

engineering consultant and expert witness. My Curriculum Vitae is Exhibit 1.

5. I have qualified as an expert witness before the Nuclear Regulatory Commission (NRC) Atomic Safety and Licensing Board (ASLB) and Advisory Committee on Reactor Safeguards (ACRS), in Federal Court, the State of Vermont Public Service Board, the State of Vermont Environmental Court, and the Florida Public Service Commission.
6. I am an author of the first edition of the Department of Energy (DOE) Decommissioning Handbook.
7. As an appointee of Vermont State Legislature for the past two years, I am charged with serving in an oversight role of Entergy Nuclear Vermont Yankee and an advisory role on nuclear reliability issues to the Vermont State Legislature.
8. I have more than 38-years of professional nuclear experience *including and not limited to*: Nuclear Power Operations, Nuclear Safety Assessments, Nuclear Power Management, Nuclear Quality Assurance, Archival Storage and Document Control, NRC Regulations and Enforcement, Licensing, Engineering Management, Contract Administration, Reliability Engineering, In-service Inspection, Thermohydraulics, Criticality Analysis, Radioactive Waste Processes, Decommissioning, Waste Disposal, Cooling Tower Operation, Cooling Tower Plumes, Consumptive Water Use, Source Term Reconstruction, Dose Assessment, Technical Patents, Structural Engineering Assessments, Nuclear Fuel Rack Design and Manufacturing, Nuclear Equipment Design and Manufacturing, Public Relations, Prudency Defense, Employee Awareness Programs, and Whistleblower Protection.

Introduction

9. The undersigned Declarant, Arnold Gundersen, hereby proffers the following statements in support of proposed Contention No. 15 submitted by the Intervenor parties in this Fermi 3 Nuclear Power Plant licensing proceeding. My declaration is intended to specifically address quality assurance issues relative to the Combined

Operating License Application (COLA) for Detroit Edison's proposed Economic Simplified Boiling Water Reactor (ESBWR) at its Fermi Nuclear Power Plant (NPP) Unit 3.

10. More specifically, in its November 6, 2009 *Supplemental Petition to NRC for Admission of a Newly-Discovered Contention, and for Partial Suspension of NRC's DTE COLA Adjudication*, Intervenors noted that Detroit Edison lacks a complete and cohesive QA program as required by Appendix B to 10 CFR Part 50, so stating:

“Detroit Edison has failed to comply with Appendix B to 10 CFR Part 50 to establish and maintain a quality assurance (QA) program since March 2007 when it entered into a contract with Black and Veatch (B&V) for the conduct of safety-related combined license (COL) application activities and to retain overall control of safety-related activities performed by B&V. DTE further has failed to complete any internal audits of QA programmatic areas implemented for Fermi 3 COLA activities performed to date. And DTE also has failed to document trending of corrective actions to identify recurring conditions adverse to quality since the beginning of the Fermi 3 project in March 2007.”¹

11. During my 38-year professional career, including my position as a Senior Vice President for a NRC licensee, I have been responsible for personnel who worked at more 70-NPPs throughout United States. I am therefore intimately familiar with the nuclear industry's desire to achieve high levels of quality through cohesive Quality Assurance (QA) plans and organizations. During my 38-year career, I have never witnessed a nuclear reactor program that did not have a fully operational Quality Assurance Program in place at the onset of its design process. The complete

¹ *Supplemental Petition of Beyond Nuclear, Citizens for Alternatives to Chemical Contamination, Citizens Environmental Alliance of Southwestern Ontario, Don't Waste Michigan, Sierra Club, Keith Gunter, Edward McArdle, Henry Newman, Derek Coronado, Sandra Bihn, Harold L. Stokes, Michael J. Keegan, Richard Coronado, George Steinman, Marilyn R. Timmer, Leonard Mandeville, Frank Mantei, Marcee Meyers, and Shirley Steinman for Admission of a Newly-Discovered Contention, and for Partial Suspension of COLA Adjudication*, to US NRC Atomic Safety and Licensing Board (ASLB), Docket No. 52-033, Regarding the Detroit Edison Company Fermi Nuclear Power Plant Unit 3, November 6, 2009, Page 2.

involvement of a QA program and its substantiating design review, document control, and rigorous process must begin several years prior to an application for a NRC license.

12. Since assuming the Chairmanship of the U.S. Regulatory Commission, The Honorable Gregory B. Jaczko, has taken on the challenge of bringing nuclear power plant design and QA to a new level of coherency and NRC regulation as evidenced by the series of speeches he has given during the October and November 2009. In *Moving Safety and Security to the Front Edge of Design*, his prepared remarks given October 8, 2009 at the Workshop on Small- and Medium-Sized Nuclear Reactors, The Honorable Chairman Jaczko said,

“The NRC is a regulatory agency. We license and regulate the commercial use of nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. With that as our mission, the NRC does not develop or promote reactor designs, nor participate in the selection of one reactor design over another. That is the responsibility of other organizations. We are focused on safety and security of the public and environment. **One licensing process lesson that we can learn, from the ongoing new reactor design certification and combined license reviews, is that timely and effective licensing reviews not only require the regulator to be ready, but it also requires the applicant to be ready.** Prospective applicants, whether they are seeking a design certification, a design approval, or a combined license, need to ensure that their design is sufficiently complete to support a licensing review. **The application needs to be complete when it is initially submitted to the NRC.** I know that the staff plans to address this subject sometime during the next day and a half. The SMR community should give careful consideration to their advice on the importance of sufficiently completing the design and any testing needed to support the application prior to the submittal of an application.” *Moving Safety and Security to the Front Edge of Design* Prepared Remarks for The Honorable Gregory B. Jaczko Chairman U.S. Regulatory Commission at the Workshop on Small- and Medium-Sized Nuclear Reactors October 8, 2009, Document No. S-09-28. *[Emphasis Added]*

13. The Honorable Gregory B. Jaczko makes it clear that for “new reactor design certification and combined license reviews ...The application needs to be complete

when it is initially submitted to the NRC.” [Emphasis Added] With such a position clearly articulated by the Commission Chairman, it is unsatisfactory for Detroit Edison to have provided an incomplete and poorly developed COLA for Fermi Unit 3. Moreover, NRC and the Intervenors rightfully expected that initial COLA submittal filed in 2008 to be complete. According to the NRC’s Notice of Violation (NOV)², DTE lacked a QA program to oversee site-specific engineering prior to license submittal. Therefore, DTE’s Fermi Unit 3 COLA does not meet the NRC requirement for a complete filing that has been clearly delineated by NRC Chairman The Honorable Gregory B. Jaczko.

14. As The Honorable Chairman Jaczko said above in describing the NRC’s mission, “The NRC is a regulatory agency. We license and regulate the commercial use of nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.” [Emphasis Added] The hallmark of any nuclear power plant construction, in fact the item that most distinguishes a nuclear plant construction project from a coal or oil construction project, is its *Nuclear Quality Assurance*.
15. In fact, Nuclear Quality Assurance is so critical that it is codified in law in numerous places within the Code of Federal Regulations. The single most important reference to Nuclear Quality Assurance is within the General Design Criteria (GDC). In fact Criterion 1 of the GDC demands Quality Assurance, and it is so critical to ensuring meeting the NRC mission of ensuring public health and safety that of all 64 General Design Criteria, regulators deliberately chose Nuclear Quality Assurance to be the first Criterion. Without Criterion 1, without nuclear grade quality and nuclear grade materials assured through a rigorous QA program, there might not in fact be any nuclear construction. Criterion 1 states:

“Criterion 1--Quality standards and records. Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of

² NRC Inspection Report 05200033/2009-201 and Notice of Violation October 5, 2009.

the safety functions to be performed. Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function. A quality assurance program shall be established and implemented in order to provide adequate assurance that these structures, systems, and components will satisfactorily perform their safety functions. Appropriate records of the design, fabrication, erection, and testing of structures, systems, and components important to safety shall be maintained by or under the control of the nuclear power unit licensee throughout the life of the unit.”

16. The design of “*structures, systems, and components critical to safety*”³ must begin prior to Detroit Edison’s (DTE) application for a license for ESBWR Fermi Unit 3. Criterion 1 makes it clear that DTE had the responsibility to initiate a full Quality Assurance Program to “*provide adequate assurance that these structures, systems, and components will satisfactorily perform their safety functions*” prior to its COLA for Fermi Unit 3.

17. The responsibility for a Quality Assurance Program is not something that an applicant for a NPP may legally delegate to others. GDC Criterion 1 further emphasizes Detroit Edison’s responsibility,

“Appropriate records of the design, fabrication, erection, and testing of structures, systems, and components important to safety **shall be maintained by or under the control of the nuclear power unit licensee throughout the life of the unit.**”⁴ [*Emphasis Added*]

18. 10 CFR Part 50 Appendix B also applies in its entirety to Quality Assurance for Nuclear Plants such as Fermi. In addition to compliance with the quality related federal regulation inherent in Criterion 1 of the GDC, DTE Fermi Unit 3 must also comply with 10CFR50 Appendix B: Criterion 1 as noted here:

"The applicant shall be responsible for the establishment and execution of the quality assurance program."

19. Once again, 10 CFR Part 50 Appendix B that has the statutory authority that

³ General Design Criteria, Criterion 1, Sentence 1.

⁴ General Design Criteria, Criterion 1, Sentence 4.

demands Detroit Edison Fermi Unit 3 holds the complete responsibility to execute a QA program, and that that responsibility may not be delegated.

20. The evidentiary record delineated by NRC staff emails indicates that the NRC first became aware the violation at DTE Fermi Unit 3 in June of 2009. The following NRC internal email by an NRC staff member with specific knowledge regarding Quality Assurance clearly delineates DTE's non-compliance with the COL requirement of 10 CFR 52:

“From: Rivera-Varona, Aida [Quality Assurance]
Sent: Thursday, June 04, 2009 8:56 AM
To: Hale, Jerry
Cc: Tonacci, Mark; Lipscomb, George; Deschaine, Wesley
Subject: RE: Fermi Conf Call
Jerry/Mark

I think that for the QA topic, we should discuss with them the idea that we are contemplating to have a public meeting instead of the visit. We can tell them that **what we are looking for is their explanation on how they are meeting the requirement of 52.79(a)(25), which requires the applicant to provide a QA program consistent with App B to 10 CFR Part 50 for design, fabrication and construction activities. Although we understand that the FSAR is not a quality document, all design activities performed in support of the FSAR (e.g., siting, geotechnical, departures from the DCD) are quality activities subject to AppB requirements. At this time, the application is not providing an applicant's QA program for these activities as required by 52.79(a)(25). [Emphasis Added]**

Aida

21. The email from NRC QA personnel acknowledges DTE's utter lack of compliance with the QA requirements embedded in the Code of Federal regulations in its COLA application for Fermi Unit 3. As The Honorable Chairman Jaczko emphasized in his presentation to Small- and Medium-Sized Nuclear Reactors (SMR) group,

“... combined license reviews... not only require the regulator to be ready, but it also requires the applicant to be ready... The application needs to be complete when it is initially submitted to the NRC.”

22. As Aida Rivera-Varona noted in the email regarding NRC review of the DTE

COLA, the Detroit Edison Fermi Unit 3 application is not complete. Even more concerning is the fact that the basic tenets of nuclear law as codified in GDC Criterion 1 and 10 CFR Part 50 Appendix B Criterion 1 have not been followed by DTE in its process to build an ESBWR NPP.

23. As Rivera-Varona said in the June 2009 email, **“At this time, the application is not providing an applicant’s QA program for these activities as required by 52.79(a)(25).”** [*Emphasis Added*] Such a statement corroborates the exact emphasis The Honorable Chairman Jaczko placed upon the COLA process in his October statement to the SMR group, when he said, “... combined license reviews... not only require the regulator to be ready, but it also requires the applicant to be ready... **The application needs to be complete when it is initially submitted to the NRC.**” [*Emphasis added*]

24. Accordingly, by linking The Honorable Chairman Jaczko’s statements and NRC commitment to quality regulation with Rivera-Varona’s email trail, the Intervenors’ request for partial suspension of the COLA proceeding is both factually supported and meets the Code of Federal Regulations regulatory requirements. As Rivera-Varona so clearly stated in the June 4, 2009 email,

“52.79(a)(25), which requires the applicant to provide a QA program consistent with App B to 10 CFR Part 50 for design, fabrication and construction activities. Although we understand that the FSAR is not a quality document, **all design activities performed in support of the FSAR (e.g., siting, geotechnical, departures from the DCD) are quality activities subject to AppB requirements.**”⁵ [*Emphasis Added*]

25. There is significant factual data supporting the Intervenors’ petition. I would like to believe that the NRC staff members who drafted the December 1, 2009 NRC

⁵ Rivera-Varona, Aida [Quality Assurance] email sent: Thursday, June 04, 2009.

response *NRC Staff Answer To Supplemental Petition For Admission Of A Newly-Discovered Contention, And For Partial Suspension Of Cola Adjudication* were simply unaware of the substantial email trail and looked at legal filing deadlines rather the evidentiary file compiled in this case within their own organization, however, the evidence provided herein paints an entirely different picture.

26. On my second review of all the evidence herein discussed for my expert report, I became aware that NRC Staff Attorney Marcia Carpentier, who signed the NRC staff response to Intervenors, was copied on many of the emails I reference in my report. As a former licensee Senior Vice-President and a nuclear Whistleblower, who has testified in Congressional Hearings and had all of my allegations substantiated by the Office of the Inspector General, I am further appalled to discover that in fact several of the emails detailing Detroit Edison's flawed QA Program were directed specifically to Attorney Carpentier.
27. Yet, in spite of her personal and professional knowledge of Detroit Edison's transgressions, in her response entitled *NRC Staff Answer To Supplemental Petition For Admission Of A Newly-Discovered Contention, And For Partial Suspension Of Cola Adjudication*, Attorney Carpentier falsely claimed that the Intervenors had no material issue of fact when she wrote,
- “These two categories of issues raised in the discussion of proposed Contention 15 do not raise a genuine dispute on a material issue of law or fact that is susceptible to resolution in a hearing on the COLA, supply a basis for such an issue, or demonstrate that any such issue is within the scope of the proceeding and material to the licensing decision that the NRC must make.”⁶
28. It is even more egregious that on Page 1 of the NRC Staff Answer, the NRC staff recommends that The Atomic Safety and Licensing Board (ASLB) directly contradict The Honorable Chairman Jaczko's demand that all COLAs be complete when filed. Rivera-Varona's email is not simply one person's

⁶ *NRC Staff Answer To Supplemental Petition For Admission Of A Newly-Discovered Contention, And For Partial Suspension Of Cola Adjudication*, Page 18.

opinion in a single stand-alone document, but is part of a series of emails leading all the way to John A. Nakoski, Chief /RA/ Quality and Vendor Branch 2 Division of Construction Inspection & Operational Programs Office of New Reactors, and to Attorney Marcia Carpentier, author of the NRC recommended denial of Intervenor's Petition. The factual evidence reviewed clearly delineates non-compliance by Detroit Edison for Fermi Unit 3 and factual support for partial suspension of DTE's COLA proceedings due to an incomplete application.

29. Back to my detailed review of the factual evidence substantiating a breach by both Detroit Edison and the NRC. It was only six days after NRC QA specialist Aida Rivera-Varona wrote her detailed email that on June 10, 2009 NRC reactor operation engineer Mark Tonacci further clarified the problems at Detroit Edison Fermi Unit 3 by specifically noting that the COL applicant had no quality assurance program in place for design and engineering. See highlights in email:

“From: Tonacci, Mark
Sent: Wednesday, June 10, 2009 8:18 AM
To: Rivera-Varona, Aida; Hale, Jerry; Lipscomb, George
Cc: FermiCOL Resource
Subject: RE: Fermi 3 QA

Aida,

Tried to call you on this yesterday. **They do not have a Fermi QA program for design – that is why they did not send it to you. They decide if the work is safety related and if it is send it to Black and Veatch and use the B&V program.** The actual mechanics I believe have changed several times over the past 2 yrs via different contracts they had in place that invoke proposals with cost information embedded in them.

It does seem like going there will work better just because I believe that sooner or later, what you need to see will be in their contract that have sensitive pricing information. By the way, B&V was used by River Bend to do the geotech work and Entergy (not DTE) did some audits of B&V.

My cell has died today. When I get back this afternoon, time permitting, I will call you and we can discuss. I think this still needs careful looking into.

Mark” *[Emphasis Added]*

30. According to NRC reactor operation engineer Tonacci, “They [DTE] decide if the work is safety related and if it is send it to Black and Veatch and use the B&V program.” Such procedures fly directly in direct opposition to requirements of Criterion 1 of the GDC and Criterion 1 of 10 CFR Part 50 Appendix B, with which DTE Fermi Unit 3 must comply. 10 CFR Part 50 Appendix B also applies in its entirety to Quality Assurance for Nuclear Plants such as Fermi. In addition to compliance with the quality related federal regulation inherent in Criterion 1 of the GDC, DTE Fermi Unit 3 must also comply with 10CFR50 Appendix B: Criterion 1 as noted here:

"The applicant shall be responsible for the establishment and execution of the quality assurance program."

31. As a result, NRC engineer Mark Tonacci has clearly articulated the dilemma posed by the fact that Detroit Edison *determines what items may be safety related and then refers that safety related work to Black and Veatch*. Yet, NRC’s Tonacci acknowledges that there is no Detroit Edison Fermi Unit 3 QA Program in place by which such a determination could be made. This evidence is obviously the statement of the fatal flaw in DTE’s COLA application.

32. Not only is the Detroit Edison COLA application incomplete, it is clear that the Quality Assurance Program of the entire Detroit Edison COLA for Fermi Unit 3 should be thoroughly reevaluated by the NRC and made to meet the requirements of 10 CFR Part 50 Appendix B and 52.79(a)(25). The evidence trail traced through this series of emails, clearly show that Fermi lacked a Design Quality Assurance Program as highlighted below in this Rivera-Varona follow-up email:

“From: Rivera-Varona, Aida
Sent: Monday, June 08, 2009 3:30 PM
To: Hale, Jerry; Lipscomb, George
Cc: Tonacci, Mark
Subject: RE: Fermi 3 QA

Jerry,

I can see why they might think that some of the documents might get into the public, but they need to be clear that based on the regulation they need to provide in the docket QA programs for design, fabrication

and construction activities. We are not talking about the contract documents, and we don't want or we are not expecting to see them as part of the meeting. The only thing that we need them to come and explain is the quality program that they are implementing. Also, it might be beneficial to mention them that we are thinking on performing an inspection later where we will take a look at the contract documents in detail (and where the documents will not need to be made public).

The message that we want to give them is that:

- **They need to explain us (they not need to show us documents on how they are doing it at this time) how they are meeting the requirement of 52.79(a)(25). They need to explain which DTE program was used for all design activities performed in support of the FSAR (e.g., sitting, geotechnical, departures from the DCD). The application is not providing an applicant's QA program for design activities in support of the application as required by 52.79(a)(25).**

- **This issue puts into question the quality of the overall application.** *[Emphasis Added]*

Let me know if you have any other question.

Thanks!

Aida”

33. In the following email, Rivera-Varona of the NRC Quality Assurance Program, clearly identifies that Detroit Edison Fermi Unit 3 has not met the statutory requirements for a licensee COLA. The attached email also indicates that the NRC knew that Detroit Edison Fermi Unit 3 has abrogated its responsibilities as a licensee by failing to have a QA Program in place, “At this time, the application is not providing an applicant's QA program for these activities as required by 52.79(a)(25).” NRC QA staff further emphasizes its concerns in bold in stating, “**how the applicant will retain responsibility for, and maintain control over, those portions of the QA program delegated to other organizations**”... “**FSAR should identify the responsible organization and the process for verifying that delegated QA functions are effectively implemented.**” *[Emphasis created in original NRC document, not added by expert.]*

“From: Rivera-Varona, Aida
Sent: Thursday, June 11, 2009 7:56 AM
To: Tonacci, Mark; Carpentier, Marcia

Cc: Hale, Jerry; Lipscomb, George; Cruz, Jeffrey; FermiCOL
Resource; Nakoski, John
Subject: RE: Fermi QA Issue

Marcia,

Mark gave a general explanation of the issue. Here are more details:

First, Fermi is not meeting the requirements of 52.79(a)(25), which requires the applicant to provide a QA program consistent with AppB to 10 CFR Part 50 for design, fabrication and construction activities. Although we understand that the FSAR is not a quality document and is a licensing document subject to 52.6, **all design activities performed in support of the FSAR (e.g., siting, geotechnical, departures from the DCD) are quality activities subject to AppB requirements. At this time, the application is not providing an applicant's QA program for these activities as required by 52.79(a)(25).** Fermi does submitted with the application a QA program for construction and operations.

Second, we understand that the regulations allows for delegation of QA programs to other organizations. However the Reg Guide 1.206 is very clear that the FSAR should also clearly delineate those QA functions that are implemented within the applicant's QA organization and those that are delegated to other organizations. In addition, the Reg guide states that the FSAR should describe **how the applicant will retain responsibility for, and maintain control over, those portions of the QA program delegated to other organizations.** Based on the application and the phone calls we have done with DTE, there is no description of how they are maintaining this responsibility and under which program. The Reg Guide clearly states that the **FSAR should identify the responsible organization and the process for verifying that delegated QA functions are effectively implemented.** Also, based on the calls we have had, DTE has rely on others for verification of implementation.

Aida”⁷

34. The tone of frustration by the NRC staff as it attempted to elicit compliance from Detroit Edison Fermi Unit 3 is evident in the following NRC email by engineer Tonacci. DTE clearly rebuffed the staff's efforts to rectify this statutory breach by DTE. *[Emphasis Added]*

“From: Tonacci, Mark
Sent: Wednesday, June 10, 2009 5:32 PM
To: Carpentier, Marcia

⁷ *Emphasis created in original NRC document, not added by expert.*

Cc: Hale, Jerry; Lipscomb, George; Rivera-Varona, Aida; Cruz, Jeffrey; FermiCOL Resource
Subject: Fermi QA Issue

Marcia,

Can you help us understand the potential QA issue that is developing regarding the Fermi 3 COLA. As I understand it today, **Detroit Edison (DTE) does not have a QA program for the design phase of Fermi 3.** They have contracted with a vendor, Black and Veatch, for engineering services and use their QA program. When work is needed, DTE decides if it is safety related, and if so uses Black and Veatch. **Our QA folks believe DTE needs to have oversight of B&V in the form of a QA program and without it their application is incomplete.**

After several phone calls that were unproductive, we have invited DTE to come explain their QA to us on June 29 at 10 AM. We are still developing the specifics of the issue that concerns us. This deals with 52.79(a)(25) and RG 1.206 C I 17.5.3. Can you give us your perspective on this issue please?

Aida - did I miss anything?

Mark? *[Emphasis Added]*

35. Again, as the Intervenors notified NRC it their petition, Tonacci made it clear that the DTE Fermi Unit 3 COLA is incomplete thus saying so, “Our QA folks believe DTE needs to have oversight of B&V in the form of a QA program and without it their application is incomplete.” Once again, NRC engineer Mark Tonacci has plainly articulated the dilemma posed by the fact that Detroit Edison *determines what items may be safety related and then refers that safety related work to Black and Veatch.* Yet, NRC’s Tonacci acknowledges that there is no Detroit Edison Fermi Unit 3 QA Program in place by which such a determination could be made. This evidence is obviously the statement of the fatal flaw in DTE’s COLA application.
36. Besides substantiating the issues raised in Intervenors’ Petition, Tonacci’s email is directly addressed to Staff Attorney Carpentier, the author of the NRC denial to Intervenors’ Petition, making it clear to all parties that this particular NRC attorney had factual evidence proving the Intervenors’ allegations.

37. Finally, in late June of 2009 the NRC indicated that the entire DTE Fermi COLA was in jeopardy due to its lack of a Quality Assurance Program on the design and engineering to support the FSAR application [*Emphasis Added*]:

“June 23, 2009

MEMORANDUM TO: Jeffrey Cruz

ESBWR/ABWR Projects Branch 1

Division of New Reactor Licensing

Office of New Reactors

FROM: John A. Nakoski, Chief /RA/

Quality and Vendor Branch 2

Division of Construction Inspection & Operational Programs

Office of New Reactors

SUBJECT: FERMI 3 APPLICATION QUALITY ASSURANCE
(QA) PROGRAM

The purpose of this memorandum is to document a concern with the Fermi 3 COL application. No response to this memorandum is required. As the result of my staff's review of the Fermi 3 Combined License Application, Part 2: Final Safety Analysis Report (FSAR), Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permits, and New License Applicants," **it is not evident that the FSAR provides for a QA program that governs the design activities performed in support of the FSAR.** Specifically, CQVB staff needs to understand how DTE is meeting the requirements of 52.79(a)(25), which requires the applicant to provide a QA program consistent with Appendix B to 10 CFR Part 50 (Appendix B) for design, fabrication and construction activities. DTE needs to clarify which DTE QA programs were used for all safety-related design activities performed in support of the FSAR (e.g. site characterization, geotechnical, departures from the DCD). Section 17.5 of the FSAR states that the COL Application Project has been performed under a DTE contract issued to Black and Veatch, which included safety-related activities in support of the application. It also states that DTE provided oversight of the contracted activities by way of procurement control and oversight / surveillances. Within the context of our acceptance review this was sufficient information to conclude that the application was adequate for us to continue our review. On the surface, the DTE approach appeared consistent with the practice used during the development of other COL applications. However, based on our continued review, **the staff determined that the oversight provided by DTE was not governed by a DTE QA program meeting the requirements of Appendix B.** Even though the requirements for Appendix B allows for the delegation of QA programs to other organizations, the guidance of

Regulatory Guide 1.206 states that the FSAR should describe how the applicant will retain responsibility for, and maintain control over, those portions of the QA program delegated to other organizations. The guidance also states that the FSAR should identify the responsible organization and the process for verifying that delegated QA functions are effectively implemented. After a review of their submission and subsequent discussions during conference calls, it is not clear how DTE has met these requirements.

These concerns will be assessed during an inspection, but in any case, are of sufficient concern at this time that they might question the quality of the overall application.” *[Emphasis Added]*

38. Not only do NRC regulations require a fully functional QA program be in place and be the responsibility of the applicant prior to developing a license application, but the best practices within the nuclear industry also support the same conclusion.

39. It is an incontrovertible fact that the entire nuclear industry, through its trade organization, the Nuclear Energy Institute (NEI), so undeniably recognizes and emphasizes the need to implement a Quality Assurance Program before applying to the NRC for a license that NEI has developed its own *Quality Assurance Program Description*. Moreover, NEI has written a boilerplate template for license applicants, like DTE Fermi Unit 3, in a simplified fill-in-the-blanks format so that a COLA is almost assuredly guaranteed if each step in the COLA process is followed as NEI has outlined.

40. A basic reading of the NEI *Quality Assurance Program Description* alerts the reader to the fact that NEI and the nuclear industry as a whole adhere to the fact that a Quality Assurance Program must be in place prior to the start of any NPP licensing process. In paragraph 1.5.2 NEI said,

“1.5.2 Quality Assurance

The [CA] Quality Assurance Organization is responsible for independently planning and performing activities to verify the development and effective implementation of the [CA] QAPDs including but not limited to [Nuclear Development], engineering, licensing, document control, corrective action program and

procurement that support new nuclear plant generation.”⁸ [Emphasis in original NEI document.] NEI 06-14 [Revision 7], Quality Assurance Program Description, July 2009.

41. NEI was quite specific as to its delineation of the order that a newly created Quality Assurance Program must follow as it develops its COLA, beginning with engineering which precedes licensing on the NEI list. Such order is not simply an artifact of alphabetical listing, since licensing is then followed by “document control” which clearly occurs earlier in the alphabet than licensing. NEI’s delineation is another clear indication of the industry’s recognition that a functioning QA system is one of the first steps in the COLA process and not merely an arbitrary postscript to the COLA.
42. In its license submittal to the NRC Detroit Edison parrots the NEI position 1.5.2 almost verbatim.

“1.4 Quality Assurance

The Detroit Edison quality assurance (QA) organization is responsible for independently planning and performing activities to verify the development and effective implementation of the Fermi 3 QAPD including but not limited to engineering, document control, corrective action program and procurement that support new nuclear plant generation.” Chapter 17, Revision 1, March 2009.

43. Furthermore, NEI restates the nuclear industry’s position that a functioning QA Program is required before applying for its license in the second chapter of its QA Program Description. Specifically, NEI states:

“SECTION 2 QUALITY ASSURANCE PROGRAM
[CA]has established the necessary measures and governing procedures to implement the QAP as described in the QAPD. [CA] is committed to implementing the QAP in all aspects of work that are important to the safety of the nuclear plant[s] as described and to the extent delineated in the QAPD. Further, [CA] ensures through the systematic process described herein that its suppliers of safety-related equipment or services meet the applicable requirements of 10 CFR 50, Appendix B. Senior management is regularly apprised of the adequacy of implementation of the QAPD through the audit functions described in Part II, Section 18.

⁸ NEI 06-14 [Revision 7], *Quality Assurance Program Description*, July 2009

The objective of the QAPD is to assure that *[CA]*'s nuclear generating plant/s are/is/*[designed, constructed, and operated]* in accordance with governing regulations and license requirements. The program is based on the requirements of ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications," as further described in this document. The QAPD applies to those quality-related activities that involve the functions of safety-related structures, systems, and components (SSCs) associated with the *[design (excluding Design Certification activities), fabrication, construction, and testing of the SSCs of the facility and to the managerial and administrative controls to be used to assure safe operations]*. *[Examples of ESP/COL program safety-related activities include, but are not limited to, site-specific engineering related to safety-related SSCs, site geotechnical investigations, site engineering analysis, seismic analysis, and meteorological analysis.]* A list or system that identifies SSCs and activities to which this program applies is maintained at the appropriate facility. *[The Design Certification Document is used as the basis for this list.]* Cost and scheduling functions do not prevent proper implementation of the QAPD.⁹
[Emphasis in original NEI document.]

44. It is important to note that in the first paragraph NEI clearly states that a Quality Assurance Program is required "... in all aspects of work that are important to the safety of the nuclear plant..." and also that in the second paragraph, NEI states "The QAPD applies to those quality-related activities that involve the functions of safety-related structures, systems, and components (SSCs) associated with the associated with the *[design (excluding Design Certification activities), fabrication, construction, and testing of the SSCs of the facility and to the managerial and administrative controls to be used to assure safe operations]*." Clearly, "design" activities leading up to the filing of a COLA application are "safety related" and therefore require a Quality Assurance Program according to NEI.
45. Equally important in the second paragraph is the only item that NEI excludes from the role of QA. The only item that NEI excludes from the role of a QA organization is the "Design Certification activities" which relate only to the generic application. Therefore, site-specific portions of the license application are still subject to the

⁹ NEI 06-14 [Revision 7], *Quality Assurance Program Description*, July 2009

licensee's QA program. NEI then continues by specifically including within the scope of the QA organization "...site-specific engineering related to safety-related SSCs, site geotechnical investigations, site engineering analysis, seismic analysis, and meteorological analysis."

46. Once again in its license submittal to the NRC Detroit Edison claims to be in compliance when it parrots the NEI Section 2 almost verbatim:

"SECTION 2 QUALITY ASSURANCE PROGRAM

Fermi 3 has established the necessary measures and governing procedures to implement the QAP as described in the QAPD. Fermi 3 is committed to implementing the Quality Assurance Program in all aspects of work that are important to the safety of the nuclear plants as described and to the extent delineated in this QAPD. Further, Fermi 3 ensures through the systematic process described herein that its suppliers of safety-related equipment or services meet the applicable requirements of 10 CFR 50, Appendix B. This QAPD also applies to certain nonsafety-related structures, systems, components and activities to a degree consistent with their importance to safety. Senior management is regularly apprised of audit results evaluating the adequacy of implementation of the QAP through the audit functions described in the Audit Section of this QAPD.

The objective of the QAP is to assure that Fermi 3 nuclear generating plant is designed constructed and operated in accordance with governing regulations and license requirements. The program is based on the requirements of ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications," as further described in this document. The QAPD applies to those quality-related activities that involve the functions of safety-related structures, systems, and components (SSCs) associated with the design, licensing, construction and operation of new nuclear power plants as described in the COL Final Safety Analysis Report. Examples of COL safety-related activities include, but are not limited to, site specific engineering related to safety-related SSCs, site geotechnical investigations, site engineering analysis, seismic analysis, and meteorological analysis. A list or system identifying SSCs and activities to which this program applies is maintained at the appropriate facility. The Design Certification Document is used as the basis for this list. Cost and scheduling functions do not prevent proper implementation of the QAP.¹⁰

¹⁰ DTE Fermi Unit 3 COLA, Chapter 17, revision 1, March 2009

47. Finally, the fourth paragraph of Chapter 2 shows that the nuclear industry clearly acknowledges that activities prior to license submittal are included in the applicant's QA Program. The NEI states:

“For the [ESP and/or COL] applications, the QAPD applies to those [Nuclear Development] and [CA] activities that can affect either directly or indirectly the safety-related site characteristics or analysis of those characteristics. In addition, the QAPD applies to engineering activities that are used to characterize the site or analyze that characterization.”¹¹

48. Then again DTE Fermi Unit 3 quotes the NEI industry-recommended paragraph almost verbatim in the fifth paragraph of Section 2, Chapter 17 of its COLA.

“For the COL application, this QAPD applies to those Fermi 3 activities that can affect either directly or indirectly the safety-related site characteristics or analysis of those characteristics. In addition, this QAPD applies to engineering activities that are used to characterize the site or analyze that characterization.”¹²

49. Leaving nothing to happenstance, Section 18 of the NEI *Quality Assurance Program Description* addresses Audits, and once again clearly articulates that a QA program must be in place prior COLA. In, Section 18.1 NEI said,

“18.1 Performance of Audits

Internal audits of selected aspects of licensing, design, construction phase and operating activities are performed with a frequency commensurate with safety significance and in a manner which assures that audits of safety-related activities are completed. During the early portions of [Nuclear Development] activities, audits will focus on areas including, but not limited to, [site investigation], procurement, and corrective action. Functional areas of an organization's QA program for auditing include, at a minimum, verification of compliance and effectiveness of implementation of internal rules, procedures [(e.g., operating, design, procurement, maintenance, modification, refueling, surveillance, test, security, radiation control procedures, and the emergency plan), Technical Specifications, regulations and license conditions, programs for training, retraining,

¹¹ NEI 06-14 [Revision 7], *Quality Assurance Program Description*, July 2009, Chapter 2, paragraph 4.

¹² DTE Fermi Unit 3 COLA, Chapter 17, revision 1, March 2009, Chapter 17, Section 2, paragraph 5.

qualification and performance of operating staff, corrective actions, and observation of performance of operating, refueling, maintenance and modification activities, including associated record keeping]¹³.

50. It is clear in NEI Paragraph 18.1 that a full QA Program must be in place prior to tendering a COLA to the NRC “During the early portions of *[Nuclear Development]* activities, audits will focus on areas including, but not limited to, *[site investigation]*, procurement, and corrective action. Functional areas of an organization's QA program for auditing include, at a minimum, verification of compliance and effectiveness of implementation of internal rules, procedures... *Technical Specifications, regulations and license conditions.*” According to NEI, all such activities are required prior to COLA.
51. Once again Detroit Edison Fermi Unit 3’s COLA implies compliance that does not exist. The DTE COLA regurgitates a modified NEI COLA template. Detroit Edison’s Fermi 3 COLA state:

“18.1 Performance of Audits

Internal audits of selected aspects of licensing, design, construction phase and operating activities are performed with a frequency commensurate with safety significance and in a manner which assures that audits of safety-related activities are completed. During the early portions of Fermi 3 COL activities, audits will focus on areas including, but not limited to, site investigation, procurement, and corrective action. Functional areas of an organization’s QA program for auditing include at a minimum verification of compliance and effectiveness of implementation of internal rules, procedures (e.g., operating, design, procurement, maintenance, modification, refueling, surveillance, test, security, radiation control procedures, and the emergency plan), Technical Specifications, regulations and license conditions, programs for training, retraining, qualification and performance of operating staff, corrective actions, and observation of performance of operating, refueling, maintenance and modification activities, including associated record keeping.”¹⁴

52. DTE makes it clear that its management did not fail to recognize the specific QA

¹³ NEI 06-14 [Revision 7], *Quality Assurance Program Description*, July 2009, Chapter 2, paragraph 18.1.

¹⁴ DTE Fermi Unit 3 COLA, Chapter 17, revision 1, March 2009, Chapter 18.1

requirements for a ESBWR COLA, but instead simply failed to implement the very program to which it committed and to which the NRC is responsible to make licensees adhere. As DTE said in its COLA, “Functional areas of an organization’s QA program for auditing include at a minimum verification of compliance and effectiveness of implementation of internal rules, procedures (e.g., operating, design, procurement, maintenance, modification, refueling, surveillance, test, security, radiation control procedures, and the emergency plan), Technical Specifications, regulations and license conditions...” etc.

53. As the evidentiary trail of emails has proven, a thorough reading of the DTE Fermi Unite 3 COLA makes it clear that DTE knew and acknowledged its QA responsibilities, and now having been caught without implementation of GDC Criterion 1, the corporation is attempting to obfuscate the entire process rather than go back to the beginning and start over with a valid QA Program in place.
54. In his prepared remarks to the nuclear industry at the American Nuclear Society Meeting November 16, 2009, The Honorable Gregory B. Jaczko Chairman of the U.S. Nuclear Regulatory Commission admonished the industry to do what is required by statute and not to let complacency or economics rule their adherence to the law. Let me quote and highlight in bold several applicable points that pertain to the predicament in which DTE now finds itself with its incomplete COLA. The Honorable Jaczko said,

“...Today I will briefly address two topics: applications to build new reactors and existing reactors.

The Commission has made dramatic changes to the regulations to make the application review process a more straightforward and predictable effort. But as you know, **I have not been shy about pointing out that no applicants are following the Part 52 licensing process as it was envisioned.** I do not say that to criticize anyone’s approach but rather to explain the facts. This is a complicated endeavor and there is no requirement to follow Part 52 as it was envisioned.

...There is a quote that I like, in the novel *Hocus Pocus* by Kurt Vonnegut: “Another flaw in the human character is that everybody wants to build and **nobody wants to do maintenance.**”

...Gone for now – at least in the short term – are the days of burgeoning utility revenues which made it relatively easy to reinvest the profits from nuclear plants back into nuclear infrastructure. Gone too, is the single-minded focus on the existing nuclear plants, as more and more utilities expend resources on the effort to build new ones. And gone also, is the initial challenge of striving to meet the standards of a novel reactor oversight process and a new force- on-force inspection regime.

All of these pressures – a weakened economy and a recent decrease in load demand, the development of new reactors applications and potential new construction, and some complacency about a ten-year-old reactor oversight process – pose a real and tangible risk, threatening to divert attention from safety and security goals. They can lead to distraction and complacency.”¹⁵

55. Detroit Edison seems to be one of the applicants acknowledged by The Honorable Jaczko not meeting the COLA process as envisioned by the NRC and even more clearly articulated by the NEI on behalf of the industry as a whole.
56. The evidence I reviewed shows that Detroit Edison deliberately chose to emasculate the QA manager’s critical role in its organization. Whether it is as The Honorable Jaczko suggests an issue of “a weakened economy and a recent decrease in load demand” or “distraction and complacency”, there is “a real and tangible risk, threatening to divert attention from safety and security goals.”
57. Specifically, NEI and the industry have highlighted the role of the QA Project Manager as a key contributor to the successful implementation of a valid and operational QA Program. In its QA Program Description, NEI further elaborates on the necessity of an operational QA Program directed by a Quality Assurance Program Manager prior to COLA submission. In Paragraph 1.5.2.1.1 of its *Quality Assurance Program Description* NEI describes the role of the QA manager thus:
“1.5.2.1.1 [Nuclear Development] Quality Assurance Project Manager

¹⁵ *Keeping the Focus on Safety*, Prepared Remarks for The Honorable Gregory B. Jaczko Chairman U.S. Nuclear Regulatory Commission to the American Nuclear Society November 16, 2009, No. S-09-034

The [Nuclear Development] Quality Assurance Project Manager (QAPM) reports administratively to the [CA] QA Manager and functionally to the Senior Nuclear Development Officer, and is responsible for the development and verification of implementation of the QAPD described in this document. The QAPM is responsible for assuring compliance with regulatory requirements and procedures through audits and technical reviews; ensuring that vendors providing quality services, parts and materials to [CA] are meeting the requirements of 10 CFR 50, Appendix B through NUPIC or [CA] vendor audits. The QAPM has sufficient independence from other [Nuclear Development] priorities to bring forward issues affecting safety and quality and makes judgments regarding quality in all areas necessary regarding [CA]'s [Nuclear Development] activities. The QAPM may make recommendations to the [Nuclear Development] management regarding improving the quality of work processes. If the QAPM disagrees with any actions taken by the [ND] organization and is unable to obtain resolution, the QAPM shall inform the QA Manager and bring the matter to the attention of the Senior Nuclear Development Officer] who will determine the final disposition.”¹⁶

58. More specifically, NEI makes it clear that “ensuring that **vendors** providing quality services, parts and materials to [CA] are meeting the requirements of 10 CFR 50, Appendix B through NUPIC or [CA] vendor audits” is one of the responsibilities of the QA Program Manager. Instead of following this critical protocol, DTE abrogated its licensee responsibilities by turning any QA over to **vendor** Black & Veatch with no statutorily obligated oversight, and with no QA Program in place with which to make such an evaluation.
59. In particular, NEI clearly articulates the NRC requirements that the regulatory requirements of the COLA must have a QA Project Manager in place to assure regulatory compliance. In direct opposition to the statutory requirement and industry methodology well articulated by NEI, Detroit Edison proposed a much weaker role for its overall quality function. The paragraph in the DTE Fermi Unit 3 COLA should ostensibly parallel NEI paragraph 1.5.2.1.1 [Nuclear Development] Quality Assurance Project Manager. Instead, the Fermi position on QA is much weaker than the nuclear industry view as articulated for applicants by NEI.

¹⁶ NEI 06-14 [Revision 7], *Quality Assurance Program Description*, July 2009.

“1.4.1 New Plant Oversight Manager

The new plant oversight manager is responsible for developing and maintaining the Fermi 3 QAPD, evaluating compliance to the programs, and managing QA resources. The new plant oversight manager is responsible for assuring compliance with regulatory requirements and procedures through audits and technical reviews; for monitoring organization processes to ensure conformance to commitments and licensing document requirements; for ensuring that vendors providing quality services, parts and materials to Fermi 3 are meeting the requirements of 10 CFR 50, Appendix B through NUPIC or Fermi 3 vendor audits.

The new plant oversight manager has sufficient independence from other department priorities to bring forward issues affecting safety and quality and makes judgments regarding quality in all areas necessary regarding Fermi 3 nuclear activities. The new plant oversight manager may make recommendations to management regarding improving the quality of work processes. If the new plant oversight manager disagrees with any actions taken by other Fermi 3 organizations and is unable to obtain resolution, the new plant oversight manager shall bring the matter to the attention of the executive in charge of the MEP organization who will determine the final disposition.”¹⁷

60. There are glaring differences between Fermi’s view of the role of the “Plant Oversight Manager” and NEI’s opinion of the need for a strong “Quality Assurance Project Manager.” (QAPM) These include:
 - 60.1. The title of “Quality Assurance” does not appear in the DTE Fermi Unit 3 job description.
 - 60.2. The NEI believes that the QAPM should report “functionally to the Senior Nuclear Development Officer” but the reporting relationship is much weaker within the DTE Fermi organization. In fact, at DTE Fermi Unit 3, there is no defined reporting relationship to Senior Management.
 - 60.3. NEI states that the QAPM is broadly “responsible for the development and verification of implementation of the QAPD described in this document” while the DTE Fermi Unit 3 Oversight Manager has the simplified and much weaker role limited to “developing and maintaining the Fermi 3 QAPP.” The words in

¹⁷ DTE Fermi Unit 3 COLA, Chapter 17, revision 1, March 2009, Chapter 18.1

the DTE Fermi Unit 3 COLA unveil the fact that Detroit Edison's senior managers have deliberately eliminated any verification role from the job description of the Oversight Manager.

60.4. If quality related problems are discovered and are unable to be resolved, NEI states that it is critically important for the QAPM to “inform the QA Manager and bring the matter to the attention of the Senior Nuclear Development Officer] who will determine the final disposition.” No such authority is vested in the DTE Fermi Unit 3 Oversight Manager whose reduced QA oversight role is simply to “bring the matter to the attention of the executive in charge of the MEP organization who will determine the final disposition”.

60.5. The difference between the NEI articulated industry perception of a bona fide QA Program and the DTE Fermi Unit 3 program is significant. The NEI specifies that the entire Corporate Quality Organization and Senior Executives should be involved QA problem resolution, while the DTE Fermi Unit 3 program severely limits the role of the “Oversight Manager” to effect organizational change.

61. In the first place, it is clear that this reduction in the role from the NEI approved “Quality Assurance Project Manager” to the Detroit Edison Fermi Unit 3 program of using a “Plant Oversight Manager” instead has created a spate of recent problems at DTE Fermi Unit 3. Simply put, Quality Assurance is not the same as minimal oversight, and Detroit Edison is scoffing at industry-wide protocols by applying for this position in its COLA.

62. In the second place, it appears that the Nuclear Regulatory Commission's quality assurance review staff missed the critical distinction between the industry-wide title, role, and job description of “Quality Assurance Project Manager” compared to the reduced “Plant Oversight Manager” role created by Detroit Edison.

63. In the third place, on November 16, 2009, the Office of the Inspector General issued an Audit Report entitled *Audit of NRC's Quality Assurance Planning for New*

Reactors that was highly critical of the NRC's QA staff. The OIG report stated:

“The coordination among NRO branches of QA reviews during the combined license application review process, when it occurs, is informal. Sections of the standard review plan specify that the responsible technical reviewer will coordinate the applicable QA reviews with the NRO's QA branches. However, this coordination is not clearly defined and there is no process in place to ensure that it occurs. Consequently, there is no way to verify that the QA review coordination has occurred, nor that all the QA portions of the standard review plan technical chapters have been fully satisfied.”¹⁸

64. Specifically, the OIG identified a lack of clearly defined coordination and the inability to verify QA review coordination that has occurred in the NRC QA review of all license applications similar to that of Detroit Edison Fermi Unit 3.
65. More specifically, Detroit Edison's laxity in organizational reporting relationships and the reduced role of QA at DTE Fermi Unit 3 compared to the industry standard articulated by NEI are areas that the NRC should have reviewed according to federal statute as delineated in the Code of Federal Regulations. Apparently, breakdowns within the NRC's review staff may have also contributed to the existing QA problems on the DTE Fermi Unit 3 docket.
66. In particular, an example of such breakdown is evidenced in the NRC staff response to Intervenors' petition, in which NRC staff either neglected to do a thorough investigative job, did not have the proper training and nuclear engineering background to understand the magnitude of the issues, or purposely chose to ignore factual evidence because NRC **“personnel [once again] relied upon the assurances of the licensee”**¹⁹. The series of internal NRC emails already detailed in my report create a clear and factual evidentiary trail regarding the NRC's knowledge of Detroit Edison's mismanagement of the QA Program required for its COLA.

¹⁸ *Audit of NRC's Quality Assurance Planning for New Reactors, OIG-10-A-02*, November 16, 2009.

¹⁹ Direct Quote from July 29, 1992 letter from Inspector General David Williams to then NRC Commissioner Ivan Selin.

67. Moreover, none of this evidence is new. In 1990 as the Senior Vice President of a nuclear licensee involved with more than 70 Nuclear Power Plants nationwide, I alerted the NRC staff to similar issues. The staff neglected to respond to my concerns. Therefore, in 1991, 1992, and 1993, at the request of several U.S. Senators, I worked with members of the U.S. Senate and the NRC Office of Inspector General to ascertain the level of fraud and technical competency of the NRC's own staff. During this time period, Senator John Glenn and Senator Joseph Lieberman called for a thorough investigation by the Office of the Inspector General. In a July 29, 1992 letter from Inspector General David Williams to then NRC Commissioner Ivan Selin, Inspector General Williams said, [emphasis added]

“...My office has conducted three inquiries involving inspection activities... **a common denominator among the three is that...personnel relied on the representations made by licensees that were inaccurate or untrue. The representations were not adequately examined or verified until external influences forced an independent review.** I believe that this common denominator requires our attention.” [Emphasis Added]

68. The Report of NRC Inspector General David Williams was not unique only to my allegations but became part of a nationwide expose on errors made by the nuclear industry. *The Cleveland Plain Dealer* series regarding NRC mishaps was runner-up for the Pulitzer Prize in 1993 and is described below:

"In 1992, the Cleveland Plain Dealer and reporters Ted Wendling and Dave Davis wrote "Lethal Doses: Radiation That Kills," a searing examination of medical treatment gone wrong -- needlessly, hopelessly, tragically wrong -- and the pathological failure of the Nuclear Regulatory Commission to do anything about it. Based on a computer-assisted review of more than 10,000 pages of state and federal records obtained under Freedom of Information laws, as well as on more than 150 interviews with doctors, lawyers, government officials, and radiation victims, the five-part series (December 13-17, 1992) detailed case after case in which shoddy machinery and sloppy procedures had led to disfigurement and death -- shrouded or buried by hospital administrators and the federal agency created to oversee the civilian uses of nuclear materials. By the time the series ended, Congress had announced two immediate investigations and the NRC had promised reform. **As the agency's chairman said of the series to**

a reporter from The New York Times,
"They're telling us stuff we didn't know." [*Emphasis Added*]
Columbia Journalism Review
http://backissues.cjrarchives.org/year/93/2/d_1.asp

69. One part of this award-winning series concerned information I provided to the NRC Office of the Inspector General (OIG) concerning inadequate inspections and cozy personal relationships between NRC inspectors and licensees. These OIG findings resulted in Congressional hearings by Senator John Glenn in May 1993 where the full scope of the Cleveland Plan Dealer investigation was discussed. The full text may be found at

http://www.archive.org/stream/federalregulatio00unit/federalregulatio00unit_djvu.txt.

70. Public evidence and documented personal knowledge show that the NRC was notified of its conflict of interest in the regulation of its licensees almost 20-years ago, and yet the agency continues to rely upon the assurances of its licensees rather than the factual evidence presented to NRC staff during evaluative processes or submitted by Intervenors or Whistleblowers.

71. Following errors made by NRC employees during 1990 inspections, I notified the NRC Inspector General in 1991 that NRC employees had made mistakes during an inspection because they did not have adequate staff and that other NRC staffers were accepting illegal gratuities from licensees. My allegations were substantiated and also led to Congressional hearings in 1993. From the hearing transcript before the Committee on Governmental Affairs, May 6, 1993, page 22: [*Emphasis Added*]

Committee Chairman Senator John Glenn:

"...What is the NRC doing to assure that Commission employees don't engage in potential conflict of interest practices?"

NRC former Chairman Ivan Selin:

"...It is true. Everything Mr. Gundersen said was absolutely right; he performed quite a service..."

Selin continued, stating that the conflict of interest issue is

"...much more troublesome because, to be frank, it's not just a question of who was paying for the lunches, but why these people were having lunch together in the first place. I mean it was the familiarization and the fraternization that was more worrisome... We are very concerned about this situation. We are sharpening our regulations, but in this case there is no question that the actions happened as described by the IG, people knew or should have known that they should not have done these actions...**But that is a very worrisome situation- both of fraternization with the licensees** and then the well-meaning but very dangerous practice of recommending people to licensees to help them solve problems."

Committee on Governmental Affairs, May 6, 1993, transcript page 3:

Senator Glenn:

"I would like to acknowledge the efforts of Senator Lieberman...Senator Lieberman's diligence in the oversight of the NRC and the work of the NRC's Office of Inspector General...The OIG review resulted in the re-inspection and validation of a number of allegations raised by Connecticut citizen Mr. Arnold Gundersen, which originally were **missed by a faulty NRC inspection.**"

Committee on Governmental Affairs, May 6, 1993, transcript page 5:

Senator Lieberman:

"Mr. Gundersen then contacted my office, presenting us with allegations that the original inspection was faulty and we passed those along to the NRC...**The second report, which the committee is releasing today concerns allegations that the NRC staff...did not maintain an arm's length relationship with the personnel from Nuclear Energy Services...** The report highlighted several practices ... by NRC personnel that gave the appearance that NRC staff... were not maintaining a proper regulatory relationship with personnel of this private company."

Committee on Governmental Affairs, May 6, 1993, transcript page 6:

Senator Lieberman:

"In response to the NRC's handling of the original Gundersen allegations... I have requested the NRC's Inspector General to conduct a comprehensive review of the way the Commission is handling whistleblower complaints. The IG will in fact be looking at questions such as **whether NRC personnel are too trusting of**

statements made to their own inspectors...by some of the licensees."

CONCLUSION

72. First, based upon NRC emails beginning in June 2009, it is abundantly clear to me that the NRC has been and is fully aware that the Intervenor's Petition is factually accurate and poses grave concerns about the quality of the Detroit Edison Fermi Unit 3 COLA.
73. Second, the Code of Federal Regulations makes it abundantly clear that a formal QA Program must be in place well before the Detroit Edison Fermi Unit 3 COLA was to be reviewed by the NRC.
74. Third, further factual evidence reviewed and presented in this report show that the Detroit Edison Fermi Unit 3 actually has agreed that a complete and thorough Quality Assurance Program is required for site-specific activities well prior to its COLA submittal to the NRC as it wrote in its COLA in the very language articulated for the nuclear industry by NEI.
75. Fourth, the factual record shows that the actual Root Cause of the DTE Fermi Unit 3 QA Program failure is the direct result of significant differences between the critical position of "Quality Assurance Project Manager" as envisioned by the nuclear industry and articulated by NEI and the dramatically weaker and limited role of "Plant Oversight Manager" that has been created by Detroit Edison at Fermi Unit 3 as a vehicle to escape required nuclear regulation.
76. As a result, this weakened role for the Quality Assurance organization is the Root Cause of the current hole in a statutorily mandated Quality Assurance Program at the DTE Fermi Unit 3, and it also portends serious problems in the future of Fermi Unit 3 if construction is permitted. Such a weakened and happenstance QA program in comparison to NEI articulated industry standards foretells of Unit-wide QA issues should the NRC look the other way and not fulfill its statutory obligations.

77. Consequently, the differences in the organizational approaches toward QA well articulated by NEI compared to that created by Detroit Edison at its Fermi Unit 3 are not merely semantic nuances. Quite simply, the weakened role that DTE has chosen to give to its “Oversight Manager” indicates that the very senior levels of Detroit Edison do not comprehend the importance of a fully independent QA Organization as envisioned the nuclear industry, articulated by NEI and mandated by statute.
78. Naturally, the independence of the role of the Quality Assurance Project Manager as envisioned by NEI places Quality before Profit. The role of “Plant Oversight Manager” as limited by the Senior Management at Detroit Edison emasculates Quality Assurance and appears to place a premium on speed and profitability rather than public health and safety.
79. After all, the factual evidence and evidentiary trail exposed and detailed within this expert report clearly supports the Intervenor’s *Supplemental Petition For Admission Of A Newly- Discovered Contention, And For Partial Suspension Of Cola Adjudication*. In my opinion, all work on the Detroit Edison Fermi Unit 3 should stop and not be reinstated until a bona fide QA Program is fully implemented as mandated by the Code of Regulations.
80. Finally, all work done to date requires serious review and the pedigree of the Quality Assurance supporting that work must be evident. This inadequacy of Quality Assurance cannot be remedied simply through the hiring of additional personnel. This significant disparity over the role and independence of QA between Detroit Edison and the NRC and nuclear industry must be addressed by the NRC and rectified by Detroit Edison.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this day, December 8, 2009 at Burlington, Vermont.

 /s/

Arnold Gundersen, MSNE

Chief Engineer, Fairewinds Associates, Inc

CURRICULUM VITAE
Arnold Gundersen
 Chief Engineer, Fairewinds Associates, Inc
 November 2009

Education and Training

ME NE	Master of Engineering Nuclear Engineering Rensselaer Polytechnic Institute, 1972 U.S. Atomic Energy Commission Fellowship Thesis: Cooling Tower Plume Rise
BS NE	Bachelor of Science Nuclear Engineering Rensselaer Polytechnic Institute, Cum Laude, 1971 James J. Kerrigan Scholar
RO	Licensed Reactor Operator, U.S. Atomic Energy Commission License # OP-3014

Qualifications – including and not limited to:

- Chief Engineer, Fairewinds Associates, Inc
- Nuclear Engineering, Safety, and Reliability Expert
- Federal and Congressional hearing testimony and Expert Witness testimony
- Former Senior Vice President Nuclear Licensee
- Former Licensed Reactor Operator
- 38-years of nuclear industry experience and oversight
 - Nuclear engineering management assessment and prudence assessment
 - Nuclear power plant licensing and permitting – assessment and review
 - Nuclear safety assessments, source term reconstructions, dose assessments, criticality analysis, and thermohydraulics
 - Contract administration, assessment and review
 - Systems engineering and structural engineering assessments
 - Cooling tower operation, cooling tower plumes, and thermal discharge assessment
 - Nuclear fuel rack design and manufacturing, nuclear equipment design and manufacturing, and technical patents
 - Radioactive waste processes, storage issue assessment, waste disposal and decommissioning experience
 - Reliability engineering and aging plant management assessments, in-service inspection
 - Employee awareness programs, whistleblower protection, and public communications
 - Quality Assurance (QA) & records

Publications

Co-author — *DOE Decommissioning Handbook, First Edition*, 1981-1982, invited author.
 Co-author — *Decommissioning the Vermont Yankee Nuclear Power Plant: An Analysis of Vermont Yankee's Decommissioning Fund and Its Projected Decommissioning Costs*, November 2007, Fairewinds Associates, Inc.

Co-author — *Decommissioning Vermont Yankee – Stage 2 Analysis of the Vermont Yankee Decommissioning Fund – The Decommissioning Fund Gap*, December 2007, Fairewinds Associates, Inc. Presented to Vermont State Senators and Legislators.

Co-author — *Vermont Yankee Comprehensive Vertical Audit – VYCV – Recommended Methodology to Thoroughly Assess Reliability and Safety Issues at Entergy Nuclear Vermont Yankee*, January 30, 2008 Testimony to Finance Committee Vermont Senate

Co-author — *Act 189 Public Oversight Panel Report*, March 17, 2009, to the Vermont State Legislature by the Vermont Yankee Public Oversight Panel.

Author — Fairewinds Associates, Inc *First Quarterly Report to the Joint Legislative Committee*, October 19, 2009.

Patents

Energy Absorbing Turbine Missile Shield – U.S. Patent # 4,397,608 – 8/9/1983

Committee Memberships

Vermont Yankee Public Oversight Panel – appointed by President Pro-Tem Vermont Senate
 National Nuclear Safety Network – Founding Board Member
 Three Rivers Community College – Nuclear Academic Advisory Board
 Founding Member of Connecticut Low Level Radioactive Waste Advisory Committee –10 years
 Founding Member Radiation Safety Committee, NRC Licensee
 ANSI N-198, Solid Radioactive Waste Processing Systems

Honors

U.S. Atomic Energy Commission Fellowship, 1972
 B.S. Degree, Cum Laude, RPI, 1971, 1st in nuclear engineering class
 Tau Beta Pi (Engineering Honor Society), RPI, 1969 – 1 of 5 in sophomore class of 700
 James J. Kerrigan Scholar 1967–1971
 Teacher of the Year – 2000, Marvelwood School
 Publicly commended to U.S. Senate by NRC Chairman, Ivan Selin, in May 1993 – “It is true...everything Mr. Gundersen said was absolutely right; he performed quite a service.”

Nuclear Consulting and Expert Witness Testimony

Vermont Legislature Joint Fiscal Committee Expert Witness Oversight Role re: Entergy Nuclear Vermont Yankee (ongoing appointment July 2009 to May 2010)

Entergy Nuclear Vermont Yankee (ENVY) is currently under review by Vermont State Legislature to determine if it should receive a Certificate for Public Good (CPG) to extend its operational license for another 20-years. Vermont is the only state in the country that has legislatively created the CPG authorization for a nuclear power plant. Act 160 was passed to ascertain ENVY’s ability to run reliably for an additional 20 years. I am under contract to the Joint Fiscal Committee of the Vermont State Legislature as an expert witness to oversee the compliance by ENVY to reliability issues uncovered during the 2009 legislative session by the Vermont Yankee Public Oversight Panel of which I was appointed a member along with former NRC Commissioner Peter Bradford. The First Quarterly Report to the Joint Legislative Committee issued October 19, 2009. (<http://www.leg.state.vt.us/JFO/Vermont%20Yankee.htm>)

Florida Public Service Commission (FPSC)

Gave direct oral testimony to the FPSC in hearings in Tallahassee, FL, September 8 and 10, 2009 in support of Southern Alliance for Clean Energy (SACE) contention of anticipated licensing and construction delays in newly designed Westinghouse AP 1000 reactors proposed by Progress Energy Florida and Florida Power and Light (FPL).

Florida Public Service Commission (FPSC)

NRC announced delays confirming my original testimony to FPSC detailed below. My supplemental testimony alerted FPSC to NRC confirmation of my original testimony regarding licensing and construction delays due to problems with the newly designed Westinghouse AP 1000 reactors in *Supplemental Testimony In Re: Nuclear Plant Cost Recovery Clause By The Southern Alliance For Clean Energy*, FPSC Docket No. 090009-EI, August 12, 2009.

Florida Public Service Commission (FPSC)

Licensing and construction delays due to problems with the newly designed Westinghouse AP 1000 reactors in *Direct Testimony In Re: Nuclear Plant Cost Recovery Clause By The Southern Alliance For Clean Energy*, FPSC Docket No. 090009-EI, July 15, 2009.

U.S. Nuclear Regulatory Commission

Expert Witness providing testimony on Combined Operating License Application (COLA) at North Anna Unit 3 supporting *Blue Ridge Environmental Defense League's Contentions* (June 26, 2009).

U.S. Nuclear Regulatory Commission

Expert Witness providing testimony on Through-wall Penetration of Containment Liner and Inspection Techniques of the Containment Liner at Beaver Valley Unit 1 Nuclear Power Plant supporting *Citizen Power's Petition* (May 25, 2009).

U.S. Nuclear Regulatory Commission

Expert Witness providing testimony on Quality Assurance and Configuration Management at Bellefonte Nuclear Plant supporting *Blue Ridge Environmental Defense League's Contentions in their Petition for Intervention and Request for Hearing* (May 6, 2009).

Pennsylvania Statehouse

Formal Presentation and Testimony March 26, 2009 regarding actual releases from Three Mile Island Nuclear Accident. <http://www.tmia.com/march26>

Vermont Legislative Testimony and Formal Report for 2009 Legislative Session

As a member of the Vermont Yankee Public Oversight Panel, I spent almost eight months examining the Vermont Yankee Nuclear Power Plant and the legislatively ordered Comprehensive Vertical Audit. Panel submitted Act 189 Public Oversight Panel Report March 17, 2009 and oral testimony to a joint hearing of the Senate Finance and House Natural Resources March 19, 2009. (See: <http://www.leg.state.vt.us/JFO/Vermont%20Yankee.htm>)

Finestone v FPL (11/2003 to 12/2008) Federal Court

Plaintiffs' Expert Witness for Federal Court Case with Attorney Nancy LaVista, from the firm Lytal, Reiter, Fountain, Clark, Williams, West Palm Beach, FL. This case involved two

plaintiffs in cancer cluster of 40 families alleging that illegal radiation releases from nearby nuclear power plant caused children's cancers. Production request, discovery review, preparation of deposition questions and attendance at Defendant's experts for deposition, preparation of expert witness testimony, preparation for Daubert Hearings, ongoing technical oversight, source term reconstruction and appeal to Circuit Court.

U.S. Nuclear Regulatory Commission Advisory Committee Reactor Safeguards (NRC-ACRS)
Expert Witness providing oral testimony regarding Millstone Point Unit 3 (MP3) Containment issues in hearings regarding the Application to Uprate Power at MP3 by Dominion Nuclear, Washington, DC. (July 8-9, 2008).

Appointed by President Pro-Tem of Vermont Senate to Legislatively Authorized Nuclear Reliability Public Oversight Panel

To oversee Comprehensive Vertical Audit of Entergy Nuclear Vermont Yankee (Act 189) and testify to State Legislature during 2009 session regarding operational reliability of ENVY in relation to its 20-year license extension application. (July 2, 2008 to present).

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Expert Witness providing testimony regarding *Pilgrim Watch's Petition for Contention 1 Underground Pipes* (April 10, 2008).

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Expert Witness supporting *Connecticut Coalition Against Millstone In Its Petition For Leave To Intervene, Request For Hearing, And Contentions Against Dominion Nuclear Connecticut Inc.'s Millstone Power Station Unit 3 License Amendment Request For Stretch Power Uprate* (March 15, 2008).

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Expert Witness supporting *Pilgrim Watch's Petition For Contention 1: specific to issues regarding the integrity of Pilgrim Nuclear Power Station's underground pipes and the ability of Pilgrim's Aging Management Program to determine their integrity.* (January 26, 2008).

Vermont State House – 2008 Legislative Session

- House Committee on Natural Resources and Energy – Comprehensive Vertical Audit: *Why NRC Recommends a Vertical Audit for Aging Plants Like Entergy Nuclear Vermont Yankee (ENVY)*
- House Committee on Commerce – Decommissioning Testimony

Vermont State Senate – 2008 Legislative Session

- Senate Finance – testimony regarding Entergy Nuclear Vermont Yankee Decommissioning Fund
- Senate Finance – testimony on the necessity for a Comprehensive Vertical Audit (CVA) of Entergy Nuclear Vermont Yankee
- Natural Resources Committee – testimony regarding the placement of high-level nuclear fuel on the banks of the Connecticut River in Vernon, VT

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB) MOX Limited Appearance Statement to Judges Michael C. Farrar (Chairman), Lawrence G. McDade, and Nicholas G. Trikouros for the “Petitioners”: Nuclear Watch South, the Blue Ridge Environmental Defense League, and Nuclear Information & Resource Service in support of *Contention 2: Accidental Release of Radionuclides, requesting a hearing concerning faulty accident consequence assessments made for the MOX plutonium fuel factory proposed for the Savannah River Site.* (September 14, 2007).

Appeal to the Vermont Supreme Court (March 2006 to 2007)

Expert Witness Testimony in support of *New England Coalition’s Appeal to the Vermont Supreme Court Concerning: Degraded Reliability at Entergy Nuclear Vermont Yankee as a Result of the Power Uprate.* New England Coalition represented by Attorney Ron Shems of Burlington, VT.

State of Vermont Environmental Court (Docket 89-4-06-vtec 2007)

Expert witness retained by New England Coalition to review Entergy and Vermont Yankee’s analysis of alternative methods to reduce the heat discharged by Vermont Yankee into the Connecticut River. Provided Vermont's Environmental Court with analysis of alternative methods systematically applied throughout the nuclear industry to reduce the heat discharged by nuclear power plants into nearby bodies of water. This report included the review of condenser and cooling tower modifications.

U.S. Senator Bernie Sanders and Congressman Peter Welch (2007)

Briefed Senator Sanders, Congressman Welch and their staff members regarding technical and engineering issues, reliability and aging management concerns, regulatory compliance, waste storage, and nuclear power reactor safety issues confronting the U.S. nuclear energy industry.

State of Vermont Legislative Testimony to Senate Finance Committee (2006)

Testimony to the Senate Finance Committee regarding Vermont Yankee decommissioning costs, reliability issues, design life of the plant, and emergency planning issues.

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)

Expert witness retained by New England Coalition to provide Atomic Safety and Licensing Board with an independent analysis of the integrity of the Vermont Yankee Nuclear Power Plant condenser (2006).

U.S. Senators Jeffords and Leahy (2003 to 2005)

Provided the Senators and their staffs with periodic overview regarding technical, reliability, compliance, and safety issues at Entergy Nuclear Vermont Yankee (ENVY).

10CFR 2.206 filed with the Nuclear Regulatory Commission (July 2004)

Filed 10CFR 2.206 petition with NRC requesting confirmation of Vermont Yankee's compliance with General Design Criteria.

State of Vermont Public Service Board (April 2003 to May 2004)

Expert witness retained by New England Coalition to testify to the Public Service Board on the reliability, safety, technical, and financial ramifications of a proposed increase in power (called an uprate) to 120% at Entergy's 31-year-old Vermont Yankee Nuclear Power Plant.

International Nuclear Safety Testimony

Worked for ten days with the President of the Czech Republic (Vaclav Havel) and the Czech Parliament on their energy policy for the 21st century.

Nuclear Regulatory Commission (NRC) Inspector General (IG)

Assisted the NRC Inspector General in investigating illegal gratuities paid to NRC Officials by Nuclear Energy Services (NES) Corporate Officers. In a second investigation, assisted the Inspector General in showing that material false statements (lies) by NES corporate president caused the NRC to overlook important violations by this licensee.

State of Connecticut Legislature

Assisted in the creation of State of Connecticut Whistleblower Protection legal statutes.

Federal Congressional Testimony

Publicly recognized by NRC Chairman, Ivan Selin, in May 1993 in his comments to U.S. Senate, "It is true...everything Mr. Gundersen said was absolutely right; he performed quite a service." Commended by U.S. Senator John Glenn for public testimony to Senator Glenn's NRC Oversight Committee.

PennCentral Litigation

Evaluated NRC license violations and material false statements made by management of this nuclear engineering and materials licensee.

Three Mile Island Litigation

Evaluated unmonitored releases to the environment after accident, including containment breach, letdown system and blowout. Proved releases were 15 times higher than government estimate and subsequent government report.

Western Atlas Litigation

Evaluated neutron exposure to employees and license violations at this nuclear materials licensee.

Commonwealth Edison

In depth review and analysis for Commonwealth Edison to analyze the efficiency and effectiveness of all Commonwealth Edison engineering organizations, which support the operation of all of its nuclear power plants.

Peach Bottom Reactor Litigation

Evaluated extended 28-month outage caused by management breakdown and deteriorating condition of plant.

Special Remediation Expertise:

Director of Engineering, Vice President of Site Engineering, and the Senior Vice President of Engineering at Nuclear Energy Services (NES).

- NES was a nuclear licensee that specialized in dismantlement and remediation of nuclear facilities and nuclear sites. Member of the radiation safety committee for this licensee.
- Department of Energy chose NES to write *DOE Decommissioning Handbook* because NES had a unique breadth and depth of nuclear engineers and nuclear physicists on staff.
- Personally wrote the “Small Bore Piping” chapter of the DOE’s first edition *Decommissioning Handbook*, personnel on my staff authored other sections, and I reviewed the entire *Decommissioning Handbook*.
- Served on the Connecticut Low Level Radioactive Waste Advisory Committee for 10 years from its inception.
- Managed groups performing analyses on dozens of dismantlement sites to thoroughly remove radioactive material from nuclear plants and their surrounding environment.
- Managed groups assisting in decommissioning the Shippingport nuclear power reactor. Shippingport was the first large nuclear power plant ever decommissioned. The decommissioning of Shippingport included remediation of the site after decommissioning.
- Managed groups conducting site characterizations (preliminary radiation surveys prior to commencement of removal of radiation) at the radioactively contaminated West Valley site in upstate New York.
- Personnel reporting to me assessed dismantlement of the Princeton Avenue Plutonium Lab in New Brunswick, NJ. The lab’s dismantlement assessment was stopped when we uncovered extremely toxic and carcinogenic underground radioactive contamination.
- Personnel reporting to me worked on decontaminating radioactive thorium at the Cleveland Avenue nuclear licensee in Ohio. The thorium had been used as an alloy in turbine blades. During that project, previously undetected extremely toxic and carcinogenic radioactive contamination was discovered below ground after an aboveground gamma survey had purported that no residual radiation remained on site.

Teaching and Academic Administration Experience

Rensselaer Polytechnic Institute (RPI) – Advanced Nuclear Reactor Physics Lab

Community College of Vermont – Mathematics Professor – 2007 to present

Burlington High School

Mathematics Teacher – 2001 to June 2008

Physics Teacher – 2004 to 2006

The Marvelwood School – 1996 to 2000

Awarded Teacher of the Year – June 2000

Chairperson: Physics and Math Department

Mathematics and Physics Teacher, Faculty Council Member

Director of Marvelwood Residential Summer School

Director of Residential Life

The Forman School & St. Margaret’s School – 1993 to 1995

Physics and Mathematics Teacher, Tennis Coach, Residential Living Faculty Member

Nuclear Engineering 1970 to Present

Vetted as expert witness in nuclear litigation and administrative hearings in federal, international, and state court and to Nuclear Regulatory Commission, including but not limited to: Three Mile Island, US Federal Court, US NRC, NRC ASLB & ACRS, Vermont State Legislature, Vermont State Public Service Board, Florida Public Service Board, Czech Senate, Connecticut State Legislature, Western Atlas Nuclear Litigation, U.S. Senate Nuclear Safety Hearings, Peach Bottom Nuclear Power Plant Litigation, and Office of the Inspector General NRC.

Nuclear Engineering, Safety, and Reliability Expert Witness 1990 to Present

- Fairewinds Associates, Inc – Chief Engineer, 2005 to Present
- Arnold Gundersen, Nuclear Safety Consultant and Energy Advisor, 1995 to 2005
- GMA – 1990 to 1995, including expert witness testimony regarding the accident at Three Mile Island.

Nuclear Energy Services, Division of PCC (Fortune 500 company) 1979 to 1990**Corporate Officer and Senior Vice President - Technical Services**

Responsible for overall performance of the company's Inservice Inspection (ASME XI), Quality Assurance (SNTC 1A), and Staff Augmentation Business Units – up to 300 employees at various nuclear sites.

Senior Vice President of Engineering

Responsible for the overall performance of the company's Site Engineering, Boston Design Engineering and Engineered Products Business Units. Integrated the Danbury based, Boston based and site engineering functions to provide products such as fuel racks, nozzle dams, and transfer mechanisms and services such as materials management and procedure development.

Vice President of Engineering Services

Responsible for the overall performance of the company's field engineering, operations engineering, and engineered products services. Integrated the Danbury-based and field-based engineering functions to provide numerous products and services required by nuclear utilities, including patents for engineered products.

General Manager of Field Engineering

Managed and directed NES' multi-disciplined field engineering staff on location at various nuclear plant sites. Site activities included structural analysis, procedure development, technical specifications and training. Have personally applied for and received one patent.

Director of General Engineering

Managed and directed the Danbury based engineering staff. Staff disciplines included structural, nuclear, mechanical and systems engineering. Responsible for assignment of personnel as well as scheduling, cost performance, and technical assessment by staff on assigned projects. This staff provided major engineering support to the company's nuclear waste management, spent fuel storage racks, and engineering consulting programs.

New York State Electric and Gas Corporation (NYSE&G) — 1976 to 1979

Reliability Engineering Supervisor

Organized and supervised reliability engineers to upgrade performance levels on seven operating coal units and one that was under construction. Applied analytical techniques and good engineering judgments to improve capacity factors by reducing mean time to repair and by increasing mean time between failures.

Lead Power Systems Engineer

Supervised the preparation of proposals, bid evaluation, negotiation and administration of contracts for two 1300 MW NSSS Units including nuclear fuel, and solid-state control rooms. Represented corporation at numerous public forums including TV and radio on sensitive utility issues. Responsible for all nuclear and BOP portions of a PSAR, Environmental Report, and Early Site Review.

Northeast Utilities Service Corporation (NU) — 1972 to 1976

Engineer

Nuclear Engineer assigned to Millstone Unit 2 during start-up phase. Lead the high velocity flush and chemical cleaning of condensate and feedwater systems and obtained discharge permit for chemicals. Developed Quality Assurance Category 1 Material, Equipment and Parts List. Modified fuel pool cooling system at Connecticut Yankee, steam generator blowdown system and diesel generator lube oil system for Millstone. Evaluated Technical Specification Change Requests.

Associate Engineer

Nuclear Engineer assigned to Montague Units 1 & 2. Interface Engineer with NSSS vendor, performed containment leak rate analysis, assisted in preparation of PSAR and performed radiological health analysis of plant. Performed environmental radiation survey of Connecticut Yankee. Performed chloride intrusion transient analysis for Millstone Unit 1 feedwater system. Prepared Millstone Unit 1 off-gas modification licensing document and Environmental Report Amendments 1 & 2.

Rensselaer Polytechnic Institute (RPI) — 1971 to 1972

Critical Facility Reactor Operator, Instructor

Licensed AEC Reactor Operator instructing students and utility reactor operator trainees in start-up through full power operation of a reactor.

Public Service Electric and Gas (PSE&G) — 1970

Assistant Engineer

Performed shielding design of radwaste and auxiliary buildings for Newbold Island Units 1 & 2, including development of computer codes.

Public Service, Cultural, and Community Activities

2005 to Present – Public presentations and panel discussions on nuclear safety and reliability at University of Vermont, NRC hearings, Town and City Select Boards, Legal Panels, Television, and Radio

2007-2008 – Created Concept of Solar Panels on Burlington High School; worked with Burlington Electric Department and Burlington Board of Education Technology Committee on Grant for installation of solar collectors for Burlington Electric peak summer use

Vermont State Legislature – Ongoing Public Testimony to Legislative Committees
Certified Foster Parent State of Vermont – 2004 to 2007
Mentoring former students – 2000 to present – college application and employment application questions and encouragement
Tutoring Refugee Students – 2002 to 2006 – Lost Boys of the Sudan and others from educationally disadvantaged immigrant groups
Designed and Taught Special High School Math Course for ESOL Students – 2007 to 2008
Featured Nuclear Safety and Reliability Expert (1990 to present) for Television, Newspaper, Radio, & Internet
Including, and not limited to: CNN (Earth Matters), NECN, WPTZ VT, WTNH, VPTV, WCAX, Cable Channel 17, The Crusaders, Front Page, Mark Johnson Show, Steve West Show, Anthony Polina Show, WKVT, WDEV, WVPR, WZBG CT, Seven Days, AP News Service, Houston Chronicle, Christian Science Monitor, New York Times, Brattleboro Reformer, Rutland Herald, Times-Argus, Burlington Free Press, Litchfield County Times, The News Times, The New Milford Times, Hartford Current, New London Day, evacuationplans.org, Vermont Daily Briefing, Green Mountain Daily, and numerous other national and international blogs
NNSN – National Nuclear Safety Network, Founding Advisory Board Member, meetings with and testimony to the Nuclear Regulatory Commission Inspector General (NRC IG)
Berkshire School Parents Association, Co-Founder
Berkshire School Annual Appeal, Co-Chair
Sunday School Teacher, Christ Episcopal Church, Roxbury, CT
Washington Montessori School Parents Association Member
Episcopal Marriage Encounter National Presenting Team with wife Margaret
Provided weekend communication and dialogue workshops weekend retreats/seminars
Connecticut Episcopal Marriage Encounter Administrative Team – 5 years
Northeast Utilities Representative Conducting Public Lectures on Nuclear Safety Issues

End