Sarah Rich

From: John Richmond
Sent: Monday, January 19, 2009 7:00 PM
To: Darrell Roberts; Richard Conte; Ronald Bellamy; Diane Bearde; Karl Farrar
Cc: Doug Tifft; David Pelton; Mary Baty; Michael Modes; Diane Screnci; Neil Sheehan; Nancy McNamara
Subject: OC 2008-07 Rev-14 >> ALL comments incorporated
Attachments: OC 2008-07 LRI_rev-14.doc

attached is the [hopefully] final version of this OC report.

I have incorporated all comments, with the final comments coming from Darrell.

LAST CHANCE for review or comments! [Yes. Yes. I know HQ has Tues off... but progress can't wait]

Thanks for all the support and help.
John R.

I/7

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TO BE WITHHELD FOR EXEMPTION 6

Mr. Charles G. Pardee
Chief Nuclear Officer (CNO) and Senior Vice President
Exelon Generation Company, LLC
200 Exelon Way
Kennett Square, PA 19348

SUBJECT: OYSTER CREEK GENERATING STATION - NRC LICENSE RENEWAL FOLLOW-UP INSPECTION REPORT 05000219/2008007

Dear Mr. Pardee

On December 23, 2008, 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 December 23, 2008, with Mr. T. Rausch, Site Vice President, Mr. M. Gallagher, Vice President License Renewal, and other members of your staff.

First, 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 absent a final NRC decision on license renewal. This inspection observed Oyster Creek license renewal activities during the last planned refueling outage prior to entering the period of extended operation. The license renewal application was the subject of a hearing and the Atomic Safety and Licensing Board decision is being appealed to the Commission. Because a renewed license has not been issued, the proposed license conditions and associated regulatory commitments, made as a part of the license renewal application, are not in effect. Accordingly, as related to license renewal activities, the enclosed report records the inspector's factual observations.

Second, the inspection examined activities conducted under your current license as they relate to safety and compliance with the Commission's rules and regulations. This portion of the inspection focused on the inservice inspection of the drywell containment. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of the NRC's inspection, the NRC did not identify any safety significant conditions affecting current 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 me at (610) 337-5126 if you have any questions regarding this letter.

Sincerely,

Darrell Roberts, Director
Division of Reactor Safety

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

Enclosure: Inspection Report No. 05000219/2008007
w/Attachment: Supplemental Information

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
P. Orphanos, Plant Manager, Oyster Creek Generating Station
J. Kandasamy, Regulatory Assurance Manager, Oyster Creek
R. DeGregorio, Senior Vice President, Mid-Atlantic Operations
K. Jury,Vice President, Licensing and Regulatory Affairs
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B. Fewell, Associate General Counsel, Exelon
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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

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 me at (610) 337-5126 if you have any questions regarding this letter.

Sincerely,

Darrell Roberts, Director
Division of Reactor Safety

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U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.:	50-219
License No.:	DPR-16
Report No.:	05000219/2008007
Licensee:	Exelon Generation Company, LLC
Facility:	Oyster Creek Generating Station
Location:	Forked River, New Jersey
Dates:	October 27 to November 7, 2008 (on-site inspection activities) November 13, 15, and 17, 2008 (on-site inspection activities) November 10 to December 23, 2008 (in-office review)
Inspectors:	J. Richmond, Lead M. Modes, Senior Reactor Engineer G. Meyer, Senior Reactor Engineer T. O'Hara, Reactor Inspector J. Heinly, Reactor Engineer J. Kulp, Resident Inspector, Oyster Creek
Approved by:	Darrell Roberts, Director Division of Reactor Safety Region I

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SUMMARY OF FINDINGS

IR 05000219/2008007; 10/27/2008 - 12/23/2008; Exelon, LLC, Oyster Creek Generating Station; License Renewal Follow-up.

The report covers a multi-week inspection of license renewal follow-up items. The inspection was conducted by five region based engineering inspectors and with assistance from the Oyster Creek resident inspector. The inspection was conducted 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 inspection activities.

A. NRC-Identified and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

None.

REPORT DETAILS

Summary of Plant Status

The Oyster Creek Generating Station was in a scheduled refueling outage during the on-site portions of this inspection.

At the time of the inspection, AmerGen Energy Company, LLC was the licensee for Oyster Creek Generating Station. As of January 8, 2009, the Oyster Creek license was transferred to Exelon Generating Company, LLC by license amendment No. 271 (ML083640373).

4. OTHER ACTIVITIES (OA)

4OA5 License Renewal Follow-up (IP 71003)

1. Inspection Overview

1.1 Purpose of Inspection

The NRC conducted this inspection using the guidance of Inspection Procedure (IP) 71003 "Post-Approval Site Inspection for License Renewal." The license renewal application was the subject of a hearing and the Atomic Safety and Licensing Board decision is being appealed to the Commission. Although IP 71003 is designated as a "post-approval" inspection procedure, the NRC conducted this inspection as a prudent measure absent a final NRC decision on license renewal. This inspection observed Oyster Creek license renewal activities during the last refueling outage prior to entering the period of extended operation.

Inspection observations were made of license renewal commitments and license conditions selected from NUREG-1875, "Safety Evaluation Report (SER) Related to the License Renewal of Oyster Creek Generating Station" (ML071290023 & ML071310246). The inspection included observations of a number of license renewal commitments which were enhancements to exiting programs implemented under the current license. When the performance of an existing program was evaluated by the inspectors, the basis for the evaluation was the current licensing basis (CLB), and the license renewal enhancements were not considered in the evaluation.

For license renewal activities, within the context of 10 CFR 54, the report only documents inspector observations, because the proposed license conditions and associated regulatory commitments were not in effect at the time of this inspection. These proposed conditions and commitments were not in effect because the application for a renewed license remains under Commission review for final decision, and a renewed license has not been approved for Oyster Creek. Thus they are referred to in this report as "proposed" conditions and commitments.

1.2 Sample Selection Process

The SER proposed commitments and proposed license conditions were selected based on the risk significance using insights gained from sources such as the NRC's

"Significance Determination Process Risk Informed Inspection Notebooks," the results of previous license renewal audits, and inspections of aging management programs. The inspectors also reviewed selected corrective actions taken as a result of previous license renewal inspections.

2. Assessment of Current Licensing Basis Performance Issues

2.1 ASME, Section XI, Subsection IWE Program

Monitoring of the condition of the primary containment drywell is accomplished through Exelon's ASME Section XI, Subsection IWE monitoring program. The inspectors determined Exelon provided an adequate basis to provide assurance that the drywell primary containment will remain operable throughout the period to the next scheduled examination (2012 refueling outage). This determination was based on the inspectors' evaluation of the drywell shell ultrasonic test (UT) thickness measurements (Sections 3.10 & 3.11), direct observation of drywell shell conditions both inside the drywell (Section 3.6, 3.8, & 3.11), including the floor trenches (Section 3.10), and outside the drywell in the sand bed regions (Sections 3.7 & 3.9), condition and integrity of the drywell shell epoxy coating (Section 3.9), and condition of the drywell shell moisture barrier seals (Sections 3.6 & 3.7). On a sampling basis, the inspectors observed that the enhancements made as a result of license renewal activities were integrated into the existing program for the drywell structural integrity.

The drywell shell epoxy coating and the moisture barrier seal, both in the sand bed region, are barriers used to protect the drywell from corrosion. The problems identified with these barriers (discussed in Sections 3.7 & 3.9) were corrected and had a minimal impact on the drywell steel shell. The drywell shell corrosion rate remains very small, as confirmed by the inspectors' review of Exelon's technical evaluations of the 2008 UT data. The inspectors determined Exelon provided an adequate basis to conclude the likelihood of additional blisters or moisture barrier seal issues will not impact the containment safety function during the period before the next scheduled examination (2012 refueling outage). This is based on the inspectors' direct observations of four coating blisters and a number of moisture barrier seal issues, review of Exelon's repairs, and direct observation of the general conditions of the drywell shell, both inside the drywell and outside the drywell, in the sand bed regions, as well as the overall condition and integrity of the drywell shell epoxy coating.

2.2 Issues for Follow-up

Introduction

The inspectors and Exelon identified a number of issues during the inspection with potential implications on the current licensing basis (CLB). More information is required in order to determine whether these issues are acceptable or are CLB performance deficiencies.

Description

As noted in the detailed observations of this report, a number of issues were observed

which Exelon placed into it's corrective action program. The specific issues for further review include:

(1) Exelon applied a strippable coating to the refuel 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 refuel cavity seal leakage. As a result, water entered the gap and subsequently flowed down the outside of the shell and into four sand bed bays. In addition, 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. (Sections 3.1 & 3.5)

(2) While the reactor cavity was being filled, Exelon frequently monitored the cavity seal leakage by observing flow in the cavity trough drain line. Subsequently, Exelon determined 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. (Section 3.2)

(3) During the refueling 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 drain lines. Exelon subsequently discovered that the poly bottle tubing was not connected to the drain lines for two sand bed bays. (Section 3.4)

(4) Exelon identified four blisters on the epoxy coating in one sand bed bay. Exelon's evaluation to determine the cause of the blisters was still in-progress at the time this inspection was completed. In addition, 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. (Section 3.9)

In an inspection to be determined later, the inspectors will review these issues to determine whether the individual issues are acceptable or constitute a CLB performance deficiency. The inspectors' assessment will, in part, determine whether these items are consistent with design specifications and requirements, the conduct of operations, and whether appropriate administrative controls were utilized. **(URI 05000219/2008007-01: Drywell Sand Bed Water Intrusion, Drain Monitoring, and Coating Deficiency)**

3. Detailed Review of License Renewal Activities

3.1 Reactor Refuel Cavity Liner Strippable Coating

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancement (2), stated, in part:

A strippable coating will be applied to the reactor cavity liner to prevent water intrusion into the gap between the drywell shield wall and the drywell shell during periods when the reactor cavity is

flooded. Prior to filling the reactor cavity with water.

The inspectors reviewed work order (WO) R2098682-06, "Coating Application to Cavity Walls and Floors."

b. Observations

The strippable coating is applied to the reactor cavity liner before the cavity is filled with water to minimize the likelihood of cavity seal leakage into the cavity concrete trough. This action is taken to prevent water intrusion into the gap (Figure A-3) between the drywell steel shell and the concrete shield wall. (see Figure A-1 for general arrangement)

From Oct. 29 to Nov. 6, the cavity liner strippable coating limited cavity seal leakage into the cavity trough drain to less than 1 gallon per minute (gpm). On Nov. 6, in one localized area of the refuel cavity, the liner strippable coating started to de-laminate. Water puddles were subsequently identified in sand bed bays 11, 13, 15, and 17 (see Section 3.5 below for additional details). This issue was entered into the corrective action program as Issue Report (IR) 841543. In addition, this item was included in a common cause evaluation as part of IR 845297. Exelon's initial evaluations identified several likely or contributing causes, including:

- A portable submerged water filtration unit was improperly placed in the reactor cavity, which resulted in flow discharged directly on the strippable coating.
- A small oil spill into the cavity may have affected the coating integrity.
- No post installation inspection of the coating had been performed.

3.2 Reactor Refuel Cavity Seal Leakage Monitoring

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancement (3), stated, in part:

> The reactor cavity seal leakage trough drains and the drywell sand bed region drains will be monitored for leakage, periodically.

The inspectors directly observed Exelon's cavity seal leakage monitoring activities, performed under WO R2095857. The inspectors independently checked the cavity trough drain flow immediately after the reactor cavity was filled, and several times throughout the outage. The inspectors also reviewed the written monitoring logs.

b. Observations

Exelon monitored reactor refuel cavity seal leakage by checking and recording the flow in a two inch drain line from the cavity concrete trough to a plant radwaste system drain funnel which, in turn, drained to the reactor building equipment drain tank. (See Figures A-1 thru A-3)

On Oct. 27, Exelon isolated the cavity trough drain line to install a tygon hose to allow drain flow to be monitored. On Oct. 28, the reactor cavity was filled. Drain line flow was monitored frequently during cavity flood-up, and daily thereafter. On Oct. 29, a boroscope examination of the drain line identified that the isolation valve had been left closed. When the drain line isolation valve was opened, about 3 gallons of water drained out. The drain flow then subsided to about an 1/8 inch stream (less than 1 gpm). This issue was entered into the corrective action program as IR 837647.

3.3 Reactor Cavity Trough Drain Inspection for Blockage

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancement (13), stated, in part:

> The reactor cavity concrete trough drain will be verified to be clear from blockage once per refueling cycle. Any identified issues will be addressed via the corrective action process.

The inspectors reviewed a video recording of a boroscope inspection of the cavity trough drain line, performed under WO R2102695.

b. Observations

See observations in Section 3.2 above.

3.4 Drywell Sand Bed Region Drain Monitoring

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancement (3), stated, in part:

> The sand bed region drains will be monitored daily during refueling outages.

The inspectors directly observed Exelon's activities to monitor sand bed drains, performed under WO R2095857. The inspectors independently checked drain line poly bottles and accompanied Exelon personnel during routine daily checks. The inspectors also reviewed the written monitoring logs.

b. Observations

There is one sand bed drain line for every two sand bed bays (i.e., total of five drains for 10 bays). Exelon remotely monitored the sand bed drains by checking for the existence of water in poly bottles attached via tygon tubing (approximately 50 foot long) to a funnel hung below each drain line. The sand bed drains, funnels, and a majority of the tygon tubing were not directly observable from the outer area of the torus room, where the poly bottles were located. (see Figures A-1, A-4, & A-5)

On Nov. 10, Exelon found two of the five tygon tubes disconnected from their funnels and laying on the floor (bays 3 and 7). Exelon personnel could not determine when the tubing was last verified to be connected to the funnel. The inspectors directly observed that the torus room floor had standing water for most of the outage, due to other identified system leaks. The inspectors noted that the standing water would have prevented Exelon personnel from determining whether any water had drained directly onto the floor from a sand bed drain during the time period that the tygon tubing was disconnected. The inspectors also noted that bays 3 and 7 remained dry throughout the outage, with no identified water intrusion (see observations in Section 3.5). Both tubes were subsequently reconnected. This issue was entered into the corrective action program as IR 843209.

On Nov. 15, during a daily check of the sand bed bay 11 drain poly bottle, Exelon found the poly bottle nearly full. Chemistry collected about 4.3 gallons out of the poly bottle and tubing. The inspectors noted that Exelon had found the poly bottle empty during each check throughout the outage until Nov. 15, and had only noted water in the poly bottle three days after the reactor refuel cavity had been drained. In addition, the inspectors noted that the poly bottle had a capacity of about 5 gallons and the funnel had a capacity of about 6 gallons, which suggested that the funnel had not overflowed. Finally, the inspectors noted that Exelon entered bay 11 within a few hours of identifying the water, visually inspected the bay, and found it dry. Exelon sampled the water, but could not positively determine the source based on radiolytic or chemical analysis. This issue was entered into the corrective action program as part of the common cause evaluation IR 845297.

3.5 Reactor Cavity Seal Leakage Action Plan for 1R22

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancement (3), stated, in part:

> If leakage is detected [out of a sand bed drain], procedures will be in place to determine the source of leakage and investigate and address the impact of leakage on the drywell shell.

The inspectors reviewed Exelon's cavity seal leakage action plan.

b. Observations

For the reactor cavity seal leakage, Exelon established an administrative limit of 12 gpm flow in the cavity trough drain, based on a calculation which indicated that cavity trough drain flow of less than 60 gpm would not result in trough overflow into the gap between the drywell concrete shield wall and the drywell steel shell. (see Figures A-1 thru A-5)

The inspectors noted that Exelon's action plan, in part, directed the following actions to be taken:

- If the cavity trough drain flow exceeded 5 gpm, then increase monitoring of the cavity drain flow from daily to every 8 hours.
- If the cavity trough drain flow exceeded 12 gpm, then increase monitoring of the sand bed poly bottles from daily to every 4 hours.
- If the cavity trough drain flow exceeded 12 gpm and any water is found in a sand bed poly bottle, then enter and inspect the sand bed bays.

On Nov. 6, the reactor cavity liner strippable coating started to de-laminate (see Section 3.1 above). The cavity trough drain flow took a step change from less than 1 gpm to approximately 4 to 6 gpm. Exelon increased monitoring of the trough drain to every 2 hours and monitoring of the sand bed poly bottles to every 4 hours. The cavity trough drain flow remained at about 4 to 6 gpm until the cavity was drained on Nov. 12, when the drain flow subsided to zero.

On Nov. 8, personnel working in sand bed bay 11 identified dripping water. Water puddles were subsequently identified in sand bed bays 11, 13, 15, and 17. These issues were entered into the corrective action program as IR 842333. In addition, these items were included in a common cause evaluation as part of IR 845297. The inspectors noted that all sand bed bay work was originally scheduled to have been completed and the sand bed bays closed out by Nov. 2. The inspectors questioned whether the plan provided adequate guidance, based on actual water intrusion into the sand bed region at a value below the threshold established in the action plan, and considering that no water was identified in a sand bed poly bottle until 2 days after the refueling cavity was drained.

On Nov. 12, the cavity was drained. All sand bed bays were dried and inspected by Exelon for any water or moisture damage; no issues were identified. Exelon stated follow-up ultrasonic test (UT) examinations will be performed during the next refuel outage to evaluate the upper drywell shell for corrosion as a result of the water intrusion into the sand bed bays.

On Nov. 15, water was found in sand bed bay 11 poly bottle (see Section 3.4 above).

The inspectors observed that actions taken in response to increased cavity seal leakage were inconsistent with Exelon's action plan, in that the actions were performed earlier than what the action plan would have dictated. The plan did not direct increased sand bed poly bottle monitoring for the given leakage rate, and would not have required a sand bed entry or inspection until Nov. 15, when water was first found in a poly bottle (although these actions were taken as a result of the identification of the dripping water identified on Nov. 8). The inspectors also noted that water had entered the gap between the drywell shield wall and the drywell shell at a much lower value of cavity seal leakage than Exelon had calculated.

3.6 Moisture Barrier Seal Inspection (inside drywell)

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancement (17), stated, in part:

> Perform visual inspection of the moisture barrier seal between the drywell shell and the concrete floor curb, installed inside the drywell during the October 2006 refueling outage.

The inspectors reviewed structural inspection reports 187-001 and 187-002, performed under WO R2097321-01 on Nov. 1 and Oct. 29, respectively. The reports documented visual inspections of the perimeter seal between the concrete floor curb and the drywell steel shell, at the 10-foot elevation. In addition, the inspectors reviewed selected photographs taken during the inspection, and directly observed portions of the moisture barrier seal.

b. Observations

The inspectors performed a general visual observation of the moisture barrier seal inside the drywell on multiple occasions during the outage. For the areas directly observed, the inspectors did not identify any problems or concerns.

3.7 Moisture Barrier Seal Inspection (inside sand bed bays)

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancements (12 & 21), stated, in part:

> Inspect the [moisture barrier] seal at the junction between the sand bed region concrete [sand bed floor] and the embedded drywell shell. During the 2008 refueling outage and every other refueling outage thereafter.

The inspectors directly observed portions of Exelon's activities to perform a 100% visual test (VT) inspection of the seal in the sand bed region (total of 10 bays). The inspectors performed independent field walkdowns to determine the as-found conditions in portions of 6 sand bed bays, and as-left conditions in 4 sand bed bays. The inspectors made general visual observations inside the sand bed bays to independently identify flaking, peeling, blistering, cracking, de-lamination, discoloration, corrosion, or mechanical damage.

The inspectors reviewed VT inspection records for each sand bed bay, and compared their direct observations to the recorded VT inspection results. The inspectors reviewed Exelon VT inspection procedures, interviewed non-destructive examination (NDE) supervisors and technicians, and directly observed field collection, recording, and reporting of VT inspection data. The inspectors also reviewed a sample of NDE technician visual testing qualifications.

The inspectors reviewed Exelon's activities to evaluate and repair the moisture barrier seal in sand bed bay 3.

b. Observations

The purpose of the moisture barrier seal is to prevent water from entering a gap below the concrete floor in the sand bed region. The inspectors observed that NDE visual inspection activities were conducted in accordance with approved procedures. The inspectors noted that Exelon completed the inspections, identified condition(s) in the moisture barrier seal which required repair, completed the seal repairs in accordance with engineering procedures, and conducted appropriate re-inspection of repaired areas.

The VT inspections identified moisture barrier seal problems in 7 of the 10 sand bed bays, including small surface cracks and partial separation of the seal from the steel shell or concrete floor. Exelon determined the as-found moisture barrier function was not impaired, because no cracks or separation fully penetrated the seal. All identified problems were entered into the corrective action program and subsequently repaired (IRs are listed in the Attachment). In addition, these items were included in a common cause evaluation as part of IR 845297.

The VT inspection for sand bed bay 3 identified a seal crack and surface rust stains below the crack. When the seal was excavated, some drywell shell surface corrosion was identified. Exelon's laboratory analysis of removed seal material determined the epoxy seal material had not adequately cured, and concluded it was an original 1992 installation issue. The seal crack and drywell shell surface were repaired. This issue was entered into the corrective action program as IRs 839194, 841957, and 844288.

The inspectors compared the 2008 VT results to the 2006 results and noted that, in 2006, no moisture barrier seal problems were identified in any sand bed bay.

3.8 Drywell Shell Internal Coatings Inspection (inside drywell)

a. Scope of Inspection

Proposed SER Appendix-A Item 33, Protective Coating Monitoring and Maintenance Program, stated, in part:

> The program provides for aging management of Service Level I coatings inside the primary containment.

The inspectors reviewed a vendor memorandum which summarized the vendor inspection findings for a coating inspection of the as-found condition of the ASME Service Level I coating of the drywell shell inner surface. The final detailed report, with specific elevation notes and photographs, was not available during the on-site portion of this inspection. The inspectors reviewed selected photographs taken during the coating inspection and the initial assessment and disposition of identified coating deficiencies. The inspectors also interviewed the vendor coating inspector. The coating inspection was conducted on Oct. 30, by a qualified ANSI Level III coating inspector.

b. Observations

The inspectors performed a general visual observation of the drywell shell coating on

multiple occasions during the outage. The inspectors noted that Exelon's documented inspection results appeared to accurately describe the conditions directly observed by the inspectors. The inspectors did not identify any problems or concerns with Exelon's inspection activities.

3.9 Drywell Shell External Coatings Inspection (inside sand bed bays)

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancements (4 & 21), stated, in part:

> Perform visual inspections of the drywell external shell epoxy coating in all 10 sand bed bays. During the 2008 refueling outage and every other refueling outage thereafter.

The inspectors directly observed portions of Exelon's activities to perform a 100% visual inspection of the epoxy coating in the sand bed region (total of 10 bays). The inspectors performed independent field walkdowns to determine the as-found conditions of the epoxy coating in portions of 6 sand bed bays, and the as-left conditions in sand bed bay 11 after coating repairs. The inspectors made general visual observations inside the sand bed bays to independently identify flaking, peeling, blistering, de-lamination, cracking, discoloration, corrosion, or mechanical damage.

The inspectors reviewed VT inspection records for each sand bed bay and compared their direct observations to the recorded VT inspection results. The inspectors reviewed Exelon VT inspection procedures, interviewed NDE supervisors and technicians, and directly observed field collection, recording, and reporting of VT inspection data. The inspectors also reviewed a sample of NDE technician visual testing qualifications.

The inspectors directly observed Exelon's activities to evaluate and repair the epoxy coating in sand bed bay 11. In addition, the inspectors reviewed Technical Evaluation 330592.27.46, "Coating Degradation in Sand Bed bay 11."

b. Observations

The inspectors observed that NDE visual inspection activities were conducted in accordance with approved procedures. The inspectors noted that Exelon completed the inspections, identified condition(s) in the exterior coating which required repair, completed the coating repairs in accordance with engineering procedures, and conducted appropriate re-inspection of repaired areas.

In sand bed bay 11, the NDE inspection identified one small broken blister, about 1/4 inch in diameter, with a 6-inch surface rust stain, dry to the touch, trailing down from the blister. During the initial investigation, three additional smaller surface irregularities (initially described as surface bumps) were identified within a 1 to 2 square inch area near the broken blister. The three additional bumps were subsequently determined to be unbroken blisters. This issue was entered into the corrective action program as IRs 838833 and 839053. In addition, this item was included in a common cause evaluation

as part of IR 845297. All four blisters were evaluated and repaired.

On Nov. 13, the inspectors conducted a general visual observation of the repaired area and the general condition of the epoxy coating and moisture barrier seal in bay 11. The inspectors noted that Exelon's inspection data reports appeared to accurately describe the conditions directly observed by the inspectors.

All sand bed bays had been inspected by the same NDE technician. To confirm the adequacy of the coating inspection, Exelon re-inspected 4 sand bed bays (bays 3, 7, 15, and 19) with a different NDE technician. No additional concerns or problems were identified. In Technical Evaluation 330592.27.46, Exelon determined, by laboratory analysis using energy dispersive X-ray spectroscopy, that the removed blister material contained trace amounts of chlorine. Exelon also determined that the presence of chlorine, in a soluble salt as chloride on the surface of the drywell shell prior to the initial application of the epoxy coating, can result in osmosis of moisture through the epoxy coating. The analysis also concluded there were no pinholes in the blister samples. In addition, the analysis determined approximately 0.003 inches of surface corrosion had occurred directly under the broken blister. Exelon concluded that the corrosion had taken place over an approximately 16-year period. In addition, UT dynamic scan thickness measurements under the four blisters, from inside the drywell, confirmed the drywell shell had no significant degradation as a result of the corrosion. On Nov. 13, the inspectors conducted a general visual observation of the general conditions in bay 5 and 9. The inspectors observed that Exelon's inspection data reports adequately described the conditions directly observed by the inspectors.

In follow-up, Exelon reviewed a 2006 video of the sand beds, which had been made as a general aid, not as part of an NDE inspection. The 2006 video showed the same 6-inch rust stain in bay 11. The inspectors compared the 2008 VT results to the 2006 results and noted that in 2006 no coating problems were identified in any sand bed bay. This inconsistency, between the results of the 2006 coating inspection and the 2007 inspection, was entered into the corrective action program as IR 839053.

During the final closeout of bays 3, 5, and 7, minor chipping in the epoxy coating was identified, which Exelon described as incidental mechanical damage from personnel entry for inspection or repair activities. All identified problems were entered into the corrective action program and subsequently repaired (IRs are listed in the Attachment).

During the final closeout of bay 9, an area approximately 8 inches by 8 inches was identified where the color of the epoxy coating appeared different than the surrounding area. Because each of the 3 layers of the epoxy coating is a different color, Exelon questioned whether the color difference could have been indicative of an original installation deficiency. This issue was entered into the corrective action program as IR 844815, and the identified area was re-coated with epoxy.

3.10 Drywell Floor Trench Inspections

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancements

(5, 16, & 20), stated, in part:

> Perform visual test (VT) and ultrasonic test (UT) examinations of the drywell shell inside the drywell floor inspection trenches in bay 5 and bay 17 during the 2008 refueling outage, at the same locations that were examined in 2006. In addition, monitor the trenches for the presence of water during refueling outages.

The inspectors directly observed NDE activities and reviewed UT examination records. The inspectors independently performed field walkdowns to determine the conditions in the trenches on multiple occasions during the outage. The inspectors compared UT data to licensee established acceptance criteria in Specification IS-328227-004, revision 14, "Functional Requirements for Drywell Containment Vessel Thickness Examinations," and to design analysis values for minimum wall thickness in calculations C-1302-187-E310-041, revision 0, "Statistical Analysis of Drywell Sand Bed Thickness Data 1992, 1994, 1996, and 2006," and C-1302-187-5320-024, revision 2, "Drywell External UT Evaluation in the Sand Bed." In addition, the inspectors reviewed Technical Evaluation 330592.27.43, "2008 UT Data of the Sand Bed Trenches."

The inspectors reviewed Exelon UT examination procedures, interviewed NDE supervisors and technicians, and reviewed a sample of NDE technician UT qualifications. The inspectors also reviewed records of trench inspections performed during two non-refueling plant outages during the last operating cycle.

b. Observations

In Technical Evaluation 330592.27.43, Exelon determined the UT thickness values satisfied the general uniform minimum wall thickness criteria (e.g., average thickness of an area) and the locally thinned minimum wall thickness criteria (e.g., areas 2-inches or less in diameter) for the drywell shell, as applicable. For UT data sets, such as 7x7 arrays, the Technical Evaluation calculated statistical parameters and determined the data set distributions were acceptable. The Technical Evaluation also compared the data values to the corresponding values recorded by the 2006 UT examinations in the same locations, and concluded there were no significant differences in measured thicknesses and no observable on-going corrosion. The inspectors independently verified that the UT thickness values satisfied applicable acceptance criteria.

During two non-refueling plant outages during the last operating cycle, both trenches were inspected for the presence of water and found dry by Exelon's staff and by NRC inspectors (NRC Inspection Reports 05000219/2007003, 05000219/2007004, and memorandum ML071240008).

During the initial drywell entry on Oct. 25, the inspectors observed that both floor trenches were dry. On subsequent drywell entries for routine inspection activities, the inspectors observed the trenches to be dry. On one occasion, Exelon observed a small amount of water in the bay 5 trench, which Exelon attributed to water spilled nearby on the drywell floor; the trench was dried and the issue entered into the corrective action program as IR 843190. On Nov. 17, during the final drywell closeout inspection, the inspectors observed the following:

- Bay 17 trench was dry and had newly installed sealant on the trench edge where concrete meets shell, and on the floor curb near the trench.

- Bay 5 trench had a few ounces of water in it. The inspectors noted that within the last day there had been several system flushes conducted in the immediate area. Exelon stated the trench would be dried prior to final drywell closeout. This issue was entered into the corrective action program as IR 846209 and IR 846240.

- Bay 5 trench had the lower 6-inches of grout re-installed and had newly installed sealant on the trench edge where concrete meets shell, and on the floor curb near the trench.

3.11 Drywell Shell Thickness Measurements

a. Scope of Inspection

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancements (1, 9, 14, & 21), stated, in part:

> Perform full-scope drywell inspections [in the sand bed region], including UT thickness measurements of the drywell shell, from inside and outside the drywell. During the 2008 refueling outage and every other refueling outage thereafter.

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancements (7, 10, & 11) stated, in part:

> Conduct UT thickness measurements in the upper regions of the drywell shell. Prior to the period of extended operation and two refueling outages later.

The inspectors directly observed NDE activities and independently performed field walkdowns to determine the condition of the drywell shell both inside the drywell, including the floor trenches, and in the sand bed bays (drywell external shell). The inspectors reviewed UT examination records and compared UT data results to licensee established acceptance criteria in Specification IS-328227-004, revision 14, "Functional Requirements for Drywell Containment Vessel Thickness Examinations," and to design analysis values for minimum wall thickness in calculations C-1302-187-E310-041, revision 0, "Statistical Analysis of Drywell Vessel Sand Bed Thickness Data 1992, 1994, 1996, and 2006," and C-1302-187-5320-024, revision 2, "Drywell External UT Evaluation in the Sand Bed." In addition, the inspectors reviewed the Technical Evaluations (TEs) associated with the UT data, as follows:

- TE 330592.27.42, "2008 Sand Bed UT data - External"
- TE 330592.27.45, "2008 Drywell UT Data at Elevations 23-foot & 71-foot"
- TE 330592.27.88, "2008 Drywell Sand Bed UT Data - Internal Grids"

The inspectors reviewed UT examination records for the following:

- Sand bed region elevation, inside the drywell
- All 10 sand bed bays, drywell external
- Various drywell elevations between the 50-foot and 87-foot elevations
- Transition weld from bottom to middle spherical plates, inside the drywell
- Transition weld from 2.625-inch plate to 0.640-inch plate (knuckle area), inside the drywell

The inspectors reviewed Exelon UT examination procedures, interviewed NDE supervisors and technicians, and directly observed field collection, recording, and reporting of UT data. The inspectors also reviewed a sample of NDE technician UT qualifications.

b. Observations

The inspectors observed that NDE UT examination activities were conducted in accordance with approved procedures. In addition, the inspectors performed a general visual observation of the drywell shell general conditions on multiple occasions during the outage.

In Technical Evaluations 330592.27.42, 330592.27.45, and 330592.27.88, Exelon determined the UT thickness values satisfied the general uniform minimum wall thickness criteria (e.g., average thickness of an area) and the locally thinned minimum wall thickness criteria (e.g., areas 2-inches or less in diameter) for the drywell shell, as applicable. For UT data sets, such as 7x7 arrays, the Technical Evaluations calculated statistical parameters and determined the data set distributions were acceptable. The Technical Evaluations also compared the data values to the corresponding values recorded by the 2006 UT examinations in the same locations, and concluded there were no significant differences in measured thicknesses and no observable on-going corrosion. The inspectors independently verified that the UT thickness values satisfied applicable acceptance criteria.

3.12 One Time Inspection Program

a. Scope of Inspection

Proposed SER Appendix-A Item 24, One Time Inspection Program, stated, in part:

> The One-Time Inspection program 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 period of extended operation, and therefore will not require additional aging management. Perform prior to the period of extended operation.

The inspectors reviewed the program's sampling basis and sample plan. Also, the inspectors reviewed UT results from selected piping sample locations in the main steam, spent fuel pool cooling, domestic water, and demineralized water systems.

b. Observations

The inspectors noted that for two UT sample locations, the measured piping thickness did not satisfy the acceptance criteria, and the results were evaluated within the corrective action program. The inspectors did not identify any problems or concerns with Exelon's inspection activities.

3.13 "B" Isolation Condenser Shell Inspection

a. Scope of Inspection

Proposed SER Appendix-A Item 24, One Time Inspection Program Item (2), stated, in part:

> To confirm the effectiveness of the Water Chemistry program to manage the loss of material and crack initiation and growth aging effects. A one-time UT inspection of the "B" Isolation Condenser shell below the waterline will be conducted looking for pitting corrosion. Perform prior to the period of extended operation.

The inspectors directly observed NDE examinations of the "B" isolation condenser shell performed under WO C2017561-11. The NDE examinations included a visual inspection of the shell interior, UT thickness measurements in two locations that were previously tested in 1996 and 2002, additional UT tests in areas of identified pitting and corrosion, and spark testing of the final interior shell coating. The inspectors reviewed the UT data records, and compared the UT data results to the established minimum wall thickness criteria for the isolation condenser shell, and compared the UT data results with previously UT data measurements from 1996 and 2002.

b. Observations

The inspectors noted that the UT results satisfied the acceptance criteria for minimum wall thickness. The inspectors did not identify any problems or concerns with Exelon's inspection activities.

3.14 Periodic Inspections

a. Scope of Inspection

Proposed SER Appendix-A Item 41, Periodic Inspection Program, stated, in part:

> Activities consist of a periodic inspection of selected structures, systems, and components to verify integrity and confirm the absence of identified aging effects. Perform prior to the period of extended operation.

The inspectors directly observed the following field activities:

- Condensate expansion joints Y-2-11 and Y-2-12 inspection (WO R2083515)

- 4160 V Bus 1C switchgear fire barrier penetration inspection (WO R2093471)

b. Observations

The inspectors noted that Exelon's documented inspection results appeared to accurately describe the conditions directly observed by the inspectors. The inspectors did not identify any problems or concerns.

3.15 Circulating Water Intake Tunnel & Expansion Joint Inspection

a. Scope of Inspection

Proposed SER Appendix-A Item 31, Structures Monitoring Program Enhancement (1), stated, in part:

> Buildings, structural components and commodities that are not in scope of maintenance rule but have been determined to be in the scope of license renewal. Perform prior to the period of extended operation.

On Oct. 29, the inspector directly observed the conduct of a structural engineering inspection of the circulating water intake tunnel, including reinforced concrete wall and floor slabs, steel liners, embedded steel pipe sleeves, butterfly isolation valves, and tunnel expansion joints. The inspection was conducted by a qualified Exelon structural engineer. After the inspection was completed, the inspectors compared his direct observations with the documented visual inspection results.

b. Observations

The inspectors noted that Exelon's documented inspection results appeared to accurately describe the conditions directly observed by the inspectors. The inspectors did not identify any problems or concerns with Exelon's inspection activities.

3.16 Buried Emergency Service Water Pipe Replacement

a. Scope of Inspection

Proposed SER Appendix-A Item 63, Buried Piping, stated, in part:

> Replace the previously un-replaced, buried safety-related emergency service water piping prior to the period of extended operation. Perform prior to the period of extended operation.

The inspectors directly observed the following activities, performed under WO C2017279:

- Field work to remove old pipe and install new pipe
- Foreign material exclusion (FME) controls
- External protective pipe coating, and controls to ensure the pipe installation

activities would not result in damage to the pipe coating

b. Observations

The inspectors did not identify any problems or concerns.

3.17 Electrical Cable Inspection inside Drywell

a. Scope of Inspection

Proposed SER Appendix-A Item 34, Electrical Cables and Connections, stated, in part:

> 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. Perform prior to the period of extended operation.

The inspector accompanied electrical technicians and an electrical design engineer during a visual inspection of selected electrical cables in the drywell. The inspector directly observed the pre-job brief which discussed inspection techniques and acceptance criteria. The inspector directly observed the visual inspection activities, which included cables in raceways, as well as cables and connections inside junction boxes. After the inspection was completed, the inspector compared his direct observations with the documented visual inspection results.

b. Observations

The inspectors noted that Exelon's documented inspection results appeared to accurately describe the conditions directly observed by the inspectors. The inspectors did not identify any problems or concerns with Exelon's inspection activities.

3.18 Inaccessible Medium Voltage Cable Test

a. Scope of Inspection

Proposed SER Appendix-A Item 36, Inaccessible Medium Voltage Cables, stated, in part:

> 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. Perform prior to the period of extended operation.

The inspectors directly observed field testing activities for the 4 kilovolts feeder cable from the auxiliary transformer secondary to Bank 4 switchgear and independently reviewed the test results. A Doble and power factor test of the transformer, with the cable connected to the transformer secondary, was performed, in part, to detect deterioration of the cable insulation. The inspectors also compared the current test

results to previous test results from 2002. In addition, the inspectors interviewed plant electrical engineering and maintenance personnel.

b. Observations

The inspectors noted that the cable test results satisfied the acceptance. The inspectors did not identify any problems or concerns with Exelon's test activities.

3.19 Fatigue Monitoring Program

a. Scope of Inspection

Proposed SER Appendix-A Item 44, Metal Fatigue of Reactor Coolant Pressure Boundary, stated, in part:

> The program will be enhanced to use the EPRI-licensed FatiguePro cycle counting and fatigue usage factor tracking computer program.

The inspectors reviewed Exelon's proposed usage of the FatiguePro software program, reviewed the list of high cumulative usage factor components, and interviewed the fatigue program manager.

b. Observations

The inspectors noted that the FatiguePro program, although in place and ready to go, had not been implemented. Exelon stated the FatiguePro program will be implemented after final industry resolution of a concern regarding a mathematical summation technique used in FatiguePro.

4. Proposed Conditions of License

a. Scope of Inspection

SER Section 1.7 contained two outage-related proposed conditions of license:

> The fourth license condition requires the applicant to perform full-scope inspections of the drywell sand bed region every other refueling outage.
>
> The fifth license condition requires the applicant to monitor drywell trenches every refueling outage to identify and eliminate the sources of water and receive NRC approval prior to restoring the trenches to their original design configuration.

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancements (1, 4, 9, 12, 14, & 21) implement the proposed license condition associated with a full-scope drywell sand bed region inspection.

Proposed SER Appendix-A Item 27, ASME Section XI, Subsection IWE Enhancements (5, 16, & 20) implement the proposed license condition associated with the drywell trenches.

b. Observations

For observations, see the applicable sections above for the specific ASME Section XI, Subsection IWE Enhancements.

5. Commitment Management Program

a. Scope of Inspection

The inspectors evaluated current licensing basis procedures used to manage and revise regulatory commitments to determine 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 Nuclear Energy Institute (NEI) 99-04, "Guidelines for Managing NRC Commitment Changes." In addition, the inspectors reviewed the procedures to assess whether adequate administrative controls were in-place to ensure commitment revisions or the elimination of commitments altogether would be properly evaluated, approved, and annually reported to the NRC. The inspectors also reviewed Exelon's current licensing basis commitment tracking program to evaluate its effectiveness. In addition, the following commitment change evaluation packages were reviewed:

- Commitment Change 08-003, OC Bolting Integrity Program
- Commitment Change 08-004, RPV Axial Weld Examination Relief

b. Observations

The inspectors observed that the commitment change activities were conducted in accordance with approved procedures, which required an annual update to the NRC with a summary of each change.

4OA6 Meetings, Including Exit Meeting

Exit Meeting Summary

xxx Added Exit Notes ML# << Delete If we decide they should be Non-public
The inspectors presented the results of this inspection to Mr. T. Rausch, Site Vice President, Mr. M. Gallagher, Vice President License Renewal, and other members of Exelon's staff on December 23, 2008. NRC Exit Notes from the exit meeting are located in ADAMS within package ML090120726.

No proprietary information is present in this inspection report.