

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

G. Paul Bollwerk, III, Chairman  
Nicholas G. Trikouros  
Dr. James Jackson

In the Matter of )  
Southern Nuclear Operating Company, Inc. ) Docket Nos. 52-025 and 52-026 COL  
Vogtle Electric Generating Plant, ) ASLBP No. 09-873-01-COL-BD01  
Units 3 and 4 ) August 12, 2010  
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**PROPOSED NEW CONTENTION BY JOINT INTERVENORS  
REGARDING THE INADEQUACY OF APPLICANT'S  
CONTAINMENT/COATING INSPECTION PROGRAM**

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Pursuant to 10 C.F.R. § 2.309(f)(2), Joint Intervenors Blue Ridge Environmental Defense League, Center for a Sustainable Coast, Georgia Women's Action for New Directions ~~for Clean Energy~~, hereby submit a new contention challenging the adequacy of the combined operating license application ("COLA") submitted by Southern Nuclear Operating Company ("SNC"). Specifically, Intervenors contend that the proposed containment inspection will fail to determine whether corrosion or degraded coatings create an undue risk that holes, cracks or other through-wall penetrations of the containments at the two reactors ("VEGP Units 3 and 4") could foreseeably lead to outside leakage of radioactive material in the event of an accident.

As demonstrated below, this amended contention should be admitted because it is based on information not previously available to Joint Intervenors, the information now available is materially different than information previously available, and this motion is being submitted in a timely fashion.

## **I. BACKGROUND**

On March 28, 2008, SNC submitted a COLA to construct and operate Units 3 and 4 at the VEGP site. In response to this application, Joint Intervenors filed a petition for intervention on November 17, 2008, seeking to admit three contentions. By order dated March 5, 2009, the Atomic Safety and Licensing Board (the “Board”) admitted contention SAFETY-1; the Nuclear Regulatory Commission (the “NRC”) affirmed admission of SAFETY-1 on July 31, 2009.

On May 19, 2010, the Board granted SNC’s motion for summary disposition of SAFETY-1, thus leaving no admitted contentions. LBP-10-08.

In April of this year, a report was submitted to the Advisory Committee on Reactor Safeguards (“ACRS”) by Arnold Gunderson, a nuclear engineer in the employ of the AP1000 Oversight Group.<sup>1</sup> In his report, XXX, Mr. Gunderson set forth his concerns regarding an unreviewed safety question regarding the ACRS’ pending review of the design of the AP1000 reactor. Specifically, Mr. Gunderson explained that the AP1000, because of its (1) lack of a secondary containment system and (2) unusually high vulnerability to chronic containment corrosion and containment-coating degradation, presents an unusually high risk, in the event of a reactor accident, of leakage to the environment of radioactive materials. Several days later, Mr. Gunderson presented his concerns to the ACRS in person. There Mr. Gunderson explained that the corrosion

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<sup>1</sup> . Mr. Gunderson has been retained, separately, by the Joint Intervenors in the instant proceeding.

problems require that the operator of any AP1000 reactor conduct an intensive inspection program to verify frequently that the integrity of the containment and any associated coatings have not been compromised.

In a transcript of that meeting released exactly 30 days ago, Harold B. Ray, Chairman of the ACRS, made a statement to the effect that issues relating to the need for inspections of the containment and containment coatings associated with the “AP1000” reactor design should be addressed not in the pending generic review of the AP1000 design by the ACRS, but within individual COL proceedings. Specifically, Chairman Ray stated:

CHAIRMAN RAY: Well the coating certainly is an important element of this whole system. And the points that you're making about accessibility for inspection are ones that we have yet to look at. And your input to us is helpful in focusing our attention on that.

I just made the point earlier, Mr. Runkle, that that will be taken up as part of the COL. So if you don't see it being discussed in the context of the DCD, it's because its there and not any other place.

Other things that you've raised about the offsite dose assumption and so on and so forth, those are more likely part of the DCD scope and have been there in that location.

I guess during the course of your presentation I've asked all the questions I have following reading your letter. You can tell that personally I'm more focused on this issue that you mentioned about the coating inspectability and the integrity of the coating, which is obviously important.

Transcript at pp. 58-59.

This announcement by the ACRS Chairman amounts to a determination that questions regarding inspection of the containment and its coatings fall outside the purview of the ACRS's pending proceeding. Accordingly, Intervenors submit the following proposed contention for consideration in this proceeding.

## **II. PROPOSED CONTENTION SAFETY-2**

Joint Intervenors propose to litigate the following contention, suggested to be denominated "SAFETY-2":

SNC's COLA fails to demonstrate that VEGP Units 3 and 4 can be operated safely because the containment and containment-coating inspection regime proposed in the FSAR, *see* COLA at pp. 6.1-1 – 6.1-4, fails to provide assurance against corrosion-caused penetrations of the containment that would lead, in the event of an accident, to leakage to the environment of radioactive materials in excess of regulatory requirements.

## **III. COMPLIANCE WITH 10 C.F.R. § 2.309**

New contentions must satisfy the requirements of both 10 C.F.R. § 2.309(f)(1), concerning contentions in general, and 10 C.F.R. § 2.309(f)(2), concerning amended or new contentions. The proposed SAFETY-2 satisfies these requirements.

### **Compliance with 10 C.F.R. § 2.309(f)(1)**

SAFETY-2 complies with the provisions of 10 C.F.R. § 2.309(f)(1).

#### 10 C.F.R. §§ 2.309(f)(1)(i) and (iii) –

The proposed contention comprises a challenge to the technical sufficiency of the FSAR (and the COLA), and it is properly within the scope of this proceeding. The attached declaration of Mr. Gunderson, attached as Exhibit 1, in conjunction with his report to the ACRS (Exhibit 3), the associated Powerpoint presentation (Exhibit 4) and the excerpted transcript of the ACRS meeting demonstrate that the design of the AP1000 presents special risks of containment corrosion and coating failure, thus requiring that

each plant receive special, intensive inspections that address the special circumstance faced by every plant. Mr. Gunderson has established that SNC's proposed visual inspections via access ports will be insufficient to protect the public health and safety; rather each AP1000 reactor requires visual, perhaps robotic inspections of the interior of the containments, too. Gunderson declaration at par. 41; Report to the ACRS, exh. 3, at 17.

10 C.F.R. § 2.309(f)(1)(ii) – The new contention is based on the FSAR's failure to satisfy the requirement in 10 C.F.R. 52.157 that an applicant demonstrate that, in the event of an accident, "an individual located at any point on the outer boundary of the low population zone, who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a radiation dose in excess of 25 rem TEDE." Mr. Gunderson's declaration demonstrates that inadequacies in SNC's proposed inspection regime pose a high likelihood of causing a release well in excess of the regulatory threshold.

Similarly, Mr. Gunderson's declaration and supporting materials show that the COLA does not satisfy the requirements of General Design Criterion 53:

Criterion 53--Provisions for containment testing and inspection. The reactor containment shall be designed to permit (1) appropriate periodic inspection of all important areas, such as penetrations, (2) an appropriate surveillance program, and (3) periodic testing at containment design pressure of the leaktightness of penetrations which have resilient seals and expansion bellows.

10 C.F.R. § 2.309(f)(1)(iv) – Joint Intervenors have shown, in Mr. Gunderson's declaration and the supporting materials, that SNC's proposed containment and coating

inspection plan will not assure that the proposed reactors can be operated in a manner that is sufficiently protective of the public health and safety, or that complies with the regulatory provision set forth above. Thus, the contention is material to findings the NRC must make to support licensing.

10 C.F.R. § 2.309(f)(1)(v) – The explanation required by this provision is provided above and in the attached materials, such satisfying the requirements of this provision.

10 C.F.R. § 2.309(f)(1)(vi) – A genuine dispute exists as to whether SNC has provided sufficient evidence of the adequacy of its proposed containment and containment-coating inspection system.

**Compliance with 10 C.F.R. § 2.309(f)(2)**

Proposed contention SAFETY-2 complies with the provisions of 10 C.F.R. 2.309(f)(2).

10 C.F.R. § 2.309(f)(2)(i) – The proposed new contention is based on information that was released by the ACRS on July 13, 2010. Prior to this date, Petitioners had reasonably assumed that matters related to containment corrosion and containment-coating degradation would be addressed by the ACRS in its generic review of the AP1000. It was not until that date that there was any public record of ACRS Chairman Ray’s announcement that questions as to inspections should be raised and resolved in the context of individual COL proceedings. *See generally Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 345 (1999), quoting Potomac Elec. Power Co. (Douglas Point Nuclear Generating Station, Units 1 and 2),*

ALAB-218, 8 AEC 79, 85 (1974). “licensing boards should not accept in individual license proceedings contentions which are (or are about to become) the subject of general rulemaking by the Commission.”

10 C.F.R. § 2.309(f)(2)(ii) – Research reveals no other source of information indicating that flaws in the design of the AP1000 call for unusually intensive inspections of the containment and its coatings. This information was delivered to the ACRS only four months ago. The recently published remarks by the ACRS members demonstrated, for the first time, that NRC personnel see the possible need for enhanced inspection regimes, tailored to the site-specific environmental conditions of every plant site.

10 C.F.R. § 2.309(f)(2)(iii) – The ACRS transcript was published only 30 days ago.

## **CONCLUSION**

For the foregoing reasons, Joint Intervenors respectfully request that the Board admit new contention SAFETY-2 for consideration in this proceeding.



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**CERTIFICATE OF SERVICE**

I hereby certify that copies of the foregoing was served upon the following persons by Electronic Information Exchange and/or electronic mail.

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Dated: August 12, 2010

/signed (electronically) by/  
James B. Dougherty



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), 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.
9. My declaration is intended to support Contentions of the Blue Ridge Environmental Defense League and is specific to issues regarding the Combined License Application (COLA), of the Southern Nuclear Operating Company for the Vogtle Electric Generating Plant, Units 3&4.

## **BACKGROUND**

10. On April 21, 2010, the AP1000 Oversight Group, represented by Attorney John Runkle, submitted the *AP1000 Containment Leakage Report Fairewinds Associates*

- *Gundersen, Hausler, 4-21-2010* by Fairewinds Associates, Inc. to the NRC, attached as Exhibit 3.

11. In response to an invitation from the NRC Advisory Committee on Reactor Safeguards (ACRS), Attorney John Runkle and I made an hour and 15 minute presentation to the ACRS on June 25, 2010. The PowerPoint presentation PDF is attached herein as Exhibit 4 and the relevant portion of the ACRS transcript from our presentation to the ACRS is attached as Exhibit 5. The PowerPoint slide show and accompanying audio transcript of the meeting and discussion may be viewed at <http://fairewinds.com/content/ap1000-nuclear-design-flaw-addressed-to-nrc-acrs>

#### **NEW CONTENTION**

12. In the United States, each of the 104 commercial nuclear power plants has a reactor that is fully encased by a containment system.
13. The primary containment system is usually steel or a combination of steel and concrete. Historically the containment system has a secondary system designed to collect any radiation that leaks out and subsequently releases those gases through a stack only after the radioactivity is filtered to specific limits designed to protect public health and safety.
14. In direct contrast to the containment system design of the currently operating nuclear power plants, the Vogtle AP1000 is unique among all other operating pressurized water reactors (PWR's) in that its containment has only a single barrier.
15. Moreover, behind this single barrier there is an air gap that has been specifically designed to pull any air or gases that enter the gap and release them directly into the environment.
16. I named the phenomena of pulling air or gases into the annular gap and wafting them out into the environment as the *chimney effect* in the report I wrote entitled, *AP1000 Containment Leakage Report Fairewinds Associates - Gundersen, Hausler, 4-21-2010* that was presented to the ACRS via a PowerPoint presentation June 25,

2010. My report is Exhibit 3.

17. Nuclear power plant containment systems have a long history of degradation, cracking, and through-wall holes. While there is no single source that identifies all of these containment system problems, I estimate that there have been at least 80-significant cases of containment degradation on United States (U.S.) nuclear reactors during the last several decades. Of these 80 or more incidents, approximately 40 incidents are directly related to failure of the concrete, and approximately 40 incidents of containment system failure are related to failure of the steel.
18. Despite the history of containment integrity failure, Westinghouse has assumed that there is a zero percent probability that its new AP1000 design will fail in an accident scenario and would release any radioactive isotopes.
19. Since the AP1000 has no concrete in its containment system, the remainder of my analysis will address the 40 instances of steel corrosion and steel cracking in U.S. nuclear reactor containment systems.
20. My research indicates that there are four causative factors for steel containment or containment liner failure. These factors are:
  - 20.1. corrosion of the steel,
  - 20.2. inadequate inspections,
  - 20.3. cracking of the steel, and
  - 20.4. protective coating failures.
21. Additionally, although in some cases the steel liner or containment did not rust through completely, in many other cases there was a complete penetration of either the containment liner or the containment itself.
22. As I discussed in great detail in my attached report, there have been rust-related holes discovered in the liners at Brunswick, DC Cook, Beaver Valley, and other reactors. These holes have been complete penetrations through the steel liners that have had a secondary concrete containment behind them.

23. The NRC Staff's response to these through-wall penetrations of the steel containment is that the secondary containment system would have protected public health and safety by preventing any outside leakage of radioactive material.
24. Additionally, there have also been numerous recorded instances reporting that containment liners have thinned to a level below the regulated minimum-wall thickness and at the same time the protective coatings on the outside of the steel containment system have also failed.
25. In addition to the reported liner failures, there have also been repeated through-wall cracks in thicker containments that happen to be quite similar in design to the AP1000 containment. The through-wall cracks that have heretofore been uncovered have occurred at Hatch 1, Hatch 2, and Fitzpatrick.
26. These through-wall crack failures in the containment are not due to rust but are cracks that have developed over a long period of time due to thermal stress.
27. Therefore, the first item of great concern is that each of the liner or containment failures that have been uncovered to date shares a significant common element. The significant common element is that in every case, the American Society of Mechanical Engineers (ASME) inspection techniques have failed to detect any problem until a crack or hole has in fact become a through-wall failure.
  - 27.1. As I discussed in my June 25 presentation to the ACRS (Exhibit 4), in each instance the nuclear licensee firmly believed that ASME inspections alone were a reliable method of assessing containment integrity. Moreover, even the NRC had concurred that ASME inspections by themselves were a reliable method of determining containment integrity.
  - 27.2. Instead, through-wall cracks and holes have developed without warning in containment systems monitored by ASME inspections thus proving that the use of ASME inspections to monitor containment integrity is a wholly inadequate methodology.

28. The second item of major concern regarding containment integrity is the nuclear industry's belief in the viability of protective coatings as a reliable barrier in the protection of public health and safety, when in fact the protective coatings applied to containment systems have a significant history of abject failure.
  - 28.1. In the Fairewinds Associates, Inc PowerPoint presentation to the ACRS (Exhibit 4), I alerted the NRC to the significant failure rate of protective coatings.
  - 28.2. Although protective coating applications have been failing for more than 10-years, the NRC continues to approve these coatings and nuclear power plant licensees continue to claim that these protective coatings are an effective barrier to unmonitored radiation releases.
  - 28.3. Finally, even the NRC Inspector General faults the NRC for not adequately evaluating the veracity of nuclear power plant licensee claims that these protective coatings aid in maintaining containment integrity prior to the NRC approval of nuclear power plant license extensions for an additional 20-years of operation. (Inspector General Report OIG-07-A-15)
29. The Vogtle AP1000 nuclear power plant design is directly and significantly impacted by the nuclear industry's experience of through wall cracks, liner failures, and through-wall rust holes.
30. As I stated earlier in this declaration, existing U.S. operating nuclear power plants have reactors that are backed up by a secondary containment system. In effect such a containment system functions like a double-hulled oil tanker in that if one hull fails, there is a second hull intact to protect the cargo. Similarly, the AP1000 design is comparable to only a single hulled vessel. Thus, in the event of a crack during an AP1000 Loss of Coolant Accident, radioactive gases would leak directly into the environment because they would be wafted out of the containment vessel via the chimney effect I discuss in detail in Exhibits 3 and 4.

31. In lay terminology, *single failure proof* means that a failure caused by a single event will not immediately cascade into failure of the whole system. By design, emergency equipment in a nuclear power plant is expected to be redundant and therefore guarantee that if one emergency system fails to shut down the reactor or cool the fuel, then a second emergency system would take over and complete that critical function. The design of the Vogtle AP1000 containment system is not a single failure proof system. As both Vogtle 3 and 4 are currently designed, if a crack or a hole should develop, radioactive material will leak directly into the environment.
32. To compensate for Vogtle's flaw in containment integrity, the industry and the NRC staff are claiming that protective coatings and the ASME inspection program are mitigating factors that would assure protection of public health and safety in the case of an accident in the single-hulled Vogtle design. However, the data reviewed does not substantiate this industry claim, and instead confirms what the industry knows to be true, that both protective coatings and ASME containment inspection programs have been proven to be wholly inadequate. Due to Vogtle's coating and inspection problems on its proposed Units 3 and 4, critical measures that are discussed in my conclusion must be implemented at Vogtle.

### **CONCLUSION**

33. My report to the NRC and presentation to the ACRS concerning industry problems with containment integrity directly addresses containment integrity for the AP1000. With the current AP1000 design, the evidence reviewed shows that there is a significant likelihood of post-accident radioactive isotopic leakage into the environment that will exceed design basis values. Equally important, nuclear engineer and analyst Dr. Gianni Petrangeli has suggested that there is a 46% probability that containment leakage in new reactors could exceed technical specification values during an accident by a factor of 10.
34. Neither the NRC nor the applicant SNC have evaluated the likelihood of a through-wall containment leak at Vogtle that could lead to greater-than-design-basis isotopic leakage in the event of an accident:

- 34.1. Industry experience indicates through-wall cracking has occurred repeatedly in existing containment systems.
  - 34.2. Industry experience indicates through-wall rust has occurred repeatedly in existing containment systems.
  - 34.3. Industry experience indicates ASME inspection programs have failed to detect cracks and rust holes.
  - 34.4. Industry experience indicates that protective coatings have failed in containment systems.
35. Despite these known failure mechanisms and burgeoning history of containment failure, Southern Nuclear Operating Company assumes the probability for a containment breach at Vogtle to be zero. SNC's assumption regarding Vogtle is not consistent with the historical evidence.
36. Moreover, SNC's proposed Vogtle AP1000 design exacerbates the dispersion of radioactive material during and after an accident.
37. In conclusion, the reactor containment system proposed at Vogtle creates a unique, unanalyzed risk to public health and safety, and there is inadequate assurance that radiation releases during and following an accident will ever meet 10CFR100 accident exposure limits.
38. Clearly, the design changes I discussed during my meeting with the ACRS requiring a filtered ventilation system must be implemented.
39. Fairewinds' Report (Exhibit 3) and PowerPoint presentation to the ACRS (Exhibit 4) clearly establish that existing ASME XI inspection programs for containments and containment liners on operating reactors have a long history of failing to detect incipient cracks or rust until the metal has been completely breached. Yet in Chapter 6 of the Vogtle COL application, the Applicant relies only upon meeting these criteria that have already failed in the past. Given the Vogtle Unit 3 and 4's unique

containment design, the existing inspection regime suggested by the applicant does not provide adequate margins of safety. In addition to the inspections suggested in SNC's COLA, a 100% volumetric inspection of the containment from the inside of the containment once every refueling outage should be required by the ASLB and NRC in order to assure that through-wall propagation of holes or cracks is not occurring.

40. The Fairewinds Associates' Report (Exhibit 3) and Fairewinds' PowerPoint presentation to the ACRS (Exhibit 4) clearly establish that existing ASTM coating application programs and ASTM coating monitoring programs for containment systems and containment liners on operating reactors have a long history of failing to prevent incipient rust until the metal has been completely breached. Page 18 of the Fairewinds' Report (Exhibit 3) clearly indicates that "While coatings can provide some protection when properly applied, there is no assurance that field application can be completely successful...." PowerPoint slide number 8 of Exhibit 4 shows field applied coating failures that the NRC allowed to exist for more than 10-years.
41. Yet in Chapter 6 of the Vogtle COLA, the Applicant relies only upon meeting ASTM D5144-08, ASTM D5163-05a, and ASTM D7167-05. These policies have already failed in the past as indicated in Exhibits 3 and 4. Given that the containment and attached hangers will be welded in the field and coatings will also be applied in the field after welding is completed, the existing coating application and inspection regime suggested by the applicant does not provide adequate margins of safety in Vogtle Units 3 and 4.
42. The applicant bases the adequacy of its coating program on claims that periodic external visual examinations. The annular gap outside the containment provides limited access for personnel and the environmental conditions in the gap are not conducive to long term occupancy. Access ports have been provided for limited visual inspections, however full 360-degree visual inspections of the hangers that are attached to the containment will be nearly impossible to achieve. As discussed in Exhibit 3, these hangers are the most likely location for corrosion to begin, yet are

most difficult to examine. Additionally, coatings will only be applied to a depth of six inches below floor level, and crevices in that area are likely to create rust deposits near the floor similar to those that recently occurred at the Salem PWR.

43. Access problems will definitely limit visual inspections and the frequency of inspections planned by SNC is not adequate to prevent rust propagation. Therefore, for all these reasons, continuous external monitoring of the containment coating by robotic means is required to assure rust will not develop. Additionally, along with the continuous external robotic monitoring, the containment system must also be examined with internal volumetric exams as discussed in #39 of this declaration.
44. Finally, given the probability of gaseous release of radioactive isotopes in the event of an accident, the Vogtle emergency planning zones and the owner-controlled exclusion zones must be expanded.

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

Executed this day, August 12, 2010 at Burlington, Vermont.

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/s/

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