July 13, 2004

MEMORANDUM TO: James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Daniel S. Collins, Senior Project Manager, Section 2 ***/RA/***
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: HOPE CREEK GENERATING STATION, FACSIMILE TRANSMISSION, DRAFT REQUEST FOR ADDITIONAL INFORMATION (RAI) TO BE DISCUSSED IN AN UPCOMING CONFERENCE CALL (TAC NO. MC2221)

The attached draft RAI was transmitted by facsimile on July 8, 2004, to Mr. John Nagle, PSEG Nuclear LLC (the licensee). This draft RAI was transmitted to facilitate the technical review being conducted by the Office of Nuclear Reactor Regulation (NRR) and to support a conference call with the licensee to discuss the RAI. The RAI was related to the licensee's submittal dated March 1, 2004, concerning the utilization of a Risk Informed Inservice Inspection Program. Review of the RAI would allow the licensee to determine and agree upon a schedule to respond to the RAI. This memorandum and the attachment do not convey or represent an NRR staff position regarding the licensee's request.

Docket No. 50-354

Attachment: Draft RAI

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DRAFT-REQUEST FOR ADDITIONAL INFORMATION

REGARDING PROPOSED ALTERNATIVE TO

UTILIZE A RISK INFORMED-INSERVICE INSPECTION PLAN

HOPE CREEK GENERATING STATION

By letter dated March 1, 2004, PSEG Nuclear, LLC (PSEG) submitted a proposed alternative to the requirements of "Rules for Inservice Inspection of Nuclear Power Plant Components", Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for the Hope Creek Generating Station (HGCS). The request was submitted pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i). The Nuclear Regulatory Commission staff has been reviewing your submittal and has determined that the following additional information is required to complete our review:

1. Regulatory Guide (RG 1.178, *An approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping, Revision 1*, dated September 2003, replaced the original "*For Trial Use*" RG dated September 1998. Revision 1 of RG 1.178 includes guidance on what should be included in risk informed-inservice inspection (RI-ISI) submittals, particularly in dealing with probabilistic risk assessment (PRA) issues. Specifically, on page 28 of RG 1.178, the following is stated:

   > "A description of the staff and industry reviews performed on the PRA. Limitations, weakness or improvements identified by the reviewers that could change the results of the PRA should be discussed. The resolution of the reviewer comments, or an explanation of the insensitivity of the analysis used to support the submittal to the comment, should be provided."

   Section 1.2 of your submittal discussed the HCGS IPE. By letter dated April 23, 1996, the NRC issued a safety evaluation, concluding that the IPE had met the intent of GL88-20, and had identified plant-specific vulnerabilities per the guidance of NUREG-1335. With regard to the IPE, answers to the following are required:

   a. What weaknesses were identified?

   b. What was done to correct the identified weaknesses or why the uncorrected weaknesses are not relevant to this application?

2. In Section 1.2 of your submittal, you identify that an industry peer review was completed in November of 1999. The Section notes that 'most' of the significant findings from this formal peer review were incorporated in Revision 1.3 and that this revision of the PRA model was used in your submittal. Section 1.2 further states that the main comments from the peer review were associated with the treatment of the human action dependencies and the Level 2 Large Early Release Frequency (LERF) sequences timing. While the staff concurs with your expectation that a pessimistic adjustment of

the timing of LERF sequences would not impact the consequence rankings, the following information is needed in regard to the human action:

a. Was the peer review comment about human action dependencies corrected by Revision 1.3?

b. If Revision 1.3 did not address the human action dependencies concern (i.e., the dependent Human Error Probabilities (HEPs) are basically unchanged since the peer review), explain why the consequences rankings would likely not be affected by a correction to this issue.

3. Section 3.6.1 indicates that you used the "Simplified Risk Quantification Method" as described in Section 3.7 of the Electric Power Research Institute (EPRI) Topical Report (TR) 112657 in support of your overall risk impact assessment. You selected 1E-08 per weld-year as the pressure boundary failure frequency for a weld with no known degradation mechanism (i.e., low failure potential) and a value of 20 times that (i.e., 2E-07) for a weld with medium failure potential, which is similar to the failure rate used by some of the pilot plants for the EPRI TR, as noted by your citation of References 9 and 14 in the TR.

   a. Given this information, a Category 4 weld should have a contribution to CDF of (1E-03) * (1E-08) or 11E-11/year. Assuming that the inspections are 100 percent effective in finding flaws before they progress to a rupture, then the decrease of one weld inspection should result in an increase in CDF of 1.0E-11/year. Table 3.6-1, which presents the risk impact results, indicates a net decrease of seven system RPV Category 4 weld inspections, resulting in a CDF increase of 3.5E-11/year, rather than the expected 7.0E-11/year. Additionally, Table 3.6-1 lists a net increase of four system BE Category 4 weld inspections, resulting in a CDF decrease of 2.0E-11/year, rather than the expected 4.0E-11/year. Clarify this discrepancy.

   b. Many of the numerical entries in Table 3.6-1 have the same CDF impact or LERF impact values in the "w/ [with] POD [probability of detection]" column as in the "w/o [without] POD" column, while other entries have different CDF and LERF impact values between the two columns. Explain why the "w/ POD" and "w/o POD" values are sometimes, but not consistently different.

      i. Provide an example calculation of CDF and LERF impact for a Category 4 group of welds in which there is no CDF/LERF impact between the "w POD" and "w/o POD" columns.

4. Section 2.2 of the submittal lists augmented inspection programs that were considered during the RI-ISI application. Section 6.5 of EPRI TR-112657 also provides a listing of augmented inspection programs, and how they are to be treated in relation to the RI-ISI program. Two programs, applicable to boiling water reactors, are listed in the EPRI document which are not discussed in Section 2.2 of your submittal. Specifically, NRC Bulletin 88-08 (Thermal Stresses in Piping Connected to Reactor Coolant Systems) and NRC Generic Letter 89-13 (Service Water Integrity Program) were identified. Describe how these two augmented inspection programs were treated with respect to the HCGS RI-ISI program.

5. As explained in paragraph 4 of Section 3.5, and reiterated in the notes to Table 3.5 of the March 1, 2004 submittal, you have included 6 non-Category A Intergranular Stress Corrosion Cracking (IGSCC)-susceptible welds in the scope of the RI-ISI program. This was done even though you indicated that the IGSCC inspection program was to be unaffected by the RI-ISI program and welds only susceptible to IGSCC are excluded from the RI-ISI program scope such that IGSCC susceptibility was no longer considered in the risk-ranking of a piping segment. Therefore, the scope of piping segments left for consideration under the RI-ISI program include only IGSCC welds susceptible to multiple degradation mechanisms.

   Section 3.6.4 of EPRI TR-112657 provides two alternatives for selecting weld locations. The alternatives are also discussed in ASME Code Cases N-560 and N-578, but the staff has only endorsed the alternatives as described in the EPRI Topical Report and has not endorsed the Code Cases. The selection alternatives discussed in Section 3.6.4.1 and 3.6.4.2 correspond to discussions in ASME Code Case N-560 and N578 respectively. In Section 3.6.4.1 of the TR, there are explicit provisions for crediting an augmented inspection program examination as an RI-ISI examination, provided that the location is a high risk location (Risk Categories 1, 2, or 3), and that no more than half of the total RI-ISI examinations may be "borrowed" from these programs. Section 3.6.5.1 expands on this discussion by noting that the locations of these "borrowed" examinations must be identical to those called out in the augmented inspection program, and not one that is within the scope of the program, but not identified for inspection.

   Section 3.6.4.2 of the TR requires that the augmented inspection program remain completely as is. All elements in high and medium risk segments that are part of these programs must continue to be examined. The "number, location, and frequency" would remain the same. These programs are not subsumed into the EPRI RI-ISI program (with the exception of Category A IGSCC welds). The section further states that elements determined to have degradation mechanisms, other than those in the Flow Accelerated Corrosion (FAC) and IGSCC inspection programs are to be included in the RI-ISI program. The number and locations are to be selected according to the RI-ISI program. There is no provision in this section which allows augmented inspections to be credited toward the total number of RI-ISI examinations.

   Section 3.6.5.2 of the TR, which discusses the attributes of a Code Case N-578 examination, only reiterates the provisions for welds that are under the jurisdiction of an augmented inspection program. No additional information is given. For welds not under one of these programs, this section provides additional guidance for selection of locations. Again, there is no provision given for crediting these augmented inspection program examinations toward the RI-ISI examination count.

   In the first alternative, augmented program elements are fully included in the RI-ISI program but augmented inspections may be credited to satisfy the required number of inspection locations. In the second alternative, augmented program elements (and degradation mechanism) are excluded from the RI-ISI program although discontinued Section XI inspections must still be reflected in the change in risk estimates. There are no provisions in EPRI TR-112657 for mixing the alternatives by excluding the

augmented inspection program elements and degradation mechanism but crediting the inspections.

Section 3.5 of your submittal, and the notes to Table 3.5, appear to indicate that you have excluded all augmented program elements from the RI-ISI program but have credited some of the inspections in the RI-ISI program, in essence, mixing the alternatives. Explain this apparent discrepancy.

6. Section 3 of PSEG's March 1, 2004 submittal states that the RI-ISI program for HCGS will deviate from the EPRI RI-ISI methodology for the assessment for thermal stratification, cycling, and striping (TASCS). State whether or not the revised methodology for assessing TASCS potential is in conformance with the updated criteria described in the EPRI letter to the NRC dated March 28, 2001. Also, confirm that as stated in the March 28, 2001 letter (Available under ADAMS Accession Number ML011070238), once the final material reliability program guidance has been developed, the RI-ISI program will be updated for the evaluation susceptibility to TASCS, as appropriate.

7. Section 2.2 of the submittal states, in part, "[t]he feedwater nozzle-to-safe end weld locations are included in the scope of both the NUREG 0619 Program and the RI-ISI Program. The plant augmented inspection program requirements for these locations are not affected or changed by the RI-ISI Program." Explain if credit has been taken from this augmented program as part of the RI-ISI program. If so, explain the weld selection criteria as compared to EPRI TR-112657, given that NUREG-0619 is not considered as an augmented program in EPRI TR-112657.

8. Section 3.5 of the submittal states, in part, "[t]he above sampling percentage does not take credit for any inspection locations selected for examination per the plant's augmented inspection program for FAC beyond those selected per the RI-ISI process. It should be noted that no FAC examinations are being credited to satisfy RI-ISI selection requirements. Inspection locations selected for RI-ISI purposes that are in the FAC Program will be subjected to an independent examination to satisfy the RI-ISI Program requirements." Provide information on those selections made by the RI-ISI process that are also included in the augmented FAC program.

9. The second paragraph of Section 3.5.1 states that additional examinations will be conducted during the current outage. Clarify the time frame for second sample examinations.