

**UNITED STATES OF AMERICA
U.S. NUCLEAR REGULATORY COMMISSION
BEFORE THE SECRETARY**

In the Matter of:
SOUTHERN NUCLEAR OPERATING CO.
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

**PETITION FOR LEAVE TO INTERVENE AND REQUEST FOR HEARING BY
THE BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE AND ITS
CHAPTER CONCERNED CITIZENS OF SHELL BLUFF REGARDING
SOUTHERN NUCLEAR OPERATING COMPANY'S REQUEST FOR A
LICENSE AMENDMENT AND EXEMPTION FOR CONTAINMENT
HYDROGEN IGNITER CHANGES, LAR-15-003**

Introduction

Pursuant to 10 C.F.R. § 2.309(f) and a notice published by the Nuclear Regulatory Commission (öNRCö or öCommissionö) at 81 Fed. Reg. 10920 (March 2, 2016), the Blue Ridge Environmental Defense League and its chapter Concerned Citizens of Shell Bluff (öBREDLö or öPetitionerö) hereby petition for leave to intervene and request a hearing in the above-captioned License Amendment Request (öLARö) by Southern Nuclear Operating Company (öSNOCö or öCompanyö). BREDL opposes the granting of the license amendment. This petition sets forth our interests in this proceeding, the reasons this intervention should be granted, and specific contentions we seek to have addressed. As demonstrated below, Blue Ridge Environmental Defense League has representational standing, through its members, to make this request.

Description of the Proceeding

On February 9, 2012, the Nuclear Regulatory Commission approved Southern Nuclear Operating Company's application for a license to construct and operate two additional Westinghouse AP1000 reactor units at Plant Vogtle, located on the banks of the Savannah River in Shell Bluff, Georgia. Vogtle Electric Generating Plant Units 3 and 4 are now under construction (Vogtle Units 3 and 4). On February 6, 2015, the Company submitted a request seeking a license amendment and exemption related to the installation of hydrogen igniters within the reactor containment structure at Vogtle Units 3 and 4.¹ The Company's license amendment request proposes to modify the design of the hydrogen ignition system by adding two igniters to be positioned at the roof vents of the In-Containment Refueling Storage Tank. Other changes requested would change the design of the hydrogen igniters and alter their control systems.

Description of the Petitioners

Blue Ridge Environmental Defense League is a regional, community-based non-profit environmental organization working in Virginia, North Carolina, South Carolina, Tennessee, Alabama and Georgia. BREDL's founding principles are earth stewardship, environmental democracy, social justice, and community empowerment. BREDL encourages government agencies and citizens to take responsibility for conserving and protecting our natural resources and protecting public health. BREDL also functions as a "watchdog" of the environment, monitoring issues and holding government officials accountable for their actions. BREDL is a league of community groups called "chapters." BREDL and its chapters are unitary, with a common incorporation, financial

¹ Request for License Amendment and Exemption LAR-15-003, 6 February 2015

structure, board of directors and executive officer. BREDL chapter Concerned Citizens of Shell Bluff was founded March 6, 2010 to advocate for environmental justice in Georgia.

Standing

Under 10 CFR § 2.309(d), a request for hearing or petition for leave to intervene must address 1) name and address of petitioner, 2) the nature of the petitioner's right under the Atomic Energy Act to be made a party to the proceeding, 3) the nature and extent of the petitioner's property, financial, or other interest in the proceeding, and 4) the possible effect of any order that may be entered in the proceeding on the petitioner's interest. Other standing requirements are found in NRC case law. See *Pacific Gas & Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), LBP-02-23, 56 NRC 413, 426 (2002).²

As demonstrated by the declarations filed, Petitioner's members live near Vogtle, i.e., within 25 miles. Representational standing has been granted to an organization with

² In determining whether a petitioner has sufficient interest to intervene in a proceeding, the Commission has traditionally applied judicial concepts of standing. See *Metropolitan Edison Co.* (Three Mile Island Nuclear station, Unit 1), CLI-83-25, 18 NRC 327, 332 (1983) (citing *Portland General Electric Co.* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610 (1976)). Contemporaneous judicial standards for standing require a petitioner to demonstrate that (1) it has suffered or will suffer a distinct and palpable harm that constitutes injury-in-fact within the zone of interests arguably protected by the governing statutes (e.g., the Atomic Energy Act of 1954 (AEA), the National Environmental Policy Act of 1969 (NEPA)); (2) the injury can be fairly traced to the challenged action; and (3) the injury is likely to be redressed by a favorable decision. See *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plants), LBP-99-25, 50 NRC 25, 29 (1999). An organization that wishes to intervene in a proceeding may do so either in its own right by demonstrating harm to its organizational interests, or in a representational capacity by demonstrating harm to its members. See *Hydro Resources, Inc.* (2929 Coors Road, Suite 101, Albuquerque, NM 87120), LBP-98-9, 47 NRC 261, 271 (1998). To intervene in a representational capacity, an organization must show not only that at least one of its members would fulfill the standing requirements, but also that he or she has authorized the organization to represent his or her interests. See *Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 168, *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998).

members within 15 miles of a plant. *See* Entergy Nuclear Vermont Yankee, L.L.C. and Entergy Nuclear Operations, Inc. (Vermont Yankee Nuclear Power Station), LBP-04-28, 60 NRC 548, 553-54.

Further, as in *Vermont Yankee*, the LAR is an action with obvious potential for offsite consequences. The purpose of the hydrogen ignition system is to prevent levels of hydrogen created by a reactor accident from reaching concentrations sufficient to cause a breach of containment. Granting of the LAR by the NRC could allow conditions leading to unsafe levels of hydrogen. Therefore, BREDL members could suffer 1) a distinct and palpable harm that constitutes injury-in-fact within the zone of interests arguably protected by the governing statutes, 2) the injury could be fairly traced to the changes contemplated in the LAR and 3) the injury is likely to be redressed by a denial of the LAR.

Also, there is authority indicated that to establish injury-in-fact it is not necessary to proffer radiation impacts that amount to a regulatory violation. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 417 (2001) (citing *Yankee Atomic Electric Co.* (Yankee Nuclear Power Station), CLI-96-7, 43 NRC 235, 247-48 (1996)).

In light of the above, standing to participate in this proceeding is demonstrated by the 30 declarations of members of the Blue Ridge Environmental Defense League and Concerned Citizens of Shell Bluff who have authorized Petitioners to represent their interests.

BREDL members who signed declarations of standing live well within 25 miles of Plant Vogtle; in fact, some are within 7 miles. *Locus standi* is based on three requirements: injury, causation and redressability. Petitioners hereby request to be made a party to the proceeding because: 1) Granting of the LAR would present a tangible and particular risk of harm to the health and well-being of our members, 2) The NRC has initiated proceedings for a license amendment, the granting of which would directly affect our members, and 3) The Commission is the sole agency with the power to approve or deny the modification of a license to construct and operate a commercial nuclear power plant. The Petitioners' members seek to protect their health and lives by opposing the license amendment requested by SNOC.

Background

Under Title 10 CFR Part 52, all nuclear power plant construction must be in accord with the plant's design and current licensing basis (CLB) as well as the applicable statutes and regulations. The process for modifying the CLB is set forth in 10 CFR 52.98(f).³ A licensee that requests an amendment or exemption must perform 1) an applicability determination evaluation, 2) a safety-security interface evaluation, 3) a construction impacts evaluation and 4) a 10 CFR 50.59-like screening evaluation. *See* COL-ISG-025. If upon completion of its review the NRC finds that there would be unacceptable incompatibilities, it may condition its approval of the LAR upon the licensee making adjustments to the existing design and licensing basis. *See* Entergy Nuclear Vermont Yankee, L.L.C. and Entergy Nuclear Operations, Inc. (Vermont

³ §52.98(f): Any modification to, addition to, or deletion from the terms and conditions of a combined license, including any modification to, addition to, or deletion from the inspections, tests, analyses, or related acceptance criteria contained in the license is a proposed amendment to the license. There must be an opportunity for a hearing on the amendment.

Yankee Nuclear Power Station), LBP-04-28, 60 NRC 548, 565 (2004).

Overview of the Contentions to be Raised in this Petition

Five years ago, Southern Nuclear Operating Company identified a key atomic reactor safety risk: the potential for hydrogen generated from an atomic reactor meltdown to seriously damage the containment of the AP1000 atomic reactor at Vogtle Units 3 and

4. In a letter to the NRC, the Company states:

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.⁴

This plant damage risk was identified by the Company well before the Vogtle COL license was issued in 2012. Unaccountably, four more years elapsed before the company informed NRC of this risk to the Unit 3 and 4 reactors; presently, this selfsame risk is the subject of License Amendment Request LAR-15-003.

On February 9, 2012, the day the license for Vogtle Units 3 and 4 were approved, the chairman of the NRC stated, “[U]ltimately, my responsibility is to make what I believe is the best decision for nuclear safety. I simply cannot authorize issuance of these licenses without any binding obligation that these plants will have implemented the lessons learned from the Fukushima accident before they operate.” See CLI-12-02, Chairman Gregory B. Jaczko, Dissenting at 1. (emphasis added)

The Petitioners hereby seek to raise two contentions centered on the hydrogen ignition problem raised by SNOC: 1) the danger presented by the poorly conceived modifications posed by the LAR, and 2) the failure of the NRC to properly incorporate

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

the experience gained from previous hydrogen explosions in its license for Vogtle.

Petitioner's requests for leave to intervene and a hearing are supported by an affidavit submitted on behalf of the Petitioner by Arnold Gundersen (Gundersen Declaration) (Attachment A).

Based on our review, the license amendment request has not been fully evaluated by the NRC and is not justified by the information presented by the Company.

CONTENTION ONE: The proposed modification by The Southern Company creates an extremely dangerous situation rather than mitigating it.

(i) Specific issue of law or fact to be raised

New nuclear power plant construction must be conducted in accordance with the combined license (COL) current licensing basis (CLB)⁵, the Atomic Energy Act, and the applicable regulations. The change process for the COL is set forth in 10 CFR 52.98.

(ii) Brief explanation of contention

Relying on its engineering judgement instead of rigorous testing and analysis would result in an unanalyzed condition that significantly compromises plant safety. Instead of protecting against the threat of a hydrogen buildup and subsequent explosion, the proposed solution introduces a new threat to the already vulnerable AP1000 containment by placing Vogtle Units 3 and 4 hydrogen igniters possibly near the location

⁵ As defined in 10 CFR 54.3 6 CLB is the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 52, 54, 55, 70, 72, 73, 100 and appendices thereto; orders; license conditions; exemptions; and technical specifications. It also includes the plant-specific design-basis information defined in 10 CFR 50.2 as documented in the most recent final safety analysis report as required by 10 CFR 50.71 and the licensee's commitments remaining in effect that were docketed licensing correspondence such as licensee responses to NRC bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports.

of excess concentrations of hydrogen. Good engineering practice includes the axioms “extrapolate existing data into unknown regions with extreme caution” and “when possible, always test in the real world.”⁶

(iii) Contention is within the scope of the proceeding

Pursuant to 10 CFR 52.98, the NRC is responsible for approval of any modification, addition or deletion from the license (CLB). The LAR involves a change to the COL, Appendix C, and departures from plant-specific Tier 1 information, tests, analyses and acceptance criteria (ITAAC).

(iv) Issues raised are material to the findings NRC must make

One necessary component of NRC review of a license amendment application is review of the proposed amendment’s compatibility with the licensee’s existing design and licensing basis. If the NRC finds that there would be unacceptable incompatibilities, it may condition its approval of the amendment upon the licensee making necessary adjustments to the existing design and licensing basis to resolve these incompatibilities.

Entergy Nuclear Vermont Yankee, L.L.C. and Entergy Nuclear Operations, Inc.

(Vermont Yankee Nuclear Power Station), LBP-04-28, 60 NRC 548, 565 (2004).

(v) Expert opinion supporting Petitioner’s contention

Experience in Japan is illustrative of the unanticipated problems that have been created by the LAR 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

⁶ *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)
<http://appel.nasa.gov/wp-content/uploads/sites/2/2014/06/SAGE-Paper.pdf>

International Atomic Energy Agency (IAEA)⁷ to inform it that 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. 400 kilograms of hydrogen leaked from the containment, not just at the top but from the sides and bottom as well and migrated upward. The deflagration shock wave developed horizontally. However, at Fukushima Daiichi Unit 3, an entirely different explosion progression occurred. 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. The detonation shock wave developed vertically, and was much more forceful than the deflagration shockwave on the top floor. Gundersen Declaration, Section 16.

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. Gundersen Declaration, Section 22. Gundersen concludes: "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." Gundersen Declaration, Section 26.

(vi) Information showing a genuine dispute with licensee

The Company has not done the prudent and required evaluations: 1) an applicability determination evaluation, 2) a safety-security interface evaluation, 3) a

⁷ Severe Accident Analyses of Fukushima-Daiich 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>

construction impacts evaluation and 4) a 10 CFR 50.59-like screening evaluation. Rather, it has relied on its engineering judgement.

CONTENTION TWO: The engineering and support of the proposed modification fails to evaluate historical precedents of hydrogen explosions as a significant contributor to atomic reactor risk.

(i) Specific issue of law or fact to be raised

New nuclear power plant construction must be conducted in accordance with the combined license (COL) current licensing basis (CLB), the Atomic Energy Act, and the applicable regulations. The change process for the COL is set forth in 10 CFR 52.98.

(ii) Brief explanation of the contention

Rather than performing a rigorous gaseous diffusion and flame propagation analysis, the Company chose to place two hydrogen igniters in a likely area by relying upon the personal engineering judgment of its engineers. A much more rigorous analysis is warranted.

(iii) Contention is within the scope of the proceeding

Pursuant to 10 CFR 52.98, the NRC is responsible for approval of any modification, addition or deletion from the license (CLB). The LAR involves a change to the COL, Appendix C, and departures from plant-specific Tier 1 information, tests, analyses and acceptance criteria (ITAAC).

(iv) Issue is material to the findings NRC must make

One necessary component of NRC review of a license amendment application is review of the proposed amendment's compatibility with the licensee's existing design

and licensing basis. If the NRC finds that there would be unacceptable incompatibilities, it may condition its approval of the amendment upon the licensee making necessary adjustments to the existing design and licensing basis to resolve these incompatibilities.

Entergy Nuclear Vermont Yankee, L.L.C. and Entergy Nuclear Operations, Inc.

(Vermont Yankee Nuclear Power Station), LBP-04-28, 60 NRC 548, 565 (2004).

(v) Expert opinion supporting Petitioner's contention

First, the LAR assumes concentration of hydrogen is 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 layers. 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.

Second, the Company hypothesizes 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.⁸

Third, other sources of hydrogen production are ignored, which can produce hydrogen and oxygen in a stoichiometric ratio, causing an explosion simply from being in proximity to the proposed hydrogen igniters.

Fourth, radiolytic decomposition of water has been ignored as a source of both hydrogen and oxygen,⁹ and concrete degradation from contact with corium creates both

⁸ For a demonstration of a hydrogen explosion as pure hydrogen is diluted with oxygen, see "Hydrogen buildup at Fukushima? What does it mean & why does it happen?" Fairewinds Energy Education, November 16, 2011, at <http://www.fairewinds.org/nuclear-energy-education/hydrogen-buildup-at-fukushima-what-does-it-mean-why-does-it-happen?rq=hydrogen>

⁹ 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

hydrogen and oxygen, called the Molten Core Concrete Interaction (MCCI). Gundersen Declaration, Section 14.

Finally, SNOC's analysis ignores the possibility that the igniter can create a flame that blows back through the In-containment Refueling Water Storage Tank (IRWST) roof vents along the steam generator dog house wall into the sub-compartment causing a serious detonation. According to the World Association of Nuclear Operators (WANO), backflow did occur at Fukushima Daiichi.¹⁰ Gundersen Declaration, Section 15.

(vi) Information showing a genuine dispute with licensee

Petitioners hereby seek to ensure that the requested license amendment is not issued by the U.S. Nuclear Regulatory Commission. SNOC has not demonstrated full compliance with the Atomic Energy Act and implementing regulations. A licensee generally bears the ultimate burden of proof. Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-697, 16 NRC 1265, 1271 (1982), citing 10 C.F.R. § 2.325 (formerly § 2.732).

Conclusion

The granting of the Company's License Amendment Request does not comply with the current licensing basis, the applicable statutes and regulations, or the process for modifying the current licensing basis as set forth in 10 CFR 52.98(f) Vogtle Units 3 and 4. The Nuclear Regulatory Commission cannot approve this license amendment request. Our principal interests are the health and safety of our members living near the plant and

¹⁰ Fukushima Accident, WANO, updated April 2016, <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-accident.aspx>

the general public. For the foregoing reasons, the contentions are admissible and should be admitted for a hearing.

Respectfully submitted

A handwritten signature in black ink that reads "Louis A. Zeller". The signature is written in a cursive style and is followed by a horizontal line.

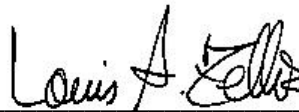
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CERTIFICATE OF SERVICE

I hereby certify that the
**PETITION FOR LEAVE TO INTERVENE AND REQUEST FOR HEARING BY
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has been filed through the Electronic Information Exchange system
this 2nd day of May, 2016.



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