



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

February 11, 2016

Mr. Robert Braun
President and Chief Nuclear Officer
PSEG Nuclear LLC - N09
P.O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION – COMPLETION OF REVIEW OF THE
IMPLEMENTATION OF LICENSE RENEWAL LICENSE CONDITIONS 2.C.(27)b
AND 2.C.(27)c (CAC NO. MF6686)

Dear Mr. Braun:

By letter dated July 22, 2015,¹ PSEG Nuclear LLC (PSEG), the licensee for Hope Creek Generating Station, submitted a summary of the results of the ultrasonic thickness (UT) measurements and leakage detection from penetrations obtained during Refueling Outage (RFO) 19 in accordance with Renewed Facility Operating License No. NPF-57, License Conditions 2.C.(27)b and 2.C.(27)c. The actions required by the license conditions are also described in license renewal Commitment No. 28 in Appendix A of NUREG-2102, "Safety Evaluation Report Related to the License Renewal of Hope Creek Generating Station."² These license conditions require the licensee to perform UT measurements of identified portions of the drywell, monitor specific penetrations for leakage when the reactor is flooded, and provide a summary of the UT results to the U.S. Nuclear Regulatory Commission (NRC).

The NRC staff reviewed the information provided in the licensee's letter, and based on this review, the NRC staff finds that the licensee has completed the actions required by License Conditions 2.C.(27)b and 2.C.(27)c for RFO 19. The NRC staff review of the licensee's submittal is summarized in the enclosure to this letter. This completes the NRC staff efforts for CAC No. MF6686.

¹ Agencywide Documents Access and Management System (ADAMS) Accession No. ML15203A072

² ADAMS Accession No. ML11200A221

R. Braun

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If you have any questions regarding this matter, please contact me at (301) 415-1603 or Carleen.Parker@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Carleen J. Parker". The signature is written in a cursive style with a long horizontal stroke at the end.

Carleen J. Parker, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosure:
Office of Nuclear Reactor Regulation
Review of Information Provided

cc w/enclosure: Distribution via Listserv

OFFICE OF NUCLEAR REACTOR REGULATION
REVIEW OF INFORMATION PROVIDED AS REQUIRED BY
LICENSE CONDITIONS 2.C.(27)b AND 2.C.(27)c RELATED TO DRYWELL EXAMINATIONS

PSEG NUCLEAR LLC

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

1.0 INTRODUCTION

By letter dated July 22, 2015,¹ PSEG Nuclear LLC (PSEG), the licensee for Hope Creek Generating Station (Hope Creek), submitted a summary of the results of the ultrasonic thickness (UT) measurements and leakage detection from penetrations obtained during Refueling Outage (RFO) 19 in accordance with Renewed Facility Operating License No. NPF-57, License Conditions 2.C.(27)b and 2.C.(27)c. The actions required by the license conditions are also described in license renewal Commitment No. 28 in Appendix A of NUREG-2102, "Safety Evaluation Report Related to the License Renewal of Hope Creek Generating Station."² These license conditions require the licensee to perform UT measurements of identified portions of the drywell, monitor specific penetrations for leakage when the reactor is flooded, and provide a summary of the UT results to the U.S. Nuclear Regulatory Commission (NRC).

2.0 BACKGROUND

Renewed Facility Operating License No. NPF-57 for Hope Creek was issued on July 20, 2011.³ The renewed license contains several license conditions related to license renewal and, in particular, to the Hope Creek drywell air gap drains. Some portions of these license conditions were included in the RFO 17 scope and were addressed during the outage that began on April 13, 2012, and ended on May 9, 2012. The licensee's continued investigations were included in the RFO 18 scope and were worked during the outage that began on October 11, 2013, and ended on November 10, 2013. The licensee's monitoring of air gap leakage and performance of drywell shell UT thickness measurement were also included in the RFO 19 scope and were worked during the outage that began on April 10, 2015, and ended on May 13, 2015.

3.0 REGULATORY EVALUATION

Renewed Facility Operating License No. NPF-57 for Hope Creek contains several license conditions, including License Condition 2.C.(27)c, which requires UT measurements of the drywell shell. More specifically, License Condition 2.C.(27) delineates those activities required

¹ Agencywide Documents Access and Management System (ADAMS) Accession No. ML15203A072

² ADAMS Accession No. ML11200A221

³ ADAMS Accession No. ML11116A148

to be performed following the establishment of drainage capability from the drywell air gap (that is, following completion of License Condition 2.C.(26)), and reads as follows:

- (27) After drainage has been established from the bottom of the air gap in all four quadrants, the licensee will:
- a. Submit a report to the NRC staff in accordance with 10 CFR [Title 10 of the *Code of Federal Regulations*] 50.4 describing the final drain line configuration and summarizing the testing results that demonstrate drainage has been established for all four quadrants.
 - b. Monitor penetration sleeve J13 daily for water leakage when the reactor cavity is flooded up. In addition, perform a walkdown of the torus room to detect any leakage from other drywell penetrations. These actions shall continue until corrective actions are taken to prevent leakage through J13 or through the four air gap drains.
 - c. Perform UT measurements of the drywell shell between elevation 86'-11" (floor of the drywell concrete) and elevation 93'-0" (bottom of penetration J13) below penetration J13 area during the next three refueling outages. In addition, UT measurements shall be performed around the full 360 degree circumference of the drywell between elevations 86'-11" and 88'-0" (underside of the torus down comer vent piping penetrations). The results of the UT measurements will be used to identify drywell surfaces requiring augmented inspections in accordance with IWE requirements for the period of extended operation, establish a corrosion rate, and demonstrate that the effects of aging will be adequately managed such that the drywell can perform its intended function until April 11, 2046. Within 90 days of completion of each refueling outage, submit a report to the NRC staff in accordance with 10 CFR 50.4 summarizing the results from the UT measurements and if appropriate, corrective action.

This review addresses only the RFO 19 actions and results related to the monitoring of air gap leakage and performance of drywell shell UT thickness measurement. The review of the actions and results related to the monitoring of air gap leakage and performance of drywell shell UT measurement from RFO 18 were addressed previously by letter dated June 2, 2014, "Hope Creek Generating Station – Completion of Review of the Implementation of Licensing Conditions 2.C.(27).b and 2.C.(27).c (TAC No. MF3537)."⁴

⁴ ADAMS Accession No. ML14111A239

4.0 TECHNICAL EVALUATION

4.1 License Condition 2.C.(27)a

The action required by License Condition 2.C.(27)a was completed, and the results were submitted to the NRC in PSEG Letter No. LR-N12-0212 dated July 19, 2012.⁵ The NRC staff reviewed the results and documented its conclusion in a letter dated May 13, 2013.⁶

4.2 License Condition 2.C.(27)b

The licensee monitored the J13 penetration sleeve daily for leakage while the reactor cavity was flooded during RFO 19 (April 13, 2015, through April 30, 2015). Also, the licensee monitored the penetrations adjacent to penetration J13 (J19, J14, J29, J24, and J37, called the "J13 penetration group") and the air gap drains daily for water leakage. The licensee observed water at the 225 degree azimuth from the J13 penetration group (specifically the J19 penetration), as well as the excavated access tunnel located at 250 degree azimuth (credited air gap drain).

On April 17, 2015, the licensee identified leakage from penetration sleeve J19 at a leak rate of approximately 42 drops per minute (dpm). On April 20, 2015, the licensee observed a leakage of approximately 10 dpm coming out of the excavated access tunnel at 250 degree azimuth, in addition to the leakage from the J19 penetration sleeve, which had continued. On April 21, 2015, the licensee observed that the leakage in the excavated access tunnel at 250 degree azimuth remained at approximately 10 dpm, while the leakage from penetration sleeve J19 dropped to 20 dpm. On April 22, 2015, the licensee observed that the leakage from the 250 degree azimuth access tunnel ceased. The last recorded leakage by the licensee from penetration sleeve J19 was on April 25, 2015, at 1 dpm. The licensee noted that the cavity remained flooded through April 30, 2015, and attributed the leakage to likely be residual leakage. The licensee also noted that total leakage observed during RFO 19 was less than 25 percent of that collected by the licensee during RFO 18. The licensee concluded that the leakage observed during RFO 19 has not degraded from RFO 18 to RFO 19. The licensee observed that all leakage stopped before the reactor cavity was drained. No leakage from the end of the other three drywell gap drains or from the excavated tunnels was observed by the licensee during RFO 19.

The reactor cavity leakage is currently an ongoing investigation by the licensee. The licensee will perform additional investigatory actions during RFO 20, since the leakage only occurs while the reactor cavity is flooded.

4.3 License Condition 2.C.(27)c

The licensee performed the UT measurements required by License Condition 2.C.(27)c during RFO 19. Based on the UT measurements, the licensee concluded that no corrosion is occurring on the drywell shell.

⁵ ADAMS Accession No. ML12228A388

⁶ ADAMS Accession No. ML13114A965

UT measurements were performed by the licensee on the drywell shell at the 225 degree azimuth between 86'-11" and 93'-0" elevation (below the J13 penetration group). The lowest UT measurements occurred on a plate below the J13 penetration group and measured 1.475" in RFO 16, 1.470" in RFO 17, 1.477" in RFO 18, and 1.490" in RFO 19. Comparing the lowest reading of 1.470" from RFO 17 to the analysis limit of 1.4375" shows approximately 32.5 mils thickness margin remains.

UT measurements were also performed by the licensee for the full circumference of the drywell shell between elevations 86'-11" and 88'-0". The lowest UT measurements at the bottom of the drywell were 1.480" in RFO 16, 1.477" in RFO 17, 1.471" in RFO 18, and 1.475" in RFO 19. Comparing the lowest reading of 1.471" from RFO 18 to the analysis limit of 1.4375" shows that approximately 33.5 mils thickness margin remains. If a corrosion rate of 6 mils per cycle were to be assumed, the analysis limit of 1.4375" would not be reached for at least five cycles. The UT measurements will be taken again during the RFO 20 to confirm that no corrosion is occurring in the drywell shell.

License Condition 2.C.(27).c requires these UT measurement activities for three RFOs following establishment of drainage capability from the bottom of the drywell air gap. RFO 19 is the second of these outages. Therefore, the licensee will continue these UT measurement activities for the next RFO (RFO 20).

5.0 CONCLUSION

Based on this review, the NRC staff concludes that the licensee has completed the actions required by License Conditions 2.C.(27)b and 2.C.(27)c for RFO 19 at Hope Creek. The results of the UT measurements demonstrate that there are currently no drywell surfaces requiring augmented inspections in accordance with IWE requirements for the period of extended operation. This completes the NRC staff's review under TAC No. MF6686.

Principal Contributor: Juan Lopez, NRR

Date: February 11, 2016.

R. Braun

- 2 -

If you have any questions regarding this matter, please contact me at (301) 415-1603 or Carleen.Parker@nrc.gov.

Sincerely,

/RA/

Carleen J. Parker, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

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ADAMS Accession No.: ML16027A194

*by memo

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DATE	1/28/2016	1/27/2016	11/4/2015	2/11/2016	2/11/2016

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