PSEG Nuclear LLC
P.O. Box 236, Hancocks Bridge, New Jersey 08038-0236

PSEG
Nuclear LLC

FOL 2.C. (27)

LR-N17-0036

FEB 07 2017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington DC 20555-001

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
Docket No. 50-354

Subject: License Renewal Commitment Implementation

References: (1) LR-N12-0212, "License Renewal Commitment Implementation," dated July 19, 2012

The Renewed Operating License No. NPF-57 for Hope Creek Generating Station (HCGS) was issued on July 20, 2011. The renewed license included several license conditions related to the ASME Section XI, Subsection IWE aging management program and, in particular, to the Hope Creek drywell air gap drains. In accordance with License Condition 2.C. (27) c, this letter transmits a report summarizing the results of the ultrasonic thickness (UT) measurements taken during Refueling Outage 20 (Attachment 1.)

There are no regulatory commitments contained in this letter.

If you have any questions or require additional information, please contact Ms. Alysse K. Ochoa at 856-339-2742.

Sincerely,

Eric Carr
Site Vice President
Hope Creek Generating Station

ako

Attachment 1: Hope Creek Generating Station License Renewal Commitment Implementation 90-Day Report for Refueling Outage 20

cc: Mr. Daniel Dorman, Regional Administrator - NRC Region 1
Ms. Carleen Parker, Project Manager - USNRC
Mr. Justin Hawkins, USNRC Senior Resident Inspector - Hope Creek
Mr. Patrick Mulligan, Manager IV, NJBNE
Mr. Lee Marabella, Corporate Commitment Tracking Coordinator
Mr. Thomas MacEwen, Hope Creek Commitment Tracking Coordinator

LR-N17-0036
Attachment 1

Hope Creek Generating Station License Renewal Commitment Implementation 90-Day Report for Refueling Outage 20

Hope Creek Generating Station License Renewal Commitment Implementation 90-Day Report for Refueling Outage 20

Background:

Renewed Operating License No. NPF-57 for Hope Creek Generating Station was issued on July 20, 2011. 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 Refueling Outage (RF) 17 scope and were worked during the outage that began on April 13, 2012, and ended on May 9, 2012. Continued investigations and changes were included in RF18 scope and were worked during the outage that began on October 11, 2013, and ended November 10, 2013. Monitoring of air gap leakage and performance of drywell shell UT thickness measurements were included in the RF19 scope and were worked during the outage that began on April 10, 2015, and ended May 13, 2015. Monitoring of air gap leakage and performance of drywell shell UT thickness measurements were also included in the RF20 scope and were worked during the outage that began on October 14, 2016, and ended November 11, 2016.

The relevant license conditions are contained in Section 2.C of the renewed license. Specifically, Section 2.C.(27) delineates those activities required 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 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 walk-down 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.

Hope Creek Generating Station License Renewal Commitment Implementation
90-Day Report for Refueling Outage 20

Summary of Commitment Implementation:

The action required by License Condition 2.C. (27) a. was completed and the results submitted to the NRC in PSEG Letter No. LR-N12-0212 dated July 19, 2012. In accordance with License Condition 2.C. (27), this report discusses the actions taken by PSEG during Hope Creek Refueling Outage 20 (RF20) to satisfy license condition 2.C. (27) b. and 2.C. (27) c., above. The specific license conditions addressed and/or resolved during RF20 are as follows:

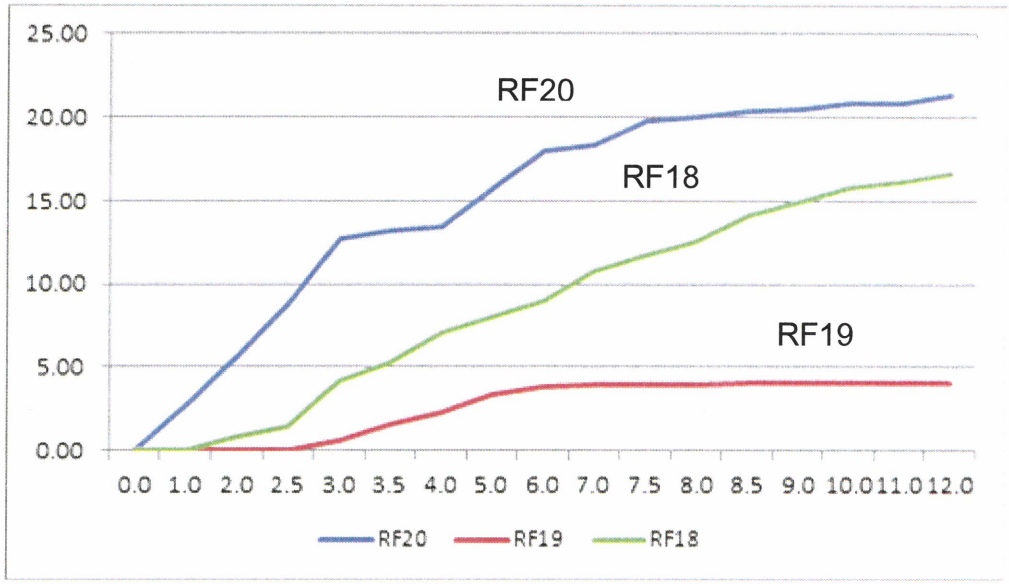
A. Monitoring of J13 Penetration Sleeve (License Condition 2.C. (27) b.)

During RF20, the J13 penetration sleeve was monitored daily for leakage while the reactor cavity was flooded up (October 18, 2016 through November 3, 2016). Further, the penetrations adjacent to penetration J13 (J19, J14, J29, J24, and J37, specified here as the "J13 penetration group"), and the air gap drains were monitored daily for water leakage. In addition, a full walk-down of the torus room was performed to confirm that there was no leakage from any other penetrations. While the reactor cavity was flooded, walk-downs were performed by Operations in accordance with Operating Procedure HC.OP-DL.ZZ-0026, Surveillance Log. In addition, Engineering performed independent walk-downs during this time to gather additional data points. During the walk-downs, following reactor cavity flood-up and continuing until reactor cavity drain down, water was observed leaking at the 225 degree azimuth from the J13 penetration group (specifically the J19 penetration). Unlike in the previous two refueling outages, there was zero leakage identified at the excavated access tunnel located at 250 degree azimuth (specified here as the "250 Tunnel", a credited air gap drain).

On October 19, 2016, leakage was identified from penetrations J14/J24 at a leak rate of approximately 125 drops per minute (dpm). At penetrations J13/J37 and J19/29, leakage was identified at a rate of approximately 5 dpm at each penetration respectively. No water was noted leaking from any other areas within the torus room. The leak rate from the J14/24 penetrations increased to 332 dpm on October 20, 2016, and the leakrate on penetrations J13/J37 and J19/29 increased to approximately 125 dpm and 166 dpm, respectively. There was zero leakage identified coming out of the 250 Tunnel. On October 21, 2016, the 250 Tunnel leakage remained at zero, while the penetrations J14/24 leakage dropped to approximately 262 dpm, and the leakage on the J13/37 and J19/29 penetrations dropped to approximately 83 dpm and 21 dpm, respectively. On October 23, 2016, the leakage from the 250 Tunnel remained at zero, and the leakage from the penetrations J14/24 dropped to approximately 97 dpm and the leakage on the J13/37 and J19/29 penetrations dropped to approximately 29 dpm and zero leakage, respectively. On October 25, 2016, the leakage from the 250 Tunnel remained at zero, and the leakage from penetrations J14/24 increased to 498 dpm, and the leakage on the J13/37 and J19/29 penetrations increased to approximately 249 dpm and 24 dpm, respectively. From October 26, 2016, to October 30, 2016, leakage diminished to zero at the J14/24 penetrations and the J13/37 penetrations, but there was a slight increase in leakage on the J19/29 penetrations to 80 dpm on October 26, 2016. The leakage at penetrations J19/29 dropped over the next two days to approximately 28 dpm. The last leakage was recorded on October 30, 2016, from the penetration J19/29

Hope Creek Generating Station License Renewal Commitment Implementation 90-Day Report for Refueling Outage 20

at a rate of approximately 28 dpm. Note that the cavity remained flooded through November 3, 2016. The chart below represents a comparison of the RF20 leakage to that of the RF19 and RF18 leakage, where the X-axis represents days following flood up and the Y-axis represents cumulative gallons leaked.



The data for RF18 and RF20 is similar. Leakage was first observed during RF20 after one day flooded up versus two days for RF18. The durations of the leakage for RF18 and RF20, however, were similar. The RF18 data versus RF20 data indicates a potential increase in leakage. The difference in leakage between RF18 and RF20 is very small (5 gallons total) and, overall, the total leakage continues to remain low.

No leakage was observed from any other air gap penetrations, and there was no sign of leakage from the end of the other three air gap drains (at 80, 160 and 340 degree azimuths), or from the excavated tunnels at 250, 290, 155 and 115 degree azimuths. The Reactor Cavity to Drywell Seal Rupture Drain Alarm (HC.OP-AR.ZZ-0024, Alarm point D3837) did not actuate at any time while the reactor cavity was flooded up. All leakage from the penetrations stopped before draining of the reactor cavity.

B. <u>UT Measurements (License Condition 2.C. (27) c.)</u>

The Ultrasonic Thickness (UT) measurements prescribed by license condition 2.C. (27) c. were performed during RF20. Based on the consistency of the UT measurements with those taken in previous outages, PSEG has concluded that no significant corrosion is occurring on the drywell shell.

UT measurements were performed on the drywell shell at the 225 degree azimuth between 86'-11" and 93'-0" elevation (below the J13 penetration group). The lowest UT

Hope Creek Generating Station License Renewal Commitment Implementation 90-Day Report for Refueling Outage 20

measurements occurred on a plate below the J13 penetration group and measured 1.475" in RF16, 1.470" in RF17, 1.477" in RF18, 1.490" in RF19, and 1.482" in RF20. Note that these readings were not at the same measurement point but were the lowest of all recorded readings taken during the respective outages. Comparing the lowest reading of 1.470" (from RF17) to the analysis limit of 1.4375" proves that at least 0.0325" thickness margin remains. Further, the consistency of the thickness measurements proves that no corrosion to the drywell shell is occurring below the J13 penetration group. It should be noted that during development of the Hope Creek license renewal application, PSEG concluded that the cause of the lower readings on this plate were due to the plate's construction tolerances being at the lower end, but acceptable for use. UT measurements were also performed for the full circumference of the drywell shell between elevations 86'-11" and 88'-0". The bottom of the drywell air gap is on the outside of the drywell shell between these elevations. The lowest UT measurements at the bottom of the drywell were 1.480" in RF16, 1.477" in RF17, 1.471" in RF18, 1.475" in RF19, and 1.481" in RF20. Note that these readings were not at the same measurement point but were the lowest of all recorded readings taken during the respective outages. Comparing the lowest reading of 1.471" (from RF18) to the analysis limit of 1.4375" shows that 0.0335" thickness margin remains. Based on the consistency of these UT measurements, PSEG has concluded that no corrosion is occurring in the drywell shell at the bottom of the drywell air gap.

Readings were also taken on the weld located above penetrations J-14 and J-24. The lowest reading observed on this weld was 1.460" in RF20. Readings at this point in previous outages were as follows: 1.518" in RF16, 1.579" in RF17, 1.584" in RF18, and 1.583" in RF19. This location's surface condition and geometry, however, is not conducive to consistent data.

Nevertheless, even if a very conservative corrosion rate of 0.006" per cycle were to be assumed, the analysis limit of 1.4375" would not be reached for at least 3 cycles.

The UT measurement activities required to be completed during RF20 by license condition 2.C. (27) c. were completed as described above. License condition 2.C. (27) c requires these UT measurement activities for the three refueling outages following establishment of drainage capability from the bottom of the drywell air gap. RF20 is the third of these outages. The results of the RF20 UT measurements were compared to the previous UT measurements. No corrosion has been observed based on the data. Using a conservative corrosion rate, the analysis limit of 1.4375" would not be reached for 3 cycles. The UT measurements are being incorporated into the 3rd Interval IWE inspections, under category E-C, Item Number E4.12, to be performed once per period (every other outage) in accordance with ASME Section XI, 2007 edition, 2008 addenda.

Hope Creek Generating Station License Renewal Commitment Implementation 90-Day Report for Refueling Outage 20

C. Corrective Actions

The reactor cavity leakage continues to be monitored and documented in the Corrective Action Program (CAP). While the reactor cavity leakage continues to exist, the leakage monitoring actions prescribed by License Condition 2.C. (27) and UFSAR Section A.5, Commitment No 28; Sub-commitment 10 (Pages A-70 & 71) will be performed. UT measurements will be performed in accordance with the 3rd Interval Containment In-Service Inspection Long-Term Plan. There were no additional corrective actions as a result of the activities in RF20.

Conclusion:

Activities associated with the Hope Creek renewed operating license condition 2.C. (27) that were required to be completed during the RF20 refueling outage were completed. License Condition 2.C. (27) a. was satisfied through submittal of PSEG Letter No. LR-N12-0212 on July 19, 2012. License conditions 2.C. (27) b. and 2.C. (27) c were satisfied during RF18 as documented in LR-N14-0029, for RF19 as documented in LR-N15-0147, and for RF20 as discussed above. This report satisfies the reporting requirements of 2.C. (27) c.