UFSAR	updated final safety analysis report
UT	ultrasonic testing
V	volt(s)

SECTION 1

INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

This document is a supplemental safety evaluation report (SER) for the license renewal application for Pilgrim Nuclear Power Station (PNPS) as filed by Entergy Nuclear Operations, Inc. (ENO or the applicant). By letter dated January 25, 2006, ENO submitted its application to the U.S. Nuclear Regulatory Commission (NRC) for renewal of the PNPS operating license for an additional 20 years.

The staff issued the original SER in June 2007, which summarized the results of its safety review of the renewal application for compliance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." The staff issued Supplement 1 to the SER in September 2007 which documented the safety review results of the applicant's program to deal with the effects of reactor water environments on the fatigue life of reactor components. Subsequently, the staff issued NUREG-1891, "Safety Evaluation Report Related to the License Renewal of Pilgrim Nuclear Power Station," in November 2007, which included both the June 2007 SER and Supplement 1.

This supplemental SER documents the staff's review of information provided by the applicant since the issuance of NUREG-1891. This information includes annual updates required by 10 CFR 54.21(b) and updated information and commitments in response to recent industry operating experience.

The topics of the staff's review include current licensing basis changes materially affecting the license renewal application as submitted in the 2009 and 2010 Annual Updates and the review of the following updates to the PNPS aging management programs as a result of recent industry operating experience:

- Inaccessible Cables
- One-Time Inspection of Small-Bore Piping
- Selective Leaching Sampling
- Containment Coatings
- Buried Piping and Tanks
- Structures Monitoring
- Neutron Absorber Materials
- Metal Fatigue Monitoring

This document provides only the changes to NUREG-1891. This SER supplements portions of SER Sections 2, 3, 4, 5, Appendix A, and Appendix B.

SECTION 2

STRUCTURES, SYSTEMS, AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW

2.1 Scoping and Screening Methodology

2.1.4 Plant Systems, Structures, and Components Scoping Methodology

2.1.4.1 Application of the Scoping Criteria in 10 CFR 54.4(a)(1)

2.1.4.1.1 Summary of Technical Information in the Application

By letter dated December 28, 2009, the applicant submitted its 2009 Annual Update in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54.21(b). The applicant stated that subsequent to the issuance of the safety evaluation report (SER), Pilgrim Nuclear Power Station (PNPS) received approval to use an alternate source term for the analysis of fuel handling accidents. The update stated, in part:

> [The PNPS definition of safety-related] is the same as 10 CFR 54.4 except that only 10 CFR 100 is cited for dose guidelines. In addition to the guidelines of 10 CFR 100, 10 CFR 54.4(a)(1)(iii) references the dose guidelines of 10 CFR 50.34(a)(1) and 10 CFR 50.67(b)(2). These guidelines, applicable to facilities seeking a construction permit or facilities which have revised the current accident source term used in their design basis radiological analyses, respectively, were not applicable to PNPS at the time of the initial submittal of the LRA [license renewal application]. PNPS submitted and received approval to use the 10 CFR 50.67 alternate source term for analysis of the fuel handling accident, but this does not change the systems that are within the scope of license renewal.
>
> This change to reflect the use of the [10 CFR] 50.67 analysis has no impact on the systems that are in scope and subject to aging management review.

2.1.4.1.2 Staff Evaluation

During its review of the LRA, the staff verified that the applicant had not amended its operating license to allow the use of an alternative source term for accident analyses. However, following the staff's initial review, the applicant submitted the 2009 Annual Update by letter dated December 28, 2009. The applicant stated that subsequent to the issuance of the June 2007 SER, PNPS received approval to use an alternate source term for the analysis of fuel handling accidents. The staff reviewed the information provided by the applicant in the annual update and determined that the applicant had appropriately considered the effects of the limited scope alternate source term on the review of systems, structures, and components (SSCs) to be included within the scope of license renewal and determined that no additional SSCs were required to be within the scope of license renewal.

2.1.4.1.3 Conclusion

The staff does not have any changes or updates to this section of the SER.

2.3 Scoping and Screening Results: Mechanical Systems

2.3.1 Reactor Coolant System

2.3.1.3 Reactor Coolant Pressure Boundary

2.3.1.3.1 Summary of Technical Information in the Application

By letter dated December 28, 2009, the applicant submitted the 2009 Annual Update in accordance with 10 CFR 54.21(b). In the December 2009 letter, the applicant deleted the "pump cover thermal barrier" component type from LRA Table 2.3.1-3, "Reactor Coolant Pressure Boundary Component Subject to Aging Management Review," of the original application. The LRA previously identified the intended function of the pump cover thermal barrier as a reactor coolant pressure boundary.

The staff was unclear why the pump cover thermal barrier was removed from the scope of license renewal and how the reactor coolant pressure boundary was being maintained since this information was not provided in the submittal. By letter dated October 21, 2010, the applicant submitted a supplement to the 2009 Annual Update which clarified information concerning the pump cover thermal barrier.

2.3.1.3.2 Staff Evaluation

The applicant replaced the reactor recirculation pump internals and covers in April 2007 for pump P-201-B and in April 2009 for pump P-201-A. This replacement involved a design change to eliminate concerns with thermal fatigue cracking of the pump shafts and covers. The pump cover thermal barrier was a cooling water passage through the cover in the old pump design. The new pump design eliminated this pump cover cooling. The new design has two connections between the pump and reactor building closed cooling water instead of the four connections in the old design. The old mechanical seal cooler design was a tube and shell type heat exchanger that was noted industrywide to have thermal fatigue cracking issues. The new design eliminates these issues with a tubeless cooler housing so the reactor coolant pressure boundary barrier of the new design consists solely of the pump casing and cover. Therefore, the pressure boundary will be maintained without the pump cover thermal barrier.

The staff has reviewed the information in the 2009 Annual Update and supplement and has concluded that the removal of the pump cover thermal barrier from the scope of license renewal is in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1) because the new pump design maintains the reactor coolant pressure boundary without the pump cover thermal barrier.

2.3.1.3.3 Conclusion

The staff does not have any changes or updates to this section of the SER.

2.3.3 Auxiliary Systems

2.3.3.4 Emergency Diesel Generator

2.3.3.4.1 Summary of Technical Information in the Application

By letter dated December 28, 2009, the applicant submitted its 2009 Annual Update in accordance with 10 CFR 54.21(b). In the December 2009 letter, the applicant deleted the "fogger housing" component type from LRA Table 2.3.3-4, "Emergency Diesel Generator System Components Subject to Aging Management Review," of the original application. The LRA had previously identified the intended function of the fogger housing as a pressure boundary.

The staff discussed a draft request for information during a May 25, 2010, conference call regarding the basis for the deletion of the fogger housing as a component type subject to an aging management review (AMR) (conference call summary dated October 15, 2010). By letter dated October 21, 2010, the applicant provided the basis for removing the "fogger housing" component type from the list of components subject to an AMR.

2.3.3.4.2 Staff Evaluation

The applicant stated that the fogger housing was no longer needed to support the emergency diesel generator intended functions because components in the air start subsystem had been replaced. The fogger housing provided an oil mist in the starting air stream to lubricate vanes in the original air start motors. The applicant stated that the vane-type motors had been replaced with turbine-type air motors that do not require oil mist for lubrication. Since the fogger housings were no longer needed to provide lubrication, the applicant removed the fogger housings and replaced them with air piping components to maintain the pressure boundary. Piping performing a pressure boundary intended function had been listed in LRA Table 2.3.3-4 as a component type subject to an AMR. Therefore, the pressure boundary will be maintained without the fogger housing and it is acceptable to remove this component from the scope of license renewal. Further, the applicant has identified components subject to an AMR consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21.

2.3.3.4.3 Conclusion

The staff does not have any changes or updates to this section of the SER.

SECTION 3

AGING MANAGEMENT REVIEW RESULTS

3.0 Applicant's Use of the Generic Aging Lessons Learned Report

3.0.3 Aging Management Programs

Safety evaluation report (SER) Table 3.0.3-1, "PNPS [Pilgrim Nuclear Power Station] Aging Management Programs," presents the aging management programs (AMPs) credited by the applicant and described in license renewal application (LRA) Appendix B and subsequent LRA supplements. The table also indicates the systems or structures that credit the AMPs and the Generic Aging Lessons Learned (GALL) Report AMP with which the applicant claimed consistency. Further, it shows the SER section in which the staff's evaluation of the program is documented.

The following is an amendment to SER Table 3.0.3-1 which lists the AMPs the applicant has added subsequent to the issuance of the June 2007 SER. Note that all references to the GALL Report in this SER refer to Revision 1.

Table 3.0.3-1a PNPS Additional Aging Management Programs

PNPS AMP (LRA Section)	GALL Report Comparison	GALL Report AMPs	LRA Systems or Structures That Credit the AMP	Staff's SER Section
Neutron Absorber Monitoring Program	Plant-specific program	N/A	Auxiliary components	3.0.3.3.9
Protective Coating Program	Consistent	XI.S8	System and component supports	3.0.3.1.14

3.0.3.1 AMPs Consistent with the GALL Report

3.0.3.1.5 Non-Environmental Qualification Inaccessible Medium-Voltage Cable Program

Summary of Technical Information in the Application. The staff does not have any changes or updates to this section of the SER.

Staff Evaluation. The staff's evaluation of the applicant's proposed Non-Environmental Qualification (EQ) Inaccessible Medium-Voltage Cable Program is documented in SER Section 3.0.3.1.5. The applicant provided additional information subsequent to the issuance of the SER. The staff's evaluation of the additional information related to this AMP is discussed below.

In letters dated January 7, March 16, April 22, and May 18, 2011, the applicant provided supplemental information on enhancements to the Non-EQ Inaccessible Medium-Voltage Cable Program. The applicant stated that these enhancements reflect recent industry, staff, and PNPS correspondence as well as industry correspondence related to Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients."

By letter dated January 7, 2011, the applicant provided information including the aging management of in-scope inaccessible low-voltage power cables. The applicant stated that due to industry concerns regarding inaccessible power cables, the Non-EQ Inaccessible Medium-Voltage Cable Program was expanded to include low-voltage (400V to 2kV) inaccessible power cables, increase the cable inspection and test frequencies, and describe how relevant operating experience is used to assure program effectiveness.

Specifically, the applicant stated that the Non-EQ Inaccessible Medium-Voltage Cable Program will be based on and consistent with the program described in GALL AMP XI.E3, Revision 2 including the following:

- Remove the "exposure to significant voltage" criterion (defined as system voltage for more than 25 percent of the time)
- Expand the voltage range to include 400V to 2kV in-scope inaccessible power cables
- Increase the frequency of inspections for water collection in manholes to at least annually
- Increase the frequency of testing of inaccessible cables (400V to 35kV) for degradation of cable insulation to at least once every 6 years
- Include event-driven inspections (e.g., as a result of heavy rain or flood) into the Non-EQ Inaccessible Medium-Voltage Cable Program
- Include reviews of cable test results and manhole inspection results to determine the need for more frequent testing and inspections

The applicant conducted a review of more recent operating experience stating that in its response to GL 2007-01, no failures involving medium-voltage or low-voltage inaccessible cables were identified. The applicant also conducted a search of operating experience since the response to GL 2007-01, stating that no failures of in-scope inaccessible 400V to 2kV cables were identified.

In a letter dated March 16, 2011, the applicant provided additional clarification to the January 7, 2011, letter for the Non-EQ Inaccessible Medium-Voltage Cable Program. The applicant stated that no failures of inaccessible medium-voltage cables were noted since the applicant's response to GL 2007-01. The applicant also revised the LRA to state that it will test in-scope low-voltage inaccessible cables prior to the period of extended operation.

The application of GALL Report AMP XI.E3 to inaccessible medium voltage cables was based on the operating experience available at the time Revision 1 of the GALL Report was developed. More recent industry operating experience provided by NRC licensees in response to GL 2007-01 has shown that there is an increasing trend of inaccessible power cable failures with length in service and that the presence of water, moisture, or submerged conditions appears to be the predominant factor contributing to cable failure. The staff has determined, based on the review of the cable failure data, that these cables should be addressed in an AMP. Therefore, considering the information provided in the applicant's responses, the staff finds the

Non-EQ Inaccessible Medium-Voltage Cable Program acceptable with respect to inaccessible low-voltage power cables because the applicant has included in-scope inaccessible low-voltage power cables (400V to 2kV) into this program consistent with industry and plant-specific operating experience and current staff recommendations.

The staff also finds that an increase in manhole inspection frequency to at least once per year with more frequent inspections based on inspection results, is consistent with industry operating experience. The addition of condition-based (event-driven) inspections, including the verification of dewatering system function, as applicable, for in-scope manholes reflects industry operating experience and is consistent with staff recommendations.

The staff finds the applicant's revised cable testing frequencies of once every 6 years, with more frequent testing based on testing results, acceptable since it is consistent with industry operating experience and current staff recommendations.

The removal of the "exposure to significant voltage" criterion is also acceptable because it expands the scope of the program and is consistent with industry operating experience and current staff recommendations. On the basis of its review of the enhancements discussed above, the staff concludes that the Non-EQ Inaccessible Medium-Voltage Cable Program will adequately manage the aging effects of inaccessible power cables, consistent with industry operating experience, such that there is reasonable assurance that inaccessible power cables (400V to 35kV) subject to significant moisture will be adequately managed during the period of extended operation.

UFSAR Supplement. In LRA Section A.2.1.21, the applicant provided the updated final safety analysis report (UFSAR) supplement for the Non-EQ Inaccessible Medium-Voltage Cable Program. In a letter dated September 13, 2006, the applicant committed (Commitment No. 15) to implement the Non-EQ Inaccessible Medium-Voltage Cable Program as described in LRA Section B.1.19.

By letters dated January 7, and March 16, 2011, the applicant revised the UFSAR supplement and Commitment No. 15 for the applicant's Non-EQ Inaccessible Medium-Voltage Cable Program based on industry operating experience and staff concerns with in-scope inaccessible power cable operating experience. The applicant revised the UFSAR supplement, LRA Section A.2.1.21, to include event-driven inspections and to specify that test frequencies are adjusted based on the evaluation of test results.

The staff compared the UFSAR supplement to the applicant's Non-EQ Inaccessible Medium-Voltage Cable Program and noted inconsistencies between the LRA AMP, LRA Section A.2.1.21, and Commitment No. 15 concerning AMP implementation, event-driven inspections (including the procedure revision), and the definitions for significant moisture and voltage. In a conference call on March 23, 2011 (conference call summary dated April 11, 2011), the staff discussed the above concerns with the applicant. During the conference call, the applicant stated that it would revise LRA Section A.2.1.21 and Commitment No. 15 to resolve the staff's concerns.

By letters dated April 22 and May 18, 2011, the applicant submitted revisions to LRA Section A.2.1.21 and Commitment No. 15. LRA Section A.2.1.21 was revised to state that the applicant's Non-EQ Inaccessible Medium-Voltage Cable Program is based on and consistent with GALL AMP XI.E3, Revision 2. Commitment No. 15 was revised to indicate that the program would be implemented prior to June 8, 2012. The commitment also stated that

manhole inspections would be performed annually and testing would be conducted once prior to the period of extended operation and at least once every 6 years after entering the period of extended operation.

Based on the above, the staff finds the UFSAR supplement and Commitment No. 15 consistent with industry operating experience and current staff recommendations. The revisions to LRA Section A.2.1.21 and Commitment No. 15 resolve the staff's concerns.

The staff reviewed this section and determined that, upon implementation of Commitment No. 15, the information in the UFSAR supplement is an adequate summary description of the program, as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54.21(d).

Conclusion. On the basis of its audit and review of the applicant's Non-EQ Inaccessible Medium-Voltage Cable Program, the staff finds: (a) the applicant's program will be implemented based on and consistent with the program elements of GALL AMP XI.E3, Revision 2, and (b) the program enhancements, including the incorporation of 400V to 2kV power cables, are consistent with industry operating experience, current staff recommendations, and GALL AMP XI.E3. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis (CLB) for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.8 One-Time Inspection Program

Summary of Technical Information in the Application. The staff does not have any changes or updates to this section of the SER.

Staff Evaluation. The staff's evaluation of the applicant's proposed One-Time Inspection Program is documented in SER Section 3.0.3.1.8 of NUREG-1891, issued November 2007. The applicant provided additional information subsequent to issuance of the SER based on a discussion with the staff concerning recent operating experience. The staff's evaluation of the additional information related to the One-Time Inspection Program is discussed below.

On December 1, 2010 (conference call summary dated January 7, 2011), the staff held a conference call with the applicant to discuss its One-Time Inspection Program regarding the adequacy of the small-bore piping inspection. The staff provided information regarding recent operating experience and the need to include volumetric examinations of Class 1 socket welds in the program.

By letter dated January 7, 2011, the applicant provided supplemental information to the One-Time Inspection Program and to Commitment No. 20. The applicant stated in both the letter and the commitment that it will perform volumetric examinations of 10 percent of its Code Class 1 small-bore socket welds and 10 percent of its Code Class 1 small-bore butt welds. It further stated that it uses its risk-informed inservice inspection (ISI) program to identify the most susceptible and risk-significant welds.

The staff noted that the inspection sampling is a focused inspection which selects the most susceptible and risk-significant welds to ensure a high probability that cracking is detected, if it exists. The staff also noted that, if cracking is detected during the inspection, there will be an

extent of condition review to evaluate the inspection sample size in order to ensure that it is adequate to identify cracking at other possible locations.

The staff finds the applicant's proposed inspection sampling acceptable because the inspections will focus on the most susceptible and risk-significant welds and an adequate number of welds will be selected for inspection, which is consistent with the recommendations of GALL AMP XI.M35, "One-Time Inspection of ASME Code Class 1 Small-Bore Piping." The staff also finds that the proposed inspection methodology, which includes a volumetric examination capable of detecting cracking in welds, acceptable because it is consistent with the recommendations of the "detection of aging effects" program element of GALL AMP XI.M35.

The applicant further stated that, in lieu of a volumetric examination, it may perform a destructive examination, in which each destructive weld examination will be considered equivalent to performing two volumetric weld examinations. The total number of socket welds inspected will be a combination of volumetric and destructive examinations. The staff finds the applicant's proposed alternative acceptable because welds that are destructively examined provide more information when compared to the information obtained from a weld that is examined with nondestructive techniques.

Regarding program implementation, the applicant stated that, in addition to inspections already performed, the remainder of all inspections will be performed during outages in 2011, 2013, and 2015, but no later than 2017. The staff noted that the applicant will be entering the period of extended operation on June 8, 2012, and the proposed inspections will be completed within the next 6 years. The staff finds it reasonable and timely for the applicant to complete the small-bore piping inspections by 2017 because this schedule will allow sufficient time for the applicant to: (1) plan and schedule the inspections during outages prior to 2017, (2) improve techniques to volumetrically inspect small-bore socket welds, (3) develop plant-specific procedures, and (4) qualify personnel to perform the inspections.

Based on its review, the staff determined that the applicant's proposed aging management of Code Class 1 small-bore piping is adequate because the program includes: (1) a sufficient number of welds to be inspected, (2) an adequate selection methodology that focuses on susceptibility and risk-significance of welds, and (3) timely implementation of the small-bore piping inspections, as described above.

By letter dated January 31, 2011, the applicant submitted supplemental information regarding the sampling of components, other than small-bore pipe welds, inspected by the One-Time Inspection Program. The applicant stated that representative samples are chosen from each population, where a population is a group of components with the same material and environment combination. The applicant also stated that the sample size will be based on Chapter 4 of Electric Power Research Institute (EPRI)-TR 107514, "Age Related Degradation Inspection Method and Demonstration," except for populations of less than 100 where the criterion will be modified such that the sample size is at least 20 percent of the population with no less than 2 inspections. The applicant further stated that inspection locations will focus on the bounding or lead component most susceptible to aging due to time in service and severity of operating conditions, where practical. The staff finds the applicant's supplemental information acceptable because the applicant's sampling methodology ensures that a representative sample of material and environment combinations is considered, ensures sample locations will focus on the most susceptible components, and includes an appropriate sample size.

Operating Experience. The staff does not have any changes or updates to this section of the SER.

UFSAR Supplement. The staff's evaluation of the applicant's UFSAR supplement for the One-Time Inspection Program is documented in SER Section 3.0.3.1.8 of NUREG-1891, issued in November 2007.

The staff also noted that the applicant updated Commitment No. 20 to the One-Time Inspection Program for welds in small-bore piping by letter dated January 7, 2011, as follows:

> Entergy [Entergy Nuclear Operations, Inc.] will perform volumetric examinations of 10 percent of the population of ISI small-bore socket welds at PNPS. In lieu of volumetric examinations, destructive examinations will be performed. The total welds inspected will be any combination of volumetric and destructive examinations where one destructive examination may be substituted for two volumetric examinations. In addition to the destructive examinations performed in 2005, Entergy will schedule four volumetric examinations for 2013. The remaining inspections will be completed no later than 2017.
>
> As a further enhancement, Entergy will inspect three small-bore butt welds in 2011 and another one in 2015.

The staff determines that the information in the UFSAR supplement, as amended, is an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. The staff does not have any changes or updates to this section of the SER.

3.0.3.1.9 Selective Leaching Program

Summary of Technical Information in the Application. The staff does not have any changes or updates to this section of the SER.

Staff Evaluation. The staff's evaluation of the applicant's proposed Selective Leaching Program is documented in Section 3.0.3.1.9 of NUREG-1891, issued in November 2007. Subsequently, the applicant provided additional specific information regarding how the selected set of components to be sampled will be determined and the size of the sample of components that will be inspected. The staff's evaluation of the additional information related to the Selective Leaching Program is discussed below.

By letter dated January 31, 2011, the applicant submitted supplemental information regarding the sampling of components inspected by the Selective Leaching Program. The applicant stated that representative samples are chosen from each population, where a population is a group of components with the same material and environment combination. The applicant also stated that the sample size will be based on Chapter 4 of EPRI-TR 107514, "Age Related Degradation Inspection Method and Demonstration," except for populations of less than 100 where the criterion will be modified such that the sample size is at least 20 percent of the population with no less than 2 inspections. The applicant further stated that inspection locations will focus on the bounding or lead component most susceptible to aging due to time in service and severity of operating conditions, where practical. The staff finds the applicant's supplemental information acceptable because the applicant's sampling methodology ensures that a representative sample of material and environment combinations is considered, ensures

sample locations will focus on the most susceptible components, and includes an appropriate sample size.

Operating Experience. The staff does not have any changes or updates to this section of the SER.

UFSAR Supplement. The staff does not have any changes or updates to this section of the SER.

Conclusion. The staff does not have any changes or updates to this section of the SER.

3.0.3.1.14 Protective Coating Monitoring and Maintenance Program

Summary of Technical Information in the Application. By letter dated January 7, 2011, as supplemented by letters dated March 16, and April 21, 2011, the applicant amended its LRA to include the new Protective Coating Monitoring and Maintenance Program. These amendments describe the new Protective Coating Monitoring and Maintenance Program as consistent with GALL AMP XI.S8, "Protective Coating Monitoring and Maintenance Program."

The applicant stated that the program manages the effects of aging on Service Level I coatings applied to steel and concrete surfaces inside containment. The applicant stated that the Service Level I protective coatings are not credited to manage the effects of aging, however, the applicant stated that proper maintenance of protective coatings inside containment is essential to ensure operability of post-accident safety systems that rely on water recycled through the containment. The applicant further stated that proper monitoring and maintenance of Service Level I coatings ensure that there is no coating degradation that would impact safety functions. The applicant reported that the Protective Coating Monitoring and Maintenance Program complies with those sections of Regulatory Guide (RG) 1.54, Revision 2, "Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants," that relate to managing the effects of aging, that is, inspection and maintenance of Service Level I protective coatings as addressed under Section C.3, "Training and Qualifications of Nuclear Coating Specialist, Protective Coating Inspectors and Coating Applicators," and Section C.4, "Maintenance of Coating."

The applicant stated that the program will comply with the guidelines identified in American Society for Testing and Materials (ASTM) D5163-08 for specifics of an acceptable AMP for Service Level I coatings. The applicant indicated that the program monitors and inspects any visible defects, such as blistering, cracking, flaking, peeling, rusting, and physical damage. The applicant stated that coating inspections will be performed at least once every 40 months in conjunction with the IWE program. In addition, the applicant stated that a general visual inspection will be conducted on all readily accessible coated surfaces during each refueling outage. The applicant further stated that after the general visual inspections, a thorough visual inspection is carried out on previously designated areas and on areas noted as deficient.

The applicant indicated that field documentation of inspection results will be performed in accordance with subparagraph 10.3 of ASTM D5163-08. Furthermore, the applicant stated that if portions of the coating cannot be inspected, the inspector will note the specific areas on the inspection report location map, along with the reason why the inspection cannot be conducted. In addition, the applicant stated that for coating surfaces determined to be suspect, defective, or deficient, physical tests, such as dry film thickness (Test Methods D1186 and SSPC-PA 2), and adhesion (Test Methods D3359, D4541, or D6677) may be performed when directed by the

nuclear coating specialist. The applicant also stated that personnel qualification will be in accordance with paragraph 9 of ASTM D5163.

The applicant stated that ASTM D5163 is used to evaluate and document inspection reports. The applicant also stated that the inspection evaluations cover blistering, cracking, flaking, peeling, delamination, and rusting. In addition to ASTM D5163, the applicant stated that the following ASTM standards will be used: ASTM D660 for evidence of checking, ASTM D661 for evidence of cracking, and ASTM D772 for evidence of flaking (scaling).

Staff Evaluation. The staff reviewed the applicant's claim of consistency with the GALL Report.

The staff compared elements one through six of the applicant's program to the corresponding elements of GALL AMP XI.S8. The staff confirmed that these elements are consistent with the corresponding elements of GALL AMP XI.S8. The staff finds the frequency of coating inspections to be acceptable since performing general visual inspections every refueling outage will provide adequate assurance that there is proper maintenance of the protective coatings. The method of performing the coatings inspection is acceptable to the staff since visual inspections performed are able to detect for adverse coating conditions such as blistering, cracking, flaking, peeling, rusting, and physical damage. The staff also found acceptable that the program meets the requirements of ASTM D5163, since it is consistent with RG 1.54, Revision 2. In addition, the qualification of personnel who perform the inspection is found to be acceptable since the staff has reviewed and confirmed that the requirements in paragraph 9 of ASTM D5163 are acceptable. The staff finds that elements one through six of the applicant's Protective Coating Monitoring and Maintenance Program are consistent with the corresponding program elements of GALL AMP XI.S8 and, therefore, acceptable.

Operating Experience. By letter dated March 16, 2011, the applicant provided supplemental information regarding operating experience related to the new Protective Coating Monitoring and Maintenance Program.

The applicant provided the following:

> Coating inspections were conducted and documented in conjunction with the IWE containment examinations in 1999, 2003, and 2007; and are scheduled for 2011. Torus desludging, coating inspection and coating repair was performed by divers in 1999, 2003, and 2007. Results have determined assessments continue to be bounding as volumes are less than allowed by calculation and therefore the present frequencies for examinations are adequate to manage aging effects. The Structures Monitoring Program inherently addresses protective coatings on structures and structural components inside primary containment through visual inspections of those structures and components. Industry operating experience identified in GL 98-04, and tenets of EPRI TR-109937 were used in establishment of PNPS, and Entergy [Entergy Nuclear Operations, Inc.] Containment Coatings Program.

The staff reviewed the operating experience information in the application to determine whether the applicable aging effects and industry and plant-specific operating experience were reviewed by the applicant. During its review, the staff found no operating experience to indicate that the applicant's program would be ineffective in adequately managing aging effects during the period of extended operation.

Based on its review of the application, the staff finds that operating experience related to the applicant's program demonstrates that it can adequately manage the detrimental effects of aging on SSCs within the scope of the program and that implementation of the program has resulted in the applicant taking appropriate corrective actions. The staff confirmed that the "operating experience" program element satisfies the criterion in SRP-LR Section A.1.2.3.10 and, therefore, the staff finds it acceptable.

UFSAR Supplement. By letter dated April 21, 2011, the applicant provided the UFSAR supplement, LRA Section A.2.1.42, for the Protective Coating Monitoring and Maintenance Program. The staff noted that the applicant did not provide additional LRA changes or a UFSAR supplement to reflect the new program. During a conference call held on April 6, 2011 (conference call summary dated April 19, 2011), the staff requested the applicant to provide the UFSAR supplement associated with the Protective Coating Monitoring and Maintenance Program.

In its response dated April 26, 2011, the applicant provided the following UFSAR supplement:

> The Protective Coating Monitoring and Maintenance Program manage[s] the effects of aging on Service Level 1 coatings inside containment by means of periodic visual inspections. The program also includes direction to select and review the suitability of the coatings applied to surfaces inside containment (e.g., steel containment shell, structural steel, supports, penetrations, and concrete walls and floors). Inspection of coatings inside containment is performed of accessible areas in accordance with the IWE requirements of ASME Section XI during every other refueling outage (once per ASME Section XI IWE period) which is a maximum of four years.

The staff reviewed the UFSAR supplement description of the program and notes that it conforms to the recommended description for this type of program as described in SRP-LR Table 3.5-2. The staff also noted that the applicant committed (Commitment No. 53) to enhance safety-related coatings programs and procedures to be consistent with the recommendations of GALL AMP XI.S8. In addition, the applicant committed to implement the new Protective Coating Monitoring and Maintenance Program prior to entering the period of extended operation.

The staff determines that the information in the UFSAR supplement is an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review of the applicant's Protective Coating Monitoring and Maintenance Program, the staff finds all program elements consistent with the GALL Report. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2 AMPs Consistent with the GALL Report with Exceptions and/or Enhancements

3.0.3.2.1 Buried Piping and Tanks Inspection Program

Summary of Technical Information in the Application. The staff does not have any changes or updates to this section of the SER.

Staff Evaluation. The staff's evaluation of the applicant's Buried Piping and Inspection Program is documented in Section 3.0.3.2.1 of the SER. By letters dated January 7, March 16, and April 22, 2011, the applicant described changes to its Buried Piping and Tanks Inspection Program based upon industry operating experience that had occurred subsequent to the issuance of the original SER and Supplement 1 to the SER, dated June 2007 and September 2007, respectively. The staff's evaluation of the additional information related to the Buried Piping Inspection Program is discussed below.

The exception to GALL AMP XI.M34, "Buried Piping and Tanks Inspection," evaluated in the original SER input to allow alternative inspection methods such as phased array ultrasonic testing (UT) to determine wall thickness without excavating will only be used for buried in-scope stainless steel piping associated with the high-pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) suction piping. The applicant stated that alternative inspection methods are required for this piping because it is not accessible for excavated direct visual inspection due to its location near building structures. The staff finds the applicant's use of alternative inspection methods for the HPCI and RCIC suction piping acceptable because it is impractical to excavate the piping and measuring pipe wall thickness in lieu of a direct visual inspection is consistent with the "detection of aging effects" program element of GALL AMP XI.M41, "Buried and Underground Piping and Tanks."

The applicant provided the following additional plant-specific operating experience in letters dated January 7, and March 16, 2011:

- A review of plant records indicates that no age-related failures of in-scope buried piping have occurred due to external corrosion.
- Visual inspections of excavated fire protection, service water, and diesel generator fuel oil piping indicate that the external surfaces and coatings remain in good condition.
- An unspecified length of salt service water piping was examined in 2010 and there were no signs of degradation of its external coating, and when the coating was removed, the exposed surface of the piping had no indications of pitting or loss of material.
- An 8-foot section of the cast iron firewater system was sent offsite in 2009 for failure analysis due to through wall leakage. The failure was attributed to installation damage and the pipe's exterior coating showed no age-related degradation.
- Ultrasonic and visual inspections of the steel diesel generator fuel oil tank revealed no degradation in 2010 and during the previous inspection conducted 10 years prior.

The applicant further stated that:

- The cathodic protection system is available greater than 90 percent of the time and inspected annually by a National Association of Corrosion Engineers (NACE)-licensed vendor, with structure-to-soil measurements obtained in accordance with NACE Standard SP0169. If availability drops below 90 percent, or if the system is out of service for greater than 90 days, a corrective action report is generated and an evaluation is conducted to determine if additional inspections are necessary.
- Soil testing will be conducted at a minimum of two locations at least 3 feet below the surface in the vicinity of buried in-scope non-cathodically protected piping. The parameters to be monitored include soil resistivity, pH, redox potential, moisture, and sulfides. America Water Works Association (AWWA) Standard C105, Appendix A, will

be used to determine the aggregate impact of these parameters to determine soil corrosivity. Soil measurements will be taken during each excavation.

- The plant-specific backfill specifications require clean, free-draining sand, excluding materials greater than 3/8 inch within 6 inches of coated pipes and underground tanks. Reports from field personnel and a recent review of construction photographs indicate that the backfill meets the plant-specific specifications. Installed backfill conditions will be further assessed during excavated inspections.
- All in-scope buried piping is located above the groundwater table.
- There are two in-scope buried fiberglass tanks that contain fuel for the station blackout (SBO) diesel. The tanks are double wall constructed with the interstitial space monitored and alarmed at the SBO panel.
- The buried steel fuel oil storage tanks are ultrasonically examined every 10 years. The inspection points cover 70 percent of the tank interior and are conducted at those locations most susceptible to degradation.
- Inspections of steel piping will consist of direct visual inspection of excavated components and will be conducted as follows:
    - Buried in-scope steel piping in all systems except fire protection will be inspected by December 31, 2013, using a direct visual inspection of the entire circumference of at least 10 feet of piping.
    - At least 20 feet of steel non-cathodically protected piping will be inspected every 10 years during the period of extended operation. Alternatively, at least 40 feet of this piping will be inspected if the soil is determined to be corrosive, backfill has been found to have damaged the coating, or soil resistivity is less than 20,000 ohm-cm.
    - At least 80 feet of steel cathodically-protected piping will be inspected every 10 years during the period of extended operation.
    - Annual flow testing in accordance with National Fire Protection Association (NFPA) 25 will be conducted for the fire protection system in lieu of excavated direct visual inspections.

The staff finds the revised Buried Piping and Tanks Inspection Program as described in the supplemental letters acceptable because:

- although there was one instance of plant-specific data where a small area of surface corrosion was found on fire protection piping (attributed to marginal installation techniques), all other inspections have found the coatings and piping to be in acceptable condition
- plant-specific backfill specifications are sufficient such that when properly implemented, they can prevent damage to piping and piping coatings, inspections to date have found the backfill to meet the specification, and the applicant has committed to further excavated inspections that will continue to provide trending data related to the quality of the backfill
- the cathodic protection system for the SBO diesel fuel oil, SBO diesel cooling water, and fuel oil piping is available at least 90 percent of the time and annual effectiveness surveys are conducted in accordance with NACE standards
- all buried steel piping is coated

- the applicant monitors the space between the inner and outer shell of the fiberglass diesel fuel oil storage tanks for leakage and conducts ultrasonic examinations of the steel fuel oil storage tanks every 10 years, both of which are consistent with the "detection of aging effects" program element of GALL AMP XI.M41
- the planned inspections or tests and the applicant's planned expansion of inspections, if the soil is found to be corrosive or backfill has damaged the coatings, is sufficient to provide a reasonable assurance that the buried in-scope components will meet their CLB function(s)

Based on its review of the applicant's supplemental information for the Buried Piping and Tanks Inspection Program, the staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

UFSAR Supplement. The applicant committed (Commitment No. 50) to inspect buried steel piping in all in-scope systems, except for fire protection, by December 31, 2013, using a direct visual inspection of the entire circumference of at least 10 feet of exposed piping. In a letter dated April 22, 2011, the applicant revised LRA Section A.2.1.2 to state: (1) the number of buried pipe inspections for the SBO diesel fuel oil, SBO cooling, fuel oil, and standby gas treatment systems; (2) the frequency of these inspections; and (3) planned expansion of inspections for the standby gas treatment systems if the soil is found to be corrosive or backfill is found to have damaged the coating. In addition, LRA Section A.2.1.2 was also revised to state the inspection frequency of the diesel generator fuel oil storage tank inspections.

Conclusion. The staff does not have any changes or updates to this section of the SER.

3.0.3.2.17 Structures Monitoring Program

Summary of Technical Information in the Application. The staff does not have any changes or updates to this section of the SER.

Staff Evaluation. The staff's evaluation of the applicant's proposed Structures Monitoring Program is documented in Section 3.0.3.2.17 of NUREG-1891, issued in November 2007. Subsequently, the applicant provided additional information regarding the Structures Monitoring Program acceptance criteria. The staff's evaluation of the additional information related to the Structures Monitoring Program is discussed below.

GALL AMP XI.S6, "Structures Monitoring Program," states that American Concrete Institute (ACI) 349.3R, "Evaluation of Existing Nuclear Safety-Related Concrete Structures," is an acceptable basis for selection of parameters monitored, detection of aging effects, and acceptance criteria. The LRA states that the applicant's program incorporates inspection guidance based on recommendations contained in ACI 349.3R; however, it does not clearly state that the acceptance criteria align with those in ACI 349.3R.

By letter dated January 31, 2011, the applicant stated that its Structures Monitoring Program has a responsible engineer with the appropriate education and experience to identify and evaluate existing conditions using appropriate standards, including ACI standards. The applicant further stated that the program will be enhanced to include more detailed guidance on quantitative acceptance criteria of ACI 349.3R. The applicant committed to implementing this enhancement prior to the period of extended operation (Commitment No. 51).

The staff reviewed the applicant's response and found it acceptable because the applicant has committed to enhance its Structures Monitoring Program to include acceptance criteria aligned with the quantitative criteria recommended in ACI 349.3R and, therefore, with the recommendations in the GALL Report. The applicant has committed to implement this enhancement prior to the period of extended operation.

Operating Experience. The staff does not have any changes or updates to this section of the SER.

UFSAR Supplement. In LRA Section A.2.1.32, the applicant provided the UFSAR supplement for the Structures Monitoring Program. In a letter dated September 13, 2006, the applicant revised LRA Section A.2.1.32, Structures Monitoring Program, to include Commitment Nos. 25 and 26 to specify enhancements to this program. In a letter dated January 31, 2011, the applicant supplemented the application to add Commitment No. 51 to specify an additional enhancement to the program.

The staff determines that the information in the UFSAR supplement is an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. The staff does not have any changes or updates to this section of the SER.

3.0.3.3 AMPs Not Consistent with or Not Addressed in the GALL Report

3.0.3.3.9 Neutron Absorber Monitoring Program

Summary of Technical Information in the Application. By letter dated October 21, 2010, as supplemented by letters dated January 7, March 16, and April 21, 2011, the applicant provided information regarding the new Neutron Absorber Monitoring Program.

LRA Section B.1.35 describes the new Neutron Absorber Monitoring Program as plant-specific. The applicant stated that the program manages loss of material and reduction of neutron absorption capacity of Boral and Metamic neutron absorption panels in the spent fuel racks. The applicant further stated that the program will rely on periodic inspection, testing, monitoring, and analysis of the criticality design to assure that the required 5 percent subcriticality margin is maintained during the period of extended operation.

Staff Evaluation. The staff reviewed program elements one through six of the applicant's program against the acceptance criteria for the corresponding elements as stated in SRP-LR Section A.1.2.3. The staff's review focused on how the applicant's program manages aging effects through the effective incorporation of these program elements. The staff's evaluation of each of these elements follows.

Scope of the Program. LRA Section B.1.35 states that the program manages the effects of aging on Boral and Metamic neutron absorption panels used in spent fuel racks at PNPS.

The staff reviewed the applicant's "scope of the program" program element against the criteria in SRP-LR Section A.1.2.3.1, which states that the scope of the program should include the specific structures and components of which the program manages the aging. After reviewing the "scope of the program" program element, the staff determined that the applicant adequately described the structures and components to be managed.

The staff confirmed that the "scope of the program" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.1 and, therefore, the staff finds it acceptable.

Preventive Actions. LRA Section B.1.35 states that the applicant's Neutron Absorber Monitoring Program is a condition monitoring and inspection program and, therefore, there are no preventive actions required.

The staff reviewed the applicant's "preventive actions" program element against the criteria in SRP-LR Section A.1.2.3.2, which states that for condition or performance monitoring programs, they do not rely on preventive actions and thus, this information need not be provided.

The staff confirmed that the "preventive actions" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.2 and, therefore, the staff finds it acceptable.

Parameters Monitored or Inspected. LRA Section B.1.35 states that the parameters monitored include the physical condition of the Boral and Metamic neutron-absorption panels including geometric changes in the material (formation of blisters, pits, and bulges) as observed from coupons. The applicant also stated that the primary parameter to be monitored is B-10 areal density.

The staff reviewed the applicant's "parameters monitored or inspected" program element against the criteria in SRP-LR Section A.1.2.3.3, which states that the parameters to be monitored or inspected should be identified and linked to the degradation for the particular structure and component intended function(s). The SRP-LR also states that for a performance monitoring program, a link should be established between the degradation of the particular structure or component intended function(s) and the parameter(s) being monitored.

After reviewing the "parameters monitored or inspected" program element, the staff determined that the applicant adequately addressed the criterion defined in SRP-LR Section A.1.2.3.3. Inspection of the Boral and Metamic coupons, which are indicative of the Boral and Metamic in the spent fuel racks, is an acceptable means to monitor for the aging effects of loss of material and reduction of neutron absorber capacity. Furthermore, monitoring the physical condition of the neutron-absorbing material, such as geometric changes in the material (formation of blisters, pits, and bulges) and changes in B-10 areal density, makes this element of the program consistent with LR-ISG-2009-01, "Aging Management of Spent Fuel Pool Neutron-Absorbing Materials other than the Boraflex." The LR-ISG-2009-01 provides information on an acceptable neutron absorber program that uses neutron-absorbing material other than the Boraflex.

The staff confirmed that the "parameters monitored or inspected" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.3 and, therefore, the staff finds it acceptable.

Detection of Aging Effects. LRA Section B.1.35 states that the aging effects (i.e., loss of material and degradation of the neutron absorption capacity) will be determined through coupon testing of each material. The applicant stated that coupon testing will measure B-10 areal density and geometric changes (i.e., blistering, pitting, and bulges) which will be recorded and evaluated. Furthermore, the applicant stated that any changes will be identified and documented.

The applicant stated that the frequency of inspection will be at least once every 10 years. It was stated that the interval will be shortened if results of PNPS testing, testing of similar materials at

other ENO facilities, or industry operating experience indicate that unacceptable degradation may occur prior to the next scheduled test.

The staff reviewed the applicant's "detection of aging effects" program element against the criteria in SRP-LR Section A.1.2.3.4, which states that detection of aging effects should occur before there is a loss of the structure- and component-intended function(s). The parameters to be monitored or inspected should be appropriate to ensure that the structure- and component-intended function(s) will be adequately maintained for license renewal under all CLB design conditions. This includes aspects such as method or technique (e.g., visual, volumetric, surface inspection), frequency, sample size, data collection, and timing of new/one-time inspections to ensure timely detection of aging effects. Additionally, the program should provide information that links the parameters to be monitored or inspected to the aging effects being managed.

After reviewing the "detection of aging effects" program element, the staff determined that the applicant adequately addressed the criterion defined in SRP-LR Section A.1.2.3.4 because the Neutron Absorber Monitoring Program is set up to facilitate early detection of aging effects in the Boral and Metamic panels in the spent fuel pool via detection of aging effects in the Boral and Metamic coupons. The program performs inspections at least once every 10 years and performs testing on coupons to determine loss of material and reduction of neutron absorption capacity.

The staff confirmed that the "detection of aging effects" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.4 and, therefore, the staff finds it acceptable.

Monitoring and Trending. LRA Section B.1.35 states that the measurements from periodic inspections and analysis results will be compared to prior measurements and analysis results for trending.

The staff reviewed the applicant's "monitoring and trending" program element against the criteria in SRP-LR Section A.1.2.3.5, which states that monitoring and trending activities should be described, and they should provide predictability of the extent of degradation and thus effective timely corrective or mitigative actions. Plant-specific and/or industrywide operating experience may be considered in evaluating the appropriateness of the technique and frequency.

After reviewing the "monitoring and trending" program element, the staff determined that the applicant adequately addressed the criterion defined in SRP-LR Section A.1.2.3.5 because the applicant's program includes trending and comparison of measurements from periodic inspections and testing results.

The staff confirmed that the "monitoring and trending" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.5 and, therefore, the staff finds it acceptable.

Acceptance Criteria. LRA Section B.1.35 states that testing will confirm that the Boral and Metamic panels continue to meet the minimum B-10 areal density assumptions of the spent fuel pool criticality analysis. The applicant further stated that the neutron-absorbing capacity will be measured and analyzed to ensure 5 percent subcriticality margin for the spent fuel pool. The applicant also stated that the changes in physical dimensions will be evaluated for acceptability under the corrective action program.

The staff reviewed the applicant's "acceptance criteria" program element against the criteria in SRP-LR Section A.1.2.3.6, which states that the acceptance criteria of the program and its basis should be described. The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the structure- and component-intended function(s) are maintained under all CLB design conditions during the period of extended operation.

The staff confirmed that the "acceptance criteria" program element satisfies the criterion defined in SRP-LR Section A.1.2.3.6 and, therefore, the staff finds it acceptable.

Operating Experience. LRA Section B.1.35 summarizes operating experience related to the neutron-absorbing material.

The applicant stated that the operating experience included the following:

(a) Loss of material from neutron-absorbing material has been seen at some plants, including loss of aluminum, which was detected by monitoring the aluminum concentration in the spent fuel pool. One instance of this was documented in the Vogtle LRA Water Chemistry Program B.3.28.

(b) Blistering has also been noted at some plants. Examples include blistering at Seabrook and Beaver Valley.

(c) Loss of neutron-absorbing capacity of the plate-type Carborundum material has been reported at Palisades.

The staff reviewed this information against the acceptance criteria in SRP-LR Section A.1.2.3.10, which states that the operating experience of AMPs, including past corrective actions resulting in program enhancements or additional programs, should be considered. A past failure would not necessarily invalidate an AMP because the feedback from operating experience should have resulted in appropriate program enhancements or new programs. This information can show where an existing program has succeeded and where it has failed (if at all) in intercepting aging degradation in a timely manner. This information should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the structure- and component-intended function(s) will be maintained during the period of extended operation.

During its review, the staff found no operating experience to indicate that the applicant's program would not be effective in adequately managing aging effects during the period of extended operation.

The staff confirmed that the applicant addressed operating experience identified after issuance of the GALL Report (Revision 1). Based on its review, the staff finds that operating experience related to the applicant's program demonstrates that it can adequately manage the detrimental effects of aging on SSCs within the scope of the program and that implementation of the program has resulted in the applicant taking appropriate corrective actions. The staff confirmed that the "operating experience" program element satisfies the criterion in SRP-LR Section A.1.2.3.10 and, therefore, the staff finds it acceptable.

UFSAR Supplement. LRA Section A.2.1.41 provides the UFSAR supplement for the Neutron Absorber Monitoring Program.

The staff reviewed this UFSAR supplement description of the program and notes that it conforms to the recommended description for this type of program as described in LR-ISG-2009-01. The staff also notes that the applicant committed (Commitment No. 49) to the following commitment for the neutron-absorbing material in the spent fuel pool:

> Entergy will perform periodic inspection and neutron absorber testing of Boral and Metamic in accordance with the methods and frequencies recommended by LR-ISG-2009-01. Acceptance criteria will be that measured and analyzed neutron-absorbed capacity is adequate to ensure 5% subcriticality margin for the spent fuel pool, assuming neutron absorber degradation as the applicable aging effect. Results not meeting the acceptance criteria will be entered into the PNPS corrective action program for evaluation and corrective action. One test on each material will be performed within the five year preceding the PEO [period of extended operation], with additional testing performed on each material at least once every 10 years during the PEO.

After reviewing the UFSAR supplement, the staff determined that more information was needed to complete its review. During a conference call held on April 6, 2011 (conference call summary dated April 19, 2011), the staff requested that the applicant revise its UFSAR supplement to include information on the planned number and frequency of inspections and testing for this program prior to, and during, the period of extended operation. In its response dated April 26, 2011, the applicant stated that the Neutron Absorber Monitoring Program will be initiated prior to the period of extended operation. The applicant further stated that one test on each material (i.e., Boral and Metamic) will be performed within 5 years preceding the period of extended operation, with additional testing performed on each material at least once every 10 years during the period of extended operation. The staff finds this acceptable since it meets the recommendations found in LR-ISG-2009-01.

The staff determines that the information in the UFSAR supplement is an adequate summary description of the program, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review of the applicant's Neutron Absorber Monitoring Program, the staff determines that those program elements for which the applicant claimed consistency with the LR-ISG-2009-01 are consistent. The staff concludes that the applicant has determined that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concludes that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.3 Aging Management of Auxiliary Systems

3.3.2 Staff Evaluation

3.3.2.2 AMR Results Consistent with the GALL Report for Which Further Evaluation is Recommended

3.3.2.2.6 Reduction of Neutron-Absorbing Capacity and Loss of Material due to General Corrosion

By letter dated April 21, 2011, the applicant provided a revision to LRA Section 3.3.2.2.6, Tables 3.3.1 and 3.3.2-13 regarding the inclusion of the Metamic and the Neutron Absorber Monitoring Programs.

LRA Section 3.3.2.2.6, referenced by LRA Table 3.3.1, item 3.3.1-13, addresses Boral, Metamic, and spent fuel storage racks neutron-absorbing sheets exposed to treated water or borated water, which are being managed for reduction of neutron-absorbing capacity and loss of material due to general corrosion by a plant-specific program. The applicant addressed the further evaluation criteria by stating that the Neutron Absorber Monitoring and Water Chemistry Control-BWR programs will be used to manage reduction of neutron-absorbing capacity and loss of material due to general corrosion of the neutron-absorbing sheets exposed to treated borated water.

LRA Table 3.3.2-13 addresses neutron absorber component types and includes Boral and Metamic as the neutron absorber materials used in the spent fuel pool. The applicant identified the Neutron Absorber Monitoring and Water Chemistry Control-BWR programs as AMPs for these materials.

The staff reviewed LRA Section 3.3.2.2.6 against the criteria in SRP-LR Section 3.3.2.2.6, which states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of boiling-water reactor (BWR) and pressurized-water reactor (PWR) spent fuel storage racks exposed to treated water or treated borated water. The SRP-LR also states that the GALL Report recommends further evaluation of a plant-specific AMP to ensure that these aging effects are adequately managed and that acceptance criteria are described in Branch Technical Position RLSB-1.

The staff evaluated the applicant's Neutron Absorber Monitoring Program in Section 3.0.3.3.9 of this supplement, and the Water Chemistry Control-BWR Program in Section 3.0.3.1.13 of the SER. In its review of components associated with item 3.3.1-13 and neutron-absorbing materials found in LRA Table 3.3.2-13, the staff finds the applicant's proposal to manage aging using the Neutron Absorber Monitoring and Water Chemistry Control-BWR programs acceptable because both programs satisfy the acceptance criteria of the SRP-LR and uses inspection techniques (e.g., B-10 areal density measurements and visual inspection of coupons) that can detect aging effects related to the neutron absorption and dimensional integrity.

On the basis of its review, the staff finds that the applicant has appropriately evaluated the aging management review (AMR) results of material, environment, aging effect requiring management (AERM), and AMP combinations not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the

intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

3.3.2.3.4 Emergency Diesel Generator System Summary of Aging Management Evaluation – LRA Table 3.3.2-4

By letter dated December 28, 2009, the applicant provided its 2009 Annual Update in accordance with 10 CFR 54.21(b). Item 5 of the enclosure to the 2009 Annual Update deleted the "fogger housing" component type from LRA Table 3.3.2-4, "Emergency Diesel Generator System Summary of Aging Management Evaluation." The staff reviewed LRA Table 3.3.2-4, which summarizes the results of AMR evaluations for the emergency diesel generator system component groups. LRA Table 3.3.2-4 had identified the fogger housing material as "copper alloy >15% Zn" with an internal environment of untreated air and an external environment of indoor air. However, as described in SER Section 2.3.3.4.2, the applicant has removed the fogger housing and replaced the pressure boundary with piping components. The applicant had listed steel and stainless steel piping with an internal environment of untreated air and an external environment of indoor air in LRA Table 3.3.2-4. Since the pressure boundary intended function of the fogger housing has been replaced by piping and a piping component type with the correct material and environment has been included in LRA Table 3.3.2-4, the change is consistent with the requirements of 10 CFR 54.21 and, therefore, acceptable.

SECTION 4

TIME-LIMITED AGING ANALYSES

4.3 Metal Fatigue Analyses

4.3.3 Effects of Reactor Water Environment on Fatigue Life

4.3.3.1 Summary of Technical Information in the Application

The staff does not have any changes or updates to this section of the safety evaluation report (SER).

4.3.3.2 Staff Evaluation

SER Section 4.3.3.2 presents the staff's evaluation of the applicant's time-limited aging analysis (TLAA) related to the effects of reactor water environment on fatigue life. The staff's analysis in SER Section 4.3.3.2 was supplemented in SER Supplement 1. Subsequent to the issuance of the supplement, the staff noted that the applicant's plant-specific configuration may contain locations that should be analyzed for the effects of the reactor coolant environment other than those generic locations identified in NUREG/CR-6260. The staff's evaluation of the additional information submitted by the applicant in relation to environmentally-assisted fatigue is discussed below.

By letters dated January 31, 2010, and March 16, 2011, the applicant committed (Commitment No. 52) to the following:

> Entergy will review design basis ASME [American Society of Mechanical Engineers] Code Class 1 fatigue evaluations to determine whether the NUREG/CR-6260 locations that have been evaluated for the effects of the reactor coolant environment on fatigue usage are the limiting locations for the Pilgrim plant configuration. If more limiting locations are identified, the most limiting location will be evaluated for the effects of the reactor coolant environment on fatigue usage.
>
> PNPS [Pilgrim Nuclear Power Station] will use the NUREG/CR-6909 methodology in the evaluation of the limiting locations consisting of nickel alloy, if any. This evaluation will be completed prior to the period of extended operation.

The staff finds the use of NUREG/CR-6909 to calculate an environmental fatigue life correction factor (F_{en}) for nickel alloys acceptable because it is consistent with Regulatory Guide (RG) 1.207, "Guidelines for Evaluating Fatigue Analyses Incorporating the Life Reduction of Metal Components Due to the Effects of the Light-Water Reactor Environment for New Reactors," and NUREG-1801, "Generic Aging Lessons Learned (GALL) Report."

Based on its review, the staff finds the applicant's supplemental information and Commitment No. 52 acceptable because: (1) the applicant will review its design basis ASME Code Class 1 fatigue evaluations to determine whether the NUREG/CR-6260 locations are the limiting

locations for its plant; (2) if more limiting locations are identified, the applicant will perform an environmentally-assisted fatigue analysis for the most limiting location; and (3) a methodology consistent with NUREG/CR-6909 will be used in the evaluation of nickel-alloy limiting locations. Additionally, Commitment No. 52 is consistent with the recommendations in NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," Revision 1, dated September 2005, Sections 4.3.2.2 and 4.3.3.2; and GALL AMP X.M1, "Fatigue Monitoring," to consider environmental effects for the NUREG/CR-6260 locations.

4.3.3.3 UFSAR Supplement

The staff does not have any changes or updates to this section of the SER.

4.3.3.4 Conclusion

The staff does not have any changes or updates to this section of the SER.

SECTION 5

REVIEW BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The staff has provided the Advisory Committee on Reactor Safeguards with a copy of this supplemental safety evaluation report.

SECTION 6

CONCLUSION

The staff concludes that the additional information provided by Entergy Nuclear Operations, Inc., does not alter the conclusion stated in the safety evaluation report and that the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 54.29(a) have been met.

APPENDIX A

PNPS LICENSE RENEWAL COMMITMENTS

During the review of the Pilgrim Nuclear Power Station (PNPS) license renewal application (LRA) by the staff of the U.S. Nuclear Regulatory Commission (NRC) (the staff), Entergy Nuclear Operations, Inc. (the applicant) made commitments related to aging management programs (AMPs) to manage the aging effects of structures and components prior to the period of extended operation. The following table lists these commitments along with the implementation schedules and the sources for each commitment.

Table A-1. Pilgrim Nuclear Power Station License Renewal Commitments

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
1	Implement the Buried Piping and Tanks Inspection Program as described in LRA Section B.1.2.	B.1.2	June 8, 2012	Letters 2.06.003 and 2.06.057
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.	B.1.6	June 8, 2012	Letters 2.06.003 and 2.06.057

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
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, with at least one-third of the inspections to be completed within the first six (6) years and at least two-thirds within the first 12 years of the period of extended operations. Locations selected for examination will be areas that have exceeded the neutron fluence threshold.	B.1.8	Inspections completed within the first 18 years of the period of extended operation (at least one-third of these inspections completed within the first six years and at least two-thirds completed within the first 12 years)	Letters 2.06.003, 2.06.057, 2.06.064, and 2.06.081
4	Enhance the Diesel Fuel Monitoring Program to include quarterly sampling of the security diesel generator fuel storage tank. Particulates (filterable solids), water and sediment checks will be performed on the samples. Filterable solids acceptance criteria will be = 10 mg/l. Water and sediment acceptance criteria will be = 0.05%.	B.1.10	June 8, 2012	Letters 2.06.003, 2.06.057, and 2.06.089
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.	B.1.10	June 8, 2012	Letters 2.06.003 and 2.06.057
6	Enhance the Diesel Fuel Monitoring Program to specify acceptance criterion for UT measurements of emergency diesel generator fuel storage tanks (T-126A&B).	B.1.10	June 8, 2012	Letters 2.06.003 and 2.06.057

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
7	Enhance Fire Protection Program procedures to state that the diesel engine subsystems (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.	B.1.13.1	June 8, 2012	Letters 2.06.003, 2.06.057, and 2.06.064
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.	B.1.13.1	June 8, 2012	Letters 2.06.003 and 2.06.057
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.	B.1.13.2	June 8, 2012	Letters 2.06.003 and 2.06.057

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
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.	B.1.13.2	June 8, 2012	Letters 2.06.003 and 2.06.057
11	Enhance the Fire Water System Program to state that wall thickness evaluations of fire protection piping will be performed on system components using nonintrusive 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.	B.1.13.2	June 8, 2012	Letters 2.06.003 and 2.06.057
12	Implement the Heat Exchanger Monitoring Program as described in LRA Section B.1.1 5.	B.1.15	June 8, 2012	Letters 2.06.003 and 2.06.057
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.	B.1.17	June 8, 2012	Letters 2.06.003 and 2.06.057
14	Implement the Metal-Enclosed Bus Inspection Program as described in LRA Section B.1.18.	B.1.18	June 8, 2012	Letters 2.06.003 and 2.06.057

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
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.	B.1.19	June 8, 2012	Letters 2.06.003 and 2.06.057
16	Implement the Non-EQ Instrumentation Circuits Test Review Program as described in LRA Section B.1.20.	B.1.20	June 8, 2012	Letters 2.06.003 and 2.06.057
17	Implement the Non-EQ Insulated Cables and Connections Program as described in LRA Section B.1.21.	B.1.21	June 8, 2012	Letters 2.06.003 and 2.06.057
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.	B.1.22	June 8, 2012	Letters 2.06.003 and 2.06.057
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.	B.1.22	June 8, 2012	Letters 2.06.003 and 2.06.057
20	Implement the One-Time Inspection Program as described in LRA Section B.1.23.	B.1.23	June 8, 2012	Letters 2.06.003, 2.06.057, and 2.07.023

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
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.	B.1.24	June 8, 2012	Letters 2.06.003 and 2.06.057
22	Enhance the Reactor Vessel Surveillance Program to proceduralize the data analysis, acceptance criteria, and corrective actions described in LRA Section B.1.26.	B.1.26	June 8, 2012	Letters 2.06.003 and 2.06.057
23	Implement the Selective Leaching Program in accordance with the program as described in LRA Section B.1.27.	B.1.27	June 8, 2012	Letters 2.06.003 and 2.06.057
24	Enhance the Service Water Integrity Program procedure to clarify that heat transfer test results are trended.	B.1.28	June 8, 2012	Letters 2.06.003 and 2.06.057
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.	B.1.29.2	June 8, 2012	Letters 2.06.003 and 2.06.057

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
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.	B.1.29.2	June 8, 2012	Letters 2.06.003 and 2.06.057
27	Enhance the Water Control Structures Monitoring Program scope to include the east breakwater, jetties, and onshore revetments in addition to the main breakwater.	B.1.29.3	June 8, 2012	Letters 2.06.003 and 2.06.057
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).	B.1.30	June 8, 2012	Letters 2.06.003 and 2.06.057
29	Implement the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program as described in LRA Section B.1.31.	B.1.31	June 8, 2012	Letters 2.06.003 and 2.06.057
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.	B.1.3	June 30, 2015	Letter 2.06.057

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
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 refine our current fatigue analyses to include the effects of reactor water environment and verify that the cumulative usage factors (CUFs) are less than 1. This includes applying the appropriate Fen [sic] factors to valid CUFs determined in accordance with one of the following: 1. For locations, including NUREG/CR-6260 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 added in addition to 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 or NRC-approved alternative (e.g., NRC-approved code case) may be performed to determine a valid CUF. During the period of extended operation, PNPS may also use one of the following options for fatigue management if ongoing monitoring indicates a potential for a condition	4.3.3	June 8, 2012 June 8, 2010 for submitting the AMP if PNPS selects the option of managing the effects of aging due to environmentally assisted fatigue	Letters 2.06.057, 2.06.064, 2.06.081, 2.07.005, and 2.07.064

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
	outside the analysis bounds noted above: 1. Update and/or refine the affected analyses described above. 2. Implement an inspection program that has been reviewed and approved by the NRC (e.g., periodic nondestructive 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 before exceeding a CUF of 1.0.			
32	Implement the enhanced Bolting Integrity Program described in Attachment C of Pilgrim License Renewal Application Amendment 5 (Letter 2.06.064).		June 8, 2012	Letters 2.06.057, 2.06.064, and 2.06.081
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
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	Letters 2.06.057 and 2.06.089

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
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 before 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 AMP 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 AMP if PNPS selects the option of managing the effects of aging	Letters 2.06.057, 2.06.064, and 2.06.081

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
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
37	The BWR Vessel Internals Program includes inspections of the steam dryer. Inspections of the steam dryer will follow the guidelines of BWRVIP-139 and General Electric SIL 644 Revision 1.	A.2.1.8 / Conference call on September 25, 2006	June 8, 2012	Letter 2.06.089
38	Enhance the Diesel Fuel Monitoring Program to include periodic ultrasonic thickness measurement of the bottom surface of the diesel fire pump day tank. The first ultrasonic inspection of the bottom surface of the diesel fire pump day tank will occur prior to the period of extended operation, following engineering analysis to determine acceptance criteria and test locations. Subsequent test intervals will be determined based on the first inspection results.	B.1.10	June 8, 2012	Letter 2.06.089
39	Perform a one-time inspection of the Main Stack foundation prior to the period of extended operation.	B.1.23	June 8, 2012	Letter 2.06.094

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
40	Enhance the Oil Analysis Program by documenting program elements 1 through 7 in controlled documents. The program elements will include enhancements identified in the PNPS license renewal application and subsequent amendments to the application. The program will include periodic sampling for the parameters specified under the Parameters Monitored/Inspected attribute of NUREG-1801 Section XI.M39, Lubricating Oil Analysis. The controlled documents will specify appropriate acceptance criteria and corrective actions in the event acceptance criteria are not met. The basis for acceptance criteria will be defined.	B.1.22	June 8, 2012	Letter 2.06.094
41	Enhance the Containment Inservice Inspection (CII) Program to require augmented inspection in accordance with ASME Code Section XI IWE-1240, of the drywell shell adjacent to the sand cushion following indications of water leakage into the annulus air gap.	A.2.1.17 and B.1.16.1	June 8, 2012	Letter 2.06.094
42	Implement the Bolted Cable Connections Program, described in Attachment C of Pilgrim License Renewal Application 11 (Letter 2.07.003), prior to the period of extended operation.	A.2.1.40 and B.1.34	June 8, 2012	Letter 2.07.003
43	Include within the Structures Monitoring Program provisions to ensure groundwater samples are evaluated periodically to assess the aggressiveness of groundwater to concrete, as described in Attachment E of License Renewal Application 12 (Letter 2.07.005), prior to the period of extended operation.	A.2.1.32 and B.1.29.2	June 8, 2012	Letter 2.07.005

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
44	Perform another set of the UT measurements just above and adjacent to the sand cushion region prior to the period of extended operation and once within the first 10 years of the period of extended operation.	A.2.1.17 and B.1.16.1	Prior to the period of extended operation and once within the first 10 years of the period of extended operation	Letter 2.0.7.010
45	If groundwater continues to collect on the Torus Room floor, obtain samples and test such water to determine its pH and verify the water is non-aggressive as defined in NUREG-1801 Section III.A1 item III.A.1-4 once prior to the period of extended operation and once every five years during the period of extended operation.	A.2.1.32 and B.1.29.2	June 8, 2012	Letters 2.07.010 2.07.027, and 2.07.029
46	Inspect the condition of a sample of the torus hold-down bolts and associated grout and determine appropriate actions based on the findings prior to the period of extended operation.	A.2.1.32 and B.1.29.2	June 8, 2012	Letter 2.07.027
47	Submit to the NRC an action plan to improve benchmarking data to support approval of new P-T curves for Pilgrim.	4.2.2, A.2.2.1.1, and A.2.2.1.2	September 15, 2007	Letter 2.07.027
48	On or before June 8, 2010, Entergy will submit to the NRC calculations consistent with Regulatory Guide 1.190 that will demonstrate limiting fluence values will not be reached during the period of extended operation.	4.2, 4.7.1, A.1.1 and A.2.2.1	June 8, 2010	Letter 2.07.027

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
49	Perform periodic inspection and neutron absorber testing of Boral and Metamic in accordance with the Neutron Absorber Monitoring Program as described in LRA Section B.1.35. One test on each material will be performed within the five years preceding the PEO, with additional testing performed on each material at least once every 10 years during the PEO.	B.1.35	As stated in the commitment	Letters 2.11.001 and 2.11.027
50	Buried carbon steel (CS) piping in all in-scope systems except fire protection will be inspected by 12/31/2013, using a direct visual inspection of the entire circumference of at least ten linear feet of exposed pipe. Results not meeting the inspection acceptance criteria will be entered into the PNPS corrective action program for evaluation and corrective actions. Prior to the period of extended operation, Entergy will implement the corporate Buried Piping and Tanks Inspection and Monitoring Program which defines the requirements for continuing inspection of buried and underground piping and tanks.	3.0.3.2.1 A.2.1.2	As stated in the commitment	Letters 2.11.001 and 2.11.031
51	Enhance the Structures Monitoring Program to invoke quantitative acceptance criteria for inspections of concrete structures in accordance with ACI 349.3R, “Evaluation of Existing Nuclear Safety-Related Concrete Structures” prior to the period of extended operation.	3.0.3.2.17 A.2.1.32	As stated in the commitment	Letter 2.11.008

APPENDIX A: PNPS LICENSE RENEWAL COMMITMENTS				
Number	**Commitment**	**LRA Section(s)**	**Implementation Schedule**	**Source**
52	Entergy will review design basis ASME Code Class 1 fatigue evaluations to determine whether the NUREG/CR-6260 locations that have been evaluated for the effects of the reactor coolant environment on fatigue usage are the limiting locations for the Pilgrim plant configuration. If more limiting locations are identified, the most limiting location will be evaluated for the effects of the reactor coolant environment on fatigue usage. PNPS will use the NUREG/CR-6909 methodology in evaluation of the limiting locations consisting of nickel alloy, if any. This evaluation will be completed prior to the period of extended operation.	4.3.3.2	June 8, 2012	Letter 2.11.017
53	Enhance safety-related coatings programs and procedures to be consistent with the recommendations of NUREG-1801, Section XI.S8, Protective Coating Monitoring and Maintenance Program.	3.0.3.1.13 A.2.1.42	June 8, 2012	Letter 2.11.027

APPENDIX B

CHRONOLOGY

This appendix contains a chronological listing of the licensing correspondence between the staff of the U.S. Nuclear Regulatory Commission (NRC) and Entergy Nuclear Operations, Inc. This appendix updates the correspondence regarding the staff's review of the Pilgrim Nuclear Power Station (PNPS) license renewal application (LRA) (under Docket No. 50-293) since issuance of NUREG-1891 in November 2007.

CHRONOLOGY	
Date	**Subject**
December 28, 2009	PNPS LRA 2009 Annual Update (ADAMS Accession No. ML093640058)
October 15, 2010	Summary of May 25, 2010, Conference Call between the NRC and Entergy Nuclear Operations, Inc. (ADAMS Accession No. ML102590086)
October 21, 2010	PNPS LRA 2009 Annual Update Supplement (ADAMS Accession No. ML103081016)
October 15, 2010	Summary of June 2, 2010, Conference Call between the NRC and Entergy Nuclear Operations, Inc. (ADAMS Accession No. ML102590077)
December 22, 2010	PNPS LRA 2010 Annual Update (ADAMS Accession No. ML110040332)
January 7, 2011	Summary of December 1, 2010, Conference Call between the NRC and Entergy Nuclear Operations, Inc. (ADAMS Accession No. ML103410506)
January 7, 2011	PNPS LRA Supplement (ADAMS Accession No. ML110200058)
January 31, 2011	PNPS LRA Supplemental Information (ADAMS Accession No. ML110410376)
February 15, 2011	Summary of December 6, 2010, Conference Call between the NRC and Entergy Nuclear Operations, Inc. (ADAMS Accession No. ML110040419)
March 16, 2011	PNPS LRA 2010 Annual Update Supplement (ADAMS Accession No. ML110770025)
March 16, 2011	PNPS LRA Supplemental Information (ADAMS Accession No. ML110770026)
April 11, 2011	Summary of March 23, 2011, Conference Call between the NRC and Entergy Nuclear Operations, Inc. (ADAMS Accession No. ML110820208)
April 19, 2011	Summary of February 24, 2011, Conference Call between the NRC and Entergy Nuclear Operations, Inc. (ADAMS Accession No. ML110820689)
April 19, 2011	Summary of April 6, 2011, Conference Call between the NRC and Entergy Nuclear Operations, Inc. (ADAMS Accession No. ML110970034)
April 21, 2011	PNPS LRA Supplemental Information (ADAMS Accession No. ML11123A122)

CHRONOLOGY	
Date	**Subject**
April 22, 2011	PNPS LRA Supplemental Information (ADAMS Accession No. ML11123A124)
May 18, 2011	PNPS LRA List of Commitments (ADAMS Accession No. ML11145A113)