



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 27, 2017

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

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT 2 – REVIEW OF STEAM DRYER
INSPECTION RESULTS (CAC NO. MF7742)

Dear Mr. Hanson:

By letter dated August 1, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16222A388), Exelon Generation Company, LLC (Exelon, the licensee) submitted information (1) summarizing the steam dryer inspection results for the second refueling outage (RFO) post-extended power uprate (EPU) for the Nine Mile Point Nuclear Station, Unit 2 (NMP2), (2) describing the long-term steam dryer inspection plan for NMP2, and (3) providing information to support resolution of two open items from the U.S. Nuclear Regulatory Commission (NRC) staff's review of the steam dryer inspection results for the first RFO post-EPU for NMP2. The purpose of this letter is to provide the results of the NRC staff's review of the steam dryer inspection results and the information to support resolution of the two open items. The NRC staff will provide separate correspondence regarding the NRC staff's review of the long-term steam dryer inspection plan.

The NMP2 license included the following two license conditions (i.e., requirements) concerning EPU:

License Condition 2.C.(20)(f):

During the first two scheduled refueling outages after reaching 120 percent OLTP [original licensed thermal power] conditions, a visual inspection shall be conducted of all accessible, susceptible locations of the steam dryer in accordance with BWRVIP [Boiling Water Reactor Vessel and Internals Project] -139 inspection guidelines. In addition, a visual inspection of all accessible welds that were analyzed using embedded models shall be conducted. In addition, a visual inspection of the existing indications in the upper support ring, the drain channel to skirt weld, the tie bar-to-hood weld heat affected zone, and vertical support plates shall be conducted.

License Condition 2.C.(20)(g):

The results of the visual inspections of the steam dryer shall be reported to the NRC staff within 90 days following startup from the respective refueling outage.

Consistent with the requirements listed above, Exelon provided the steam dryer inspection results, including a description of the scope of the inspection in its August 1, 2016, letter. The NRC staff reviewed the steam dryer inspection results for the second RFO post-EPU. The NRC staff's review of the licensee's steam dryer inspection results revealed no EPU-related service induced cracking.

A regulatory audit was conducted on February 18, 2016 at Continuum Dynamics Inc. in Ewing Township, New Jersey, as part of the NRC staff's review of the steam dryer inspection results for the first RFO post-EPU for NMP2. The purpose of the audit was to assess the validity and applicability of a new loading component that was used in the NMP2 steam dryer stress analysis. A summary of the audit dated June 24, 2016, is available at ADAMS Accession No. ML16146A211. The NRC staff completed the audit with two open items:

1. The staff found the information provided does not substantiate the application of velocity induced loading (VIL) as proposed by the licensee in its letters dated July 28, 2014, and October 8, 2015 (ADAMS Accession Nos. ML14216A347 and ML15288A248, respectively). Therefore, the minimum alternating stress ratio computed without the use of VIL damping is representative of the actual alternating stress state of the NMP2 dryer.
2. In addition, the staff found that the reexamination of the NMP2 revised dryer loads presented in Appendix C of Report No. 14-09P, Revision 1, "Acoustic and Low Frequency Hydrodynamic Loads at 115% CLTP Target Power Level on Nine Mile Point Unit 2 Steam Dryer to 250 Hz Using ACM Rev. 4.1R," dated May 2014 (ADAMS Accession No. ML15022A662), show much lower than expected pressure loading spectra based on experience with similar sized plants and dryers. The licensee has agreed to check the accuracy of the plots provided in the report.

To address the first open item concerning VIL, the licensee performed steam dryer stress analysis without VIL considered (letter dated May 4, 2016; ADAMS Accession No. ML16131A653). The licensee's stress analysis results, without VIL considered, show that all the steam dryer locations have an alternating stress ratio greater than the NMP2 licensing basis American Society of Mechanical Engineers (ASME) code minimum ratio of 1.0. The stress ratios indicate that the dryer maximum alternating stress is less than 9,714 pounds per square inch (psi), which corresponds to an alternating stress ratio of 1.4 and is, therefore, below the ASME fatigue endurance limit of 13,600 psi for austenitic stainless steel. Furthermore, a qualitative review by the NRC staff of the fatigue usage for the locations, with alternating stress ratios below 2.0 when discounting the VIL mechanism, shows the minimum number of fatigue cycles experienced at NMP2 post-EPU is greater than 10^9 cycles during its 4 years of operation under EPU conditions without fatigue cracking. Thus, the NMP2 steam dryer has sufficiently demonstrated that fatigue cracking is unlikely under EPU conditions.

To address the second open item concerning revised dryer loads, the licensee performed three checks:

1. A comparison between a representative measured outer bank hood pressure loading on the Quad Cities Unit 2 (QC2) dryer and the computed pressure loading at a similar location on the NMP2 outer bank hood at a similar main steam line Mach number. The conclusion is that the loading definition for NMP2 is consistent with the load measured on the QC2 dryer.

2. An independent check of the design record file of the calculation supporting the load definition was completed, and no errors or inconsistencies were found in the analysis.
3. The loads were compared to a similar size plant and dryer evaluated with the Continuum Dynamics Inc. Acoustic Circuit Model and the pressure loading spectra considered to be in the same order of magnitude.

The NRC staff has reviewed the checks provided by the licensee and finds them acceptable because the checks demonstrated that the revised dryer loads were accurate.

Based on a review of the information provided, the NRC staff concludes that the licensee has provided the information required by License Conditions 2.C.(20)(f) and 2.C.(20)(g). Also, the NRC staff determined that there are no technical issues that warrant additional followup action regarding the steam dryer inspection results for the second RFO post-EPU or the information to support resolution of two open items from the staff's review of the steam dryer inspection results for the first RFO post-EPU.

Sincerely,



Michael L. Marshall, Jr., Senior Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-410

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SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT 2 – REVIEW OF STEAM DRYER INSPECTION RESULTS (CAC NO. MF7742) DATED MARCH 27, 2017

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