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PSEG
Nuclear LLC

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REQUEST FOR CHANGE TO TECHNICAL SPECIFICATIONS
OSCILLATION POWER RANGE MONITOR (OPRM)
HOPE CREEK GENERATING STATION
FACILITY OPERATING LICENSE NPF-57
DOCKET NO. 50-354

Reference: LR-N04-0069, "Request for Change to Technical Specifications: Oscillation Power Range Monitor (OPRM)," dated March 31, 2004.

By the referenced letter, PSEG Nuclear LLC (PSEG) requested a revision to the Technical Specifications (TS) for the Hope Creek Generating Station to include the Oscillation Power Range Monitor (OPRM) system. In communications from Mr. G. Miller on June 3 and June 25, 2004, and in telephone conferences on June 15 and June 30, 2004, the NRC requested additional information concerning the proposed change. The requested information is provided in the attachment to this letter. In accordance with 10CFR50.91(b)(1), a copy of this submittal has been sent to the State of New Jersey.

PSEG has determined that the information contained in this letter and attachment does not alter the conclusions reached in the 10CFR50.92 no significant hazards analysis previously submitted.

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If you have any questions or require additional information, please contact Mr. Paul Duke at (856) 339-1466.

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

Executed on 8/9/04
(date)

David F. Garchow
Vice President
Engineering/Technical Support

Attachment

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HOPE CREEK GENERATING STATION
FACILITY OPERATING LICENSE NPF-57
DOCKET NO. 50-354
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
OSCILLATION POWER RANGE MONITOR (OPRM)

By letter dated March 31, 2004, PSEG Nuclear LLC (PSEG) requested a revision to the Technical Specifications (TS) for the Hope Creek Generating Station to include the Oscillation Power Range Monitor (OPRM) system. In communications from Mr. G. Miller on June 3 and June 25, 2004, and in telephone conferences on June 15 and June 30, 2004, the NRC requested additional information concerning the proposed change. PSEG's responses are provided below.

1. Please describe the details of the confirmation process for the proposed OPRM system to meet the conditions stated in CENPD-400-P-A, Rev 01, "Generic Topical Report for the ABB Option III Oscillation Power Range Monitor (OPRM)," and identify any deviations.

   PSEG Response:
   Attachment 3 to PSEG's March 31, 2004 letter describes the degree to which the Hope Creek design and implementation conform to the applicable NRC accepted generic topical reports and associated NRC safety evaluation reports. This information was obtained as part of the design analysis performed for installation of the OPRM.

   The design analysis included assessments of hardware and performance requirements; process conditions; equipment qualification; environmental conditions; interface requirements; redundancy, diversity and separation requirements; setpoint calculations; failure modes and effects; and human factors. Attachment 3 to PSEG's letter includes the plant-specific actions listed in Section 5.0 of the NRC's safety evaluation for CENPD-400-P, Rev. 1.

   As noted in Attachment 3 to PSEG's letter, the tested Relative Humidity (RH) range for the OPRM does not envelope the lower end of the normal control room humidity range for Hope Creek. However, the OPRM vendor (ABB-CE) performed an evaluation to confirm the OPRM equipment will continue to operate properly at 10% RH which envelopes the lower end of the humidity range for Hope Creek.

2 Provide detailed procedures to verify the accuracy of trip setpoints for the new OPRM instrumentation based on available data of the system calibration tests during normal operation as well as the shutdown and subsequent startup from refueling outage.

PSEG Response:
Data recorded by the OPRM system at Hope Creek has been used to determine appropriate values for the period tolerance and conditioning filter cutoff frequency as described in section 3.4.1 of NEDO-32465-A. The determination of these values is dependent on the Hope Creek specific operational neutron flux noise characteristics. This data is not used to verify the accuracy of the OPRM system trip setpoints.

In accordance with the guidance in CENPD-400-P-A, PSEG will establish channel functional test procedures and channel calibration procedures to be performed on a frequency specified in Surveillance Requirements 4.3.11.1 through 4.3.11.4 of the proposed technical specification. The channel functional test procedures will verify that the OPRM trip system channel will perform its intended function. The channel calibration procedures verify that the channel responds to the measured parameter within the necessary range and accuracy.

The OPRM channel functional test and channel calibration will be performed using the OPRM Maintenance Terminal as described in sections 2.3.6 and 2.3.7 of CENPD-400-P-A. Details of the OPRM calibration are listed in CENPD-400-P-A, section 2.3.7. The LPRM calibration requirement (proposed SR 4.3.11.2) will be satisfied in accordance with the current TS requirement (Note (f) to TS Table 4.3.1.1-1).

3. Please provide a detailed description of the methodology for calculation of the plant-specific DIVOM correlation and the OPRM setpoints for TS 3/4.3.11. Also, provide a detailed description of the procedure to generate the OPRM Period Based Algorithm Allowable Value and Confirmation Counts for future cycles. Please identify any plant-specific differences from the generic values specified in NEDO-32465-A such as Period Based Detection Algorithm (PBDA) period confirmation setpoints in Table 3-1, PBDA trip setpoints in Table 3-2, and generic DIVOM curve slope. Provide specific values for OPRM scram setpoints and the DIVOM correlation for the next cycle.

PSEG Response:
The process by which a DIVOM curve will be calculated for Hope Creek is contained in NEDO-32465-A. For example, (as in section 4.4.4 of NEDO-32465-A) TRACG will be used to simulate a flow coastdown event that results in a growing reactor oscillation. The thermal hydraulic conditions are used to calculate the CPR response of the fuel, using the appropriate CPR correlation for either the GE14 fuel design (GEXL14) or the SVEA-96+ fuel design (GEXL80). The TRACG output will be processed to correlate each minimum of the time-varying CPR with the preceding channel power maximum. For each power oscillation peak, the normalized oscillation magnitude and associated fractional change in CPR will then be determined. The results of these TRACG evaluations will be used directly to determine the DIVOM slope

instead of use of the generic DIVOM curve displayed on Figure 4-13 of NEDO-32465-A.

With the DIVOM slope determined from the plant specific inputs (as described above), the OPRM setpoint will be determined following the process for plant-specific first application described in NEDO-32465-A section 5. The final MCPR will be calculated from the equation

$$FMCPR = IMCPR - IMCPR * \left\{ \frac{\Delta CPR}{MCPR} \right\}$$

and compared to the SLMCPR. If SLMCPR is less than FMCPR then the setpoint chosen is appropriate for the cycle.

For future cycles and for planned changes to the licensed Hope Creek operating domain, an evaluation will be performed that will determine the applicability of the DIVOM slope calculated for cycle 13. If necessary, a new DIVOM curve will be determined; otherwise the process is the same as described above for determining the OPRM setpoint allowable value and confirmation counts.

Table 3-1 of NEDO-32465-A lists the acceptable ranges for the period tolerance and conditioning filter cutoff frequency. PSEG will use values within the ranges specified in Table 3-1. Table 3-2 of NEDO-32465-A relates the confirmation count setpoint (Np) to the amplitude setpoint (Sp) for the period based detection algorithm based on a conservative theoretical relationship between the two parameters. None of the plant-specific evaluations performed by PSEG have resulted in a need to change this relationship for Hope Creek. Instead of the generic DIVOM slope displayed in Figure 4-13 of NEDO-32465-A, PSEG will use a plant specific DIVOM curve developed as described in the previous paragraphs.

The development of the plant-specific DIVOM curve and OPRM setpoints for operation in the currently licensed operating domain for cycle 13 is still in progress. PSEG expects this work to be completed by September 30, 2004 and documented in a report from the fuel vendor to PSEG for Hope Creek.

The adequacy of the OPRM armed region (the power and flow region in which the OPRM modules are automatically enabled) will also be assessed in the evaluation being performed for cycle 13, in response to the notification from GE Nuclear Energy to stability Option III plants (Reference 1) which stated that plant and cycle variation in stability performance can cause a reduction in stability margin at the upper boundary of the armed region.

4. Please describe the functional relationship between the Interim Corrective Actions (ICAs) and Actions stated in TS 3.3.11 for OPRM. Also, provide the rationale to delete Figure 3.4.1.1-1 from the TS and identify any role of Figure

3.4.1.1-1 in the reactor operating manual. Provide a detailed description of the alternate method to detect and suppress thermal hydraulic instability oscillation stated in TS 3.3.11 Action b.

PSEG Response:
The Interim Corrective Actions (ICAs) as published by the BWR Owners Group (BWROG-94078) can be summarized as guidance for reactor operation in regions of the power/flow domain where the margin to thermal hydraulic instability has been reduced. When published, the ICAs defined the regions in terms of core flow and rodlines (flow control lines) based on experience of reactor instability events. Operation in or near these regions was to be supplemented by specific operator actions that are described throughout the document. BWROG-94078 states: "Alternative approaches based on plant specific evaluations or analyses may also be acceptable and are not precluded by these BWROG recommendations. Such alternative approaches might consider different regions as well as different actions and oscillation detection guidelines, based on appropriately supported knowledge of specific plant characteristics." Hope Creek will use cycle specific decay ratio calculations to define the boundaries of the Immediate Exit Region and the Scram Region. However, the actions associated with entry into either of these regions will not change from the description in BWROG-94078. In the event that the size of the regions change, the changes will be implemented via procedure changes, changes to control room displays, and introduced through Operator requalification training prior to the changes being implemented.

As described in the existing Bases for TS 3/4.4.1, Figure 3.4.1.1-1 displays an area of the power/flow operating domain inside which a neutron flux noise surveillance is to be performed. The OPRM system design incorporates digital signal filters that automatically reduce the neutron flux noise levels prior to evaluating the signal using the Oscillation Detection Algorithms (ODAs). Since the OPRM enabled region is much larger than the region defined in TS Figure 3.4.1.1-1, the OPRM system provides at least the same level of protection to the margin of thermal hydraulic instability as the manual neutron flux surveillance.

In the event that the OPRM system becomes inoperable and the alternate method is implemented, procedures are in place that would prohibit intentional operation in the Immediate Exit Region and would further require immediate operator actions to exit the Immediate Exit Region following an inadvertent entry. Since the Immediate Exit Region will be based on cycle-specific decay ratio calculations, these requirements provide at least the same level of protection of the margin to thermal hydraulic instability while the OPRM system is inoperable.

The alternate method of detection and suppression of thermal hydraulic oscillations is described in the first paragraph of the response to this question.

5. The proposed TS change to TS 6.9.1.9 Core Operating Limits to add TS 3/4.3.11 Oscillation Power Range Monitor (OPRM) may not be consistent with the guidance specified in Generic Letter 88-16. TS 6.9.1.9 should list all the cycle-specific core operating limits in the proposed TS change not an OPRM system. Please provide justification for this proposed change.

PSEG Response:
Inclusion of the OPRM period based algorithm amplitude trip setpoint (Sp) allowable value in the COLR is consistent with CENPD-400-P, Rev. 1, Appendix A and with TS changes approved by the NRC for the Perry Nuclear Power Plant (Accession No. ML010590101) and the Columbia Generating Station (Accession No. ML011020189).

PSEG proposes to include the setpoints for the new OPRM LCO 3.3.11 in the COLR because these setpoints are developed for each reload cycle, utilizing NRC-approved methods, and established such that all applicable limits of the plant safety analysis are met. Including this information in the COLR is consistent with the stated criteria for the contents of the COLR. By reference from the COLR, the Period Based Algorithm setpoints become integral to the Operability basis for the OPRM protective function.

Changes to the setpoints may be made without affecting nuclear safety, since the changes will be determined using an NRC-approved methodology. Incorporation of the setpoints into the COLR controls the values of cycle-specific setpoints and assures conformance to 10 CFR 50.36, which calls for specifying the lowest functional performance levels acceptable for continued safe operation, by specifying the calculation methodology and acceptance criteria.

REFERENCES

1. GE Nuclear Energy, Safety Information Communication, "Stability Option III OPRM Armed Region Boundary," February 17, 2003