



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

April 13, 2017

EA-16-241

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

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION – FINAL SIGNIFICANCE DETERMINATION FOR A WHITE FINDING WITH ASSESSMENT FOLLOW-UP AND NOTICE OF VIOLATION - INSPECTION REPORT 05000219/2016004

Dear Mr. Hanson:

This letter provides you the final significance determination for the preliminary White finding discussed in the U.S. Nuclear Regulatory Commission (NRC) letter dated January 25, 2017, which included NRC Inspection Report Number 05000219/2016004 (ML17025A063).¹ The finding involved a failure by Exelon Generation Co., LLC (Exelon) staff at the Oyster Creek Nuclear Generating Station (Oyster Creek) to implement a procedure related to the maintenance of safety-related equipment. As described in the subject inspection report, the NRC determined that this finding involved an apparent violation of Technical Specification (TS) 6.8.1, "Procedures and Programs," because Exelon personnel did not follow electromatic relief valve (EMRV) reassembly instructions that required personnel to reinstall previously removed lock washers from the 'E' EMRV cut-out switch lever. The incorrect reassembly impacted the ability of the 'E' EMRV to perform its intended safety function. As a consequence, Exelon also violated TS 3.4.B, "Automatic Depressurization System," since the 'E' EMRV was determined to be inoperable for a period greater than its TS allowed outage time of three days.

At your request, a Regulatory Conference was held on March 9, 2017, to discuss Exelon's views on this issue. During the conference Exelon staff provided a presentation (ML17074A354) that described its assessment of the significance of the finding and the corrective actions taken to resolve them. Specifically, Exelon agreed with the finding, but disagreed with the NRC's preliminary characterization of the finding as being low-to-moderate (White) safety significance. Exelon acknowledged that the quantitative risk evaluation performed by the NRC, in assessing the preliminary significance of the finding, was conducted in accordance with NRC Risk Assessment Standardization Project (RASP) Guidance (ML13030A049), and consistent with Exelon's significance determination risk assessment. However, Exelon disagreed with the application of the common cause probability factor and recommended that the NRC use the flexibility provided in the NRC RASP guidance to qualitatively assess the final significance of the finding based on the number of barriers that Exelon put in place to prevent common cause effects. A summary of Exelon's position as

¹ Designation in parentheses refers to an Agency-wide Documents Access and Management System (ADAMS) accession number. Documents referenced in this letter are publicly-available using the accession number in ADAMS.

provided at the Regulatory Conference and its presentation, the NRC's response to the points raised by Exelon, and the details of the NRC's conclusion on the safety significance of this issue are provided in Enclosure 1.

After careful consideration of the information developed during the inspection and the information provided at the Regulatory Conference, the NRC has concluded that the finding is appropriately characterized as White, a finding of low to moderate safety significance. You have 30 calendar days from the date of this letter to appeal the NRC staff's determination of significance for the identified White finding. Such appeals will be considered to have merit only if they meet the criteria given in the NRC Inspection Manual Chapter 0609, Attachment 2. An appeal must be sent in writing to the Regional Administrator, Region I, 2100 Renaissance Boulevard, Suite 100, King of Prussia, PA 19406.

The finding and the associated TS violations are cited in the attached Notice of Violation (Notice) provided in Enclosure 2. In accordance with the NRC Enforcement Policy, the Notice is considered an escalated enforcement action because it is associated with a White finding. The NRC has concluded that the information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence, and the date when full compliance was achieved is already adequately addressed on the docket in NRC Inspection Report Number 05000219/2016004. Therefore, you are not required to respond to this letter unless the description therein does not accurately reflect your corrective actions or your position.

As a result of this White finding in the Mitigating Systems Cornerstone, the NRC has assessed Oyster Creek to be in the Regulatory Response column of the NRC's Reactor Oversight Process Action Matrix described in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program," retroactive to the fourth calendar quarter of 2016. The NRC plans to conduct a supplemental inspection for this finding in accordance with Inspection Procedure 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs," following Exelon's notification of readiness for this inspection. This inspection is conducted to provide assurance that the root causes and contributing causes of any performance issues are understood, the extent of condition is identified, and the corrective actions are sufficient to prevent recurrence.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

B. Hanson

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Should you have any questions regarding this matter, please contact Mr. Silas Kennedy, Chief, Projects Branch 6, Division of Reactor Projects in Region I, at (610) 337-5046.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Dorman" with a stylized flourish at the end. To the right of the signature, the word "for" is written in a smaller, cursive script.

Daniel H. Dorman
Regional Administrator

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

Enclosures: As stated

cc w/encl: Distribution via ListServ

ENCLOSURE 1

NRC RESPONSE TO INFORMATION PROVIDED IN THE MARCH 9, 2017, REGULATORY CONFERENCE BETWEEN EXELON GENERATION CO., LLC (EXELON) AND THE NRC REGARDING THE 'E' ELECTROMATIC RELIEF VALVE FINDING

Summary of Exelon's Position

During the March 9, 2017, Regulatory Conference, Exelon agreed with the performance deficiency and the associated apparent violation involving Exelon's failure to implement a procedure related to the maintenance on the 'E' electromatic relief valve (EMRV), as documented in NRC Inspection Report 05000219/2016004 (ML17025A063). However, Exelon disagreed with the NRC's preliminary safety significance determination of this issue. Exelon believes that the safety significance of this performance deficiency is more appropriately characterized as very low significance (Green) vice low to moderate safety significance (White). Specifically, Exelon stated that the risk assessment for the failure of the 'E' EMRV should not assume an increased common cause failure (CCF) probability for the unaffected EMRVs based upon their as-found condition and the multiple barriers Exelon put in place to guard against multiple failures during the refurbishment of the EMRVs in the 2014 refueling outage. Also, Exelon stated that while the NRC's risk assessment of this finding was consistent with the current Risk Assessment Standardization Project (RASP) guidance (ML13030A049), Exelon believes that RASP, Section 5.0, "Common-Cause Failure Modeling," Ground Rule #3 should also be applied. Ground Rule #3 allows the NRC flexibility to give credit to the licensee (qualitative adjustments) where it has been determined that the licensee had implemented programmatic actions to defend against CCF coupling factors.

NRC Response:

The NRC reconvened on March 13, 2017, to consider Exelon's written and verbal response to the apparent violation and safety significance determination. The NRC concluded that the "qualitative factors" outlined by Exelon to defend against common cause failures or events (i.e., just-in-time training, additional oversight by supervision, subject matter experts and quality assurance personnel, procedural revisions and additional briefings, etc.) were not unique or characteristic of actions to decouple individual elements of a common cause component group (CCCG). The factors outlined by Exelon were viewed by the NRC as measures typically prescribed under the station's Quality Assurance Program for maintaining and operating safety related systems, components and structures. By Exelon's own admission, these actions were uniformly applied to all five relief valves, without discrimination. Further, in the absence of available post-work documentation, Exelon was not able to specifically conclude which individual(s) worked which relief valve on what day, preventing a conclusion that the person who made the error during re-assembly of the 'E' EMRV could not have made the same error during re-assembly of any of the other valves. NRC and industry derived common cause guidance (reference NUREG/CR-6268, "Common-Cause Failure Database and Analysis System: Event Data Collection, Classification, and Coding," (ML072970404) defines effective defenses against common cause failure mechanisms as deliberate actions that decouple the elements of a CCCG. For example, unique design attributes, diverse operating environments or applications, or performance of maintenance/operation by different crews on different days, could provide a measure of distinction between elements of a CCCG.

The NRC concluded that the qualitative maintenance practices implemented by the Oyster Creek staff did support a defense-in-depth approach and helped to minimize the potential for error introduction. However, as presented by Exelon, these practices were uniformly applied to

all EMRVs by the Oyster Creek staff. The NRC also concluded that the uniformly applied organizational factors, portrayed by Exelon as unique defenses to prevent CCF, did not contribute to decoupling the five EMRVs during the 2014 refuel outage refurbishment activities. Accordingly, the NRC did not agree with Exelon's conclusion that the 'E' EMRV failure should be regarded as an independent failure due to a single human error and therefore exempt from common cause potential treatment. Therefore, the application of an increased common cause probability for the risk significance evaluation for this performance deficiency was appropriate and remains unchanged.

Additional Exelon Comments for Consideration:

Exelon stated that the failure of the 'E' EMRV would not be considered as a common cause event per the guidance in NUREG/CR-6268, "Common-Cause Failure Database and Analysis System: Event Data Collection, Classification, and Coding."

The NRC agrees that the 'E' EMRV failure should not be classified as a common cause event. As defined in NUREG/CR-6268 (June 1998) Volume 3, Section 1.3, a common-cause event is a dependent failure in which two or more component fault states exist simultaneously, or within a short time interval, and are a direct result of a shared cause. Based upon the failure of the 'E' EMRV, and no additional EMRV failures identified as a result of the 2014 refurbishment, this single component failure would not be categorized as a common cause event. Industry-wide component failure databases, such as Licensee Event Reports, Nuclear Plant Reliability Data System (NPRDS) and Equipment Performance and Information Exchange (EPIX), include independent failures, common cause failures and initiating events. These industry databases are used by Idaho National Laboratory to periodically update generic component failure probabilities such as those published in NUREG/CR-6928, "Industry-Average Performance for Components and Initiating Events at U.S. Commercial Nuclear power Plants," (ML070750650) and NUREG/CR-6819, Volumes 1-4, "Common Cause Failure Event Insights," (ML031710318, 328, 333, and 861), as well as NUREG/CR-6268. Data from the occurrence of specific common cause events are collected independently for use in updating the development of generic component parametric factors such as used in the Alpha and Multiple Greek Letter methods. The parametric factors are used separately in the calculation which estimates common cause failure probability and the failure of the 'E' EMRV does not impact the value of these factors. While not categorized as a common cause event, treatment of the 'E' EMRV failure in the NRC risk evaluation appropriately warrants consideration for increased common cause potential due to the proximate causal factors (common procedural guidance and maintenance practices) present during refurbishment of all five EMRVs.

Lastly, Exelon recommends that long term, the NRC apply a graded approach to the assignment of common cause failure probabilities. Exelon views the current alpha factor CCF methodology as resulting in a disproportionate increase in risk and not adequately accounting for the actual extent of condition of the unaffected components in a CCGG.

Exelon's recommendation to apply a graded approach to the assignment of CCF values may have merit for consideration in future revisions to the NRC guidance. However, the specific example provided in Exelon's presentation lacked sufficient detail and depth to facilitate an understanding of how graded values would be assigned, what the technical/probabilistic bases for those values are, or how the graded approach applies to various sized CCGGs. Additional details and supporting analysis are warranted in order for the NRC staff to consider such an approach. The NRC welcomes future engagement by industry on this topic.

Summary

The NRC staff carefully reviewed the information discussed at the regulatory conference and the information provided in Exelon's presentation. The NRC acknowledges and considered Exelon's viewpoint, but ultimately determined that the information did not alter our original risk assessment outcome or methodology as described in Inspection Report 05000219/2016004. Based upon the additional information provided, the NRC staff concluded that the finding remains appropriately characterized as White.

ENCLOSURE 2

NOTICE OF VIOLATION

Exelon Nuclear, LLC
Oyster Creek Nuclear Generating Station

Docket No. 50-219
License No. DPR-16
EA-16-241

During an NRC inspection conducted from October 1, 2016 through December 31, 2016, and for which an inspection exit meeting was conducted on January 4, 2017, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Oyster Creek Technical Specification (TS) 6.8.1, "Procedures and Programs," requires, in part, that written procedures be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide (RG) 1.33, "Quality Assurance Program Requirements," Revision 2, as referenced in NO-AA-10, "Quality Assurance Topical Report."

RG 1.33, "Quality Assurance Program Requirements," Appendix A, Section 9, requires, in part, that procedures for maintenance that can affect the performance of safety-related equipment be properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances.

Engineering Change Request (ECR) 14-00371, "Oyster Creek EMRV Conversion Instructions," Revision 1, "Unmodified Actuator Disassembly" section, Step 9 requires, in part, removal during disassembly of the two hex head screw pins from the cutout switch lever arm and retaining the lock washers for re-use.

ECR 14-00371, "Oyster Creek EMRV Conversion Instructions," Revision 1, "Modification Instructions" section, Step 2 requires, in part, that two new screw pins be installed with the previously removed lockwashers.

TS 3.4.B, "Automatic Depressurization System," states, in part, that five electromechanical relief valves shall be operable and if at any time there are only four operable EMRVs, the reactor may remain in operation for a period not to exceed three days. If one EMRV is inoperable for more than three days, then reactor pressure shall be reduced to 110 psig or less, within 24 hours.

Contrary to the above, on September 5, 2014, Exelon failed to properly implement a procedure related to the maintenance of safety-related equipment. Specifically, Exelon personnel did not follow the EMRV reassembly instructions for the 'E' EMRV that directed reinstallation of the lever plate with the previously removed lock washers. The incorrect reassembly caused excessive friction between the solenoid frame and the cut-out switch lever, causing the cut-out switch lever to become bound in the energized position, impacting the ability of the 'E' EMRV to perform its safety function. Between October 11, 2014 and September 19, 2016, this incorrect reassembly resulted in the 'E' EMRV being inoperable for greater than the Technical Specification allowed outage time.

This violation is associated with a White Significance Determination Process finding.

The NRC has concluded that information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence, and the date when full compliance was achieved is already adequately addressed on the docket in NRC Inspection Report Number 05000219/2016004. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation; EA-16-241," and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region I, 2100 Renaissance Boulevard, Suite 100, King of Prussia, PA 19406, and a copy to the NRC Resident Inspectors at Oyster Creek Nuclear Generating Station, within 30 days of the date of the letter transmitting this Notice of Violation (Notice).

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

If you choose to respond, your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Dated this 13th day of April, 2017.