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

September 27, 2010

Mr. Thomas Joyce
President and Chief Nuclear Officer
PSEG Nuclear
P.O. Box 236, N09
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION - ISSUANCE OF AMENDMENT RE: CONTROL ROD SCRAM TIMES (TAC NO. ME2815)

Dear Mr. Joyce:

The Commission has issued the enclosed Amendment No. 183 to Facility Operating License No. NPF-57 for the Hope Creek Generating Station (HCGS). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated December 1, 2009, as supplemented by letters dated July 23, and August 19, 2010.

The amendment changes the HCGS TSs to: (1) revise the required frequency of testing control rod scram times from "at least once per 120 days of POWER OPERATION" to "at least once per 200 days of POWER OPERATION"; (2) revise the evaluation methodology for control rod scram time tests; (3) establish a new category of operable but "slow" control rods; and (4) establish allowable limits for the number and distribution of "slow" rods. The changes are based, in part, on Nuclear Regulatory Commission-approved TS Task Force (TSTF) change traveler TSTF-460, "Control Rod Scram Time Testing Frequency."

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

Sincerely,

Richard B. Ennis, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosures:
1. Amendment No. 183 to License No. NPF-57
2. Safety Evaluation

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

PSEG NUCLEAR LLC

DOCKET NO. 50-354

HOPE CREEK GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 183
License No. NPF-57

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment filed by PSEG Nuclear LLC dated December 1, 2009, as supplemented by letters dated July 23, and August 19, 2010, 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. 183, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into the 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

Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the License
and Technical Specifications

Date of Issuance: September 27, 2010

ATTACHMENT TO LICENSE AMENDMENT NO. 183

FACILITY OPERATING LICENSE NO. NPF-57

DOCKET NO. 50-354

Replace the following page of the 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	Insert
3	3

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
v	v
3/4 1-3	3/4 1-3
3/4 1-4	3/4 1-4
3/4 1-5	3/4 1-5
3/4 1-6	3/4 1-6
3/4 1-7	3/4 1-7
3/4 1-8	3/4 1-8
3/4 1-9	3/4 1-9

(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.

C. This 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. 183, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into the license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Inservice Testing of Pumps and Valves (Section 3.9.6, SSER No. 4)*

This License Condition was satisfied as documented in the letter from W. R. Butler (NRC) to C. A. McNeill, Jr. (PSE&G) dated December 7, 1987. Accordingly, this condition has been deleted.

*The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

3/4.1.3 CONTROL RODS

CONTROL ROD OPERABILITY

LIMITING CONDITION FOR OPERATION

3.1.3.1 All control rods shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

ACTION:

a. With one control rod inoperable due to being immovable, as a result of excessive friction or mechanical interference, or known to be untrippable:

   1. Immediately:

      a) Verify that the inoperable control rod, if withdrawn, meets the stuck control rod separation criteria.

      Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

   2. Within two hours:

      a) Disarm the associated control rod drive.

      Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

b. With one or more control rods trippable but inoperable for causes other than addressed in ACTION a, above:

   1. Within three hours: insert the inoperable withdrawn control rod(s).

   2. Within four hours disarm the associated control rod drive.

   Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

c. With two or more inoperable control rods not in compliance with banked position withdrawal sequence (BPWS) and not separated by two or more OPERABLE control rods*****:

   1. Within 4 hours, restore compliance with BPWS, or

   2. Within 4 hours, restore control rod(s) to OPERABLE status, or

   3. Within 8 hours, verify control rod drop accident limits are met.

   Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION (Continued)

d. One or more BPWS groups with four or more inoperable control rods*****, within 4 hours, restore control rod(s) to OPERABLE status.

Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

e. With more than 8 control rods inoperable, be in at least HOT SHUTDOWN within 12 hours.

f. With one or more scram discharge volume (SDV) vent or drain lines*** with one valve inoperable, isolate the associated line within 7 days or be in at least HOT SHUTDOWN within the next 12 hours.****

g. With one or more SDV vent or drain lines*** with both valves inoperable, isolate the associated line within 8 hours or be in at least HOT SHUTDOWN within the next 12 hours.****

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The scram discharge volume drain and vent valves shall be demonstrated OPERABLE by:

a. At least once per 24 hours verifying each valve to be open,* and

b. At least once per 31 days cycling each valve through at least one complete cycle of full travel.

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* These valves may be closed intermittently for testing under administrative controls.

** May be rearmed intermittently, under administrative control, to permit testing associated with restoring the control rod to OPERABLE status.

*** Separate Action entry is allowed for each SDV vent and drain line.

**** An isolated line may be unisolated under administrative control to allow draining and venting of the SDV.

***** Not applicable when THERMAL POWER is greater than 8.6% RATED THERMAL POWER.

SURVEILLANCE REQUIREMENTS (Continued)

4.1.3.1.2 When above the low power setpoint of the RWM, all withdrawn control rods not required to have their directional control valves disarmed electrically or hydraulically shall be demonstrated OPERABLE by moving each control rod at least one notch:

a. At least once per 31 days, and

b. Within 24 hours when any control rod is immovable as a result of excessive friction or mechanical interference.

4.1.3.1.3 All control rods shall be demonstrated OPERABLE by performance of Surveillance Requirements 4.1.3.2, 4.1.3.3, 4.1.3.5, 4.1.3.6 and 4.1.3.7.

4.1.3.1.4 The scram discharge volume shall be determined OPERABLE by demonstrating:

a. The scram discharge volume drain and vent valves OPERABLE at least once per 18 months, by verifying that the drain and vent valves:

1. Close within 30 seconds after receipt of a signal for control rods to scram, and

2. Open when the scram signal is reset.

CONTROL ROD MAXIMUM SCRAM INSERTION TIMES

LIMITING CONDITION FOR OPERATION

3.1.3.2 The maximum scram insertion time of each control rod from the fully withdrawn position to notch position 5, based on de-energization of the scram pilot valve solenoids as time zero, shall not exceed 7.0 seconds.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

ACTION:

a. With the maximum scram insertion time of one or more control rods exceeding 7.0 seconds:

   1. Declare the control rod(s) with the slow insertion time inoperable

   Otherwise, be in at least HOT SHUTDOWN within 12 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.2 Verify each control rod scram time from fully withdrawn to notch position 05 is ≤ 7.0 seconds in accordance with Surveillance Requirement 4.1.3.3.

CONTROL ROD SCRAM INSERTION TIMES

LIMITING CONDITION FOR OPERATION

3.1.3.3 No more than 13 OPERABLE control rods shall be "slow," in accordance with Table 3.1.3.3-1, and no more than 2 OPERABLE control rods that are "slow" shall occupy adjacent locations.

Table 3.1.3.3-1

NOTES

1. OPERABLE control rods with scram times not within the limits of this Table are considered "slow."

2. Enter applicable Conditions and Required Actions of LCO 3.1.3.2, "Control Rod Maximum Scram Insertion Times," for control rods with scram times > 7.0 seconds to notch position 05. These control rods are inoperable in accordance with SR 4.1.3.2 and are not considered "slow."

Notch Position	Scram Times[(a)(b)] (Seconds) When Reactor Steam Dome Pressure ≥ 800 psig
45	0.52
39	0.86
25	1.91
05	3.44

(a) Maximum scram time from fully withdrawn position, based on de-energization of scram pilot valve solenoids at time zero.

(b) Scram times as a function of reactor steam dome pressure, when < 800 psig are within established limits.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

ACTION:

With more than 13 OPERABLE control rods exceeding any of the above limits or more than 2 OPERABLE control rods that are "slow" occupy adjacent locations, be in at least HOT SHUTDOWN within 12 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.3 During single control rod scram time surveillances with the control rod drive pumps isolated from the accumulators:

a. Verify each control rod scram time is within the limits of Table 3.1.3.3-1 with reactor steam dome pressure ≥ 800 psig prior to THERMAL POWER exceeding 40% RATED THERMAL POWER after each reactor shutdown ≥ 120 days.

b. Verify for a representative sample, each tested control rod scram time is within the limits of Table 3.1.3.3-1 with reactor steam dome pressure ≥ 800 psig at least once per 200 days of POWER OPERATION.

c. Verify each affected control rod scram time is within the limits of Table 3.1.3.3-1 with any reactor steam dome pressure prior to declaring control rod OPERABLE after work on control rod or CRD System that could affect scram time.

d. Verify each affected control rod scram time is within the limits of Table 3.1.3.3-1 with reactor steam dome pressure ≥ 800 psig prior to THERMAL POWER exceeding 40% RATED THERMAL POWER after fuel movement within the affected core cell AND prior to exceeding 40% RTP after work on control rod or CRD System that could affect scram time.

FOUR CONTROL ROD GROUP SCRAM INSERTION TIMES

LIMITING CONDITION FOR OPERATION

3.1.3.4 Deleted

REACTIVITY CONTROL SYSTEMS

CONTROL ROD SCRAM ACCUMULATORS

LIMITING CONDITION FOR OPERATION

3.1.3.5 Each control rod scram accumulator shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2 and 5*.

ACTION:

---NOTE---
Separate condition entry is allowed for each control rod

a. In OPERATIONAL CONDITIONS 1 or 2:

1. With one control rod scram accumulator inoperable and reactor pressure ≥ 900 psig, within 8 hours,

a) Restore the inoperable accumulator to OPERABLE status, or

b) Declare the associated control rod scram time "slow"***, or

c) Insert the associated control rod, declare the associated control rod inoperable and disarm the associated control valves by closing the drive water and exhaust water isolation valves.

Otherwise, be in at least HOT SHUTDOWN with the next 12 hours.

2. With two or more control rod scram accumulators inoperable and reactor pressure ≥ 900 psig,

a) Within 20 minutes of discovery of this condition concurrent with charging water pressure < 940 psig, restore charging water header pressure to ≥ 940 psig otherwise place the mode switch in the shutdown position**, and

b) Within one hour, declare the associated control rod scram time "slow"***, or

c) Within one hour insert the associated control rods, declare the associated control rods inoperable and disarm the associated control valves by closing the drive water and exhaust water isolation valves.

Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

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* At least the accumulator associated with each withdrawn control rod. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

** Not applicable if all inoperable control rod scram accumulators are associated with fully inserted control rods.

*** Only applicable if the associated control rod scram time was within the limits of Table 3.1.3.3-1 during the last scram time Surveillance. Rods that are already considered "slow" should be declared inoperable and fully inserted.

UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 183 TO FACILITY OPERATING LICENSE NO. NPF-57

PSEG NUCLEAR LLC

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

1.0 INTRODUCTION

By letter dated December 1, 2009, as supplemented by letters dated July 23, and August 19, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML093430242, ML102150349 and ML102520076, respectively), PSEG Nuclear, LLC (PSEG or the licensee) requested changes to the Technical Specifications (TSs) for the Hope Creek Generating Station (HCGS). The proposed amendment would revise the HCGS TSs to change the required frequency of testing control rod scram times from "at least once per 120 days of POWER OPERATION" to "at least once per 200 days of POWER OPERATION." This change is based on TS Task Force (TSTF) change traveler TSTF-460, Revision 0, "Control Rod Scram Time Testing Frequency."

TSTF-460 has been approved generically by the Nuclear Regulatory Commission (NRC or the Commission) for incorporation into the boiling water reactor (BWR) Standard TS (STS); NUREG-1433 (BWR/4) and NUREG-1434 (BWR/6). The NRC staff published a notice announcing the availability of this proposed TS change using the consolidated line item improvement process (CLIIP) in the *Federal Register* on August 23, 2004 (69 FR 51864). Since HCGS has not adopted the STS, PSEG has proposed variations from the CLIIP to ensure consistency with NUREG-1433, Revision 3, "Standard Technical Specifications, General Electric Plants, BWR/4." The changes to align with NUREG-1433 involve the adoption of a revised control rod scram time test methodology and an establishment of a category of operable but "slow" control rods.

The supplements dated July 23, and August 19, 2010, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on January 26, 2010 (75 FR 4119).

2.0 REGULATORY EVALUATION

As discussed in HCGS Updated Final Safety Analysis Report (UFSAR) Section 4.6.1.2, the control rod drive (CRD) system controls gross changes in core reactivity by incrementally

positioning neutron absorbing control rods within the reactor core in response to manual control signals. It is also required to quickly shut down (scram) the reactor in emergency situations by rapidly inserting all control rods into the core, in response to a signal from the reactor protection system. As discussed in UFSAR Section 1.2.4.2.3, each control rod is controlled individually by a hydraulic control unit (HCU). When a scram signal is received, either the high pressure water stored in an accumulator in the HCU or the reactor pressure forces its control rod into the core. As discussed in UFSAR Section 4.6.1.1, one of the safety design bases for the CRD system is that the design provides for sufficiently rapid control rod insertion so that no fuel damage results from any abnormal operating transient.

Title 10 of the *Code of Federal Regulations* (CFR), Part 50, Appendix A, General Design Criterion (GDC) 29, "Protection against anticipated occurrences," states that:

> The protection and reactivity control systems be designed to assure an extremely high probability of accomplishing their safety functions in an event of anticipated operational occurrences.

Section 3.1 of the UFSAR discusses conformance of the HCGS design with the GDC in Appendix A of 10 CFR Part 50. With respect to GDC 29, UFSAR Section 3.1.2.3.10.1 states that an extremely high reliability of timely response to anticipated operational occurrences is maintained by a thorough program of inservice testing and surveillance.

Section 50.36(c)(3) of 10 CFR Part 50 requires that TSs include surveillance requirements (SRs) "relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

3.0 TECHNICAL EVALUATION

3.1 Proposed TS Changes

The proposed amendment would revise the following TSs:

TS 3/4.1.3.1, "Control Rod Operability"

TS 3/4.1.3.2, "Control Rod Maximum Scram Insertion Times"

TS 3/4.1.3.3, "Control Rod Average Scram Insertion Times"

TS 3/4.1.3.4, "Four Control Rod Group Scram Insertion Times"

TS 3/4.1.3.5, "Control Rod Scram Accumulators"

Sections 2.0 and 5.0 of Attachment 1 to the licensee's application dated December 1, 2009, provide a description and analysis of the specific proposed TS changes. The NRC staff's evaluation of the proposed changes is described below in safety evaluation (SE) Sections 3.2 through 3.5.

3.2 TS 3/4.1.3.1, "Control Rod Operability"

Actions for One Withdrawn Control Rod Stuck

The current limiting condition for operation (LCO) 3.1.3.1 Action a.1.a requires that with one control rod stuck (i.e., immovable, as a result of friction or mechanical interference, or known to be untrippable), the operator must, within 1 hour, verify that the inoperable rod, if withdrawn, is separated from all other inoperable control rods by at least two control cells in all directions. The proposed amendment would change Action a.1.a to require that the operator immediately verify that the inoperable control rod, if withdrawn, meets the stuck control rod separation criteria. These criteria would be added to the TS Bases consistent with the STS. The proposed changes would make HCGS TS 3.1.3.1 Action a.1.a consistent with STS LCO 3.1.3, Required Action A.1.

The current LCO 3.1.3.1 Action a.1.b requires that, with one control rod stuck, the operator must, within 1 hour, disarm the associated directional control valves hydraulically by closing the drive water and exhaust valves. The proposed amendment would relabel Action a.1.b as Action a.2.a and would revise the completion time requirement from 1 hour to 2 hours. This would allow more time to complete the required action while maintaining the ability to shut down the reactor, provided no additional control rods fail to insert. The LCO wording would be simplified to state "disarm the associated control rod drive." The proposed changes would make HCGS TS 3.1.3.1 Action a.2.a consistent with STS LCO 3.1.3, Required Action A.2.

The current LCO 3.1.3.1 Action a.2 requires that the inoperable control rod, if withdrawn, be restored to operable status within 48 hours or be in at least Hot Shutdown within the next 12 hours. The proposed amendment would delete this Action for consistency with the STS.

As proposed in the license amendment request (LAR), to allow continued operation with a one withdrawn control rod stuck, proposed LCO 3.1.3.1 Actions a.1.a and a.2.a would have to be met. In addition, the Shutdown Margin (SDM) requirements of LCO 3.1.1 would have to be met. If any of these LCOs are not met in operational conditions 1 or 2, each of these actions requires the unit be in Hot Shutdown within 12 hours. The NRC staff finds that the proposed TS changes for one withdrawn control rod stuck provide reasonable assurance that the scram reactivity requirements will be met and the unit can be shut down, as required, in the event of design-basis accident (DBA) or transient. As such, the proposed change is acceptable.

Actions for Control Rods Trippable but Inoperable for Causes other than Action a

The current LCO 3.1.3.1 Action b.1 requires that, with one or more control rods trippable but inoperable for causes other than addressed in Action a, the operator must, within 1 hour, verify that the inoperable withdrawn control rod(s) is separated from all other inoperable control rods by at least two control cells in all directions. In addition, the operator must demonstrate the insertion capability of the inoperable withdrawn control rod(s) by inserting the control rod(s) at least one notch. In order to align with STS LCO 3.1.3 Condition C, the proposed amendment would remove the option of operating with these inoperable control rods in the withdrawn position. Specifically, the proposed amendment would require that the inoperable control rod(s) be inserted within 3 hours and the associated CRD disarmed within 4 hours. The NRC staff finds that this change is more restrictive (i.e., conservative) with respect to the current HCGS TS requirements. As such, the proposed change is acceptable.

New Actions c and d

The DBA analysis for a control rod drop accident (CRDA) at HCGS is discussed in UFSAR Section 15.4.9. As discussed in the UFSAR, HCGS is a Banked Position Withdrawal Sequence (BPWS) plant and the analytical methods, assumptions and conditions for analyzing the CRDA is described in GESTAR II (General Electric Standard Application for Reactor Fuel, NEDE-24011-P-A). As described in Section 2.2.3.1, "Control Rod Drop Accident Evaluation," of GESTAR-II (ADAMS Accession No. ML091340080), the sequence of events for a CRDA at BPWS plants assumes that the operators are functioning within the constraints of the BPWS.

The proposed amendment would add new Actions c and d to LCO 3.1.3.1. The existing Actions c, d, and e would be relabeled as Actions e, f, and g. New Actions c and d provide new requirements, not previously in the HCGS TSs, to ensure compliance with the assumptions for a BPWS plant. The NRC staff finds that this change is more restrictive (i.e., conservative) with respect to the current HCGS TS requirements and provides requirements intended to ensure plant operation consistent with the CRDA analysis. As such, the proposed change is acceptable.

3.3 TS 3/4.1.3.2, "Control Rod Maximum Scram Insertion Times"

Actions for Control Rods with Scram Insertion Times Exceeding 7 Seconds

The current SR 4.1.3.2.c requires that the maximum scram insertion time be demonstrated for a sample of control rods at least once per 120 days. The current LCO 3.1.3.2 Action a.2, requires that SR 4.1.3.2.c be performed at least once per 60 days (i.e., more frequently) when operation is continued with three or more control rods with maximum scram insertion times in excess of 7 seconds. The proposed amendment would delete Action a.2. Following implementation of the proposed amendment, if there were control rods with maximum scram insertion times in excess of 7 seconds: (1) LCO 3.1.3.2 Action a.1 would require that these control rods be declared inoperable; and (2) proposed LCO 3.1.3.1 Action b.1 would require that these rods be inserted and the associated CRDs disarmed. As such, these control rods would meet their reactivity control design function. In addition, the proposed amendment would revise LCO 3.1.3.3 (discussed below in SE Section 3.4) to establish requirements for a limited number of operable but "slow" control rods. This change provides assurance that generic degradation of scram performance would be found. Based on these considerations, the NRC staff concludes that the deletion of LCO 3.1.3.2 Action a.2 is acceptable.

Surveillance Requirements

The proposed amendment would revise SR 4.1.3.2 to be consistent with STS SR 3.1.3.4. Specifically, SR 4.1.3.2 would state: "Verify each control rod scram time from fully withdrawn to notch position 05 is $\leq$ 7.0 seconds in accordance with Surveillance Requirement 4.1.3.3." The existing requirements in SR 4.1.3.2 would be relocated to proposed SR 4.1.3.3 and modified to align with STS SRs 3.1.4.1, 3.1.4.2, 3.1.4.3, and 3.1.4.4. The NRC staff finds that this change is acceptable because the SR provides testing requirements directly related to the requirements in LCO 3.1.3.2 (i.e., maximum insertion time from fully withdrawn to notch position 05 shall not exceed 7.0 seconds). The proposed changes to SR 4.1.3.3 are discussed below in SE Section 3.4.

3.4 TS 3/4.1.3.3, "Control Rod Average Scram Insertion Times" and TS 3/4.1.3.4, "Four Control Rod Group Scram Insertion Times"

Overview of Changes

The proposed amendment would change the title of TS 3/4.1.3.3 from "Control Rod Average Scram Insertion Times" to "Control Rod Scram Insertion Times" and changes would be made to LCO 3.1.3.3 and SR 4.1.3.3. In addition, TS 3/4.1.3.4, "Four Control Rod Group Scram Insertion Times" would be deleted. The proposed changes are being made to align the requirements for control rod scram insertion times with STS 3.1.4. The changes are discussed further and evaluated below.

Changes to LCOs for Control Rod Scram Insertion Times

The purpose of LCO 3.1.3.3 is to ensure the negative scram reactivity corresponding to that used in the licensing basis DBA and transient analysis is supported by the actual scram performance of the control rods. The proposed amendment revises the current LCO 3.1.3.3 to identify new scram time acceptance criteria which allows a condition where a control rod may be considered "slow" but still operable. The proposed changes adopt a different method to determine if the measured scram insertion times are sufficient to insert the amount of negative reactivity assumed in the licensing basis DBA and transient analysis. The application dated December 1, 2009, stated that a description and supporting analysis for the proposed test method is contained in a letter dated September 17, 1987, from R. F. Janecek (BWR Owners Group (BWROG)) to R. W. Starostecki (NRC), "BWR Owners Group Revised Reactivity Control System Technical Specifications," BWROG-8754. The analysis discussed in BWROG-8754 provides that the analytical scram reactivity curve will be satisfied if no more than 7 percent of the rods are slow and these slow rods are distributed in a satisfactory manner. The NRC staff has previously reviewed and accepted the methodology in BWROG-8754 and this methodology forms the basis for the control rod scram times currently shown in Revision 3 of NUREG-1433, STS LCO 3.1.4.

The current LCOs for scram insertion times require two sets of scram insertion time tables, one identifying the average scram insertion times for all operable control rods (in LCO 3.1.3.3) and one identifying the average scram insertion times for the three fastest operable control rods in all two-by-two arrays (in LCO 3.1.3.4). The proposal simplifies the approach by introducing one scram insertion time table, to be added to LCO 3.1.3.3 (Table 3.1.3.3-1), which identifies any control rod not within the specified scram insertion group as "slow." This change to base the scram time acceptability on individual control rod performance also eliminates the concern of potentially allowing operation with too many "slow" rods because a few fast scramming rods were available to provide an acceptable "average time" of multiple rods. Furthermore, it identifies any control rod with scram times greater than 7.0 seconds to notch position 05 as inoperable. The revised LCO Action would allow no more than 13 control rods (or 7 percent of 185) to be "slow" and allows no more than two operable but "slow" control rods to occupy adjacent locations. The proposed scram insertion time table also identifies scram test configuration requirements and associated acceptance criteria.

The licensee's application dated December 1, 2009, provided the following discussion regarding the proposed changes to LCO 3.1.3.3 in relation to the licensing/design basis:

> The methodology used in the design basis transient analysis (one-dimensional neutronics) assumes all control rods scram at the same speed. This is called the analytical scram time requirement. Performing an evaluation assuming all control rods scram at the analytical limit will result in the generation of a scram reactivity versus-time curve that is called the analytical scram reactivity curve. It is the purpose of the scram time LCO to ensure that under allowed plant conditions, this analytical scram reactivity will be met. Since scram reactivity cannot be readily measured at the plant, safety analyses use appropriately conservative scram reactivity-versus-insertion fraction curves to account for the variation in scram reactivity during a cycle. Therefore, the technical specifications must only ensure that the proposed scram times (in proposed Table 3.1.3.3-1) are satisfied.
>
> If all control rods scram at least as fast as the proposed scram time limits, the analytical scram reactivity curve will be met.

Based on the above, the NRC staff finds that there is reasonable assurance that the proposed changes to the LCOs for control rod scram insertion times will ensure scram reactivity within the bounds assumed in the plant licensing/design basis. Therefore, the NRC staff concludes that the proposed changes are acceptable.

Changes to SRs for Control Rod Scram Insertion Times

As discussed above in SE Section 3.3, the existing requirements in SR 4.1.3.2 would be relocated to proposed SR 4.1.3.3 and modified to align with STS SRs 3.1.4.1, 3.1.4.2, 3.1.4.3, and 3.1.4.4. In addition SR 4.1.3.4 would be deleted. The proposed new surveillances (SRs 4.1.3.3.a, 4.1.3.3.b, 4.1.3.3.c and 4.1.3.3.d) rely on new TS Table 3.1.3.3-1 (discussed above) to control test configurations and test acceptance criteria.

Currently, SR 4.1.3.2 requires that the scram insertion time be demonstrated through measurement with reactor coolant pressure greater than or to equal to 950 pounds per square inch gauge (psig). Three of the proposed SRs (4.1.3.3.a, 4.1.3.3.b and 4.1.3.3.d) would specify this test requirement in terms of "reactor steam dome pressure" instead of "reactor coolant pressure" to better describe the parameter that is measured. In addition, the test pressure for these three SRs would be changed from greater than or to equal to 950 psig to greater than or equal to 800 psig. The licensee's application dated December 1, 2009, stated that the proposed change to the reactor pressure requirement is more conservative because the maximum scram times occur at reactor pressure of approximately 800 psig due to the competing effects of the reactor vessel pressure and the accumulator scram forces. Since the change is conservative with respect to the current TS requirements, the NRC staff concludes that this change is acceptable.

Currently, SR 4.1.3.2.a requires that control rod scram time testing be performed prior to exceeding 40 percent rated thermal power (RTP) following core alterations (i.e., a refueling outage) or after a reactor shutdown greater than 120 days (i.e., an extended shutdown). These requirements are addressed via new SRs 4.1.3.3.a and 4.1.3.3.d.

The refueling outage requirements are included in proposed SR 4.1.3.3.d. Specifically, this SR would require that control rod scram time testing be performed prior to exceeding 40 percent

RTP after fuel movement within the affected core cell and prior to exceeding 40 percent RTP after work on a control rod or CRD system that could affect scram time. The extended shutdown requirements are included in proposed SR 4.1.3.3.a. This SR would require that control rod scram time testing be performed prior to exceeding 40 percent RTP after each reactor shutdown greater than 120 days. The NRC staff finds that the proposed changes are equivalent to the existing SRs. Therefore, these changes are acceptable.

Currently, SR 4.1.3.2.b requires that control rod scram time testing be performed for specifically affected individual control rods following maintenance or modification to the control rod or CRD system which could affect scram insertion times for those control rods. As discussed above, this test is to be performed with reactor coolant pressure greater than or equal to 950 psig. The proposed amendment would replace the requirements in SR 4.1.3.2.b with new SR 4.1.3.3.c which would require that control rod scram time be performed prior to declaring the control rod operable after work on the control rod or CRD system that could affect scram time. This test could be performed at any reactor steam dome pressure. The licensee stated that this change is pursued to eliminate the requirement to declare affected control rods inoperable during reactor startup because of the inability (or impracticality) of performing a scram time test at reactor coolant pressure greater than or equal to 950 psig as required by the current SR 4.1.3.2.b. Since proposed SR 4.1.3.3.c can be performed at any reactor steam dome pressure and since maintenance or modifications to control rods or the CRD system are typically performed when the reactor is shutdown, it is expected that the affected rods will be scram time tested prior to taking the reactor critical. The scram time testing will still verify that the scram time is within the acceptance limits specified in TS Table 3.1.3.3-1. The NRC staff finds that the proposed SR 4.1.3.2.b provides reasonable testing parameters for declaring a control rod operable following maintenance or modifications. Therefore, the proposed change is acceptable.

Currently SR 4.1.3.2.c requires that at least 10 percent of the control rods, on a rotating basis, be scram time tested at least once per 120 days of power operation. The proposed amendment would replace the requirements in SR 4.1.3.2.b with new SR 4.1.3.3.b. The new SR would require that scram time testing be performed for a representative sample of control rods at least once per 200 days of power operation. As discussed above in SE Section 1.0, this change is based on NRC-approved TSTF-460, Revision 0. The TSTF-460 frequency of 200 days is based on industry experience demonstrating that scram times do not significantly change over an operating cycle. The licensee's application dated December 1, 2009, provided the following information to justify the proposed change for HCGS:

> Hope Creek has demonstrated this high reliability of the scram function through review of historical scram time data. Scram time testing results from 1989 (Cycle 3) to early 2009 (Cycle 15) were reviewed. This data reflects a combined total of 5467 individual scram time tests, each measuring the scram time at four insertion positions (Positions 45, 39, 25, and 05). The review showed that all 5467 individual tests met the criterion of existing TS 3.1.3.2, namely "The maximum scram insertion time off each control rod from the fully withdrawn position to notch position 5, based on de-energization of the scram pilot solenoid valves as time zero, shall not exceed 7.0 seconds." The review also showed that Hope Creek has always met existing TS 3.1.3.3 for core average scram times.

Each performance of existing TS SR 4.1.3.2.c (every 120 days of POWER OPERATION) requires 10 percent of the control rods to be tested. This currently results in 4 (on the current 18-month cycle) mid-cycle tests within an operating cycle. Therefore, over half of the control rods are not tested during these mid-cycle tests, but are only tested after refueling during the initial cycle testing of each of the 185 control rods. As such, historical test data shows that a substantial population of individual rods meets the scram time requirements with up to 18 months between tests and provides a basis to conclude that more frequent testing does not provide any conditioning necessary for adequate performance of the control rod scram function. Therefore the future reliability of the Hope Creek scram time performance will not be affected by implementing the proposed change to the mid-cycle periodic testing frequency. An extension from 120 to 200 days of POWER OPERATION, and the associated reduction in the number of rods tested mid-cycle, will not have an adverse affect on the Hope Creek control rod scram function.

The review also determined that only 17 of the 5467 tests yielded a time slow enough to evaluate current TS 3.1.3.4 for the slow control rod. In all of those cases, the average of the 3 fastest control rods in each group of four control rods arranged in a two-by-two array did not exceed the criteria in TS 3.1.3.4. Therefore, Action Statement 3.1.3.4.a did not have to be taken. Using the proposed Table in TS 3.1.3.3-1 for determining "slow" rods, 24 of the tests would have resulted in rods being declared "slow". None of them occupied adjacent locations with other "slow" rods; therefore, the proposed Action Statement 3.1.3.3 would not have been entered. There have been no documented "slow" rods since 2003. Therefore, the justifications for the change presented in TSTF-460 and the model SE are applicable to HCGS.

The NRC staff concurs with the licensee's conclusion that that the historical data justifies the reliability of scram capability. Therefore, the NRC staff concludes that the proposed change is acceptable.

3.5 TS 3/4.1.3.5, "Control Rod Scram Accumulators"

The operability of the control rod scram accumulators is required to ensure that adequate scram insertion capability exists when needed over the entire range of reactor pressures. The operability of the control rod scram accumulators is based on maintaining adequate accumulator pressure. Consistent with SR 4.1.3.5, the accumulator is considered operable if its pressure is greater than or equal to 940 psig.

The current LCO 3.1.3.5 Action a.1 requires with one control rod scram accumulator inoperable and reactor pressure greater than or equal to 900 psig, the accumulator must be restored to operable status within 8 hours, or the associated control rod must be inserted and declared inoperable.

The current LCO 3.1.3.5 Action a.2 requires with two or more control rod scram accumulators inoperable and reactor pressure greater than or equal to 900 psig, the charging water header pressure must be restored to greater than or equal to 940 psig within 20 minutes (if the pressure

is less than 940 psig) and the associated control rod must be inserted and declared inoperable within 1 hour.

The proposed amendment would revise LCO 3.1.3.5 Actions a.1 and a.2 to add the option of declaring the associated control rod scram time as slow rather than inserting the rod and declaring it inoperable. A note would be added indicating that declaring the control rod "slow" only applies if the associated scram time was within the limits of Table 3.1.3.3-1 during the last scram time test. The note would also state that rods that are already considered "slow" should be declared inoperable and fully inserted. The proposed changes are consistent with STS LCO 3.1.5.

The NRC staff finds the proposed change is acceptable since with the control rod scram accumulator inoperable and the reactor pressure greater than or equal to 900 psig, the control rod will still scram using only the reactor operating pressure.

3.6 Technical Evaluation Conclusion

Based on the findings in SE Sections 3.2 through 3.5, the NRC staff concludes that the proposed amendment is 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. In a letter dated July 20, 2010, the State Official provided the following comment regarding the LAR:

> LAR H09-06 Section 6.0, "Commitments," mistakenly addresses changes pertaining to the reactor recirculation system that were requested in LAR H09-02 (dated July 30, 2009). Therefore, LAR H09-06 Section 6.0 should be revised to delete any references to the reactor recirculation system and to include the commitments pertaining to the control rod system as summarized in LAR H09-06 Attachment 4.

The NRC staff notified the licensee of the error in its application dated December 1, 2009. In the supplement dated July 23, 2010, the licensee made corrections to Section 6.0 of the LAR. On July 28, 2010, the State Official notified the NRC staff that the licensee's supplement fully addresses the concerns that were raised.

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 and changes SRs. 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 (75 FR 4119). 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) 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 Contributors: D. Cunanan
R. Ennis

Date: September 27, 2010

September 27, 2010

Mr. Thomas Joyce
President and Chief Nuclear Officer
PSEG Nuclear
P.O. Box 236, N09
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION - ISSUANCE OF AMENDMENT RE: CONTROL ROD SCRAM TIMES (TAC NO. ME2815)

Dear Mr. Joyce:

The Commission has issued the enclosed Amendment No. 183 to Facility Operating License No. NPF-57 for the Hope Creek Generating Station (HCGS). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated December 1, 2009, as supplemented by letters dated July 23, and August 19, 2010.

The amendment changes the HCGS TSs to: (1) revise the required frequency of testing control rod scram times from "at least once per 120 days of POWER OPERATION" to "at least once per 200 days of POWER OPERATION"; (2) revise the evaluation methodology for control rod scram time tests; (3) establish a new category of operable but "slow" control rods; and (4) establish allowable limits for the number and distribution of "slow" rods. The changes are based, in part, on Nuclear Regulatory Commission-approved TS Task Force (TSTF) change traveler TSTF-460, "Control Rod Scram Time Testing Frequency."

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

Sincerely,
/ra/
Richard B. Ennis, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosures:
1. Amendment No. 183 to License No. NPF-57
2. Safety Evaluation

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