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

October 16, 2008

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

SUBJECT: SAFETY EVALUATION OF RELIEF REQUESTS FOR THE THIRD 10-YEAR INTERVAL OF THE INSERVICE INSPECTION PROGRAM FOR HOPE CREEK GENERATING STATION (TAC NOS. MD7503, MD7504 AND MD7505)

Dear Mr. Joyce:

By letter dated December 12, 2007, as supplemented by letter dated June 11, 2008, PSEG Nuclear LLC submitted relief requests HC-I3R-01, HC-I3R-02, and HC-I3R-03 which proposed alternatives to certain requirements of Section XI of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code) for Hope Creek Generating Station (HCGS). The subject relief requests are for the third 10-year inservice inspection (ISI) interval at HCGS which began on December 13, 2007.

The U.S. Nuclear Regulatory Commission staff has completed its review of the subject relief requests as documented in the enclosed Safety Evaluation (SE). Our SE concludes the following.

1) With respect to relief requests H-I3R-01 and H-I3R-02, the proposed alternatives will provide an acceptable level of quality and safety. Therefore, pursuant to Section 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations* (10 CFR), the proposed alternatives are authorized for the third 10-year ISI interval at HCGS.

2) With respect to relief request H-I3R-03, compliance with the specified Code requirements is impractical. The proposed alternative provides reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the third 10-year ISI interval at HCGS. Granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions concerning this matter, please contact the HCGS Project Manager, Mr. Richard Ennis, at (301) 415-1420.

Sincerely,

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

Docket No. 50-354

Enclosure:
Safety Evaluation

cc w/encl: Distribution via ListServ

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUESTS FOR THE

THIRD 10-YEAR INTERVAL OF THE INSERVICE INSPECTION PROGRAM

PSEG NUCLEAR LLC

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

1.0 INTRODUCTION

By letter dated December 12, 2007, as supplemented by letter dated June 11, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML073531254 and ML081700233, respectively), PSEG Nuclear LLC (PSEG or the licensee) submitted relief requests HC-I3R-01, HC-I3R-02, and HC-I3R-03 which proposed alternatives to certain requirements of Section XI of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code) for Hope Creek Generating Station (HCGS). The subject relief requests are for the third 10-year inservice inspection (ISI) interval at HCGS.

2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific relief has been granted by the Nuclear Regulatory Commission (NRC or Commission) pursuant to 10 CFR 50.55a(g)(6)(i). Pursuant to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulation requires that inservice examination of components and system pressure tests conducted during the first 10-year interval, and subsequent intervals, comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

Enclosure

The third 10-year ISI interval at HCGS began on December 13, 2007, and will conclude on December 12, 2017. The applicable edition of Section XI of the ASME Code for the HCGS third 10-year ISI interval is the 2001 Edition up to and including the 2003 Addenda.

In relief request HC-I3R-01, "Request for Relief for Alternate Risk-Informed Selection and Examination Criteria for Examination Category B-F, B-J, and C-F-2 Pressure Retaining Piping Welds In Accordance with 10 CFR 50.55a(a)(3)(i)," PSEG requested NRC authorization to extend the risk-informed inservice inspection (RI-ISI) program plan for HCGS to the third 10-year ISI interval. The HCGS RI-ISI program for the second 10-year interval was submitted to the NRC by letter dated March 1, 2004 (Reference 3). The NRC authorized HCGS to implement an RI-ISI program during the third period of the second 10-year ISI interval by letter dated December 8, 2004 (Reference 4). The licensee's RI-ISI program, as outlined in Reference 3, was developed in accordance with the methodology contained in the Electric Power Research Institute's (EPRI's) report EPRI TR-112657, Rev. B-A (Reference 5) which was reviewed and approved by the NRC staff.

In relief request HC-I3R-02, "Request for Relief for Alternate Testing and Examination Requirements for Snubbers In Accordance with 10 CFR 50.55a(a)(3)(i)," PSEG requested relief from certain ISI and examination requirements of Article IWF-5000 of Section XI of the ASME Code. IWF-5000 references ASME/American Nuclear Standards Institute (ANSI) *Code for Operation and Maintenance of Nuclear Power Plants* (OM), Part 4 (OM-4), 1987 Edition with OMa-1988 Addenda. The licensee proposed to perform snubber surveillance activities using HCGS Technical Specification (TS) 3/4.7.5, "Snubbers."

In relief request HC-I3R-03, "Request for Relief for Inservice Inspection Impracticality of Pressure Testing the RPV [Reactor Pressure Vessel] Head Flange Seal Leak Detection System In Accordance with 10 CFR 50.55a(g)(5)(iii)," PSEG requested relief from performing a system leakage test of the reactor vessel head flange seal leak detection piping at the ASME Code-required test pressure corresponding to nominal operating pressure during system operation. The licensee's request stated that the configuration of the leak detection piping precludes implementing the Code-required pressure test either with the vessel head installed or while removed. The licensee's request also stated that the Code requirement for system pressure test of the reactor vessel head flange seal leak detection piping is impractical and would necessitate redesign of the O-ring and its groove in the reactor vessel head flange if the requirement is imposed.

3.0 TECHNICAL EVALUATION

The NRC's evaluation of relief requests HC-I3R-01, HC-I3R-02, and HC-I3R-03 is provided in Safety Evaluation (SE) Sections 3.1, 3.2, and 3.3, respectively.

3.1 Relief Request HC-I3R-01

3.1.1 ASME Code Components Affected

Code Class: 1 and 2

Examination Category: B-F, B-J, and C-F-2

Item Number: B5.10, B9.11, B9.21, B9.31, B9.32, B9.40, C5.51, and C5.81

Description: Alternate Risk-Informed Selection and Examination Criteria for Category B-F, B-J, and C-F-2 Pressure Retaining Piping Welds

Component: Pressure Retaining Welds

3.1.2 ASME Code Requirements

Table IWB-2500-1, Examination Category B-F, requires volumetric and/or surface examinations on all welds for Items B5.10 and B5.20.

Table IWB 2500-1, Examination Category B-J, requires volumetric and/or surface examinations on a sample of welds for Item Numbers B9.11, and B9.31, and surface examinations on a sample of welds for Item Numbers B9.21, B9.32, and B9.40. The weld population selected for inspection includes the following:

1. All terminal ends in each pipe or branch run connected to vessels.

2. All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed either of the following limits under loads associated with specific seismic events and operational conditions:

   a. primary plus secondary stress intensity range of $2.4S_m$ for ferritic steel and austenitic steel; and

   b. cumulative usage factor U of 0.4.

3. All dissimilar metal welds not covered under Category B-F.

4. Additional piping welds so that the total number of circumferential butt welds (or branch connection or socket welds) selected for examination equals 25% of the circumferential butt welds (or branch connection or socket welds) in the reactor coolant piping system. This total does not include welds excluded by IWB-1220.

Table IWC-2500-1, Examination Category C-F-2, requires volumetric and surface examinations on a sample of welds for Item Number C5.51, and surface examinations on a sample of welds for Item Number C5.81. The weld population selected for inspection includes the following:

1. Welds selected for examination shall include 7.5%, but not less than 28 welds, of all carbon and low alloy steel welds (Examination Category C-F-2) not exempted by IWC-1220. (Some welds not exempted by IWC-1220 are not required to be nondestructively examined per Examination Category C-F-2. These welds, however, shall be included in the total weld count to which the 7.5% sampling rate is applied). The examinations shall be distributed as follows:

a. the examinations shall be distributed among the Class 2 systems prorated, to the degree practicable, on the number of nonexempt carbon and low alloy welds (Examination Category C-F-2) in each system;

b. within a system, the examinations shall be distributed among terminal ends and structural discontinuities prorated, to the degree practicable, on the number of nonexempt terminal ends and structural discontinuities in the system; and

c. within each system, examinations shall be distributed between line sizes prorated to the degree practicable.

3.1.3 Licensee's Proposed Alternative

The licensee plans to use the RI-ISI methodology approved for use by the NRC staff for the HCGS second 10-year ISI interval (Reference 4) as the alternative for the third 10-year ISI interval. The licensee states that the third interval RI-ISI Program will be a continuation of the current application and will continue to be a living program. No changes to the evaluation methodology as currently implemented under ERPI TR-112657, Rev. B-A, are required as part of the interval update. However, the licensee plans to implement the following two enhancements:

1. In lieu of the evaluation and sample expansion requirements in Section 3.6.6.2, "RI-ISI Selected Examinations" of EPRI TR-112657, the requirements of Subarticle-2430, "Additional Examinations" contained in Code Case N-578-1 (Reference 6) will be used as the first enhancement.

2. The second enhancement proposed by the licensee is to use Table 1, Examination Category R-A, "Risk-Informed Piping Examinations" contained in Code Case N-578-1 as an alternative to the requirements listed in Table 4-1, "Summary of Degradation-Specific Inspection Requirements and Examination Methods" of EPRI TR-112657.

The licensee states that the HCGS RI-ISI Program, as developed in accordance with EPRI TR-112657, Rev. B-A, requires that 25% of the elements that are categorized as "High" risk (i.e., Risk Category 1, 2, and 3) and 10% of the elements that are categorized as "Medium" risk (i.e., Risk Categories 4 and 5) be selected for inspection. For this application, the licensee states that the guidance for the examination volume for a given degradation mechanism is provided by the EPRI TR-112657, while the guidance for the examination method and categorization of parts to be examined are provided by the EPRI TR-112657, as supplemented by Code Case N-578-1.

Lastly, the licensee states that in addition to this risk-informed evaluation, and examination procedure, all ASME Section XI piping components, regardless of risk classification, will continue to receive the required pressure testing as part of the current ASME Section XI program. VT-2 visual examinations are scheduled in accordance with the HCGS pressure testing program, which remains unaffected by the RI-ISI program.

3.1.4 Licensee's Basis for Proposed Alternative

Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested on the basis that the proposed alternative utilizing Reference 5 along with two enhancements from ASME Code Case N-578-1 (Reference 6) will provide an acceptable level of quality and safety.

As stated in "Safety Evaluation Report Related to EPRI Risk-Informed Inservice Inspection Evaluation Procedure (EPRI TR-112657, Revision B, July 1999)" (Reference 7):

> The staff concludes that the proposed RI-ISI program as described in EPRI TR-112657, Revision B, is a sound technical approach and will provide an acceptable level of quality and safety pursuant to 10 CFR 50.55a for the proposed alternative to the piping ISI requirements with regard to the number of locations, locations of inspections, and methods of inspection.

The initial HCGS RI-ISI Program was submitted during the third period of the second 10-year ISI interval. This initial RI-ISI program was developed in accordance with EPRI TR-112657, Revision B-A (Reference 5), as supplemented by Code Case N-578-1 (Reference 6). The program was approved for use by the NRC via SE as transmitted to PSEG on December 8, 2004 (Reference 4).

The transition from the 1998 Edition through the 2000 Addenda to the 2001 Edition through the 2003 Addenda of ASME Code, Section XI for HCGS's third interval does not impact the currently approved RI-ISI evaluation process used in the second interval, and the requirements of the new Code edition/addenda will be implemented as detailed in the HCGS ISI Program Plan.

The Risk Impact Assessment completed as part of the original baseline RI-ISI Program was an implementation/transition check on the initial impact of converting from a traditional ASME Code Section XI program to the new RI-ISI methodology.

As an added measure of assurance, any new systems, portions of systems, or components being included in the RI-ISI Program for the third interval will be added to the Risk Impact Assessment performed during the previous interval. These components will be addressed within the evaluation at the start of the new interval to assure that the new third interval RI-ISI element selection provides an acceptable overall change-in-risk when compared to the old ASME Section XI population of exams, which existed prior to the implementation of the first RI-ISI Program.

The actual "evaluation and ranking procedure" including the Consequence Evaluation and Degradation Mechanism Assessment processes of the currently approved (Reference 4) RI-ISI Program remain unchanged and are continually applied to maintain the Risk Categorization and Element Selection methods of EPRI TR-112657, Revision B-A. These portions of the RI-ISI Program have been and will continue to be reevaluated and revised as major revisions of the site probabilistic risk assessment (PRA) occur and modifications to plant configuration are made. The Consequence Evaluation, Degradation Mechanism Assessment, Risk Ranking, and Element Selection steps encompass the complete living program process applied under the HCGS RI-ISI Program.

3.1.5 NRC Staff Evaluation of Relief Request HC-I3R-01

In its submittal (Reference 1), the licensee requested relief pursuant to 10 CFR 50.55a(a)(3(i). The licensee sought relief from the requirements of ASME Code, Section XI to utilize an RI-ISI Program at HCGS during the third 10-year ISI interval.

The licensee stated that the third interval RI-ISI Program will be a continuation of the current application with no changes to the evaluation methodology as currently implemented. However, they propose to implement two enhancements as noted in Section 3.1.3 of this SE. As discussed in Reference 4, the ISI program approved for use in the second 10-year interval did contain one deviation. This deviation related to additional considerations for determining the potential for thermal stratification, cycling, and striping mechanisms and has no relation to the two enhancements discussed above.

In a Request for Additional Information (RAI) dated May 7, 2008 (Reference 10), the NRC staff noted that per Regulatory Guide 1.193, "ASME Code Cases Not Approved For Use," Revision 2 (October 2007), Code Case N-578-1 is listed as an unacceptable ASME Code, Section XI Code Case. The staff asked the licensee to clarify how their use of this Code Case provides a "more refined methodology for implementing necessary additional examinations" as stated in the licensee's description of the first enhancement. In response to this question dated June 11, 2008 (Reference 2), the licensee stated that the EPRI TR-112657, Section 3.6.6.2, has a brief discussion of additional examinations under the context of an evaluation, with little detail regarding the evaluation method. Subarticle -2430 of the Code Case uses a similar method but provides a more descriptive process based on postulated failure mode and impact of failure potential. The licensee continued by stating that the Code Case also adds a second expansion process should further flaws or relevant conditions be found in the first expanded scope, as well as providing guidance for returning the components receiving additional examinations back into the normal periodic schedule. The NRC staff has reviewed the relevant sections of EPRI TR-112657 and Code Case N-578-1, as well as the ASME Code, Section XI, IWB-2430 "Additional Examinations" and finds that the application of the Code Case N-578-1 sample expansion process is comparable to that in the ASME Code, Section XI and acceptable provided that the sample expansion will occur during the same outage as the relevant conditions are identified.

The second enhancement proposed by the licensee is to use Table 1, Examination Category R-A, "Risk-Informed Piping Examinations" contained in Code Case N-578-1 as an alternative to the requirements listed in Table 4-1, "Summary of Degradation-Specific Inspection Requirements and Examination Methods" of EPRI TR-112657. The NRC staff agrees that Table 1 of Code Case N-578-1 provides a more detailed and complete breakdown of examination categories than Table 4.1 of Reference 1, and thus the staff finds the use of Table 1 of Code Case N-578-1 acceptable.

An acceptable RI-ISI program plan is expected to meet the five key principles discussed in Regulatory Guide 1.178 (Reference 8), Standard Review Plan 3.9.8 (Reference 9) and EPRI TR-112657 (Reference 5), as stated below:

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.

2. The proposed change is consistent with the defense-in-depth philosophy.

3. The proposed change maintains sufficient safety margins.

4. When proposed changes result in an increase in Core Damage Frequency (CDF) or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

5. The impact of the proposed change should be monitored by using performance measurement strategies.

The first principle is met in this relief request because an alternative ISI program may be authorized pursuant to 10 CFR 50.55a(a)(3)(i) and therefore an exemption request is not required. The second and third principles require assurance that the alternative program is consistent with the defense-in-depth philosophy and that sufficient safety margins are maintained, respectively. Assurance that the second and third principles are met is based on the application of the approved methodology and not on the particular inspection locations selected. The licensee stated that they are using the same methodology as the original submittal. Since, the methodology used to develop the RI-ISI program for the third 10-year interval is unchanged from the methodology approved for development of the RI-ISI program used in the second 10-year ISI interval, the second and third principles are met.

The fourth principle (i.e., that any increase in CDF and risk are small and consistent with the Commission's Safety Goal Policy Statement), requires an estimate of the change in risk, and the change in risk estimate is dependent on the location of inspections in the proposed ISI program compared to the location of inspections that would be inspected using the requirements of ASME Code, Section XI.

In Reference 2, the licensee stated that for the third 10-year ISI interval, the methodology of the calculation of the risk impact assessment has not changed, and the calculation remains part of the living program. The licensee states that in maintaining this portion of the RI-ISI Evaluation living, the change-in-risk for the program proposed for the third interval has been assessed against the pre-risk-informed 1989 ASME Section XI program. The NRC staff has previously determined that it is not necessary to develop a new deterministic ASME program for each new 10-year interval but, instead, it is acceptable to compare the new proposed RI-ISI program with the last deterministic ASME program.

The licensee stated that the change in CDF is 7.41E-09/year and the change in large early release frequency (LERF) is 7.44E-10/year, which meets the acceptance guidelines. The licensee states that the change-in-risk analysis was likewise done at a system level, and the system acceptance criteria in EPRI TR-112657 were not exceeded for any individual system within the RI-ISI Program. The NRC staff finds that the change in risk estimate meets the guidelines and therefore provides assurance that the fourth key principle is met.

The fifth principle of risk-informed decision-making requires that the impact of the proposed change be monitored by using performance measurement strategies. As described in Reference 3, and approved by the NRC staff in Reference 4, the RI-ISI program is a living program that requires periodic updating and that, as a minimum, risk ranking of piping segments will be reviewed on an ASME period basis. In its submittal, the licensee provided a summary of the changes that have occurred after the original implementation of the RI-ISI program. These include:

- Transition from the 1989 Edition to the 2001 Edition through the 2003 Addenda of ASME Code, Section XI;

- Limited examination coverage which resulted in modifications in some cases to optimize examination code coverage;

- Plant modifications including Extended Power Uprate, Reactor Pressure Vessel Head Spray line deletion, and removal of post accident sampling system (PASS);

- PRA Model Revisions that occurred twice before the changes were incorporated in this update of the RI-ISI Program; and

- Extended Power Uprate license change was issued on May 14, 2008 (TAC No. MD3002) which increases maximum power level by approximately 15% from the previous licensed thermal power of 3,339 megawatts thermal to 3,840 megawatts thermal.

As described in Section 3.2.1 of EPRI TR-112657 (Reference 5), the RI-ISI program scope is determined by the ASME Code inspection program scope. As a result of the above changes, for the third 10-year ISI interval, the number of high risk category weld examinations at HCGS increased from 19 to 23 and the number of medium risk examinations at HGCS decreased from 85 to 84 with the total count of welds to be examined in the third 10-year ISI interval increasing from 104 to 107 welds. The analyses and changes reported by the licensee in its submittal demonstrate that the RI-ISI program is a living program that is being periodically updated and therefore the NRC staff concludes that the fifth key principle which provides that risk-informed applications should include performance monitoring and feedback provisions is met.

Based on the above discussion, the NRC staff finds that the five key principles of risk-informed decision-making are ensured by the licensee's proposed third interval RI-ISI program plan and therefore, the proposed program for the third ISI interval is acceptable.

3.1.6 Conclusion for Relief Request HC-I3R-01

Based on the information provided in the licensee's submittals, the NRC staff has determined that the proposed alternative, as described in HC-I3R-01, provides an acceptable level of quality and safety, and, therefore, is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year ISI interval at HCGS.

3.2 Relief Request HC-I3R-02

3.2.1 ASME Code Components Affected

ASME Code Class 1, 2 and 3 snubbers

3.2.2 ASME Code Requirements

The ASME Code, Section XI, Article IWF-5000, provides inservice inspection requirements for snubbers.

Paragraphs IWF-5200(a) and IWF-5300(a) require that snubber preservice and inservice examinations be performed in accordance with OM-4, using the VT-3 visual examination method described in IWA-2213.

Paragraphs IWF-5200(b) and IWF-5300(b) require that snubber preservice and inservice tests be performed in accordance with OM-4.

Paragraphs IWF-5200(c) and IWF-5300(c) require that integral and non-integral attachments for snubbers, including lugs, bolting, pins, and clamps, be examined in accordance with the requirements of Subsection IWF.

3.2.3 Licensee's Proposed Alternative

The licensee proposes to use HCGS TS 3/4.7.5, "Snubbers," to perform visual examinations and functional testing of ASME Code Class 1, 2 and 3 snubbers in lieu of meeting ASME Code, Section XI requirements.

3.2.4 Licensee's Basis for Proposed Alternative

HCGS TS 3/4.7.5, "Snubbers," contains specifically developed and approved visual inspection and functional testing requirements for the snubbers at HCGS. The TS 3/4.7.5 requirements differ from the OM-4 requirements for examination scheduling, re-examinations, and functional testing requirements.

Generic Letter (GL) 90-09, "Alternative Requirements for Snubber Visual Inspection Intervals and Corrective Actions," dated December 11, 1990, was issued to reduce the burden placed on utilities by the previous visual examination schedule requirements. HCGS TS 3/4.7.5 has incorporated these recommendations. The HCGS TSs specifiy three different plans for snubber functional testing:

1. 10% Sample Plan: Functionally test 10% of a type of snubber with an additional 10% tested for each functional testing failure, or

2. 37 Sample Plan: Functionally test a sample size and determine sample acceptance or rejection using TS figure 4.7.5-1, or

3. 55 Sample Plan: Functionally test a representative sample size and determine sample acceptance or rejection using the equation, N = 55 (1+C/2), where "C" is the number of snubbers found that do not meet the functional test acceptance criteria and "N" is the total number of snubbers tested.

OM-4 specifies three functional test plans. This Code was completely revised in the 1988 Addenda to incorporate three snubber functional testing sampling plans, identified as the 10% testing sample plan, the 37 testing sample plan and the 55 testing sample plan. The 10% testing sample plan differs from the TS plan in that it only requires an additional 5% of snubbers to be tested for each functional test failure. The TS plan requires additional 10% snubbers to be tested for each functional test failure. This results in an increase in the overall level of plant quality and safety when using the TSs. In addition, the HCGS TSs contain requirements for snubber service life monitoring including items such as seals, springs, and other critical parts based on test results and failure history.

PSEG requests the use of HCGS TS 3/4.7.5, "Snubbers," for visual inspection, and functional testing requirements. Snubber preservice and inservice visual examinations will be conducted using the VT-3 visual examination method described in IWA-2213 of ASME Section XI.

Repair/replacement activities performed on snubbers shall be in accordance with Article IWA-4000 of ASME Section XI. Snubbers installed, corrected, or modified by repair/replacement activities shall be preservice examined and preservice tested in accordance with the applicable TS requirements prior to return to service.

3.2.5 NRC Staff Evaluation of Relief Request HC-I3R-02

The licensee requested relief from the requirements of the ASME Code, Section XI, paragraphs IWF-5200(a) and (b), and IWF-5300(a) and (b). The licensee proposed that the inservice visual examinations and functional testing of ASME Code Class 1, 2 and 3 snubbers be performed in accordance with the requirements of the HCGS TS 3/4.7.5 in lieu of meeting the requirements in the ASME Code, Section XI, paragraphs IWF-5200(a) and (b), and IWF-5300(a) and (b).

The applicable edition of Section XI of the ASME Code for the HCGS third 10-year ISI interval is the 2001 Edition through 2003 Addenda. The ASME Code, Section XI, paragraphs IWF-5200(a) and (b), and IWF-5300(a) and (b), references OM-4, 1987 Edition with OMa-1988 Addenda.

ASME Code, Section XI, paragraphs IWF-5200(a) and IWF-5300(a) require that snubber preservice and inservice examinations be performed in accordance with OM-4, using the VT-3 visual examination method described in IWA-2213. Paragraphs IWF-5200(b) and IWF-5300(b) require that snubber preservice and inservice tests be performed in accordance with OM-4.

Paragraphs IWF-5200(c) and IWF-5300(c) require that integral and non-integral attachments for snubbers, including lugs, bolting, pins, and clamps, be examined in accordance with Subsection IWF. In a response to an RAI dated June 11, 2008 (Reference 2), the licensee stated that the applicable visual inspection guidelines do not differentiate between integral and non-integral attachments. Visual examination includes verification that attachments to the foundation or supporting structure are secure and a check for any evidence of pipe clamp movement (walking or rotation). The licensee stated that this provides an acceptable level of quality and safety in lieu of the requirements of Subsections IWF-5200(c) and IWF-5300(c).

ASME Section XI, Table IWA-1600-1 states that OM-4 shall be of Edition 1987 with OMa-1988 Addenda. OM-4 specifies the requirements for visual examination (paragraph 2.3) and functional testing (paragraph 3.2). The licensee proposes to use TS 3/4.7.5 for inservice visual examination and functional testing of snubbers. A visual inspection is the observation of the condition of installed snubbers to identify those that are damaged, degraded, or inoperable as caused by physical means, leakage, corrosion, or environmental exposure. To verify that a snubber can operate within specific performance limits, the licensee performs functional testing that typically involves removing the snubber and testing it on a specially designed stand or bench. The performance of visual examinations is a separate process that complements the functional testing program and provides additional confidence in snubber operability.

HCGS TS 3/4-7.5 incorporates GL 90-09, "Alternative Requirements for Snubber Visual Inspection Intervals and Corrective Actions." GL 90-09 acknowledges that the visual inspection schedule (as contained in OM-4) is excessively restrictive and that licensees with large snubber populations have spent a significant amount of resources and have subjected plant personnel to unnecessary radiological exposure to comply with the visual examination requirements. GL 90-09 states that its alternative schedule for visual inspection provides the same confidence level as that provided by OM-4.

TS 3/4.7.5 defines inservice examination requirements: (1) visual examination; (2) visual examination interval frequency; (3) method of visual examination; (4) subsequent examination intervals; and (5) inservice examination failure evaluation. Inservice operability testing requirements are also defined: (1) inservice operability or functional test; (2) initial snubber sample size; (3) additional sampling; (4) failure evaluation; (5) test failure mode groups; and (6) corrective actions for the 10% sample, 37 sample and 55 sample plans that are similar to those provided by OM-4. OM-4 requirements and TS 3/4.7.5 criteria are compared and summarized in the following table and followed by a detailed review:

	Criteria	**ASME/ANSI OM Part 4 -1987 through OMa-1988 Addenda**	**HCGS TS 3/4. 7.5**
Inservice Examination			
1.	Visual Examination	Paragraph 2.3.1.1, Visual Examination, states that snubber visual examinations shall identify impaired functional ability due to physical damage, leakage, corrosion, or degradation.	TS 3/4.7.5, Surveillance Requirements (SR) 4.7.5.c, requires that visual inspections shall verify that: (1) the snubber has no visible indications of damage or impaired operability; (2) attachments to the foundation or supporting structure are secure; and (3) fasteners for the attachment of the snubber to the component and to the snubber anchorage are secure.

	Criteria	ASME/ANSI OM Part 4 -1987 through OMa-1988 Addenda	HCGS TS 3/4. 7.5
2.	Visual Examination Interval Frequency	Paragraph 2.3.2.2 provides visual examination interval frequency.	TS Table 4.7.5-1 provides snubber visual inspection interval frequency. These visual inspection interval frequency requirements are similar to those contained in NRC GL 90-09.
3.	Method of Visual Examination	IWF-5200(a) and IWF-5300(a) require use of the VT-3 visual examination method described in IWA-2213.	The licensee states that snubber preservice and inservice visual examinations will be conducted using the VT-3 visual examination method described in IWA-2213 of ASME, Section XI.
4.	Subsequent Examination Intervals	Paragraph 2.3.2 provides guidance for inservice examination intervals based on the number of unacceptable snubbers discovered.	TS Table 4.7.5-1 provides a snubber visual inspection interval based on the number of unacceptable snubbers discovered. These requirements are similar to those contained in NRC GL 90-09.
5.	Inservice Examination Failure Evaluation	Paragraph 2.3.4 states that snubbers not meeting examination and acceptance criteria shall be evaluated to determine the cause of unacceptability.	SR 4.7.5.c states that snubbers which appear inoperable as a result of visual inspections shall be classified as unacceptable and may be reclassified acceptable for the purpose of establishing the next visual inspection interval, provided that: (1) the cause of the rejection is clearly established and remedied for that particular snubber and for other snubbers, irrespective of type, that may be generically susceptible; or (2) the affected snubber is functionally tested in the as-found condition and determined operable per the acceptance criteria of SR 4.7.5.f.
Inservice Operability Test			
1.	Inservice Operability Test Requirements	Paragraph 3.2.1.1, Operability Test, states that snubber operational readiness tests shall verify activation, release rate, and breakaway force or drag force by	SR 4.7.5.f states that the snubber functional test is to verify: (1) activation (restraining action) is achieved within the specified range in both tension and compression;

	Criteria	ASME/ANSI OM Part 4 -1987 through OMa-1988 Addenda	HCGS TS 3/4. 7.5
		either an in-place or bench test.	(2) bleed rate, or release rate where required, is present in both tension and compression, within the specified range (hydraulic snubbers); (3) the force required to initiate or maintain motion is within the specified range in both directions of travel (mechanical snubbers); and (4) the ability to withstand load without displacement. The licensee states that generally snubbers shall be functionally tested either in-place or in a bench test.
2.	Snubber Sample size	Paragraph 3.2.3 states that each defined test plan group shall use either a 10% sampling plan; a "37 testing sample plan;" or a "55 testing sample plan" during each refueling outage.	SR 4.7.5.e, Functional Tests, states that snubbers shall be functionally tested using the following sample plans: (1) 10% sample testing plan; or (2) 37 testing sample (Figure 4.7.5-1) plan; or (3) 55 testing sample plan. The licensee's 10% testing sample, 37 testing sample, and 55 testing sample plans meet the requirements as specified in OM-4.
3.	Additional Sampling	(a) <u>10% Testing Sample Plan</u>: Paragraph 3.2.3.1(b) states that for any snubber(s) determined to be unacceptable as a result of testing, an additional sample of at least one-half the size of the initial sample lot shall be tested. (b) & (c) <u>37 Testing Sample and 55 Testing Sample Plans</u>: Paragraph 3.2.3.2(b) states that for any snubber(s) determined to be unacceptable as a result of testing, an additional random sample of at least one-half the size of the initial sample lot shall be tested until the total number tested is equal to the initial sample size multiplied by the factor (1+C/2), where C is total number	(a) <u>10% Testing Sample Plan</u>: TS SR 4.7.5.e.1 requires that for each snubber of that type that does not meet the functional test acceptance criteria of SR 4.7.5.f, an additional 10% of that type of snubber shall be tested. (b) <u>37 Testing Sample Plan</u>: The licensee states that SR 4.7.5.e.2 requirements are the same as of the OM-4 Code. (c) <u>55 Testing Sample Plan</u>: The licensee states that SR 4.7.5.e.3 requirements are the same as of the OM-4 Code. (Detailed evaluation is provided later in Item 3, Additional Sampling)

	Criteria	ASME/ANSI OM Part 4 -1987 through OMa-1988 Addenda	HCGS TS 3/4. 7.5
		of snubbers found to be unacceptable. If the 37 plan is selected, initial and any additional testing shall be in accordance with Figure 1 of the OM-4 Code.	
4.	Inservice Operability Failure Evaluation	Paragraph 3.2.4.1 states that snubbers not meeting the operability testing acceptance criteria in paragraph 3.2.1 shall be evaluated to determine the cause of the failure.	SR 4.7.5.g, "Functional Test Failure Analysis," states that an engineering evaluation shall be made of each failure to meet the functional test acceptance criteria to determine the cause of the failure. The results of this evaluation shall be used, if applicable, in selecting snubbers to be tested in an effort to determine the operability of other snubbers, irrespective of type, which may be subject to the same failure mode.
5.	Test Failure Mode Groups	Paragraph 3.2.4.2 states that unacceptable snubber(s) shall be categorized into failure mode group(s). A test failure mode group(s) shall include all unacceptable snubbers that have a given failure mode, and all other snubbers subject to the same failure mode.	SR 4.7.5.g requires an engineering evaluation of each functional test failure to determine the cause of the failure. The licensee states that, if any snubber selected for functional testing either fails to lock up or fails to move (i.e., is frozen-in-place), the cause will be evaluated; and, if caused by a manufactured or design deficiency, all snubbers of the same type subject to the same defect shall be functionally tested. This testing requirement shall be independent of the requirements stated in SR 4.7.5.e. for not meeting the functional test acceptance criteria.
6.	Corrective Actions for 10% Testing Sample Plan or 37 Testing Sample Plan or 55 Testing Plan	Paragraphs 3.2.5.1 and 3.2.5.2 state that unacceptable snubbers shall be repaired, modified, or replaced.	SR 4.7.5.h, states that snubbers which fail the visual inspection or the functional test acceptance criteria shall be repaired or replaced. Replacement snubbers which have repairs which might affect functional test results shall be tested to meet the functional test criteria before installation.

Inservice Examination Requirements

1. Visual Examination

TS 3/4.7.5, SR 4.7.5.c, requires that visual inspections shall verify that: (1) the snubber has no visible indications of damage or impaired operability; (2) attachments to the foundation or supporting structure are secure; and (3) fasteners for the attachment of the snubber to the component and to the snubber anchorage are secure. The visual examination per SR 4.7.5.c verifies visible indication of damage or impaired operability of snubbers as well as its attachments and anchorages. OM-4, paragraph 2.3.1.1, requires snubber visual examinations to identify impaired functional ability due to physical damage, leakage, corrosion, or degradation. TS 3/4.7.5 snubber visual examination requirements are considered to be equivalent to snubber visual examination requirements of OM-4 paragraph 2.3.1.1. Therefore, this alternative provides an acceptable level of quality and safety.

2. Visual Examination Interval Frequency

TS Table 4.7.5-1 provides snubber visual inspection interval frequency requirements which are different than the OM-4 visual inspection interval requirements. Table 4.7.5-1 incorporates the visual inspection interval frequency as specified in GL 90-09, "Alternative Requirements for Snubber Visual Inspection Intervals and Corrective Actions." GL 90-09 acknowledges that the visual inspection interval frequency (as contained in OM-4) is excessively restrictive and that licensees with large snubber populations have spent a significant amount of resources and have subjected plant personnel to unnecessary radiological exposure to comply with the visual examination requirements. GL 90-09 states that its alternative schedule (interval frequency) for visual inspection provides the same confidence level as that provided by OM-4. Therefore, this alternative provides an acceptable level of quality and safety.

3. Method of Visual Examination

IWF-5200(a) and IWF-5300(a) require that inservice examination be performed in accordance with OM-4, using the VT-3 visual examination method described in IWA-2213. IWA-2213 states that VT-3 examinations are conducted to determine the general mechanical and structural condition of components and their supports by verifying parameters such as clearance, settings, and physical displacements; and to detect discontinuities and imperfections, such as loss of integrity at bolts and welded connections, loose or missing parts, debris, corrosion, wear, or erosion. VT-3 includes examinations for conditions that could affect operability or functional adequacy of snubbers and constant load and spring type supports.

TS SR 4.7.5.c requires that visual inspections shall verify that: (1) the snubber has no visible indications of damage or impaired operability; (2) attachments to the foundation or supporting structure are secure; and (3) fasteners for the attachment of the snubber to the component and to the snubber anchorage are secure.

The licensee states that the snubber preservice and inservice visual examination will be conducted using the VT-3 visual examination method described in IWA-2213. Therefore, the scope of HCGS TS visual inspection requirements are equivalent to the OM-4 VT-3 examination requirements. As such, the NRC staff finds the licensee's method of snubber visual inspection provides an acceptable level of quality and safety and is acceptable.

4. Subsequent Examination Intervals

TS Table 4.7.5-1 establishes subsequent snubber visual inspection intervals based on the number of unacceptable snubbers discovered, in lieu of OM-4 paragraph 2.3.2 requirements. These requirements are equivalent to the guidance provided in GL 90-09, which has been approved for use by the NRC. Therefore, the NRC staff finds that the subsequent examination intervals contained in TS Table 4.7.5-1 provide an acceptable level of quality and safety and are acceptable.

5. Inservice Examination Failure Evaluation

OM-4, paragraph 2.3.4.1, requires that snubbers not meeting examination criteria be evaluated to determine the cause of unacceptability. Paragraph 2.3.4.2 states that snubbers found unacceptable may be tested in accordance with the requirements of Paragraph 3.2. TS SR 4.7.5.c states that snubbers which appear inoperable as a result of visual inspections shall be classified as unacceptable and may be reclassified acceptable for the purpose of establishing the next visual inspection interval, provided that: (1) the cause of the rejection is clearly established and remedied for that particular snubber and for other snubbers, irrespective of type, that may be generically susceptible; and/or (2) the affected snubber is functionally tested in the as-found condition and determined operable per the acceptance criteria of SR 4.7.5.f. The licensee program is considered to be equivalent to the requirements of OM-4. Therefore, the NRC staff finds that the TS's inservice examination failure evaluation requirements provide an acceptable level of quality and safety.

<u>Inservice Operability Testing Requirements</u>

1. Inservice Operability Test

TS SR 4.7.5.f states that the snubber functional test is to verify: (1) activation is achieved within the specified range in both tension and compression; (2) bleed rate, or release rate where required, is present in both tension and compression, within the specified range (hydraulic snubbers); (3) the force required to initiate or maintain motion is within the specified range in both directions of travel (mechanical snubbers); and (4) the ability to withstand load without displacement. The licensee states that generally snubbers shall be functionally tested in a bench test. OM-4, paragraph 3.2.1.1, Operability Test, states that snubber operability test shall be performed to verify activation, release rate, and breakaway force or drag force by either an in-place or bench test. The NRC staff finds that the TS requirements are considered to be equivalent to the snubber operability test requirements of OM-4 paragraph 3.2.1.1. Therefore, the TS functional test requirements provide an acceptable level of quality and safety.

2. Snubber Sample Size

TS SR 4.7.5.e, Functional Tests, states that snubbers shall be functionally tested using the following sample plans: (1) <u>10% sample plan</u>: at least 10% of the total population of each type snubber; or (2) <u>37 sample plan</u>: a representative sample of each type of snubber in accordance with Figure 4.7.5-1; or (3) 55 sample plan: a representative sample of 55 snubbers of each type. The sample plan(s) shall be selected for each type prior to the test period and cannot be changed during the test period. OM-4, Section 3.2.3 requires either a 10% testing sampling plan, a "37 testing sample plan," or a "55 testing sample plan." The licensee's 10% testing sample, 37 testing sample (Figure 4.7.5-1), and 55 sample plans are similar to the plans as specified in OM-4. As a result, the number of snubbers tested during outages are considered to be equivalent to the OM-4 requirements. Therefore, the TS requirements for snubber sample size provide an acceptable level of quality and safety.

3. Additional Sampling

(a) For 10% testing sample plan

TS SR 4.7.5.e.1 requires that for each snubber of the type that does not meet the functional test acceptance criteria of SR 4.7.5.f, an additional 10% of that type of snubber shall be functionally tested. OM-4, paragraph 3.2.3.1(b), requires that an additional sample size must be at least one-half the size of the initial sample size of the "defined test plan group" of snubbers. That is, for a 10% sample program, an additional 5% of the same type of snubber in the overall population would need to be tested. Therefore, the TS 3/4.7.5 requirements for 10% additional sampling when using the 10% testing sample plan provide an acceptable level of quality and safety.

(b) For 37 testing sample plan

OM-4, paragraph 3.2.3.2(b) states that for any snubber(s) determined to be unacceptable as a result of testing, an additional random sample of at least one-half the size of initial sample lot shall be tested until the total number tested (N) is equal to the initial sample size multiplied by the factor 1+ C/2, where C is total number of snubbers found to be unacceptable. The testing of additional samples is also required for snubbers determined to be unacceptable in any additional test. For the 37 sample plan, initial and any additional testing shall be in accordance with Figure C1 of the Appendix C of OM-4. The 37 sample plan, has an "accept" and a "reject" line (Figure C1). The "accept" line is governed by an equation, $N = 37(1 + C/2)$, and "reject" line is governed by $N = 37(-1 + C/2)$. Points are plotted only at the end of a sample lot's testing. If the point plotted ever falls above the "reject" line, all snubbers of that group must be tested. The NRC staff finds that the acceptance and rejection criteria of the TS SR 4.7.5.e.2 and Figure 4.7.5-1 are similar to the requirements of OM-4 and provide an acceptable level of quality and safety with respect to additional sampling.

(c) For 55 testing sample plan

OM-4, paragraph 3.2.3.2(b) states that for any snubber(s) determined to be unacceptable as a result of testing, an additional random sample of at least one-half the size of initial sample lot shall be tested until the total number tested (N) is equal to the initial sample size multiplied by the factor 1+ C/2, where C is total number of snubbers found to be unacceptable. The testing of additional samples is also required for snubbers determined to be unacceptable in any additional test. The 55 sample plan only has an "accept" line, which is governed by an equation, $N = 55(1 + C/2)$. Each lot shall be plotted as soon as it is tested. If the point plotted falls on or below the "accept" line, testing of that group may be discontinued. If the point falls above the "accept" line, all snubbers of that group must be tested. The NRC staff finds that the 55 testing sample plan criteria of the TS SR 4.7.5.e.3 are similar to the requirements of OM-4 and provide an acceptable level of quality and safety with respect to additional sampling.

4. Inservice Operability Failure Evaluation

OM-4 paragraph 3.2.4.1 requires that snubbers not meeting the operability testing acceptance criteria in paragraph 3.2.1 shall be evaluated to determine the cause of the failure. The cause of failure evaluation requires a review of information related to other unacceptable snubbers and a determination of whether other snubbers of similar design would require further examination. SR 4.7.5.g, "Functional Test Failure Analysis," states that an engineering evaluation shall be made of each failure to meet the functional test acceptance criteria to determine the cause of the failure. The results of this evaluation shall be used, if applicable, in selecting snubbers to be tested in an effort to determine the operability of other snubbers, irrespective of type, which may be subject to the same failure mode. The NRC staff finds that the TS SR requirements related to inservice operability failure evaluation are equivalent to the OM-4 requirements and, therefore, provide an acceptable level of quality and safety.

5. Test Failure Mode Groups

OM-4 paragraph 3.2.4.2 requires that unacceptable snubber(s) be categorized into failure mode group(s). A test failure mode group shall include all unacceptable snubbers that have a given failure mode, and all other snubbers subject to the same failure mode. SR 4.7.5.g requires an engineering evaluation of each functional test failure to determine the cause of the failure. The licensee states that, if any snubber selected for functional testing either fails to lock-up or fails to move,(i.e., is frozen-in-place), the cause will be evaluated; and, if caused by a manufactured or design deficiency, all snubbers of the same type subject to the same defect shall be functionally tested. This testing requirement shall be independent of the requirements stated in SR 4.7.5.e. for not meeting the functional test acceptance criteria. All snubbers susceptible to the same failure conditions would be identified and evaluated, or replaced, without categorizing a mode group(s). The NRC staff finds that the proposed alternative is equivalent to the OM-4 requirement and, therefore, provides an acceptable level of quality and safety.

6. Inservice Operability Testing Corrective Actions for 10% sample or 37 sample plan

OM-4, paragraphs 3.2.5.1 and 3.2.5.2, require that unacceptable snubbers be adjusted, repaired, modified, or replaced. SR 4.7.5.h states that snubbers which fail the visual inspection or the functional test acceptance criteria shall be repaired or replaced. Replacement snubbers which have repairs which might affect functional test results shall be tested to meet the functional test criteria before installation. The NRC staff finds that the TS SR corrective actions associated with unacceptable snubbers at HCGS are equivalent to the OM-4 requirements and, therefore, provide an acceptable level of quality and safety.

3.2.6 Conclusion for Relief Request HC-I3R-02

Based on the above discussion, the NRC staff finds that snubber inservice visual examinations and functional testing, conducted in accordance with TS 3/4.7.5, provide reasonable assurance of snubber operability and provide a level of quality and safety equivalent to that of the ASME

Code, Section XI, Subarticles IWF-5200(a) and (b), and IWF-5300(a) and (b). As such, the staff concludes that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed alternative is authorized for the third 10-year ISI interval at HCGS.

3.3 Relief Request HC-I3R-03

3.3.1 ASME Code Components Affected

Class 2 Reactor Vessel Head Flange Seal Leak Detection System

3.3.2 ASME Code Requirements

The 2001 Edition of ASME Code, Section XI, Table IWC-2500-1, Examination Category C-H, Item Number C7.10 requires a system leakage test (IWC-5221) conducted at the system pressure obtained while the system, or portion of the system, is in service performing its normal operating function or at the system pressure developed during a test conducted to verify system operability (e.g., to demonstrate system safety function or satisfy TS surveillance requirements).

3.3.3 Licensee's Request for Relief and Proposed Alternative

Relief is requested from performing the system leakage test at a pressure corresponding to nominal operating pressure during system operation. As an alternative, a VT-2 visual examination will be performed on the Class 2 portion of the reactor vessel head flange seal leak detection line when the reactor pressure vessel head is off and the head cavity is flooded above the vessel flange (i.e., during a refueling outage). The licensee stated that the hydrostatic head developed with the leak detection line filled with water will allow for the detection of any gross indications in the line. This examination will be performed with the frequency specified by Table IWC-2500-1 for an IWC-5220 test (once each inspection period).

3.3.4 Licensee's Basis for Relief Request

The licensee provided the following basis for the relief request in its letter dated December 12, 2007:

> Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested on the basis that pressure testing the RPV Flange Leak Detection Line is deemed impractical. The Reactor Vessel Head Flange Leak Detection Line is separated from the reactor pressure boundary by one passive membrane, a silver-plated O-ring located on the vessel flange. A second O-ring is located on the opposite side of the tap in the vessel flange (See Figure HC-13R-03.1). This line is required during plant operation and will indicate failure of the inner flange seal O-ring. Failure of the O-ring would result in a High Pressure Alarm in the Main Control Room.
>
> The configuration of this system precludes manual testing while the vessel head is removed. As figure HC-13R-03.1 portrays, the configuration of the vessel tap, combined with the small size of the tap and the high test pressure requirement (approximately 1005 psig), prevents the tap from being temporarily plugged.

Also, when the vessel head is installed, an adequate pressure test cannot be performed due to the fact that the inner O-ring is designed to withstand pressure in one direction only. Due to the groove that the O-ring sits in and the pin/wire clip assembly (See Figure HC-13R-03.2), pressurization in the opposite direction into the recessed cavity and retainer clips would likely damage the O-ring.

Pressure testing of this line during the Class 2 System Leakage Test is precluded because the line will only be pressurized in the event of a failure of the inner O-ring. Purposely failing the inner O-ring to perform the Code required test would require purchasing a new set of O-rings, additional time and radiation exposure to detension the reactor vessel head, install the new O-rings, and then reset and retension the reactor vessel head. Based on the above, Hope Creek Generating Station requests relief from the ASME Section XI requirements for system leakage testing of the Reactor Vessel Head Flange Seal Leak Detection System.

3.3.5 NRC Staff Evaluation of Relief Request HC-I3R-03

The ASME Code, Section XI, requires that all Class 2 components undergo a system leakage test once each inspection period (40 months). In relief request HC-I3R-03, the licensee requested relief from performing a system leakage test of the reactor vessel head flange seal leak detection line at the Code-required test pressure corresponding to the nominal operating pressure during system operation. The line is located between the inner and the outer O-ring seals of the vessel flange and is required during plant operation in order to detect failure of the inner flange seal O-ring. The design of this line makes the Code-required system leakage test impractical either with the vessel head in place or removed. The piping cannot be filled completely with water since it cannot be vented to remove entrapped air from the line either with the vessel head in place or removed due to its configuration. If a pressure test were to be performed with the head in place, the space between the inner and the outer O-ring seals would be pressurized. The test pressure would exert a net inward force on the inner O-ring that would tend to push it into the recessed cavities that house the retainer with the possibility of damaging the inner O-ring seal. The configuration of this piping also precludes system pressure testing while the vessel head is removed because the odd configuration of the vessel tap coupled with the high test pressure requirement prevents the tap in the flange from being temporarily plugged or connected to other piping. The opening in the flange is smooth walled, making the effectiveness of a temporary seal very limited. Failure of this seal could possibly cause ejection of the device used for plugging or connecting to the vessel.

To perform the system leakage test in accordance with the Code requirements, the reactor vessel head flange seal leak detection piping would have to be redesigned, fabricated, and installed. This would impose severe burden on the licensee. The licensee has proposed to perform a VT-2 visual examination of the reactor vessel head flange seal leak detection piping when the reactor cavity is flooded with water during a refueling outage. The NRC staff believes that the hydrostatic head developed due to the water above the vessel flange during flood-up will allow for the detection of any gross inservice flaws if present in the subject piping and the proposed testing would provide reasonable assurance of structural integrity. Therefore, the staff finds that the proposed testing is acceptable.

3.3.6 Conclusion for Relief Request HC-I3R-03

Based on NRC staff's evaluation of the information provided by the licensee, the staff finds that a system leakage test of the reactor vessel head flange seal leak detection line at the Code-required test pressure corresponding to the nominal operating pressure during system operation is impractical and would cause severe burden on the licensee if the requirement is imposed. The licensee's proposed alternative provides reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), the licensee's proposed alternative is authorized for the third 10-year ISI interval at HCGS. The relief granted is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

4.0 CONCLUSION

The following summarizes the NRC staff conclusions based on the technical evaluation discussed above in SE Section 3.1 through 3.3.

With respect to relief requests H-I3R-01 and H-I3R-02, the proposed alternatives will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternatives are authorized for the third 10-year ISI interval at HCGS.

With respect to relief request H-I3R-03, compliance with the specified Code requirements is impractical. The proposed alternative provides reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the third 10-year ISI interval at HCGS. Granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

5.0 REFERENCES

1. Letter from Jeffrie Keenan (PSEG) to NRC dated December 12, 2007, "Submittal of Relief Requests Associated with the Third Inservice Inspection (ISI) Interval" (ADAMS Accession No. ML073531254).

2. Letter from Christine T. Neely (PSEG) to NRC dated June 11, 2008, "Response to Request for Additional Information Related To Relief Requests HC-I3R-01 and HC-I3R-02 (TAC Nos. MD7503 and MD7504)" (ADAMS Accession No. ML081700233).

3. Letter from David F. Garchow (PSEG) to NRC dated March 1, 2004, "Request For Authorization To Use A Risk-Informed Inservice Inspection Alternative To The ASME Boiler And Pressure Vessel Code Section XI Requirements For Class 1 And 2 Piping" (ADAMS Accession No. ML040710308).

4. Letter from Darrell J. Roberts (NRC) to A. Christopher Bakken, III (PSEG) dated December 8, 2004, "Hope Creek Generating Station - Implementation of a Risk-Informed Inservice Inspection Program (TAC No. MC2221)" (ADAMS Accession No. ML043080161).

5. Electric Power Research Institute (EPRI) Topical Report (TR) 112657 Rev. B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," December 1999 (ADAMS Accession No. ML013470102).

6. ASME Code Case N-578-1, "Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method B."

7. Letter from W. H. Bateman (NRC) to G. L. Vine (EPRI) dated October 28, 1999, "Safety Evaluation Report Related to EPRI Risk-Informed Inservice Inspection Evaluation Procedure (EPRI TR-112657, Revision B, July 1999)" (ADAMS Accession No. ML993190477).

8. NRC Regulatory Guide 1.178, "An Approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping," Revision 1, September 2003 (ADAMS Accession No. ML032510128).

9. NRC NUREG-0800, Chapter 3.9.8, "Standard Review Plan for the Review of Risk-Informed Inservice Inspection of Piping," September 2003 (ADAMS Accession No. ML032510135).

10. Letter from Richard B. Ennis (NRC) to William Levis (PSEG) dated May 7, 2008, "Request for Additional Information Related to Relief Requests HC-I3R-01 and HC-I3R-02 (TAC NOS. MD7503 and MD7504)" (ADAMS Accession No. ML081130350).

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Date: October 16, 2008

If you have any questions concerning this matter, please contact the HCGS Project Manager, Mr. Richard Ennis, at (301) 415-1420.

Sincerely,

/ra/

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

Docket No. 50-354

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