May 18, 2009

Mr. Charles G. Pardee
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO), Exelon Nuclear
4300 Winfield Rd.
Warrenville, IL 60555

SUBJECT: OYSTER CREEK GENERATING STATION - NRC LICENSE RENEWAL FOLLOW-UP INSPECTION REPORT 05000219/2009006

Dear Mr. Pardee:

On March 27, 2009, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Oyster Creek Generating Station. The enclosed report documents the inspection results, which were discussed on April 16, 2009, with Mr. T. Rausch, Site Vice President, Mr. M. Gallagher, Vice President License Renewal, and other members of your staff.

This inspection was an examination of your activities to implement the license renewal commitments contained in Appendix A to the NRC's Safety Evaluation Report (SER), dated March 2007 and supplemented in September 2008. Within these areas, the inspection involved examination of selected procedures and representative records, observations of activities, and interviews with personnel.

This inspection was conducted using the guidance of Inspection Procedure (IP) 71003 "Post-Approval Site Inspection for License Renewal." Although IP 71003 is designated as a "post-approval" inspection procedure, the NRC conducted this inspection as a prudent measure while awaiting a final NRC decision on license renewal. Because a renewed license had not yet been issued at the time of this inspection, the proposed license conditions and regulatory commitments, made as a part of the license renewal application, were not in effect. Accordingly, as related to license renewal activities, the enclosed report documents the inspectors' factual observations. Subsequent to the inspection, the Oyster Creek operating license was renewed on April 8, 2009.

The team determined that there were no findings of significance as a result of this inspection and no more than minor inconsistencies between the commitments and license conditions described in the SER and your activities to implement those items. In addition, the team found no adverse conditions which would preclude continued safe operations.

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 Web-site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

We appreciate your cooperation. Please contact Richard Conte of my staff at (610) 337-5183 if you have any questions regarding this letter.

Sincerely,

/RA/

Darrell J. Roberts, Director
Division of Reactor Safety

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

Enclosure: Inspection Report No. 05000219/2009006
w/Attachment: Supplemental Information

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C. Crane, President and Chief Operating Officer, Exelon Corporation
M. Pacilio, Chief Operating Officer, Exelon Nuclear
T. Rausch, Site Vice President, Oyster Creek Nuclear Generating Station
M. Gallagher, Vice President License Renewal
P. Orphanos, Plant Manager, Oyster Creek Generating Station
J. Barstow, Regulatory Assurance Manager, Oyster Creek
J. Grimes, Acting Senior Vice President, Mid-Atlantic Operations
K. Jury, Vice President, Licensing and Regulatory Affairs
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Correspondence Control Desk, Exelon Nuclear
Mayor of Lacey Township
P. Mulligan, Chief, NJ Dept of Environmental Protection
R. Shadis, New England Coalition Staff
E. Gbur, Chairwoman - Jersey Shore Nuclear Watch
E. Zobian, Coordinator - Jersey Shore Anti Nuclear Alliance
P. Baldauf, Assistant Director, NJ Radiation Protection Programs

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H. Chernoff, NRR
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G. Miller, PM, NRR
J. Hughey, NRR, Backup
ROPreportsResource@nrc.gov
Region I Docket Room (with concurrences)
D. Roberts, DRS
K. Gruss, DRS
R. Conte, DRS

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.:	50-219
License No.:	DPR-16
Report No.:	05000219/2009006
Licensee:	Exelon Generation Company, LLC
Facility:	Oyster Creek Generating Station
Location:	Forked River, New Jersey
Dates:	March 9 to 27, 2009
Inspectors:	J. Richmond, Team Leader, Division of Reactor Safety (DRS) J. Schoppy, Senior Reactor Engineer, DRS G. Meyer, Senior Reactor Engineer, DRS M. Modes, Senior Reactor Engineer, DRS R. Carrion, Senior Reactor Inspector, DRS, Region II S. Chaudhary, Reactor Engineer, DRS H. Jones, Reactor Engineer, DRS
Accompanied by:	L. Regner, NRR License Renewal Project Manager
Approved by:	Richard J. Conte, Chief Engineering Branch 1 Division of Reactor Safety Region I

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EXECUTIVE SUMMARY/SUMMARY OF FINDINGS

IR 05000219/2009006; 03/09/2009 – 03/27/2009; Exelon Energy Company, LLC, Oyster Creek Generating Station; License Renewal Activities.

The report covered a three-week onsite inspection of license renewal activities. Seven region-based engineering inspectors conducted the inspection using Inspection Procedure (IP) 71003, "Post-Approval Site Inspection for License Renewal." In accordance with the NRC's memorandum of understanding with the State of New Jersey, state engineers from the Department of Environmental Protection, Bureau of Nuclear Engineering, observed portions of the NRC's inspection activities. The preliminary results of this inspection were documented in an April 8, 2009, letter to Mr. Charles Pardee (available in ADAMS as ML090980328).

The NRC normally conducts inspections using IP 71003 after a plant's license is renewed to confirm proper implementation of the new license conditions and commitments made by the licensee during the course of the application review and approval process. Because a renewed license had not been issued at the time of the onsite inspection, the proposed license conditions and commitments, which were part of the Oyster Creek license renewal application and which formed the basis for this inspection, were not yet in effect. With the end of the first 40-year operating license nearing, the NRC regional staff conducted the inspection as a prudent measure while awaiting a final NRC decision on license renewal. As a result, this inspection report documents factual-based observations as they relate to Exelon's implementation of new license-renewal commitments and conditions, not assessments regarding regulatory compliance. Subsequent to the inspection, on April 8, 2009, the NRC renewed the Oyster Creek operating license, and at 12:01 a.m. on April 10, 2009, the plant entered its extended operating period. As such, all license renewal conditions and regulatory commitments are now in effect and will be subject to future NRC inspection.

Notwithstanding the status of the license renewal application at the time of the inspection, the team observed or reviewed more than half of Exelon's activities to implement its aging management programs, license renewal commitments and license conditions. The team also reviewed selected corrective actions taken as a result of previous license renewal inspections. The inspection team found no significant inconsistencies between Exelon's implementing actions and the actions described in the SER. In addition, the team found no adverse conditions that would preclude continued safe operations. The team also closed an unresolved item documented in the previous IP 71003 inspection report 0500219/2008007 (ADAMS ML090210106) related to the licensee's implementation of drywell shell inspections, its implications on the then-current licensing basis, and the staff's review of other selected license renewal commitments. This inspection report documents four violations of minor significance which are not subject to enforcement action in accordance with NRC's Enforcement Policy. In all four cases, the performance deficiencies had no more than minor impact on safety and the licensee took appropriate action to enter the issues into its corrective action program.

In addition, Office of Nuclear Reactor Regulation (NRR) staff reviewed a summary report of Exelon's three-dimensional (3-D) finite element analysis (FEA) of the Oyster Creek drywell shell, consistent with the direction provided in the Commission Memorandum and Order issued April 1, 2009. Exelon submitted its 3-D FEA Summary Report to the NRC on January 22, 2009, as required by a proposed license condition and commitment in the staff's final Safety Evaluation Report (SER) on Oyster Creek's license renewal application. The summary report documented the results of Exelon's drywell shell analysis, which was performed to provide a more accurate quantification of the margin above the American Society of Mechanical Engineers (ASME) Code requirements. The analysis also included sensitivity studies to determine the degree to which uncertainties in the size of the thinned areas associated with the

drywell shell could affect the ASME Code margins. The staff concluded that the analysis reaffirms that the Oyster Creek drywell shell meets the ASME code limits even when accounting for measurement uncertainties in the thicknesses of the shell. The staff's review also determined that Exelon's analysis was based on realistic, but conservatively biased, assumptions and that it was conducted using good engineering practices and judgment. The results of this review are discussed in Section 4.6 of this report. The staff's detailed review is available in ADAMS as ML091310413, "Assessment of the Oyster Creek 3-D Finite Element Analysis of the Drywell Shell."

Subsequent to the inspection, the licensee discovered leaking piping associated with the Oyster Creek condensate storage tank. Both the tank and some of its associated piping are covered under the scope of Exelon's license renewal aging management programs. This issue is the subject of an ongoing NRC inspection, the results of which will be documented in NRC Inspection Report 05000219/2009008.

The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

None.

C. Other

No more than minor inconsistencies were noted with the license renewal basis documents.

REPORT DETAILS

4. OTHER ACTIVITIES (OA)

4OA5 License Renewal Follow-up (IP 71003)

1. (Closed) Unresolved Item 05000219/2008007-01: Drywell Sand Bed Water Intrusion, Drain Monitoring, and Coating Deficiency

a. Inspection Scope

During the 2008 refuel outage (1R22), the inspectors and Exelon identified several license renewal (LR) related issues with potential implications regarding the Oyster Creek (OC) current licensing basis (CLB). The inspectors treated these issues as an unresolved item (URI) pending completion of Exelon's associated evaluations and subsequent NRC review. (see NRC Inspection Report 05000219/2008007 for a complete description of the URI and associated NRC observations)

During this follow-up inspection, inspectors independently assessed Exelon's evaluation of the issues and its corrective actions, reviewed the OC CLB, and evaluated the issues to identify potential Exelon performance deficiencies. The inspectors also walked down accessible portions of the drywell shell sand bed bay leakage monitoring drains and poly bottles in the torus room and the reactor cavity liner trough drain in the reactor building. Documents reviewed are listed in Attachment A.

b. Observations and Assessment

Current Licensing Basis Review The inspectors noted numerous references to the strippable coating and sand bed bay leakage monitoring in the General Public Utilities (GPU, the license at that time) correspondence with the NRC, and corrective action documents that pre-dated Exelon's LR commitments. These previous actions were taken in direct response to the drywell shell corrosion concerns identified in the 1980s. These actions were intended to preclude reactor cavity liner leakage from entering the gap between the drywell steel shell and the concrete shield wall and to enable monitoring for potential leakage into the sand bed bay region to ensure drywell shell integrity. Based on a review of OC licensing basis and corrective action documents, the inspectors determined that these issues were part of OC's CLB requirements and licensee established standards.

Specifically, GPU Letter 5000-90-1990 to the NRC, dated Dec. 5, 1990, in part, stated:

- Actions would be taken to prevent reactor cavity seal leakage and surveil for potential leakage into the sand bed bay region;
- Apply a strippable coating to the cavity liner to prevent cavity seal leakage;
- Establish an on-going program for surveillance for water intrusions; and,
- Establish a thorough program for managing leakage that could affect drywell integrity.

In addition, Updated Final Safety Analysis Report (UFSAR) Section 3.8.2.8, "Drywell Corrosion," in part, stated:

- The new drywell design pressure, coupled with measures to prevent water intrusion into the gap between the vessel and the concrete, will allow the upper portion of the vessel to meet the American Society of Mechanical Engineers (ASME) Code for the remainder life of the plant.

- Keeping the drywell shell dry was also identified as a requirement even though it would be less of a concern in this region once the strippable coating was applied.

1.1 Reactor Cavity Strippable Coating

Issue No. 1 - Strippable Coating De-Lamination During the 1R22 outage, Exelon applied a strippable coating to the reactor cavity liner to prevent water intrusion into the gap between the drywell steel shell and the concrete shield wall. The strippable coating unexpectedly de-laminated, resulting in increased reactor cavity seal leakage. As a result, water entered the gap and subsequently flowed down the outside of the drywell shell and into four of the ten sand bed bays.

Exelon entered this issue into the corrective action program as issue report (IR) 841543. Exelon's evaluations and actions included the following:

- Determined the most likely cause for the de-lamination was that the coating developed a pinhole or gap separation at the sparger bracket on the west wall of the cavity which, in turn, allowed the direct impingement force from the discharge of an underwater filtration unit to adversely affect the cavity coating;

- Conducted more frequent monitoring of the cavity trough drain and sand bed bay drains during the refuel outage;

- Revised the refuel floor operating procedure to ensure that a filtration unit discharge be directed away from the cavity wall; and,

- Revised the coating application procedure to require a final coating inspection prior to cavity flood-up and included an instruction to coat the sparger line bracket.

NRC Observations and Assessment The inspectors did not identify any issues with Exelon's corrective actions.

Significance Although the strippable coating de-laminated, the inspectors concluded that it was not reasonable for Exelon to identify and correct the deficiency prior to November 2008 based on previous internal and external operating experience (OE). Therefore, this issue does not represent an Exelon performance deficiency. The impact of the reactor cavity seal leakage into the drywell shell sand bed bays is discussed in section 1.4 of this report.

Enforcement The inspectors did not identify any violations of more than minor significance associated with this particular issue.

Issue No. 2 - Administrative Limit for Cavity Seal leakage The inspectors identified that Exelon had established an administrative limit for cavity seal leakage that was higher than the actual leakage rate at which water intrusion into the gap occurred.

Exelon entered this issue into the corrective action program as IR 871692. Exelon's evaluations and actions included the following:

- Based on OE during the 1R22 outage, Exelon determined that the administrative limit of 5.0 gallons per minute (gpm) for the cavity trough drain line flow used to triggered increased monitoring, was non-conservative because some water entered the sand bed bays at an observed flow rate less than 5.0 gpm;

- Lowered the cavity trough drain line flow administrative limit to 1.0 gpm, and required personnel to initiate an IR, evaluate the condition, and increase the leakage monitoring frequency, if the trough drain flow exceeded 1.0 gpm; and,

- Established an additional administrative limit at 3.0 gpm to require sand bed bay entry and additional evaluations.

NRC Observations and Assessment Exelon determined that the original leakage limit of 12.0 gpm (a pre-existing regulatory commitment dating back to February 1996) was based on engineering judgment and not on plant OE. The 12.0 gpm flow rate was assumed to be the flow that the cavity trough drain line could accommodate without backing up and overflowing (resulting in water in the sand bed bays). Exelon had conservatively based its 5.0 gpm administrative limit on this limit. Even though its administrative limit for increased monitoring was 5.0 gpm, the inspectors noted that Exelon had initiated increased monitoring after the flow rate exceeded 1.0 gpm. Exelon used the corrective action system to evaluate the source of the leakage. The inspectors did not identify any issues with Exelon's corrective actions.

Significance Although Exelon's administrative limit for reactor cavity trough drain leakage was non-conservative, the inspectors concluded that it was not reasonable for Exelon to identify and correct the deficiency prior to November 2008 based on previous internal and external OE. Therefore, this issue does not represent an Exelon performance deficiency. The impact of the reactor cavity seal leakage into the drywell shell sand bed bays is discussed in section 1.4 of this report.

Enforcement The inspectors did not identify any violations of more than minor significance associated with this particular issue.

1.2 Reactor Cavity Trough Drain Monitoring

Issue While the reactor cavity was being filled, Exelon frequently monitored the cavity seal leakage by observing the flow rate in the cavity trough drain line. Subsequently, Exelon identified that the trough drain line had been left isolated during a previous maintenance activity. As a result, cavity seal leakage had not been monitored as intended.

Exelon entered this issue into the corrective action program as IR 837647. Exelon's evaluations and actions included the following:

- Took prompt action to re-open the valve and inspect the down stream sand bed bay drain poly bottles for potential leakage.

- Identified that the cavity trough drain line was not controlled by cavity flood-up procedures.

- Revised 205.94, "RPV Flood-up Using Core Spray," and 205.95, "Reactor Flood-Up & Drain-Down," to include appropriate configuration control for the cavity trough drain isolation valve (V-18-131).

NRC Observations and Assessment Exelon personnel had closed V-18-131 in order to safely install tygon tubing downstream of this valve for leakage monitoring while flooded up for refueling. The inspectors noted that the valve was isolated for only a short time during actual flood-up activities before identified by Exelon personnel. Reactor cavity flood-up began at 11:00 AM on October 29, 2008. Exelon identified that V-18-131 was closed at 6:00 PM on October 29 and re-opened the valve at 9:40 PM on October 29. There was no leakage into the sand bed bays as a result of the closed valve. Exelon reported that the leak rate was limited to a trickle (less than 1.0 gpm) once the valve was re-opened. The inspectors did not identify any issues with Exelon's corrective actions.

Significance The inspectors determined that Exelon's failure to ensure adequate configuration control during refuel operations was a performance deficiency that was reasonable for Exelon to identify and correct prior to November 2008. The inspectors reviewed NRC Inspection Manual Chapter (IMC) 0612, Appendix B, "Issue Screening," and determined the performance deficiency was minor because it was not viewed as a precursor to a significant event; if left uncorrected, the performance deficiency, in and of itself, would not have the potential to lead to a more significant safety concern; and it did not adversely impact the Reactor Safety Barrier Integrity Cornerstone objective to provide reasonable assurance that the physical design barrier (e.g., primary containment) protects the public from radionuclide releases caused by accidents or events. In particular, the isolation valve was closed for a relatively short time during flood-up activities and there was no resultant overflow into the sand bed bays.

Enforcement OC Technical Specification 6.8.1.c required that written procedures be established, implemented, and maintained covering refuel operations. Contrary to the above, OC procedures 205.94, "RPV Flood-up Using Core Spray," and 205.95, "Reactor Flood-up and Drain Down," had not been adequately maintained. Specifically, the procedures did not contain adequate guidance to ensure that the cavity drain line isolation valve (V-18-131) was open prior to reactor cavity flood-up. However, this performance deficiency constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the NRC's Enforcement Policy.

1.3 Drywell Shell Sand Bed Bay Drain Monitoring

Issue No. 1 - Disconnected Poly Bottle Tubing During the refuel outage, Exelon monitored for water leakage from the sand bed bay drains by checking poly bottles connected via tygon tubing and funnels to the sand bed bay drain lines. Subsequently,

Exelon identified that the poly bottle tubing was not connected to the drain lines for two sand bed bays.

Exelon entered this issue into the corrective action program as IR 843209. Exelon's evaluations and actions included the following:

- Performed an extent-of-condition review for the remaining sand bed bay drain lines.

- Initiated actions to fortify the tubing arrangement with more rugged tubing and a more secure method of attaching the tubing to the drain lines.

- Added tasks to its leakage monitoring plan to verify that the drain lines are properly connected prior to reactor cavity flood-up, following sand bag removal from the drain lines, following any work in the area, and at the completion of the refuel outage.

NRC Observations and Assessment Exelon technicians demonstrated a questioning attitude in identifying the two disconnected drain lines while working in the area in preparation to boroscope the sand bed bay drain lines. During the URI follow-up inspection, the inspectors identified that the two disconnected tubing lines were from sand bed bays 3 and 19 (IR 843209 and NRC Inspection Report 05000219/2008007 had erroneously reported the affected bays as 3 and 7). Exelon initiated IR 894723 for this issue. There was no leakage into bays 3 or 19 during the outage. Based on interviews, Exelon engineering and NRC inspectors walked down the five poly bottles and observed that they were empty and connected to tygon tubing, before the cavity flood-up. However, the tubing connection at the drain line funnels could not be observed at that time. Exelon believed that the tygon tubing was disconnected during outage activities to remove sand bags from the access manways into the sand bed bays. The inspectors did not identify any issues with Exelon's corrective actions.

Significance The inspectors determined that Exelon's failure to effectively implement its drywell sand bed bay leakage monitoring plan was a performance deficiency that was reasonable for Exelon to identify and correct prior to November 2008. The inspectors reviewed IMC 0612, Appendix B, and determined the performance deficiency was minor because it was not viewed as a precursor to a significant event; if left uncorrected, the performance deficiency, in and of itself, would not have the potential to lead to a more significant safety concern; and it did not adversely impact the Reactor Safety Barrier Integrity Cornerstone objective to provide reasonable assurance that the physical design barrier (e.g., primary containment) protects the public from radionuclide releases caused by accidents or events. The drain lines were most likely disconnected for a short period of time, there was no water leakage into the affected bays during the time the drains were disconnected, and alternate means of bay leakage detection was available (i.e., personnel were inside the bays performing work during that time period). In addition, the inspectors determined that the drywell shell epoxy coating and the drywell steel shell, in the sand bed region, were not significantly impacted by the amount of water that did enter the other sand bed bays (i.e., the bays with connected drain lines).

Enforcement 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," required, in part, that activities affecting quality shall be prescribed by

documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, Exelon's documented instructions for performing drywell shell sand bed bay leakage monitoring were not appropriate to the circumstances. Specifically, preventative maintenance (PM) task 1870M did not contain appropriate guidance to verify that the sand bed bay drain line funnels were adequately attached to the drain line tubing. However, this performance deficiency constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the NRC's Enforcement Policy.

Issue No. 2 - Sand Bed Bay 11 Drain Funnel Blockage During the URI follow-up inspection, the inspectors identified that Exelon did not initiate a corrective action issue report for an unexpected condition discovered that could involve an undesirable effect on the performance of equipment and/or programs (three missed opportunities to document in an IR). The sand bed bay 11 funnel was found full, as a result of blockage, on November 15, 2008 (three days after cavity drain down). Exelon workers documented the blocked funnel and its follow-up actions in the work order. They removed the funnel blockage, without documenting the blockage in an IR, allowing approximately four gallons of water to flow into a poly bottle in the torus room. Exelon supervision reviewed the work order documentation but did not initiate an IR. Subsequently, Exelon personnel identified that there was water present in the poly bottle during a routine bottle check. However, they too did not initiate an IR to document that condition.

Exelon entered this issue into the corrective action program as IR 894273. Exelon's evaluations and actions included the following:

- Reinforced expectations regarding the initiation of IRs for deficient conditions identified in the plant, and for the proper review of work order documentation.

- Coded the associated IR for outage prep and required its review prior to the next refuel outage (1R23).

- Initiated an engineering evaluation to determine the most appropriate and effective method to verify the drain lines and funnels are remained free from blockage.

NRC Observations and Assessment Exelon technicians identified the full funnel while performing an extent-of-condition review for the disconnected tubing issue. The workers adequately documented the condition and its follow-up actions in the work order. However, Exelon missed three opportunities to document the condition in its corrective action program (CAP). Exelon believes that the water in the funnel was the result of the known leakage into sand bed bay 11 during the 1R22 outage. The inspectors did not identify any issues with Exelon's corrective actions.

Significance The inspectors determined that Exelon's failure to initiate corrective action IRs for unexpected conditions was a performance deficiency that was reasonable for Exelon to identify and correct prior to March 2009. The inspectors reviewed IMC 0612, Appendix B, and determined the performance deficiency was minor because it was not

viewed as a precursor to a significant event; if left uncorrected, the performance deficiency, in and of itself, would not have the potential to lead to a more significant safety concern; and it did not adversely impact the Reactor Safety Barrier Integrity Cornerstone objective to provide reasonable assurance that the physical design barrier (e.g., primary containment) protects the public from radionuclide releases caused by accidents or events. In particular, the water in the funnel was most likely the result of the known leakage into sand bed bay 11 during the 1R22 outage, there was no sand bed bay water leakage that was masked by the blocked funnel, there was no additional leakage from sand bed bay 11 reported after the funnel was unclogged, and an alternate means of bay leakage detection was available (i.e., personnel were inside the bays performing work during that time period). In addition, the inspectors concluded that the drywell shell epoxy coating and the drywell shell, in the sand bed region, were not significantly impacted by the amount of water that entered the sand bed bays.

Enforcement 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," required, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Exelon procedure LS-AA-120, Issue Identification and Screening Process, partially implements the corrective action requirements specified in the Exelon Quality Assurance Topical Report (QATR). LS-AA-120, Section 3.7, requires that Exelon Nuclear personnel and contractors identify conditions that have or could have an undesirable effect on performance of equipment, programs, or organizations. Contrary to the above, Exelon Nuclear personnel and contractors did not identify conditions that could have had an undesirable effect on performance of the drywell. Specifically, personnel did not initiate an issue report for water found in the bay No. 11 drain line funnel and poly bottle on November 15, 2008. However, this performance deficiency constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the NRC's Enforcement Policy.

1.4 Blisters on Drywell Shell Epoxy Coating in Bay 11

Issue Exelon identified four blisters on the epoxy coating in one sand bed bay. A video recording from 2006 appeared to indicate that one of the blisters existed at that time, but was not identified during Exelon's 2006 visual inspection.

Exelon entered this issue into the corrective action program as IRs 838833, 839053, 839911 and 871692. Exelon's evaluations and actions included the following:

- Determined the 2006 visual test (VT-1) inspection guidance was adequate and that the VT-1 inspection procedure had not changed appreciably since 2006.

- Could not determine whether the technician had not seen the discoloration in 2006, or whether he had seen it and dispositioned it as non-relevant (not recordable on a VT-1 inspection), based on the results of several detailed investigations.

- Identified that there was increased supervisor oversight during the 2008 VT-1 inspections and that there had been extensive Operating Experience and insight

gained in 2007, regarding corrosion monitoring, which may have improved the effectiveness of the 2008 VT-1 inspection.

- Initiated IR 891752 to enhance its VT-1 inspection guidance to include lessons learned from 1R22, to include the use of OE to improve the inspection technique and documentation of identifications, and to direct increased supervisory oversight.

NRC Observations and Assessment: The inspectors did not identify any issues with Exelon's determination of the cause of the blisters. The inspectors concurred with Exelon's determination that the 2006 VT-1 inspection guidance was adequate and that the VT-1 inspection procedure did not change appreciably since 2006. The inspectors also concurred with Exelon's determination that increased supervisor oversight and extensive OE on corrosion monitoring improved the effectiveness of Exelon's 2008 VT-1 inspection. However, the inspectors concluded it was reasonable for a technician to have identified the discoloration and evaluate it as a recordable indication in 2006 (evidence included: 2006 video taken three days after VT-1 inspection, the lab analysis of rust stain under blister identified iron oxide, non-destructive examination (NDE) review of video in July 2007 noted and questioned discoloration, blister found in exact same location in 2008). The inspectors did not identify any issues with Exelon's corrective actions.

Significance The inspectors determined that Exelon's failure to identify and adequately evaluate a surface discoloration during its 2006 outage VT-1 examination was a performance deficiency that was reasonable for Exelon to identify and correct prior to November 2008. The inspectors reviewed IMC 0612, Appendix B, and determined the performance deficiency was minor because it was not viewed as a precursor to a significant event; if left uncorrected, the performance deficiency, in and of itself, would not have the potential to lead to a more significant safety concern; and it did not adversely impact the Reactor Safety Barrier Integrity Cornerstone objective to provide reasonable assurance that the physical design barrier (e.g., primary containment) protects the public from radionuclide releases caused by accidents or events. In particular, the discoloration was evident by the 2006 video but a broken blister was not, the overlooked discoloration was limited to this one location, there was no evidence of water leakage into sand bed bay 11 between the 2006 and 2008 inspections, and the resultant evaluation confirmed that the blister had no adverse impact on drywell integrity.

Enforcement Technical Specification 4.3.B required that Inservice inspection of ASME Code Class 1, Class 2, and Class 3 systems and components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda, as required by 10 CFR 50.55a. Exelon implemented this requirement through Article IWE-3000, Acceptance Standards, 1992 Section XI. Section IWE-3512.1 provided the inspection guidance for visual examinations on coated containment surfaces. Specification IS-328227-004, Requirements for Drywell Containment Vessel Thickness Examinations, Rev 13, implemented the ASME Section IWE-3512.1 requirements. IS-328227-004, Section 3.2.4.2.1 required that all surfaces with flaking, chipping, blistering, peeling, pinpoint rusting, cracking, chalking and discoloration attributable to rust blooms shall be entered into the CAP and evaluated by engineering. Contrary to the above, during the 2006 drywell external coating VT-1 examination, Exelon Nuclear personnel and contractors did not enter a discoloration

attributable to rust into the CAP. However, this performance deficiency constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the NRC's Enforcement Policy.

c. Findings

No findings of significance were identified. This URI is closed.

2. Detailed Review of License Renewal Activities

2.1 Inspection Overview

The NRC performed this inspection using the guidance of Inspection Procedure (IP) 71003, "Post-Approval Site Inspection for License Renewal." The license renewal (LR) application was the subject of a hearing, and the Atomic Safety and Licensing Board decision was in appeal to the Commission at the time of this inspection. Although IP 71003 is designated as a "post-approval" inspection procedure, the NRC performed this inspection as a prudent measure while awaiting a final NRC decision on LR. The team documented observations related to consistency with license renewal basis documents because the license renewal was pending NRC Commission review at the time of the inspection.

This inspection reviewed the implementation of LR commitment activities, in accordance with IP 71003. In general, inspectors compared Exelon's implementing actions to the program descriptions in Exelon's LR application and to the program descriptions and NRC staff evaluations in NUREG-1875, "Safety Evaluation Report (SER) Related to the License Renewal of Oyster Creek Generating Station" (ML070890637), dated March 2007 and supplemented in September 2008 (ML080230078).

The proposed commitments and proposed license conditions were selected based on whether the program or commitment activity was new or an enhancement to an existing program. Pre-existing aging management programs, which were not modified or enhanced, were not selected. In addition, the results of previous LR inspections were used to prioritize the selected inspection samples. The inspectors also reviewed selected corrective actions taken as a result of previous LR inspections.

For all of the areas in Sections 2 and 3, the team identified no more than minor inconsistencies between Exelon's voluntary implementation of license renewal activities and those described in the SER, or in Exelon's LR application, as amended by Exelon's response to NRC staff requests for additional information (RAI).

2.2 BWR Feedwater Nozzle

a. Scope of Inspection

SER Appendix A Commitment 5, in part, stated:

> The existing program will be enhanced to implement the recommendations of the BWR Owners Group Licensing Topical Report, General Electric NE-523-A72-0594-A, Rev 1.

The inspector reviewed the enhancement to the existing program, and reviewed selected records and documents to observe Exelon's implementation of this commitment.

b. Observations

The inspector did not identify any significant problems or concerns.

2.3 BWR Stress Corrosion Cracking

a. Scope of Inspection

SER Appendix-A Commitment 7, in part, stated:

> The existing program will be enhanced to add the following requirement to the Line Specifications for all applicable LR systems: All new and replacement stainless steel (SS) materials be low-carbon grades of SS with carbon content limited to 0.035 weight-% maximum and ferrite content limited to 7.5% minimum.

The inspector reviewed the enhancement to the existing program, and reviewed selected records and interviewed the BWR stress corrosion cracking program owner and other relevant station personnel, to observe Exelon's implementation of this commitment.

b. Observations

The inspector did not identify any significant problems or concerns.

The inspector noted the line specifications for the applicable programs were updated to include the enhancement. The inspector also observed that line specifications where treated as quality design information within a controlled component database, and any changes to the database would be managed according to established administrative controls.

2.4 BWR Vessel Internals

a. Scope of Inspection

SER Appendix A Commitment 9, in part, stated:

> The existing program will be enhanced to include:
>
> (1) Inspection of the steam dryer in accordance with BWRVIP-139.
>
> (2) Inspection of the top guide as recommended in NUREG-1801.

(3) Rolling of the control rod drive (CRD) stub tubes as a permanent repair, once the NRC approves the ASME Code Case N-730. If Code Case N-730 is not approved, Exelon will develop a permanent ASME code repair plan. This permanent ASME code repair could be performed in accordance with BWRVIP-58-A, which has been approved by the NRC, or an alternate ASME code repair plan that would be submitted for prior NRC approval. If it is determined that the repair plan needs prior NRC approval, Exelon will submit the repair plan two years before entering the period of extended operation (PEO). After the implementation of an approved permanent roll repair, if there is a leak in a CRD stub tube, Exelon will weld repair any leaking CRD stub tubes during the PEO by implementing a permanent NRC approved ASME Code repair for leaking stub tubes that cannot be made leak tight using a roll expansion method, prior to restarting the plant.

(4) Exelon will revise its Reactor internals program to also manage the aging effect of loss of material due to the corrosion for Reactor Internals.

(5) Exelon will comply with all the applicable requirements that will be specified in the NRC's final safety evaluations of the BWRVIP-76 and BWRVIP-104 reports, and that it will complete all the LR action items in the final SE applicable to OC, when they are issued.

(6) The Reactor Internals program will be enhanced to include inspection for loss of material for the feedwater sparger, steam separator, reactor pressure vessel (RPV) surveillance capsule holders and baffle plate.

(7) The Reactor Internals Program will be enhanced to include and document the condition of the CRD and Feedwater Nozzle thermal sleeves to ensure future inspections look for thermal sleeve bypass flow.

(8) Exelon is committed to following BWRVIP guidelines:

- OC will inform the NRC of any decision to not fully implement a BWRVIP guidelines approved by the NRC within 45 days of the report.

- OC will notify the NRC if changes are made to the RPV and its internals' programs that affect the implementation of the BWRVIP report.

- OC will submit any deviation from the existing flaw evaluation guidelines that are specified in the BWRVIP report.

The inspector reviewed all enhancements to the existing program, and reviewed selected work orders, procedures, and the results of Exelon inspections to observe Exelon's implementation of this commitment.

b. Observations

The inspector did not identify any significant problems or concerns.

Enhancement (1) ER-OC-331-1005, " Reactor Internals Program," subpart "Inspection Plan 7.10, Steam Dryer BWRVIP-139," included requirements to inspect the steam dryer in conformance with BWRVIP-139.

Enhancement (2) In May of 2007, ER-OC-331-1005 was revised to include commitments made as part of the on-going NRC review. ER-OC-331-1005 revisions included examination of the top guide. In April of 2008, ER-OC-331-1005, subpart "Inspection Plan 7.1" was revised to add requirements to test the Core Spray Sparger using the guidance contained in BWRVIP-18A.

The procedure was implemented for the inspections performed during the October-November 2008 outage with no reported results related to the inspection requirements included as part of the aging management commitments.

Subsequent to the outage, the program was once again revised to include the inspection guidance of BWRVIP-183 for the top guide, and the three commitments related to cast austenitic stainless steel (CASS) inspections discussed elsewhere in this report.

Although the revisions for CASS were made subsequent to the 2008 outage, the visual examination results of reactor internals, reported in GE OC-IVVI-08-166684, included an examination of CASS as well as the aging management program commitments previously added to the procedure.

Enhancement (3) The stub tubes were originally roll-repaired using BWRVIP-17NP. Subsequent to the roll-repair, the stub tubes were observed to be leaking during the November 2000 outage inspection. The stub tubes were then permanently repaired using a draft of ASME Code Case N-730. The use of the draft Code Case was granted, as relief from the Code requirements, by the NRC on October 6, 2006, and during the 2008 outage, no leaking of the stub tubes was observed. Because no permanent repair by welding is needed, to date, the commitment to submit a weld repair plan has been obviated.

Enhancements (4), (6), and (7) The "Reactors Internal Program" was re-issued in March 2006 as Rev 0 of ER-OC-331-1005, superseding OC-5 Rev 1. In response to RAI B.1.9-8, Exelon stated the LR application committed to inspect the steam dryer in accordance with the guidelines of BWRVIP-139, beginning in 2008. The feedwater spargers are inspected in accordance with the requirements of NUREG-0619. In the RAI response, Exelon committed to revise the Reactor Internals Program to clarify that monitoring for the loss of material on the feedwater sparger, steam separator, RPV surveillance capsule holders and baffle plate would be included in the program. ER-OC-331-1005 implemented this enhancement.

Enhancement (5) BWRVIP-104 was withdrawn by the industry prior to NRC approval. ER-OC-331-1005 included requirements in "Inspection Plan 7.5, Shroud Support" to implement BWRVIP-38 including the requirements of GE Service Information Letter (SIL) 624. BWRVIP-38 (with the requirements of GE SIL 624) is the predecessor to BWRVIP-104. Exelon is currently developing a response to the withdrawal of BWRVIP-104 considering the actions necessary to comply with guidance in Nuclear Energy Institute (NEI) 99-04, "Guidelines for Managing NRC Commitment Changes."

BWRVIP-76 has not been approved by the NRC staff. However, Exelon is using the guidance in its vessels internal inspection program in ER-OC-331-1005, subpart "Inspection Plan 7.3, Core Shroud BWRVIP-76."

Enhancement (8) The administrative portion of ER-OC-331-1005 included requirements to (1) inform the NRC staff of any decision to not fully implement a BWRVIP guidelines approved by the staff within 45 days of the NRC staff's approval report, (2) notify the staff if changes are made to the RPV and its internals' programs that affect the implementation of the BWRVIP report, and (3) submit any deviation from the existing flaw evaluation guidelines that are specified in the BWRVIP report.

2.5 Thermal Aging and Neutron Irradiation Embrittlement of CASS

a. Scope of Inspection

SER Appendix-A Commitment 10, in part, stated:

> The program is new and will include a component specific evaluation of the loss of fracture toughness in accordance with the criteria specified in NUREG-1801, XI.M13 (i.e., GALL Rev 1). At least one year prior to the PEO, the following information will be submitted to the NRC:
>
> (1) The type and composition of CASS reactor internal components within the scope of LR.
>
> (2) The results of the evaluations performed to determine the susceptibility to thermal aging and neutron embrittlement.
>
> For those components where loss of fracture toughness may affect the intended function of the component, a supplemental inspection will be performed. The inspection will ensure the integrity of the CASS components exposed to high temperature and neutron fluence present in the reactor.

The inspector reviewed this new program, and reviewed selected work orders, procedures, and the results of Exelon inspections to observe Exelon's implementation of this commitment.

b. Observations

The inspector did not identify any significant problems or concerns.

This is a new program intended to identify and calculate loss of fracture toughness for susceptible components. In a letter to the NRC, dated April 9, 2008 (Exelon Letter RA-08-030) Exelon identified the susceptible CASS components at OC. The components were:

(1) Orificed Fuel Support
(2) Core Spray Sparger Spray Nozzle Elbow
(3) Control Rod Guide Tube Base

The material certifications for the above components either did not contain an analysis for the critical constituent molybdenum or were not available prior to the commitment deadline of one year prior to the PEO. Without certain knowledge about the level of molybdenum present in the components, Exelon was unable to perform a fracture toughness calculation. In the absence of data, Exelon conservatively assumed the components were sensitive to loss of fracture toughness and exercised the option of supplementary examinations.

ER-OC-331-1005 was revised February 25, 2009, to specifically include the following:

- The Orificed Fuel Support was already examined by remote underwater camera during maintenance, using 205.29 "Control Rod Blade/Fuel Support Piece Removal and Replacement." The remote underwater camera inspection satisfied the alternate inspection requirements of BWRVIP-47A. The utility revised this examination by adding a VT-1 inspection of accessible surfaces of one fuel support piece each refuel outage, when a fuel support piece is removed from the core plate, during control rod blade exchange. If no control rod blade exchange is performed, then one fuel support piece will be inspected every other refuel outage during the PEO.

- The Core Spray Sparger assembly is regularly inspected by VT-1 following the guidance of BWRVIP-18A. Fifty percent of all sparger to nozzle lock welds are examined every other refuel outage. The utility expects these inspections to identify any degradation of the spray nozzle elbows that could affect their structural integrity. The program has been revised to include the LR commitment to inspect embrittlement of CASS by increasing the sample to 100% of all sparger to nozzle lock welds. The first 100% sample inspection will occur during the 2010 outage inspection.

- The Control Rod Guide Tube Base casting-to-wrought weld is already being inspected using the guidance in BWRVIP-47A. The component weld is currently inspected by EVT-1. Ten percent of all the Control Rod Guides are inspected within a 12-year period with at least 50% of the sample inspected in the first 6 years. The program has been enhanced to include a VT-1 inspection of the lower inside diameter of one accessible cast-component per outage. If the

inside diameter is not accessible then at least one control rod guide tube base will be inspected every other fueling outage during the PEO.

GE Report OC-IVVI-08-166684, dated November 2008, lists the above CASS components with no indication of a problem. The procedure revision precedes the last outage and is scheduled to be used in the next outage.

2.6 Fire Water System

a. Scope of Inspection

SER Appendix-A Commitment 20, in part, stated:

> The existing program will be enhanced to include:
>
> (1) Sprinkler head testing in accordance with National Fire Protection Association (NFPA) 25, "Inspection, Testing, and Maintenance of Water Based Fire Protection Systems." Samples will be submitted to a testing laboratory prior to being in service 50 years. This testing will be repeated at intervals not exceeding 10 years.
>
> (2) Water sampling for the presence of microbiologically-influenced corrosion (MIC) at an interval not to exceed 5 years.
>
> (3) Periodic non-intrusive wall thickness measurements of selected portions of the fire water system at an interval not to exceed every 10 years.
>
> (4) Visual inspection of the redundant fire water storage tank heater during tank internal inspections.

The inspector reviewed all enhancements to the existing program, and reviewed SER Section 3.0.3.2.17, "Fire Water System," PBD-AMP-B.1.20, "Fire Water System Program Basis Document," implementing procedures, planned and completed work orders and PMs, and related corrective action IRs. The inspector also interviewed responsible plant personnel. The inspector reviewed UT data records, and compared the UT data results to the established minimum wall thickness criteria for the selected piping locations. In addition, the inspector walked down accessible portions of the fire water system in the fire pond house, in and about the redundant fire pump house, including the storage tank, in the reactor building, and in the turbine building to observe the material condition and aging management control.

b. Observations

The inspector did not identify any significant problems or concerns.

Enhancement (1) Exelon developed a PM task and a draft procedure for the 50-year sprinkler head inspection, in accordance with NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems."

Enhancement (2) In Jan. 2009, Exelon sampled the fire water system for the presence of MIC and established a recurring task PM to perform the MIC sample at least every 5 years.

Enhancement (3) Exelon inspected selected portions of the fire protection system piping located aboveground and exposed to water in ten diverse locations, by non-intrusive volumetric UT examinations prior to the PEO. The inspector independently reviewed the UT results and associated structural assessments.

Exelon determined that two pipes, located in the fire water pond house, had a pipe wall thickness less than the approved acceptance criteria of 87.5% of nominal pipe wall thickness. A ten-inch fire pump discharge header had a UT thickness reading of 0.216 inches, which was approximately 59% of nominal wall thickness. A three-inch discharge line had a UT thickness reading of 0.121 inches, which was approximately 56% of nominal wall thickness. Exelon entered these conditions into the corrective action program (IR 893090) and performed a functional assessment, in accordance with ASME B31.1 requirements.

Engineering evaluation A22195548-02 determined a follow-up inspection at the same two locations would be performed by Exelon in two years to verify the assumed corrosion rates. The inspector identified that the evaluation did not recommend expanding the test scope to evaluate the extent-of-condition. Exelon entered this issue into the corrective action program (IR 896996) to further evaluate the fire protection system piping in the fire pond pump house and consider UT examinations at additional locations, to ensure the aging mechanism is understood.

Enhancement (4) Exelon inspected the redundant fire water storage tank heater pressure boundary components during the tank internal inspection in August 2008 and established a recurring task PM for future periodic inspections during the PEO.

The work order documentation for the 2008 inspection was not sufficient to determine whether the as-performed visual inspection verified the heater pressure boundary components. Subsequent inspector follow-up and interviews identified that a pressure boundary inspection had been performed. In addition, the PM task directed a visual inspection of the redundant fire water storage tank heater. Based on inspector questions, Exelon identified that the intent of this enhancement was to inspect the tank heater pressure boundary components, not the surface of the electrical heater element. Specifically, PBD-AMP-B.1.20, section 3.1 stated "The fire water system aging management program will be enhanced to include visual inspection of the water storage tank heater pressure boundary components during the periodic tank internal inspection." Exelon entered this issue into the corrective action program (IRs 897389 and 897394) to

revise the associated PM task and the enhancement description in the OC commitment management system.

2.7 Aboveground Outdoor Tanks

a. Scope of Inspection

SER Appendix-A Commitment 21, in part, stated:

> Program is new and will manage the corrosion of outdoor carbon steel and aluminum tanks. The program credits the application of paint, sealant, and coatings as a corrosion preventive measure and performs periodic visual inspections to monitor degradation of the paint, sealant, and coatings and any resulting metal degradation of carbon steel or of the unpainted aluminum tank. Bottom UTs are performed on tank bottoms supported by soil or concrete.

The inspector reviewed this new program, and reviewed selected records, procedures, and work orders, which documented previously completed inspections and PMs, as well as inspections and PMs scheduled during the PEO. The inspector interviewed the responsible engineering personnel. In addition, the inspector performed field walk downs to independently observe material conditions.

b. Observations

The inspector did not identify any significant problems or concerns.

Tanks in this program included the condensate storage tank (CST), fire system carbon dioxide storage tank, nitrogen storage tank, emergency diesel generator (EDG) main fuel oil storage tank, redundant fire water storage tank, and the fire diesel pump fuel oil tanks 1-1 and 1-2.

The inspector noted that identified problems had been placed in Exelon's corrective action program for evaluation and resolution. However, during a walk down with the system engineer, to observe the material condition of several tanks in the program, the inspector identified a degraded condition related to weathered caulking at the base of the CST (exterior). Exelon entered this condition into the corrective action program (IR 892050).

The inspector reviewed Exelon's scheduled WO to inspect the CST tank bottom. Originally, the inspection had been scheduled to be completed during the last refuel outage, in October 2008. However, due to potential changing radiological conditions inside of the tank during an outage, the tank inspection was rescheduled to June 2009. The inspector, in conjunction with input from NRR staff, determined that the timing of the CST inspection was not part of Exelon's regulatory commitment. Exelon Technical Evaluation 891862-04 qualitatively assessed the likelihood of a through-wall leak in the CST bottom between March to December 2009. Based on the evaluation, Exelon concluded that performing the CST inspection in June 2009 was acceptable.

After this NRC inspection was completed on-site (3/27/2009), Exelon identified an underground leak from the condensate transfer system. Both the CST and the associated underground piping were in-scope of Exelon's LR aging management programs; based on the leak, the CST tank bottom inspection was advanced to May 16, 2009. No leakage or corrosion was identified in the tank bottom. This issue is currently the subject of an on-going NRC inspection. The results of current on-going inspection will be documented in NRC Inspection Report 05000219/2009008.

2.8 Fuel Oil Chemistry

a. Scope of Inspection

SER Appendix-A Commitment 22, in part, stated:

> The existing program will be enhanced to include:
>
> (1) Routine analysis for particulate contamination using modified American Society for Testing Materials (ASTM) D 2276-00 Method A on fuel oil samples from the Emergency Diesel Generator Fuel Storage Tank, the Fire Pond Diesel Fuel Tanks, and the Main Fuel Oil Tank.
>
> (2) Analysis for particulate contamination using modified ASTM D 2276-00 Method A on new fuel oil.
>
> (3) Analysis for water and sediment using ASTM D 2709-96 for Fire Pond Diesel Fuel Tank bottom samples.
>
> (4) Analysis for bacteria to verify the effectiveness of biocide addition in the Emergency Diesel Generator Fuel Storage Tank, the Fire Pond Diesel Fuel Tanks, and the Main Fuel Oil Tank.
>
> (5) Periodic draining, cleaning, and inspection of the Fire Pond Diesel Fuel Tanks and the Main Fuel Oil Tank. Inspection activities will include the use of UT techniques for determining tank bottom thicknesses should there be any evidence of corrosion or pitting.
>
> (6) One time internal inspection of the Emergency Diesel Generator fuel oil day tanks prior to the PEO to confirm the absence of aging effects.

The inspector reviewed all enhancements to the existing program, and reviewed selected procedures and work orders for fuel oil chemistry analysis, including analysis results, and tank internal inspection activities. The inspector interviewed the responsible program owner and other relevant Exelon personnel, and walked down the emergency diesel generator fuel storage tank, the main fuel oil tank, the fire pond diesel fuel tanks, and the emergency diesel generator fuel oil day tanks to observe material conditions.

The inspector also reviewed actions taken for the implementation of each enhancement including review of procedure revisions and the creation of new recurring task work orders.

b. Observations

The inspector did not identify any significant problems or concerns.

Enhancements (1), (2), (3), (4), and (6) The inspector reviewed these enhancements and did not have any specific observations.

Enhancement (5) The inspector reviewed results of the draining and inspection of one of the two fire pond diesel fuel tanks. The inspector observed that the tank inspection in question had been documented as satisfactorily completed in WO R2068875. However, the inspector noted that the first time the fire pond diesel was run after the tank cleaning, the engine's fuel oil filter clogged and the engine had to be prematurely shut down (see NRC Inspection Report 05000219/2007005, Section 1R12). Exelon entered this issue into the corrective action program (IR678386) and subsequently concluded that due to the reduced accessibility of the fire pond diesel tank internals, to perform adequate cleaning and inspection, an option to revise the commitment enhancement to replace the tanks every five years in lieu of periodic draining, cleaning, and inspection activities would be evaluated. The inspector also observed that Exelon had created a recurring task work order to direct the periodic draining, cleaning and inspection of the fire pond diesel tanks.

2.9 One Time Inspection

a. Scope of Inspection

SER Appendix-A Commitment 24, in part, stated:

> The program is new and will provide reasonable assurance that an aging effect is not occurring, or that the aging effect is occurring slowly enough to not affect the component or structure intended function during the PEO, and therefore will not require additional aging management. This program will be used for the following:
>
> (1) To confirm crack initiation and growth due to stress corrosion cracking, intergranular stress corrosion cracking, or thermal and mechanical loading is not occurring in Class 1 piping less than four-inch nominal pipe size exposed to reactor coolant. Inspections will include UT examination of 10% of the total small bore Class I butt welds and destructive or non-destructive examination of a single small bore Class I socket welded connection.
>
> (2) To confirm the effectiveness of the Water Chemistry program to manage the loss of material and crack

initiation and growth aging effects. Included in the scope of this activity, a one time UT inspection of the "B" Isolation Condenser shell below the waterline will be conducted looking for pitting corrosion.

(3) To confirm the effectiveness of the Closed Cycle Cooling Water System program to manage the loss of material aging effect.

(4) To confirm the effectiveness of the Fuel Oil Chemistry program and Lubricating Oil Monitoring Activities program to manage the loss of material aging effect.

(5) To confirm loss of material in stainless steel piping, piping components, and piping elements is insignificant in an intermittent condensation (internal) environment.

(6) To confirm loss of material in steel piping, piping components, and piping elements is insignificant in an indoor air (internal) environment.

(7) To confirm loss of material is insignificant for non-safety related piping, piping components, and piping elements of vents and drains, floor and equipment drains, and other systems and components that could contain a fluid, and, are in scope for 10 CFR 54.4(a)(2) for spatial interaction. The scope of the program consists of only those systems not covered by other aging management activities.

(8) Two stainless steel pipe sections in a stagnant or low flow area in the Reactor Water Cleanup System, and two stainless steel pipe sections in a stagnant or low flow area in the Isolation Condenser System will be included in the one time inspection samples for stress corrosion cracking.

The inspector reviewed this new program, and reviewed the program inspection and test results, including a summary report of all UT test results, all six NDE data records with test results which did not satisfy the acceptance criteria and the resulting technical evaluations, 17 additional inspection data records, the destructive evaluation report, and scheduled work orders for future inspections and tests. In addition, the inspector interviewed the responsible engineering personnel.

b. Observations

The inspector did not identify any significant problems or concerns.

The program consists of inspections to confirm that either an aging effect is not occurring or is occurring so slowly that the components' intended functions will be maintained during the entire PEO. The program also confirms the effectiveness of other aging management programs, including, but not limited to, the Water Chemistry, Closed Cycle Cooling Water, and Fuel Oil Chemistry Programs. If an aging effect is identified, the condition will be evaluated to determine the need to expand inspections or establish an aging management program.

The inspector reviewed the program results, which included completion of an initial set of UT examinations. The inspections were accomplished within established work control programs using existing inspection procedures, and as such, no additional program procedures were required. The inspections were performed on multiple systems, including, but not limited to, the condensate, control rod drive, isolation condenser, reactor building closed cooling water, reactor recirculation, reactor water cleanup, spent fuel pool cooling, standby liquid control, and main steam systems.

The program performed UT examinations of selected piping to determine pipe wall thickness and evaluate for possible aging effects (i.e., corrosion). The established acceptance criterion of 87.5% of nominal pipe wall thickness was chosen based on the typical fabrication tolerances of 87.5% to 112.5%. Accordingly, a UT result below 87.5% of nominal wall thickness may indicate corrosion. The acceptance criterion was not based on ASME Code requirements or on the structural integrity of the pipe. The acceptance criteria is a conservative administrative limit, intended to identify whether any aging effect might be present. UT test results below the acceptance criterion were evaluated for component design capability and operability. The initial set of 61 pipe UT examinations covered the eight program categories above, for testing identified in the LR application and in this commitment. Six of the sixty-one UT examinations had test results below the acceptance criteria and were further evaluated. Exelon entered these conditions into the corrective action program for evaluation and resolution.

Four of these six pipe locations, with a wall thickness less than the acceptance criteria, were evaluated as having minimal corrosion because the deviations below the acceptance criteria were small (i.e., 10% or less). In addition, these four locations represented a minority of the tested locations within their category (i.e., new program items 1 thru 8 listed above, in SER Commitment 24). Two of these four pipe locations were previously discussed in NRC Inspection Report 05000219/2008007. For these four locations, technical evaluations (A769206-03, A804754-03, A783173-03, and A771740-03) determined that the pipe wall losses were less than 0.002 inches (2 mils) per year. The technical evaluations calculated that it would take an additional 62 years, at the estimated corrosion rate, before the wall loss reached the minimum design wall thickness, for the rated pressure. Exelon determined that follow-up actions would include repeated UT examinations of the same areas in approximately four years, to confirm the assumed corrosion rates and verify that the actual corrosion would not affect the ability of the systems to perform their design function.

For the remaining two UT test results below acceptance criteria, Exelon pursued an accelerated follow-up schedule (technical evaluation A878804-02). These two UT examinations were part of a set of three UT tests within program category 7 (i.e., new program item 7 listed above, in SER Commitment 24), and were on 2-inch carbon steel drain lines in the reactor building, outside of the drywell. These drain lines were part of the drywell floor and drywell equipment sump drain systems. The UT pipe wall thickness values for these two lines were 0.096 inches and 0.127 inches, with an administrative acceptance criteria of 0.135 inches (i.e., 87.5% of nominal wall). Exelon calculated the minimum design wall thickness at rated pressure to be 0.050 inches, and also calculated a corrosion rate of 2 mils per year. At the calculated corrosion rate, Exelon estimated that the pipe wall thickness would remain greater than the design minimum value over the entire PEO. Exelon decided to repeat the UT examinations on the same areas within 2 years. In addition, Exelon decided to expand the scope of testing in this category to more of the drywell floor and drywell equipment sump drain system, including portions located inside the drywell, and to the reactor building equipment drain tank system, a similar piping system with similar hot fluid conditions. Exelon's planned action requests, for these additional future UTs, directed engineering to evaluate the test results and determine whether any additional corrective actions or test scope expansion was necessary.

The program also performed destructive testing on one small bore ASME Class 1 socket welded pipe fitting, to verify whether cracking was present. Exelon did not identify any cracking, and the test acceptance criteria was satisfied. The inspector's review of the test results and Exelon's planned activities did not identify any issues.

2.10 Selective Leaching of Materials

a. Scope of Inspection

SER Appendix-A Commitment 25, in part, stated:

> The program is new and will consist of inspections of a representative selection of components of the different susceptible materials to determine if loss of material due to selective leaching is occurring. Visual inspections will be consistent with ASME Section XI VT-1 visual inspection requirements and supplemented by hardness tests and other examinations of the selected set of components. If selective leaching is found, the condition will be evaluated to determine the need to expand inspections.

The inspector reviewed this new program, and reviewed program results, including a results summary, all eight inspection records, the laboratory destructive evaluation report, the technical evaluation of component functionality, and scheduled work orders for future inspections and tests. In addition, the inspector interviewed the responsible engineering personnel.

b. Observations

The inspector did not identify any significant problems or concerns.

Program results included completion of an initial set of inspections for four material-environment combinations. The inspections were accomplished within established work control programs using existing inspection procedures, and as such, no additional program procedures were needed. The program used visual inspections and hardness testing to evaluate the material for selective leaching. Results were inconclusive.

Following these inspections, four components were removed and sent for more in-depth laboratory evaluations, including destructive examinations. Of these four components, two had no evidence of selective leaching and two exhibited selective leaching. One of those two had multiple indications of superficial dezincification, and other one had mild to moderate graphitic corrosion. Exelon entered these conditions into the corrective action program for evaluation and resolution. The superficial dezincification involved the removal of zinc from a brass valve body in a raw water (i.e., saltwater) environment, with depths of selective leaching from 3 to 5 mils. Exelon concluded that the minimal dezincification would not affect the structural capability of the valve body over the entire PEO and no further actions were needed for other brass components.

The mild to moderate graphitic corrosion involved the removal of iron from a gray cast iron valve body in a raw water (i.e., saltwater) environment. The graphitic corrosion was generally to a depth of 0.090 inches, such that the remaining wall thickness was 0.580 inches. The most severe localized wall loss, within that valve, was 0.270 inches, such that the remaining wall thickness was 0.330 inches (note: nominal wall thickness within a valve body is not uniform and varies depending on location within the valve). The affected valve was a non-safety related valve in the service water system which operates at low pressure (75 psig) and enables the main condenser to be treated with chlorine. Exelon concluded that three additional susceptible valves should be removed and replaced during the next refuel outage (i.e., within two years). Destructive examination of the three removed valves will be conducted to evaluate graphitic corrosion in saltwater and to evaluate any adverse affects caused by the combination of saltwater and chlorine. Four other cast iron valves in saltwater had not exhibited graphitic corrosion. Also, cast iron components in saltwater are in limited use, due to prior replacements with upgraded materials. Exelon concluded the corrosion rate would not adversely affect the structural capability of the affected valves before they could be re-evaluated during the next refuel outage.

2.11 Buried Piping Inspection

a. Scope of Inspection

SER Appendix-A Commitment 26, in part, stated:

> The existing program will be enhanced to include:
>
> (1) Inspection of buried piping within ten years of entering the period of extended operation, unless an

opportunistic inspection occurs within this ten year period. The inspections will include at least one carbon steel, one aluminum and one cast iron pipe or component. In addition, for each of these materials, the locations selected for inspection will include at least one location where the pipe or component has not been previously replaced or recoated, if any such locations remain.

(2) Fire protection components in scope of the program.

(3) Piping located inside the vault in the scope of the program. The vault is considered a manhole, located between the reactor building and the exhaust tunnel.

The inspector reviewed all enhancements to the existing program, and reviewed selected inspection and test results, and Exelon's activities to implement the commitment as described in the SER.

The inspector reviewed PBD-AMP-B.1.26, "Buried Piping Inspection Program Basis Document," implementing procedures, planned and completed work orders, and related corrective action IRs. In addition, the inspector interviewed the responsible plant personnel regarding these documents. The inspector reviewed the piping inspection records and photos, and compared the results to Exelon's established underground piping inspection guidance and criteria. In addition, the inspector walked down accessible outdoor areas in the vicinity of buried piping looking for indications of potential underground leakage.

b. Observations

The inspector did not identify any significant problems or concerns.

Exelon's enhancements to the existing program included:

- Excavated and inspected two carbon steel pipes, one in the service water system and one in the emergency service water system, prior to the PEO.
- Excavated and inspected a fire protection system cast iron pipe prior to the PEO.
- Excavated and inspected one condensate transfer system (line CH-5, A4) six-inch aluminum pipe, between the turbine building and the condensate transfer building prior to the PEO.
- Inspected six pipes in the Southeast Vault prior to the PEO.

After this NRC inspection was completed on-site (3/27/2009), Exelon identified an underground leak from the condensate transfer system. Both the CST and the associated underground piping were in-scope of Exelon's LR aging management programs. This issue is currently the subject of an on-going NRC inspection. The results of current on-going inspection will be documented in NRC Inspection Report 05000219/2009008.

2.12 ASME Section XI, Subsection IWE

a. Scope of Inspection

SER Appendix-A Commitment 27, in part, stated:

> The existing program will be enhanced to include:
>
> (3) The reactor cavity seal leakage trough drains and the drywell sand bed region drains will be monitored for leakage quarterly during non-outage periods.

The inspector reviewed this one selected enhancement to the existing program, and reviewed selected records and interviewed personnel to observe Exelon's implementation of the enhancement to quarterly monitor drains during non-outage periods. In addition, the inspector walked down the reactor cavity concrete trough drain line and the five sand bed bay drain lines to independently observe field conditions.

b. Observations

The inspector did not identify any significant problems or concerns.

The inspector performed a walk down of the reactor cavity and sand bed drain lines during power operations (i.e., reactor cavity empty). During the walk down, the inspector identified a small amount of leakage from the reactor cavity trough drain line of approximately 7 drops per minute. This leakage had not previously been identified. Exelon entered this into the corrective action program (IR 892629) and evaluated the potential impact of the leakage. Based on the leakage rate, Exelon concluded it was not credible for the reactor cavity concrete trough to overflow into a sand bed bay.

Exelon initiated actions to identify the source of the leakage, which was initially thought to be water from the refuel floor equipment storage pool leaking into the reactor cavity. Exelon increased the frequency of monitoring the cavity trough drain to daily. Subsequently, the equipment storage pool was drained and the observed leakage stopped.

The inspector noted that 7 drops per minute is roughly equivalent to 0.0001 gallons per minute, based on about 20 drops per milliliter and 3785 milliliters per gallon. NRC Inspection Report 05000219/2008007 Sections 3.1, 3.2, and 3.5 documented that during the 2008 refuel outage, from Oct. 28 until Nov 6 (when the cavity liner strippable coating started to de-laminate), the reactor cavity seal leakage rate, as observed from the cavity trough drain, was about an 1/8-inch stream (less than 1 gpm). That report also documented that no water was observed to overflow the trough into the sand bed region until after Nov 6, when the cavity trough drain flow increased to 4 to 6 gpm, due to the de-lamination of the reactor cavity strippable coating.

2.13 Structures Monitoring Program

a. Scope of Inspection

SER Appendix-A Commitment 31, in part, stated:

> The existing program includes elements of the Masonry Wall Program and the RG 1.127, "Inspection of Water-Control Structures." The Structures Monitoring Program will be enhanced to include:
>
> (3) Inspection of OC external surfaces of mechanical components that are not covered by other programs, HVAC duct, damper housings, and HVAC closure bolting. The scope of this enhancement includes the Reactor Building Closed Cooling Water (RBCCW) System carbon steel piping and piping elements located inside the Drywell since operating experience has shown an exposure to an environment conducive to corrosion during outages. Also, to confirm that there is no significant age related degradation occurring on the external carbon steel surfaces of the feedwater and main steam system located inside containment, one time visual inspections of feedwater and main steam system piping inside the containment for loss of material due to corrosion will be performed. Inspection and acceptance criteria of the external surfaces will be the same as those specified for structural steel components and structural bolting.
>
> (4) The visual inspection of insulated surfaces will require the removal of insulation. Removal of insulation will be on a sampling basis that bounds insulation material type, susceptibility of insulated piping or component material to potential degradations that could result from being in contact with insulation, and system operating temperature.
>
> (6) Periodic sampling, testing, and analysis of ground water to confirm that the environment remains nonaggressive for buried reinforced concrete.
>
> (7) Periodic inspection of components submerged in salt water (Intake Structure and Canal, Dilution structure) and in the water of the fire pond dam, including trash racks at the Intake Structure and Canal.
>
> (10) The current inspection criteria will be revised to add loss of material, due to corrosion for steel components, and change in material properties, due

to leaching of calcium hydroxide and aggressive chemical attack for reinforced concrete. Wooden piles and sheeting will be inspected for loss of material and change in material properties.

(16) The program will be enhanced to require visual inspection of external surfaces of mechanical steel components that are not covered by other programs for leakage from or onto external surfaces, worn, flaking, or oxide-coated surfaces, corrosion stains on thermal insulation, and protective coating degradation (cracking and flaking).

(17) The program will be enhanced to require performing a baseline inspection of submerged water control structures prior to entering the PEO. A second inspection will be performed six years after this baseline inspection and a third inspection eight years after the second inspection. After each inspection, an evaluation will be performed to determine if identified degradation warrant more frequent inspections or corrective actions.

The inspector reviewed these seven selected enhancements to the existing program. In general, the inspector reviewed Exelon's Structural Monitoring Program implementing procedure, ER-OC-450, to observe whether the procedure had been revised to incorporate codes and standards to which Exelon's monitoring and surveillance observations and results will be compared and evaluated. The inspector reviewed ER OC 450 Attachment 7 to observe whether the enhancement tasks and task frequencies had been included in the procedure, and whether the evaluation standards were also included in the procedure. The inspector observed whether minimum personnel qualifications had been established in the procedure.

b. Observations

The inspector did not identify any significant problems or concerns.

Enhancement (3) Exelon committed to a one time visual inspection of the main steam and feedwater piping located inside the drywell, per RAIs 3.4-4, 3.4-7, and 3.4-8 (Exelon Letter 2130-06-20299). Exelon completed those inspections in November 2008, during the last refuel outage. Exelon reviewed and approved the inspection results using qualified personnel. The inspector reviewed relevant documentation and photographic records of the inspections and did not identify any issues regarding Exelon's activities to implement this enhancement. Also, the inspector verified that Exelon revised 2400-GMM-3900.52 to incorporate restrictions on the use of certain lubricants in bolted connections. In addition, the inspector reviewed the results of an inspection performed in November 2008 to meet the enhancement to perform periodic inspections of RBCCW piping inside the drywell, as established by PM 54108M and implemented by new recurring work order (WO) R2113993.

Enhancement (4) The inspector reviewed ER-OC-450 to observe whether the revised procedure established the method and frequency of inspection for insulated piping. PM 18720M had been created to perform this task. The most recent inspection had been completed by WO R2114261, during the 2008 refuel outage. However, the structural inspection report was not available for NRC review because it had not been reviewed and approved by Exelon during the time period of the NRC inspection.

Enhancement (6) The inspector reviewed PM 187715, which had been issued to establish a requirement for sampling chemical analysis of ground water on-site on a recurring basis to assure that the ground water chemistry was within the acceptable range for chlorides, sulfates, and pH value. The work had been performed under WO R2120558, but the results of the analysis had not been received from the laboratory conducting the tests and were not available for inspector review during the inspection period.

Enhancement (7) See section 2.14 of this report for a review of this enhancement.

Enhancement (10) The inspector reviewed Exelon's inspection results and evaluations and photographic records of the inspection of wood piles and sheet pilings in the bulkhead of the intake structure to satisfy the enhancement to revise the Structural Monitoring Program to include requirements for a baseline and subsequent inspections. Exelon created PM 10047M and, using this PM, completed the baseline inspection on December 17, 2008. During these inspections, Exelon observed some indications of minor cracking in wood piles (i.e., surface cracks that did not extend below the treated surface) and moderately uniform surface corrosion on sheet pilings that were considered to be normal degradation for the items in such service condition. The inspector did not identify any issues with Exelon's determination that this initial inspection was adequate to serve as baseline data for future inspections.

Enhancement (16) The inspector reviewed Exelon's inspection results and evaluations and photographic records of the inspection of drywell and torus internals to satisfy the enhancement to revise the Structural Monitoring Program to include requirements for a visual inspection of external surfaces of mechanical steel components. The inspection was completed using WO R2097321 during the plant refuel outage in November 2008.

Enhancement (17) See section 2.14 of this report for a review of this enhancement.

2.14 RG 1.127, Inspection of Water-Control Structures

a. Scope of Inspection

SER Appendix-A Commitment 32, in part, stated:

> Existing program is part of the Structures Monitoring Program and will be enhanced to include:
>
> (1) Monitoring of submerged structural components and trash racks.

(2) Periodic inspection of components submerged in salt water (Intake Structure and Canal, Dilution structure) and in the water of the fire pond dam.

(3) Periodic inspection of the Fire Pond Dam for loss of material and loss of form.

(4) Inspection of steel components for loss of material, due to corrosion.

(5) Inspection of wooden piles and sheeting for loss of material and change in material properties.

Submerged water control structures will be inspected under the Structural Monitoring Program as follows: A baseline inspection of submerged water control structures will be performed prior to entering the PEO. A second inspection will be performed six years after this baseline inspection and a third inspection eight years after the second inspection. After each inspection, an evaluation will be performed to determine if identified degradation warrants more frequent inspection or corrective actions.

The inspector reviewed these five selected enhancements, and enhancements 7 and 17 in the previous section, to the existing program, and reviewed selected procedures, including ABN-31, "High Winds," ABN-38, "Station Seismic Event," and ER-OC-450, "Structures Monitoring Program." The inspector reviewed a digital video recording structural inspection record of submerged areas of the Intake Structure to document the baseline conditions. The inspector also reviewed documented structural inspection results and evaluations of wood piles and sheet piling in the bulkhead of the Intake Structure, and photographic records of the inspection, completed in December 2008. The inspector reviewed several IRs which had been previously initiated to evaluate and correct degradation of various submerged components. The inspector also reviewed completed engineering evaluations to observe whether the identified conditions were complete and technically adequate.

b. Observations

The inspector did not identify any significant problems or concerns.

The relevant procedures were revised to include the commitments and the baseline inspections of submerged structural components. Those revised procedures were implemented during the last two refuel outages. The south end of the Intake Structure was inspected in 2006 and the north end in 2008. Some indications of minor cracking in wood piles (i.e., surface cracks that did not extend below the treated surface) was documented in Exelon's inspection reports and/or visible on the video recordings or photographs. In addition, moderately uniform surface corrosion on sheet pilings was observed and will serve as baseline data for future inspections. The inspector noted that Exelon had no LR commitment to inspect the intake tunnels or tunnel expansion joints, these structures had been added to the scope of the structural monitoring program and the associated inspection procedure.

2.15 Electrical Cables and Connections

a. Scope of Inspection

SER Appendix-A Commitment 34, in part, stated:

> The program is new and will be used to manage aging of cables and connections during the PEO. A representative sample of accessible cables and connections located in adverse localized environments will be visually inspected at least once every 10 years for indications of accelerated insulation aging.

The inspector reviewed this new program, and reviewed selected work orders, PMs, and MA-AA-723-500, "Inspection of Cables and Connections for Managing Adverse Localized Environments," to observe Exelon's implementation of this commitment. The inspector also reviewed the completed inspection results for cables located in the drywell and condenser bay areas. The inspector reviewed selected IRs which had been written as a result of Exelon's inspection activities. In addition, the inspector interviewed the responsible design engineer for this program.

b. Observations

The inspector did not identify any significant problems or concerns.

2.16 Instrumentation Cables and Connections

a. Scope of Inspection

SER Appendix-A Commitment 35, in part, stated:

> The existing program will be enhanced to include:
>
> (1) A review of the Reactor Building High Radiation Monitoring and Air Ejector Offgas Radiation Monitoring system calibration results for cable aging degradation before the period of extended operation and every 10 years thereafter.
>
> (2) A review of the LPRM/APRM and IRM system cable testing results for cable aging degradation before the PEO and every 10 years thereafter.

The inspector reviewed all enhancements to the existing program, and reviewed selected work orders, PMs, and test procedures to observe Exelon's implementation of this commitment. The inspector also reviewed the completed test results and technical evaluations which Exelon performed to analyze cable trending. The inspector also reviewed selected IRs which had been written as a result of Exelon's implementation activities. In addition, the inspector interviewed the responsible design engineer for this program. The reviewed procedures included:

- 621.3.002, Offgas Radiation Monitor Check Source Functional Test,
- 621.3.005, Reactor Building High Radiation Monitor Calibration,
- 2400-SMI-3623.03, IRM, SRM, LPRM Characterization Trending & Diagnostics,
- 2400-SMI-3623.08, IRM Detector Current-Voltage Testing, and
- 2400-SMI-3623.09, Calibration and Operation of LPRM Diagnostic.

b. Observations

The inspector did not identify any significant problems or concerns.

2.17 Inaccessible Medium Voltage Cables

a. Scope of Inspection

SER Appendix-A Commitment 36, in part, stated:

> The Program is new. Manholes, conduits and sumps associated with these cables will be inspected for water collection every 2 years and drained as required. In addition, the cable circuits will be tested using a proven test for detecting deterioration of the insulation system due to wetting, such as power factor or partial discharge, as described in Electric Power Research Institute (EPRI) TR-103834-P1-2, or other testing that is state of the art at the time the test is performed. The cable circuits will be tested at an initial frequency of six years, after which the frequency will be evaluated and adjusted, based on test results; the period between tests shall not exceed 10 years. Results of cable tests will be trended. Trending will occur at the same frequency as cable testing. Inclusion of the 13.8-kV system circuits in this program reflects the scope expansion of the Station Blackout System electrical commodities. Inclusion of the 34.5-kV system circuits in this program reflects the scope enhancement for reconciliation of this aging management program from the draft January 2005 Generic Aging Lessons Learned Report [GALL, i.e., NUREG-1801] to the approved September 2005 GALL.

The inspector reviewed this new program, and reviewed selected work orders, PMs, and test procedures to observe Exelon's implementation of this commitment. The inspector reviewed Exelon and vendor completed cable test records for 51 medium voltage cables in-scope of this LR program, which had been performed in 2006, 2007, 2008, and 2009. The inspector reviewed Exelon's manhole inspection results, performed from 2006 through March 2009. The inspector reviewed selected IRs which had been written as a result of Exelon's implementation activities. The inspector also interviewed the responsible engineer for this program. The reviewed procedures included:

- 2400-SME-3780.05, Power Factor Testing of 5-KV Cables,
- 2400-SME-3780.06, Dielectric Testing of 2.3-KV and 5-KV Cables, and
- MA-OC-773-001, Testing and Condition Monitoring of Inaccessible Cables.

b. Observations

The inspector did not identify any significant problems or concerns.

The inspector identified that the vendor cable test results were not reviewed and approved by Exelon station personnel and were not retained in document control for future review or audit. Exelon entered this issue into the corrective action program (IR 892012). The inspector's review of the vendor test results did not identify any issues.

2.18 Periodic Inspection Program

a. Scope of Inspection

SER Appendix-A Commitment 41, in part, stated:

> The program is new and will include systems in the scope of LR that require periodic monitoring of aging effects, and are not covered by other existing periodic monitoring programs. Activities consist of a periodic inspection of selected systems and components to verify integrity and confirm the absence of identified aging effects. The inspections are condition monitoring examinations intended to assure that existing environmental conditions are not causing material degradation that could result in a loss of system intended functions.

The inspector reviewed this new program, and reviewed the program sampling basis and program inspection and test results, including a summary of inspection and test results, all inspection and test records where the acceptance criteria was not satisfied and the resulting technical evaluations, 28 additional inspection records, and scheduled work orders for future inspections and tests. In addition, the inspector interviewed the responsible engineering personnel.

Specifically, the inspector reviewed Exelon's implementation of inspections and tests in the three program areas, to observe how Exelon's activities confirmed:

- that changes in material properties is not occurring in non-metallic components, such as elastomer expansion joints and flexible hoses.

- that a reduction in heat transfer capabilities is not occurring in heat exchangers exposed to an outside air environment.

- that any loss of material (i.e., corrosion) is insignificance in miscellaneous components, such as piping elements, heat exchangers, and ductwork.

b. Observations

The inspector did not identify any significant problems or concerns.

Program results included completion of an initial set of more than 100 planned inspections. The inspections were accomplished within work control programs under existing inspection procedures, and as such, no additional program procedures were needed. Subsequent periodic inspections are to be performed at a minimum of once every 10 years.

In the non-metallic component area, which was primarily expansion joints, Exelon performed visual inspections of these components. Any components which did not meet acceptance criteria were evaluated, and repaired, replaced, or scheduled for short-term re-inspection. The inspector noted that Exelon planned to create routine PM tasks for expansion joints, to replace the joints every 12-years. Exelon also planned to remove these components from the periodic inspection aging management program, based on re-classifying the expansion joints as short-lived components.

To confirm the heat transfer capability of heat exchangers in an outdoor air environment, Exelon visually inspected components and performed condition monitoring during diesel generator performance tests. All acceptance criteria were met.

For miscellaneous piping and components, Exelon performed UT examinations of piping and visual inspections of other components to evaluate possible loss of material. Exelon evaluated three instances where inspected conditions did not meet acceptance criteria. In large diameter circulating water piping, corroded piping was repaired and recoated. In bronze circulating water small diameter piping, one area that was 2 mils below the acceptance criteria of 87.5% of nominal pipe wall thickness will be re-inspected by UT in approximately 4 years to evaluate the significance of the aging effect. In heating coils, any degradation will be evaluated during more frequent preventive maintenance.

2.19 Wooden Utility Pole Program

a. Scope of Inspection

SER Appendix-A Commitment 42, in part, stated:

> The program is new and is used to manage loss of material and change of material properties for wooden utility poles in or near the Oyster Creek Substation that provide structural support for the conductors connecting the Offsite Power System and the 480/208/120V Utility (JCP&L) Non-Vital Power System to the Oyster Creek plant. The program consists of inspection on a 10-year interval by a qualified inspector. The wooden poles are inspected for loss of material due to ant, insect, and moisture damage and for change in material properties due to moisture damage.

The inspector reviewed this new program, and reviewed the WO for pole inspections and discussed the planned work with the responsible engineering personnel.

b. Observations

The inspector did not identify any significant problems or concerns.

The program consists of periodic inspections of a set of 15 wooden utility poles, which support a backup offsite power line addressed in Technical Specifications. The poles are to be inspected for loss of material and changes in material properties by a qualified inspector on a 10-year frequency.

Exelon created recurring WO R2121575, for pole inspections by a contracted, qualified inspector. No additional program or implementing procedures were needed. The initial baseline inspections were scheduled for April 2009.

Previously, in NRC Inspection Report 05000219/2006007, an inspector noted that one degraded pole had been previously analyzed and that plans were in place to reinforce the pole. The inspector walked down this pole in the field and noted that repairs to reinforce the pole had not yet been performed. The action to reinforce or replace the pole was tracked in Exelon's corrective action program. Exelon stated the pole was still in an acceptable condition, and that the pole owner, Jersey Central Power & Light (JCP&L), still had an action to reinforce the pole. Additional NRC review in this area will be documented in NRC Inspection Report 05000219/2009003.

2.20 Metal Fatigue of Reactor Coolant Pressure Boundary

a. Scope of Inspection

SER Appendix A Commitment 44, in part, stated:

> The existing program will be enhanced to use the EPRI-licensed FatiguePro cycle counting and fatigue usage factor tracking computer program. The computer program provides for calculation of stress cycles and fatigue usage factors from operating cycles, automated counting of fatigue stress cycles and automated calculation and tracking of fatigue cumulative usage factors. The program will also be enhanced to provide for calculating and tracking of the cumulative usage factors for bounding locations for the reactor pressure vessel, Class I piping, the torus, torus vents, torus attached piping and penetrations, and the isolation condenser.
>
> Exelon will revise the OC UFSAR to update the current licensing basis to reflect that a cumulative usage factor of 1.0 will be used in fatigue analysis for reactor coolant pressure boundary components, as endorsed by the NRC in 10 CFR 50.55a.
>
> Certification by a Professional Engineer of the reactor vessel design specification and design reports prepared for the fatigue activities associated with the OC LR Application will be performed.

The inspector, on two prior occasions (see NRC Inspection Reports 05000219/2006007 and 05000219/2008007) performed detailed reviews of this program, including an in-depth review of the re-calculation baseline, the FatiguePro outputs, and discussed at length, the program implementation with the responsible program manager.

This inspection is a follow-up to determine implementation status.

b. Observations

The inspector did not identify any significant problems or concerns.

The original licensing basis Metal Fatigue Program monitors plant events and calculates the affect of these events on the fatigue life of critical components in the reactor coolant pressure boundary system. The Metal Fatigue Program monitors operating transients, calculates fatigue usage factor, and alerts Exelon management when corrective actions may be necessary. Metal fatigue analysis, for the reactor coolant pressure boundary, is categorized as a time-limited aging analysis for the purposes of LR. The program provides an analytical basis for confirming that the number of cycles established by the original design calculations, which is also the current analysis of record, will not be exceeded before the end of the PEO.

Exelon stated, in its application for a renewed license, they will determine fatigue cumulative usage factors more accurately by implementing the Electric Power Research Institute-licensed FatiguePro fatigue monitoring software. FatiguePro calculates cumulative fatigue using cycle-based and stress-based monitoring. The FatiguePro cycle counting and fatigue usage factor tracking computer program provides for calculation of stress cycles and fatigue usage factors from operating cycles, automated counting of fatigue stress cycles and automated calculation and tracking of fatigue cumulative usage factors.

The NRC, in reviewing other renewal applications, discovered FatiguePro took advantage of a calculation methodology identified as Green's function. The NRC was concerned with a simplified input, used by FatiguePro, for applying the Green's function in which only one value of stress is used for the evaluation of the actual plant transients. The NRC favors a detailed stress analysis which requires consideration of six stress components, as discussed in ASME Code, Section III, Subsection NB, Subarticle NB-3200. Simplification of the analysis to one value of stress may provide acceptable results for some applications.

Because the affect of a simplified approach using Green's function on a fatigue calculation was not fully understood, the NRC requested a number of LR applicants, including OC, to re-calculate some critical pressure boundary locations utilizing ASME Code Section III, NB-3200. At the same time, the NRC issued DRAFT Regulatory Issue Summary 2008-XX, "Fatigue Analysis of Nuclear Power Plant Components" (ML080950235). Exelon was asked, in RAI 4.3.4-1, dated April 29, 2008, to re-calculate the cumulative usage factor for the recirculation outlet nozzle. Exelon did so and reported the cumulative usage factor was reduced from a FatiguePro generated 0.9781 to 0.1366, in effect showing that FatiguePro was almost an order of magnitude more conservative in its results when using Green's function. Exelon also confirmed that the recirculation nozzle was the only location where the function had been used.

The high level corporate procedure for fatigue analysis and monitoring, ER-AA-470 "Fatigue and Transient Monitoring Program," was revised to include an OC LR specific reference that ties the program back to the commitment implementation. The site specific procedure ER-OC-470-10001 "Fatigue and Transient Monitoring Program" was revised to include the specific environmental affects used in OC fatigue calculations.

Effective March 1, 2009, FatiguePro replaced the original fatigue monitoring program as the official program of record.

In addition the cumulative usage factor for the reactor vessel, originally limited to 0.8, was changed to unity and the design was certified by a professional engineer.

2.21 Axial Weld Examination Relief

a. Scope of Inspection

SER Appendix A Commitment 48, in part, stated:

> Apply for extension Reactor Vessel Axial Weld Examination Relief for 60-year operation.

The inspector reviewed Commitment Change 08-004, revision 2, RPV Axial Weld Examination Relief (see section 4.0) to observe Exelon's implementation of this commitment. In addition, NRR staff reviewed SER section 4.2.5, which, in part, stated:

> Exelon must submit, on an interval-by-interval basis, either a request for approval of an alternative to ASME Code, Section XI, requirements, pursuant to 10 CFR 50.55a(a)(3), or a request for relief from ASME Code, Section XI, requirements, pursuant to 10 CFR 50.55a(g)(6)(i), to address future axial weld examinations if less than "essentially 100 percent" coverage is, or will be, obtained.

b. Observations

The inspector did not identify any significant problems or concerns.

The revised commitment allowed Exelon to either make a future relief request, on an inservice inspection interval-by-interval basis, or to perform the weld inspection as required by ASME Code.

2.22 FRCT Aboveground Steel Tanks

a. Scope of Inspection

SER Appendix-A Commitment 53, in part, stated:

> This Forked River Combustion Turbine (FRCT) program is new and will manage corrosion of aboveground outdoor steel tanks.

> Paint coating is a corrosion preventive measure, and periodic visual inspections will monitor degradation of the paint coating and any resulting metal degradation of tank external surfaces. The aboveground tanks external surfaces will be visually inspected for coating degradation by walk down at least once every two years.
>
> The Main Fuel Oil tank bottom is in contact with concrete and soil, and is inaccessible for visual inspection. Therefore, the program includes periodic Non-destructive wall-thickness examinations of the Main Fuel Oil tank bottom to verify that significant corrosion is not occurring.
>
> This program, including the initial tank external paint inspections, will be implemented prior to the PEO. The recommended UT inspection of the Main Fuel Oil tank bottom was performed in October 2000, so it is not necessary to perform this inspection again prior to entering the PEO. Based on the results of the October 2000 inspections, and subsequent repairs to the tank floor, the tank was certified to be suitable for the storage of number 2 fuel oil for a period of time not to exceed 20 years from October 2000, before the next internal inspection would be necessary. Therefore, additional UT inspections will be performed prior to October 2020.

The inspector reviewed this new program, and reviewed selected procedures and work orders, and interviewed the responsible engineering personnel. In addition, the inspector performed field walk downs to independently observe material conditions.

The inspector reviewed the new procedures and new recurring work orders for the FRCT tank inspections. The inspector walked down the in-scope tanks with Exelon's engineering program owner and a FRCT representative. The inspector also interviewed Exelon's engineering program owner and the FRCT representative, regarding their respective duties and obligations with respect to this program.

b. Observations

The inspector did not identify any significant problems or concerns.

The main fuel oil storage tank, both closed cooling water system head tanks, and both diesel starter jacket water head tanks were included in the scope of this new program.

2.23 FRCT Fuel Oil Chemistry

a. Scope of Inspection

SER Appendix-A Commitment 54, in part, stated:

> The program is new and will provide assurance that contaminants are maintained at acceptable levels in new and stored fuel oil for systems and components within the scope of LR. The Fuel Oil

Storage Tank will be maintained by monitoring and controlling fuel oil contaminants in accordance with the guidelines of ASTM. Fuel oil sampling activities will be in accordance with ASTM D 4057 for multilevel and tank bottom sampling. Fuel oil will be periodically sampled and analyzed for particulate contamination in accordance with modified ASTM D 2276 Method A or ASTM D 6217, and, for the presence of water and sediment in accordance with ASTM D 2709 or ASTM D 1796. The Fuel Oil Storage Tank will be periodically drained of accumulated water and sediment and will be periodically drained, cleaned, and internally inspected. These activities effectively manage the effects of aging by providing reasonable assurance that potentially harmful contaminants are maintained at low concentrations.

This new program will be implemented prior to entering the PEO. The internal inspection of the Main Fuel Oil tank was performed in October 2000, so it is not necessary to perform this inspection again prior to entering the PEO. Based on the results of the October 2000 inspections and repairs, the tank was certified to be suitable for the storage of number 2 fuel oil for a period of time not to exceed 20 years from October 2000, before the next internal inspection would be necessary. Therefore, additional internal inspections of the tank floor are not necessary prior to entering the PEO and will be performed prior to October 2020.

The inspector reviewed this new program, and reviewed 117.3-1, "FRCT Aging Management Activities to Meet OC LR Regulatory Commitments," OC recurring task WOs R2121600 and R2121546, and Forked River WOs 08-0029, 08-0030, 08-0032, and 08-0034. The inspector walked down the FRCT main fuel oil tank. The inspector also interviewed FRCT personnel and Exelon's station blackout program owner.

b. Observations

The inspector did not identify any significant problems or concerns.

This new program established requirements for performing and documenting activities associated with the combustion turbine fuel oil quality. The program directed quarterly sampling and analysis of new and existing fuel oil. The program also directed draining the FRCT fuel oil storage tank of accumulated water and sediment. In addition, once every twenty years, the fuel oil storage tank will be drained, cleaned, and internally inspected to ensure the bottom surface of the tank is not undergoing significant degradation.

The OC Station Blackout System Manager is responsible for monitoring overall Exelon and Forked River Power, LLC compliance with the LR commitments. Forked River Power, LLC is responsible for sampling and analyzing the data collected.

2.24 FRCT One Time Inspection

a. Scope of Inspection

SER Appendix A Commitment 55, in part, stated:

> The program is new and will provide measures to verify that an aging management program is not needed, confirms the effectiveness of existing activities, or determines that degradation is occurring which will require evaluation and corrective action.
>
> Inspection methods will include visual examination or volumetric examinations. Should aging effects be detected, the program will initiate actions to characterize the nature and extent of the aging effect and determine what subsequent monitoring is needed to ensure that intended functions are maintained during the PEO.

The inspector reviewed this new program, and reviewed program inspection and test results, including all six inspection records, the program implementing procedure, and the inspection reports for the above major inspections. In addition, the inspector interviewed the responsible engineering personnel.

b. Observations

The inspector did not identify any significant problems or concerns.

The program is a new aging management program, which consists of inspections to confirm that an aging effect is not occurring or is occurring so slowly that the components' intended functions will be maintained during the PEO. The inspections for loss of material and loss of heat transfer will be performed on fuel oil and lubricating oil system components to confirm that aging management activities of the FRCT Fuel Oil Chemistry and FRCT Lubrication Oil Analysis Programs have been effective. If an aging effect is found, the condition is to be evaluated to determine the need to expand inspections or establish appropriate corrective actions.

Program results included preparation of a program implementing procedure and completion of the planned UT examinations. The inspections were accomplished within work control programs under existing inspection procedures.

In June 2008 Exelon performed six UT examinations, three on fuel oil lines and three on lubricating oil lines. All inspections met acceptance criteria.

Also, major inspection and maintenance activities were performed on the FRCT Unit 1 in March 2004, and on the FRCT Unit 2 in October 2005, by contracted combustion turbine services. The material conditions of fuel oil and lubricating oil components were independently observed by the inspector.

2.25 FRCT Selective Leaching of Materials

a. Scope of Inspection

SER Appendix A Commitment 56, in part, stated:

> The program is new and will consist of inspections of components constructed of susceptible materials to determine if loss of material due to selective leaching is occurring. For the FRCT power plant, these are limited to copper alloy materials exposed to a closed cooling water environment. One time inspections will consist of visual inspections supplemented by hardness tests. If selective leaching is found, the condition will be evaluated to determine the ability of the component to perform its intended function until the end of the PEO and for the need to expand inspections. This new program will be implemented in the time period after January 2018 and prior to January 2028.

The inspector reviewed this new program, and reviewed the program implementing procedure and associated scheduled work order for future component removals and destructive evaluations. In addition, the inspector interviewed the responsible engineering personnel.

b. Observations

The inspector did not identify any significant problems or concerns.

Exelon committed to implement the FRCT Selective Leaching of Materials Program in the period of January 2018 to January 2028. The program is a new aging management program, which consists of inspections of a set of copper alloy components (susceptible materials) on the combustion turbine to determine if loss of material is occurring due to selective leaching of zinc in the closed cooling water environment. If selective leaching is found, the condition is to be evaluated to determine whether the affected components are able to perform their intended functions through the PEO. Since the combustion turbines were installed in 1988, the inspections are not to be performed before 2018 because selective leaching is a slow-acting corrosion process that typically takes 30 years of service before degradation can be detected.

Program implementation included a program implementing procedure, and scheduled WO C2020083, for future component removals and destructive evaluations.

2.26 FRCT Buried Piping Inspection

a. Scope of Inspection

SER Appendix A Commitment 57, in part, stated:

> The program is new program and will manage the external surface aging effects of loss of material for carbon steel piping and piping system components in a soil (external) environment.

> The program activities consist of preventive and condition monitoring measures to manage the loss of material due to external corrosion for piping and piping system components in the scope of LR that are in a soil (external) environment. The program scope includes buried portions of glycol cooling water piping located at the FRCT station.
>
> External inspections of buried components will occur opportunistically when they are excavated during maintenance. Within 10 years prior to entering the PEO, inspection of buried piping will be performed unless an opportunistic inspection occurs within this 10 year period. Upon entering the PEO, inspection of buried piping will again be performed within the next 10 years, unless an opportunistic inspection occurs during this 10 year period.

The inspector reviewed this new program, and reviewed PBD-AMP-B.1.26, "FRCT Buried Piping Inspection Program Basis Document," implementing procedure 117.3-1, planned and completed work orders, and related corrective action IRs. The inspector interviewed the responsible plant personnel regarding these documents. The inspector reviewed the piping inspection records and photos, and compared the results to Exelon's established underground piping inspection guidance and criteria. In addition, the inspector walked down the aboveground area in the vicinity of the buried closed cooling water system piping looking for indications of potential underground leakage.

b. Observations

The inspector did not identify any significant problems or concerns.

The program is credited with managing the loss of material aging effects of corrosion on the pressure-retaining capacity of carbon steel piping in a soil (external) environment for the two FRCTs. Exelon's actions to implement this program included:

- Developed and implemented a new procedure to control FRCT activities (including work documentation and corrective actions).
- Inspected two buried pipes prior to the PEO.

2.27 FRCT Periodic Inspection Program

a. Scope of Inspection

SER Appendix A Commitment 60, in part, stated:

> The program is new and will consist of periodic inspections of selected components to verify the integrity of the system and confirm the absence of identified aging effects. Inspections will be scheduled to coincide with major combustion turbine maintenance inspections, when the subject components are made accessible. These inspections will be performed on a frequency not to exceed once every 10 years. The purpose of the inspection is to

> determine if a specified aging effect is occurring. If the aging effect is occurring, an evaluation will be performed to determine the effect it will have on the ability of affected components to perform their intended functions for the PEO, and appropriate corrective action is taken. Inspection methods may include visual examination, surface or volumetric examinations. When inspection results fail to meet established acceptance criteria, an evaluation will be conducted to identify actions or measures necessary to provide reasonable assurance that the component intended function is maintained during the PEO. The initial inspections associated with this program will be performed at the next major inspection outage for each unit. Based on an inspection frequency of 10 years, the next inspection for FRCT Unit 1 will be performed by May 2014, and the next inspection for FRCT Unit 2 will be performed by November 2015.

The inspector reviewed this new program, and reviewed the inspection reports from the completed major inspection activities, the program implementing procedure, and the planned work under the associated WOs. In addition, the inspector interviewed the responsible engineering personnel.

b. Observations

The inspector did not identify any significant problems or concerns.

Exelon committed to implement the FRCT Periodic Inspection Program inspections for FRCT Unit 1 by May 2014 and for the FRCT Unit 2 by November 2015. The program is a new, plant-specific aging management program, which consists of inspections to periodically monitor aging effects in combustion turbine systems which are only accessible during outage disassembly and are not covered in another FRCT aging management program. Primarily, the inspections involve visual inspections of heat exchanger surfaces and internal surfaces of carbon steel components on a 10-year frequency.

Program implementation included a program implementing procedure, and scheduled recurring task WOs R2121527 and R2121528, for future inspections.

Also, major inspection and maintenance activities were performed on Unit 1 FRCT in March 2004, and on Unit 2 FRCT in October 2005, by contracted combustion turbine services.

2.28 Met Tower Buried Piping and Tank Inspection

a. Scope of Inspection

SER Appendix-A Commitment 61, in part, stated:

> The program is new and will manage the external surface aging effects of loss of material for copper and carbon steel piping, and carbon steel tanks in a soil (external) environment. The program

> activities consist of preventive and condition monitoring measures to manage the loss of material due to external corrosion for piping and tanks in the scope of LR that are in a soil (external) environment. The program scope includes buried portions of the Met Tower based radio communications system repeater backup engine generator fuel (propane) supply piping and the associated buried fuel supply tank, located at the Meteorological Tower.
>
> External inspections of buried components will occur opportunistically when they are excavated during maintenance. Within 10 years prior to entering the PEO, inspection of buried piping will be performed unless an opportunistic inspection occurs within this 10 year period. Upon entering the PEO, inspection of buried piping will again be performed within the next 10 years, unless an opportunistic inspection occurs during this 10 year period.

The inspector reviewed this new program, and reviewed a new preventive maintenance procedure created to perform this inspection. In addition, the inspector performed an independent review of the documented inspection results, including a review of photos of the excavated tank and piping, for an opportunistic inspection that was performed on the tank and piping on February 25, 2009. The inspector also interviewed the responsible engineering personnel.

b. Observations

The inspector did not identify any significant problems or concerns.

Exelon's opportunistic inspection, performed on February 25, 2009, used the new procedure and did not identify any age related issues. Based on the inspection results, Exelon determined no significant degradation was evident. The inspector's review of the documented inspection results did not identify any inconsistencies between the inspector's indirect observations and Exelon's documented inspection conclusions.

2.29 Spent Fuel Pool Liner Leakage Monitoring

a. Scope of Inspection

SER Appendix-A Commitment 62, in part, stated:

> Exelon will commit to perform monitoring of any leakage from the spent fuel pool liner via the pool leak chase piping.

The inspector reviewed the Electronic Shift Operations Management System (eSOMS) Reactor Building Tour points for the spent fuel pool tell-tale drains, from September 2008 to March 2009, and Exelon Letter to the NRC, "Reconciliation of OC LR Application with September 2005 Revision 1 NUREG-1800 and NUREG-1801," dated March 30, 2006. The inspector interviewed the spent fuel pool liner leakage monitoring program owner and other relevant station personnel, and walked down the tell-tale drains located in the reactor building.

b. Observations

The inspector did not identify any significant problems or concerns.

The inspector observed that operators monitor the spent fuel pool tell-tale drain lines via a camera stationed at the 54-foot elevation in the reactor building on a weekly basis. The inspector identified that the eSOMS tour point long descriptions did not clearly identify the activity as a license renewal commitment. In follow-up to the inspector observation, Exelon entered this issue into the corrective action program (IR 891368) and additionally added an acceptance criteria within eSOMS, to require an equipment operator to enter a log remark if any leakage was identified.

2.30 FRCT Quality Assurance Program and Administrative Controls

a. Scope of Inspection

SER Appendix A Commitment 65, in part, stated:

> Exelon will ensure that procedures are established to implement the program elements of Corrective Action, Confirmation, and Administrative Controls, as described in Sections A.0.5 and B.0.3 of Enclosure 1 of AmerGen letter 2130-06-20334, for the FRCT aging management activities.

The inspector reviewed the new implementing procedure 117.3-1, planned and completed work orders, the FRCT site deficiency log, combustion turbine system trending and reliability data, and related corrective action IRs. In addition, the inspector interviewed the responsible Exelon and FRCT site personnel regarding these documents. The inspector performed several walkdowns at the FRCT site, the OC SBO transformer, and the OC SBO control panel (ER-743-189) to observe the material condition and aging management control.

b. Observations

The inspector did not identify any significant problems or concerns.

OC LR Commitment 65 established corrective action, confirmation and administrative controls for FRCT aging management activities. In general, maintenance performed on equipment that provides a function to support the response to a station blackout (SBO) event must meet the quality requirements of NRC Regulatory Guide 1.155. The two FRCTs are owned, operated, and maintained by Forked River Power, LLC, under contract to supply SBO services to OC. Exelon has a contract and interface agreement with the FRCT site owner titled "SBO Agreement" that prescribes the required quality standards. The aging management procedure for the FRCT equipment is executed in accordance with this agreement. Exelon's actions for this new program included:

- Developed and implemented a new procedure to control FRCT aging management activities (including work documentation and corrective actions).

- Established a signed agreement with the FRCT site owner that effectively linked the existing SBO Agreement to the new procedure, 117.3-1, "Aging Management Activities to Meet OC LR Regulatory Commitments."

- Maintained oversight of the Forked River Power activities to ensure that corrective action, confirmation and administrative controls requirements were implemented using Exelon corrective action program (CAP) and work control processes prior to the PEO.

3. Commitment Management Program

a. Scope of Inspection

The inspector reviewed current licensing basis procedures used to manage and revise regulatory commitments to observe whether they were consistent with the requirements of 10 CFR 50.59, NRC Regulatory Issue Summary 2000-17, "Managing Regulatory Commitments," and the guidance in NEI 99-04, "Guidelines for Managing NRC Commitment Changes." In addition, the inspector reviewed the procedures to observe whether administrative controls were in-place to ensure commitment revisions or the elimination of commitments altogether would be evaluated, approved, and reported to the NRC, if required. The inspector reviewed Exelon's current licensing basis commitment tracking program. The following commitment change evaluation packages were also reviewed:

- Commitment Change 08-004, revision 2, RPV Axial Weld Examination Relief and
- Commitment Change 09-001, ASME Section XI, Subsection IWE and the Protective Coating Monitoring and Maintenance Program

In addition, NRR completed a routine audit of Exelon's management of regulatory commitments in February 2009 (ML090570036). Based on the audit results, NRR concluded that Exelon had implemented an acceptable program for implementing and managing NRC commitments at OC.

b. Observations

The inspector did not identify any significant problems or concerns.

4. NRR Staff Review Items

4.1 Revised Pressure-Temperature Limits

a. Scope of Review

SER Appendix A Commitment 46, in part, stated:

> Revised pressure-temperature limits for a 60 year licensed operating life have been prepared and will be submitted to the NRC for approval.

NRR staff reviewed the Exelon Technical Specification change request to relocate the pressure-temperature limit curves to the Pressure and Temperature Limits Report (ML080740287) and the NRC SER related to that request (ML082390685).

b. Observations

The NRR staff did not identify any significant problems or concerns.

4.2 Circumferential Weld Examination Relief

a. Scope of Review

SER Appendix A Commitment 47, in part, stated:

> Apply for extension Reactor Vessel Circumferential Weld Examination Relief for 60 year operation.

NRR staff reviewed Exelon's submitted relief request (ML090440230) to the requirements of 10 CFR 50.55a concerning reactor pressure vessel circumferential shell welds, dated February 13, 2009.

b. Observations

The NRR staff did not identify any significant problems or concerns.

4.3 RAMA Fluence Methodology

a. Scope of Review

SER Appendix A Commitment 50, in part, stated:

> The NRC issued a SER for RAMA approving RAMA for reactor vessel fluence calculations. Oyster Creek will comply with the applicable requirements of the SER.

NRR staff reviewed EXL-FLU-001-R-002, "Fluence Evaluation for Reactor Pressure Vessel," the SER related to Radiation Analysis Modeling Application (RAMA) Methodology (ML073130188), and LR SER, sections 4.2, "Neutron Embrittlement of the Reactor Vessel and Internals," and 4.2.2, "Adjusted Reference Temperature for Reactor Vessel Materials due to Neutron Embrittlement." In addition, NRR staff interviewed Exelon engineering personnel.

b. Observations

No significant problems or concerns were identified.

OC fluence calculations are benchmarked using plant-specific surveillance capsule dosimetry, in accordance with the requirements of the RAMA SER for plants which do not have the geometries similar to the referenced geometry of a BWR-IV plant. OC is a BWR-II plant.

Exelon stated that the measured and calculated data obtained from the capsule analysis meets the benchmarking guidelines contained in Regulatory Guide 1.190, "Calculational and Dosimetry Methods for Determining Reactor Pressure Vessel Neutron Fluence." The NRC staff verified that Oyster Creek data found in EXL-FLU-001-R-002 (ML060830567) met the benchmarking guidelines contained in Regulatory Guide 1.190.

4.4 Engineering Study of Reactor Cavity Liner

a. Scope of Review

SER Section 1.7, Summary of Proposed License Conditions, in part, stated:

> The sixth license condition requires the applicant to perform an engineering study prior to the PEO to identify options to eliminate or reduce the leakage in the OC reactor cavity liner.

NRR staff reviewed SIR-07-490-NPS, "OC reactor Cavity Liner Leakage Evaluation," EXLNOC71-PR-001, "Conceptual Designs for Reactor Cavity Liner Modifications," and Exelon Project Review Committee Meeting Minutes, dated December 18, 2008, to observe Exelon's implementation of this license condition.

b. Observations

The NRR staff did not identify any significant problems or concerns.

SIR-07-490-NPS identified potential repair or modification options to eliminate cavity liner leakage.

4.5 Biological Opinion

a. Scope of Review

The Supplemental Environmental Impact Statement (ML070100234), in part, stated:

> The November 21, 2006 Biological Opinion (BO) for OC, issued by the National Marine Fisheries Service (NMFS), stated that in order to be exempt from prohibitions of section 9 of the Endangered Species Act, OC must comply with eleven terms and conditions specified in the Incidental Take Statement. The terms and conditions involve monitoring, minimizing, mitigating, reporting, rehabilitating, and performing necropsies on sea turtles taken by the plant.

As a result, the NRC proposed to include an additional condition of license which, in part, stated:

> Biological Opinion. Within 30 days from the issuance date of the renewed license, Exelon shall comply with the terms and conditions of the Incidental Take Statement associated with certain sea turtles in the Biological Opinion in effect or as

subsequently issued by the National Marine Fisheries Service regarding operation of the facility.

NRR staff reviewed selected procedures, Sea Turtle Incidental Take Reports, and Annual Sea Turtle Incident Take Reports to observe Exelon's implementation activities regarding the terms and conditions of the BO. In addition, the NRR staff interviewed cognizant Exelon personnel, including regulatory affairs engineers, who are responsible for implementing the associated reporting requirements. The reviewed procedures included, but were not limited to:

- eSOMS Operator Rounds for Sea Turtle Tours, 9/21 thru 10/2/2008,
- 106.12, "Sea Turtle Surveillance, Handling and Reporting Instructions,"
- 324.1, "Thermal Dilution Trash Rake Operations,"
- 344.2, "Intake Trash Rake Operations," and
- LS-MA-1253, OC-08, "Reportable Event Plant-Specific Requirements - Sighting or Capture of Sea Turtle."

b. Observations

The NRR staff did not identify any significant problems or concerns.

Operator Logs for Tours, instructs operators to monitor for turtles every four hours, in accordance with the BO Terms & Conditions (2) which, in part, stated that tours are to be performed three times per shift/every four hours from June thru October.

106.12 provided instructions to operators regarding turtle tours, handling, and reporting, in accordance with the requirements of the BO, Appendix II, "Handling and Resuscitation Procedures Sea Turtles Found at OC." 106.12-1, Attachment 1, "Sea Turtle Observation/Incidental Take Report," directed operators to record specific on-site data necessary to satisfy the reporting requirements of the BO Appendix III, "Incident Report of Sea Turtle Take at OC." In addition, six Sea Turtle Incidental Take Reports, 2008-1 thru 2008-6, prepared by Brigantine Marine Mammal Stranding Center, under contract to Exelon, included all required information, in accordance with the BO Appendix III, "Incident Report of Sea Turtle Take at OC."

324.1 directed dilution trash rake cleaning at least once every 24 hours or notify NMFS of an alternative from June thru October, in accordance with the BO Terms & Conditions Item (1). In addition, 324.1 references 106.12 for handling of sea turtles and NMFS reporting requirements.

344.2 directed intake trash rake cleaning at least once every 24 hours or notify NMFS of an alternative from June thru October, in accordance with the BO Terms & Conditions Item (1). In addition, 344.2 references 106.12 for handling of sea turtles and NMFS reporting requirements.

LS-MA-1253 contained reporting requirements, in accordance with the BO Terms & Conditions (7, 8, and 9).

4.6 Three Dimensional Finite Element Analysis of the Drywell Shell

a. Scope of Review

SER Appendix-A Commitment 27, "ASME Section XI, Subsection IWE," in part, stated:

> The existing program will be enhanced to include:
>
> (18) AmerGen [now Exelon] will perform a 3-D finite element structural analysis of the primary containment drywell shell using modern methods and current drywell shell thickness data to better quantify the margin that exists above the Code required minimum for buckling. The analysis will include sensitivity studies to determine the degree to which uncertainties in the size of thinned areas affect Code margins. If the analysis determines that the drywell shell does not meet required thickness values, the NRC will be notified in accordance with 10 CFR 50 requirements.

SER Section 1.7, Summary of Proposed License Conditions, in part, stated:

> The seventh license condition requires the applicant to perform a 3-D (dimensional) finite element analysis of the drywell shell prior to entering the period of extended operation.

In January 2009, Exelon submitted a summary report of the results of the OC three dimensional (3-D) finite element analysis (FEA) of the drywell shell. The summary report consists of two enclosures, which summarize a baseline analysis and two sensitivity analyses. The first enclosure summarizes the process used in defining the condition of the drywell shell, a description of the 3-D FEA model, the loads and load combinations imposed on the drywell shell, the buckling mode identifications, the analysis results, and the calculated margins with respect to the ASME Code acceptance criteria. The second enclosure includes two sensitivity analyses which use the same model and analysis techniques employed in the baseline analysis. The sensitivity analyses reduce the observed sand bed bay thicknesses to capture uncertainties in UT thickness measurements.

NRC staff reviewed the report of the results of the 3-D FEA of the OC drywell shell, including selected supporting analysis, calculations, and documents. Exelon's report included:

- Structural Integrity Associates Report 0006004.403, Structural Evaluation of the OC Drywell Summary Report (ML090270872)

- Structural Integrity Associates Report 0006004.404, OC Drywell Sand Bed region Wall Thinning Sensitivity Analysis Summary Report (ML090270873)

As part of its evaluation, the NRC technical reviewers and staff visited Exelon offices to interview Exelon technical staff and Structural Integrity Associates' (SIA) technical staff,

which performed the analysis. The NRC also reviewed SIA's original calculations and supporting documentation for its analysis. The staff's review and assessment includes a discussion of the baseline analysis, discussion of the two sensitivity analyses, and an overall assessment of the analyses. The staff's detailed review is available in ADAMS as ML091310413, "Assessment of the Oyster Creek 3-D Finite Element Analysis of the Drywell Shell."

b. Observations

The applicant performed a 3-D FEA of the drywell shell using modern methods of computer analysis. The analysis also included sensitivity studies to determine the degree to which uncertainties in the size of the thinned areas associated with the drywell shell could affect the ASME Code margins. The staff concluded that the analysis reaffirms that the Oyster Creek drywell shell meets the ASME code limits even when accounting for measurement uncertainties in the thicknesses of the shell. The staff's review also determined that Exelon's analysis was based on realistic, but conservatively biased, assumptions and that it was conducted using good engineering practices and judgment. As a result, the staff found that the analyses fulfilled SER Appendix-A Commitment 27, and the associated license condition. It is important to note that these analyses are not the analysis of record for the Oyster Creek drywell shell.

4OA6 Meetings, Including Exit Meeting

Exit Meeting Summary

The inspector presented the results of this inspection to Mr. M. Gallagher, Vice President License Renewal, Mr. P. Orphanos, Plant Manager, and other members of Exelon's staff on April 16, 2009.

No proprietary information is contained in this inspection report.

ATTACHMENT A

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Dragoo, FRCT - Purenergy Operating Services, LLC
M. Gallagher, Vice President License Renewal
M. Hand, Structural Engineer
G. Harttraft, Reactor Internals & ISI Program Manager
M. Herrera, Structural Integrity Associates
D. Hinchliffe, Exelon System Engineer for EDG and FRCT
J. Hufnagel, Exelon License Renewal
S. Bee Kok, Structural Integrity Associates
F. Ku, Structural Integrity Associates
J. O'Rourke, Exelon License Renewal
D. Olszewski, Program Manager
P. Orphanos, Plant Manager
F. Polaski, Exelon License Renewal
R. Pruthi, Electrical Design Engineer
A. Sparks, Aboveground Tanks Program Manager
P. Tamburro, Site License Renewal Lead
S. Tang, Structural Integrity Associates
C. Taylor, Regulatory Affairs
T. Trettel, Fire Protection System Engineer

NRC Personnel

H. Asher, Senior Structural Engineer, Division of Engineering, NRR
M. Ferdas, Senior Resident Inspector, Oyster Creek
B. Harris, Counsel for NRC Staff
A. Hiser, Senior Advisor, Division of License Renewal, NRR
J. Kulp, Resident Inspector, Oyster Creek
L. Lund, Senior Project Manager, Division of License Renewal, NRR
K. Manoly, Senior Advisor, Division of Engineering, NRR
M. Mitchell, Chief - Vessels & Internals Integrity Branch, Division of Component Integrity, NRR
B. Parks, Reactor Systems Branch, Division of Safety Systems, NRR
D. Pelton, Chief - License Renewal Projects Branch 1, Division of License Renewal, NRR
A. Prinaris, Structural Engineer, Division of License Renewal, NRR
L. Regner, Project Manager, Division of License Renewal, NRR

Observers

R. Pinney, New Jersey State Department of Environmental Protection
R. Zak, New Jersey State Department of Environmental Protection
M. Fallin, Constellation License Renewal Manager
R. Leski, Nine Mile Point License Renewal Manager
P. Marcus, Dresden License Renewal Engineer

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None.

Closed

05000219/2008007-01	URI	Drywell Sand Bed Water Intrusion, Drain Monitoring, and Coating Deficiency (Section 1)

LIST OF ACRONYMS

3-D	Three Dimensional
APRM	Average Power Range Monitor
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing Materials
BO	[National Marine Fisheries Service] Biological Opinion
BWROG	Boiling Water Reactor Owners Group
CAP	Corrective Action Program
CASS	Cast Austenitic Stainless Steel
CLB	Current Licensing Basis
CRD	Control Rod Drive
CST	Condensate Storage Tank
EDG	Emergency Diesel Generator
EPRI	Electric Power Research Institute
eSOMS	Electronic Shift Operations Management System
FEA	Finite Element Analysis
FRCT	Forked River Combustion Turbine
IMC	[NRC] Inspection Manual Chapter
IN	[NRC] information Notice
IP	[NRC] Inspection Procedure
IR	[Exelon] Issue Report (i.e., corrective action condition report)
IRM	Intermediate Range Monitor
JCP&L	Jersey Central Power & Light
GALL	Generic Aging Lessons Learned Report [NUREG-1801]
GE	General Electric
gpm	Gallons Per Minute
GPU	General Public Utilities
LPRM	Local Power Range Monitor
LR	License Renewal
MIC	Microbiologically-Influenced Corrosion
NDE	Non-destructive Examination
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NMFS	National Marine Fisheries Service
NRC	U. S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OC	Oyster Creek

OE	Operating Experience
PEO	Period of Extended Operation
PM	Preventive Maintenance
QATR	Quality Assurance Topical Report
RAI	[NRC] Request for Additional information
RAMA	Radiation Analysis Modeling Application
RBCCW	Reactor Building Closed Cooling Water
RG	[NRC] Regulatory Guide
RPV	Reactor Pressure Vessel
SBO	Station Blackout
SER	[NRC] Safety Evaluation Report
SIL	[GE] Service Information Letter
SS	Stainless Steel
UFSAR	Updated Final Safety Analysis Report
URI	[NRC] Unresolved Item
UT	Ultrasonic Test
VT	Visual Testing
WO	Work Order

LIST OF DOCUMENTS REVIEWED

License Renewal Program Documents

Exelon Letter 2130-07-20502 to NRC, 10 CFR 54.21(b) Annual Amendment to OC LR Application (TAC No. MC7624), dated 7/9/2007
PBD-AMP-B.1.20, Fire Water System Program Basis Document, Rev 2
PBD-AMP-B.1.26, Buried Piping Inspection Program Basis Document, Rev 1
PBD-AMP-B.1.26A, FRCT Buried Piping Inspection Program Basis Document, Rev 1
PP-09, Inspection Sample Basis for the One-Time Inspection AMP, Rev 0

Plant Procedures and Specifications

106.12, Sea Turtle Surveillance, Handling and Reporting Instructions, Rev 9
117.3, Alternate AC System Reliability Monitoring, Rev 2
117.3-1, Aging Management Activities to Meet OC LR Regulatory Commitments, Rev 1
205.29, Control Rod Blade/Fuel Support Piece Removal and Replacement, Rev 0
205.94, RPV Flood-up Using Core Spray, Rev 9
205.95, Reactor Flood-Up/Drain-Down, Rev 10
311, Fuel Pool Cooling System, Rev 99
324.1, Thermal Dilution Trash Rake Operations, Rev 5
327.1, Fuel Oil Receipt and Handling Procedure, Rev 44
344.2, Intake Trash Rake Operations, Rev 4
607.4.016, Containment Spray and Emergency Service Water System 1 Pump Operability and Quarterly Inservice Test, Rev 12
607.4.017, Containment Spray and Emergency Service Water System 2 Pump Operability and Quarterly Inservice Test, Rev 14
621.3.002, Air Ejector Offgas Radiation Monitor Check Source Functional Test, Rev 13
621.3.005, Reactor Building High Radiation Monitor Calibration, Rev 9
641.4.001, Service Water Pump Operability and In-Service Test, Rev 52

642.4.001, RBCCW Inservice Test, Rev 30
644.4.002, Condensate Transfer Pump Operability and In-Service Test, Rev 38
645.6.023, Fire Suppression Water System Underground Flow Test, Rev 13
2400-GMM-3900.52, Inspection of Bolted Connections, Rev 4
2400-SME-3780.05, Power Factor Testing of 5KV Cables, Rev 4
2400-SME-3780.06, Dielectric Testing of 2.3KV and 5KV Cables, Rev 10
2400-SMI-3623.03, IRM, SRM, LPRM Characterization Trending & Diagnostics, Rev 10
2400-SMI-3623.08, IRM Detector Current-Voltage Testing, Rev 6
2400-SMI-3623.09, Calibration and Operation of LPRM Diagnostic, Rev 14
2400-SMM-3900.04, System Pressure Test Procedure (ASME XI), Rev 9
ABN-31, High Winds, Rev 8
ABN-37, Station Blackout, Rev 10
ABN-38, Station Seismic Event, Rev 9
CC-AA-104, Document Change Requests, Rev 9
CC-AA-501-1017, Welding Filler Material Procurement Requirements, Rev 3
CC-MA-102-1001, Design Inputs and Impact Screening - Implementation, Rev 8
CY-AA-130-921, Water and Sediment, Rev 5
CY-AB-120-100, Reactor Water Chemistry, Rev 9
CY-OC-120-540, Plant Oil Sampling, Rev 0
CY-OC-120-1107, Fuel Oil System Sample and Analysis, Rev 4
ER-AB-331, BWR Internals Program Management Rev 7
ER-AB-331-1003, BWR Vessel Integrated Surveillance Program Implementation, Rev 2
ER-AA-330-001, Section XI Pressure Testing, Rev 8
ER-AA-330-002, Inservice Inspection of Section XI Welds and Components, Rev 7
ER-AA-330-008, Exelon Service Level I, and Safety-Related (Service Level III) Protective Coatings, Rev 6
ER-AA-330-009, ASME Section XI Repair/Replacement Program, Rev 5
ER-AA-335-004, UT Measurement of Material Thickness and Interfering Conditions, Rev 3
ER-AA-335-007, UT Inspection for Determination of Sedimentation in Piping Systems or Components and Fluid Level Measurements, Rev 2
ER-AA-335-018, Detailed, General, VT-1, VT-1C, VT-3 and VT-3C Visual Examination of ASME Class MC and CC Containment Surfaces and Components, Rev 3 & 5
ER-AA-335-025, Oversight of Vendor NDE Activities, Rev 4
ER-AA-470, Fatigue and Transient Monitoring Program, Rev 0
ER-AA-5400-1002, Buried Pipe Examination Guide, Rev 1
ER-AA-370, Reactor Coolant Pressure Boundary Integrity, Rev 5
ER-AA-5400-1002, Buried Piping Guide, Rev 1
ER-AB-331-1003, BWR Vessel Integrated Surveillance Program Implementation, Rev 2
ER-OC-330-001, ISI Program Plan Fourth Ten-Year Inspection Interval, Rev 5
ER-OC-330-1001, ISI Program Plan, Rev 5
ER-OC-330-1002, Intergranular Stress Corrosion Cracking Inspection Program, Rev 2
ER-OC-331-1005, Reactor Internals Program, Rev 3
ER-OC-450, Structures Monitoring Program, Rev 1
ER-OC-470-10001, Fatigue and Transient Monitoring Program, Rev 0
ES-001, OC Engineering Classifications, Rev 10
LS-AA-104-1002, 50.59 Applicability Review, Rev 3
LS-AA-110, Commitment Change management, Rev 6
LS-AA-120, Issue Identification and Screening Process, Rev 9
LS-MA-1253, OC-08, Reportable Event Plant-Specific Requirements - Sighting or Capture of Sea Turtle, Rev 8

MA-AA-723-500, Inspection of Non EQ Cables and Connections for Managing Adverse Localized Environments, Rev 2
MA-OC-205-001, Reactor Pressure Vessel Disassembly, Rev 4 (draft)
MA-OC-773-001, Testing and Condition Monitoring of Inaccessible Cables, Rev 0
OP-AA-106-101, Significant Event reporting, Rev 11
PES-P-006, Diesel Fuel Oil, Rev 5
RP-OC-6006, Reactor Cavity and Equipment Pit Leak Mitigation and Decontamination, Rev 0
SA-AA-117, Excavation, Trenching, and Shoring, Rev 10

Drawings

GE-153-02-009, General Arrangement Reactor Building, Rev 4
GE-148F262 Sheet 1, Emergency Condenser Flow Diagram, Rev 53
BR 2005, sheet 2, Service Water System, Rev 98
BR 2005, sheet 4, Emergency Service Water System, Rev 80
BR-3001A, 4160V System One Line Diagram - Switchgear Bus 1A, Rev 0
BR-3001B, 4160V System One Line Diagram - Switchgear Bus 1C & 1D, Rev 0
BR-3001C, 4160V System One Line Diagram- Switchgear Bus 1B, Rev 0
FP SE-5419, Chlorination System, Rev 58
LR-BR-2003, sheet 1, Condensate and Feed System, Rev 0
LR-BR-2004, sheet 2, Condensate Transfer System, Rev 0

Issue Reports (Corrective Action Reports) and Action Requests
* = IRs written as a result of the NRC inspection

2182273	729790	837688	871692	893299*
2207488	729801	837883	872014	893305*
330592	769206	837887	884953	893493*
348545	796815	837899	888215	894273*
354906	797281	837908	890420	894552
390956	797298	837914	890453	894562
469998	804754	838139	890699*	894723*
471363	806819	838143	891368*	894786
471867	809564	838176	891465	895313
472141	813967	838523	891485	895320
472707	819365	838833	891748*	896192*
544925	828338	839053	891752*	896437*
546915	830588	839911	892012*	896838*
547236	835560	841543	892050*	896996*
550305	836362	842333	892078*	897389*
557180	836367	843209	892233*	897394*
678386	836367	843608	892629*	897649*
711132	837464	845297	892738*	
724846	837647	847464	893090	

Work Orders (WOs)

C2010561	C2014423	C2015999	C2017334	C2017507
C2011220	C2015468	C2016834	C2017336	C2017509
C2012339	C2015469	C2017086	C2017426	C2018240

C2018241	R2033700	R2096352	R2120084	R2121597
C2018565	R2040953	R2096505	R2120210	R2121600
C2018639	R2040953	R2097321	R2120558	R2121964
C2019409	R2042556	R2100216	R2120634	R2122597
C2019518	R2054006	R2111727	R2120679	R2122604
C2019555	R2057483	R2113811	R2120771	R2122895
C2020083	R2060566	R2113993	R2120850	R2125551
C2020359	R2062981	R2114206	R2121391	R2125842
PM 021111	R2062981	R2114261	R2121397	R2126856
PM 021121	R2068875	R2114262	R2121398	R2127195
PM 10047M	R2074618	R2114290	R2121401	R2128741
PM 18720M	R2076388	R2114370	R2121402	R2129014
PM 187715	R2081079	R2114981	R2121402	R2129743
PM 54108M	R2081515	R2115008	R2121444	R2130780
PM 621041	R2088454	R2116819	R2121494	R2131310
R0801029	R2088629	R2117387	R2121496	R2131338
R0801029	R2090069	R2119012	R2121525	R2133724
R0803892	R2090364	R2119126	R2121527	R2135734
R0805012	R2091031	R2119501	R2121528	R2136030
R0805013	R2093134	R2119514	R2121546	R2136191
R0805014	R2093526	R2119626	R2121575	R2137530
R2021655	R2093874	R2119750	R2121596	R2137800
R2026131	R2095857	R2119978	R2121597	R2199114

Forked River Combustion Turbine Work Orders

08-0011	08-0027	08-0030	08-0037
08-0025	08-0028	08-0032	08-0038
08-0026	08-0029	08-0034	

Non-destructive Examination Reports

1R22-LRA-002, dated 10/14/2008
1R22-LRA-003, dated 10/21/2008
1R22-LRA-005, dated 10/27/2008
1R22-LRA-007, dated 10/26/2008
1R22-LRA-008, dated 10/26/2008
1R22-LRA-010, dated 10/28/2008
1R22-LRA-011, dated 10/28/2008
1R22-LRA-012, dated 10/27/2008
1R22-LRA-015, dated 10/28/2008
1R22-LRA-016, dated 10/28/2008
1R22-LRA-017, dated 10/28/2008
1R22-LRA-045, dated 11/1/2008
1R22-LRA-056, dated 11/2/2008
1R22-LRA-060, dated 11/6/2008
1R22-LRA-066, dated 11/5/2008
1R22-LRA-072, dated 11/5/2008
1R22-LRA-080, dated 11/6/2008
1R22-LRA-085, dated 11/8/2008

1R22-LRA-086, dated 11/8/2008
1R22-LRA-087, dated 11/11/2008
2005-002-017, P-9-102A Cooling Water Line, dated 7/13/2005
2005-002-018, Pipe between V-9-360 & 4" Pipe, dated 7/19/2005
2005-002-019, P-9-102B Cooling Water Line, dated 7/19/2005
2008-002-028, T-9-101 Storage Tank, dated 8/20/2008
2008-002-029, T-9-101 Storage Tank, dated 8/20/2008
2008-006-001, dated 4/25/2008
2008-006-002, dated 4/26/2008
2008-006-003, dated 4/26/2008
2008-006-004, dated 4/26/2008
2008-006-005, dated 4/25/2008
2008-006-006, dated 4/26/2008
2008-006-010, dated 4/26/2008
2008-006-011, dated 4/26/2008
2008-006-013, dated 4/27/2008
2008-006-014, dated 4/29/2008
2008-007-002, dated 5/20/2008
2008-007-003, dated 4/29/2008
2008-007-004, dated 5/2/2008
2008-007-006, dated 5/5/2008
2008-007-008, dated 5/12/2008
2008-007-009, dated 5/12/2008
2008-007-010, dated 5/12/2008
2008-007-011, dated 5/13/2008
2008-007-012, dated 5/13/2008
2008-007-016, dated 6/5/2008
2008-007-018, dated 6/6/2008
2008-007-019, dated 6/6/2008
2008-007-020, dated 6/5/2008
2008-007-031, dated 9/25/2008
2008-007-032, dated 9/25/2008
2008-007-033, dated 10/1/2008
2008-007-035, dated 12/10/2008
2008-007-036, dated 12/18/2008
2008-007-042, dated 2/2/2009
2008-007-043, dated 2/10/2009
2008-007-044, dated 2/10/2009
2008-007-047, Piping Down Stream of V-9-208, dated 3/14/2009
2008-007-049, Piping Above V-9-295, dated 3/14/2009
2008-007-051, Sprinkler System 9, TB South, dated 3/14/2009
2008-007-053, Sprinkler System 3, dated 3/14/2009
2008-007-055, Piping Below V-9-298, dated 3/14/2009
2008-007-057, Sprinkler System 4, dated 3/14/2009
2008-007-059, Sprinkler System 12, dated 3/14/2009
2008-007-061, Piping Down Stream of V-9-4, dated 3/14/2009
2008-007-062, Piping of Pond Pump 2, dated 3/14/2009
2008-007-063, Piping Down Stream of V-9-043, dated 3/15/2009
ER-AA-335-018 Attachment 4, ASME IWE (Class MC) Containment Visual Examination Record
1R21LR-007, dated 10/20/2006

ER-AA-335-018 Attachment 4, ASME IWE (Class MC) Containment Visual Examination NDE Report 1R22-LRA-046, dated 10/31/2008
ER-AA-335-018 Attachment 4, ASME IWE (Class MC) Containment Visual Examination NDE Report 1R22-LRA-076, dated 11/6/2008
ER-AA-5400-1002 Attachment 8, As-Found Buried Piping Visual Inspection Report (531-CS-YU), dated 11/20/2008
ER-AA-5400-1002 Attachment 8, As-Found Buried Piping Visual Inspection Report (Cooling Tower Supply Line - Unit 1), dated 1/30/2009
ER-AA-5400-1002 Attachment 8, As-Found Buried Piping Visual Inspection Report (Cooling Tower Supply Line - Unit 2), dated 1/30/2009
ER-AA-5400-1002 Attachment 8, As-Found Buried Piping Visual Inspection Report (Condensate Transfer Line A-4), dated 4/10/2008
ER-AA-5400-1002 Attachment 8, As-Found Buried Piping Visual Inspection Report (Southeast Vault CS-10), dated 9/4/2008
ER-AA-5400-1002 Attachment 8, As-Found Buried Piping Visual Inspection Report (Fire Hydrant FH-19), dated 10/17/2008
Examination Summary Sheet for Recirculation Safe End to Nozzle, dated 11/512008
Examination Summary Sheet for Core Spray Elbow to pipe weld overlay, dated 11/9/2008
GE UT Examination Report C2008336, Control Rod Drive Housing 46-39
GE OC-IVVI-08-166684, dated 11/2008
OCR20-088, dated 11/10/2004
OCR20-089, dated 11/10/2004

Completed Tests and Inspections

2009 One-Time Inspection Program - NDE Results Summary Report, dated 2/12/2009
2009 Selective Leaching Program - Results Summary Report, dated 3/12/2009
636.4.003, EDG 1 Load Test, completed 07/21/2008
636.4.003, EDG 1 Load Test, completed 09/15/2008
636.4.013, EDG 2 Load Test, completed 07/14/2008
678.4.005, Station Blackout Functional Test, completed 11/3/2006 and 10/26/2008
AAC System Reliability, dated between 1/2006 and 2/2009
CableWISE Vendor Report, Condition Assessment of 22 Cable Circuits, dated 6/22/2006
CableWISE Vendor Report, Condition Assessment of 21 Cable Circuits, dated 9/5/2007
CableWISE Vendor Report, Condition Assessment of 2 Cable Circuits, dated 1/29/2009
Dam Inspection Report, Regular Inspection of Fresh Water Impounding Pond Dam, 2005
EDG Fuel Oil Storage Tank All Levels Sample Analysis, completed 12/1/2008
EDG Fuel Oil Storage Tank Sample Analysis, completed 1/19/2009
EDG Fuel Oil Storage Tank Sample Analysis, completed 11/24/2008
Elite Pipeline Services, Circulating Water Piping Inspection, dated 11/1/2008
Exelon PowerLabs, Inspection of Valves & Pump Body for Selective Leaching, dated 2/6/2009
Fire Pond Diesel #1 Sample Analysis, completed 12/2/2008
Fire Pond Diesel #2 Sample Analysis, completed 12/2/2008
Fire Protection Water System Health Report, dated 10/1/2008 to 12/31/2008
FRCT Inspection Report FSR #300T1889, dated 1/4/2002
FRCT Inspection Report FSR #300T1994, dated 6/7/2004
Fuel Oil Truck Delivery Sample Analysis Taken, completed 1/23/2009
Fuel Oil Truck Delivery Particulate Contamination Data, completed between 12/24/2008 and 1/28/2009

Fuel Oil Fire Pond Diesel Storage Tank #1 and #2 Water and Sediment Analysis, completed between 2/23/2007 and 2/20/2009
Fuel Oil Truck Delivery Water and Sediment Analysis, completed between 1/2/2009 and 3/6/2009
Henderson Labs Water Analysis Report (Deluge System 7 & 8 Pipe Scrapings), dated 1/19/2009
Main Fuel Oil Storage Tank Sample Analysis, completed 11/13/2008
Main Fuel Oil Storage Tank All Levels Sample Analysis, completed 1/27/2009
Main Fuel Oil Storage Tank All Levels Sample Analysis, completed 10/15/2008
Main Fuel Oil Storage Tank Truck Delivery Sample Analysis, completed 11/24/2008
Main Fuel Oil Storage Tank Truck Delivery Sample Analysis, completed 11/25/2008
Station Blackout Functional Test Report, dated 2/14/2008 & 10/26/2008
Station Blackout Performance Monitoring and Unavailability, dated 1/2007 to 1/2009
Structures and Components Monitoring Report No. 168-002
Williams Industrial Services, B Isolation Condenser Internal Coating Assessment Report, dated 11/2/2008

Calculations, Analysis, Technical Evaluations, and Specifications

A2018671, Evaluation of ½ Inch Fire Pump Cooling Water Lines in July 2005, dated 7/21/2005
A2194271, Trend and Analysis for Offgas and RB Radiation Monitor Cables, dated 3/2009
A2122803, Trend and Analysis for LPRM and IRM Cables, dated 3/2009
A2219548-02, Evaluate NDE Results for Fire Protection Piping Min Walls, dated 3/17/2009
A330592.27.46, Degradation Coating Found in Sand Bed Bay 11 in 1R22, Rev 0
A769088-03, Circulating Water Piping One Time Inspection Results, dated 12/9/2008
A769206-03, Condensate Piping One Time Inspection Results, dated 12/9/2008
A771740-03, Recirculation MG Set Piping One Time Inspection Results, dated 12/9/2008
A783174-03, Heating Steam Piping One Time Inspection Results, dated 12/9/2008
A804754-03, Spent Fuel Pool Cooling Piping One Time Inspection Results, dated 12/9/2008
A839375-03, Chlorination Valve One Time Inspection Results, dated 2/6/2009
A878804-02, Drywell Equipment Drains One Time Inspection Results, dated 2/6/2009
A891862-04, Evaluate Extending CST Inspections until October 2009, dated 3/24/2009
CCA-845297, Common Cause Analysis of 1R22 Outage License Renewal Activities, Rev 0
Corrosion Evaluation of the OC Drywell, dated 3/6/1987
ECR 08-00960-000, Add Stainless Steel Requirements to Line List
EXL-FLU-001-R-002, Fluence Evaluation for Reactor Pressure Vessel, Rev 0
EXLNOC071-PR-001, Conceptual Designs for Reactor Refuel Cavity Liner Modifications, Rev 0
FRCT Analytical Report, dated 2/5/2009
IS-328227-004, Specification for OC Function Requirements for Drywell Containment Vessel Thickness Examinations, Rev 13 & 14
Line Specifications for Lines NE-1C, MV-5A, NC-4, ND-10A, ND-10B, ND-10C, ND-1A, ND-1B, ND-1C, ND-9B, NE-1A, NE-1B , NE-1C, NE-2, NE-5, NU-3, NU-4, NZ-3, RHC-2A, RHC-2B, and SS-1
Microbiological Analysis of OC Corrosion Samples, dated 2/2/1987
OYS-20872, Material Analysis of Samples Removed from Sand Bed Bay Nos. 11 & 3 in Support of Drywell Exterior Liner Inspection Outage Activities, dated 11/11/2008
OYS-24910, Material Evaluation of the InstaCote Coating that did not adhere on the West Side of the Rx Cavity Wall, ML-2 InstaCote Organic Polymer, dated 1/22/2009
OYS-85377, Failure Analysis of Fire Protection Piping and Isolation Valve V-9-60 for Diesel Fire Pump 1-2 from System 811 – OC Unit 1, dated 11/21/2003

SIR-07-490-NPS, Reactor Cavity Liner Leakage Evaluation, dated 1/14/2008
SP-1302-52- 2108, Specification for Inspection of Tanks, Rev 3
SP-9000-06-004, Specification for Application and Repair of Service Level III Coatings, Rev 1
Specification, Application & Repair of Service Level II Coatings, dated 1/9/2009
Structural Integrity Associates Calculation OC-15Q-301, OC Drywell Components, Dimensions, Material Specifications, and Penetration List, Rev 1
Structural Integrity Associates Calculation OC-15Q-304, Vent Headers & Downcomers Geometry Modeling, Rev 1
Structural Integrity Associates Calculation OC-15Q-306, Independent Study of Star Truss Loads, Rev 1
Structural Integrity Associates Calculation OC-15Q-314, Mesh Refinement and Large Deformation Sensitivity Analyses, Rev 1
Structural Integrity Associates Calculation OC-15Q-316, Detailed Evaluation of Star Truss Male Lugs, Rev 0
Structural Integrity Associates Report 0006004.401, Appendix D, Refueling Case Eigenvalue Buckling Mode Shape, Rev 0
Structural Integrity Associates Report 0006004.401, Appendix E, Flooding Case Eigenvalue Buckling Mode Shape, Rev 0
Structural Integrity Associates Report 0006004.403, Structural Evaluation of the OC Drywell Summary Report (ML090270872), Rev 0
Structural Integrity Associates Report 0006004.404, OC Drywell Sand Bed region Wall Thinning Sensitivity Analysis Summary Report (ML090270873), Rev 0

Miscellaneous Documents

2006 OC Biological Opinion from NMFS (ML063320346), dated 11-21-06
Applicability of ASME Code Case N-284-1 to Buckling Analysis of Drywell Shell, Clarence D. Miller, Ph.D., P.E., dated 6/15/2006
CAP No. 2003-2586, 2004-0161, 2004-0235
EPRI BWRVIP Letter, Code Case N-730 Roll Expansion of Class I Control Rod Drive Bottom Head Penetrations in BWRs, dated 10/16/2006
eSOMS Operator Rounds for Spent Fuel Pool Tell-Tale Drain Checks, from 9/2008 to 3/2009
eSOMS Operator Rounds for Sea Turtle Tours from 9/21/2008 to 10/2/2008
Exelon Draft Procedure, 50 Year Sample Testing of Fire System Sprinkler Heads, no date
Exelon Project Review Committee Meeting Minutes, dated 12/18/2008
Exelon Letter 2130-06-20291 to NRC, Response to NRC RAI (ML061100138), dated 4/18/2006
Exelon Letter 2130-06-20299 to NRC, Response to NRC RAI (ML061220306), dated 4/28/2006
Exelon Letter 2130-06-20334 to NRC, Supplemental Information for FRCT Quality Assurance Attributes, Related to the OC LR Application (ML061440152), dated 5/18/2006
Exelon Letter 2130-06-20293, Reconciliation of LR Application with revision 1 to NUREG-1800 and NUREG-1801 (ML060950408), dated 3/30/2006
Exelon Letter to NRC, Technical Specification Change Request No. 348 (ML080740287), dated 3/10/2008
Exelon Letter to NRC, RA-07-042, 2007 Annual Sea Turtle Incidental Take Report (ML080080409), dated 12/28/2007
Exelon Letter to NRC, RA-08-030, Thermal Aging and Neutron Irradiation Embrittlement of CASS (ML081070060), dated 4/9/2008
Exelon Letter to NRC, RA-08-061, Sea Turtle Incidental Take Reports 2008-1 and 2008-2 (ML082060197), dated 7/18/2008

Exelon Letter to NRC, RA-08-075, Sea Turtle Incidental Take Reports 2008-3, 2008-4, and 2008-5 (ML082410417), dated 8/22/2008
Exelon Letter to NRC, RA-08-086, Sea Turtle Incidental Take Report 2008-6 (ML082950484), dated 10/10/2008
Exelon Letter to NRC, RA-08-088, 2008 Annual Sea Turtle Incidental Take Report (ML090050255), dated 12/23/2008
Exelon Proposed Relief Request to 10 CFR 50.55a (ML090440230), dated 2/13/2009
Exelon Cast Austenitic Stainless Steel Submittal (ML081070060), dated 4/9/2008
Exelon Revised Pressure-Temperature Limits Submittal (ML081900082), dated 6/30/2008
Exelon Technical Specification Change Request to Relocate Pressure-Temperature Curves to the Pressure and Temperature Limits Report (ML080740287), dated 3/10/2008
FRCT Deficiency Log, dated 3/17/2009
FRCT Power Aging Management Activities Manual, dated 3/17/2009
FRCT Letter to OC, Aging Management Activities to Meet OC LR Regulatory Commitments, dated 10/9/2008
GPU Letter 5000-86-1986 to NRC, OC Drywell Containment, dated 12/18/1986
GPU Letter 5000-90-1993 to NRC, OC Drywell Containment (ML061020638), dated 11/26/1990
GPU Letter 5000-90-1995 to NRC, OC Drywell Containment (ML072841069), dated 12/5/1990
GPU Letter 5000-95-0088 to NRC, Drywell Corrosion Monitoring Program, dated 9/15/1995
GPU Letter to NRC, Generic Letter 87-05 (ML091180736), dated 5/12/1987
NMFS to NRC (Nash) Letter, regarding New Biological Opinion, dated 2/8/2007
NO-AA-10, Quality Assurance Topical Report (QATR), Rev 79 and Rev 82
NOSA-OYS-08-05 (AR 783640), Engineering Programs and Station Blackout Audit Report, dated 7/24/2008
OC Proposed Relief Request to Requirements of 10 CFR 50.55a concerning Reactor Pressure Vessel Circumferential Shell Welds (ML090440230), dated 2/13/2009
System Health Report, Station Blackout & Support System, dated 10/1/2008 to 12/31/2008
System Health Report, EDG, 4th Quarter 2008
Trend of EDG 1 System Performance Monitoring, 3/2009
Topical Report 116, OC Underground Piping Program Description and Status, Rev 3
Topical Report 140, Emergency Service Water and Service Water System Plan, Rev 3

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NRC Assessment of the Oyster Creek 3-D Finite Element Analysis of the Drywell Shell (ML091310413), dated 5/18/2009
NRC Inspection Report 05000219/2006007 (ML062650059), dated 9/21/2006
NRC Inspection Report 05000219/2006013 (ML070170396), dated 1/17/2007
NRC Inspection Report 05000219/2007005 (ML080250267), dated 1/25/2008
NRC Inspection Report 05000219/2008007 (ML090210106), dated 1/21/2009
NRC Letter to GPU, TAC M92688, Drywell Monitoring Program Changes, dated 2/15/1996
NRC Letter to GPU, TAC M93658, OC Drywell Monitoring Program Changes, dated 11/1/1995
NRC Letter to OC, Relief Request for Application of Draft ASME Code Case N-730 (ML062700140), dated 10/6/2006
Information Notice (IN) 85-24, Failures of Protective Coatings in Pipes and Heat Exchangers
IN 86-99, Supplement 1, Degradation of Steel Containments
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RG 1.155, Station Blackout
RG 1.190, Calculational and Dosimetry Methods for Determining RPV Neutron Fluence

RIS 2000-17, Managing Regulatory Commitments made to the NRC Staff
NUREG-0619, BWR Feedwater Nozzle & Control Rod Drive Return Line Nozzle Cracking (ML031600712), November 1980
NUREG-1801, SER related to LR of OC (ML070890637), dated March 2007
NUREG-1801, Supplement 1, SER related to LR of OC (ML080230078), dated 9/2008
NUREG-1437, Volume 1, Supplement 28, Generic Environmental Impact Statement regarding OC (ML070100234), dated 1/2007
NUREG-1437, Volume 2, Supplement 28, Generic Environmental Impact Statement regarding OC (ML070100258), dated 1/2007
SER related to OC Operation License Amendment No. 269 (ML082390685), dated 9/30/2008
SER related to Evaluation of OC Drywell Structural Integrity (ML070290668), dated 4/24/1992
SER related to OC Operation License Amendment No. 165 (ML011200289), dated 9/13/1993
SER related to Exelon Technical Specification Change Request ML080740287 (ML082390685), dated 9/30/2008
SER related to RAMA Methodology (ML073130188), dated 5/13/2005

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ASME Section XI-1992, IWE-3000, Acceptance Standards
ASTM D 1796-2004, Test Method for Water and Sediment in Fuel Oils by Centrifuge Method
ASTM D 2209-1996, Test Method for Water & Sediment in Middle Distillate Fuels by Centrifuge
ASTM D 2276-2000, Test Method for Particulate Contaminant in Fuel by Line Sampling
ASTM D 4057-2006, Manual Sampling of Petroleum and Petroleum Products
ASTM D 6217-1998, Test Method for Particulate Contamination in Middle Distillate Fuels by Laboratory Filtration
NEI 99-04, Guidelines for Managing NRC Commitments, Rev 0
NFPA 25-1998, Inspection, Testing, & Maintenance of Water-Based Fire Protection Systems
IEEE 400.3-2006, Partial Discharge Testing of Shielded Power Cable Systems
GE-NE-523-A71-0594, Rev 1, Alternate BWR Feedwater Nozzle Inspection Requirements, BWR Owners Group, August 1999
GE SIL 564, Verification of SRM, IRM, or LPRM Detector Response, Rev 0
GE SIL 564, Verification of SRM, IRM, or LPRM Detector Response, Rev 1
GE SIL 624, Stress Corrosion Cracking in Alloy 182 Welds in Shroud Support Structure, Rev 0