

RAS-H-30

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
E. Roy Hawkens, Chair
Dr. Paul B. Abramson
Dr. Anthony J. Baratta

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OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

In the Matter of:

AmerGen Energy Company, LLC

(License Renewal for Oyster Creek Nuclear
Generating Station)

May 27, 2008

Docket No. 50-219

AMERGEN'S RESPONSE TO MAY 21 BOARD ORDER

In a May 21, 2008 Order,¹ the Board directed each of the parties to submit an expert affidavit "that discusses with particularity the significance of the AmerGen Response attached to [AmerGen's] May 5 letter" to the Commission, "accompanied by a pleading that explains the impact (if any) of that Response on the proper disposition of Citizens' motion to reopen the record and add a new contention."² In response to that Order, AmerGen Energy Company, LLC ("AmerGen") files this Response along with the attached Affidavit of Gary L. Stevens.

As demonstrated below, AmerGen's response attached to the May 5 letter confirms:

(1) that the Board should not reopen the record under 10 C.F.R. § 2.326 to entertain Citizens' egregiously late contention because the issue Citizens raise lacks safety significance, a materially different result in this licensing proceeding is not likely, and under 10 C.F.R. § 2.309(c), Citizens

¹ Order (Directing Parties to Submit Explanatory Pleadings and Affidavits) (May 21, 2008) (unpublished) ("Order").

² Order at 2, referring to the "Motion by Nuclear Information and Resource Service; Jersey Shore Nuclear Watch, Inc.; Grandmothers, Mothers and More for Energy Safety; New Jersey Public Interest Research Group; New Jersey Sierra Club; and New Jersey Environmental Federation to Reopen the Record and for Leave to File a New Contention, and Petition to Add a New Contention" (Apr. 18, 2008) ("Motion").

TEMPLATE = SECY-035

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will not contribute to the development of a sound record; and (2) that Citizens' proposed contention fails to raise a genuine dispute as required under 10 C.F.R. § 2.309(f)(1)(vi), and is therefore inadmissible.

I. BACKGROUND

On April 3, 2008 the NRC Staff notified the Commission that it was "reviewing the use of a simplified method to calculate cumulative usage factors (CUF) that may not be conservative."³ The Staff focused its review on one type of component at Oyster Creek; namely, recirculation outlet nozzles.⁴ The Staff provided this information to the Commission, not because it raised a significant safety issue, but "because this may be an issue of public interest."⁵ In fact, the Staff stated "that the safety significance of using the simplified analysis method is low based on the risk assessments performed by the staff in resolving generic safety issues (GSI)-166 and GSI-190."⁶ The April 3 Commission Notification concluded by stating that "[t]he staff plans to ask Oyster Creek to perform a confirmatory analysis consistent with the methodology in Section III of the ASME Code."

Citizens viewed the April 3 Commission Notification as a reason to request that the Commission reopen the record and admit a new contention requesting that AmerGen be required

³ Board Notification 2008-01, Notification of Information in the Matter of Oyster Creek Nuclear Generating Station License Renewal Application (Apr. 3, 2008), available at ADAMS Accession No. ML080940688 ("Commission Notification").

⁴ *Id.* This is because AmerGen only applied the method questioned by the NRC Staff on the recirculation outlet nozzle.

⁵ *Id.*

⁶ *Id.* In a subsequent Draft Regulatory Issue Summary ("RIS"), the Staff explained that this was a generic issue that applied throughout the industry and that the simplified methodology "could be nonconservative if not correctly applied." Regulatory Issue Summary, "Fatigue Analysis of Nuclear Power Plant Components" at 1 (Apr. 11, 2008), originally available at ADAMS Accession No. ML0809502350. This RIS was later published in the Federal Register in an unnumbered format (*i.e.*, RIS 2008-XX), which is the format used in the attached Stevens Affidavit. See 73 *Fed. Reg.* 24094 (May 1, 2008).

to perform a confirmatory analysis for the recirculation outlet nozzles at Oyster Creek.⁷

AmerGen and the Staff opposed the Motion for its failure to meet the stringent requirements for a motion to reopen the record, or the timeliness requirements for a late-filed contention, or the substantive requirements for contention admissibility.⁸ In its Answer, AmerGen stated that it was performing a confirmatory analysis of the recirculation outlet nozzle.⁹ But AmerGen could not provide results because the analysis was not final.

AmerGen completed the confirmatory analysis for the recirculation outlet nozzle, and provided the results as a response to a Staff Request for Additional Information,¹⁰ which it docketed on Thursday, May 1, 2008 ("RAI Response").¹¹ Counsel for AmerGen submitted that RAI Response to the Commission and the parties on Monday, May 5, 2008.¹²

The intent of AmerGen's Commission Notification was to close the loop created by the Staff's Commission Notification by communicating to the Commission and the general public that the confirmatory analysis that the Staff had requested was complete, and that the result of

⁷ See Motion at 12. Citizens also requested that similar confirmatory analyses be carried out for any other component that relied upon the potentially non-conservative analysis method, and the metal fatigue monitoring program for Oyster Creek be revised to eliminate reliance on the potentially non-conservative analysis method. However, in their Reply, they withdrew these other issues from litigation. "Reply by Nuclear Information and Resource Service; Jersey Shore Nuclear Watch, Inc.; Grandmothers, Mothers and More for Energy Safety; New Jersey Public Interest Research Group; New Jersey Sierra Club; and New Jersey Environmental Federation to AmerGen's Opposition to Their Petition to Add a New Contention" at 3 (May 5, 2008) ("Reply").

⁸ "AmerGen's Answer Opposing Citizens' Motion to Reopen Record and Petition to Add a New Contention" (Apr. 28, 2008) ("Answer"); NRC Staff's Response in Opposition to Citizens' Motion to Reopen the Record and for Leave to File and Add a New Contention" (Apr. 28, 2008) ("Staff Answer").

⁹ See Answer at 23.

¹⁰ Request for Additional Information Related to Oyster Creek Generating Station License Renewal Application (Apr. 29, 2008) available at ADAMS Accession No. ML0810800770. AmerGen obviously did not wait for the Staff to issue a Request for Additional Information to begin its confirmatory analysis.

¹¹ Letter from M. Gallagher to NRC Document Control Desk, "Response to NRC Request for Additional Information on Metal Fatigue Analysis Related to Oyster Creek Nuclear Generating Station License Renewal Application (TAC No. MC7624)" (May 1, 2008) available at ADAMS Accession No. ML081270386 ("RAI Response").

¹² Letter from A. Polonsky to Chairman D. Klein, "In the Matter of AmerGen Energy Company, LLC (License Renewal for Oyster Creek Nuclear Generating Station) Docket No. 50-219-LR" (May 5, 2008).

that analysis confirmed that the recirculation outlet nozzle at Oyster Creek would perform within ASME Code allowables. It also closed the loop in AmerGen's Answer, which stated that the analysis was being performed, but which could not provide the results of the analysis because they were not yet final.

The Secretary referred adjudication of the Motion to the Board,¹³ and on May 21, the Board issued its Order requesting this response.

II. ARGUMENT

Citizens must satisfy *all* of the requirements in: (1) 10 C.F.R. § 2.326 to reopen the record; (2) 10 C.F.R. § 2.309(c) for nontimely filings; and (3) 10 C.F.R. § 2.309(f)(1) and (2) for contention admissibility. The RAI Response affects the Board's analysis of Citizens' Motion to Reopen and Petition to have admitted a late-filed contention under §§ 2.326, 2.309(c), and 2.309(f)(1).

A. **AmerGen's Response Confirms That The Board Should Not Reopen The Record Or Entertain A Late-Filed Contention on Metal Fatigue**

The RAI Response affects the Board's analysis of Citizens' Motion to Reopen under 10 C.F.R. § 2.326(a)(1) (authorizing a Board to consider an exceptionally grave issue even if it is untimely); § 2.326(a)(2) (that the motion must address a significant safety issue), and § 2.326(a)(3) (that the motion must demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially).

1. *The RAI Response Confirms that the Record Should Not Be Reopened*

The RAI Response demonstrates that there is no justification to reopen the record, because it confirms the lack of safety significance of the issue Citizens raise and because it provides additional evidence showing that a materially different outcome is unlikely.

¹³ Order (May 9, 2008) (unpublished).

As to the safety significance, the Staff's Commission Notification unambiguously stated that "the staff believes that the safety significance of using the simplified analysis method is low."¹⁴ The RAI Response "confirms that the results of the original analysis are conservative and remain acceptable."¹⁵ Specifically, the confirmatory analysis revealed a cumulative usage factor ("CUF") with environmental effects included of 0.1366, far lower than the previously calculated value of 0.9781 and below the acceptable limit of 1.0 by nearly an order of magnitude.¹⁶ Mr. Stevens explains this further in his attached affidavit.¹⁷ By demonstrating that the simplified fatigue usage calculation method provided conservative and acceptable results for the recirculation outlet nozzle, the RAI Response provides additional evidence of the low safety significance of the issue Citizens raise. Thus, the RAI Response confirms that Citizens' motion to reopen fails to raise a significant safety issue, contrary to 10 C.F.R. § 2.326(a)(2).

Because it fails to raise a significant safety issue, it necessarily follows that it does not present an exceptionally grave issue that justifies waiving the timeliness requirements of 10 C.F.R. § 2.326(a)(1).

The RAI Response also demonstrates that a materially different result is unlikely because both the original and confirmatory analyses determined that the CUF would be less than the ASME Code limit after 60 years of plant operation. As explained in AmerGen's Answer, Citizens have failed to provide any evidence or information to carry their burden of showing that a materially different result is likely.¹⁸ In fact, Citizens relied on their misinterpretation that the Commission Notification identified a significant safety issue for their argument on this

¹⁴ Answer at 15 (*quoting* Commission Notification).

¹⁵ RAI Response Encl. at 4.

¹⁶ *Id.* at 2.

¹⁷ Stevens Affidavit, ¶¶ 9, 10.

¹⁸ See Answer at 17-19.

requirement.¹⁹ Thus, the RAI Response provides additional unchallenged evidence showing that Citizens have not met this burden.

2. *The RAI Response Confirms that Citizens Cannot Assist in Developing a Sound Record*

The RAI Response also further demonstrates Citizens' inability to assist in developing a sound record, cutting against Citizens under the eighth factor of the balancing test in 10 C.F.R. § 2.309(c). Citizens' safety significance argument and the substance of their proposed contention rely heavily upon Dr. Hopenfled's "expectation" about the results of any confirmatory analysis: "I expect that the simplified method has under-estimated [*sic*] the CUF of the recirculation nozzle at Oyster Creek."²⁰ But the RAI Response shows that this speculation is unfounded and demonstrates that the original CUF calculation is conservative.²¹ By confirming that Citizens' testimony and arguments are not only speculative, but false, the RAI Response further undermines any claim by Citizens that they will contribute to the development of the record.

B. AmerGen's RAI Response Confirms That Citizens' Contention Fails To Raise A Genuine Dispute

In its Answer, AmerGen explained that the new contention is inadmissible because it fails to raise a genuine dispute, contrary to 10 C.F.R. § 2.309(f)(1)(vi), for two reasons: first, because the relief Citizens requested (*i.e.*, performance of a confirmatory analysis) had already been granted, and second because the contention rested on Dr. Hopenfled's speculation that the

¹⁹ See *id.*

²⁰ Citizens' Exh. MFC-1, Declaration of Dr. Joram Hopenfled ¶ 7 (Apr. 15, 2008) ("Hopenfled Declaration").

²¹ See generally attached Stevens Affidavit; RAI Response.

confirmatory analysis would reveal that the originally-calculated CUF for the recirculation line outlet nozzles was not conservative.²²

The RAI Response demonstrates that Dr. Hopenfeld's speculation is wrong. As explained in Section III.A.2, above, contrary to Dr. Hopenfeld's speculation, the confirmatory analysis shows that the originally-calculated CUF for the recirculation outlet nozzle is conservative and acceptable. Thus, the RAI Response provides additional evidence that the proposed contention fails to raise a genuine dispute.

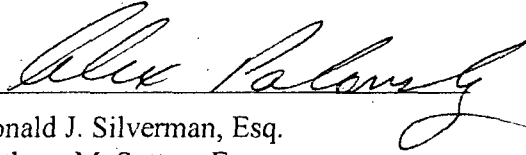
Moreover, now that the confirmatory analysis is complete, Citizens' request that the NRC require AmerGen to do so even more clearly fails to raise a genuine dispute with the other parties to this proceeding. As the RAI Response shows, and as more fully explained in the attached affidavit, the confirmatory analysis uses a conservative method to demonstrate that the original analysis was adequate to meet ASME Code allowables. Thus, it is now even clearer that Citizens' contention fails to raise a genuine dispute.

III. CONCLUSION

For the reasons set forth above, the RAI Response confirms that the Board must not reopen the record or admit Citizens' late-filed contention.

²² See Answer at 26-28.

Respectfully submitted,



Donald J. Silverman, Esq.

Kathryn M. Sutton, Esq.

Alex S. Polonsky, Esq.

Raphael P. Kuyler, Esq.

MORGAN, LEWIS & BOCKIUS LLP

1111 Pennsylvania Avenue, N.W.

Washington, DC 20004

Phone: (202) 739-5502

E-mail: dsilverman@morganlewis.com

E-mail: ksutton@morganlewis.com

E-mail: apolonskv@morganlewis.com

E-mail: rkuyler@morganlewis.com

J. Bradley Fewell

Associate General Counsel

Exelon Corporation

4300 Warrenville Road

Warrenville, IL 60555

Phone: (630) 657-3769

E-mail: Bradley.Fewell@exeloncorp.com

Dated in Washington, D.C.
this 27th day of May 2008

COUNSEL FOR
AMERGEN ENERGY COMPANY, LLC

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

ATOMIC SAFETY AND LICENSING BOARD

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CERTIFICATE OF SERVICE

I hereby certify that copies of "AmerGen's Response to May 21 Board Order" were served this day upon the persons listed below, by e-mail and first class mail.

Secretary of the Commission*
U.S. Nuclear Regulatory Commission
Attn: Rulemakings and Adjudications Staff
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738
(E-mail: HEARINGDOCKET@nrc.gov)

Administrative Judge
E. Roy Hawkens, Chair
Atomic Safety and Licensing Board Panel
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: erh@nrc.gov)

Administrative Judge
Paul B. Abramson
Atomic Safety and Licensing Board Panel
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: pba@nrc.gov)

Administrative Judge
Anthony J. Baratta
Atomic Safety and Licensing Board Panel
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: ajb5@nrc.gov)

John A. Covino
Valerie Anne Gray
Division of Law
Environmental Permitting and Counseling Section
P.O. Box 093
Hughes Justice Complex
Trenton, NJ 08625
(E-mail: john.covino@dol.lps.state.nj.us)
(E-mail: valerie.gray@dol.lps.state.nj.us)

Suzanne Leta
NJPIRG
11 N. Willow Street
Trenton, NJ 08608
(E-mail: sleta@njpirg.org)

Mary C. Baty
Kimberly A. Sexton
James E. Adler
Office of the General Counsel, 0-15D21
U.S. Nuclear Regulatory Commission
Washington, DC 20555
(E-mail: kas2@nrc.gov)
(E-mail: mcb1@nrc.gov)
(E-mail: jeal@nrc.gov)

Office of Commission Appellate
Adjudication
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: OCAAmail@nrc.gov)

Richard Webster
Julia LeMense
Eastern Environmental Law Center
744 Broad Street, Suite 1525
Newark, NJ 07102
(E-mail: rwebster@easternenvironmental.org)
(E-mail: jlemense@easternenvironmental.org)

Paul Gunter
Kevin Kamps
Beyond Nuclear
6930 Carroll Avenue
Suite 400
Takoma Park, MD 20912
(E-mail: paul@beyondnuclear.org)
(E-mail: kevin@beyondnuclear.org)

Emily Krause
Law Clerk
Atomic Safety and Licensing Board
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: eik1@nrc.gov)

* Original and 2 copies



Brian P. Oldham

UNITED STATES OF AMERICA
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AFFIDAVIT OF GARY STEVENS

1. My name is Gary Lance Stevens, and I am a Senior Associate at Structural Integrity Associates, Inc. ("SIA"). SIA is a contractor to AmerGen Energy Company, LLC ("AmerGen").
2. My professional and educational experience is summarized in the *curriculum vitae* attached to this affidavit. Briefly summarized, I specialize in the application of finite element analysis, fracture mechanics, and structural and fatigue analyses to nuclear components. I have extensive experience in the application of ASME Code Sections III and XI methodology to fatigue and fracture analyses of reactor vessels and internals components. I was the Chairman of former ASME Section XI Task Group on Operating Plant Fatigue Assessments, am the Secretary of the ASME Section XI Working Group on Operating Plant Criteria, the Secretary of the ASME Section XI Subgroup on Evaluation Standards, and a member of the ASME Section XI Subcommittee on Nuclear Inservice Inspection.
3. I am familiar with the Nuclear Regulatory Commission's ("NRC's") proposed generic

communication, Regulatory Issue Summary 2008-XX, "Fatigue Analysis of Nuclear Power Plant Components" (May 1, 2008) ("RIS 2008-XX")¹, and Board Notification 2008-01, Notification of Information in the Matter of Oyster Creek Nuclear Generating Station License Renewal Application (Apr. 3, 2008) ("Commission Notification"), both of which present NRC Staff questions about the use of a methodology, known as a simplified Green's Function methodology, to calculate projected cumulative usage factors ("CUF") for fatigue analysis of nuclear power plant components. I am also familiar with AmerGen's Response to a NRC Staff Request for Additional Information ("RAI") on Metal Fatigue Analysis related to Oyster Creek Nuclear Generating Station ("OCNGS") License Renewal Application ("LRA"), dated May 1, 2008 ("RAI Response").

4. The purpose of this affidavit is to respond to the Licensing Board's Order of May 21, 2008, by providing my expert opinion—"with particularity"—as to the significance of the RAI Response which was also submitted to the Commissioners via a letter from Alex S. Polonsky, Counsel for AmerGen, dated May 5, 2008. That RAI Response discusses the results of calculations of CUF (including environmentally assisted fatigue) of components at OCNGS performed by SIA.
5. My role with respect to the CUF calculations for OCNGS was to supervise the SIA technical staff involved in performing these calculations, to perform and review calculations as needed, and to provide expert technical consultation and review to all aspects of the work. I was the Project Manager for all of the CUF work initially completed for OCNGS in the 2005 time frame to support OCNGS's LRA. I was also the Project Manager for the confirmatory fatigue analysis of the OCNGS recirculation outlet nozzle

¹ U.S. Federal Register, Vol. 73, No. 85, Thursday, May 1, 2008, Notices, p. 24094.

completed in 2008.

6. To answer the Licensing Board's question about the significance of the RAI Response, I offer the following. AmerGen's response directly addresses several technical issues associated with CUF evaluation for OCNGS. First, the RAI Response describes the results of a confirmatory analysis SIA performed for the OCNGS recirculation outlet nozzle that addresses all relevant technical issues described in NRC RIS 2008-XX. Second, AmerGen's Response specifically addresses the Staff's question as to whether the CUF evaluation originally performed for the recirculation outlet nozzle in the OCNGS LRA is conservative.
7. As to the first technical issue, RIS 2008-XX requested that recent license renewal applicants that have used a simplified Green's function methodology (using a single stress term) to evaluate CUF effects also perform confirmatory analyses (retaining all six stress components) to demonstrate that the simplified Green's function methodology analyses provide acceptable results. This request was based on the confirmatory analysis of one physical location (the nozzle corner) of a component performed to-date for a boiling-water reactor feedwater nozzle (not OCNGS) that led the Staff to conclude that use of a simplified Green's Function methodology that used a single stress term did not produce conservative results in the nozzle corner area when compared to the confirmatory analysis.
8. AmerGen requested SIA to perform a confirmatory analysis for the OCNGS recirculation outlet nozzle that would satisfy the technical issues raised in RIS 2008-XX. The recirculation outlet nozzle is the only component for OCNGS that utilized the methodology in question by NRC Staff in RIS 2008-XX. SIA performed such analysis for the OCNGS recirculation outlet nozzle and, since SIA also performed the confirmatory analysis for the

boiling water reactor feedwater nozzle identified in the RIS, we performed the OCNGS analysis in a consistent manner with that of the boiling water reactor feedwater nozzle. The results of the OCNGS confirmatory analysis, as well as key comparisons to the original CUF evaluation performed for the recirculation outlet nozzle in the OCNGS LRA, are described in the RAI Response.

9. As stated in the response to RAI 4.3.4-1, the OCNGS recirculation outlet nozzle confirmatory analysis addresses the concern identified in RIS 2008-XX for the following reasons: (1) the analysis was performed using ASME Code, Section III, Subsection NB-3200 methodology; (2) Green's Functions were not utilized in the confirmatory analysis; (3) all six stress components were retained and utilized in the confirmatory analysis; and (4) the results of the confirmatory analysis demonstrate that the results of the original CUF evaluation for the OCNGS recirculation outlet nozzle are conservative and remain acceptable.

The results of AmerGen's confirmatory evaluation of the recirculation outlet nozzle showed that the maximum CUF with environmental effects included (" CUF_{en} ") is 0.1366 for 60 years of operation, compared to a conservative value of 0.9781 reported in the initial evaluation that was documented in the OCNGS LRA. Therefore, AmerGen's fatigue evaluations for purposes of license renewal provide reasonable assurance that components will not operate beyond their allowable metal fatigue limits during the proposed period of extended operation.

10. The confirmatory analysis performed for the OCNGS recirculation outlet nozzle produced a CUF_{en} that was approximately a factor of seven lower than the original evaluation performed for this component (0.1366 vs. 0.9781). There were several differences in the

two analyses, including the elimination of Green's Functions and the use of all six stress components, as previously described. These differences, as well as the reasons for the significant decrease in CUF, were described in AmerGen's RAI response, specifically in Items 1-4 of the response to RAI 4.3.4-1. The single most significant contributor to the significant decrease in CUF was that in the original analysis for the OCNGS recirculation outlet nozzle, stresses were conservatively extracted on the stainless steel cladding surface and were evaluated using the carbon steel fatigue curve, which provided very conservative fatigue usage results. In the confirmatory analysis, the stainless steel nozzle cladding was considered absent for the fatigue calculation, as permitted in NB-3122.3 of Section III of the ASME Code, and the low alloy steel base metal was evaluated for both stresses and fatigue usage using the carbon steel fatigue curve. This difference accounted for essentially all of the change in CUF, and is a source of significant conservatism in the original OCNGS analysis.

11. As to the second technical issue, the results of AmerGen's confirmatory analysis for the recirculation outlet nozzle, as discussed in paragraph 6 above and documented in the RAI Response, demonstrates that the original CUF evaluation performed for the OCNGS recirculation outlet nozzle is conservative and the nozzle has significant margin with respect to allowable. It therefore directly addresses the Staff question as to whether the original analysis was conservative.
12. The RAI Response also confirms that the OCNGS recirculation outlet nozzle was the only location where the methodology called into question in RIS 2008-XX was used. All other locations were evaluated and certified under accordance with ASME Code, Section III, methodology.

In accordance with 28 U.S.C. § 1746, I state under penalty of perjury that the factual statements and opinions I express in this affidavit are true and correct to the best of my personal knowledge and belief:

Mary L. Stevens

Gary Stevens

5/27/2008

Date

Gary L. Stevens, P. E.
Senior Associate

Education

MS, Mechanical Engineering, San Jose State University (1991)
BS, Mechanical Engineering, California Polytechnic State University (1981)

Professional Associations

Registered Professional Mechanical Engineer, State of California
Registered Professional Mechanical Engineer, State of Colorado

Professional Experience

1999 to present	Structural Integrity Associates, Inc., Centennial, CO Senior Associate
1996 to 1999	Structural Integrity Associates, Inc., San Jose, CA Associate
1995 to 1996	Structural Integrity Associates, Inc., San Jose, CA Senior Consultant
1981 to 1995	GE Nuclear Energy San Jose, CA

Summary

Mr. Stevens has 25 years of technical and supervisory experience in the nuclear energy field. His experience includes ASME Code stress and fatigue analysis, fracture mechanics analysis, analytical computer applications, and on-line fatigue monitoring of critical plant components. Mr. Stevens has achieved a significant amount of business management experience and skill, which includes technical project management, extensive technical proposal preparation and related customer interface, hardware design interface, and computer application development and management. He is currently SI's Product Lead for BWR License Renewal Services, BWR Fatigue Monitoring, and BWR Pressure-Temperature Curves.

At Structural Integrity Associates, Mr. Stevens has been responsible for a variety of projects for both PWR and BWR systems. These include the development of Class 1 fatigue management programs for plant license renewal applications (including environmental fatigue-related issues), the management, development, and installation of on-line fatigue and fatigue crack growth

G. L. Stevens

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monitoring systems, finite element model stress and fatigue analyses, and a variety of fracture mechanics applications including limit load and linear elastic fracture mechanics methodologies. Mr. Stevens has authored several technical papers enveloping all of these areas, has been an active member and participant in ASME Code Section XI Task Groups, Working Groups, Subgroups and Subcommittee, and has provided selected technical training to customers in the areas of fatigue and fracture mechanics. Mr. Stevens has developed an extensive working knowledge of the stress, fatigue and fracture mechanics areas through this experience.

Mr. Stevens is actively involved with the SI team developing nuclear plant Class 1 fatigue management programs. In particular, he has supported the development and deployment of the **FatiguePro** system, which is an on-line fatigue-damage monitoring system for power plants and other thermo-mechanical systems, at many plants world-wide. He has also been involved with various feedwater nozzle analyses throughout his career, and he continues to be a key contributor to the fracture mechanics work related to BWR internals, which is being studied by the BWR Vessel and Internals Project (BWRVIP).

At GE, Mr. Stevens began his career as a participant in the Edison Engineering Training Program, which provided three rotating work assignments before participants accepted a permanent position. This rotational work experience included nuclear fuel channel design, computer program design and development, spare parts, document database development, and structural analysis and design. After selecting a permanent position in March 1983, Mr. Stevens spent over 12 years performing ASME Code stress and fatigue analyses and various fracture mechanics evaluations for BWR vessel, piping, and vessel internals components. He was a key participant on most BWR vessel internals structural issues from the first significant incidences of detected cracking in 1993. During his tenure at GE, Mr. Stevens became recognized as a structural analysis expert for BWR services.

While at GE, Mr. Stevens received the prestigious "Young Engineer Award" for his contributions in the structural analysis area, as well as the "Product Application - Service Engineering Award" for his successful implementation of thermal cycle monitoring in Japan.

Over the years, Mr. Stevens has gained related computer experience in several computer environments (C, FORTRAN, BASIC, UNIX, and HP BASIC). In addition, he has extensive past experience in the use and application of the ANSYS finite element computer code.

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