**PSEG Nuclear LLC**
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PSEG
*Nuclear LLC*

10 CFR 50.90

LR-N16-0066
LAR H16-02

JUN 17 2016

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

HOPE CREEK GENERATING STATION
RENEWED FACILITY OPERATING LICENSE NO. NPF-57
NRC DOCKET NO. 50-354

Subject: **License Amendment Request to Permit Operability of Low Pressure Coolant Injection While Aligned to Shutdown Cooling**

In accordance with 10 CFR 50.90, PSEG Nuclear LLC (PSEG) hereby requests an amendment to Renewed Facility Operating License No. NPF-57 for Hope Creek Generating Station. In accordance with 10 CFR 50.91(b)(1), a copy of this request for amendment has been sent to the State of New Jersey.

The proposed change would add a note to Hope Creek Technical Specification (TS) 3.5.2 allowing one Low Pressure Coolant Injection (LPCI) subsystem of Residual Heat Removal (RHR) to be considered operable while the subsystem is aligned and operating in the Shutdown Cooling Mode during Operational Conditions (OPCONs) 4 and 5.

The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1), using the criteria in 10 CFR 50.92(c), and it has been determined that this request involves no significant hazards considerations.

There are no regulatory commitments contained in this letter.

Attachment 1 to this letter provides an evaluation supporting the proposed changes. The marked-up TS pages, with the proposed changes indicated, are provided in Attachment 2 to this letter. Attachment 3 provides, for information only, proposed changes to the TS Bases.

These proposed changes have been reviewed by the Plant Operations Review Committee.

PSEG requests NRC approval of the proposed License Amendment within one year of submittal to be implemented within 60 days of issuance.

10 CFR 50.90

If you have any questions or require additional information, please contact Mr. Lee Marabella at (856) 339-1208.

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

Executed on June 17, 2016
(Date)

Respectfully,

Paul J. Davison

Paul J. Davison
Site Vice President
Hope Creek Generating Station

Attachments:

1. Request for Changes to Technical Specifications
2. Technical Specification Pages with Proposed Changes
3. Technical Specification Bases Pages with Proposed Changes (for information only)

cc: Administrator, Region I, NRC
Project Manager, NRC
NRC Senior Resident Inspector, Hope Creek
Mr. P. Mulligan, Chief, NJBNE
Mr. L. Marabella, Corporate Commitment Tracking Coordinator
Mr. T. MacEwen, Hope Creek Commitment Tracking Coordinator

LR-N16-0066

**Attachment 1**

**Request for Changes to Technical Specifications**

HOPE CREEK GENERATING STATION
RENEWED FACILITY OPERATING LICENSE NO. NPF-57
DOCKET NO. 50-354

**License Amendment Request to Permit Operability of Low Pressure Coolant Injection While Aligned to Shutdown Cooling**

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## 1.0 DESCRIPTION

In accordance with the provisions of 10 CFR 50.90, PSEG Nuclear LLC (PSEG) requests an amendment to renewed facility operating license NPF-57 for the Hope Creek Generating Station (Hope Creek). The proposed change would add a note to Hope Creek Technical Specification (TS) 3.5.2 allowing one low pressure coolant injection (LPCI) subsystem to be considered operable in Operational Conditions (OPCONs) 4 and 5 during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable. This change is consistent with NUREG-1433, "Standard Technical Specifications - General Electric BWR/4 Plants," (Reference 2).

## 2.0 PROPOSED CHANGE

The proposed TS change is described below and is indicated on the marked up TS page provided in Attachment 2 of this submittal.

Limiting Condition for Operation (LCO) 3.5.2.b.2 would be modified by a note:

** 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.

## 3.0 BACKGROUND

The Hope Creek Residual Heat Removal (RHR) System consists of four pumps, two heat exchangers, and associated piping, valves, and instrumentation that can be used to cool the Nuclear Steam Supply System (NSSS) in a variety of situations. The LPCI mode of RHR operation is an engineered safety feature (ESF) for use during a postulated loss-of-coolant accident (LOCA). Four pumps deliver water from the suppression chamber to four separate reactor vessel nozzles and inject directly into the core shroud region. The design basis for the LPCI mode of RHR is to pump a total of 10,000 gpm of water per loop, using the separate pump loop, when the vessel pressure is 20 psid over drywell pressure. The initiating signals for automatic LPCI initiation are reactor vessel water level at level 1 or high drywell pressure. The integrated response time requirement for LPCI actuation operability is based on a design basis LOCA in OPCON 1.

During normal shutdown and reactor servicing, the shutdown cooling mode of the RHR system functions to remove residual and decay heat. Two separate shutdown cooling loops are provided with the exception of the common suction line from the 'B' reactor recirculation loop. Each shutdown cooling loop returns to the discharge side of the respective reactor recirculation loop. Flow is established in the shutdown cooling mode of operation when reactor pressure is less than high pressure isolation setpoint for the common suction line isolation valves and the return line isolation valves.

The LCO for TS 3.5.2 requires that at least two of the following be operable in Operational Conditions 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.

- Low pressure coolant injection (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 one of the required subsystems inoperable, TS 3.5.2 requires the inoperable subsystem to be restored to operable status within 4 hours or all operations with a potential for draining the reactor vessel to be suspended.

The Hope Creek Technical Specifications were developed based on NUREG-0123, "Standard Technical Specifications for General Electric Boiling Water Reactors," (Reference 3). As part of the conversion of NUREG-0123 to NUREG-1433 Rev 0, SR 3.5.2.4 to verify emergency core cooling system (ECCS) injection valve position in Modes 4 and 5 was modified with a note allowing one LPCI subsystem to be considered operable during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable. Technical Specification Task Force (TSTF) traveler TSTF-416, Rev. 0, subsequently moved the note from SR 3.5.2.4 to LCO 3.5.2. The NRC approved TSTF-416 in a letter to the Nuclear Energy Institute dated August 12, 2002.

## 4.0 TECHNICAL ANALYSIS

The proposed note to be added to LCO 3.5.2.b.2 will allow one LPCI subsystem to be considered operable during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable. The time required to reach rated LPCI conditions would be increased. However, operators would have sufficient time in OPCONs 4 and 5 to complete the manual realignment to the LPCI mode of operation.

The integrated response time requirement for LPCI operability is based on a design basis LOCA in OPCON 1. However, the reactor decay heat loads and temperatures are significantly lower in OPCONs 4 and 5 compared to OPCON 1. The potential for inventory loss from depressurization and steam flashing is eliminated due to the reduced coolant temperature. In OPCONs 4 and 5, the remaining methods of inventory loss are boiloff and draindown.

Realigning the RHR subsystem to the LPCI mode of operation requires the pump suction and discharge valves to be repositioned. These actions can be performed from the control room. Based on the small number of operator actions required which can be performed from the control room, and the low pressure and low temperature conditions in OPCONs 4 and 5, sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery.

The ECCS requirements for OPCONs 4 and 5 in the Hope Creek Technical Specifications are consistent with the requirements in NUREG-1433, Rev. 4 Specification 3.5.2 as discussed below:

- The Hope Creek TS and NUREG-1433 Limiting Conditions for Operation (LCOs) both require two ECCS subsystems to be operable. The Hope Creek LCO contains additional details relating to system design, function, and OPERABILITY that were deemed unnecessary and therefore removed during the conversion to NUREG-1433. These details were relocated to licensee controlled documents. The Core Spray System OPERABILITY for ECCS-Shutdown (LCO 3.5.2.a.2), which allows for suction from the CST or suppression pool provided the source has sufficient level, is addressed by NUREG-1433 SR 3.5.2.2.
- The Applicability for both the Hope Creek TS and NUREG-1433 is OPCONs 4 and 5. ECCS subsystems are not required to be OPERABLE in OPCON 5 with the spent fuel pool gates removed, and water level maintained within the TS limits for movement of fuel assemblies.
- With one required subsystem inoperable, both the Hope Creek TS and NUREG-1433 require the inoperable subsystem to be restored to operable status within 4 hours or all operations with a potential for draining the reactor vessel to be suspended.
- With both required subsystems inoperable, the Hope Creek TS and NUREG-1433 both require all operations with a potential for draining the reactor vessel to be suspended and at least one subsystem to be restored to operable status with 4 hours. In addition, the Hope Creek TS require core alterations to be suspended. The NUREG-1433 conversion deleted this requirement because refueling LCOs provide requirements to ensure safe operation during CORE ALTERATIONS including required water level above the RPV flange. The ECCS function provides additional protection for loss of vessel inventory events. However, these events are not initiated by, nor is the response of ECCS hampered by, CORE ALTERATIONS operations.
- If one inoperable subsystem is not restored to operable status within 4 hours, the Hope Creek TS requires secondary containment integrity to be established within the next 8 hours. NUREG-1433 requires immediate initiation of actions to restore secondary containment and one standby gas treatment subsystem to operable status, and isolation capability in each required secondary containment penetration flow path which is not isolated. The underlying intent of the required TS actions is the same.
- NUREG-1433 SR 3.5.2.1 and 3.5.2.2.a is equivalent to current Hope Creek TS SR 4.5.3.1 which was administratively relocated for NUREG 1433.

Upon approval of the proposed TS change, the Hope Creek TS Bases will be revised in accordance with the requirements of TS 6.15, Technical Specification Bases Control Program to add the following, consistent with NUREG-1433 TS Bases:

> As noted, one LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. Alignment and operation for decay heat removal includes when the required RHR pump is not operating or when the system is realigned from or to the RHR shutdown cooling mode. This allowance is necessary since the RHR System may be required to operate in the shutdown cooling mode to remove decay heat and sensible heat from the reactor. Because of the low pressure and low temperature conditions in MODES 4 and 5, sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery.

## 5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, PSEG Nuclear LLC (PSEG) hereby requests an amendment to Renewed Facility Operating License No. NPF-57 for Hope Creek Generating Station.

The license amendment request proposes a change which would add a note permitting one Low Pressure Coolant Injection (LPCI) subsystem of Residual Heat Removal (RHR) to be considered OPERABLE in Operational Conditions (OPCONs) 4 and 5 during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

PSEG has evaluated whether or not a Significant Hazards Consideration is involved by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

**1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?**

Response: No.

There are no physical changes being made to the plant. The LPCI mode of RHR is an automatic ECCS function during OPCONs 4 and 5. LPCI mode is used in accident conditions to provide cooling and mitigate accident conditions. The proposed note would allow one LPCI subsystem to be considered operable during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable. The required number of operable ECCS subsystems in OPCONs 4 and 5 would not be reduced from the current requirement. Considering one LPCI subsystem as operable when aligned for SDC does not increase the probability or consequences of an accident. Although it will take longer to realign manually from SDC to LPCI in the event of a drain-down event or accident, with the lower heat loads and temperatures in OPCONs 4 and 5, the operator will have sufficient margin to perform the realignment in the event of a draindown event prior to core uncovery.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

**2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

The LPCI mode of RHR is an accident mitigator, not an initiator. This change will not reduce the number of required ECCS subsystems during OPCONs 4 and 5. The change will permit the operability of one LPCI subsystem while the components of that subsystem are aligned and operating in the Shutdown Cooling mode of RHR. The change does not alter current methods of plant operation nor does the change make a physical change to plant equipment resulting in an unanalyzed malfunction of equipment.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

**3. Does the proposed amendment involve a significant reduction in a margin of safety?**

Response: No.

The proposed change, which adds a note which will allow one LPCI subsystem to be considered operable during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable, does not exceed or alter a setpoint, design basis or safety limit.

The basis of TS section 3.5.2 is to ensure sufficient ECCS capacity to maintain core cooling in OPCONs 4 and 5. This proposed change does not affect the required number of ECCS subsystems during OPCONs 4 and 5; therefore adequate capability through subsystem redundancy is maintained. The amount of time required to obtain rated LPCI conditions is increased due to the manual realignment, from the Main Control Room, of the suction valves and restart of the RHR pump following LPCI injection conditions. However, this change will not result in any design or regulatory limit being exceeded with respect to the safety analyses documented in the UFSAR and is consistent with NUREG-1433.

Therefore, the proposed amendment does not involve a significant reduction in a margin of safety.

Based upon the above, PSEG Nuclear concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92 (c), and, accordingly, a finding of "no significant hazards consideration" is justified.

## 5.2 Applicable Regulatory Requirements and Criteria

**10 CFR 50.36 Technical Specifications**

10 CFR 50.36, "Technical specifications" identifies the requirements for the Technical Specification categories for operating power plants: (1) *Safety limits, limiting safety system settings, and limiting control settings*, (2) *Limiting conditions for operation,* (3) *Surveillance requirements*, (4) *Design features,* (5) *Administrative controls,* (6) *Decommissioning,* (7) *Initial notification, and* (8) *Written Reports*. For limiting conditions for operation, 10 CFR 50.36(c)(2)(i) states: *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.*

The proposed change modifies an existing LCO to allow a LPCI subsystem to be considered OPERABLE during alignment and operation for decay heat removal in OPCONs 4 and 5 if capable of being manually realigned and not otherwise inoperable. This change does not reduce the number of required OPERABLE ECCS subsystems and therefore maintains the minimum capability or performance level of equipment required for safe operation of the facility.

In conclusion, based on the considerations discussed above, (1) there is a reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the NRC'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.

## 6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

## 7.0 REFERENCES

1. Hope Creek Technical Specifications.

2. Improved Standard Technical Specifications, General Electric BWR/4 Plants, NUREG-1433, Revision 4.0.

3. Standard Technical Specifications, General Electric BWR/4 Plants, NUREG-0123, Revision 4.

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**Attachment 2**

**Technical Specification Pages with Proposed Changes**

## TECHNICAL SPECIFICATION PAGES WITH PROPOSED CHANGES

The following Technical Specification for Renewed Facility Operating License NPF-57 is affected by this change request:

| Technical Specification | Page |
|---|---|
| 3.5.2.b.2 | 3/4 5-6 |

3/4 5.2 ECCS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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.

ADD

*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 realigned and not otherwise inoperable.

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**Attachment 3**

**Technical Specification Bases Pages with Proposed Changes**

**(For information only)**

## TECHNICAL SPECIFICATION BASES PAGES WITH PROPOSED CHANGES

The following Technical Specification Bases for Renewed Facility Operating License NPF-57 is affected by this change request:

| Technical Specification Bases | Page |
|---|---|
| 3/4.5.1 | B 3/4 5-1 |

3/4.5.1 and 3/4.5.2 ECCS - OPERATING and SHUTDOWN

The core spray system (CSS), together with the LPCI mode of the RHR system, is provided to assure that the core is adequately cooled following a loss-of-coolant accident and provides adequate core cooling capacity for all break sizes up to and including the double-ended reactor recirculation line break, and for smaller breaks following depressurization by the ADS.

The CSS is a primary source of emergency core cooling after the reactor vessel is depressurized and a source for flooding of the core in case of accidental draining.

The surveillance requirements provide adequate assurance that the CSS will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test requires reactor shutdown. The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.

The low pressure coolant injection (LPCI) mode of the RHR system is provided to assure that the core is adequately cooled following a loss-of-coolant accident. Four subsystems, each with one pump, provide adequate core flooding for all break sizes up to and including the double-ended reactor recirculation line break, and for small breaks following depressurization by the ADS.

Insert "A" →

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

The surveillance requirements provide adequate assurance that the LPCI system will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test requires reactor shutdown. The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.

Verification days that each RHR System cross tie valve on the discharge side of the RHR pumps is closed and power to its operator, if any, is disconnected ensures that each LPCI subsystem remains independent and a failure in the flow path in one subsystem will not affect the flow path of the other LPCI subsystem. Acceptable methods of removing power to the operator include de-energizing breaker control power or racking out or removing the breaker. For the valves in high radiation areas, verification may consist of verifying that no work activity was performed in the area of the valve since the last verification was performed. If one of the RHR System cross tie valves is open or power has not been removed from the valve operator, both associated LPCI subsystems must be considered inoperable. These valves are under strict administrative controls that will ensure that the valves continue to remain closed with either control or motive power removed.

The high pressure coolant injection (HPCI) system is provided to assure that the reactor core is adequately cooled to limit fuel clad temperature in the event of a small break in the reactor coolant system and loss of coolant which does not result in rapid depressurization of the reactor vessel. The HPCI system permits the reactor to be shut down while maintaining sufficient reactor vessel water level inventory until the vessel is depressurized. The HPCI system continues to operate until reactor vessel pressure is below the pressure at which CSS operation or LPCI mode of the RHR system operation maintains core cooling.

**“A” insert:**

As noted, one LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. Alignment and operation for decay heat removal includes when the required RHR pump is not operating or when the system is realigned from or to the RHR shutdown cooling mode. This allowance is necessary since the RHR System may be required to operate in the shutdown cooling mode to remove decay heat and sensible heat from the reactor. Because of low pressure and low temperature conditions in MODES 4 and 5, sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery.