UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD., SUITE 100
KING OF PRUSSIA, PA 19406-2713

October 15, 2015

EA-14-186

Mr. Bryan Hanson
Senior Vice President, Exelon Generation
President and Chief Nuclear Officer, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION – SUPPLEMENTAL INSPECTION REPORT 05000219/2015009 AND ASSESSMENT FOLLOW-UP LETTER

Dear Mr. Hanson:

On September 3, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection pursuant to Inspection Procedure (IP) 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," at your Oyster Creek Nuclear Generating Station (Oyster Creek). The enclosed inspection report (IR) documents the inspection results, which were discussed on September 3, 2015, with Mr. G. Stathes, Site Vice President and members of his staff.

As required by the NRC Reactor Oversight Process (ROP) Action Matrix, this supplemental inspection was conducted within the Regulatory Response Column of the NRC's ROP Action Matrix because one finding of White significance, associated with the Mitigating Systems cornerstone, was identified in the fourth quarter 2014 integrated inspection report (ML15042A072). The finding was associated with an inadequate review of a change in maintenance process that caused an inoperable emergency diesel generator (EDG). The final significance determination and follow-up assessment letter for this finding, which was issued on April 27, 2015, documented that Oyster Creek transitioned to the Regulatory Response Column of the ROP Action Matrix, retroactive to the fourth quarter of 2014. The NRC staff was informed on July 14, 2015, of your staff's readiness for this inspection.

The objectives of this supplemental inspection were to provide assurance that: (1) the root causes and the contributing causes of risk-significant performance issues were understood; (2) the extent of condition and extent of cause of risk-significant performance issues were identified; and (3) corrective actions for risk-significant performance issues were sufficient to address the root and contributing causes and prevent recurrence. The inspection consisted of examination of activities conducted under your license as they related to safety, compliance with the Commission's rules and regulations, and the conditions of your operating license.

Based on the results of this inspection, the NRC concluded that, overall, the supplemental inspection objectives were met and no significant weaknesses were identified. Additionally, no findings of significance were identified.

Based on the guidance in Inspection Manual Chapter 0305, “Operating Reactor Assessment Program,” and the results of this inspection, the White finding will be closed. However, Oyster Creek will remain in the Regulatory Response Column for a White Unplanned Scrams Per 7000 Critical Hours Performance Indicator. The Performance Indicator must return to Green and a separate supplemental inspection be performed before Oyster Creek can transition to the Licensee Response Column of the NRC’s ROP Action Matrix.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any), will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System component of the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Silas R. Kennedy, Chief
Reactor Projects Branch 6
Division of Reactor Projects

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

Enclosure:
Inspection Report 05000219/2015009
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.	50-219
License No.	DPR-16
Report No.	05000219/2015009
Licensee:	Exelon Generation Company, LLC (Exelon)
Facility:	Oyster Creek Nuclear Generating Station
Location:	Forked River, New Jersey
Dates:	August 31, 2015, through September 4, 2015
Team Lead:	A. Rosebrook, Senior Project Engineer, Division of Reactor Projects
Inspectors:	J. Ayala, Reactor Inspector, Division of Reactor Safety P. Meier, Project Engineer, Division of Reactor Projects
Approved by:	Silas R. Kennedy, Chief Reactor Projects Branch 6 Division of Reactor Projects

SUMMARY

IR 05000219/2015009; 8/31/2015 – 9/03/2015; Oyster Creek Nuclear Generating Station (Oyster Creek); Supplemental Inspection – Inspection Procedure (IP) 95001

A Senior Project Engineer and a Project Engineer from the Division of Reactor Projects, USNRC Region I, and a Reactor Inspector from the Division of Reactor Safety, USNRC Region I, performed this inspection. No significant weaknesses or findings were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5, dated February 2014.

Cornerstone: Mitigating Systems

The NRC staff performed this supplemental inspection in accordance with IP 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," to assess Exelon's evaluation of a performance deficiency and violation of White significance, associated with the Mitigating Systems cornerstone, which was identified in the fourth quarter 2014 integrated inspection report (Agencywide Documents Access and Management System (ADAMS) Accession Number ML15042A072). The finding was associated with an inadequate review of a change in maintenance process that caused an inoperable emergency diesel generator (EDG). The final significance determination and follow-up assessment letter for this finding issued on April 27, 2015, documented that Oyster Creek transitioned to the Regulatory Response Column of the NRC's Reactor Oversight Process (ROP) Action Matrix, retroactive to the fourth quarter of 2014. The NRC staff was informed on July 14, 2015, of your staff's readiness for this inspection.

Based on the results of the inspection, the inspectors concluded that Exelon had adequately performed a root cause analysis of the event, and corrective actions, both completed and planned, were reasonable to address the related issues. Based on the guidance in Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program," dated October 18, 2013, and the results of this inspection, the White finding will be closed effective October 1, 2015. However, Oyster Creek will remain in the Regulatory Response Column until the White Unplanned Scrams Per 7000 Critical Hours Performance Indicator returns to Green and a separate supplemental inspection can be performed. (Section 4OA4)

REPORT DETAILS

4. OTHER ACTIVITIES

4OA3 Follow-Up of Events and Notices of Enforcement Discretion (IP 71153)

(Closed) Licensee Event Report (LER) 05000219/2014-003-01: Technical Specification Prohibited Condition Caused by Emergency Diesel Generator Inoperable for Greater than Allowed Outage Time

On July 28, 2014, at 5:09 a.m. during a bi-weekly one hour loaded run of the No. 2 EDG, the upper fan shaft failed. This resulted in loss of all cooling to the No. 2 EDG. Operators received EDG 2 ENGINE TEMP HIGH and EDG 2 DISABLED alarms and manually shutdown the EDG. Further examination determined that the No. 2 EDG would have been unable to complete its mission time for 43 days prior to the failure. Therefore, EDG No. 2 was inoperable for greater than the technical specification allowed out of service time of 7 days, a condition prohibited by plant technical specifications which was reportable under 10 CFR 50.73(a)(2)(i)(B).

Exelon's evaluations of the failure identified that procedure changes in 2005 which changed the belt tension and belt tension measuring devices did not receive an appropriate evaluation to identify that the additional stress created by the change in belt tension exceeded with in the design limitations and assumptions of the equipment, thus creating a new failure mechanism. Corrective actions to reduce the belt tension to a lower value eliminated this new failure mechanism.

The inspectors performed an in-depth review of this LER and Exelon's evaluations, supporting documentation, station procedures, plant logs, and interviewed members of station staff. The inspectors identified a minor violation during this review. 10 CFR 50.9, requires, in part, information provided to the commission by a licensee required by Commission Regulations shall be complete and accurate in all material respects. 10 CFR 50.73(a)(2)(i)(B) requires, in part, for a licensee to submit an LER to the commission within 60 days for any operation or condition prohibited by the Plant's Technical Specifications. 10 CFR 50.73(B)(3) requires that an LER contains an assessment of safety consequences and implications of the event. Contrary to the above, the inspectors identified that LERs 50-219/2014-003-00 and 50-219/2014-003-01, "Technical Specification Prohibited Condition Caused by Emergency Diesel Generator Inoperable for Greater than Allowed Outage Time," were incomplete per the requirements of 10 CFR 50.73.b(3). Specifically, the LERs did not include an assessment of the safety consequences and implications of the failure of the No. 2 EDG being inoperable for greater than its technical specification allowed outage. This was an event of low to moderate safety significance. However, since the NRC was aware of the incomplete information, did not rely upon the LER to make a regulatory decision, and significant additional inspection or review is not required, this violation of an NRC requirement is of minor significance consistent with Section 6.0 of the NRC Enforcement Policy. Violations of minor significance are required to be entered into the station's corrective action program (CAP) and actions taken to restore compliance. Exelon entered the inspectors' observations into their CAP as issue report 02562407 and plans to revise the LER to include the missing information.

No additional issues were identified during this review. LER 50-219/2014-003-01 is closed.

4OA4 Supplemental Inspection (IP 95001)

.1 Inspection Scope

The NRC staff performed this supplemental inspection in accordance with IP 95001 to assess Exelon's evaluation of a White finding, which affected the Mitigating Systems cornerstone in the Reactor Safety strategic performance area. The inspection objectives were to:

- provide assurance that the root and contributing causes of risk-significant performance issues were understood;
- provide assurance that the extent of condition and extent of cause of risk-significant performance issues were identified,
- provide assurance that corrective actions for risk-significant performance issues were sufficient to address the root and contributing causes and prevent recurrence.

Oyster Creek entered the Regulatory Response Column of the NRC's ROP Action Matrix in the second quarter of 2015 as a result of one inspection finding of low to moderate (White) safety significance, associated with the Mitigating Systems cornerstone. This finding was identified and discussed in the fourth quarter 2014 integrated inspection report IR 05000219/2014005 (ML15042A072). The finding was associated with an inadequate review of a change in maintenance process that caused an inoperable emergency diesel generator (EDG). The final significance determination and follow-up assessment letter for this finding, which was issued on April 27, 2015 (IR 05000219/2015007, ML15112A147), documented that Oyster Creek transitioned to the Regulatory Response Column of the NRC's ROP Action Matric, retroactive to the fourth quarter of 2014.

Exelon staff informed the NRC staff on July 14, 2015, that they were ready for the supplemental inspection. Previously, in September 2013, Exelon completed an apparent cause evaluation (ACE) as part of issue report 01686101, which examined the causes that led to the failure of the EDG No.2 upper fan shaft. As part of the ACE, third party reports were prepared by Structural Integrity Associates, INC (Report Number 1400935.402.R0 dated August 8, 2014) and Exelon Power Labs (Project OYS-35189 dated August 13, 2014). In preparation for this supplemental inspection, Exelon performed a root cause analysis (RCA) in June 2015, as part of issue report 02505684, "EDG Fan Shaft Failure Maintenance Instructions." The White finding did not have an associated cross-cutting aspect because the performance deficiency occurred in 2005 and was determined to be not reflective of current plant performance.

The inspectors reviewed the causal evaluations referenced above, in addition to other documents listed in the Attachment, which supported Exelon's actions to address the White finding. The inspectors reviewed corrective actions, both completed and planned, to address the identified causes, extent of condition, and extent of cause. The inspectors also interviewed Exelon personnel to ensure that the root and contributing causes and the contribution of safety culture components were understood; and corrective actions taken or planned were appropriate to address the causes and prevent recurrence. Lastly, the inspectors conducted in-plant walk downs, which included independent inspections of both EDGs.

.2 Evaluation of the Inspection Requirements

02.01 Problem Identification

a. IP 95001 requires that the inspection staff determine that Exelon's evaluation of the issue documents who identified the issue (i.e., licensee-identified, self-revealing, or NRC-identified) and under what conditions the issue was identified.

The inspectors determined that Exelon's ACE 01686101 and RCA 02505684 both clearly identified the issue as a self-revealing failure of the EDG No. 2 upper fan shaft on July 28, 2014 at 5:09 a.m. during a surveillance run of EDG No. 2. Both evaluations identified that procedure changes in 2005 which changed the belt tension and belt tension measuring devices did not receive an appropriate evaluation to identify that the additional stress created by the change in belt tension exceeded with in the design limitations and assumptions of the equipment, thus creating a new failure mechanism.

b. IP 95001 requires that the inspection staff determine that Exelon's evaluation of the issue documents how long the issue existed and prior opportunities for identification.

The inspectors determined that Exelon's ACE 01686101 and RCA 02505684 both identified that Oyster Creek staff had a number of opportunities between 2005, when the procedure change was implemented, and October 2014, when corrective actions were implemented, to reduce belt tension on both EDG No. 1 and EDG No. 2 fan shaft belts. RCA 02505684 identified a calculation performed by MPR Associates in 2005 (Calculation 0083-0314-CZ, "Engine Driven Radiator Fan Speed Calculation") recommended a belt tension of 47.5 Hertz (Hz). However, Oyster Creek followed the vendor guidance from the belt manufacturer of 60 Hz. Following the failure and replacement of the fan shaft on July 28, 2014, belts were again tensioned to 60 Hz. Both EDG's belts remained tensioned to 60Hz is until October 2014, when the belts were adjusted to 47.5 Hz.

c. IP 95001 requires that the inspection staff determine that Exelon's evaluation documents the plant specific risk consequences, as applicable, and compliance concerns associated with the issue.

The inspectors identified that Exelon's ACE 01686101 and RCA 02505684 did not specifically document plant risk consequences associated with this plant event. Licensee Event Reports (LER) 50-219/2014-003-00 and 50-219/2014-003-01 also fail to discuss plant risk consequences associated with this event. RCA 02505684 did adequately address compliance concerns associated with this issue and demonstrated how compliance was adequately restored. Failing to specifically document plant risk in these formal evaluations and reports was considered a weakness.

While plank risk consequences were not specifically documented in either evaluation, plant risk assessments were completed and shared with the NRC during the NRC's Significance Determination Process. These risk assessments were considered during the NRC's Significance and Enforcement Review Panel process. Inspectors also recognized that RCA 02505684 was completed after the receipt of the NRC White Notice of Violation. The RCA referenced the NRC's fourth quarter 2014 integrated IR 05000219/2014005 (ML15042A072) which contained the NRC's risk assessment, IR 05000219/2015007 (ML15112A147), the final significance determination, and follow-up assessment letter.

Although the ACE, RCA, and LER did not directly address plant risk, this criteria was considered to be met since plant risk evaluations were conducted and shared with the

NRC's Senior Risk Analysts. The results of the licensee's evaluations were consistent with the NRC's risk assessment which concluded the event was of Low to Moderate Safety Significance (White). Exelon documented the inspectors' observations in their CAP as issue report 02562407.

d. Findings

No findings of significance were identified. The LER is discussed in section 4OA3.

02.02 Root Cause, Extent of Condition, and Extent of Cause Evaluation

a. IP 95001 requires that the inspection staff determine that Exelon evaluated the issue using a systematic methodology to identify the root and contributing causes.

The inspectors determined that Exelon evaluated the White finding using a systematic methodology to identify root and contributing causes. The inspectors verified that Exelon staff implemented PI-AA-125-1001, Revision 1, "Root Cause Analysis," as well as the guidance in PI-AA-125, Revision 0, "Corrective Action Program (CAP) Procedure," in the conduct of the station's causal analyses to identify the root and contributing causes. The station utilized the following systematic methods to complete the RCA:

- data gathering through interviews and document review;
- laboratory forensic examinations and third party review of the examination;
- comparative timeline;
- WHY staircase; and
- hazard-barrier-target analysis.

The inspectors verified these methods were completed by reviewing the ACE, RCA and attachments to these documents. The inspectors also verified that the root and contributing causal conclusions were consistently understood and supported by Exelon staff through the conduct of interviews, review of laboratory and non-destructive testing data, and review of third party reports.

b. IP 95001 requires that the inspection staff determine that Exelon's RCA was conducted to a level of detail commensurate with the significance of the issue.

The inspectors determined that Exelon's RCA was conducted to a level of detail commensurate with the significance of the White finding. In accordance with PI-AA-125-1001, Revision 1 as well as PI-AA-125, Revision 0, Exelon conducted an ACE and an RCA that identified the root and contributing causes associated with the failure of the EDG No. 2 upper fan shaft on July 28, 2014.

ACE 01686101 focused on identifying the cause of the fan shaft failure. The ACE identified the apparent cause of the failure to be a higher than average stress concentration factor due to an undetected deficiency in the fan shaft groove. The ACE identified several contributing causes. One was that the belt tension outlined in station procedure MA-OC-861003-100, Revision 3, "Diesel Generator Fan Belt Replacement," did not provide adequate margin necessary to address stress risers in the fan shaft groove. Another contributing cause was that procedure MA-OC-861003-100 was not processed through engineering for a technical evaluation. A technical evaluation was not conducted when the tensioning process, measuring devices, and belt tension itself were changed for the Oyster Creek EDGs.

As part of the ACE, the failed shaft was sent to Exelon Power Labs for forensic evaluation in order to determine the failure mechanism. The evidence indicated the shaft failure was caused by rotational bending fatigue and crack propagation by a high-cycle- low stress fatigue mechanism. No material defects were observed that would have contributed to the failure initiation.

Structural Integrity Associates, Inc. was contracted to determine what postulated loads could explain the observed failure and to determine at what point was the EDG no longer capable of performing its 24 hour mission time. The report agreed with Exelon Power Labs' conclusion on the failure mechanism that the value of belt tension, changed in 2005, put the stresses on the fan shaft which were close to the calculated endurance limit, and that the crack initiated on either June 16, 2014 or June 30, 2014 and prior to the crack initiation the EDG was capable of performing its full mission time. The EDG was inoperable for approximately 43 days prior to the failure on July 28, 2014.

RCA 02505684 focused on the performance deficiency and White Notice of Violation identified by the NRC, an inadequate review of a change in the maintenance process resulted in an inoperable EDG. Exelon's RCA Team also reviewed the ACE and concluded the apparent cause and contributing causes for the failure were appropriate. The root cause for the procedure was less than adequate implementation of procedure AD-AA-101, "Processing of Procedures and T&RMs," and its required interfacing processes and procedures. Contributing causes for the procedure errors were that procedure facts were incorrect and a second checker was not used to verify these facts when developing the procedure change. A second contributing cause was that there were infrequent assessments and evaluations for the Station Qualified Reviewer (SQR) program.

c. IP 95001 requires that the inspection staff determine that Exelon's RCA included a consideration of prior occurrences of the issue and knowledge of operating experience (OE).

The inspectors determined that Exelon's ACE and RCA included a detailed timeline of modifications, issues, and failures of the EDG No. 1 and EDG No. 2 fan shafts, belts, and bearings from 1991 to the date of the failure. Prior internal operating experience included a failure of the EDG No. 2 fan belts in January 1991, changing EDG No. 1 and EDG No. 2 from eight individual belts to a single belt with eight ribs in December 1992 and January 1993, the failure of the EDG No. 2 Fan shaft in June 1993, modification of the EDG No. 2 pillow block bearing in June 1993, high shaft vibrations due to a pillow block bearing being left loose making EDG No. 1 inoperable in May 2004, procedure MA-OC-86103-100 issued to replace/ inspect the belt and provide belt tensioning requirements in May 2005 (this procedure change increased belt tension to 60Hz +/- 2 Hz, re-tensioning every two years and replacing the belt every four years), and EDG No. 1 lower pillow block bearing found damaged due to over torqueing of the bearing set screws in June 2010.

Both evaluations also conducted a review of external OE including industry event report database reviews as appropriate. The RCA also identified that the Surry Nuclear Generating Station has a similar EDG radiator fan belt drive arrangement but had not experienced any reportable failures. During the inspection the inspectors asked if Oyster Creek Staff had contacted Surry staff to see how they tension their belts and if they have a single belt or the original eight belt configuration. Oyster Creek Staff wrote issue report 02551462 and developed an action item to ensure this was completed.

d. IP 95001 requires that the inspection staff determine that Exelon's RCA addresses the extent of condition and extent of cause of the issue.

The inspectors determined that Exelon's evaluations appropriately addressed the extent of condition and extent of cause of the issue. The inspectors determined these extent of condition actions were appropriate to the circumstances, based on Exelon's knowledge of the issue when the actions were created.

ACE 01686101 included an extent of condition review for the failure mechanism. This review determined that EDG No. 1 was also susceptible to the same failure mechanism and additional inspections of EDG No. 1 fan shaft were completed to ensure there was no indications of a crack. Exelon completed corrective actions to reduce belt tension to 47.5Hz on both EDG No. 1 and EDG No. 2 in October 2014. No extent of cause review was required to be completed in accordance with Exelon's ACE procedure.

RCA 02505684 included an extent of condition and extent of cause review for the less than adequate procedure change. The RCA team reviewed a representative sample of site specific procedure changes over a ten year period to determine if adequate reviews were completed. Nine of the fourteen maintenance procedure changes reviewed should have had a cross disciplinary review or an independent technical review per station procedures and did not. Actions were taken to complete these required reviews. Of note, two of the procedure changes which did not receive adequate review were related to the EDGs. (Change to torque specs set screws for the fan shaft pillow block bearings and the change from the eight belt design to a single belt on the fan shaft hub.) No significant issues were discovered when those reviews were completed.

The extent of cause review also identified that there was no requirement to audit the SQR program under the station's Nuclear Oversight (NOS) audit guides in place at the time or for the program to be audited under the department self-assessment programs. As a result, the SQR program had not been assessed over the 10 years prior to the failure.

e. IP 95001 requires the inspection staff to determine that Exelon's root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0305, "Operating Reactor Assessment Program."

The inspectors determined that Exelon's RCA 02505684 did consider the safety culture components as described in IMC 0305. The inspectors noted that Exelon performed the evaluation of the safety culture components in accordance with station procedures. Overall, the inspectors noted that Exelon appropriately identified station performance gaps in the cross-cutting areas of human performance and problem identification and resolution. Finally, the inspectors noted that Exelon's corrective actions were adequate to address the performance gaps. Attachment 4 of RCA 02505684 specifically documented the safety culture review and observations.

f. Findings

No findings of significance.

02.03 Corrective Actions

a. IP 95001 requires the inspection staff to determine that (1) Exelon specified appropriate corrective actions for each root and/or contributing cause, or (2) an evaluation stating no

actions are necessary is adequate.

Overall, the inspectors found that Exelon specified appropriate corrective actions for each root cause, contributing cause, extent of condition, and extent of cause for the White finding. Exelon's corrective actions to address the root and contributing causes were assigned in accordance with station procedure PI-AA-125-1001, Revision 1, as well as the guidance in PI-AA-125, Revision 0.

ACE 01686101 Corrective Actions included:

- Replace EDG No. 2 fan shaft,
- Perform ultrasonic testing of the EDG No. 1 and spare fan shafts,
- Obtain failure analysis for failed shaft,
- Perform a technical analysis to specify the correct belt tension,
- Replace EDG No. 1 fan shaft during May 2016 system outage,
- Implement shaft vibration performance monitoring,
- Revise MA-OC-86103-100 and re-tension belts to new specified value,
- Training for site engineering personnel and procedure writers

RCA 02505684 Corrective Actions included:

- Revised MA-OC-86103-100 with the correct belt tension specification,
- Review site specific maintenance procedures and preventive maintenance tasks for EDG cooling and starting systems, and confirm appropriate technical justification has been provided for all as left settings,
- All SQRs for maintenance procedure revisions required to be performed with AD-AA-102-1001 in hand and a cross disciplinary review required,
- Training and re-certification for all SQR qualified personnel,
- Revise AD-AA-102 to ensure the SQR and the Site Functional Area Manager shall not be the same individual,
- Conduct technical reviews for all procedure changes identified during the extent of cause review as needing one,
- Schedule check in assessments of the SQR program to validate the requirements of AD-AA-102 are being met,
- NOS to develop audit guides to ensure reviews of the SQR program are completed periodically,
- Enter the belt tension measuring tool into the Measurement and Test Equipment program and ensure proper calibration

Overall, the inspectors determined that the corrective actions were appropriate and addressed the root and contributing causes. However the inspectors had the following observations:

- RCA 02505684 was not performed until June of 2015. In accordance with Exelon procedure PI-AA-125 Revision 0, an RCA should have been performed at an earlier point in time. The past operability determination associated with the EDG No. 2 fan shaft failure determined that the EDG No. 1 was unable to perform its safety related function for its mission time for approximately 43 days prior to the failure. Once this fact was determined, in was recognized that it was a condition prohibited by Technical Specifications for greater than the allowed outage time, an LER was required, and initial NRC and licensee risk assessments determined plant risk of the low to moderate safety significance, and the NRC issued an NOV. Each of these conditions would warrant the conduct of an RCA. During an IP 95001 readiness audit, it was identified that an

RCA needed to be performed and RCA 02505684 was conducted. While this constituted a non-compliance of the licensee's CAP guidance, there was no tangible impact of the RCA being delayed, since corrective actions which precluded repetition were developed and completed or scheduled as part of the original ACE. The extent of cause review was delayed due to not being required by the ACE procedure; however, the corrective actions developed for the extent of cause were still determined by the inspectors to be timely. This concern was previously documented in Exelon's CAP as issue report 02505684

- Neither RCA 02505684 nor ACE 01686101 evaluated operator performance with respect to technical specification compliance. During interviews and review of operator logs, the inspectors determined that Exelon did not conduct the actions required for Technical Specification 3.7.C.2.d. The Technical Specification Limiting Condition for Operation Action Statement for one diesel generator becoming inoperable during power operations state, in part, perform the following within 24 hours: 1) Verify the remaining diesel generator is OPERABLE and not subject to common cause failure, OR 2) Operate the remaining OPERABLE diesel generator at least one hour at greater than 80% rated load. AR 01686101 documents an evaluation which was used to meet the intent of 3.7.C.2.d action 1. However, the evaluation incorrectly states, "EDG No. 1 is not subject to common cause failure therefore EDG No. 1 does not have to be demonstrated as operable." EDG No. 1 had the same configuration, the belts were tensioned to the same tensions using the same procedure, and the shafts were all acquired from the same manufacturer at the same time. Additionally a visual inspection of the EDG No. 1 fan shaft was not conducted as part of this evaluation. Subsequent evaluation also proved this statement was incorrect as EDG No. 1 was clearly subject to the same common cause failure. As such, the EDG should have been run in order to demonstrate the EDG was currently operable in order to meet the Action Statement. The inspectors recognized that Exelon continued to assess the operability of EDG No. 1 through additional inspections and ultra-sonic testing and successfully completed the next four bi-weekly surveillance runs as scheduled with the belts tensioned to 60Hz. The purpose of this technical specification action statement is to establish confidence that the operable EDG is currently operable. The overall conclusion that the EDG was operable was validated to be correct. Therefore, this violation was determined to be of minor significance because there was no adverse impact to the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This issue was entered into Exelon's CAP as issue report 02562407.

b. IP 95001 requires that the inspection staff determine that Exelon prioritized corrective actions with consideration of risk significance and regulatory compliance.

The inspectors determined that Exelon appropriately prioritized corrective actions with consideration of risk significance and regulatory compliance. ACE 01686101 developed corrective actions to address both potential causes of the failure mechanism by reducing the belt tension, conducted ultrasonic testing of EDG No. 1's fan shaft and scheduled replacement of the EDG No. 1 fan shaft. The reduction of the belt tension from 60Hz to 47.5 Hz, reduced the maximum stresses felt on the fan shaft by nearly 40%. This change ensure adequate margin exists below the endurance limit for the fan shaft to account for measurement uncertainty and operator error when tensioning the belt. This change would also require a Stress Concentration Factor of greater than 5.0 exist in

order to reach the endurance limit for the shaft at the bearing groove, eliminating the vulnerability from a previously undetected surface flaw based upon the results of the ultrasonic testing and previous surface flaw evaluations. This action restored compliance with the cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control."

RCA 02505684 developed and implemented corrective actions to address the programmatic aspects of the violation, as well as completing the extent of cause review which identified additional procedures which did not receive an adequate technical reviews.

c. IP 95001 requires that the inspection staff determine that Exelon established a schedule for implementing and completing the corrective actions.

The inspectors determined that Exelon established an appropriate schedule for implementing and completing the corrective actions. All corrective actions were completed with the exception of replacement of the EDG No. 1 fan shaft which was scheduled for May 2016 during the next schedule EDG outage period and effectiveness reviews. The inspectors determined that based upon the changes to the belt tensioning procedures, the ultrasonic examinations completed on EDG No. 1 in July 2014, and the lead time required to procure and manufacture a spare fan shaft, adequate justification was provided for the scheduling of this corrective action.

d. IP 95001 requires that the inspection staff determine that Exelon developed quantitative and/or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence.

The inspectors determined that Exelon developed quantitative and qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence. Exelon established measures for determining the effectiveness of the corrective actions in RCA 02505684 and ACE 01686101. These measures included the following:

- Effectiveness reviews at 6 and 12 months following completion of the corrective actions for RCA 02505684,
- A Focus Area Self-Assessment (FASA) (issue report 2505599) dated 7/20/2015,
- Quality Assurance (QA) Audits of the SQR process,
- QA review of the ACE, RCA, and FASA in preparation for the 95001

e. IP 95001 requires that the inspection staff determine that Exelon's planned or taken corrective actions adequately address an NOV that was the basis for the supplemental inspection.

The inspectors determined that Exelon's planned and completed corrective actions adequately, restored compliance with the NOV of 10 CFR 50 Appendix B Criterion III. The issue was properly evaluated for root, contributing causes and an extent of cause and extent of condition review was completed. Appropriate corrective actions were developed and implemented, including corrective actions to preclude repetition of the failure mechanism.

f. Findings

No findings were identified.

02.04 Evaluation of IMC 0305 Criteria for Treatment of Old Design Issues

The inspectors determined this issue did not meet the IMC 0305 criteria for an old design issue.

4OA6 Exit Meeting and Regulatory Performance Meeting

On September 4, 2015, the inspectors presented the inspection results to Mr. G. Stathes, Site Vice President, and other members of his staff, who acknowledged the inspection results. The inspectors asked Exelon if any of the material examined during the inspection should be considered proprietary. Exelon did not identify any proprietary information.

Upon completion of the exit meeting, the Region I Chief, Reactor Projects Branch 6, Mr. Silas R. Kennedy, conducted the Regulatory Performance Meeting, in accordance with IMC 0305, with Mr. G. Stathes, Site Vice President, and other members of his staff. The purpose of the meeting was to discuss Exelon's corrective actions in response to the White finding and NOV. Based on the guidance in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program," and the results of this inspection, the White finding will be closed effective October 1, 2015. However, Oyster Creek will remain in the Regulatory Response Column of the NRC's ROP Action Matrix for a White Unplanned Scrams Per 7000 Critical Hours Performance Indicator. The Performance Indicator must return to Green and a separate supplemental inspection be performed before Oyster Creek can transition to the Licensee Response Column of the NRC's ROP Action Matrix.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
G. Stathes, Site Vice-President
J. Dostal, Plant Manager
T. Cappuccino, Regulatory Assurance
C. Carlon, Mechanical Design Engineering
R. Csillag, Mechanical and Structural Design Engineering Manager
R. Dutes, Regulatory Assurance
D. Jones, Electrical Design Engineering
M. McKenna, Regulatory Assurance Manager
J. Parker, Engineering
J. Ruark, Engineering
H. Tritt, Design Engineering
B. Yochim, Mechanical Design Engineering

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Closed

05000219/2014005-04	NOV	EDG Cooling Fan Shaft Failure (Section4OA4)
05000219/2014-003-01	LER	Technical Specification Prohibited Condition Caused by Emergency Diesel Generator Inoperable for Greater than Allowed Outage Time (Section 4OA3)

LIST OF DOCUMENTS REVIEWED

Procedures
AD-AA-101, “Processing of Procedures and T&RMs,” Rev. 15
AD-AA-101-1002, “Writer’s Guide and Process Guide for Procedures and T&RM,” Rev. 7
AD-AA-3000, “Nuclear Risk Management Process,” Rev. 1
CC-AA-102, “Design Input and Configuration Change Impact Screening,” Rev. 6
CC-AA-103, “Configuration Change Control for Permanent Physical Plant Changes,” Rev. 27
CC-AA-103, “Configuration Change Control,” Rev. 7
CC-AA-309-101, “Engineering Technical Evaluation,” Rev. 7
CC-AA-309-101, “Engineering Technical Evaluation,” Rev. 14
LS-AA-104, “Exelon 50.59 Review Process,” Rev. 4
LS-AA-104, “Exelon 50.59 Review Process,” Rev. 10
LS-AA-104-1003, “50.59 Screening Form,” Rev. 4
LS-AA-104-1002, “50.59 Applicability Review Form,” Rev. 5
LS-AA-120,”Issue Identification and Screening Process,” Rev. 4
LS-AA-125, “Corrective Action Program (CAP) Procedure,” Rev. 8
LS-AA-125-1001, “Root Cause Investigation Report,” Rev. 4
PI-AA-120, “Issue Identification and Screening Process,” Rev. 3
PI-AA-125, “Corrective Action Program (CAP) Procedure,” Rev. 2
PI-AA-125-1001, “Root Cause Analysis Manual,” Rev. 1
PI-AA-125-1003, “Apparent Cause Evaluation Manual,” Rev. 2
MA-OC-86103-100, “Diesel Generator Fan Belt Replacement,” Rev. 3

AD-AA-101-F-01, “Document Site Approval Form,” Rev. 5
MA-OC-861101, “Diesel Generator Inspection (24 Month) – Mechanical,” Rev. 20
PI-AA-126-1001-F-01, “Focused Area Self-Assessment,” Rev. 0

Drawings

Condition Reports (*Written in response to this inspection)
1078312
1103610
1686101
2109859
2415151
2434265
2452089
2495427
2505599*
2505684*
2546203*
2551462*
2562407*

Maintenance Orders / Work Orders
C2032651 C2032634 R2190622 C2023739

Miscellaneous
ECR OC 15-00304, Engineering Change Request for As-Built Fan Belt Replacement for EDG No. 1 and EDG No. 2

05000219/2014005, NRC Integrated Inspection Report and Preliminary White Finding
TensionRite Belt Frequency Meter, User Manual

(Docket 50-219) LER 2004-001-00, #1 EDG Inoperable Caused by Cooling Fan Bearing Bolts Not Torqued Properly Following Preventative Maintenance Activities

(Docket 50-219) LER 2014-003-00, Technical Specification Prohibited Condition Caused by EDG Inoperable for Greater than Allowed Outage Time

Certification of Calibration #0010863957 for Belt Tension Meter

Structural Integrity Associates, Inc. Fracture Mechanics Evaluation of Failed Cooling Fan Shaft, Report No. 1400935.402.R0

Structural Integrity Associates, Inc. Evaluation of Failed Cooling Fan Shaft, Report No. 1401386.401 Rev. 0

MPR Task No. 0083-0401-0314-01, Engine Driven Radiator Fan Speed Calculation

Exelon Power Labs OYS-35189, Failure Analysis of Cooling Fan Shaft Section

EMD / GE Maintenance Instruction M.I.1200, Rev. A, MP45 Cooling Fan and Related Drive

Train Assembly

Operations Log, Monday, July 28, 2014

GPU Nuclear, NDE Request 93-048

GPU Nuclear, NDE Request 94-065

Audit Template Document Control and Quality Assurance Records for E1B1

Audit Template Document Control and Quality Assurance Records for X1D-1

LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
ADAMS	Agencywide Documents Access and Management System
AR	Action Request
CAP	Corrective Action Program
CCDP	Conditional Core Damage Probability
EDG	Emergency Diesel Generator
Exelon	Exelon Generation Company, LLC
FASA	Focus Area Self-Assessment
Hz	Hertz
IP	Inspection Procedure
IMC	Inspection Manual Chapter
IR	Inspection Report
LER	Licensee Event Report
NEI	Nuclear Energy Institute
NOS	Nuclear Oversight
NOV	Notice of Violation
NRC	U. S. Nuclear Regulatory Commission
OD	Operability Determination
OE	Operating Experience
Oyster Creek	Oyster Creek Nuclear Generating Station
QA	Quality Assurance
RCA	Root Cause Analysis
ROP	Reactor Oversight Process
SQR	Station Qualified Reviewer
10 CFR	Title 10 of the *Code of Federal Regulations*