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OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR VERMONT YANKEE, LLC AND ENTERGY NUCLEAR OPERATIONS, INC.	)	Docket No. 50-271-LR
	)	ASLBP No. 06-849-03-LR
(Vermont Yankee Nuclear Power Station)	)	

NRC STAFF ANSWER IN SUPPORT OF ENTERGY'S MOTION FOR SUMMARY DISPOSITION OF NEC CONTENTION 4 (FLOW ACCELERATED CORROSION)

INTRODUCTION

Pursuant to 10 C.F.R. §§ 2.323(c) and 2.1205(b), the NRC Staff ("Staff") herein answers "Entergy's Motion for Summary Disposition of New England Coalition's [NEC] Contention 4 (Flow Accelerated Corrosion)" ("Motion") filed by Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc. (collectively "Entergy") on June 5, 2007. For the reasons set forth below and in the attached "Affidavit of Jonathan G. Rowley and Kaihwa R. Hsu Concerning NEC Contention 4" ("Staff Affidavit"), the Staff submits that there is no genuine dispute of material fact with respect to the issues raised by NEC Contention 4. Accordingly, Entergy is entitled to a decision in its favor on this contention as a matter of law, and the Motion should be granted.

BACKGROUND

On May 26, 2006, NEC filed a timely "Petition for Leave to Intervene, Request for Hearing and Contentions" ("Petition") regarding Entergy's License Renewal Application ("LRA") seeking a 20-year renewal of the Vermont Yankee Nuclear Power Station

(VYNPS) license.[1] Among NEC's proffered contentions was Contention 4, which alleges that Entergy's LRA does not include an adequate plan to monitor and manage aging of plant piping due to flow-accelerated corrosion (FAC) during the period of extended operation." *See* Petition at 18. The NRC Staff and Entergy opposed admission of NEC Contention 4. *See* NRC Staff Answer to Request for Hearing of New England Coalition (June 22, 2006), at 13-14; Entergy Response to New England Coalition's Petition for Leave to Intervene, Request for Hearing, and Contentions (June 22, 2006), at 30-36.

On September 22, 2006, the Atomic Safety and Licensing Board ("Board") admitted Contention 4. *Entergy Nuclear Vermont Yankee, LLC* (Vermont Yankee Nuclear Power Station), LBP-06-20, 64 NRC 131, 192-96 (2006).[2] The Board found that Contention 4 was supported by ¶ 24 of the Declaration of Dr. Joram Hopenfeld (May 12, 2006) ("Hopenfeld Declaration") thus meeting the admissibility standards of 10 C.F.R. § 2.309(f)(1).[3] *Id.* at 194. The Board struck portions of Dr. Hopenfeld's Second Declaration concerning Contention 4 (¶¶ 16-22) because it included new arguments and factual information that were not included in the initial petition and outside the permissible scope of a responsive brief. *Id.* at 195.

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[1] Vermont Yankee Nuclear Power Station, License Renewal Application, dated January 25, 2006 (Agency Document Access and Management System (ADAMS) Accession No. ML060300085 [LRA]).

[2] Also in its September 22, 2006 Order, the Board granted NEC's and Vermont Department of Public Service's (DPS) notices of adoption of each other's contentions to the extent NEC's and DPS's contentions were admitted. *Id.* at 208.

[3] In ¶ 24, Dr. Hopenfeld asserted that CHECWORKS is an empirical code, not a mechanistic code, that must be updated continuously with plant-specific data in order to effectively predict pipe-thinning due to flow-accelerated corrosion. Dr. Hopenfeld asserted that because of Vermont Yankee's EPU, which increased the flow rate and the potential for pipe-thinning, it would take at least 10-15 years before CHECWORKS could be benchmarked to predict flow-accelerated corrosion.

The narrow issue admitted in this proceeding is whether Vermont Yankee's plan to monitor and manage aging of plant piping due to FAC is inadequate because it relies on CHECWORKS, an "empirical code" used to determine the scope and frequency of inspection of susceptible components, a code which "must be continuously updated with plant-specific data," and a code that "has not been benchmarked with data" reflecting the parameter changes associated with the recent power uprate. *See* LBP-06-20, 64 NRC 131, 192-194 (2006).

On June 5, 2007, Entergy filed the instant motion seeking summary disposition of Contention 4. Entergy asserts that summary disposition is appropriate because the "alleged limitations in the CHECWORKS program are non-existent." Motion at 3. Therefore, Contention 4 does not raise a dispute of material fact and Entergy is entitled to a decision as a matter of law. *See* Motion at 1, 3. Attached to Entergy's Motion are (1) a "Statement of Material Facts Regarding NEC Contention 4 On Which No Genuine Dispute Exists" ("Material Facts"), (2) the "Joint Declaration of Jeffery S. Horowitz and James C. Fitzpatrick in Support of Entergy's Motion for Summary Disposition of NEC Contention 4" ("Horowitz-Fitzpatrick Affidavit.") with supporting resumes, and (3) a Summary of Observations During VY Site Visit (by Mr. Horowitz), dated May 29, 2007 ("Summary").

DISCUSSION

I. Legal Standards Governing Motions for Summary Disposition

Pursuant to 10 C.F.R. § 2.1205(a), motions for summary disposition in Subpart L proceedings must be in writing, must include a written explanation of the basis of the motion, and must include affidavits to support statements of fact. In a Subpart L proceeding, the presiding officer applies the standards for summary disposition set forth in § 2.710(d)(2) for ruling on motions for summary disposition. *See* 10 C.F.R.

§ 2.1205(c). Summary judgment is appropriate if the filings in the proceeding, together with the statements of the parties and the affidavits, demonstrate that there is no genuine issue as to any material fact. *See* 10 C.F.R. §§ 2.1205 and 2.710(d)(2); *see also Advanced Medical Sys., Inc.* (One Factory Row, Geneva, Ohio), CLI-93-22, 38 NRC 98, 102-03 (1993); *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site), LBP-05-19, 62 NRC 134, 179-80 (2005); *Entergy Nuclear Vermont Yankee, LLC & Entergy Nuclear Operations* (Vermont Yankee Nuclear Power Station), LBP-06-05, 63 NRC 116, 121-122.

To prevail on a motion for summary disposition, the moving party must demonstrate the lack of a genuine issue of material fact. *See Sequoyah Fuels Corp. & Gen. Atomics Corp.* (Gore, Oklahoma Site Decontamination and Decommissioning Funding), LBP-94-17, 39 NRC 359, 361, *aff'd,* CLI-94-11, 40 NRC 55 (1994). Because it is the moving party's burden to show the lack of a genuine issue of material fact, the evidence submitted must be construed in favor of the non-moving party. *Id.* Affidavits submitted in support of summary disposition must come from individuals qualified by "knowledge, skill, experience, training, or education" and must be sufficiently grounded upon a factual basis. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-04, 61 NRC 71, 80-81 (citing Federal Rule of Evidence 702; *Bragdon v. Abbott*, 524 U.S. 624, 653 (1998) (stating that expert testimony must have a traceable, analytical basis in objective fact before it may be considered on summary judgment).

To defeat a motion for summary disposition, an opposing party must set forth specific facts demonstrating a genuine issue of material fact; mere allegations or denials of the moving party's facts are not sufficient. *See* 10 C.F.R. § 2.710(b); *Advanced Medical Sys., Inc.*, 38 NRC at 102. Furthermore, bare assertions and general denials,

even by an expert, are insufficient to oppose a properly supported motion for summary disposition. *Duke Cogema Stone & Webster*, LBP-05-04, 61 NRC at 81 (*citing Advanced Med. Sys., Inc.*, CLI-93-22, 38 NRC at 102; *Houston Lighting & Power Co.* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-629, 13 NRC 75, 78 (1981). Although the moving party bears of the burden of showing that there is no genuine issue of material fact, the non-moving party must controvert any material fact proffered by the moving party or that fact will be deemed admitted. *Advanced Medical Sys., Inc.*, 38 NRC at 102-03.

Admission of a party in a proceeding based on one acceptable contention neither precludes summary disposition nor guarantees a party a hearing on its contentions. *Wisconsin Electric Power Co.* (Point Beach Nuclear Plant, Unit 1), ALAB-696, 16 NRC 1245, 1258 n.15 (1982) (citing *Houston Lighting & Power Co.* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-590, 11 NRC 542, 550 (1980)). For the Board to find the existence of a genuine issue of material fact, "the factual record, considered in its entirety, must be enough in doubt so that there is a reason to hold a hearing to resolve the issue." *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 & 2), LBP-83-46, 18 NRC 218, 223 (1983).

II. Safety-Related Issues in License Renewal Proceedings

It is well established that the Commission's "[l]icense renewal reviews are not intended to 'duplicate the Commission's ongoing review of operating reactors.'" *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), CLI-01-17, 54 NRC 3, 7 (2001) (citing Final Rule, "Nuclear Power Plant License Renewal," 56 Fed. Reg. 64,943, 64,946 (Dec. 13, 1991)). In license renewal, the safety review process focuses on the "potential detrimental effects of aging that are not routinely addressed by ongoing regulatory oversight programs." *Id.* Issues involving the facility's current

licensing basis are outside the scope of license renewal. *Id.* at 8-9.

License renewal applicants must "demonstrate how their programs will be effective in managing the effects of aging during the period of extended operation." *Id.* at 8 (citing 10 C.F.R. § 54.21(a)). Applicants are required to "identify any additional actions, i.e., maintenance, replacement of parts, etc., that will need to be taken to manage adequately the detrimental effects of aging." *Id.* (citing Final Rule, "Nuclear Power Plant License Renewal; Revisions," 60 Fed. Reg. 22,461, 22,473 (May 8, 1995)). Here, one of the findings the NRC must make is that the affects of aging due to FAC will be adequately managed by Entergy's flow-accelerated corrosion program so that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation, as required by 10 C.F.R. § 54.21(a)(3).

III. Entergy's Motion Should Be Granted

The Staff has carefully reviewed Entergy's Motion and supporting documentation, and agrees that Entergy is entitled to a decision as a matter of law on NEC Contention 4 because there is no genuine issue of material fact to litigate. Contention 4 is based upon Dr. Hopenfeld's assertion that CHECWORKS is an empirical model that must be continuously updated with plant specific data (benchmarked to a specific plant's parameters, such as velocity and coolant chemistry) in order to accurately predict pipe-wall thinning. *See* LBP-06-20 at 194; Motion at 8-9 (citing Petition at 18-19; Hopenfeld Declaration ¶¶ 22-24). Dr. Hopenfeld asserts that because plant parameters have changed "drastically" due to Vermont Yankee's extended power uprate (EPU), 10-15 years of inspection data are needed to benchmark CHECWORKS so that it will accurately predict pipe-wall thinning at EPU conditions. *Id.*

Entergy is entitled to a decision as a matter of law on Contention 4 because prolonged benchmarking of CHECWORKS is not necessary. *See* Horowitz-Fitzpatrick

Affidavit at ¶¶ 38, 40; Staff Affidavit at ¶ 13. It is not necessary to benchmark CHECWORKS to a plant's specific parameters because CHECWORKS uses laboratory data and FAC data from other plants to construct predictive algorithms. *See* Horowitz-Fitzpatrick Affidavit at ¶ 38; Staff Affidavit at ¶¶12, 14. CHECWORKS was designed and has a proven ability, to handle changes to plant parameters resulting from an EPU, such as large changes in chemistry and flow-rate. Horowitz-Fitzpatrick Affidavit at ¶ 39; Staff Affidavit at ¶ 10.

The Staff considered and addressed the issues raised by NEC Contention 4 in "Safety Evaluation Report with Confirmatory Items Related to the License Renewal of Vermont Yankee Nuclear Power Station," dated March 2007 at 3-14 to 3-17. (ML070870378). On the basis of its evaluation, the Staff concluded that Vermont Yankee's FAC program, which uses CHECWORKS as a tool to predict pipe wall thinning, provides assurance that the aging effects due to FAC will be adequately managed during the period of extended operation. *Id.*; Staff Affidavit at ¶ 7. The Staff agrees with Entergy and the creator of the CHECWORKS program that prolonged benchmarking is not necessary and that CHECWORKS can be used effectively despite changes in chemistry, flow rate, and other operating conditions typically found in EPUs. *See* Horowitz-Fitzpatrick Affidavit at ¶ 38; Staff Affidavit at ¶¶13-14.

Finally, the Staff has reviewed Entergy's Material Facts, and has determined that those statements contained therein are correct as explained by the Staff's affiants in ¶¶ 7 and 10-15, and with the exceptions noted in ¶¶ 8 and 9. The exceptions in ¶¶ 8 and 9 address a potential ambiguity in Entergy's Fact 8 and the limits of the Staff's knowledge regarding Entergy's Fact 10. Nevertheless, none of these explanations and exceptions affect the Staff's conclusion that no genuine dispute of material fact exists with respect to Contention 4. *See* Staff Affidavit at ¶15. Thus, summary disposition is

appropriate and should be granted.

CONCLUSION

For the reasons set forth above the Board should grant Entergy's motion for summary disposition of NEC Contention 4.

Respectfully submitted,

Mitzi A. Young
Counsel for NRC Staff

Mary C. Baty
Counsel for NRC Staff

Dated at Rockville, Maryland
this 25th day of June, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR VERMONT YANKEE, LLC	)	Docket No. 50-271-LR
AND ENTERGY NUCLEAR OPERATIONS, INC.	)	
	)	
(Vermont Yankee Nuclear Power Station)	)	

AFFIDAVIT OF JONATHAN G. ROWLEY AND
KAIHWA R. HSU CONCERNING NEC CONTENTION 4

Jonathan G. Rowley (JGR) and Kaihwa R. Hsu (KRH)[1] do hereby state as follows:

1(a). (JGR) I am employed by the U.S. Nuclear Regulatory Commission ("NRC") as a Project Manager in the Office of Nuclear Reactor Regulation ("NRR"), Division of License Renewal. Since January 2006, I have served as the lead project manager for the NRC Staff ("Staff"), on the license renewal application ("LRA") for the Vermont Yankee Nuclear Power Station ("Vermont Yankee" or "VYNPS"). A statement of my professional qualifications is attached hereto.

1(b). (KRH) I am employed by the NRC as a Materials Engineer in NRR, Division of License Renewal. Since January 2006, I have served as an audit team member and audit team leader for the Staff, concerning the LRA for VYNPS. A statement of my professional qualifications is attached hereto.

2(a). (JGR) As part of my official responsibilities as the lead project manager for the Staff's safety review of the Vermont Yankee license renewal application, I serve

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[1] In this Affidavit, the identity of the affiant(s) who support each numbered paragraph is indicated by the notation of their initials in parentheses. Where all of the affiants support a numbered paragraph, no parenthetical notation of their initials is provided.

as the principal point of contact in NRR for activities related to the Vermont Yankee LRA. In addition, I coordinated the Staff's review of the Vermont Yankee LRA and preparation of the Staff's "Safety Evaluation Report with Confirmatory Items Related to the License Renewal of Vermont Yankee Nuclear Power Station" ("LRA SER"), dated March 2007 (ML070870378).

2(b). (KRH) As part of my official responsibilities as an audit team member for the license renewal safety audit at Vermont Yankee, I served as technical lead for activities related to the Vermont Yankee LRA. I also reviewed portions of the Vermont Yankee LRA including the following aging management programs: B.1.4, "BWR Penetrations;" B.1.5, "BWR Stress Corrosion Cracking;" B.1.6, "BWR Vessel ID Attachment Welds;" B.1.7, "BWR Vessel Internals;" B.1.13, "Flow-Accelerated Corrosion;" and B.1.29, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel." In this regard, I participated in preparation of Section 3.0.3 of the LRA SER, dated March 2007. In addition, I reviewed the Time-Limited Aging Analysis and prepared Sections 4.1, 4.3 and 4.7 of the LRA SER.

3. This Affidavit is prepared in response to "Entergy's Motion for Summary Disposition of New England Coalition's Contention 4 (Flow Accelerated Corrosion)" ("Motion"), filed by Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. (collectively, "Entergy") on June 5, 2007, and the "Statement of Material Facts Regarding NEC Contention 4 on Which No Genuine Dispute Exists" ("Material Facts") attached thereto.

4. NEC Contention 4 alleges that Entergy's License Renewal Application should be denied because it "does not include an adequate plan to monitor and manage aging of plant piping due to flow-accelerated corrosion (FAC) during the period of

extended operation." We have read Contention 4 and the bases submitted in support thereof, presented in NEC's "Petition for Leave to Intervene, Request for Hearing and Contentions," dated May 26, 2006, as admitted in *Entergy Nuclear Vermont Yankee, LLC* (Vermont Yankee Nuclear Power Station), LBP-06-20, 64 NRC 131, 192-96 (2006).

5. We have read Entergy's Motion seeking summary disposition of NEC Contention 4, including the Statement of Material Facts ("Material Facts"), the Declaration of Jeffrey S. Horowitz and James C. Fitzpatrick, and the Summary of Observations During VY Site Visit ("Summary") attached to the Motion. In this Affidavit, we present our views with respect to the issues addressed within our separate areas of review.

6. Based on our review of Entergy's LRA and supplements thereto; the Staff's LRA SER issued in March 2007; NEC Contention 4 as admitted by the Licensing Board in LBP-06-20; and Entergy's Motion and Material Facts, we agree that Facts 1-11 are correct, except as explained in paragraphs 7, 8, and 9 below.

7. Facts 1-7, 9, and 11 are correct in that the Staff's review found Entergy's FAC Program to be consistent with NUREG-1801, "Generic Aging Lessons Learned Report" (September 2005) ("GALL Report"), guidance for aging management program XI.M17, "Flow-Accelerated Corrosion," and adequate to manage aging effects due to FAC, as written in LRA SER section 3.0.3.1.2. The Vermont Yankee FAC program follows industry recommendations as described in NSAC-202L-R2, "Recommendations for an Effective Flow-Accelerated Corrosion Program." The program predicts wear rates, identifies locations for inspection, and inspects for FAC in piping and other pressure-retaining components.

8. (KRH) Fact 8 is correct with the following modification:

> The FAC program at VY is complemented by the use of FAC-resistant materials in the design of the plant, the use of a water chemistry that mitigates FAC, and the progressive replacement of FAC susceptible piping and components with FAC-resistant ones.

Because the use of the word "inhibit" in Fact 8 is somewhat ambiguous since it could mean that water chemistry could "prevent" FAC, this minor modification is to clarify that water chemistry can be adjusted to decrease the rate of FAC or lessen the severity of FAC.

9. With regard to Fact 10, we agree that the Summary indicates that the auditor found Vermont Yankee's FAC program consistent with NSAC-202L. However, the NRC Staff has no direct knowledge of the findings of the April 2007, two-day audit, or the extent of the use of FAC-resistant materials in Vermont Yankee's original construction.

10. (KRH) Based on my review of Entergy's LRA and supplements thereto, the Staff's LRA SER issued in March 2007; NEC Contention 4; the Licensing Board's decision in LBP-06-20; and Entergy's Motion and Statement of Material Facts, I agree that Facts 12-22 are not in dispute.

11. (KRH) My position on Facts 12-22 is based on my knowledge of CHECWORKS and my knowledge of FAC-predictive codes generally through my work for Westinghouse and the NRC. As part of my duties at the NRC, I have reviewed the use of CHECKWORKS at various facilities, including Vermont Yankee. I am knowledgeable of the conclusions reached in the March 2, 2006, SER for extended power uprate, "Safety Evaluation by the Office of Nuclear Reactor Regulation related to Amendment No. 229 to Facility Operating License No. DPR-28," (SER EPU) (ML060050028). In addition, while at Westinghouse, I was part of the team that

developed a computer code, the Westinghouse Corrosion-Erosion Monitoring System, that, like CHECWORKS, predicts pipe thinning due to FAC.

12. (KRH) The GALL Report recommends the use of CHECWORKS or a similar predictive code to predict component degradation in the systems susceptible to FAC, as indicated by specific plant data, including material, hydrodynamic, and operating conditions. GALL Report XI.M17 at XI M-61. CHECWORKS is an acceptable method of predicting component degradation due to FAC because it provides a bounding analysis for FAC. CHECWORKS was developed and benchmarked using data from many plants. GALL Report XI.M17 at XI M-61 to XI M-62.

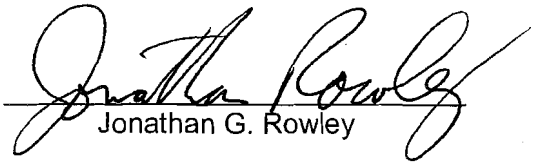
13. (KRH) The Staff's SER EPU concluded that CHECWORKS modeling would accommodate the 20 percent power increase. SER EPU Section 2.1.6 at 23-24. The EPU will affect plant parameters, which will affect FAC wear rates. The CHECWORKS input and the FAC program are modified to account for the changes in plant parameters due to EPU. SER EPU Section 2.1.6 at 23-24. Prolonged benchmarking, however, is not necessary. Inspection data from three post-EPU refueling outages will be available by the end of the current license period. The first set of inspection data can be used to establish a baseline under EPU conditions. The second set of inspection data from the same location can be used to establish the predicative wear rate at that location. The third set of inspection data can be used to verify the predicted wear rate at that location. Therefore, CHECWORKS can be used to predict wear rates with only 2-3 inspections.

14. (KRH) CHECWORKS is only one tool used to identify FAC-susceptible areas. CHECWORKS can be used effectively without first being benchmarked with plant-specific data because it is based on FAC data from many plants, plants with

varying flow rates, velocities, power levels, and piping configurations.

15. Contrary to NEC Contention 4, Vermont Yankee's FAC program, which includes the use of CHECWORKS, is adequate to monitor and manage the aging of plant piping due to FAC.

16(a). JGR) I declare under penalty of perjury that my statements set forth above and my statement of professional qualifications attached hereto are true and correct to the best of my knowledge, information and belief.



Jonathan G. Rowley

Executed in Rockville, Maryland
this 25th day of June 2007

16(b). (KRH) I declare under penalty of perjury that my statements set forth above and my statement of professional qualifications attached hereto are true and correct to the best of my knowledge, information and belief.

Kaihwa R. Hsu

Executed in Rockville, Maryland
this 23 day of June 2007

Jonathan G. Rowley
Statement of Professional Qualifications

CURRENT POSITION:

Project Manager	Division of License Renewal, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Rockville, MD

EDUCATION:

B.S., Virginia Polytechnic Institute and State University, 1993, Materials Science and Engineering

M.S., University of Texas at Arlington, 2003, Materials Science and Engineering

SUMMARY:

Over 14 years of experience in materials science and engineering and over 3 years of experience in the nuclear reactor regulation. Significant experience in the following areas:

- Materials Engineering
- License Renewal

EXPERIENCE:

U.S. Nuclear Regulatory Commission, 08/03/2003 - Present

10/01/2006 to present – Project Manager, Division of License Renewal, Office of Nuclear Regulatory Research

- Lead Project Manager for the safety review of the Vermont Yankee Nuclear Power Station license renewal application

08/03/2003 to 10/01/2006 - General Engineer, Division of License Renewal, Office of Nuclear Regulatory Research

- Lead Project Manager for the safety review of the Donald C. Cook Nuclear Plant license renewal application
- Back-up Project Manager for the safety review of the R.E. Ginna license renewal application

Iowa Beef Processors, Assistant Laboratory Manager, 1993 – 2000:

Responsible for oversight of nine junior laboratory employees and day-to-day operations of the laboratory

Kaihwa R. Hsu
Statement of Professional Qualifications

CURRENT POSITION:

Materials Engineer — Division of License Renewal, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Rockville, MD

EDUCATION:

B.S., Chung Yuan Christian College, 1975, Civil Engineering
M.S., University of South Carolina, 1981, Civil Engineering in Structural Mechanics

SUMMARY:

Over 25 years of experience in the nuclear power industry, including 22 years as a principal engineer for Westinghouse Electrical Company. Significant experience in the following areas:

- Reactor Vessel, Steam generator, Pressurizer design & analyses
- Reactor Coolant Pump, Heat exchanger design & analyses
- Stress corrosion cracking, corrosion erosion
- Fracture mechanics evaluation
- Fatigue crack growth prediction and Flaw assessment
- Fatigue evaluation and leak before break demonstration
- ASME Code Section III and XI design analyses
- License Renewal aging management

EXPERIENCE:

U.S. Nuclear Regulatory Commission, 10/2003 - Present

10/2003 to Present - Materials Engineer, Division of License Renewal, Office of Nuclear Regulatory Research

- Audit Team Leader for the license renewal safety audit at the Palisades and Vermont Yankee Plants
- Backup Audit Team Leader for the license renewal safety audit at the Milestone Units 2 and 3 , Nine Mile Point Units 1 and 2, and Shearon Harris plants
- Audit Team Member for the license renewal safety audit at the Oyster Creek, Wolf Creek, D.C. Cook, Arkansas Nuclear One - Unit 2 Plants

Westinghouse Electrical Co. 1981 – 2003

Principal Engineer the following divisions of Westinghouse

- **1998-2003, Structural Material Technology**
  - Primary water stress corrosion cracking (PWSCC) issue in reactor vessel (RV)
    - Performed all the analytical work which generated the proposed Westinghouse resolutions to plant specific problems in this area. The activities included:
      - RV CRDM/CEDM Penetration Alloy 600 Cracking & Penetration Weld Cracking
      - RV Nozzle Safe End Alloy 82/182 Butt Weld Cracking.
      - Structural Integrity Evaluation
      - Embedded Flaw Repair Technique and Procedure
      - Technical Justification for Continued Operation (JCO).
      - Alloy 82/182 Butt Weld Safety Assessment Report (EPRI MRP-44)
      - Participation in ASME Section XI Activities

- **February 1997- March 1998, Millstone Unit 3**: areas of work included
  - 10 CFR 50.54(f) program – Specific System Review
  - Resolution of Unresolved/Open Item
  - FSAR Review and Preparation of FSARCR
  - 10 CFR 50.59 Safety Evaluation for FSARCR

- **1993 – January 1997, Structural Material Technology**: areas of work included:
  - ASME Section XI Class 1 Component Finite Element Analysis.
  - Flaw Assessment per ASME Section XI
  - Inspection Procedure, Material Purchasing, and Scheduling of the steam generator replacement program
  - Pre-Operational Walk-down and Testing
  - Inspections during Refueling Outage
  - Fracture Mechanics and Structure Integrity
  - Piping Stress Qualification
  - Leak-Before-Break Demonstration
  - Fatigue Crack Growth Prediction
  - Time History Dynamic Analysis for AP600 Reactor Coolant Loop Piping
  - Steam Generator Tube Plugging
  - Transient Monitoring for Tech Specification Compliance

- **1990 – 1992, Piping Design and Qualification**: areas of work included:
  - Piping Stress Analysis
  - Equipment Qualification.
  - Thermal Stratification Analysis (IEB 88-08 and 88-11)
  - Fatigue Crack Growth Prediction
  - Computer Codes Development for the cycle monitoring system by using the Green function to perform stress and fatigue analysis
  - Nuclear Plant Records and Data Review to define operating transients

- **1988-1989, Structural Material Engineering**: areas of work included
  - Finite Element Analysis of PWR Component
  - Piping Stress Analysis
  - Fatigue Crack Growth Prediction
  - Thermal Stratification Analysis (IEB 88-08 and 88-11)
  - Computer Code Development for the Erosion and Corrosion Monitoring System

- **1983-1988, Piping Analysis and Design at Vogtle Plant Site**: areas of work included:
  - ASME Section III Piping Stress Analysis and Design
  - ANSI B31.1 Piping Stress Analysis and Design
  - Equipment Qualification
  - Instrument Tubing Design
  - Pre-Operational Walkdown and Testing

- **1981-1982, Stress Analysis at Westinghouse Tampa Division**: areas of work included:
  - Equipment Qualification, Stress Analysis and Stress Report for Model F Steam Generator

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(Vermont Yankee Nuclear Power Station)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF ANSWER IN SUPPORT OF ENTERGY'S MOTION FOR SUMMARY DISPOSITION OF NEC CONTENTION 4 (FLOW ACCELERATED CORROSION)" in the above-captioned proceeding have been served on the following by electronic mail with copies by deposit in the NRC's internal mail system or, as indicated by an asterisk, by electronic mail, with copies by U.S. mail, first class, this 25th day of June, 2007.

Alex S. Karlin, Chair
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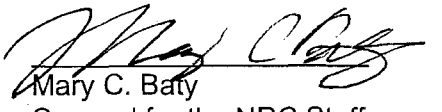

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