

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Ronald M. Spritzer, Chair
Dr. Richard F. Cole
Dr. Alice C. Mignerey
Alan S. Rosenthal

In the Matter of
Virginia Electric and Power Company
d/b/a Dominion Virginia Power and
Old Dominion Electric Cooperative
North Anna Unit 3
Combined License

Docket Nos. 52-017
ASLBP No. 08-863-01-COL

March 7, 2014

MOTION TO REOPEN AND ADMIT NEW CONTENTION

Pursuant to 10 C.F.R. § 2.326, and in accord with the Atomic Safety and Licensing Board (öASLBö) orders issued July 23, 2013¹, July 26, 2012² and September 1, 2011,³ the Blue Ridge Environmental Defense League and its chapter Peoples Alliance for Clean Energy (öBREDLö or öIntervenorö) hereby request to reopen this proceeding and to file a new contention based on new information. The Intervenorö's contention is that Dominion-Virginia Power (öApplicantö) has not presented a sound probabilistic basis for

¹ ASLB Order Holding Motion to Reopen the Proceeding in Abeyance: öBREDL asserts that the petition was timely filed following the April 26, 2013 announcement by the applicants...that they will amend their combined operating license (COL) application to utilize a new reactor design. [citation omitted]

² ASLB Order Setting Time for Filing Motion to Reopen the Proceeding: öIn consideration of the significant revisions that Dominion will make in its application, and the strict procedural requirements of a section 2.326 motion to reopen, we adopt BREDLö's suggestion and will grant a period of 60 days for BREDL to submit a motion to reopen the proceeding.ö

³ LBP-11-22 states: ö[W]e have already found that BREDL demonstrated standing pursuant to 10 C.F.R. § 2.309(d), and that it proffered one admissible contention as required by 10 C.F.R. § 2.309(f). Therefore, BREDL met the criteria for intervention and, as explained in the Commissionö's hearing notice, it became a party to the licensing proceeding and entitled to participate fully in the conduct of the hearing.ö

the magnitude of the possible adverse consequences and the likelihood of occurrence of each consequence for issuing a license to construct and operate North Anna Unit 3.

Background

On October 2, 2010 Blue Ridge Environmental Defense League filed a contention, which the ASLB declined to admit, regarding earthquake factors at North Anna.⁴ LBP-11-10.

On August 23, 2011, an alert was declared under Emergency Action Level EAL HA6.1 at the North Anna Power Station which was caused by seismic activity onsite. Both units underwent automatic reactor trips of 100% power and all offsite electrical power to the site was lost. On September 22, 2011, pursuant to 10 C.F.R. § 2.309 and in accordance with the ASLB order issued September 1, 2011,⁵ BREDL sought to file a new contention based on the earthquake of August 23, 2011. Subsequently, parties to the proceeding agreed that the proposed contention be held in abeyance until Dominion completed its reassessment of the Unit 3 application.⁶ On June 7, 2012 the Commission ordered that the record of the proceeding be closed. *See* CLI-12-14 at 15. Subsequently, the Board issued an order allowing sixty days for the Intervenor to move for reopening the proceeding for seismic issues.⁷

⁴ In Contention 13, "Unit 3 Seismic Spectra Exceedance," Intervenor argued that Dominion improperly requested a site-specific exemption from the APWR Design Control Document for proposed North Anna Unit 3. in violation of 10 C.F.R. §§ 52.7, 52.93, and 100.23.

⁵ LBP-11-22 states: "[W]e have already found that BREDL demonstrated standing pursuant to 10 C.F.R. § 2.309(d), and that it proffered one admissible contention as required by 10 C.F.R. § 2.309(f). Therefore, BREDL met the criteria for intervention and, as explained in the Commission's hearing notice, it became a party to the licensing proceeding and entitled to participate fully in the conduct of the hearing."

⁶ *Consent Motion to Hold BREDL's New Contention in Abeyance* (Oct. 12, 2011)

⁷ *ORDER (Setting Time for Filing Motion to Reopen the Proceeding)* July 26, 2012. At that time, the seismic assessment was expected to be completed in May 2013.

Motion to Reopen: Satisfaction of 10 C.F.R. § 2.326:

(a.1) The motion is timely. On January 6, 2014, an email from the Commission Secretary notified the Intervenor of the availability of a document entitled "Dominion Letter Completion of Seismic Assessment." The deadline set forth in the letter for submitting a motion to reopen was today, March 7, 2014.

(a.2) The motion addresses a significant issue. The NRC must make a determination under the Atomic Energy Act that it has a reasonable assurance that the facility will be constructed and will operate in conformity with the provisions of the Act and the Commission's rules and regulations. Under NEPA, the NRC must also evaluate the environmental impacts of the plant. As presented in detail *infra*, the proposed design of Unit 3 is unsuitable for the North Anna site.

(a.3) Demonstration that a materially different result would be likely. The contention is within the scope of this proceeding and material to the findings the NRC must make to support Dominion's request to build and operate a third reactor at North Anna. If standards cannot be met and a license is altered, a modified power plant would be substituted; alternatively, if the license is denied, no reactor will be constructed.

(b) Attached to this motion is an assessment of quake impacts on North Anna by Christopher M. Bailey, Ph.D., Professor and Chair of the Geology Department at The College of William and Mary.⁸

⁸ "All Shook Up! The 2011 Virginia Earthquake," Christopher M. Bailey, December 22, 2011

Admissibility: Satisfaction of 10 C.F.R. § 2.309(f)(1)

Case Law Cited

Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), CLI-0603, 63 NRC 19, 24 (2006). Intervenor moved to allow litigation of a new version of a previously rejected contention.

In general, a new contention must satisfy the timeliness requirement of either 10 C.F.R. §§ 2.309(f)(2) or 2.309(c), and the admissibility requirements of Section 2.309(f)(1). See Entergy Nuclear Vermont Yankee, LLC & Entergy Nuclear Operations, Inc. (Vermont Yankee Nuclear Power Station), LBP-06-14, 63 NRC 568, 571-76 (2006).

øBREDL has established its right to a hearing on all material factors bearing on the licensing decision.ø LBP-11-22 at 13, f.n. 58, citing *Union of Concerned Scientists*, 735 F.2d at 1443.

(i) Provide a specific statement of the issue of law or fact to be raised

Geologic and seismic criteria are found in 10 CFR § 100.23 and detail the requirements for determining whether a proposed site is acceptable for a nuclear power plant. The rule states that geological, seismological, and engineering characteristics of a site and its surrounding area environs must be investigated in sufficient detail to provide sufficient information to arrive at estimates of the Safe Shutdown Earthquake Ground Motion. The area to be investigated must be based on the nature of the region surrounding the proposed site. The August 23, 2011 earthquake is now, according to this rule, part of the ðnatureö of the site which must be investigated.

Under in 10 CFR § 100.23, this data would include vibratory ground motion, tectonic surface deformation, nontectonic deformation, earthquake recurrence rates, fault

geometry and slip rates, site foundation material, and seismically induced floods and water waves. However, gathering of these data may have been hampered. For example, the August 2011 quake apparently generated horizontal acceleration 100% over the existing North Anna standard, causing numerous problems such as an electronic sensor failure of eight seconds before power was restored. In order to comply with 10 CFR § 100.23, these data were essential to the determination of the geological, seismological, and engineering characteristics of the North Anna Unit 3 site.

Pursuant to 10 CFR §52.47, Contents of applications, the COL application must contain a level of design information sufficient to enable the Commission to reach a conclusion on all safety questions. Specifically, the North Anna Unit 3 COLA must contain a final safety analysis report (FSAR) that describes the facility, presents the design bases and the limits on its operation, and presents a safety analysis of the structures, systems, and components and of the facility as a whole. This includes an assessment of site itself.

(ii) Provide a brief explanation of the basis for the contention

The principal objective of the Nuclear Regulatory Commission's adjudicatory process is to produce an informed record which supports sound decision making for the protection of public health and safety and the environment. *Hydro Resources Inc.* CLI-01-4, 52 NRC 31, 38 (2001). Before a COL may be issued, the new information triggered by the central precipitating events of August 23, 2011 and developed and revealed in subsequent investigations must be assessed and integrated into the FSAR, ER, FEIS and other required documents.

(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding

Before licensing the proposed North Anna nuclear power plant, the NRC must make a determination under the Atomic Energy Act that it has a reasonable assurance that the facility will be constructed and will operate in conformity with the provisions of the Act and the Commission's rules and regulations. Under NEPA, the NRC must also evaluate the environmental impacts of the plant. The contention is within the scope of this proceeding and material to the findings the NRC must make to support Dominion's request to build and operate a third reactor at North Anna. Each reactor is designed for a different ground motion that is determined on a site-specific basis:

New reactors are designed using probabilistic techniques that characterize both the ground motion levels and uncertainty at the proposed site. These probabilistic techniques account for the ground motions that may result from all potential seismic sources in the region around the site. Technically speaking, this is the ground motion with an annual frequency of occurrence of 1×10^{-4} /year, but this can be thought of as the ground motion that occurs every 10,000 years on average.⁹

The contention is within the scope of the proceeding because it seeks to ensure compliance with AEA, NEPA and NRC implementing regulations.

(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding

NRC must show that licensing of North Anna 3 reactors would not be inimical to public health and safety. 42 U.S.C. § 2133. Further, the technical issues raised by the August 2011 quake are central to the safety determinations which NRC must make.

Under Section 182a of the Atomic Energy Act, technical specifications have the statutory function of allowing the Commission to make its operational safety finding. Section

⁹ NRC frequently asked questions related to the March 11, 2011 Japanese Earthquake and Tsunami, available at <http://www.nrc.gov/japan/faqs-related-to-japan.pdf>

182a also requires the issued license to include technical specifications. Section 185b of the Atomic Energy Act governs the issuance of combined licenses and requires the Commission to find, before issuing the license that the facility will be constructed and will operate in conformity with the license, the provisions of this Act, and the Commission's rules and regulations.¹⁰

Technical specifications include *inter alia* SCDF: Seismic core damage frequency. SCDF is the probability of damage to the core resulting from a seismic initiating event. In nuclear power plant seismic risk assessment, the site earthquake-induced vibratory ground motion is usually expressed in terms of the peak ground acceleration (PGA). Appendix A Seismic Core-Damage Frequency Estimates.

The National Environmental Policy Act requires federal agencies to supplement environmental documents when there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. 40 C.F.R. § 1509(c)(1)(ii). As a federal agency, it is clearly the NRC's continuing duty to assess environmental impacts of their actions, to determine the significance of the new data and prepare supplemental documentation. *Warm Springs Task Force v. Gribble*, 621 F.2d at 1023-24; *Stop H-3 Association v. Dole*, 740 F.2d 1442, 1463-64 (9th Cir. 1984). A materially different result can be based on different conclusions of the EIS; e.g., environmental impacts identified as SMALL would instead be classified as MODERATE or LARGE. A supplemental EIS is required when there are substantial changes in the proposed action that are relevant to environmental concerns; or there are new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. 10 C.F.R. § 51.92

¹⁰ SECY-08-0142, September 25, 2008

(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue

First, in 2010, the NRC itself rated the North Anna plant as the seventh riskiest of all nuclear reactors in the U.S.

Second, in a seismic hazard analysis conducted for Generic Issue 199, in four ESP submittals— North Anna, Grand Gulf, Vogtle, and Clinton— the seismic hazard was found to be higher over most frequency ranges compared to an earlier Electric Power Research Institute/Seismicity Owners Group (EPRI-SOG) study.¹¹

Third, probabilistic risk assessments conducted for the North Anna 3 COLA and other documents do not account for unexpected failure modes:

The lesson from the Fukushima, Chernobyl, and Three Mile Island accidents is simply that nuclear power comes with the inevitability of catastrophic accidents. While these may not be frequent in an absolute sense, there are good reasons to believe that they will be far more frequent than quantitative tools such as probabilistic risk assessments predict. Any discussion about the future of nuclear power ought to start with that realization.¹²

Also,

[A]s a 1978 Risk Assessment Review Group Report to the NRC pointed out, it is "conceptually impossible to be complete in a mathematical sense in the construction of event-trees and fault-trees í This inherent limitation means that any calculation using this methodology is always subject to revision and to doubt as to its completeness.¹³

Further,

¹¹ GI-199 Implications of Updates Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants, August 2010, <http://pbadupws.nrc.gov/docs/ML1002/ML100270639.pdf>

¹² Ramana, NV, "Beyond our imagination: Fukushima and the problem of assessing risk," *Bulletin of the Atomic Scientists*, April 19, 2011. M. V. Ramana, a physicist, is currently appointed jointly with the Nuclear Futures Laboratory and the Program on Science and Global Security, both at Princeton University, and works on the future of nuclear energy in the context of climate change and nuclear disarmament. He is the author of *The Power of Promise: Examining Nuclear Energy in India*, to be published later this year by Penguin Books. Ramana is a member of the Bulletin of Atomic Scientists Science and Security Board.

¹³ *Id.*

When it comes to future safety, nuclear designers and operators often assume that they know what is likely to happen, which is what allows them to assert that they have planned for all possible contingencies. Yet there is one weakness of the probabilistic risk assessment method that has been emphatically demonstrated with the Fukushima I nuclear accidents -- the difficulty of modeling common-cause or common-mode failures.¹⁴

Finally, attached to this motion is an assessment of quake impacts on North Anna by a geologist at The College of William and Mary which states:¹⁵

At the North Anna Nuclear Power Station, 21 km from the epicenter, peak ground accelerations reached $\sim 250 \text{ cm/sec}^2$, more than sufficient to damage unreinforced masonry structures in the epicentral region.

During the quake the southeastern side of the fault (hanging wall) was shoved upward with a maximum displacement of about 1 meter. The total rupture length along the fault was likely 5 to 10 kilometers. There was no rupture at the surface because displacement across the fault did not propagate all the way to the Earth's surface. The 2011 earthquake occurred along a blind, and previously unrecognized, reverse fault in the Virginia Piedmont.

What makes this quake special is that it was the largest quake to rock the eastern United States in over a century and was felt by more people than any other quake in U.S. history. At the recent American Geophysical Union meeting, Shao and others report a seismic moment of 5.75×10^{17} Newton meters for the quake, which translates into ~ 35 terajoules of energy released (for comparison, World War II-era atomic bombs packed an energy punch of 50 to 90 terajoules).

The region referred to in this analysis is the Central Virginia Seismic Zone and the epicenter was the one near Mineral, Virginia on August 23, 2011.

In addition, the Intervenor will rely on the expertise of Arnold Gundersen who has reviewed this submittal but is unable to provide an affidavit because he is traveling.

(vi) provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact

Intervenor has raised contentions regarding seismicity factors and environmental impacts and plant safety issues at North Anna since 2010, and for almost that long DVP

¹⁴ *Id.*

¹⁵ "All Shook Up! The 2011 Virginia Earthquake," Christopher Bailey, December 22, 2011

and NRC staff have opposed them. For example, in Intervenor's Contention 13, not admitted, Dominion alleged the contention was vague and unsupported. However, it was Dominion which provided evidence that earth movements would exceed the regulatory requirements. Dominion said that it is the Commission which determines if a requested exemption is granted and whether *special circumstances* outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. Intervenor's Reply to Dominion and NRC Staff Answers, November 4, 2010.

Discussion

The Blue Ridge Environmental Defense League seeks to reopen the proceeding to bring a new contention because events at the North Anna nuclear power site indicate that the design of North Anna Unit 3 is unsuitable for the site. The August 2011 quake registered 5.8 Richter and horizontal acceleration caused earth to move 4½ inches under the 115-ton steel casks storing highly radioactive nuclear waste. The quake was felt by residents from Georgia to Maine and Illinois. Moreover, the basis for the COL, the early site permit completed before these events occurred, is outdated. Nevertheless, the applicant again seeks numerous departures, exceptions and variances in order to gain approval for an NRC license.

Indeed, the August 23, 2011 earthquake has opened a new line of inquiry to determine the risks associated with the construction of a nuclear power plant in the Central Virginia Seismic Zone. The following findings are from an assessment of the impact of the quake on the North Anna plant by the US Geological Survey:¹⁶

- Decades of study have been unable to link earthquakes in CVSZ to a causative fault.

¹⁶ "Learning from the 2011 Virginia Earthquake," Wright Horton, Geologist, U.S. Geological Survey, March 29, 2012

- Mapped lengths of old faults suggest that, if reactivated, earthquakes larger than M5.8 are possible.
- 2011 quake occurred in a gap in detailed geologic map coverage
- Geologic mapping by VGDMR [*sic*, Virginia Division of Geology and Mineral Resources] and USGS is in progress.

The USGS analysis continues:

öBased on evaluation of the U.S. Geological Survey (USGS) data and plant specific data analysis, Dominion has confirmed that the August 23, 2011 **earthquake exceeded the spectral and peak ground accelerations for the Operating Basis and Design Basis earthquakes (OBE and DBE respectively)** for North Anna Units 1 and 2.ö - Operator report to USNRC.¹⁷

Emphasis in the original. Seismic Shaking Records gathered by USGS comparing the

Design Basis Earthquake to data gathered from instruments at the plant on 8/23/11 indicated exceedance of DBE acceleration in all three planes: eastöwest, northösouth and vertical. From the same report, a photograph of the damage at the



Washington National Cathedral illustrates the potential damage. Describing the future situation at North Anna, the USGS assessment lamented: öFundamentally, we donö know the cause of earthquakes in this part of the country.ö¹⁸

Nevertheless, the Applicant seeks departures, exceptions and variances similar to the following:

Because the SSE is also defined in DCD Tier 1, Table 5.1-1, the changes to the site-specific definition requires a departure from DCD Tier 1 information. Therefore, a request for exemption from DCD Tier 1 information is provided in Exemption 3.

¹⁷ öLearning from the 2011 Virginia Earthquake,ö Wright Horton, Geologist, U.S. Geological Survey, March 29, 2012, Slide 9

¹⁸ öLearning from the 2011 Virginia Earthquake,ö Wright Horton, Geologist, U.S. Geological Survey, March 29, 2012, Slide 20

North Anna 3, Combined License Application, December 2013.¹⁹ According to the updated COLA, the Certified Seismic Design Response Spectra (CSDRS) is 135% of that in the DCD.

Conclusion

The Applicant has tried two different designs for Unit 3. Neither one has been able to meet the standards of the DCDs. Is the geology of the North Anna site unsuitable for construction of a new nuclear power reactor?

Intervenor requests to have the North Anna Unit 3 license application process reopened pending new contentions to be submitted by BREDL to the Atomic Safety and Licensing Board. Intervenor notes that, as of this date, the ESBWR DCD is not yet finalized and still under review. At a minimum, the Commission should conduct the COL licensing proceeding for the North Anna Unit 3 including the final design certification rule, completing the ESBWR rulemaking before proceeding with the COLA.

Respectfully submitted,



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Pursuant to 10 C.F.R. § 2.323, the movant has made a sincere effort to contact counsel for the Applicant and NRC to resolve the issues raised in the motion, but the effort was unsuccessful.

¹⁹ COLA Revision 6, Part 7: Departures Report öDeparture: NAPS DEP 3.7-1, Ground Response Spectra for Seismic Structural Loads and Floor Response Spectra,ö page 1-2

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CERTIFICATE OF SERVICE

I hereby certify that the
MOTION TO REOPEN AND ADMIT NEW CONTENTION
has been filed through the Electronic Information Exchange system
this 7th day of March, 2014.



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