

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE SECRETARY

In the Matter of
Southern Nuclear Operating Company
License Amendment Application for
Combined Licenses NPF-91 and NPF-92
Vogtle Electric Generating Plant Units 3 and 4
Docket Nos. 052-00025 and 052-00026;
NRC-2008-0252-0057

May 2, 2016

DECLARATION OF ARNOLD GUNDERSEN TO SUPPORT THE
PETITION FOR LEAVE TO INTERVENE AND REQUEST FOR HEARING
BY THE BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE REGARDING
SOUTHERN NUCLEAR OPERATING COMPANY'S
VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4
REQUEST FOR LICENSE AMENDMENT AND EXEMPTION:
CONTAINMENT HYDROGEN IGNITER CHANGES (LAR-15-003)

I, Arnold Gundersen, declare as follows:

1. My name is Arnold Gundersen. I am sui juris. I am over the age of 18-years-old.
2. The Blue Ridge Environmental Defense League (BREDL) and its chapter Concerned Citizens of Shell Bluff have retained Fairewinds Associates, Inc to issue an expert report in support of the Parties' Petition For Leave To Intervene And Request For Hearing. I have specifically been retained to examine the Southern Nuclear Operating Company Vogtle Electric Generating Plant Units 3 and 4 Request for License Amendment and Exemption: Containment Hydrogen Igniter Changes (LAR-15-003).

3. I earned my Bachelor Degree in Nuclear Engineering from Rensselaer Polytechnic Institute (RPI) cum laude. I earned my Master Degree in Nuclear Engineering from RPI via an Atomic Energy Commission Fellowship. Cooling tower operation and cooling tower plume theory were my area of study for my Master's Degree.
4. I began my career as a reactor operator and instructor in 1971 and progressed to the position of Senior Vice President for a nuclear licensee prior to becoming a nuclear engineering consultant and expert witness. My Curriculum Vitae is Attachment 1.
5. I have testified as an expert witness to 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. I have more than 44-years of professional nuclear experience *including and not limited to*: Cooling Tower Operation, Cooling Tower Plumes, Consumptive Water Loss, Nuclear Plant Operation, Nuclear Management, Nuclear Safety Assessments, Reliability Engineering, In-service Inspection, Criticality Analysis, Licensing, Engineering Management, Thermohydraulics, Radioactive Waste Processes, Decommissioning, Waste Disposal, Structural Engineering Assessments, Nuclear Fuel Rack Design and Manufacturing, Nuclear Equipment Design and Manufacturing, Prudency Defense, Employee Awareness Programs, Public Relations, Contract Administration, Technical Patents, Archival Storage and Document Control, Source Term Reconstruction, Dose Assessment, Whistleblower Protection, and NRC Regulations and Enforcement.
8. I am employed as the chief engineer for Fairewinds Associates, Inc, an expert witness and paralegal services firm specializing in nuclear engineering, nuclear operations, and nuclear power plant safety analysis and assessment.

9. My declaration is intended to examine and analyze the technical issues regarding the License Amendment Application by Southern Nuclear Operating Company, [herein called Southern Company] to receive an exemption allowing it to make Containment Hydrogen Igniter Changes (LAR-15-003) to its combined operating license and to Vogtle Units 3 and 4.

Background of the Problem

10. Westinghouse and the Southern Company identified a key atomic reactor safety risk concerning the potential hydrogen generated from an atomic reactor meltdown to seriously damage the containment of the AP1000 atomic reactor at Vogtle Units 3 and 4. The NRC was informed of this expanded nuclear safety risk in 2015.

11. Specifically, the Southern Company wrote:

Design reviews in 2011 identified a credible scenario in which the applicable plant damage state meets the core damage frequency cutoff to be considered as part of the severe accident analysis.¹

12. While the licensee might be applauded for informing the NRC of the issue, it must be noted that Southern Company became aware of the problem, which manifested itself in 2011, long before the Vogtle COL license was even issued. Moreover, Southern Company waited four more years, until after it had received its license approval and construction was well underway, before belatedly informing the NRC of this extreme safety risk to the operation of Unit 3 and 4 reactors.
13. Even at this late date, when the construction of Vogtle Unit 3 should have been completed and generating electricity for its ratepayers, it is only about 50% complete. According to Fitch Ratings:

¹ Southern Company Letter, February 6, 2015, Request for a License Amendment and Exemption: Containment Hydrogen Igniter Changes (LAR-15-003), page 4 of 19

The nuclear projects at the Vogtle and V.C. Summer plants, the first new nuclear generation built in the U.S. in decades, use the Westinghouse Electric Co. LLC AP1000 reactor design, which promised to be cheaper and more efficient to build than past nuclear plants that saw spiraling cost overruns during construction. In particular, Westinghouse touted the "modern, modular" construction technique in which major plant components would be built off-site as modules, allowing pieces of the project to be completed in parallel and in turn speeding up construction. But "the recent failure of modular construction to deliver lower prices and shorter timelines will likely keep a cap on U.S. nuclear development".²

14. Now, in violation of its license and the known containment flaws shown to the world by the 2011 Fukushima Daiichi triple meltdown, The Southern Company belatedly notified the NRC that critical atomic reactor safety features supposedly designed specifically for the AP1000 containment have a design that remains fluid and incomplete. Hence Southern Company's urgent demand for a license exemption, because "Delayed approval of this licensing request could result in delay of the associated construction activity and subsequent dependent construction activities."³

The Proposed Solution by Southern Company and Westinghouse

15. Southern Company and Westinghouse have proposed the following solution to mitigate gross containment failure in the event of an atomic reactor meltdown similar to the three 2011 meltdowns at the Fukushima Daiichi nuclear facility:

This resulted in conservatively determining, by **engineering judgment**, that two additional hydrogen igniters should be installed outside of and at

² Fitch: 'Failure' of new nuke construction means fewer plants
https://www.snl.com/InteractiveX/Article.aspx?cdid=A-33617164-10551&mkt_tok=3RkMMJWWfF9wsRojva3McO/hmjTEU5z17uwtUaWyg4kz2EFye%2BLIHETpodcMT8pkNbvYDBceEJhqyQJxPr3FJNANysRuRhDgCw%3D%3D&utm_source=Sailthru&utm_medium=email&utm_campaign=Issue:%202015-08-21%20

³ Southern Company Letter to the U.S. Nuclear Regulatory Commission, ND-15-0280, Page 2 of 5, February 6, 2015

the In-Containment Refueling Water Storage Tank (IRWST) roof vents to meet the design criteria for the hydrogen igniters⁴ (emphasis added)

The IRWST roof vents along the steam generator doghouse wall is a **likely area**, based on **engineering judgment**, where hydrogen will be released.⁵ (emphasis added)

The IRWST roof vents along the steam generator doghouse wall is a **likely area**, based on **engineering judgment**, where hydrogen will be released.⁶ (emphasis added)

While there are igniters inside the IRWST which are located near these vents, providing additional igniters, based on **engineering judgment**, near the vents on the exterior of the IRWST will provide an improvement in hydrogen control at this location.⁷ (emphasis added)

16. Rather than performing a rigorous gaseous diffusion and flame propagation analysis, Westinghouse and the Southern Company chose to place two hydrogen igniters in a "likely area" by relying upon the personal "engineering judgment" of some of the corporation's engineers.
17. Knowing that Fukushima Daiichi Units 1, 2, and 3 were all destroyed by hydrogen deflagrations and detonations, it is evident a much more rigorous analysis is warranted to remediate such an incredible risk rather than just attempting to hurriedly finish construction and begin operation of an untried and unsafe design. It appears that Southern Company is more concerned with its own construction delays and significant cost overruns, than protecting public health and safety as delineated 10 CFR 50.
18. Relying upon "engineering judgment" is certainly less costly than a rigorous analytical approach, the lack of a thorough scientific analysis and critical contingency

⁴ Southern Company Letter, February 6, 2015, Request for a License Amendment and Exemption: Containment Hydrogen Igniter Changes (LAR-15-003), page 4 of 19

⁵ Ibid, page 11

⁶ Ibid, page 11

⁷ Ibid, page 12

hardware and procedures will not mitigate the very real risk of the destruction of the AP1000 containment system with hydrogen generation during a nuclear meltdown.

Containment Contention #1: The proposed modification by The Southern Company actually creates an extremely dangerous situation rather than mitigating it.

Containment Contention #2: The engineering and support of the proposed modification is completely inadequate and fails to evaluate dangerous historical precedents of hydrogen explosions as a significant contributor to atomic reactor risk.

19. Westinghouse and The Southern Company have chosen to place hydrogen igniters near a source that is known to contain high levels of hydrogen gas in an area they are calling a "likely area" to allegedly burn any hydrogen that forms before it can violently explode.
20. *What could possibly go wrong?* This proposed "engineering judgment" that is a so-called solution, does not mitigate any hydrogen concentration that may build up in the containment leading to a Fukushima Daiichi deflagration that would destroy the containment. Instead of protecting against the real threat of a hydrogen buildup and subsequent explosion, the supposed solution introduces a new threat to the already vulnerable AP1000 containment.
21. Apparently, any information that may have informed the Westinghouse and Southern Company engineers when they decided to use their "engineering judgment" ended in 2010. The 2011 disaster at Fukushima Daiichi proves that the assumptions used by Southern and Westinghouse fly in the face established facts.

22. *What are assumptions anyway?* According to the dictionary, an assumption is something taken for granted; a supposition, and its synonyms are: presupposition; hypothesis, conjecture, guess, postulate, theory.⁸
23. What are the conjectures and *possible* theories about the formation of hydrogen in an atomic reactor containment?
- 23.1. First, the concentration of hydrogen is assumed to be uniform throughout the AP1000 containment, including in sub-compartments. From a chemical standpoint, hydrogen has been known to stratify, meaning that it forms in [strata](#) or layers⁹. These layers then can explode when too much hydrogen has formed in one area near an igniter. Such stratification would cause the very explosion the Westinghouse & Southern Company proposed igniters are being supplied to prevent.
- 23.2. Second, the two corporations are hypothesizing that the only source of hydrogen is emitted from the reaction between zirconium and water. This reaction only produces hydrogen, which is not combustible *unless it is diluted by oxygen*. See <http://www.fairewinds.org/nuclear-energy-education/hydrogen-buildup-at-fukushima-what-does-it-mean-why-does-it-happen?rq=hydrogen> for a demonstration of a hydrogen explosion as pure hydrogen is diluted with oxygen.
- 23.3. Third, other sources of hydrogen production are ignored, which can produce hydrogen and oxygen in a stoichiometric [pertaining to or involving substances that are in the exact proportions required for a given reaction]¹⁰ ratio, causing an explosion simply from being in proximity to the proposed hydrogen igniters.

⁸ <http://www.dictionary.com/browse/assumptions>

⁹ <http://www.dictionary.com/browse/stratify?s=t>

¹⁰ <http://www.dictionary.com/browse/stoichiometric?s=t>

23.4. Fourth, radiolytic decomposition of water has been ignored as a source of both hydrogen and oxygen by Westinghouse and Southern Company.¹¹

23.5. Fifth, concrete degradation from contact with corium is ignored but creates both hydrogen and oxygen, called the Molten Core Concrete Interaction (MCCI).

23.6. *Finally, the Westinghouse and Southern Company's "engineering judgment" analysis ignores the possibility that the igniter can create a flame that blows back through the IRWST roof vents along the steam generator dog house wall into the sub-compartment causing a serious detonation. **Backflow** did occur at Fukushima Daiichi.* According to the World Association of Nuclear Operators (WANO):

Early on Monday 14th PCV venting was repeated, and this evidently **backflowed** to the service floor of the building, so that at 11 am a very large hydrogen explosion here above unit 3 reactor containment blew off much of the roof and walls and demolished the top part of the building. In defuelled unit 4, at about 6 am on Tuesday 15 March, there was an explosion which destroyed the top of the building and damaged unit 3's superstructure further. This was apparently from hydrogen arising in unit 3 and reaching unit 4 by **backflow** in shared ducts when vented from unit 3.¹²
[Emphasis Added]

24. The experience in Japan is illustrative to explain the unanalyzed condition that has been created by Westinghouse and Southern Company in placing hydrogen igniters near a source of hydrogen based simply on engineering judgment and not a root cause analysis determination. On September 17, 2013, the Japan Nuclear Energy Safety Organization (JNES) made a presentation to the International Atomic Energy Agency (IAEA)¹³ to inform it that:

¹¹ Radiolytic Decomposition of Coolant Water in Cirrus Reactor, D.G.Vartak, L.H.Prabhu, G.C.Shah, C.J.Jose, & M.N.Raval, Reactor Operations Division, BARC http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/05/103/5103331.pdf

¹² <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-accident.aspx>

¹³ Severe Accident Analyses of Fukushima-Daiichi Units 1 to 3, Harutaka Hoshi and Masashi Hirano, Japan Nuclear Energy Safety Organization (JNES), September 17, 2012, <http://www.aec.go.jp/jicst/NC/sitemap/pdf/P-4.pdf>

24.1. At Fukushima Daiichi Unit 1, the deflagration shockwave that occurred was created by a hydrogen explosion due to a spark on the refueling level (top floor) of Unit 1.

24.1.1. 400 kilograms of hydrogen leaked from the containment, not just at the top but from the sides and bottom as well and migrated upward.

24.1.2. The deflagration shock wave developed horizontally.

24.2. Yet at Fukushima Daiichi Unit 3, an entirely different explosion progression occurred.

24.2.1. Even though hydrogen is lighter than air and Unit 3 had similar leakage paths to those at Unit 1, the detonation shockwave that occurred was due to 1000 kilograms of hydrogen that remained in the basement for unknown reasons and did not flow upward to the refueling floor.

24.2.2. The detonation shock wave developed vertically, and was much more forceful than the deflagration shockwave on the top floor.

25. Because Fukushima Daiichi Units 1 and 3 are essentially identical containment designs that also experienced identical meltdowns, it is remarkable that their destruction was caused by such entirely different failure mechanisms. It is beyond comprehension that the engineers at Westinghouse and The Southern Company now apply "engineering judgment" of "likely areas" to ascertain the placement of dangerous hydrogen ignitors given the proof of the hydrogen detonation and deflagration at Fukushima Daiichi that thoroughly destroyed any containment of the huge amounts of radiation released in *three sequential atomic reactor meltdowns*.

25.1. What is Engineering Judgment? Quite simply "engineering judgment" has failed miserably in organizations and technologies around the world. One of the prime examples of the failure of "engineering judgment" is the total failure of NASA's Space Shuttle Challenger Mission on January 28, 1986.

25.2. Shortly after its launch, Challenger suddenly exploded, and then it disintegrated over the ocean; everyone on board was killed.

25.3. According to NASA in its special designed post-Challenger Disaster Course:

Seven Axioms of Good Engineering: Development of A Case Study-Based Course for NASA:

One component of this phenomenon is the human tendency to favor information that supports our beliefs regardless of whether that information is representative of reality. Typically referred to as confirmation bias, we are inclined (or biased) to attend to the data that supports our predetermined conclusions and ignore the rest. As a result, the entire data set is not objectively assessed.¹⁴

26. One of the striking assessments made by NASA as it tried to recover from the Challenger tragedy, is its root cause analysis of the Challenger disaster. NASA's finding is telling and directly applicable to the NRC oversight of the exemption requested by Westinghouse and Southern Company for the unanalyzed condition that significantly compromises plant safety of the hydrogen igniters placed within the Vogtle Unit 3 and Unit 4 atomic reactors possibly near a location of excess hydrogen. One of the main findings from the assessment is:

Proximate causes of engineering design failures are often due to technical flaws, but their root causes are often found in human fallibility and lack of understanding about certain fundamental truisms in the design process.¹⁵

27. Finally, the NASA course creators and NASA's management opted to take a different approach in order to better emphasize the more human element involved in

¹⁴ *Seven Axioms of Good Engineering: Development of A Case Study-Based Course for NASA*, Roger C. Forsgren NASA Academy of Program/Project & Engineering Leadership (APPEL) NASA Headquarters, Office of the Chief Engineer, Washington, D.C. Roger.C.Forsgren@nasa.gov, Anthony Luscher Associate Professor Department of Mechanical & Aerospace Engineering Ohio State University, Columbus OH luscher.3@osu.ed <http://appel.nasa.gov/wp-content/uploads/sites/2/2014/06/SAGE-Paper.pdf>

¹⁵ Ibid.

engineering design. As a result, seven truths of good engineering were identified and developed to serve as the foundation for the course:

- 1) Avoid Selective Use of Existing Data
- 2) Extrapolate Existing Data into Unknown Regions with Extreme Caution
- 3) Understand the Design's Sensitivity
- 4) When Possible, Always Test in the Physical World
- 5) Guard Against Unanticipated Loads and/or Failure Modes
- 6) Avoid Highly Coupled Systems Unless a Strong Benefit is Shown
- 7) Ensure a Human Understanding of How the System Works

28. Each one of the seven truths identified by NASA above as the epitome of "good engineering" are truths that are being ignored in the rush by Southern Company and Westinghouse to pursue their vested interests in creating this request for an exemption for regulations in the requested amendment to the Vogtle license.

29. There is no rush to move forward with: selective use of data, extrapolation into unknown regions, lack of a sensitivity to the vulnerable AP1000 containment design, an untested methodology, unanticipated failure modes proved by the containment failures at Fukushima Daiichi, the use of a highly coupled unstable system, and an extreme lack of human understanding of how the system works and why Fukushima Daiichi had a detonation in its Unit 3 atomic reactor, which calls into question any of the containment exemptions ever issued by the NRC.

30. It is well known that the AP1000 containment was flawed *well before* the disaster at Fukushima Daiichi. The AP1000 containment is already within 1 pound per square inch of its design limit without considering the additional pressure that would be created by either a detonation or deflagration shock wave if one of the proposed igniters causes backflow into a sub-compartment.

31. Fairewinds was retained by the AP1000 Oversight Group as an expert witness regarding flaws in the safety parameters of the AP1000 containment system. On June 25, 2010, Fairewinds produced a 90-minute presentation to the Advisory Committee

on Reactor Safeguards (ACRS) entitled *Post Accident AP1000 Containment Leakage*.¹⁶ [The presentation is available here.](#)

32. Presented fully 9 months prior to the Fukushima Daiichi disaster, the investigative analysis identified that containment integrity has repeatedly been compromised in the 100 operating reactors in the United States. The full report, entitled ***Nuclear Containment Failures: Ramifications for the AP1000 Containment Design***¹⁷ was submitted to the NRC on December 10, 2010 and is available on the Fairewinds Energy Education website: www.fairewinds.org.
33. In light of the three containment failures at Fukushima Daiichi Units 1, 2, and 3, Fairewinds' investigative analysis and follow-up report are even more prescient today in 2016 than they were in 2010.
34. If the NRC allows the proposed poorly designed hydrogen igniter modification to be implemented at Vogtle Units 3 and 4, a gross containment failure from a detonation shock wave in a sub-compartment is likely to occur.
- 34.1. What is past is prelude.
- 34.2. The disaster at Fukushima Daiichi contains vivid proof that an apparently robust containment can be breached by a detonation shockwave.
- 34.3. Below is a infrared photograph of Fukushima Daiichi Unit 3 taken by TEPCO several weeks after Unit 3 was destroyed by a detonation shockwave.
- 34.4. The reader is directed to the 128C gases being vented at the center of the photo. This cannot be steam, as it exceeds 100C and must therefore be hot radioactive gases being released directly from the top of the containment.

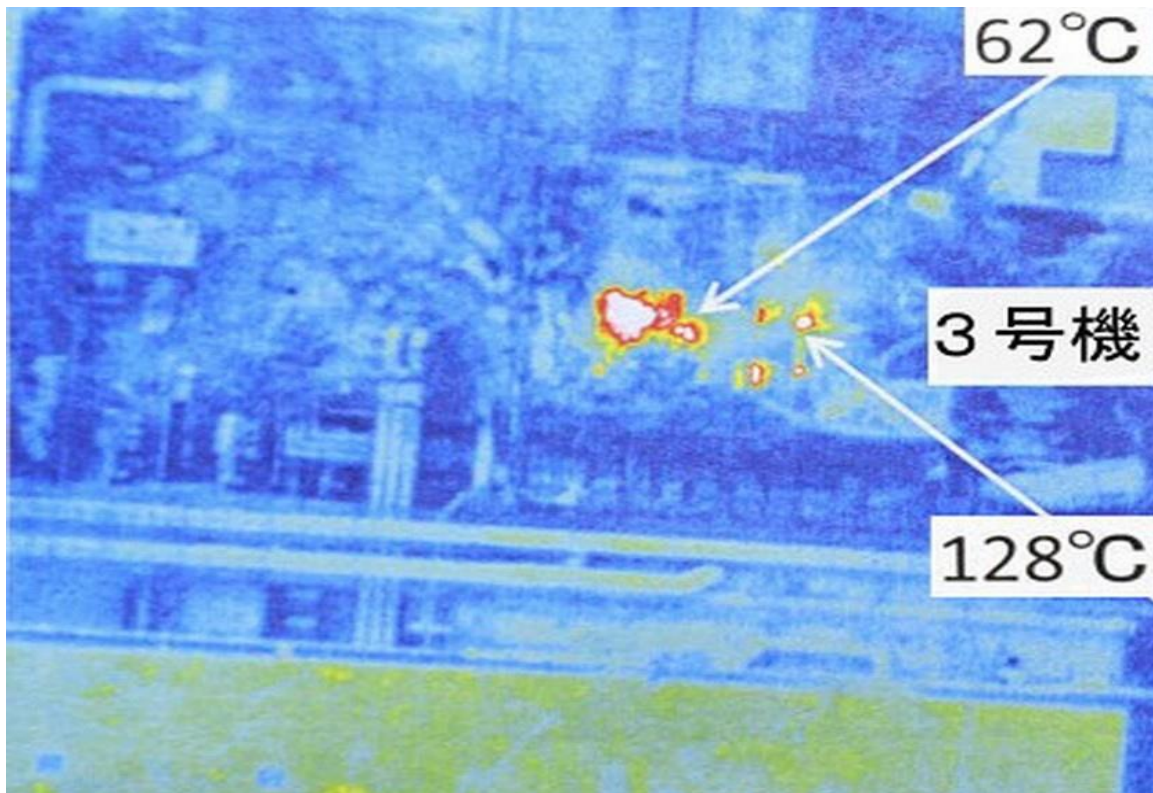
¹⁶ <http://www.fairewinds.org/nuclear-energy-education/post-accident-ap1000-containment-leakage-2>

¹⁷ <http://www.fairewinds.org/nuclear-energy-education/nuclear-containment-failures?rq=containment>

34.5. The AP1000 containment could react in a similar fashion if the proposed hydrogen igniters are installed.

34.6. This exemption request is an unanalyzed condition that significantly compromises plant safety.

Thermal Image of Radiation Leaking From Fukushima Daiichi Unit 3 Containment



35. Finally, it must be noted that the Units 3 and 4 AP1000 atomic reactor currently under construction at Vogtle were approved without any design changes related to the meltdowns at Fukushima Daiichi.

36. The proposed installation of hydrogen igniters at Vogtle are an example of what can and will go wrong when designers rely on engineering judgment instead of consulting the lessons of history. As NRC Chair Gregory Jaczko said in a dissenting opinion when the Vogtle AP1000 license was issued:

Significant safety enhancements have already been recommended as a result of learning the lessons from Fukushima, and there is still more work ahead of us. Knowing this, I cannot support issuing these licenses as if Fukushima never happened.¹⁸

Conclusion

37. The proposed addition of hydrogen igniters in new locations known to have high concentrations of hydrogen creates a dangerous situation where the igniters themselves might create a detonation or deflagration shockwave that would most certainly destroy the already vulnerable AP1000 containment.
38. My analysis disputes the entirety of Section 4.3 (Significant Hazards Consideration) on pages 16 and 17 of the Request for License Amendment and Exemption: Containment Hydrogen Igniter Changes (LAR-15-003)
39. Together, Westinghouse and The Southern Company have created a new *unanalyzed condition that significantly compromises plant safety* in their proposal to install newly designed and retrofitted hydrogen igniters whose performance and design features were never factored into the AP1000 mathematical analysis of its radical design approach.
40. The COL required burn test is insufficient and wholly inadequate due to this proposed modification and its creation of a severe environment inside the containment.
41. As a condition of the COL for Vogtle Units 3 and 4 received by Southern Company, the NRC issued the following condition:

Perform a thermal lag assessment of the as-built equipment listed in Tables 6b and 6c in Attachment A of APP-GW-GLR-069, "Equipment Survivability Assessment," to provide additional assurance that this equipment can perform its severe accident functions during environmental conditions resulting from hydrogen burns associated with severe accidents during accident

¹⁸ <http://www.neimagazine.com/news/newsus-regulator-approves-vogtle-34-reactors>

hydrogen burns using the environment enveloping method or the test based thermal analysis method described in Electric Power Research Institute (EPRI) NP-4354, "Large Scale Hydrogen Burn Equipment Experiments."

With all the uncertainty associated with the numerous methods in which hydrogen might detonate within the AP1000 containment, it is impossible to perform a realistic thermal lag assessment.

42. Fairwinds analysis has definitively proven that the entirety of Section 4.3 (Significant Hazards Consideration) of the Southern Company Request for License Amendment and Exemption: Containment Hydrogen Igniter Changes (LAR-15-003) cannot be supported by any form of rigorous technical analysis. The proposed license amendment should therefore be rejected.

43. Physicist Dr. Richard Feynman earned his Bachelor of Science degree in Physics at MIT (Massachusetts Institute of Technology) and his PhD in Physics from Princeton University in 1942. He received a Nobel Prize in Physics in 1965, after which he taught Physics at California Institute of Technology (CalTech) for 40 years. Dr. Feynman was a member of the panel that reviewed the disaster that destroyed the Space Shuttle Challenger. In Dr. Feynman's review of Challenger after which he reflected on the approach of engineering judgement, and said:

When I hear the words "engineering judgement", I know they are just going to make up numbers. *Richard Feynman, 1988*

End

Attachments:

Attachment 1 - Curriculum Vitae

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

Executed this 2nd day, May 2016 at Burlington, Vermont.

_____/s/____

Arnold Gundersen, MSNE, RSO
Chief Engineer, Fairwinds Associates, Inc

**UNITED STATES OF AMERICA
U.S. NUCLEAR REGULATORY COMMISSION**

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Vogtle Electric Generating Plant
Units 3 and 4
License Amendment Application
Docket Nos. 052-00025 and 052-00026;
NRC-2008-0252-0057

CERTIFICATE OF SERVICE

I hereby certify that the
DECLARATION OF ARNOLD GUNDERSEN TO SUPPORT THE
PETITION FOR LEAVE TO INTERVENE AND REQUEST FOR HEARING
BY THE BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE REGARDING
SOUTHERN NUCLEAR OPERATING COMPANY'S
VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4
REQUEST FOR LICENSE AMENDMENT AND EXEMPTION:
CONTAINMENT HYDROGEN IGNITER CHANGES (LAR-15-003)
has been filed through the Electronic Information Exchange system
this 2nd day of May, 2016.



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