



10 CFR 50.90

LR-N16-0231  
December 27, 2016

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

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

Subject: Response to Request for Additional Information, Re: License Amendment Request to Permit Operability of Low Pressure Coolant Injection While Aligned to Shutdown Cooling (CAC No. MF8012)

Reference: NRC letter to PSEG, "Hope Creek Nuclear Generating Station – Request for Additional Information Regarding License Amendment Request to Permit Operability of Low Pressure Coolant Injection While Aligned to Shutdown Cooling (CAC NO. MF8012)," dated November 3, 2016 (ADAMS Accession No. ML 16277A514)

In the referenced letter, the Nuclear Regulatory Commission (NRC) requested PSEG Nuclear LLC (PSEG) to provide additional information in order to evaluate the proposed License Amendment Request to Permit Operability of Low Pressure Coolant Injection While Aligned to Shutdown Cooling. Attachment 1 provides a detailed response to the request for additional information. PSEG has determined that the information provided in this submittal does not alter the conclusions reached in the 10 CFR 50.92 no significant hazards determination previously submitted. In addition, the information provided in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

In a telephone call on December 8, 2016, PSEG proposed to extend the due date for this response to January 6, 2017, and the NRC staff indicated that was acceptable.

There are no regulatory commitments contained in this letter.

Should you have any questions regarding this submittal, please contact Mr. Lee Marabella at 856-339-1208.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on DEC 27 2016  
(Date)

Sincerely,



Eric S. Carr  
Site Vice President  
Hope Creek Generating Station

Attachments:

1. Response to Request for Additional Information

cc: Mr. D. Dorman, Administrator, Region I, NRC  
Ms. C. Parker, Project Manager, NRC  
NRC Senior Resident Inspector, Hope Creek  
Mr. P. Mulligan, Chief, NJBNE  
Hope Creek Commitment Tracking Coordinator  
Corporate Commitment Tracking Coordinator

LR-N16-0231

**Attachment 1**

**Response to Request for Additional Information**

**Response to Request for Additional Information Regarding License Amendment  
Request to Permit Operability of Low Pressure Coolant Injection While Aligned to  
Shutdown Cooling  
Hope Creek Generating Station  
Docket No. 50-354**

By letter dated June 17, 2016 (Agencywide Documents Access and Management System Accession No. ML 16172A010), PSEG Nuclear LLC (PSEG or the licensee) submitted a license amendment request (LAR) to permit operability of one low pressure coolant injection (LPCI) subsystem while the subsystem is aligned to shutdown cooling for Hope Creek Generating Station (Hope Creek). Specifically, this change would add a note to Technical Specification (TS) 3.5.2 allowing one LPCI subsystem of residual heat removal to be considered operable, while the subsystem is aligned and operating in the shutdown cooling mode during Operational Conditions (OPCONs) 4 and 5.

The requirements in Title 10 of the *Code of Federal Regulations* Section 50.36, "Technical specifications," identify the requirements for the TS categories for operating power plants. One of these categories, limiting conditions for operation (LCOs), is "the lowest functional capability or performance levels of equipment required for safe operation of the facility." The proposed change modifies an existing Hope Creek TS LCO regarding the LPCI subsystem in OPCONs 4 and 5.

The U.S. Nuclear Regulatory Commission staff has reviewed the licensee's application and, based upon this review, determined that the following additional information is needed to complete their review.

**Request for Additional Information**

**RAI-1**

The technical analysis states that the remaining methods of inventory loss in OPCONs 4 and 5 are boiloff and draindown. Discuss the expected time of boiloff and draindown and confirm that these results do not adversely impact existing safety analyses.

**PSEG Response to RAI-1**

**Draindown:**

PSEG performed a technical evaluation to confirm potential draindown times do not adversely affect existing safety analyses. The evaluation included the following:

- The estimated time to realign the system in the control room is 5 minutes.
- The volume of water between the minimum vessel level with shutdown cooling in service (80") and LPCI injection signal Level 1 (-129") was calculated to be 39,779.39 gallons.

- Using a conservative realignment time of 30 minutes, the leak rate that would be necessary to drain down the vessel to Level 1 was calculated to be approximately 1,326 gpm.
- The limiting draindown event, Control Rod Drive Mechanism Replacement with blade removed, results in a postulated leak rate of 1,290 gpm.

Given that the draindown to Level 1 is 32" above the top of active fuel (-161") and since the limiting postulated draindown event leak rate (1,290 gpm) is less than the calculated leak rate required to drain the vessel to Level 1 in 30 minutes (approximately 1,326 gpm), no postulated draindown event would result in Reactor Vessel water level decreasing to Level 1 during the time it takes to re-align the sub-system to LPCI mode.

### **Boil-off:**

A technical evaluation was performed to determine the effects on reactor vessel level due to boiloff following the loss of shutdown cooling in OPCONs 4 and 5.

For all cases evaluated where the vessel head was in place (OPCONs 4 and 5), the vessel water level increased for the first 1.5 hours due to the increase in specific volume of the water as a result of an increase in temperature and pressure due to the very small vessel head vent piping area.

A case was run for the vessel head removed (OPCON 5) at a higher reactor vessel level. The results show that vessel water level increases for the first 1.4 hours until boiling begins. At time 1.5 hours, vessel level is higher than the level at the start of the case due to thermal expansion.

A final MODE 5 case was run with conservative (bounding) initial conditions to maximize the water depletion rate. These conservative results show that vessel level drops 84 inches by the 1.5 hour mark resulting in a level of -4 inches which is still 157 inches above the top of active fuel.

Therefore, the time to reach the top of active fuel due to boiloff is substantially greater than the estimated time to realign the subsystem to LPCI mode.

### **RAI-2**

The LPCI mode of operation can be manually aligned from the control room. In the LAR, it states that, "sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncover." Demonstrate that the time available to manually and remotely align and initiate LPCI operation is bounded by postulated fuel uncover time.

PSEG Response to RAI-2

PSEG estimates it would take approximately 5 minutes to re-align the Residual Heat Removal (RHR) system from SDC to LPCI Injection mode from the control room. PSEG would not consider one LPCI subsystem of RHR to be operable while the subsystem is aligned and operating in the Shutdown Cooling Mode during Operational Conditions (OPCONs) 4 and 5 unless realignment of the subsystem could be accomplished from the control room. The bases will be worded accordingly.

Using a conservative value of 30 minutes, the technical evaluation for draindown calculated the limiting leak rate that would result in vessel level decreasing to Level 1 (LPCI injection). This leak rate was compared to the limiting draindown event and was found to be bounding.

In addition, the technical evaluation for boiloff calculated that even with conservative initial conditions, the loss of decay heat removal would not result in reducing vessel level to below the top of active fuel in the 30 minute time interval assumed for re-alignment.