NRC Inspection Report
05000219/2006007
September 21, 2006

September 21, 2006

Mr. Christopher M. Crane
President and CEO
AmerGen Energy Company, LLC
200 Exelon Way, KSA 3-E
Kennett Square, PA 19348

SUBJECT: OYSTER CREEK GENERATING STATION - NRC LICENSE RENEWAL INSPECTION REPORT 05000219/2006007

Dear Mr. Crane:

On March 31, 2006, the NRC completed the onsite portion of the inspection of your application for license renewal of your Oyster Creek Generating Station. The inspection continued in our Region I office until early September 2006. The enclosed report documents the results of the inspection, which were discussed on September 13, 2006, with members of your staff in an exit meeting open for public observation at the Lacey Township Town Hall.

The purpose of this inspection was to examine the plant activities and documents that supported the application for a renewed license of Oyster Creek Generating Station. The inspection reviewed the screening and scoping of non-safety related systems, structures, and components, as required in 10 CFR 54.4(a)(2), and determined whether the proposed aging management programs are capable of reasonably managing the effects of aging. These NRC inspection activities constitute one of several inputs into the NRC review process for license renewal applications.

The inspection team concluded screening and scoping of non-safety related systems, structures, and components, was implemented as required in 10 CFR 54.4(a)(2), and the aging management portion of the license renewal activities were conducted as described in the License Renewal Application. The inspection results support a conclusion that the proposed activities will reasonably manage the effects of aging in the systems, structures, and components identified in your application. The inspection concluded the documentation supporting the application was in an auditable and retrievable form.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Donald E. Jackson, Acting Chief
Engineering Branch 1
Division of Reactor Safety

Docket No. 50-219
License No. DPR-16

Enclosure: Inspection Report 05000219/2006007

cc w/encl:
Chief Operating Officer, AmerGen
Site Vice President, Oyster Creek Nuclear Generating Station, AmerGen
Plant Manager, Oyster Creek Generating Station, AmerGen
Regulatory Assurance Manager, Oyster Creek, AmerGen
Senior Vice President - Nuclear Services, AmerGen
Vice President - Mid-Atlantic Operations, AmerGen
Vice President - Operations Support, AmerGen
Vice President - Licensing and Regulatory Affairs, AmerGen
Director Licensing, AmerGen
Manager Licensing - Oyster Creek, AmerGen
Vice President, General Counsel and Secretary, AmerGen
T. O'Neill, Associate General Counsel, Exelon Generation Company
J. Fewell, Assistant General Counsel, Exelon Nuclear
Correspondence Control Desk, AmerGen
J. Matthews, Esquire, Morgan, Lewis & Bockius LLP
Mayor of Lacey Township
K. Tosch, Chief, Bureau of Nuclear Engineering, NJ Dept of Environmental Protection
R. Shadis, New England Coalition Staff
N. Cohen, Coordinator - Unplug Salem Campaign
W. Costanzo, Technical Advisor - Jersey Shore Nuclear Watch
E. Gbur, Chairwoman - Jersey Shore Nuclear Watch
E. Zobian, Coordinator - Jersey Shore Anti Nuclear Alliance
P. Baldauf, Assistant Director, Radiation Protection and Release Prevention, State of New Jersey
R. Webster, Rutgers Environmental Law Clinic

Distribution w/encl: **(VIA E-MAIL)**
S. Collins, RA
M. Dapas, DRA
R. Bellamy, DRP
M. Ferdas, DRP, Senior Resident Inspector
R. Treadway, DRP, Resident Inspector
J. DeVries, DRP, Resident OA
B. Sosa, RI OEDO
D. Roberts, NRR
E. Miller PM, NRR
T. Valentine, Backup PM (Interim), NRR
D. Ashley, NRR
ROPreports@nrc.gov
Region I Docket Room (with concurrences)
A. Blough, DRS
M. Gamberoni, DRS
D. Jackson, DRS
M. Modes, DRS
M. Young, OGC

SUNSI Review Complete: DEJ (Reviewer's Initials)

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U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No:	50-219
License No:	DPR-16
Report No:	05000219/20006007
Licensee:	AmerGen Energy Company, LLC
Facility:	Oyster Creek Generating Station
Location:	Forked River, New Jersey
Dates:	March 13 - 17, 2006 and March 27 - 31, 2006
Inspectors:	M. Modes, Team Leader, Division of Reactor Safety (DRS) P. Kaufman, Sr. Reactor Inspector, DRS G. Meyer, Sr. Reactor Inspector, DRS S. Chaudhary, Health Physicist, Division of Nuclear Materials Safety (DNMS) T. O'Hara, Reactor Inspector, DRS J. Lilliendahl, Reactor Inspector, DRS D. Johnson, Reactor Inspector, DRS D. Werkheiser, Resident Inspector, Division of Reactor Projects (DRP)
Approved By:	Donald E. Jackson, Acting Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000219/2006007; 03/13/2006 - 03/17/2006, 03/27/2006 - 03/31/2006, Oyster Creek Generating Station; Inspection of the Scoping of Non-Safety Systems and the Proposed Aging Management Procedures for the Oyster Creek Generating Station Application for Renewed License.

This inspection of license renewal activities was performed by eight regional office engineering inspectors. The inspection was conducted in accordance with NRC Manual Chapter 2516 and NRC Inspection Procedure 71002. This inspection did not identify any "findings" as defined in NRC Manual Chapter 0612. The inspection team concluded screening and scoping of non-safety related systems, structures, and components, were implemented as required in 10 CFR 54.4(a)(2), and the aging management portions of the license renewal activities were conducted as described in the License Renewal Application. The inspection results support a conclusion that the proposed activities will reasonably manage the effects of aging in the systems, structures, and components identified in your application. The inspection concluded the documentation supporting the application was in an auditable and retrievable form.

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Report Details

4. OTHER ACTIVITIES (OA)

4OA2 Other - License Renewal

a. Inspection Scope

This inspection was conducted by NRC Region I and headquarters based inspectors in order to evaluate the thoroughness and accuracy of the screening and scoping of non-safety related systems, structures, and components, as required in 10 CFR 54.4(a)(2) and to evaluate whether aging management programs will be capable of managing the identified aging effect in a appropriate manner.

The inspection team selected a number of systems for review, using the NRC accepted guidance, in order to determine if the methodology applied by the applicant appropriately captured the non-safety systems affecting the safety functions of a system, component, or structure within the scope of license renewal.

The inspection team selected a sample of aging management programs to verify the adequacy of the applicant's documentation and implementation activities. The selected aging management programs were reviewed to determine whether the proposed aging management implementing process would adequately manage the effects of aging on the system.

The inspectors reviewed supporting documentation and interviewed applicant personnel to confirm the accuracy of the license renewal application conclusions. For a sample of plant systems and structures, inspectors performed visual examinations of accessible portions of the systems to observe aging effects.

a.1. Scoping of Non Safety-Related Systems, Structures, and Components

To assess the thoroughness and accuracy of the methods used to bring systems, structures, and components within scope of the application and to screen non-safety related systems, structures, and components, as required in 10 CFR 54.4(a)(2), the inspectors reviewed the applicant's program guidance procedures and summaries of results for Oyster Creek. The inspectors determined the applicant's procedures to be consistent with the NRC accepted guidance in Sections 3, 4, and 5 of Appendix F to NEI 95-10, Revision 5 (3: non-safety related systems, structures, and components within scope of the current licensing basis, 4: non-safety related systems, structures, and components directly connected to safety-related systems, structures, and components, and 5: non-safety related systems, structures, and components not directly connected to safety-related systems, structures, and components). Also, the inspectors determined that the applicant appropriately utilized the guidance in their process for determining which systems were within scope.

The applicant based the scoping and screening results on a technical review and walkdown of all applicable plant areas by qualified plant personnel. The inspectors reviewed the set of license renewal drawings, which were color-coded based on the results. The inspectors interviewed personnel and independently inspected numerous areas within the plant to confirm that appropriate systems, structures, and components had been included within the license renewal scope, that systems, structures, and components excluded from the license renewal scope had an acceptable basis, and that the boundary for determining scope within the systems, including anchors, was appropriate. For systems, structures, and components selected from the results, the inspectors confirmed that the in-plant configuration was accurate and acceptably categorized, and for systems, structures, and components selected within the plant, the inspectors confirmed that the categorization result in program documents was appropriate. The in-plant areas and systems reviewed included the following:

- Reactor Building;
- Turbine Building;
- Intake Structure;
- Ventilation Stack;
- Diesel Generator Building;
- Diesel Fuel Oil Building;
- Fire Protection System;
- Isolation Condenser System;
- Hardened Vent System;
- Nitrogen Supply System;
- Instrument Air System; and
- Service Water System.

The inspectors determined the personnel involved in the process were knowledgeable and appropriately trained, and that the applicant had implemented an acceptable method of scoping and screening of non-safety related systems, structures, and components.

a.2. Programs

One-Time Inspection Program

The One-Time Inspection Program is a new aging management program intended to verify the effectiveness of other aging management programs, including Water Chemistry, Closed Cycle Cooling Water Systems, and Fuel Oil Chemistry Programs, by reviewing various aging effects for impact. Where corrosion resistant materials and/or non-corrosive environments exist, the One-Time Inspection Program is intended to verify that an aging management program is not needed during extended operations by confirming that aging effects are not occurring or are occurring in a manner that does not affect the safety function of systems, structures, and components within the scope of the application. Non-destructive evaluation will be performed by qualified personnel using procedures and processes consistent with the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME) and 10 CFR 50, Appendix B. The

One-Time Inspection Program will be implemented prior to the period of extended operation.

The inspectors reviewed the program description, implementation plan, and inspection sample basis, and discussed the planned activities with the responsible staff.

For the One-Time Inspection Program, the inspectors concluded the applicant performed adequate evaluations and reviews of industry experience and plant history to determine an acceptable approach to identifying, assessing and managing any aging effects detected. The applicant developed adequate guidance for implementation of the One-Time Inspection Program.

Bolting Integrity

The Bolting Integrity Program is an existing program credited with managing the loss of material, cracking, and loss of prestress aging effects in safety-related bolting at Oyster Creek. The aging effects are managed by visual inspection for leakage during system pressure tests, normal plant operation, and periodic system maintenance, and repaired in accordance with maintenance procedures and the ASME Code.

The inspectors reviewed the program basis document, implementing procedures, documented reviews, and a bolting-related apparent cause evaluation, and interviewed the responsible plant personnel regarding these documents. In addition, the inspectors walked down portions of the Standby Liquid Control, Isolation Condenser, Control Rod Drive, and Reactor Building Closed Cooling Water Systems to confirm that the program had maintained acceptable bolting conditions.

For the Bolting Integrity Program, the inspectors concluded that the applicant had performed adequate evaluations as well as industry experience and historical reviews to determine the aging effects are managed by the Bolting Integrity Program. The applicant provided adequate guidance to ensure the aging effects are appropriately managed.

Buried Piping Inspection

The Buried Piping Inspection Program is an existing program credited with managing the loss of material aging effects on the external surfaces of piping in a soil environment, including the service water, emergency service water, and condensate transfer systems. The aging effects are managed by preventive measures, i.e., coatings, wrapping, and condition monitoring measures, including visual inspections and periodic system pressure testing. As described in Appendix B, Part 1.26 of the application, the applicant plans to enhance the program by augmenting the visual inspections prior to extended operations and performing periodic visual inspections, and to include additional piping, such as the fire protection system.

The inspectors reviewed the program basis document, system drawings, implementing procedures, and documented reviews, and interviewed the responsible plant personnel regarding these documents. Also, the inspectors walked down the service water and emergency service water systems in the vicinity of buried piping.

For the Buried Piping Inspection Program, the inspectors concluded that the applicant had performed adequate evaluations as well as industry experience and historical reviews to determine the aging effects managed by the Buried Piping Inspection Program. The applicant provided adequate guidance to ensure the aging effects are appropriately managed.

Flow-Accelerated Corrosion Program

The Flow-Accelerated Corrosion Program is an existing program credited with managing the corrosion aging effects in all carbon steel piping and components containing high-energy fluids at Oyster Creek Generating Station. The aging effects are managed by using ultrasonic and radiographic testing to detect wall thinning and by predicting wear rates to support the proactive replacement of system piping. In addition, the program provides for the performance of follow-up inspections to confirm predictions and to determine the need for repairs or replacements as necessary.

The inspectors reviewed the piping ultrasonic testing wall thickness results from previous inspections and reviewed the CHECWORKS® computer analysis of the future wall thickness forecasts. The inspector also reviewed recent changes to the CHECWORKS® model to ensure previously identified deficiencies have been corrected. The inspectors noted that recent replacements, initiated as a result of this program, were implemented preventively due to identified flow-accelerated corrosion. The replacement piping material was more resistant to corrosion than the original piping material.

For the Flow-Accelerated Corrosion Program, the inspectors concluded the applicant conducted adequate evaluations as well as industry experience and historical reviews and, as a consequence, the effects of aging will be reasonably managed by the proposed program.

Water Chemistry Program

The Water Chemistry Program is an existing program credited with managing the effects of aging on piping, piping components, piping elements, and systems, such as the condensate and feedwater, and condensate storage tank in Oyster Creek Generating Station. The aging effects are managed by monitoring and control of reactor water chemistry to minimize contaminant concentration and mitigate loss of material due to general, crevice and pitting corrosion and cracking caused by stress corrosion cracking.

Water chemistry control is administered in accordance with the Boiling Water Reactor Vessel and Internals Project guideline BWRVIP-29 and Electric Power Research Institute guideline EPRI TR-103515. The inspectors reviewed the chemistry procedures and sampling results to confirm that the guidance contained in BWRVIP-29 and EPRI TR-103515 was being implemented.

For the Water Chemistry Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Closed-Cycle Cooling Water Systems Program

The Closed-Cycle Cooling Water Systems Program is an existing program credited with managing loss of material, cracking, and buildup-of-deposit aging effects in components exposed to closed-cycle cooling water environments at the Oyster Creek Generating Station. Systems within the scope of the closed-cycle cooling water program include the turbine building closed cooling, reactor building closed cooling, and emergency diesel generator closed cooling water systems. The aging effects are managed by monitoring and control of cooling water chemistry, performing surveillance tests, and through periodic inspection of system components in a manner consistent with EPRI TR-107396 guidelines.

The inspectors observed cleaning of the turbine closed-cooling water heat exchanger and performed a walkdown of the system with plant personnel. In addition, the inspectors reviewed closed-cycle cooling water chemistry procedures and reviewed past chemistry sample results to confirm that the requirements of EPRI TR-107396 are being met.

For the Closed-Cycle Cooling Water Systems Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

10 CFR Part 50, Appendix J Program

The 10 CFR Part 50, Appendix J Program is an existing program credited with managing the aging degradation of pressure retaining boundaries of piping and components of the various systems penetrating the containment at the Oyster Creek Generating Station. In addition, the program also detects age related degradation in material properties of gaskets, o-rings, and packing materials for the primary containment pressure boundary access points. The aging effects are managed by performing containment leak rate tests to assure that leakage through primary containment and systems and components penetrating primary containment does not exceed allowable leakage limits specified in the Technical Specifications.

The inspectors reviewed Oyster Creek's procedures for leak rate testing. In addition, the inspectors reviewed corrective actions for components that did not meet leak rate test acceptance criteria. The inspectors noted that corrective actions taken to repair these components were acceptable.

For the 10 CFR Part 50, Appendix J Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Fuel Oil Chemistry Program

The Fuel Oil Chemistry Program is an existing program that will be modified for the purpose of managing the affects of pitting and corrosion in the diesel fuel oil tank at the Oyster Creek Generating Station. The aging effects are managed by the addition of biocides and corrosion inhibitors to minimize biological activity and mitigate corrosion, periodic cleaning, and applying coating to the internal surfaces of the tank.

The inspectors reviewed the schedule for implementation of the enhancements. The inspectors reviewed recent sample results and tank thickness measurements to verify that results were within the acceptable range.

For the Fuel Oil Chemistry Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Boiling Water Reactor Feedwater Nozzle Program

The Boiling Water Reactor Feedwater Nozzle Program is an existing program that will be modified to implement the recommendations of the Boiling Water Owners Group Licensing Topical Report: General Electric NE-523-A71-0594. These enhancements will be implemented prior to entering the period of extended operation per Oyster Creek Assignment Report AR# 00330592, A.1.05 Commitment (BWR Feedwater Nozzle). The program is credited with managing the aging effects of cracking in the feedwater nozzles. The program is administered by the station in-service inspection plan ER-OC-330-1001, "ISI Program Plan Fourth Ten-Year Inspection Interval," and implemented by station procedure ER-AA-330-002, "In-service Inspection of Section XI Welds and Components". The station in-service inspection program incorporates the requirements of the ASME Code. The aging effects are managed by periodic ultrasonic testing inspections of critical regions of the feedwater nozzles. The ultrasonic test inspections are performed at intervals not exceeding ten years and was embraced in an NRC safety evaluation.

Inspections performed in 1977 identified cracks in the Oyster Creek nozzles. These cracks were repaired. The inspectors reviewed plant modification #166-76-4, "Feedwater Nozzle Cladding Removal and Sparger Replacement" and reviewed selected ultrasonic testing examination reports of the feedwater nozzles. To minimize thermal cycling and fatigue induced cracking, the thermal sleeves were modified to a piston design. Subsequent inspections found no indications in the feedwater nozzles. The inspectors reviewed Focused Area Self-Assessment Report Oyster Creek Inservice Inspection Program, completed in June 2004. The inspectors determined the feedwater nozzle program at Oyster Creek effectively monitored the feedwater nozzles for cracking.

For the Boiling Water Reactor Feedwater Nozzle Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Boiling Water Reactor Stress Corrosion Cracking Program

The Boiling Water Reactor Stress Corrosion Cracking Program is an existing aging management program credited with managing crack initiation and growth due to intergranular stress corrosion cracking in stainless steel and nickel alloy reactor coolant pressure boundary piping, welds, components and piping four inches and larger nominal pipe size exposed to reactor coolant above 200EF. The aging effects are managed by preventive measures which include monitoring and controlling water impurities by improved water chemistry control activities and by providing replacement stainless steel components in a solution annealed condition with a maximum carbon content of 0.035% wt. and a minimum ferrite level of 7.5%. Inspection and flaw evaluations are conducted in accordance with Oyster Creek in-service inspection program plan ER-OC-330-1001, "ISI Program Plan Fourth Ten-Year Inspection Interval" and Oyster Creek's augmented inspection program for IGSCC ER-OC-330-1002, "IGSCC Inspection Plan Fourth Ten-Year Inspection Interval," which incorporates the technical basis and guidance described in NUREG-0313, NRC Generic Letter 88-01, and staff-reviewed Boiling Water Reactor Vessel Internal Inspection Program BWRVIP-75.

The inspectors noted that where pre-emptive piping replacement was accomplished the replacement piping material used was more resistant to intergranular stress corrosion cracking than the original piping material. The applicant replaced the following system piping material with intergranular stress corrosion cracking resistant material:

1) all isolation condenser large bore piping outside the drywell from the drywell penetrations to the isolation condensers during refueling outage 1R13 in 1991;

2) all piping within the four isolation condenser drywell penetrations and the two reactor water cleanup system drywell penetrations which contained welds that were not inspectible;

3) the head cooling spray nozzle assembly, the 4 inch tee and flange of the reactor vent line.

To further mitigate the initiation and propagation of intergranular stress corrosion cracking the applicant implemented hydrogen water chemistry during cycle 12 in 1990 and noble metals chemical additions during 1R19 refueling outage in 2002. Additionally, all accessible welds susceptible to intergranular stress corrosion cracking in reactor coolant boundary piping systems inside the drywell (except the reactor water cleanup system) were stress improved.

The Boiling Water Reactor stress corrosion cracking aging management program uses ultrasonic testing to detect intergranular stress corrosion cracking flaws in the reactor coolant boundary piping prior to loss of intended functions of the components. Of the 380 welds included in the scope of Generic Letter 88-01, Oyster Creek identified, during the period the program was implemented, there were 11 welds with indications of intergranular stress corrosion cracking. Nine welds have been repaired with full structural overlays (four in the core spray system, four in the reactor recirculation system, and one in the shutdown cooling system). Two reactor recirculation system welds, which were both stress improved before initial inspections had indications of intergranular stress corrosion cracking, remained in service without repair. Both of these welds in the reactor recirculation system have been re-examined in 2002 and 2004 using the Improved Performance Demonstration Initiative ultrasonic test examination technique and the welds did not exhibit any indication of intergranular stress corrosion cracking. No new indications of intergranular stress corrosion cracking have been detected by inspections during the past six refueling outages. As a result of the implemented preventive measures to mitigate intergranular stress corrosion cracking Oyster Creek has no indications of intergranular stress corrosion cracking at this time. Therefore the inspectors determined that the Boiling Water Reactor Stress Corrosion Program at Oyster Creek has been effective in monitoring and mitigating intergranular stress corrosion cracking in the reactor coolant boundary piping systems.

For the Boiling Water Reactor Stress Corrosion Cracking Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Periodic Inspection Program

The Periodic Inspection Program is a new program under development at Oyster Creek that consists of periodic inspections of selected systems in the scope of license renewal that require periodic monitoring of aging effects, and are not covered by other existing periodic monitoring programs to verify the integrity of the systems and confirm the absence of identified aging effects. The Periodic Inspection Program manages the aging effect of change in material properties, loss of material and reduction of heat transfer for systems, components, and environments. The aging effects are managed by periodic condition monitoring examinations performed at susceptible locations in the systems, intended to assure that existing environmental conditions are not causing material degradation that could result in a loss of system intended functions. The initial periodic inspections of this new aging management program will be implemented near

the end of the current operating term but prior to the period of extended operation. Subsequent periodic inspections will be performed on a frequency not to exceed once every ten years.

The Periodic Inspection Program provides inspection criteria, requires evaluation of the inspection results, and provides recommendations for additional inspections, as necessary. Inspections will be performed in accordance with station procedures that are based on applicable codes and standards. Inspection methods may include visual examinations VT-1 or VT-3 of disassembled components or volumetric non-destructive examination techniques. Some of the implementing procedures for the Periodic Inspection Program were reviewed by the inspectors, including existing nondestructive examination procedures ER-OC-330-1001, ISI Program Plan "Fourth Ten-Year Inspection Interval," ER-AA-35-014, "VT-1 Visual Examinations," ER-AA-335-016, "VT-3 Visual Examination of Component Supports and Attachments," and ER-AA-335-032, "Ultrasonic Through Wall Sizing in Pipe Welds". A periodic inspection table, which was in draft at the time of this inspection, is a listing of selected systems and components to be periodically inspected to verify the integrity of the system and confirm the absence of identified aging effects was also reviewed. Based on review of the implementing documents and procedures, the inspectors determined that the Periodic Inspection Program, when implemented at Oyster Creek, will provide assurance that systems and components are routinely inspected for age related degradation of change in material properties, loss of material and reduction of heat transfer for systems, components, and environments, and will adequately manage the identified aging effects.

For the Periodic Inspection Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Wooden Utility Pole Program

The Wooden Utility Pole Program is a new program credited with managing the aging effects of loss of material and change in material properties in all wooden utility poles which support an intended function for the offsite power systems at the Oyster Creek Generating Station. The aging effects are managed by inspection of wooden poles every ten years by a qualified inspector.

The team reviewed program bases documents and industry guidance. The inspectors also conducted interviews and performed walkdowns with plant personnel. During the walkdown, one pole (JC 514A L) was noted to be degraded. The applicant was able to show that the condition had been previously analyzed and that plans are in place to adequately reinforce the pole.

For the Wooden Utility Pole Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the Wooden Utility Pole Program. The applicant provided adequate draft guidance to ensure aging effects will be appropriately managed.

Periodic Testing of Containment Spray Nozzles

The Containment Spray Nozzle Program is an existing program credited with demonstrating that the drywell and torus spray nozzles are not blocked by debris or corrosion products. Carbon steel piping upstream of the drywell and torus spray nozzles is subject to possible general corrosion that could result in plugging nozzles with rust. Periodic air tests verify that the drywell and torus spray nozzles are free from plugging and are therefore available to provide the steam quenching functions of the nozzles.

The team conducted interviews and reviewed program bases documents and previous test results. The team noted that the existing program has been effective at identifying and correcting degraded conditions.

For the Periodic Testing of Containment Spray Nozzles Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the Containment Spray Nozzle Program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

The Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program developed for the purpose of aging management credited with managing the moisture related aging effects in medium-voltage cable systems at the Oyster Creek Generating Station. The aging effects are managed by cable testing and periodic inspection of manholes.

The team reviewed program bases documents and industry guidance. The inspectors also conducted interviews and performed walkdowns with plant personnel. The manhole inspection frequency was initially established at the NUREG-1801, Revision 1,"Generic Aging Lessons Learned (GALL) Report," recommended two-year frequency based on Oyster Creek's operating experience that does not indicate a trend or recurrence of cable submergence in manholes. However, NRC inspectors identified, approximately 2 inches of water in the manhole selected by the NRC team for inspection. Consequently, the applicant entered this issue into the corrective action system (CA #IR 469998, #IR 471363) and documented the need to re-evaluate the adequacy of the manhole inspection frequency.

Due to several medium-voltage cable failures in Oyster Creek's operating experience, a medium-voltage cable testing program is currently in place. Because of the limited success of the previous DC step voltage testing method, Oyster Creek has begun implementing a new method of cable testing provided by DTE Energy for most of the medium-voltage cables. NUREG 1801 (XI.E3) specifies the test method should be state-of-the-art at the time the test is performed. Although the new DTE Energy testing method is not yet recognized as an industry standard, it is a form of partial discharge testing (partial discharge testing is one of the recognized standards specifically listed in

the NUREG-1801), and the applicant expects formal acceptance of the new testing method as an industry standard prior to extended operation.

The applicant has agreed to maintain the current testing frequency limit of six years in LRCR 289 for the first six years, after which the frequency may be re-evaluated and extended up to ten years. This change will provide sufficient time for successful operating experience prior to expanding to the NUREG 1801 recommended ten year frequency.

For the Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program credited with managing the heat, radiation, and moisture aging effects in non-environmentally qualified electrical cables and connections in Oyster Creek Generating Station. Connections include splices, terminal blocks, connectors, and fuse blocks. The aging effects are managed by periodic inspections.

The team reviewed program bases documents, a draft implementing procedure and industry guidance. The inspectors also conducted interviews and performed walkdowns with plant personnel. Inspections will be done of all accessible cables and connections in adverse localized environments. This aging management program focuses on a representative sample of accessible cables and connections with sampling structured to include key areas of concern. Plant locations containing cables within scope that do not include adverse general or localized conditions may be excluded from inspections based on engineering evaluations.

Because there were several examples of polyvinyl chloride cable insulation bleeding in Oyster Creek's operating experience, the applicant agreed to specifically include polyvinyl chloride cable insulation bleeding as an aging effect to be addressed in this program. Although polyvinyl chloride cable insulation bleeding has not led to any equipment degradation at Oyster Creek, there have been instances cited in NRC's Information Notices 91-20 and 94-78 where polyvinyl chloride insulation bleeding under unfavorable configurations caused hardened plasticizer to degrade equipment. As a consequence of the NRC's review, the applicant entered this issue into their corrective action system (AR 00472707) in order to evaluate the current extent-of-condition of polyvinyl chloride cable insulation bleeding and determine if their original screening of this aging affect should be revised.

For the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. The applicant provided adequate draft guidance to ensure aging effects are appropriately managed.

Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrument Circuits

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrument Circuits Program is an existing program modified for the purpose of aging management that manages aging of the cables of the Intermediate Range Monitoring, Local Power Range Monitoring/Average Power Range Monitoring, Reactor Building High Radiation Monitoring, and Air Ejector Off-Gas Radiation Monitoring systems that are sensitive instrumentation circuits with low-level signals and are located in areas where the cables and connections could be exposed to adverse localized environments caused by heat, radiation, or moisture. The aging effects are managed by calibration, current/voltage, and time domain reflectometry testing. The current program will be enhanced to include a review of the calibration and cable testing results for cable aging degradation.

The team reviewed program bases documents, draft implementing procedure and industry guidance. The inspectors also conducted interviews and performed walkdowns with plant personnel.

For the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrument Circuits Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrument Circuits Program. The applicant provided adequate draft guidance to ensure aging effects are appropriately managed.

Fire Protection Program

The Fire Protection Program is an existing program modified for the purpose of aging management credited with managing the fire barrier function aging effects in fire protection systems and a diesel-driven fire pump inspection program. The aging effects are managed by periodic inspection of fire barrier penetration seals, fire barrier walls, ceilings, floors, and all fire rated doors. The program is credited with managing loss of material aging effects in fuel oil lines of the diesel driven fire pump through periodic testing of the pump. This aging management program will also manage the aging effects of in-scope carbon dioxide and halon suppression systems, once enhancements are made to periodically inspect these systems.

The inspectors reviewed the Fire Protection Program as well as supporting documents to verify the effectiveness of the Fire Protection Program. The inspectors also conducted interviews and performed walkdowns of various fire protection systems with plant personnel to observe the effectiveness of the existing Fire Protection Program. Enhancements to the existing program include guidance to identify fire barrier degradation, surface integrity and clearance on fire doors inspected every two years, fire pump diesel fuel supply system external surface corrosion examinations, and external corrosion and damage inspections for halon and low-pressure carbon dioxide fire suppression systems. The inspectors noted an acceptable exception in the application of the NUREG-1801 guidance for 6-month periodicity on visual inspection and functional testing of halon and carbon dioxide fire suppressions. Oyster Creek Generating Station performs in-depth operational tests and inspections on an 18-month periodicity. The applicant does perform a weekly tank/charge check and a monthly valve position alignment check and will include visual inspections of external surfaces as an enhancement prior to the period of extended operation.

For the Fire Protection Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the fire protection program. The applicant has provided adequate guidance to ensure aging effects are appropriately managed.

Fire Water System Program

The Fire Water System Program is an existing program modified for the purpose of aging management credited with managing the loss of material, microbiological influenced corrosion, and biofouling aging effects in fire water systems at Oyster Creek Generating Station. The aging effects are managed by periodic maintenance, testing, and inspection of system piping and components in accordance with codes and standards. The inspectors reviewed program bases documents, completed testing and maintenance procedures, corrective action reports, design documents, and industry guidance. The inspectors also conducted interviews and performed walkdowns of the fire water system with plant personnel. The fire water system is maintained in a pressurized state which provides the applicant with constant system integrity status. The piping internals are routinely inspected at various locations throughout the system for loss of material and biofouling. The following enhancements have been noted:

Sprinkler head inspections in accordance with NFPA 25 “Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems” (1998 Edition).

Samples will be submitted to a testing laboratory prior to being in service 50 years.

Inclusion of inspection of selected portions of the fire protection system piping located aboveground and exposed to water, by non-intrusive volumetric examinations.

Performance of water sampling for the presence of microbiological corrosion every 5 years.

Inclusion of visual inspection of the water storage tank heater pressure boundary components during the periodic tank internal inspection.

For the Fire Water System Program, the inspectors concluded the applicant had conducted adequate evaluations, as well as industry experience and historical reviews to determine aging effects managed by the fire water system program. The applicant provided an acceptable plan to implement adequate guidance and terms to ensure aging effects are appropriately managed.

Periodic Inspection of Ventilation Systems Program

The Periodic Inspection of Ventilation Systems Program is an existing program at Oyster Creek Generating Station modified for the purpose of aging management. The program is credited with managing loss of material, changes in material properties, and degradation of heat transfer in ventilation systems in the scope of license renewal (flexible connections, fan and filter housings, and access door seals). Instrument piping and valves, restricting orifices and flow elements, thermowells, and Standby Gas Treatment System ducting exposed to soil or sand will be added to the scope as enhancements to the program. The aging effects are managed by periodic inspections that will be condition monitoring examinations performed at susceptible locations in the systems, intended to assure that existing environmental conditions are not causing material degradation that could result in a loss of system intended functions.

The inspectors reviewed program bases documents, completed testing and maintenance procedures, corrective action reports, design documents, and industry guidance. The inspectors also conducted interviews and performed walkdowns of accessible portions of Standby Gas Treatment and Reactor Building Ventilation Systems with plant personnel.

Complete visual inspections and performance tests of all ventilation systems in scope are performed during system preventive maintenance activities on a frequency not to exceed five years. This includes system leakage and filter efficiency tests for Standby Gas Treatment, Reactor Building and Control Room Ventilation systems. An additional noted enhancement includes adding specific guidance to inspect for loss of material and material property changes.

For the Periodic Inspection of Ventilation Systems Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Periodic Inspection - Forked River Combustion Turbine

The Periodic Inspection - Forked River Combustion Turbine program is a new program credited with addressing the two Forked River Combustion Turbine power plant components in the scope of license renewal that require periodic monitoring of aging

effects, and are not covered by other aging management programs. In the applicant's response to the NRC's requests for additional information, RAI 2.5.1.19-1, dated October 12, 2005 and November 11, 2005, the applicant expanded the single aging management for the Forked River Combustion Turbine to twelve aging management programs. This periodic inspection program is one of twelve programs that monitor the aging effects of the Forked River Combustion Turbine.

The Periodic Inspection - Forked River Combustion Turbine aging management program manages the aging effect of change in material properties, loss of material and reduction of heat transfer for systems, components, and environments. The aging effects are managed by periodic inspections that will be condition monitoring examinations performed at susceptible locations in the systems, intended to assure that existing environmental conditions are not causing material degradation that could result in a loss of system intended functions. These inspections will be performed on a periodicity not to exceed once every 10 years and will coincide with major combustion turbine maintenance inspections.

The two Forked River Combustion Turbines are owned, operated, and maintained by FirstEnergy, under contract to supply station blackout services to Oyster Creek Generating Station. The inspectors reviewed program bases documents, maintenance rule performance data, walkdown reports, and action logs. Applicable portions of the Interconnect and Station Blackout Agreements were reviewed. The inspectors also conducted interviews and performed walkdowns with Oyster Creek Generating Station and FirstEnergy personnel of the Forked River Combustion Turbine facility and portions of its switchyard. The inspectors observed maintenance activities conducted by General Electric for FirstEnergy on Forked River Combustion Turbine #2 during a minor outage.

Though the Forked River Combustion Turbines are operated and maintained by FirstEnergy, Oyster Creek Generating Station assigns a system engineer to monitor their performance via monthly data sets and logs received from the onsite FirstEnergy engineers. Significant events and maintenance on the Forked River Combustion Turbine are logged and evaluated by the Oyster Creek system engineer for further action.

At the time of this inspection, the implementing procedures for this program were not developed. Hence, the aging management program elements have not been negotiated with FirstEnergy to be added into the Station Blackout Agreement. The Office of Nuclear Reactor Regulation accepted AmerGen's response to 2.5.1.15-1 and 2.5.1.19-1 and requests for additional information. Based on discussions with applicant personnel and reviews of supporting documents, the inspectors concluded that the applicant has plans to develop adequate guidance and terms for implementation of the Periodic Inspection - Forked River Combustion Turbine Program. AmerGen will negotiate those terms into the station blackout agreement.

For the Periodic Inspection - Forked River Combustion Turbine Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided an acceptable plan to implement adequate guidance and terms to ensure aging effects are appropriately managed.

ASME, Section XI, Subsection IWE Program

The ASME, Section XI, Subsection IWE Program is an existing program modified for the purpose of aging management credited with managing the aging effects in drywell containment systems in Oyster Creek Generating Station. ASME Section XI, Subsection IWE provides for inspection of primary containment components and the containment vacuum breakers system piping and components. It covers steel containment shells and their integral attachments; containment hatches and airlocks, seals and gaskets, containment vacuum breakers system piping and components, and pressure retaining bolting. The aging effects are managed by periodic visual inspections, and periodic ultrasonic testing wall thickness measurements. Additionally, the applicant will conduct monitoring of leakage from the drywell sand bed region drains going forward, as an additional method to detect conditions favorable for corrosion to occur. Only the visual and ultrasonic examinations are given credit for managing the affects of aging.

The inspectors reviewed all of the licensee's ultrasonic thickness testing inspection results for the condition of the drywell from 1983 through 2002, evaluations and calculations of corrosion rates and projections of wall thickness for several locations on the drywell. Also, the inspectors reviewed video records of the sand bed region condition and the removal of the sand from the sand bed region. The inspectors reviewed the structural analysis performed to confirm the structural integrity of the drywell after the amount of corrosion had been determined. The inspectors reviewed the most recently completed visual inspection results of the drywell sand bed exterior coating and the UT measurements from higher elevations of the drywell.

For the ASME, Section XI, Subsection IWE Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the ASME, Section XI, Subsection IWE Program. The applicant provided adequate guidance to ensure aging effects are appropriately managed, pending resolution of Safety Evaluation Report Open Items OI 4.7.2-1.1 through OI 4.7.1-1.4, and OI 4.7.2-3.

Protective Coating Monitoring and Maintenance Program

The Protective Coating Monitoring and Maintenance Program is an existing program credited with managing the aging effects on the internal and external surfaces of the torus and the condition of the drywell in the sand bed region in systems in Oyster Creek Generating Station. The aging effects are managed by visual inspections of the protective coatings on each component, and examination, evaluation and repair of all coating defects observed.

The inspectors reviewed the past inspection results in each area to understand what conditions are being documented, the method of evaluation of recorded indications, the repair methods used to fix any damaged or degraded coating. The inspectors also looked at the licensee's cause determination for the underlying corrosion phenomena and actions being taken to monitor the condition.

The team concluded that as long as the coating integrity was maintained by this program, the presence of water, as indicated by collection from the former sandbed area drains, would not affect the rate of corrosion of the drywell at the former sandbed area.

For the Protective Coating Monitoring and Maintenance Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the Protective Coating Monitoring and Maintenance Program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Above-Ground Outdoor Tank Monitoring Program

The Above-Ground Outdoor Tank Monitoring Program is a new program credited with managing the aging effects on above ground steel tanks in systems at the Oyster Creek Generating Station. The aging effects will be managed by periodic visual inspections, some nondestructive evaluation inspections based upon maintenance history and industry experience.

The inspectors reviewed the Oyster Creek Generation Station template used to guide and control this inspection effort, conducted field walkdowns of four of the tanks covered by the program and reviewed the industry operating experience which the licensee has used to prepare this inspection program.

For the Above-Ground Outdoor Tank Monitoring Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by the Above Ground Outdoor Tank Monitoring Program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

ASME Section XI, Subsection IWF

The ASME Section XI, Subsection IWF Program is an existing program credited with managing the aging effects in the ASME Section XI, Subsection IWF. Subsection IWF provides for periodic visual examination of ASME Section XI Class 1, 2, 3 and MC components and piping support members for loss of mechanical function and loss of material. Bolting is also included with these components, inspecting for loss of material and for loss of preload by inspecting for missing, detached, or loosened bolts.

The aging effects are managed by periodic visual examinations for corrosion and loss of material in structural members, loss of preload in bolting; missing, detached, or loosened members or bolts; and any degradation of protective coatings. The program has been enhanced by including additional MC components in the approved ASME Section XI, Inservice Inspection program.

The inspectors reviewed the program description, program basis documents, the currently approved ASME Section XI, Subsection IWF program, and the results of previous inspections and examinations. The documents reviewed and discussions with cognizant individuals indicated the operating experience of the In-service Inspection program at Oyster Creek, which includes ASME Section XI, Subsection IWF aging management activities, has not shown any adverse trend. Periodic self-assessments of the program have been performed to identify the areas that need improvement to maintain the quality and integrity of the program. The proposed aging management program based on the ASME Section XI, Subsection IWF, is generally consistent with the elements of XI.S3 of NUREG-1801 with some exceptions; e.g., NUREG1801 specifies ASME Section XI, 2001edition, including the 2002 and 2003 addenda, whereas, the station program is based on ASME Section XI, 1995 edition with 1996 addenda, an acceptable alternate edition of the code. The enhancements include additional MC supports and inspection of underwater supports.

For the ASME Section XI, Subsection IWF Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Masonry Wall Program

The Masonry Wall Program is credited with managing the aging effects in masonry walls at the Oyster Creek Generating Station as part of the Structural Monitoring Program. The aging effects are managed by a program of inspection of masonry walls for cracking on a frequency of four years to assure that the established evaluation basis for each masonry wall remains valid during the period of extended operation.

The inspectors reviewed the program description, program basis documents, the currently approved station procedures, the results of prior inspections, discussions with cognizant personnel, and a walkthrough visual examination of accessible masonry walls to assess the effectiveness of the current program. The scope of the program includes all masonry walls that perform intended functions in accordance with 10 CFR 54.4, and were covered by I. E. Bulletin 80-11.

The inspections are implemented though station procedures. Maintenance history has revealed minor degradation of masonry block walls; but none that could impact their intended function. In response to I.E. Bulletin 80-11, “Masonry Wall Design," and Information Notice 87-67, “Lessons Learned from Regional Inspections of Licensee Actions in Response to I.E. Bulletin 80-11," various actions have been taken. Actions have included program enhancements, follow-up inspections to substantiate masonry wall analyses and classifications, and the development of procedures for tracking and recording changes to the walls. These actions have addressed all concerns raised by I.E. Bulletin 80-11 and Information Notice 87-67, namely unanalyzed conditions, improper assumptions, improper classification, and lack of procedural controls. A review of operating experience indicates that the program is effective for managing aging effects of masonry walls.

For the Masonry Wall Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Structures Monitoring Program

The Structures Monitoring Program is an existing program that has been modified, and will be further modified, for the purpose of aging management of structures and structural components, including structural bolting within the scope of license renewal at Oyster Creek Station. The program was developed based on Regulatory Guide 1.160, Revision 2, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and NUMARC 93-01 Revision 2, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," to satisfy the requirement of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants".

The scope of the program also includes condition monitoring of masonry walls and water-control structures as described in the Masonry Wall Program and in the RG 1.127, and Inspection of Water-Control Structures Associated With Nuclear Power Plants aging management program. The enhanced program includes structures that are not monitored under the current term but require monitoring during the period of extended operation. Aging effects are managed by periodic visual inspections by qualified personnel to monitor structures and components for applicable aging effects. Specifically, concrete structures are inspected for loss of material, cracking, and a change in material properties. Steel components are inspected for loss of material due to corrosion. Masonry walls are inspected for cracking, and elastomers will be monitored for a change in material properties. Earthen structures associated with water-control structures and the Fire Pond Dam will be inspected for loss of material and loss of form. Component supports will be inspected for loss of material, reduction or loss of isolation function, and reduction in anchor capacity due to local concrete degradation.

Exposed surfaces of bolting are monitored for loss of material, due to corrosion, loose nuts, missing bolts, or other indications of loss of preload. The scope of the program will be enhanced to include structures that are not monitored under the current term but require monitoring during the period of extended operation.

The inspectors reviewed the program description, program basis documents, the currently approved station procedures, the results of prior inspections, discussions with cognizant personnel, and a walkthrough visual examination of accessible structural items, including reinforced concrete and structural steel members, components and systems to assess the effectiveness of the current program. The scope of the program also includes all masonry walls that perform intended functions in accordance with 10 CFR 54.4, and were covered by I. E. Bulletin 80-11. The inspections included a review of station procedures, maintenance history, inspection findings and followup of inspection findings, and current inspection schedules. Inspection frequency is every

four years; except for submerged portions of water-control structures, which will be inspected when the structures are dewatered, or on a frequency not to exceed ten years. The program contains provisions for more frequent inspections to ensure that observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is consistent with the ten elements of aging management program XI.S6, "Structures Monitoring Program," specified in NUREG-1801.

For the Structures Monitoring Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Inspection of Water Control Structures

The Inspection of Water Control Structures Program is an existing program modified for the purpose of the aging management program credited with managing the aging effects in Water Control Structure systems at the Oyster Creek Generating Station. The aging effects are managed by periodic inspections of the water control structures for structural and hydraulic degradation, and potential loss of function of intended service. The Water Control Structure Program is a subpart of the main Structures Monitoring Program. It is based on the guidance provided in RG 1.127 and ACI 349.3R and will provide for periodic inspection of the Intake Structure and Canal, the Fire Pond Dam, and the Dilution structure. The program will be used to manage loss of material, cracking, and change in material properties for concrete components, loss of material and change in material properties for wooden components, and loss of material, and loss of form of the dam, and the canal slopes. Inspection frequency is every four years; except for submerged portions of the structures, which will be inspected when the structures are de-watered, or on a frequency not to exceed ten years. The program will be enhanced to ensure that water-control structures aging effects are adequately managed during the period of extended operation.

The inspectors reviewed the program description, program basis documents, the currently approved station procedures, the results of prior inspections, discussions with cognizant personnel, and a walkthrough visual examination of accessible water control structures, including components and systems to assess the effectiveness of the current program. As the Water Control Structures Monitoring Program is a subpart of the larger Structures Monitoring Program, this review was performed in conjunction with the comprehensive review of the main Structures Monitoring Program. Inspection of Water-Control Structures Associated with Nuclear Power Plants program is consistent with the ten elements of aging management program.

For the Inspection of Water Control Structures Program, the inspectors concluded the applicant had conducted adequate evaluations as well as industry experience and historical reviews to determine aging effects managed by an aging management program. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Metal Fatigue of Reactor Coolant Pressure Boundary

The Metal Fatigue of Reactor Coolant Pressure Boundary Aging Management Program monitors select components in the reactor coolant pressure boundary by tracking and evaluating contributing plant events. The Metal Fatigue of Reactor Coolant Pressure Boundary program monitors operating transients and, by way of a computer program, calculates up-to-date fatigue usage factors.

The design basis metal fatigue analyses for the reactor coolant pressure boundary are considered time limited aging analysis for the purposes of license renewal. The Metal Fatigue of Reactor Coolant Pressure Boundary Program provides an analytical basis for confirming that the number of cycles, established by the analysis of record, will not be exceeded before the end of the period of extended operation. In order to determine cumulative usage factors more accurately, the program will implement FatiguePro® fatigue monitoring software. FatiguePro® calculates cumulative fatigue using both cycle-based and stress-based monitoring. This provides an analytical basis for confirming that the number of cycles established by the analysis of record will not be exceeded before the end of the period of extended operation.

For the Metal Fatigue of Reactor Coolant Pressure Boundary Aging Management Program, the inspectors reviewed the program including the basis calculations, ongoing monitoring, corrective actions, limiting components, and current cumulative usage factors for the limiting components. The applicant provided adequate guidance to ensure aging effects are appropriately managed.

Isolation Condenser System Review

The Oyster Creek license renewal application listed a number of plant systems within the scope of license renewal. From this list the inspectors selected the isolation condenser system for a focused review to determine whether the applicant's aging management programs were adequate to effectively manage aging effects related to this component. The following aging management programs are credited for managing aging effects of the isolation condenser system: ASME Section XI In-service Inspection, Subsection IWB, IWC, and IWD; Bolting Integrity; BWR Stress Corrosion Cracking; One Time Inspection; Structures Monitoring Program; and, Water Chemistry. The inspectors focused on the loss of material aging effect to determine how it would be managed by the identified programs applied specifically to the Isolation Condenser System.

Although the Oyster Creek 10 CFR 50, Appendix K, design basis event analysis, no longer takes credit for the Isolation Condenser it is very important for post-accident heat removal and mitigation of event consequences. It ranks very high on the probabilistic risk worth for this reason. Because of its risk importance the inspectors reviewed the aging management programs given credit for managing the affects of aging in the system.

The Isolation Condenser System contains safety-related components relied upon to remain functional during and following design basis events. For example the primary coolant boundary must be maintained through the condenser. Additionally the failure of nonsafety-related structures and components in the Isolation Condenser System could potentially prevent the satisfactory accomplishment of a safety-related function. The isolation condenser also performs functions that support fire protection and station blackout.

AmerGen is committed, in their application documents, to maintaining the water environment of the secondary side because the integrity of the heat exchanger tubes can be affected from both the inside and outside. Additionally, the heat exchanger shell, and therefore, the secondary water environment, is part of the One-Time Aging Management program because it is required to maintain structural integrity during a design basis earthquake to support the heat exchanger tubing and the attached reactor coolant/steam line piping.

The applicant proposed using the ASME Section XI In-service Inspection, Subsections IWB, IWC, and IWD aging management program with the water chemistry aging management program to manage loss of material of the Isolation Condensers. The inspectors reviewed the Oyster Creek in-service inspection program procedure ER-OC-330-1001, ISI Program Plan Fourth Ten-Year Inspection Interval to verify that it was modified to include inspections of the isolation condenser tube side components, eddy current testing of the tubes, and inspection (VT or UT) of the tube sheet and channel head to ensure that degradation is not occurring and the components intended function will be maintained. The inspectors reviewed selected NDE reports of isolation condenser system piping and components, where degradation would result, to verify compliance with ASME Section XI Code.

The inspectors reviewed the UT wall thickness data sheet 96-023-03 from 1R16 refueling outage which documented shell thickness measurements of the “B” Isolation Condenser. The UT results indicate that the shell thickness was over 0.350 inches in most cases with one reading at 0.312 inches. The vendor drawing 1691-655-20 indicates the shell thickness is 0.375 inches with 0.100 inches corrosion allowance with a minimum of 0.275 inches. Therefore, the “B” Isolation Condenser meets the original design specifications. The inspectors noted that coating inspections performed by the applicant of the inside shell surface of the “B” Isolation Condenser during 1R16 in 1996 blistering of the coating was observed in most of the submerged sections. The coating on the inside shell of the isolation condensers is not credited in the aging management programs.

Based on discussions with applicant personnel and reviews of the One-time Aging Management Program basis documents, the inspectors determined the applicant has elected to perform a one-time aging management program inspection of the shell of isolation condenser prior to entering extended plant operations.

b. Observation

The inspectors identified an observation related to the monitoring of liquid leakage from the former drywell sand bed region related to the current operating license period. This observation was determined not to be safety significant and has been entered into the applicant's ongoing corrective action system.

A current commitment for monitoring the sand bed drains is in a staff Safety Evaluation Report transmitted by letter November 1, 1995. This Safety Evaluation Report requested a commitment to perform inspections "3 months after the discovery of any water leakage". Subsequent correspondence from General Public Utilities Nuclear Corporation the licensee, at the time, clarified the commitment after discussions with the staff. The commitment made and accepted by the staff in a February 15, 1996, letter was to perform an evaluation of the impact of any leakage during power operations and conduct additional inspections of the drywell approximately 3 months after discovery of the water leakage if the evaluation determines that it is warranted. This commitment was not meant to apply to minor leakage from normal refueling activities.

During the inspection, the NRC team requested a walkdown of the torus room. AmerGen staff walked down the torus room prior to the NRC team making entry. Water collection jugs, fed by tubing from the former drywell sand bed drains, were emptied prior to the NRC's walkdown, without taking samples of the water in the jugs or recording water levels. The fact that water was present in the jugs meant that leakage had been occurring. The applicant informed the NRC team that the bottles had been improperly emptied without measurement or analysis. Upon further investigation, the applicant could not find documentation that showed prior surveillance of the water drains had been completed. AmerGen staff also could not find documented evidence that strippable coating of the refueling channel had been applied. This strippable coating is used as a measure to limit or prevent water leakage during refueling operations.

The applicant stated that, although there was no formal leakage monitoring in place, there has been no previous reported evidence of leakage from the former sand bed drains. Issue Report #348545 was submitted into the corrective action process when the missed commitment and the improper emptying of the bottles were discovered. This corrective action will capture the commitment in the applicant's computerized scheduling process so that the required actions will be automatically prompted. Because there was no previously reported leakage, the applicant did not investigate the source of leakage, take corrective actions, evaluate the impact of leakage, or perform additional drywell inspections.

The applicant further stated that a number of actions had been taken to alleviate the previous water leakage problem since discovery of the consequent drywell shell corrosion in the early 1990's. Some of the significant actions consisted of inspections of the reactor cavity wall, remote visual inspection of the trough area below the reactor cavity bellows seal area, and subsequent repair of the trough area and clearing of its drain. Clearing of the trough drain and repair of the trough routed any leakage away from the drywell shell. In addition, AmerGen believes that the strippable coating was

applied to the reactor cavity walls before the reactor cavity is filled with water as part of refueling activities to minimize the likelihood of leakage into the trough area.

The license renewal application does not take credit for the use of the strippable coating, or the monitoring of the water leakage in managing the aging affects on the liner. As long as the coating of the exterior surface of the former sand bed area is maintained, any amount of water can be present and have no affect on the corrosion rate. The thickness of the cylindrical portion of the liner is managed using ultrasonic testing and this program will capture any changes in corrosion rate due to water in the liner gap. AmerGen has taken corrective actions to ensure, in the future, the drains are monitored, and the strippable coating is applied.

c. Overall Findings

The inspection verified that there is an adequate approach to monitor and control the effects of aging so that the intended function(s) of systems, structures, and components, for which an aging management review is required, will be maintained consistent with the current licensing basis during the period of extended operation. The inspection verified documentation, procedures, guidance, and personnel, appropriately supported the license renewal application.

40A6 Meetings, Including Exit

The inspectors presented the inspection results to Mr. T. Rausch, Oyster Creek Generating Station Vice President, and other members of the licensee's staff in a meeting that was open for public observation on September 13, 2006. The licensee had no objections to the NRC observations. No proprietary information was provided to the inspectors during this inspection. The State of New Jersey, Department of Environmental Protection attended the exit meeting, and made a statement at the meeting concerning the observation associated with the monitoring of liquid leakage from the former drywell sandbed drains. In addition, they stated that a letter concerning this issue was sent to the NRC Region I Regional Administrator dated September 13, 2006. A copy of this letter is available in the NRC ADAMS document management system under ML062630218.

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

J. Camire	System Manager
L. Corsi	Mechanical Engineer, LR Project
M. Gallagher	Vice-President, License Renewal
J. Hufnagel	Licensing Lead, LR Project
K. Muggleston	Mechanical Engineer, LR Project
A. Ouaou	Civil Engineer, LR Project
F. Polaski	License Renewal Manager
T. Quintenz	Site Lead Engineer, LR Project
D. Warfel	Technical Lead, LR Project
R. Francis	App J. Program Manager
K. Muggleston	Licensing
S. Getz,	License Renewal
L. Corsi	License Renewal
R. Gayley	FAC Program Manager
J. Watley	CCCW System Engineer
C. Roth	TBCCW System Engineer
R. Artz	Chemist
M. Miller	License Renewal
T. Trettel	Fire Protection System Engineer
J. Yuen	System Engineer - Ventilation
C. Micklo	License Renewal
J. Esch	FirstEnergy Engineer
R. Bonelli	FirstEnergy Engineer
R. Skelskey	System Engineer - FRCT
M. Filippone	System Manager
E. Johnson	System Manager
R. Pruthi	System Manager
S. Schwartz	System Manager
D. Spamer	Senior Engineer, Electrical

LIST OF DOCUMENTS REVIEWED

Drawings

Complete Set of License Renewal Drawings:

LR-BR-2002, Rev. 0
LR-BR-2003, Rev. 0
LR-BR-2004, Rev. 0
LR-BR-2005, Rev. 0
LR-BR-2006, Rev. 0
LR-BR-2007, Rev. 0
LR-BR-2008, Rev. 0
LR-BR-2009, Rev. 0
LR-BR-2010, Rev. 0
LR-BR-2011, Rev. 0
LR-BR-2012, Rev. 0
LR-BR-2013, Rev. 0
LR-BR-2014, Rev. 0
LR-BR-2015, Rev. 0
LR-BR-M0012, Rev. 0
LR-FP-SE-5419, Rev. 0
LR-GE-107C5339, Rev. 0
LR-GE-148F262, Rev. 0
LR-GE-148F437, Rev. 0
LR-GE-148F444, Rev. 0
LR-GE-148F711 Rev. 0
LR-GE-148F712, Rev. 0
LR-GE-148F723, Rev. 0
LR-GE-148F740, Rev. 0
LR-GE-197E871, Rev. 0
LR-GE-234R166, Rev. 0
LR-GE-237E487, Rev. 0
LR-GE-237E756, Rev. 0
LR-GE-237E798, Rev. 0
LR-GE-713E802, Rev. 0
LR-GE-865D741, Rev. 0
LR-GE-885D781 Rev. 0
LR-GU-3E-243-21-1000, Rev. 0
LR-GU-3E-551-21-1000, Rev. 0
LR-GU-3E-551-21-1001, Rev. 0
LR-GU-3E-666-21-1000, Rev. 0
LR-GU-3E-822-21-1000, Rev. 0
LR-GU-3E-861-21-1000, Rev. 0
LR-GU-3E-861-21-1001, Rev. 0
LR-GU-3E-861-21-1002, Rev. 0
LR-GU-3E-862-21-1000, Rev. 0

LR-GU-3E-871-21-1000, Rev. 0
LR-JC-147434, Rev. 0
LR-JC-19479, Rev. 0
LR-JC-19616, Rev. 0
LR-JC-19629, Rev. 0
LR-OC-010520, Rev. 0
LR-SN-13432.19, Rev. 0

Other Drawings

Drawing 4059-2, Sheet 2 or 3, Reactor Bldg. First Floor At Elev. 23' 6", Sections & Details - SH.2
Drawing 3E-SK-5-85, 1986 Drywell Data UT Location Plan
Drawing BE-SK-S-89, Revision 0, 10/16/89; Ultrasonic Testing Drywell Level 30'2" - 67'5"
M0123, Post Accident Sampling Isometric, Rev. 2
M0124, Post Accident Sampling Isometric, Rev. 2
M0278, Diesel Fuel Oil Storage Tank Isometric, Rev. 0

GU 3E-000-A3-002, Sheet 7, Rev.1, Isometric Composite Various Systems IGSCC Weld History
Foster Wheeler Drawing1691-655-20, Outline & Section of Emergency Condenser, Rev. F
Drawing 4059-2, Sheet 2 or 3, Reactor Bldg. First Floor At Elev. 23' 6", Sections & Details - SH.2
Drawing 3E-SK-5-85, 1986 Drywell Data UT Location Plan
Drawing BE-SK-S-89, Revision 0, 10/16/89; Ultrasonic Testing Drywell Level 30'2" - 67'5"

Procedures

MA-AA-723-500, Inspection of Non-EQ Cables and Connections for Managing Adverse Localized Environments, Draft Rev 2A.
621.3.005, High Radiation Monitor Calibration, Draft Rev 48A.
621.3.002, Air Ejector Off Gas Radiation Monitor Check Source Functional Test, Draft Rev 26A.
2400-SMI-3623.09, Calibration and Operation of the LPRM Diagnostic System, Rev 11.
2400-SMI-3623.08, IRM Detector Current-Voltage (I/V) Testing, Rev 6.
2400-SMI-3623.03, IRM, SRM, LPRM, Characterization Trending and Diagnostics, Rev 7.
2400-SME-3780.05, Power Factor Testing of 5kV Cables, Rev 2.
2400-SME-3780.06, Dielectric Testing for 2.3kV and 5kV Cables and Equipment, Rev 8.
Exelon Technical Specification for Distribution System Wood Pole Inspection and Remediation, Dated 1/1/05.
ECR OC 05-00275-00: Revise C-1302-187-E310-037, Revision 2
ER-AA-330-007
ER-AA-335-018
ER-AA-330, Revision 3: Conduct Of Inservice Inspection Activities
ER-AA-330-007, Revision 3: Visual Examination Of Section XI Class MC Surfaces And Class CC Liners

ER-AA-330-018, Revision 2: General, VT-1, VT-1C, VT-3 And VT-3C, Visual Examination Of ASME Class MC And CC Containment Surfaces And Components
2400-GMM-3900.52, Revision 3: Inspection And Torquing Of Bolted Connections
SM-AA-300, Revision 0; Procurement Engineering Support Activities
WO R2064827-06, Disassemble Reactor Vessel For Refuel Outage, Prepare Areas & Apply Cavity Coating, 11/1/06
WO R2068582-03, Perform Reactor Vessel Reassembly, Remove Cavity Coating And Decon Cavity, 11/1/06
Procedure No. 666.5.007, Revision 16; Primary Containment Integrated Leak Rate Test
PP-03, Criteria for Scoping Systems and Structures Relied upon to Demonstrate Compliance with 10 CFR 54.4 (a)(2), Rev. 3
PP-04, Systems and Structures Relied upon to Demonstrate Compliance with 10 CFR 50.63 - Station Blackout, Rev. 4
PP-05, Systems and Structures Relied upon to Demonstrate Compliance with 10 CFR 50.62 - ATWS, Rev. 1
PP-13, Abnormal Operating Transients, Rev. 2
PP-15, Standard Materials, Environment, and Aging Effects, Rev. 5
Inspection Sample Basis, Aug. 16, 2005
License Renewal Project Level Instruction 5 (PLI-5), Aging Management Reviews, Rev. 5
2400-GMM-3900.52, Inspection and Torquing of Bolted Connections, Rev. 3
2400-SMM-3900.04, System Pressure Test Procedure (ASME XI), Rev. 8
ER-AA-330-008, Protective Coatings, Rev. 3
ER-AA-2030, Attachment 4, System Walkdown Standards, Rev. 3
SA-AA-117, Excavation, Trenching, and Shoring, Rev. 3
SA-AA-117, Excavation, Trenching, and Shoring, Rev. 4b
SP-1302-12-261, Specification for Pipe Integrity Inspection Program, Rev. 7
SP-9000-06-004, Specification for Application and Repair of Service Level III Coatings, Rev. 0
101.2, Oyster Creek Fire Protection Program, Rev. 54
CC-AA-211, Fire Protection Program, Rev. 1
645.6.003, Fire Hose Station, Hose House and Fire Hydrant Inspection, Rev. 17
645.6.007, Fire Protection System Flush, Rev. 15
645.6.011, Deluge and Sprinkler System Inspection, Rev. 10
645.6.013, Fire Suppression System Halon Functional Test, Rev. 19
645.6.026, Fire Damper Inspection, Rev. 11
645.6.017, Fire Barrier Penetration Surveillance, Rev. 10
ER-OC-330-1001, ISI Program Plan Fourth Ten-Year Inspection Interval (Draft)
OC-2, IGSCC Inspection Plan Fourth Ten-Year Inspection Interval, Rev. 1
ER-OC-330-1002, IGSCC Inspection Plan Fourth Ten-Year Inspection Interval (Draft)
ER-AA-330-002, In-service Inspection of Section XI Welds and Components, Rev. 5a
ER-AA-330-009, ASME Section XI Repair/Replacement Program, Rev. 4a
ER-AA-380, Rev. 3, “Primary Containment Leakage Rate Testing Program”
ER-OC-380, Rev. 0, “Oyster Creek Containment Leakage Rate Testing Program”
MA-AA-723-500, 50-Year Sample Testing of Fire Water System Sprinkler Heads, Rev. 0 (Draft)
New Oyster Creek PM Task defined in AR 00330592.20, Wall Thickness Measurements of Fire Water Systems, March 2006 (Draft)

R0801533-Annual, Recurring work task for Fire Pond Screens & Rake Clean and Lubricate (System 176)
Oyster Creek Generating Station Procedure No. 665.5.020, Rev. 19, "Integrated Local Leak Rate Test Summary"
Oyster Creek Generating Station Procedure No. 327.1, Rev. 31, "Fuel Oil Receipt and Fuel Handling Procedure"
Oyster Creek Generating Station Procedure No. 828.7, Rev. 22, "Secondary Systems Analysis: Plant Oil"
ER-AA-430, Rev. 1, "Conduct of Flow Accelerated Flow Accelerated Corrosion Activities"
ER-AA-430-1001, Rev. 1, "Guidelines for Flow Accelerated Corrosion Activities"
CY-OC-120-110, Rev. 0, "Chemistry Limits and Frequencies"
CY-AA-120-400, Rev. 8, "Closed Cooling Water Chemistry"
CY-AB-120-1000, Rev. 2, "BWR Chemistry Optimization"
CY-AB-120-1100, Rev. 3, "Reactor Water Hydrogen Water Chemistry, Noble Chem and Zinc Injection"
CY-AB-120-320, Rev. 2, "Control Rod Drive Water Chemistry"
CY-AB-120-310, Rev. 2, "Suppression Pool/Torus Chemistry"
CY-AB-120-300, Rev. 5, "Spent Fuel Pool"
CY-AB-120-200, Rev. 4, "Storage Tanks Chemistry"
CY-AB-120-130, Rev. 4, "BWR Shutdown Chemistry"
CY-AB-120-120, Rev. 4, "BWR Startup Chemistry"
CY-AB-120-100, Rev. 8, "Condensate and Feedwater Chemistry"
CY-AB-120-100, Rev. 7, "Reactor Water Chemistry"
CY-OC-120-1107, Rev. 0, "Fuel Oil Sample and Analysis Schedule"
ECR OC 05-00275-00: Revise C-1302-187-E310-037, Revision 2
ER-AA-330-007
ER-AA-335-018
ER-AA-330, Revision 3: Conduct Of Inservice Inspection Activities
ER-AA-330-007, Revision 3: Visual Examination Of Section XI Class MC Surfaces And Class CC Liners
ER-AA-330-018, Revision 2: General, VT-1, VT-1C, VT-3 And VT-3C, Visual Examination Of ASME Class MC And CC Containment Surfaces And Components
2400-GMM-3900.52, Revision 3: Inspection And Torquing Of Bolted Connections
SM-AA-300, Revision 0; Procurement Engineering Support Activities
WO R2064827-06, Disassemble Reactor Vessel For Refuel Outage, Prepare Areas & Apply Cavity Coating, 11/1/06
WO R2068582-03, Perform Reactor Vessel Reassembly, Remove Cavity Coating And Decon Cavity, 11/1/06
Procedure No. 666.5.007, Revision 16; Primary Containment Integrated Leak Rate Test
PM0001AC (RTWO R0800287) Control Room HVAC Sys B Inspection, Draft Revision
PM01279M (RTWO R0802279) Lubricate SGTS Fan EF-1-8, Draft Revision
ST 654.3.004 Control Room HVAC 'System A' Flow and Differential Pressure Test, Draft Revision
ST 651.4.001 Standby Gas Treatment System Test, Draft Revision
PM Draft for AR00330592.40-Measure wall thickness for SGTS buried exhaust ducts/trains A & B, dated March 13, 2006
ST 678.4.004 Station Blackout Combustion Turbine – Test, Rev. 7

Aging Management Review Technical Basis Documents

OC-AMR-—2.3.3.17, Hardened Vent System, Rev. 0

Documents

OC-AMR-2.3.1.3, Rev. 0, Isolation Condenser System
OC-AMR-—2.3.3.15 Vol 1, AMR Technical Basis Document – Fire Protection System, March 2006
OC-AMR-—2.3.3.15 Vol 2, AMR Technical Basis Document – Fire Protection System, March 2006
OCLR Tracking Item AMP-213 response, Fire Protection System B.1.19 Operating Experience review to support frequency of visual and functional testing of halon and CO2 Fire Suppression Systems, dated January 24, 2006
OCLR Tracking Database Open Item 1571, "OC-AMR-—2.3.3.15 Fire Protection Table Incomplete," dated February 01, 2006
Interconnection Agreement (Partial) for the Oyster Creek Nuclear Generating Station between AmerGen Energy Company LLC and Jersey Central Power & Light Company d/b/a GPU Energy – Schedule A: Interconnection Facilities, dated October 15, 1999
Station Blackout Agreement Between GPU Energy and AmerGen Energy Company, L.L.C, dated April 14, 2000
Closed Cycle Cooling Water Chemistry Assessment: Oyster Creek Nuclear Generating Station Final Report
Report of NRC Information Requests Concerning Oyster Creek License Renewal Application, Topic: Closed Cycle Cooling Water
BWRVIP-130: BWR Vessel and Internals Project - BWR Water Chemistry Guidelines, 2004 Revision
NFPA-25, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, 1998 Edition
AM-2003-07, Corporate Engineering Oversight Self-Assessment Report, "Oyster Creek Flow Accelerated Corrosion Program," February 2003
EPRI NSAC-202L-R2, "Recommendation for an Effective Flow-Accelerated Corrosion Program," April 1999
EPIR TR-109623, Rev. 2003, "Erosion, Corrosion, and Flow Accelerated Corrosion"
SP-1302-12-237, Rev. 11, "Nuclear Safety Related Pipe Wall Thinning Inspections for Oyster Creek Nuclear Generating Station Erosion/Corrosion Program"
TDR #943, Rev. 3, "Oyster Creek Flow Accelerated Corrosion Inspection History"
Focus Area Self-Assessment Report, "Reactor Water Chemistry Control," April 2004
NEI 03-08 "Guidelines for the Management of Materials Issue, May 2003
EPRI BWRVIP-62: BWR Vessel and Internal Project Technical Basis for Inspection Relief for TDR-1048, Technical Data Report-SGTS Duct Failure in the Tunnel, Rev. 0
EPRI 1007933, Aging Assessment Field Guide, Dec 2003
BWR Internals Components with Hydrogen Injection (TR-108705) - Final Report, December 1998
System 743, SBO Combustion Turbine and Support System OC-7 Functional Failure Definition, dated April 24, 2002

ASME Code Case –597
Oyster Creek UFSAR, Section 6.2: Containment Systems
Video Tape #1; Bay 7, 0-62 Wall, 9/26/92; Bay 3, 701-739 Heavy Scale
Video Tape #2; Bay 11 & 17,Coating Video Exam, 8/9/96
Video Tape #3; Bay 3, 2/26 & 2/27/92
Video Tape #4; Core Bore Drill Drywell Liner
Video Tape #5; Bay 9, 2/20/92, 10:51 AM, No Drywell Wall
Video Tape #6; Bay 9, 2/18 & 2/19/92
Video Tape #7; Bay 9 & Bay 7, 2/21 & 2/24/92; Bay 7, 600-695, 705 Wall Condition; Bay 3, 2/25/92 w. Arauera 721 Rota Router F804 TUD Guide Tube; Vacuuming from guide tube Reban 45-56
Video Tape #8; Bay 9, 2/13/92, No drywell wall
Video Tape #9; Bay 4, 2/28 & 3/2/92
Video Tape #10; 2/11/92 Inspection Bay 11, 2/13/92, Bay 11 Rota Router in Drain 11, Bay 7 0-62 Wall, 9/26/92
Video Tape #11; Drywell Liner Sample Areas Plug #'s 1, 2, 3, 4, 5, 6,& 7, Bay 7
System Manager Walkdowns of Service Water System, completed Sept. 24, 2005 & Dec. 1, 2005
Operating Experience Review - Hardened Vent - System 822, Rev. 0
Topical Report 116, Oyster Creek Underground Piping Program Description and Status, Rev. 1
Topical Report 140, Emergency Service Water & Service Water System Piping Plan, Rev. 2
Technical Data Report 829, Pipe Integrity Inspection Program, Rev. 4
System & Structure Scoping Form - Torus Water Storage and Transfer System, Rev. 1
System & Structure Scoping Form - Source Range Monitoring, Rev. 0
Assessment of Structural Support at SR/NSR Interfaces

IR & CR

CR

AR 00330592.24.01 to .22
AR 00441639
AR 002114568

IR 469998
IR 471363

Program Basis Documents

PBD-AMP-B.1.5, Rev. 0, BWR Feedwater Nozzle
PBD-AMP-B.1.7, Rev. 2, BWR Stress Corrosion Cracking
PBD-AMP-B.1.11, Rev. 0, Flow Accelerated Corrosion
PBD-AMP-B.1.14, Rev. 0, Closed Cycle Cooling Water Systems
PBD-AMP-B.1.19, Program Basis Document - Fire Protection System, March 2006
PBD-AMP-B.1.19, Program Proof Document - Fire Protection System, March 2006
PBD-AMP-B.1.20, Program Basis Document - Fire Water System, March 2006
PBD-AMP-B.1.20, Program Proof Document - Fire Water System, March 2006

PBD-AMP-B.1.29, Rev. 0, 10 CFR Part 50, Appendix J
PBD-AMP-B.1.02, Rev. 0, Water Chemistry
PBD-AMP-B.2.5, Rev. 0, Periodic Inspection Program
PBD-AMP-B.2.5a, Rev. 0, Periodic Inspection Program-FRCT
PBD-AMP-B.22, Rev. 0, Fuel Oil Chemistry
PBD-AMP-B.2.04, Program Basis Document – Periodic Inspection of Ventilation Systems, Rev. 0
Program Basis Document, PBD-AMP-B.1.27, Revision 0, ASME Section XI, Subsection IWE
Program Basis Document, PBD-AMP-B.1.33, Revision 0, Protective Coating Monitoring And Maintenance Program
Program Basis Document, PBD-AMP-B.1.21, Aboveground Steel Tanks
PBD-AMP-B.1.12, Bolting Integrity, Rev. 0
PBD-AMP-B.1.13, Open Cycle Cooling Water System, Rev. 0
PBD-AMP-B.1.24, One-Time Inspection, Rev. 0
PBD-AMP-B.1.26, Buried Piping Inspection, Rev. 0

System Health Reports

In-service Inspection Program 1st, 2nd, 3rd & 4th Quarter 2005 Reports
Oyster Creek Appendix J Program, 4th Qtr 2005 System Health Report
Flow Accelerated Corrosion Program Controlling Document: ER-AA-430, 4th Qtr. 2003 System Health Report
FRCT Walkdown Report, dated October 17-19, 2005
System 743, CT-1 & CT-2 two year Maintenance Rule Performance data, dated March 2006

Calculations

13432.46-Z-012, Pipe Supports Design - Instrument Air and Nitrogen, Rev. 0
C-1302-187-8610-030 “Statistical Analyses of Drywell Thickness Data thru September 1996"
C-1302-187-5300-028, Rev. 0, “Statistical Analyses of Drywell Thickness Data thru September 1994"
C-1302-87-5300-021, Rev. 0, “Statistical Analyses of Drywell Thickness thru May 1992"
030681, Rev. 0, CHECWORK Flow Accelerated Corrosion Model, August 4, 2003
010663-02, Rev. 1, Flow Accelerated Corrosion Susceptible Non-Modeled Analysis, August 4, 2003
Oyster Creek Nuclear Power Plant, Unit no. 1; Primary Containment Design Report
TDR 277, Revision 0; Oyster Creek Pressure Suppression Chamber Materials Coating Evaluation, 7/10/85
TDR 851, Revision 0; Assessment Of Oyster Creek Drywell Shell, 12/27/88
TDR 854, Revision 1; Drywell Sand Bed Region Corrosion Assessment, 4/22/87
TDR 948, Revision 1; Statistical Analysis Of Drywell Thickness Data, 2/1/89
TDR 922, Revision 1; 8/5/88, Drywell Upper Elevation - Wall Thinning
TDR 1080, Revision 0; Oyster Creek - Torus Internal Coating
TDR 948, Revision 1, 2/1/89; Statistical Analysis Of Drywell Thickness Data
TDR 854, Revision 1, 4/2/87; Drywell Sand Bed Region Corrosion Assessment

Calculation C-1302-187-5300-008, Revision 0, Statistical Analysis Of Drywell Thickness Data Thru 2/8/90
Calculation C-1302-187-5300-005, Revision 0,2/1/89; Statistical Analysis Of Drywell Thickness Data Thru 12/31/88
Calculation C-1302-187-5300-011, Revision 1,6/13/90; Statistical Analysis Of Drywell Thickness Data Thru 4/24/90
Calculation C-1302-187-5300-017, Revision 0, Statistical Analysis Of Drywell Thickness Data Thru May 1991
Calculation C-1302-187-5300-021, Revision 0, Statistical Analysis Of Drywell Thickness Data Thru May 1992
Calculation C-1302-187-5300-015, Revision 0; Statistical Analysis Of Drywell Thickness Data Thru March 1991
Calculation C-1302-187-5300-016, Revision 0; OCDW Projected Thickness Using Data Thru 3/3/91
Calculation C-1302-187-5300-022, Revision 0; OCDW Projected Thickness Using Data Thru 5/31/92
Calculation C-1302-187-5300-025, Revision 0; Statistical Analysis Of Drywell Thickness Data Thru December 1992
Calculation C-1302-187-5300-025, Revision 1; Statistical Analysis Of Drywell Thickness Data Thru December 1992
Calculation C-1302-187-5300-028, Revision 0; Statistical Analysis Of Drywell Thickness Data Thru September 1994
Calculation C-1302-187-310-037, Revision 2; Statistical Analysis Of Drywell Vessel Thickness Data Thru September 2000
Calculation C-1302-187-E310-037, Revision 1; Statistical Analysis Of Drywell Vessel Thickness Data Thru September 2000
Calculation C-1302-241-E610-081, Revision 2; Suction Strainer Debris Generation and Transport, 10/5/98
Calculation C-1302-187-5320-024, Revision 0; OC Drywell Ext. UT Evaluation in Sandbed, 4/16/93
Document 990-2174, Letter Report On Additional Sandbed Analyses, GE Materials Monitoring & Structural Analysis Services, 12/11/92
TDR 1108, Revision 0; Oyster Creek Drywell Vessel Corrosion Mitigation
CC-AA-309-1001, Revision 0, Oyster Creek Torus Corrosion Allowable Pit Depth; Calculation C-1302-187-E310-038
Engineering Evaluation 82-74-9, Oyster Creek Torus Shell Thickness, 7/15/76
Engineering Evaluation 82-74-4, Oyster Creek Torus Shell Thickness, 3/4/76
Calculation C-1302-187-E310-038, Revision 0; Oyster Creek Torus Corrosion Allowable Pit Depth
Calculation C-1302-187-5360-006, Revision 0; O. C. Drywell - Projected Thickness Thru June 1992, ½7/89
Calculation C-1302-187-8610-003, Revision 0; Statistical Analysis of Drywell Thickness Data thru September 1996
ECR OC 05-00275-000, Revise C-1302-187-E310-037 Revision 1 To Revision 2
ER 84-006-00, Oyster Creek, Torus Corrosion Pitting and Missing Structural Welds

Specifications

Isolation Condenser “B” Inspection and Re-coating, Rev. 0, 2/29/1996
Specification 100579-000, 8/3/77; Specification For Coating The Exterior Of The Torus Oyster Creek Nuclear Generating Station, Toms River, New Jersey
Specification SP-1302-06-009, Revision 3, 7/25/91; Specification For Application And Repair Of Service Level I Coatings On Ferrous Metal Surfaces; Oyster Creek Nuclear Generating Station, Toms River, New Jersey
EPRI TR-109937, Guideline on Nuclear Safety-Related Coatings, April 1998
Specification IS-328227-005, Revision 12: Functional Requirements For Drywell Containment Vessel Thickness Examination
Specification IS-402950-001; Functional Requirements For Augmented Drywell Inspection
Specification SP-1302-08-002, Revision 1; Inspection Of The Torus Coating, 2/17/83
Specification SP-1302-52-094, Revision 1; Drywell Shell Coating Touch-Up
Specification SP-1302-52-120; Inspection And Localized Repair Of The Torus And Vent System Coating
Specification SP-1302-32-035, Revision 0; Inspection And Minor Repair Of Coating On Concrete & Drywell Shell Surfaces In The Sandbed Region
Specification 9000-06-003, Revision 4; Application And Repair Of Service Level II And Balance Of Plant Coatings
Specification #125-75-10, Torus Shell Welding Repair, 6/13/77
Specification OCIS 328001-001, Installation Specification For Torus Coating, Oyster Creek Nuclear Generating Station Pressure Suppression Chamber, 6/28/83
Specification SP-1302-52-120, Revision 2, 10/03/02; Specification For Inspection And Localized Repair Of The Torus And Vent System Coating

Safety Evaluations

Safety Evaluation SE-000243-002, Revision 14
Safety Evaluation 000243-002, Revision 0: Drywell Shell Plate Thickness Reduction At The Base Sand Cushion Entrenchment Region
Safety Evaluation 402950-005, Revision 3: Removal Of Sand From Drywell Sand Bed
Safety Evaluation 315403-019, Revision 1: Drywell Design Pressure Reduction - Tech Spec Change
Safety Evaluation 000243-002, Revision 14, 8/2/95: Drywell Steel Shell Plate Thickness Reduction
Safety Evaluation 000187-004, Revision 0: Inspection/Repair Of Torus/Vent System Coating
Safety Evaluation 000187-001, Revision 1, 1/14/91: Evaluation Of Blistered Torus Coating
SP-1302-06-013, Post-Fire Safe Shutdown Program Requirements at Oyster Creek Nuclear Generating Station, Rev. 1
Safety Evaluation, SE-000822-023, Safety Evaluation - Repair of SGTS Duct at the Stack, Rev. 0

NRC Documents

NRC Regulatory Guide 1.147
NRC Ltr. C321-95-2235/5000-95; Oyster Creek Nuclear Generating Station (OCNGS) Docket No. 50-219 Facility Operating License No. DPR-19, Drywell Corrosion Monitoring Program
NRC Information Notice 89-79: Degraded Coatings And Corrosion Of Steel Containment Vessels
NRC Information Notice 89-79, Supplement 1: Degraded Coatings And Corrosion Of Steel Containment Vessels
NRC Information Notice 97-10: Liner Plate Corrosion In Concrete Containments
NRC Generic Letter 98-04; Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-Of-Cooling Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment, 7/14/98
NRC Ltr. Dated 1/5/87; Docket No. 50-219; December 10, 1986, Meeting With GPU Nuclear Corporation (GPUN) To Discuss Corrosion Of The Outer Surface Of The Drywell Shell
NRC Inspection Report No. 50-219/87-27
NRC Ltr. Dated 10/16/90, Docket No. 50-219; Drywell Corrosion Program - Oyster Creek Nuclear Generating Station
NRC Inspection Report No. 50-219/90-21
NRC Information Notice 86-99, Supplement 1: Degradation Of Steel Containments
NRC Ltr. Dated 11/1/95, Docket No. 50-219; Drywell Corrosion Program - Oyster Creek Nuclear Generating Station
NUREG-1522 Assessment of Inservice Conditions of Safety-Related Nuclear Plant Structures, 6/95
NRC Ltr. Dated 12/29/86, Docket No. 50-219; Interim Operation For Cycle 12 Following Corrosion Of The Outer Surface Of The Drywell Shell (TAC 64016)
NRC Ltr. Dated 9/22/87, Docket No. 50-219; Licensee Actions Taken And Action Plans For Mitigating The Corrosive Attack On The Drywell Sheel Of The Oyster Creek Nuclear Generating Station (TAC 65448)
NRC Ltr. Dated 9/13/93, Docket No. 50-219; Issuance Of License Amendment No. 165 - Change In Containment Drywell Design Pressure of 62 psig To New Design Pressure of 44 psig
NUREG-6706 Capacity of Steel and Concrete Containment Vessels With Corrosion Damage, 2/01
NUREG-0661 Safety Evaluation Report Mark I Containment Long-Term Program, 7/80

Licensee Letters

AmerGen Ltr. 2130-05-20037, Oyster Creek Generating Station Refueling Outage 20 (1R20) Inservice Inspection (ISI) Summary Report
GPUN Ltr. 5000-86-1116, 12/18/86: Oyster Creek Nuclear Generating Station Docket No. 50-219, Licensing No. DPR-16, Oyster Creek Drywell Containment
GPUN Ltr. 5/12/87: Oyster Creek Nuclear Generating Station Docket No. Generic Letter 87-05
GPUN Ltr. 5200-87-0061, 5/29/87: Oyster Creek Nuclear Generating Station Docket No.; NRC Meeting 6/11/87

GPUN Ltr. 5000-89-1717, 2/9/89: Oyster Creek Nuclear Generating Station Docket No, License No. DPR-16; Drywell Containment
GPUN Ltr. 5000-90-1995, 12/5/90: Oyster Creek Nuclear Generating Station Docket No. 50-219, License No. DPR-16, Oyster Creek Drywell Containment
GPUN Ltr. 5000-95-2235, 9/15/95: Oyster Creek Nuclear Generating Station Docket No. 50-219, License No. DPR-16, Drywell Corrosion Monitoring Program
GPUN Ltr. 1940-99-20661, 12/17/99: Oyster Creek Nuclear Generating Station Docket No. 50-219, ASME XI Relief Requests
Jersey Central Power & Light Company Ltr. EA-76-686, 7/16/76: Oyster Creek Nuclear Generating Station Docket No. 50-219, Oyster Creek Torus Shell Thickness Evaluation
GPUN Ltr. C321-93-2153, 5/25/93; Oyster Creek Nuclear Generating Statio Docket No. 50-219 Reactor Containment Building Integrated Leak Rate Test
GPU Nuclear SDBD-OC-243(MPR), Revision 11; Design Basis Document For Containment System Oyster Creek Nuclear Generating Station
Applicant Response Letter for NRC RAI 2.5.1.19-1, dated October 12, 2005
Applicant Supplemental Response Letter for NRC RAI 2.5.1.19-1, dated November 11, 2005

Vendor Documents

Condition Assessment of Cable Circuits at Exelon AmerGen Oyster Creek Nuclear Power Plant, Dated 6/1/05
Condition Assessment of Cable Circuits at Exelon AmerGen Oyster Creek Nuclear Power Plant, Dated 8/4/04
VM -OC-5001, Care and Operation of Isolation Condensers, Rev. 2
Oyster Creek Nuclear Power Plant Unit No. 1, Primary Containment Design Report, prepared by Ralph M. Parsons Company for GE
Final Inspection Report, Torus Coating Inspection and Repair and ECCS Suction Strainer Replacement; S.G. Pinney & Associates
MPR-1322, Revision 0, Results of Painting Process Qualification Tests For the Drywell Exterior in the Sand Bed Area at Oyster Creek
GE Evaluation No. 87-178-003, Revision 1; Corrosion Evaluation Of The Oyster Creek Drywell, 3/6/87
Final Report Summary Of Torus Decontamination Underwater Inspection And Coating Repair, 12R Outage, MCF Job 9401; by S.G. Pinney & Associates, Inc., 4/21/89
Final Report, Exelon/AmerGen, Oyster Creek Nuclear Generating Station, 1R19 Refueling Outage, Torus Desludging, Torus Coating And Corrosion Inspection, Torus Coating Repair; Underwater Construction Corporation, 12/2/2002
Final Engineering Report, No. FER-7047, Revision 0; GPU Nuclear, Oyster Creek Nuclear Generating Station, 1R13 Coating And Corrosion Inspection Report, Torus Immersion And Vent Header; Underwater Engineering Services, Inc., 7/29/91
Final Engineering Report, Torus Coating Inspection And Repair and ECCS Suction Strainer Replacement, GPU Nuclear, Oyster Creek Nuclear Generating Station, by S.G. Pinney & Associates, Inc., 12/22/98
MPR Calculation 83-179-001, Revision 0; Oyster Creek Torus Shell Thickness Margin For Fatigue Loading

S. G. Pinney Report 990-2587, 12/16/96; Design Basis Accident (DBA) and Irradiation Testing of Coating Repair Materials for Use in Boiling Water Reactor Suppression Chamber Immersion Areas
GE Technical Report TR-7377-1, Justification For Use Of Section III, Subsection NE, Guidance In Evaluating The Oyster Creek Drywell, November 1990
DRF #00664, Index No. 9-1, Revision 0; An ASME Section III Evaluation Of Oyster Creek Drywell Part I Stress Analysis, November 1990
DRF #00664, Index No. 9-2, Revision 0; An ASME Section III Evaluation Of Oyster Creek Drywell Part II Stability Analysis, November 1990
DRF #00664, Index No. 9-3, Revision 0; An ASME Section III Evaluation Of Oyster Creek Drywell For Without Sand Case, Part I Stress Analysis, February 1991
DRF #00664, Index N0. 9-4, Revision 2; An ASME Section III Evaluation Of Oyster Creek Drywell For Without Sand Case; Part 2 Stability Analysis, November 1992
SGPAI Procedure QCP-10-2-OCNGS-7101, Revision 2, 11/30/92; Underwater Coating Repair

Work Orders

C2012115
C2003517
A/R # A2101209
C2009903, DTE Testing of Medium Voltage Cables, Dated 6/20/05
C2008036, DTE Testing of Medium Voltage Cables, Dated 6/30/05
R2046003, Radiation Monitor Functional Test, Dated 12/21/05
R2071072, High Radiation Monitor Calibration and Test, Dated 10/6/05
R2073609, NI Cable Test Data Review, Dated 9/1/05
R0807890, IRM/SRM Characterization Trending and Diagnostics, Dated 12/2/04
R0808284, Containment Spray Nozzle Verification, Dated 10/21/02
00543366, Containment Spray Nozzle Test, Dated 11/9/00
00034392, Engineering Evaluation of Containment Spray Nozzle #6, Dated 1/4/93

Corrective Action Program

O2004-2340	O2005-1445	O2003-0318	O2000-0309
O2005-2249	O2005-0265	O2004-0200	O2001-0634
O2003-0799	O2000-1772	O2005-1152	O2000-1531
O2003-2454	O2004-3586	O2004-3745	O2000-1429
O2003-2493	O2004-3437	O2004-3550	O2000-0401
O2004-0990	O2000-1429	O2003-1865	O2000-0634
O2004-2304	O2000-1355	O2003-2076	O2005-1445
O2004-1542	O2002-1564	O2005-2249	O2005-0265
O2002-1842	O2004-3442	O2003-0799	O2000-1772
O2000-0309	O2005-1350	O2003-2454	O2004-3586
O2001-0634	O2000-1578	O2003-2493	O2004-3437
O2000-1531	O2000-1607	O2004-0990	O2000-1429
O2000-1429	O2003-1903	O2004-2304	O2000-0609
O2000-0401	O2003-0488	O2004-1542	O2004-2153
O2000-0634	O2002-1280	O2002-1842	O2005-1772

O2003-1000
O2004-0313
O2004-1644
O2003-1308
O2004-1314
O2002-1937
O2000-1788

A2097892
A2107513
A2073455

00472707*
00472141*
00471363*
00469998*
00471867*
00472346
00470325
00472090
00472346
00470325
00472090
00461639
00348545*

*As a result of this inspection

WO R0806127-01
WO R2027889-01
WO R2071967-06

CAP O2003-2586, #2 Diesel-Driven Fire Pump Cooling Water Line pin-hole leaks
CAP O2002-0916, Water leakage from base of Fire Hydrant #9
CAP O2005-2288, Debris in SGTS #1 Filter Train

Aging Management Programs

PBD-AMP-B.1.27, Revision 0, ASME Section XI, Subsection IWE
PBD-AMP-B.1.33, Revision 0, Protective Coating Monitoring And Maintenance Program
PBD-AMP-B.1.21, Aboveground Steel Tanks
PBD-AMP-B.1.34, Electrical Cables and Connections not Subject to 10 CFR 50.49 Environmental Qualification Requirements, Rev 0
PBD-AMP-B.2.01, Periodic Testing of Containment Spray Nozzles, Rev 0
PBD-AMP-B.1.35, Electrical Cables and Connections not Subject to 10 CFR 50.49 Environmental Qualification Requirements used in Instrumentation Circuits, Rev 0

PBD-AMP-B.1.36, Inaccessible Medium-Voltage Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements, Rev 0
PBD-AMP-B.2.06, Wooden Utility Pole Program, Rev 0

License Renewal Change Requests

LRCR 291
LRCR 290
LRCR 289

LIST OF ACRONYMS

ADAMS	Agency-wide Documents Access and Management System
ASME	American Society Mechanical Engineers
PARS	Publicly Available Records
GALL	Generic Aging Lessons Learned Report