



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

March 15, 2017

Mr. Peter P. Sena, III  
President and Chief Nuclear Officer  
PSEG Nuclear LLC – N09  
P.O. Box 236  
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION – ISSUANCE OF AMENDMENT TO PERMIT OPERABILITY OF LOW PRESSURE COOLANT INJECTION WHILE ALIGNED TO SHUTDOWN COOLING (CAC NO. MF8012)

Dear Mr. Sena:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 202 to Renewed Facility Operating License No. NPF-57 for the Hope Creek Generating Station. This amendment consists of a change to the Technical Specifications (TSs) in response to your application dated June 17, 2016,<sup>1</sup> as supplemented by letters dated December 27, 2016, and February 17, 2017.<sup>2</sup>

The amendment revises the TSs by adding a note permitting one low pressure coolant injection subsystem of residual heat removal to be considered OPERABLE in Operating Conditions 4 and 5 during alignment and operation for decay heat removal, if capable of being manually realigned and not otherwise inoperable.

A copy of our Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

A handwritten signature in black ink, appearing to read "Carleen J. Parker".

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

Docket No. 50-354

Enclosures:

1. Amendment No. 202 to Renewed License No. NPF-57
2. Safety Evaluation

cc w/enclosures: Distribution via Listserv

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<sup>1</sup> Agencywide Documents Access and Management System (ADAMS) Accession No. ML16172A010

<sup>2</sup> ADAMS Accession Nos. ML16363A073 and ML17048A118, respectively



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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PSEG NUCLEAR LLC

DOCKET NO. 50-354

HOPE CREEK GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 202  
Renewed License No. NPF-57

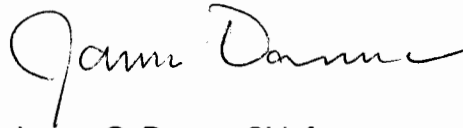
1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment filed by PSEG Nuclear LLC dated June 17, 2016, as supplemented by letters dated December 27, 2016, and February 17, 2017, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-57 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 202, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read "James Danna". The signature is fluid and cursive, written over a white background.

James G. Danna, Chief  
Plant Licensing Branch I  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Renewed License  
and Technical Specifications

Date of Issuance: March 15, 2017

ATTACHMENT TO LICENSE AMENDMENT NO. 202

HOPE CREEK GENERATING STATION

RENEWED FACILITY OPERATING LICENSE NO. NPF-57

DOCKET NO. 50-354

Replace the following page of the Renewed Facility Operating License with the revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove  
3

Insert  
3

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove  
3/4 5-6

Insert  
3/4 5-6

reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

- (4) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (5) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
- (6) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility. Mechanical disassembly of the GE14i isotope test assemblies containing Cobalt-60 is not considered separation.
- (7) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Part 30, to intentionally produce, possess, receive, transfer, and use Cobalt-60.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

PSEG Nuclear LLC is authorized to operate the facility at reactor core power levels not in excess of 3840 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 202, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

## EMERGENCY CORE COOLING SYSTEMS

### 3/4 5.2 ECCS - SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

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3.5.2 At least two of the following shall be OPERABLE:

- a. Core spray system subsystems with a subsystem comprised of:
  1. Two OPERABLE core spray pumps, and
  2. An OPERABLE flow path capable of taking suction from at least one of the following water sources and transferring the water through the spray sparger to the reactor vessel:
    - a) From the suppression chamber, or
    - b) When the suppression chamber water level is less than the limit or is drained, from the condensate storage tank containing at least 135,000 available gallons of water.
- b. Low pressure coolant injection (LPCI) system subsystems each with a subsystem comprised of:
  1. One OPERABLE LPCI pump, and
  2. An OPERABLE flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel. \*\*

APPLICABILITY: OPERATIONAL CONDITION 4 and 5\*.

#### ACTION:

- a. With one of the above required subsystems inoperable, restore at least two subsystems to OPERABLE status within 4 hours or suspend all operations with a potential for draining the reactor vessel.
- b. With both of the above required subsystems inoperable, suspend CORE ALTERATIONS and all operations with a potential for draining the reactor vessel. Restore at least one subsystem to OPERABLE status within 4 hours or establish SECONDARY CONTAINMENT INTEGRITY within the next 8 hours.

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\* The ECCS is not required to be OPERABLE provided that the reactor vessel head is removed, the cavity is flooded, the spent fuel pool gates are removed, and water level is maintained within the limits of Specification 3.9.8 and 3.9.9.

\*\* One LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.



UNITED STATES  
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 202

TO RENEWED FACILITY OPERATING LICENSE NO. NPF-57

PSEG NUCLEAR LLC

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

1.0 INTRODUCTION

By application dated June 17, 2016,<sup>1</sup> as supplemented by letters dated December 27, 2016, and February 17, 2017,<sup>2</sup> PSEG Nuclear LLC (PSEG, or the licensee) requested a change to the Hope Creek Generating Station (Hope Creek) Technical Specifications (TSs).

The requested change would revise the TSs by adding a note permitting one low pressure coolant injection (LPCI) subsystem of residual heat removal (RHR) to be considered OPERABLE in Operating Conditions (OPCONs) 4 and 5 during alignment and operation for decay heat removal, if capable of being manually realigned and not otherwise inoperable.

The supplements dated December 27, 2016, and February 17, 2017, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards determination as published in the *Federal Register* on August 16, 2016 (81 FR 54615).

2.0 REGULATORY EVALUATION

Hope Creek is a General Electric boiling-water reactor (BWR)/4 type plant with a Mark 1 containment. The Hope Creek RHR system is used to cool the nuclear steam supply system in a variety of situations. The RHR system consists of four pumps; two heat exchangers; and associated piping, valves, and instrumentation. The LPCI mode of RHR is an engineered safety feature that is used during the postulated loss-of-coolant accident. It is a subsystem of the RHR system. The LPCI system consists of four pumps that deliver water from the suppression chamber to four separate reactor vessel nozzles that inject into the core shroud region. The change requested affects the LPCI mode of RHR.

The requested change is to add a note to TS 3.5.2 that would allow one LPCI subsystem (one LPCI pump with a flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel) of RHR to be considered operable during alignment and operation for decay heat removal if the subsystem is capable of being manually realigned while in OPCONs 4 and 5. OPCONs are equivalent to the more commonly used term 'MODES.' OPCON 4 is defined in the Hope Creek TSs as Cold Shutdown with the reactor mode switch in

<sup>1</sup> Agencywide Documents Access and Management System (ADAMS) Accession No. ML16172A010

<sup>2</sup> ADAMS Accession Nos. ML16363A073 and ML17048A118, respectively

shutdown and the average reactor coolant temperature  $\leq$  200 degrees Fahrenheit. OPCON 5 is defined in the Hope Creek TSs as Refueling with the reactor mode switch in shutdown or refuel and the average reactor coolant temperature  $\leq$  140 degrees Fahrenheit. In OPCON 5 fuel is in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the proposed TS change against the regulatory requirements and guidance listed below to ensure that there is reasonable assurance that the systems and components affected by the proposed TS change will perform their safety functions.

## 2.1 Applicable Regulatory Requirements

The NRC staff identified the following regulatory requirements as applicable to the proposed amendment.

### 2.1.1 General Design Criteria

Hope Creek was designed in accordance with the General Design Criteria (GDC) contained in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants." The Hope Creek Updated Final Safety Analysis Report (UFSAR), Section 3.1, "Conformance with the NRC General Design Criteria," provides a specific assessment of the plant design for each criteria and concludes that Hope Creek is in compliance with the GDCs.

GDC 34, "Residual heat removal," states in part, "A system to remove residual heat shall be provided. The system safety function shall be to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded."

### 2.1.2 Applicable Technical Specification Regulations

The Commission's regulatory requirements related to the content of the TSs are set forth in 10 CFR 50.36, "Technical specifications." The regulation requires that the TSs include items in the following categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation (LCOs); (3) surveillance requirements; (4) design features; and (5) administrative controls. The regulation does not specify the particular requirements to be included in plant TSs.

The regulations in 10 CFR 50.36(c)(2)(i), state, in part:

Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. When a limiting condition for operation of any process step in the system of a fuel reprocessing plant is not met, the licensee shall shut down that part of the operation or follow any remedial action permitted by the technical specifications until the condition can be met.



### 2.1.3 Applicable Technical Specifications

Hope Creek TS 6.15, "Technical Specification (TS) Bases Control Program," provides the requirements for processing changes to the TS bases. The TS bases can be changed without prior NRC approval if the change does not require a change in the TSs or is a change to the UFSAR or TS bases that does not require NRC approval pursuant to 10 CFR 50.59. Changes to the TS bases that do not require prior approval will be reported to the NRC in accordance with 10 CFR 50.71(e).

### 2.2 Regulatory Guidance

The NRC staff identified the following regulatory guidance as being applicable to the proposed amendments:

- NUREG-1433, Revision 4, "Standard Technical Specifications – General Electric BWR/4 Plants,"<sup>3</sup> and
- NUREG-0123, Revision 4, "Standard Technical Specifications for General Electric Boiling Water Reactors."

### 3.0 TECHNICAL EVALUATION

#### 3.1 Technical Specification Change

The licensee proposes to add the following note to TS LCO 3.5.2.b.2.

- \*\*One LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

This note is consistent with NUREG-1433, Revision 4. It applies during OPCONs 4 and 5.

#### 3.2 Evaluation

TS LCO for 3.5.2 currently requires at least two of the following to be OPERABLE in OPCONs 4 and 5:

- Core Spray system subsystems with a subsystem comprised of two OPERABLE core spray pumps and an OPERABLE flow path capable of taking suction from the suppression chamber, or, when the suppression chamber water level is less than the limit or is drained, from the condensate storage tank containing at least 135,000 available gallons of water.
- LPCI system subsystems each with a subsystem comprised of one OPERABLE LPCI pump and an OPERABLE flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel.

With the addition of the above-described note, there is an increase in flexibility in what defines an operable LPCI system: one LPCI system can be considered OPERABLE in OPCONs 4 and 5 when that LPCI system is capable of being manually realigned. The note only allows one out

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<sup>3</sup> ADAMS Accession No. ML12104A192

of the two TS LCO 3.5.2 required systems to be considered operable during alignment and operation for decay heat removal when it is capable of being manually realigned. The TS LCO is not satisfied if the only way to have two subsystems operable is if two LPCI subsystems are capable of being manually realigned during alignment and operation for decay heat removal.

The manual alignment of a system has the potential to delay operation of the system. The delay in operation of the system can lead to boiloff and draindown, which can lead to fuel uncover. In support of manual realignment, the licensee's December 27, 2017, letter responded to the NRC staff's request for additional information<sup>4</sup> regarding the expected times of boiloff, draindown, and fuel uncover.

In its letter dated December 27, 2017, PSEG stated that it takes approximately 5 minutes to manually realign the LPCI subsystem from the control room. The licensee used a conservative 30 minutes for manual realignment when calculating the leak rate necessary to drain down the vessel to Level 1 (approximately 1,326 gallons per minute (gpm)). Level 1 is the LPCI injection signal. The limiting draindown event at Hope Creek is the control rod drive mechanism replacement with blade removed. For this event, the postulated leak rate is 1,290 gpm. Specifically, the licensee stated:

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.

The NRC staff finds that manual alignment does not negatively impact the ability of the LPCI subsystem to remove decay heat prior to draindown. The ability for Hope Creek to meet the requirements of GDC 34 is confirmed for draindown.

In the evaluation of boiloff, the licensee ran computer cases with and without the vessel head in place (OPCONs 4 and 5). For this evaluation, the bounding computer case to maximize the water depletion rate was in OPCON 5. In all cases evaluated with the vessel head in place, the vessel water level increased for the first 1.5 hours due to the increase in specific volume that accompanies an increase in temperature and pressure. For the case with the vessel head removed, the water level increased for 1.4 hours and at the 1.5-hour mark, the water level was higher than at the start of the run. In the bounding case, the initial conditions were set to maximize the water depletion rate. In this run, the vessel level dropped 84 inches by 1.5 hours, which is 157 inches above the top of active fuel. 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 from the control room.

The NRC staff finds that manual alignment does not negatively impact the ability of the LPCI subsystem to remove decay heat prior to boiloff. The ability for Hope Creek to meet the requirements of GDC 34 is confirmed for boiloff.

Based on the above, the NRC staff finds that manual alignment does not negatively impact the ability of the LPCI subsystem to remove decay heat prior to fuel uncover and the ability of Hope

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<sup>4</sup> ADAMS Accession No. ML16277A514

Creek to meet the requirements of GDC 34 is confirmed for fuel uncoverly.

Additionally, the note added to TS LCO 3.5.2 is consistent with a note found in the Standard Technical Specifications (STs), LCO 3.5.2 (NUREG-1433, Revision 4). The Hope Creek TSs were developed using NUREG-0123, Revision 4. When NUREG-1433 replaced NUREG-0123, the note allowing one LPCI subsystem to be considered operable during alignment and operation for decay heat removal if capable of being manually realigned was added. The requested change does not reduce the number of required OPERABLE emergency core cooling system subsystems (core spray and LPCI), and the change maintains the capability or performance level of equipment required for safe operation of the plant. Therefore, the requested change meets the requirements of 10 CFR 50.36.

PSEG will edit the Hope Creek TS bases to reflect the LPCI operability change. The licensee provided marked-up TS bases pages in their June 17, 2016, letter for information only. The language provided is consistent with the STS bases (NUREG-1433, Revision 4). The licensee's December 27, 2016, letter updated the TS bases to state that one LPCI subsystem is considered operable if it can be manually realigned from the control room (remotely) and that this operability is only applicable in OPCONs 4 and 5. The original proposed language allowed the LPCI subsystem to be considered operable if it could be manually realigned locally or remotely. This change reflects the assumptions made in the draindown and boiloff calculations. Any future changes to the TS bases will be controlled in accordance with Hope Creek TS 6.15.

### 3.3 Technical Conclusion

The proposed LAR was evaluated by the NRC staff to determine whether applicable regulations and requirements continue to be met. It was determined that the proposed change is acceptable because the applicable regulatory requirements will continue to be met, adequate defense-in-depth will be maintained, and sufficient safety margins will be maintained. The NRC staff, therefore, finds the change acceptable.

### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey State official was notified of the proposed issuance of the amendment on February 6, 2017. The State official had no comments.

### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (81 FR 54615). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: D. Woodyatt

Date: March 15, 2017

SUBJECT: HOPE CREEK GENERATING STATION – ISSUANCE OF AMENDMENT TO PERMIT OPERABILITY OF LOW PRESSURE COOLANT INJECTION WHILE ALIGNED TO SHUTDOWN COOLING (CAC NO. MF8012) DATED MARCH 15, 2017

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**ADAMS Accession Number: ML17053A178** \*by memorandum dated

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