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

July 14, 2009

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

SUBJECT: HOPE CREEK GENERATING STATION - SAFETY EVALUATION OF RELIEF REQUEST FOR THE THIRD 10-YEAR INTERVAL OF THE INSERVICE INSPECTION PROGRAM (TAC NO. MD9336)

Dear Mr. Joyce:

By letter dated July 30, 2008, as supplemented by letters dated January 30, June 11, and June 25, 2009, PSEG Nuclear LLC (PSEG or the licensee) submitted relief request HC-I3R-04 which proposed an alternative to certain requirements specified in the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) for the third 10-year inservice inspection (ISI) interval at Hope Creek Generating Station (HCGS). Specifically, PSEG requested use of ASME OM Code Case OMN-15, "Requirements for Extending the Snubber Operational Readiness Testing Interval at LWR [Light Water Reactor] Power Plants."

The Nuclear Regulatory Commission staff has completed its review of the subject relief request as documented in the enclosed Safety Evaluation (SE). Our SE concludes that the proposed alternative 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 alternative (with the limitations and conditions specified in Section 3.1.5.4 of the enclosed SE) is authorized for the third 10-year ISI interval at HCGS.

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 REQUEST 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 July 30, 2008, as supplemented by letters dated January 30, June 11, and June 25, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML082200316, ML090490674, ML091740138, and ML091940397 respectively), PSEG Nuclear LLC (PSEG or the licensee) submitted relief request HC-I3R-04 which proposed an alternative to certain requirements specified in the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) for the third 10-year inservice inspection (ISI) interval at Hope Creek Generating Station (HCGS). Specifically, PSEG requested use of ASME OM Code Case OMN-15, "Requirements for Extending the Snubber Operational Readiness Testing Interval at LWR [Light Water Reactor] Power Plants." The third 10-year ISI interval at HCGS began on December 13, 2007, and will conclude on December 12, 2017.

The July 30, 2008, letter included a related amendment request associated with the Technical Specification (TS) requirements for snubbers. The Nuclear Regulatory Commission (NRC) has reviewed the amendment request separately from the relief request (reference ADAMS Accession No. ML091600683).

On December 12, 2007 (ADAMS Accession No. ML073531254), the licensee submitted relief request HC-I3R-02 which proposed an alternative to certain requirements of Article IWF-5000 of Section XI of the ASME *Boiler and Pressure Vessel* Code (Code). The licensee proposed 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 the ASME Code, Section XI requirements. By letter dated October 16, 2008 (ADAMS Accession No. ML082470063), the NRC staff authorized relief request HC-I3R-02 for the third ISI interval at HCGS. The licensee's letter dated July 30, 2008, stated that PSEG will no longer use relief request HC-I3R-02 upon implementation of relief request HC-I3R-04 and the associated license amendment.

2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 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 NRC pursuant to 10 CFR 50.55a(g)(6)(i), or specific alternatives have been authorized by the NRC pursuant to 10 CFR 50.55a(a)(3)(i) or 10 CFR 50.55a(a)(3)(ii). 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, 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.

The applicable edition of the ASME OM Code for the HCGS third 10-year ISI interval is the 2001 Edition up to and including the 2003 Addenda.

3.0 TECHNICAL EVALUATION

3.1 Relief Request HC-I3R-04

3.1.1 Component for Which Relief is Requested

All HCGS safety-related ASME Code Class 1, 2 and 3 snubbers.

3.1.2 Code Requirements

The ASME OM Code, Subsection ISTD, "Preservice and Inservice Examination and Testing of Snubbers in Light-Water Reactor Nuclear Power Plants," provides requirements for preservice and inservice examination and testing of snubbers.

The regulation at 10 CFR 50.55a(b)(3)(v) allows the optional use of Subsection ISTD of the ASME OM Code, 1995 Edition through the latest edition and addenda incorporated by reference in 10 CFR 50.55a(b)(3), in lieu of ASME Section XI, Articles IWF-5200(a) and (b) and IWF-5300(a) and (b) by making appropriate changes to the TSs or licensee-controlled documents. The regulation at 10 CFR 50.55a(b)(3)(v) also states, "Preservice and inservice examination must be performed using the VT-3 visual examination method described in IWA-2213."

Paragraph ISTD-5200 specifies requirements related to the inservice operational readiness testing of snubbers during each fuel cycle. Paragraph ISTD-5240 requires that functional testing of snubbers shall be performed every fuel cycle.

3.1.3 Licensee's Proposed Alternative

The licensee proposes to use Code Case OMN-15 for functional testing of ASME Code Class 1, 2 and 3 snubbers in lieu of the requirements in ISTD-5200 and ISTD-5240. Code Case OMN-15 was published in the 2004 Edition of the ASME OM Code and revised in the 2006 Addenda (OMb-2006). Use of Code Case OMN-15 would allow the licensee to extend the test interval beyond the one fuel cycle test interval specified in Subsection ISTD of the ASME OM Code.

The revised Code Case OMN-15 published in ASME OMb-2006 will be used at HCGS and all references to OMN-15 in this Safety Evaluation pertain to the OMb-2006 version.

Currently, the Code Case OMN-15 is not endorsed by NRC in Regulatory Guide (RG) 1.192, "OM Code Case Acceptability, ASME OM Code," therefore, all the requirements of Code Case OMN-15 are proposed as an alternative under relief request HC-I3R-04.

The licensee also proposed the following:

1) ASME OM Code, Subsection ISTD, will be used in lieu of the ASME Section XI, IWF-5000 requirements.

2) Snubber preservice and inservice visual examinations will be conducted using the VT-3 visual examination method described in IWA-2213 of Section XI of the ASME Code.

3) Integral and non-integral attachments for snubbers (including lugs, bolting, pins and clamps), will be visually examined in accordance with Subsection IWF of Section XI of the ASME Code.

4) Repair/replacement activities performed on snubbers will be in accordance with Article IWA-4000 of Section XI of the ASME Code.

3.1.4 Licensee's Basis for Proposed Alternative

The licensee's letter dated July 30, 2008, provided the following basis for use of the proposed alternative:

> ASME OMN-15 Code Case describes a method to extend the testing interval for snubbers. Code Case OMN-15 has not yet been addressed by the NRC under RG 1.192, or [RG 1.193, "ASME Code Cases Not Approved for Use"]. However, based on the demonstrated reliability of the HCGS snubbers, the requirements in Code Case OMN-15 provide the same confidence level or better than those resulting from the use of ISTD-5200 and ISTD-5240.

HCGS recognized snubber performance as an area for improvement in 1987. Improved performance would result in fewer tests, thereby reducing maintenance costs and radiological exposure to plant personnel. After substantial research, the Lisega snubber was chosen to replace all of the PSA mechanical snubbers as well as E-Systems hydraulic snubbers installed at the HCGS. Snubber replacements were completed in 1997. After four subsequent operating cycles without a test failure, it was determined to pursue an extended test interval based upon improved snubber performance. As a result of initial discussions with NRC staff, PSEG supported the development of an ASME Code Case that would provide an industry consensus document and a method to accomplish this.

Since the installation of the improved snubbers at HCGS, after seven operating cycles there have been only two test failures in 345 tests, compared to the seven previous operating cycles in which there were 103 test failures including 38 test failures in RF01 [refueling outage 1]. This demonstrates the significant improvement in snubber performance at HCGS.

With regard to the implementation of the OMN-15 Code Case, [the] HCGS snubber population includes more than 370 snubbers, therefore the test plan specified in OMN-15 for this size population is Test Plan 1. Under the OMN-15 Code Case, Test Plan 1, the initial test sample for the HCGS population will be 52 rather than the 37 sample under the previous plan. Testing an initial sample of 52 snubbers meets the statistical basis for the OMN-15 Code Case which demonstrates a higher minimum operational readiness level than the existing ISTD Code. With the HCGS test population of 630 snubbers, there would have to be an uncharacteristically large number of snubber test failures to fall below the 95/90 confidence level presently required by the 37 plan specified in Subsection ISTD. Based upon site specific testing experience at HCGS since the installation of the replacement snubbers, this is highly unlikely to occur, and would be a significant departure from the HCGS experience over the past seven operating cycles where there have been only 2 failures in 345 tests.

With regard to implementation of other approved Code cases relating to snubbers, PSEG will not apply the OMN-13 visual examination extended interval Code Case. It is recognized that the combined examination, testing and service life monitoring requirements defined in ISTD result in a comprehensive approach toward maintaining snubber health and operational readiness. Visual examinations will be performed in accordance with the requirements of Table ISTD-4252-1 of Subsection ISTD.

The Lisega hydraulic snubbers installed in HCGS are designed to operate with reduced degradation that can cause snubbers to fail. Design features that contribute to their demonstrated high reliability include a sealed and pressurized design to prevent moisture intrusion; the use of corrosion resistant materials; non-metallic guide rings to isolate metal to metal sliding surfaces; and the use of hydraulic fluids qualified for long service life. To date, there have been two Lisega functional test failures in a total 345 tests during the previous seven test

campaigns since 1997. This reveals a test failure rate of below 1% over this entire period.

Snubber visual inspections will continue to be performed in accordance with the requirements of the OM ISTD Code to provide assurance of snubber operational readiness. The interval for visual inspection depends on the number of unacceptable snubbers found in proportion to the size of the population or category for each type of snubber included in the previous inspection. The manufacturer's guidance for service life monitoring [Lisega Inc. letter to Lisega Users Group member plants, dated March 29, 2001], states that the majority of information concerning a Lisega hydraulic snubber's condition and application environment can be obtained by visual examination.

The service life of snubbers will be monitored to ensure that the service life is not exceeded between surveillance inspections. The service life of a snubber is evaluated via manufacturer input and information through consideration of the snubber service conditions and associated installation and maintenance records. The maximum expected service life of critical snubber components is extended or shortened based on monitored test results and failure history. Critical parts are required to be replaced so that the maximum service life will not be exceeded during a period when snubber operational readiness is required. Based on guidance from the manufacturer [Lisega Inc. letter to Lisega Users Group member plants, dated March 29, 2001], PSEG has determined the service life of Lisega hydraulic snubbers installed in HCGS to be 21 years.

Functionally testing a representative sample of these snubbers once per 18 months requires a significant expenditure of resources and subjects plant personnel to radiological exposure while providing a negligible benefit. Extending the interval for functional testing as allowed in Code Case OMN-15 will reduce maintenance costs and occupational radiological exposure while maintaining the required assurance of functional reliability for the hydraulic snubbers.

PSEG's letter dated June 29, 2009, also stated that the licensee plans to continue the current practice of performing visual examinations on the accessible and inaccessible snubbers during alternating refueling outages. Therefore approximately one half of the snubber population will be visually examined each refueling outage.

3.1.5 NRC Staff Evaluation of Relief Request HC-I3R-04

The licensee elected to use Subsection ISTD of the ASME OM Code, 2001 Edition through 2003 Addenda in accordance with 10 CFR 50.55a(b)(3)(v) for the for examination and testing of snubbers at HCGS. The licensee also proposed to use alternatives as specified in Code Case OMN-15 in lieu of the ISTD-5200 and ISTD-5240 requirements for snubber operational readiness testing intervals. Code Case OMN-15 allows extending the snubber test interval beyond one fuel cycle and up to three fuel cycles, based on performance.

3.1.5.1 General Evaluation of the Performance-Based Approach in Code Case OMN-15

Code Case OMN-15 uses a performance-based approach to extend the snubber functional test interval beyond one fuel cycle and up to three fuel cycles. NUREG/BR-0303, "Guidance for Performance-Based Regulation," provides guidelines for performance-based alternatives in regulatory decision-making. The guidelines are set up in three groups which are called the viability guidelines, the assessment guidelines, and guidelines on consistency with regulatory principles. The application of these guidelines to Code Case OMN-15 is discussed below:

Viability Guidelines

These viability guidelines rely on the four attributes of a performance-based approach: (1) measurable or calculated parameters; (2) objective performance criteria; (3) flexibility; and (4) a performance failure not resulting in an immediate safety concern. The use of Code Case OMN-15 conforms to these elements. Snubber functional testing is a measurable activity which is performed to meet the Code-specified test parameters and performance criteria. This activity provides flexibility in selection of tested snubbers as well as the testing plan to meet the established performance criteria of ISTD-5331, ISTD-5431 and Table 1 of Code Case OMN-15, as applicable. The test plan of OMN-15 also meets the guidelines regarding performance failures and immediate safety concerns. A snubber is a device that provides restraint to a component or system during the sudden application of forces, but allows essentially free motion during thermal movement. The function of snubbers, installed in safety-related piping systems, is to ensure that the structural integrity of the piping systems is maintained during and following seismic or other event initiated dynamic loads, while allowing thermal expansion during normal and design load conditions. A snubber performance failure does not result in an immediate safety concern because the probability of a seismic or other dynamic loading event is rare and is unaffected by the proposed increase in inservice testing interval. In addition, corrective action and engineering evaluations are performed for any snubber failures that occur during testing, maintenance, transient dynamic events or are identified through service life monitoring (SLM). Failed snubbers can be replaced without disturbing the piping system in which they are installed. Therefore, the licensee is capable of detecting and correcting performance degradation before an immediate safety concern results.

Assessment Guidelines

The assessment guidelines assess whether a performance-based approach results in a positive contribution to the NRC's performance goals and achieves a net societal benefit. The principal goals are to (1) maintain safety; (2) increase public confidence; (3) increase effectiveness, efficiency and realism of the NRC's activities and decision making; (4) reduce unnecessary regulatory burden, and (5) result in net benefit. It is expected to be relatively rare that all the relevant factors can be of a quantitative nature. It is likely that expert judgment will provide at least part of the basis for an assessment.

Code Case OMN-15 establishes requirements for extending the snubber operational readiness testing interval beyond one fuel cycle and up to three fuel cycles based on performance, without changing the inservice testing requirements as specified in Subsection ISTD of the ASME OM Code. The basis for test interval extension in Code Case OMN-15 relies on an assumed maximum degradation rate over a fuel cycle. The larger initial sample size in Code Case

OMN-15, as compared to the ISTD sampling, establishes a higher initial operability level such that with low degradation rate, it is possible to skip testing during one or more fuel cycles while still maintaining an acceptable level of operability and safety. The combination of these two elements provides confidence in a higher level of operability than that associated with the basic ISTD sampling plan, thereby maintaining adequate safety margin.

Code Case OMN-15 uses a more aggressive sequential sampling plan than ISTD to extend the snubber functional test interval beyond one fuel cycle, which will reduce costs and occupational radiological exposure to plant personnel while maintaining the required assurance of functional reliability for the snubbers and ensuring a higher operability level between test intervals. Therefore, the use of the Code Case is aimed at reducing unnecessary regulatory burden, while maintaining safety and providing net benefit to industry as well as the public due to cost and dose reductions.

Guidelines for Consistency with Regulatory Principles

The guidelines for consistency with regulatory principles are to ensure that a performance-based regulatory alternative that conforms to the viability and assessment guidelines does not compromise any of NRC's basic regulatory principles. Code Case OMN-15 does not compromise any basic regulatory requirements of Subsection ISTD of the ASME OM Code for inservice examination and snubber testing requirements as established by 10 CFR 50.55a. Additionally, OMN-15 was developed as a consensus standard (ASME OM Code document), which is consistent with other similar documents incorporated by reference in the regulations. OMN-15 does not change any method or requirements of snubber inservice functional testing; however, it allows extending the functional test interval of snubber population based on its merits (good past performance and low degradation rate). Costs and personnel radiological exposures are thereby reduced while safety is maintained, eventually reducing unnecessary regulatory burden.

3.1.5.2 HCGS Specifics Related to Implementation of Code Case OMN-15

The following parameters and requirements were provided in the licensee's submittals. Together, with ASME OM Subsection ISTD and Code Case OMN-15, they define the proposed HCGS snubber testing program being evaluated by the NRC staff:

1) The applicable edition of the ASME Code for the HCGS third 10-year ISI interval is the 2001 Edition up to and including the 2003 Addenda. The third 10-year ISI interval began on December 13, 2007, and is scheduled to be completed by December 12, 2017.

2) The licensee intends to use the ASME OM Code, Subsection ISTD, in lieu of the ASME Section XI, IWF-5000 requirements and the previously authorized relief request HC-I3R-02 for the remainder of third 10-year ISI interval. Appropriate changes to the HCGS TSs or licensee-controlled documents are required by 10 CFR 50.55a(b)(3)(v).

3) HCGS will implement SLM as required by ISTD-6000.

4) Table ISTD-4252-1 permits the visual examination to be extended up to two fuel cycles. The licensee plans to continue to perform accessible and inaccessible snubber visual

examinations during alternating refueling outages; therefore approximately one half of the snubber population will be visually examined each refueling outage.

5) The HCGS snubber population is comprised of Lisega series 30 hydraulic snubbers, and the total population of 630 snubbers is considered to be one design test plan group (DTPG) as allowed by ISTD-5250.

6) HCGS is currently using the 37 snubbers sample testing plan based on plant TS Surveillance Requirement (SR) 4.7.5.e.2 (similar to ISTD-5431 requirement).

7) HCGS has already performed functional testing of 55 snubbers during RF15. The licensee states that 55 snubbers include 37 snubbers to satisfy the TS SR 4.7.5.e.2 requirement; 15 additional snubbers in anticipation of satisfying OMN-15, Table 1, Column A requirements; two non-TS snubbers; and a snubber found to have an empty fluid reservoir.

8) The degradation rate of the HCGS snubber population over the last eight fuel cycles (12 years) is less than 1% per cycle.

3.1.5.3 Evaluation of Code Case OMN-15 Application at HCGS

The licensee has elected to use the ASME OM Code, Subsection ISTD, in lieu of the ASME Section XI, IWF-5000 requirements for snubber examination and testing, as allowed by regulation 10 CFR 50.55a(b)(3)(v), for the remainder of the third 10-year ISI and testing interval. In addition to the use of ISTD, the licensee proposed an alternative to extend the snubber functional testing interval beyond the one fuel cycle requirement of ISTD-5200 and ISTD-5240. The proposed alternative to extend the functional test interval is as defined in Code Case OMN-15, as revised and published in the 2006 Addenda of the OM Code. Code Case OMN-15 states that the test interval may be extended beyond one fuel cycle to two or three fuel cycles based on previous satisfactory operational readiness.

The licensee states that the use of extended test intervals would result in significant reductions in cost and radiological exposure to plant personnel, while maintaining the same or better level of confidence in snubber operational readiness as provided by ISTD.

Code Case OMN-15 was developed based on "White Paper - Mathematical Basis for ASME OMN-15 Code Case," prepared for Electric Power Research Institute (EPRI). The OMN-15 "White Paper" basis for test interval extension relies on an assumed maximum degradation rate of 2.5% over a fuel cycle and establishment of confidence in a higher initial quality of snubber population operability level through increased sampling. By establishing a higher initial operability level and a "worst case" degradation rate, it is possible to skip testing during one or more fuel cycles while still maintaining an operability level that is at least as high as that associated with the normal (every fuel cycle) sampling plan required by ISTD.

Section 4, "Specific Requirements" of Code Case OMN-15 requires that for the test campaign immediately preceding an extended test interval, the initial sample size shall be as indicated in Table 1, Column A in lieu of the sample size listed in ISTD-5311, or ISTD-5411 as applicable.

Testing shall satisfy the applicable mathematical expression listed in Table 1, Column B in lieu of the equation listed in ISTD-5331, or ISTD-5431, as applicable.

At HCGS, the initial sample size using the 37 sample plan (ISTD-5400) is 37 snubbers, which is based on a statistical sample plan. The statistical sample plan included in ISTD-5400 for inservice testing of snubbers is a Wald sequential sampling plan. A Wald sequential sampling plan requires testing to continue until an "accept" line is crossed. The "accept" line in Figure ISTD-5431-1 is defined by:

$N > 36.49 + 18.18\ C$

Where, N = total number of snubbers tested that were selected from the DTPG, and

C = total number of unacceptable snubbers found in the DTPG

A test campaign will be concluded when the "accept" line is crossed, establishing a marginal 95% confidence level that 90 - 100% of the snubbers are operationally ready.

The proposed alternative in Code Case OMN-15, Test Plan 1 is also a Wald sequential plan. The "accept" line in Test Plan 1 is defined by:

$N > 51.60 + 21.03C$

The initial sample size for this test plan is 52. A test campaign will be concluded when the "accept" line is crossed establishing a 95% confidence level that 92 - 100% of the snubbers are operationally ready. This is a higher level of operational readiness than that established by Subsection ISTD. Subsection ISTD requires operational readiness testing during each fuel cycle. The proposed alternative (to extend the test interval beyond one fuel cycle) is acceptable based on the higher minimum level of operational readiness established by Code Case OMN-15 Test Plan 1, compared to the level established by ISTD-5400. The NRC staff finds that the operational readiness testing interval may be extended without increasing the likelihood the operability level of the snubber population will fall below the 95/90 confidence (i.e., 95% confidence level that at least 90% of the snubbers are operationally ready) produced by the existing ISTD Code, as long as the degradation rate remains sufficiently low.

Although the "White Paper" for Code Case OMN-15 assumes a fixed degradation rate, it will not be equal or consistent for all snubbers in the industry. The degradation rate of various installed snubbers will be different due to differences in design, type (mechanical or hydraulic), size, age, location, operating environment (harsh or mild), and varying treatment under SLM programs.

Although it may be difficult to measure a collective single value of degradation rate which supports the testing interval extension using OMN-15 throughout the industry as a whole, HCGS is in a somewhat unique position to do so in that it has a fairly homogeneous snubber population with uniform service time and a low degradation rate. The licensee states that there are 630 snubbers at HCGS, and during RF07 in the fall of 1997, all the mechanical and hydraulic snubbers previously installed were replaced by Lisega hydraulic snubbers. The licensee states that the snubber population at HCGS is comprised of Lisega series 30 hydraulic snubbers, and the total population is considered to be one DTPG as allowed by ISTD-5250.

Since the replacement of snubbers in December 1997, approximately 2,800 visual examinations in eight fuel cycles have been performed (i.e., about 350 visual examinations per fuel cycle). Only in one instance has degradation (empty reservoir) been observed during visual examinations. The failed snubber was removed and replaced and no significant degradation trend was observed.

During the same period (eight fuel cycles), approximately 400 functional tests have been performed (i.e., about 50 functional tests per fuel cycle). There were two functional test failures, and two instances of degradation (fluid leakage) were observed upon snubber removal for functional testing. The two functional test failures were during RF12 and were determined to have been caused by excessive pipe vibration. No significant degradation trend has been observed. Also, functional test result averages (i.e., lock-up and bleed rate results in compression and in tension) do not show a trend that would indicate significant degradation.

Instances of snubber degradation observed outside of examination and functional testing (e.g., during inspection and maintenance activities) have similarly been rare and have not shown a distinguishable trend. The licensee states that within the predicted service life span for the Lisega snubbers at HCGS, the degradation rate has been very low per fuel cycle (less than 0.5%) since 1997 when the new Lisega hydraulic snubbers were first installed. No increase in snubber degradation rate has been observed during the installed lifetime.

The observed snubber degradation rate at HCGS is low and data collected during last 12 years does not provide any indication of increasing degradation rate. Currently, the 37 snubber sample plan (per HCGS TSs and similar to ISTD-5431) is being used for functional testing of snubbers at HCGS. The 37 sample testing plan is a statistical and performance-based testing program, because no additional testing of snubbers is required if all 37 snubbers meet the functional test criteria. The ASME OM Code, Nonmandatory Appendix-D, Section D-2100, "The 37 Plan," states that "A population quality of ≥ 5% failed snubbers will probably result in extended testing." No test sample expansions were required during seven of the eight fuel cycles since 1997 at HCGS, indicating a high quality snubber population. The observed test failure rate has been approximately 0.5% over the last eight test campaigns, and the observed degradation rate for the Lisega snubber has been less than 0.3% per fuel cycle since their installation. These compare favorably with the failure and degradation rate that form the basis for ISTD and OMN-15 test plans. Thus, the extended test interval of up to three fuel cycles will provide the same confidence level as that provided by ISTD. Therefore, the proposed alternative provides an acceptable level of quality and safety as long as the HCGS snubber degradation rate remains low.

The NRC staff noted that Code Case OMN-15 does not explicitly state that all ISTD requirements, including SLM of ISTD-6000, are required to be implemented. SLM is an important measure to optimize snubber operability and performance through monitoring and reevaluating a snubber's service life due to degradation. The licensee states that all the requirements of ISTD, including ISTD-6000, will be in place before implementing the proposed alternative requirements of Code Case OMN-15. SLM will be performed in accordance with the requirements of ISTD-6000, which includes a requirement to evaluate service life at least once each fuel cycle. Also, the licensee's SLM activities, since Lisega hydraulic snubber installation, have resulted in good snubber performance over the last eight fuel cycles. The staff finds that

the licensee's existing and planned SLM program supports using Code Case OMN-15 to extend the test interval beyond one fuel cycle.

ISTD provides guidance for assigning unacceptable snubbers to a Failure Mode Group (FMG) where they are no longer counted in satisfying the mathematical expression for testing of the DTPG (as defined in ISTD-5331 and ISTD-5431). Conversely, Code Case OMN-15 does not provide any guidance related to assigning unacceptable snubbers found during DTPG testing to a FMG. The NRC staff identified the potential for inappropriately assigning unacceptable snubbers discovered in an OMN-15 test campaign to a FMG, and thereby not counting it for sample size expansion to satisfy the mathematical expression in OMN-15, Table 1, Column B. In its letter dated June 11, 2009, the licensee states that requirements of FMGs as described in ISTD-5240 would not be applied in the HCGS application of Code Case OMN-15. All continued testing will be performed within the respective DTPG. Therefore, NRC staff finds that the licensee would not use FMG for improper assignment of unacceptable snubbers to avoid expanded sampling while using the alternative requirements of Code Case OMN-15 at HCGS.

The Code Case does not address treatment of isolated snubber failures. To avoid improper classification of unacceptable snubbers as "isolated failures," the ISTD Subgroup committee is in the process of the deleting the "isolated failure" category from ISTD. In the mean time, the NRC staff is concerned that misapplication of the term "isolated failure" could lead to some failures not being counted towards sample expansion during test campaigns.

In its letter dated June 11, 2009, the licensee states that the term "isolated failure" can be misapplied and therefore HCGS will not use the classification of "isolated snubbers" to eliminate the requirements for additional testing. Therefore, NRC staff finds that the licensee would not inappropriately use the "isolated failure" category to satisfy the Code Case OMN-15 requirements to extend the test interval beyond one fuel cycle.

Visual examination and functional testing complement one another and provide assurance of the operational readiness of snubbers. Code Case OMN-13 allows extending the visual examination interval up to 10 years. If used simultaneously with OMN-15, the potential exists for multiple fuel cycles to pass with no visual examination or functional tests taking place. Given their complementary roles in assessing snubber population health and operational readiness, simultaneous application of OMN-13 and OMN-15 would need to be evaluated.

In its letter dated June 25, 2009, the licensee stated that use of the ASME OM Code, Table ISTD-4252-1, allows extending the visual examination interval up to two fuel cycles; however, HCGS would continue to perform visual examination of approximately half the snubber population during each fuel cycle. Additionally, the licensee stated that it would not apply the OMN-13 visual examination extended interval simultaneously with the proposed OMN-15 functional testing intervals. Therefore, the NRC staff finds that there is no need to evaluate simultaneous application of both code cases at HCGS.

The Code Case does not address how unacceptable snubbers are accounted for during the extended test interval. For example, unacceptable snubbers could be identified during maintenance, SLM, and visual examination activities conducted during the extended test interval. A statistical sampling or Wald Sequential snubber testing campaign has a beginning and an end during a particular fuel cycle and provides a snap shot of the condition of the

snubber population during that fuel cycle. This snap shot can be used to assess the operational readiness of the snubber population until the next test campaign. Code Case OMN-15, however, does not provide any explicit means to continually assess operational readiness of snubbers during the extended test interval (i.e., using data from sources outside the OMN-15 test plan).

In its letter dated June 11, 2009, the licensee states that while using OMN-15 to extend the test interval, all other requirements of ISTD concerning failure evaluations would still apply. All examination and test failures would be evaluated in accordance with ISTD-1800 and ISTD-4270 or ISTD-5271, and corrective action would be implemented as required by ISTD-4280 and ISTD-5280. Furthermore, the licensee states that, if failures were revealed during an extended test interval (e.g., as a result of plant walkdowns, or system maintenance), the condition would be documented and corrective action would be initiated to resolve the problem, including an evaluation of the extent of condition, commensurate with the significance of the issue. The extent of condition evaluation, including consideration of the potential for common mode failure, is required by plant procedures in accordance with the plant corrective action program for significant safety related deficiencies. If this were determined to represent some systemic issue, the engineering evaluation of the equipment failure would require further action as a plant health or safety issue.

The licensee also states that during the extended test interval, snubber service life is required to be evaluated at least once each fuel cycle, and increased or decreased, if warranted, in accordance with ISTD-6200. Snubber examination results and maintenance history are among the considerations included in the evaluation of service life during the extended test interval.

If a transient dynamic event occurs during the extended test interval that may affect snubber operability, affected snubbers and systems are required to be reviewed and appropriate corrective action is required to be taken in accordance with ISTD-1750.

For snubbers placed in the same location as snubbers that failed the previous inservice operational readiness test, retests will be performed in accordance with ISTD-5500 (i.e., at the time of next scheduled operational readiness testing unless the cause of the failure is clearly established and corrected). In addition, PSEG will visually examine replacement snubbers in accordance with ISTD-4230 during each fuel cycle in the extended test interval.

HCGS will perform visual examinations of the entire snubber population in accordance with the requirements of ISTD-4200 and implement a SLM program in accordance with ISTD-6000. Based on the snubber performance observed during the previous eight fuel cycles, the SLM and visual examination measures are considered to be sufficient to maintain snubber operational readiness and integrity when the extended interval is more than one fuel cycle.

Based on the information provided, the NRC staff concludes that the licensee would use various appropriate corrective actions to evaluate and correct the unacceptable snubbers (as defined in ISTD) found while performing various activities such as maintenance, SLM, and visual examination conducted during the extended test interval.

In addition to the alternative use of Code Case OMN-15, requirements, the licensee states that (1) snubber preservice and inservice visual examinations will be conducted using the VT-3 visual

examination method described in IWA-2213 of ASME Code, Section XI, (2) integral and non-integral attachments for snubbers, including lugs, bolting, pins and clamps, shall be visually examined in accordance with ASME Code, Section XI, Article IWF, and (3) repair/replacement activities performed on snubbers shall be in accordance with Article IWA-4000 of the ASME Code, Section XI. These measures will also contribute to providing assurance of snubber operational readiness while using Code Case OMN-15.

3.1.5.4 Limitations and Conditions on Application of Code Case OMN-15 at HCGS

Based on the above discussions, the NRC staff concludes that extending the snubber operational readiness testing interval in accordance with the requirements and guidelines of Code Case OMN-15, in lieu of meeting the requirements of ISTD-5200 and ISTD-5240, provides reasonable assurance of snubber operational readiness with the following limitations and conditions, consistent with the licensee's submittals for the proposed alternative:

1) This alternative is authorized for the remainder of the third 10-year ISI interval at HCGS. The authorized alternative cannot be continued to be used during the fourth 10-year ISI interval at HCGS without NRC's review, unless OMN-15 is subsequently endorsed in RG 1.192 and incorporated by reference in the regulations.

2) Snubber preservice and inservice visual examinations will be conducted using the VT-3 visual examination method described in IWA-2213.

3) This alternative cannot be used at HCGS unless until all ISTD requirements, including SLM (ISTD-6000), are completely implemented. The HCGS TSs or licensee-controlled documents must be updated to reflect the use of ISTD in accordance with 10 CFR 50.55a(b)(3)(v).

4) Code Case OMN-13 to extend the snubber visual examination interval cannot be implemented while using Code Case OMN-15.

5) The DTPG cannot be changed after implementing a Code Case OMN-15 test campaign in order to gain any benefit from not expanding snubber testing by instead switching a failed snubber between DTPGs.

6) FMG and "isolated snubber" categories as defined in ISTD shall not be used for snubber failures when implementing Code Case OMN-15 test campaigns.

7) Snubber service life and degradation rate must be reevaluated every fuel cycle, while using Code Case OMN-15 at HCGS. The use of the authorized alternative (Code Case OMN-15) shall be discontinued if the snubber degradation rate exceeds 2.5% per fuel cycle (as described in the OMN-15 basis "White Paper") at HCGS.

Subject to the above limitations and conditions, the NRC staff finds that the proposed alternative provides an acceptable level of quality and safety with respect to extending the HCGS snubber inservice functional testing interval beyond one fuel cycle and up to three fuel cycles.

4.0 CONCLUSION

Based on above evaluation, the NRC staff concludes that the proposed alternative to use Code Case OMN-15 (as published in ASME OMb-2006) to extend the snubber inservice functional testing interval beyond one fuel cycle and up to three fuel cycles provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed alternative, with the limitations and conditions specified above in Section 3.1.5.4, is authorized for the remainder of HCGS third 10-year ISI and testing interval.

The authorization of this relief request to use Code Case OMN-15 is plant specific for HCGS, and does not approve or endorse the use of the Code Case OMN-15 for any other plant unless Code Case OMN-15 is later endorsed by the NRC for general use or an alternative is authorized by the NRC.

Principal Contributor: G. Bedi

Date: July 14, 2009

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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