UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	**Docket No. 52-011-ESP**
Southern Nuclear Operating Company	)	**ASLBP No. 07-850-01-ESP-BD01**
(Early Site Permit for Vogtle ESP Site)	)	**February 6, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S
RESPONSIVE POSITION STATEMENT
ON ENVIRONMENTAL CONTENTION 1.3
(DRY COOLING SYSTEM ALTERNATIVES)

Pursuant to 10 C.F.R. § 2.1207(a)(1) and the Atomic Safety and Licensing Board's ("ASLB" or "Board") May 7, 2007, July 3, 2008, July 14, 2008, and October 24, 2008 Orders[1], Southern Nuclear Operating Company ("SNC") submits its Responsive Position Statement ("Response") in response to the Joint Intervenors' Initial Written Statement of Position and Prefiled Direct Testimony, filed with the Nuclear Regulatory Commission ("NRC" or "Commission") on January 9, 2009 ("Joint Intervenors Position Statement").[2] SNC's Response is supported by the Rebuttal Testimony of James W. Cuchens and Charles R. Pierce, Exhibits SNC000056 through SNC000065 filed contemporaneously herewith, as well as the testimony and exhibits filed with SNC' Initial Statement of Position on Environmental Contention 1.3 (Dry Cooling System Alternatives) submitted January 9, 2009, in this proceeding ("Initial Position

[1] Memorandum and Order (Prehearing Conference and Initial Scheduling Order) (May 7, 2007); Memorandum and Order (Revised General Schedule) (July 3, 2008); Memorandum and Order (Revised General Schedule) (July 14, 2008); Memorandum and Order (Revised General Schedule) (October 24, 2008).

[2] The Joint Intervenors include the Center for a Sustainable Coast, Savannah Riverkeeper, Southern Alliance for Clean Energy, Atlanta Women's Action for New Directions, and Blue Ridge Defense League.

Statement"). For the reasons set forth below, Joint Intervenors' Environmental Contention 1.3 ("E.C. 1.3")[3] cannot be sustained.

I. INTRODUCTION

As demonstrated by SNC's Initial Position Statement, this Response, and the associated testimony, the analysis contained and conclusions reached in the Final Environmental Impact Statement ("FEIS") are adequate, reasonable and more than satisfy the NRC Staff's NEPA responsibilities. SNC's Initial Position Statement at pp. 14-22. The FEIS clearly evidences that the NRC Staff took the required "hard look" at the relevant environmental consequences and Joint Intervenors have failed to demonstrate how the inclusion or consideration of more information was required or could have affected the NRC Staff's ultimate conclusions. Id. at pp. 16-19; Joint Intervenors' Position Statement at pp. 16-19. SNC has also demonstrated that dry cooling is not a feasible alternative given the limitations of current state-of-the-art dry cooling technology with respect to its implementation on large nuclear power plants, including the AP1000 design. Id. at pp. 22-33. Moreover, SNC has shown that the installation of dry cooling on an AP1000 unit at Vogtle would raise unit reliability concerns, result in lower unit output, incur prohibitive costs, and cause harm to the environment. Id. Finally, SNC has established that a high backpressure turbine capable of processing the AP1000 steam flow does not exist. Id.

Joint Intervenors' Position Statement alleges that the FEIS analysis is inadequate with regard to cooling system alternatives and that dry cooling is a feasible alternative to the wet cooling system specified in the Design Control Document ("DCD") for the AP1000 nuclear

[3] EC 1.3 asserts that the Environmental Report ("ER") included with the Early Site Permit ("ESP") "fails to satisfy 10 C.F.R. § 51.45(b)(3) because its analysis of the dry cooling alternative is inadequate to address the appropriateness of a dry cooling system given the presence of extremely sensitive biological resources." *Atomic Safety and Licensing Board, Memorandum and Order* ("ASLB Order") at app. A (March 12, 2007).

power plant. Joint Intervenors' Position Statement at pp. 16-19. However, Joint Intervenors fail to explain how the FEIS does not satisfy the NRC Staff's NEPA obligations and do not provide any evidence that the FEIS analysis is inadequate or that its conclusions are wrong. Id. Moreover, Joint Intervenors' argument that dry cooling is a feasible alternative is likewise unsupported by any credible explanation, data, analysis, or other evidence of the use of dry cooling systems in base load electrical generators of the capacity of the AP1000.

Based on these facts, SNC submits that NEPA does not require an evaluation of dry cooling at the Vogtle site, certainly not beyond the discussion already included in the FEIS.[4]

II. PROCEDURAL BACKGROUND

A thorough procedural history of EC 1.3 and summary of applicable legal standards are provided in SNC's Initial Position Statement on pages 2-5.

III. SNC'S WITNESSES

As noted above, this Response is supported by written, pre-filed direct and rebuttal testimony from James W. Cuchens ("Cuchens Rebuttal Testimony")[5] and Charles R. Pierce ("Pierce Rebuttal Testimony"). Mr. Cuchens submitted testimony in support of SNC's Initial Position Statement, which contains a description of his significant and essential experience

[4] See *Private Fuel Storage*, LBP-03-30, 58 NRC at 479 ("NEPA does not require the consideration of alternatives that are impractical, that present unique problems; or that cause extraordinary costs.") (citations omitted). *See* also *Envtl. Law and Policy Center v NRC*, 470 F.3d 676, 682-83 (7th Cir. 2006); *Midcoast Interstate Transmission, Inc. v. FERC*, 198 F.3d 960, 967 (D.C. Cir. 2000); *In re Long Island Lighting Company (Shoreham Nuclear Plant)*, CLI-90-8, 32 NRC 201, 206 (1990) ("[T]here is no need to consider alternatives of speculative feasibility[.]"); *see also Kelley v. Selin*, 42 F.3d 1501, 1521 (6th Cir. 1995) (finding the NRC properly held that alternatives to dry casks for storing nuclear fuel, neither proven nor practical, did not belong in an environmental document); ASLB Order at 19 ("[T]he staff's regulatory guidance instructs applicants to include alternatives that 'although not necessarily economically attractive, . . . are based on feasible technology available to the applicant during the design state.'") (citing Regulatory Guide 4.2 at 10-1)).

[5] James W. Cuchens submitted Prefiled Direct Testimony in this proceeding on January 9, 2009 ("Cuchens Testimony").

pertaining to the issues involved in EC 1.3. A description of Mr. Pierce's relevant experience and the scope of his testimony is provided below.

Charles R. Pierce

Mr. Pierce is Licensing Manager for the Vogtle project. He has twenty-eight years experience with regard to nuclear power plant licensing, design engineering and retrofitting. He has designed and evaluated safety related systems, changes in licensing to meet regulatory impacts, and site system engineering. With regard to the AP1000 standard design, he has been involved in the development of the standard design with Westinghouse Electric Corporation ("Westinghouse") and the licensing of Westinghouse's standard design with the NRC. He also has extensive knowledge of the regulatory requirements, policies, licensing practices and procedures for nuclear power plants, including all aspects of site design, installation, environmental qualifications, construction and regulatory interpretations. Mr. Pierce testifies regarding the meaning of AP1000 standard design, the importance of maintaining the standard nuclear power plant design, and related conclusions set forth in Powers' Testimony.

IV. SNC'S RESPONSIVE STATEMENT OF POSITION

A. The ER and FEIS Adequately Analyze Dry Cooling as Alternative

SNC maintains that the NRC Staff took the required "hard look" at the relevant environmental consequences and reasonably reached the determinations in the FEIS.[6] Specifically, the FEIS demonstrates that NRC Staff conducted a thorough analysis of the potential impacts of the proposed project to aquatic resources and that NRC Staff utilized

[6] *See Baltimore Gas & Elec. Co. v Nat. Res. Def. Council*, 462 U.S. 87, 97 (1983); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989); *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 374 (1989). *See also New York Nat. Res. Def. Council, Inc. v. Kleppe*, 429 U.S. 1307, 1311 (1976). SNC's Initial Position Statement (at pp. 5-10) provides an exhaustive description of the legal standards applicable to the Joint Intervenors' EC 1.3., which were not contradicted in Joint Intervenors' Position Statement.

standard methods in doing so.[7] FEIS, Sections 2.7.2.1-2, 5.4.2, and 9.3.2. In addition, the U.S. National Marine Fisheries Service concurred with NRC Staff's findings (Exhibit SNC000022). Id. Finally, SNC and Dr. Charles Coutant conducted further analysis and provided additional evidence that establish that the proposed project will have no effect on the shortnose sturgeon and robust redhorse. Id. All of which was further confirmed by the position statement, testimony and evidence that was submitted by NRC Staff in this proceeding on January 9, 2009. Exhibit SNC000022.

Joint Intervenors allege that FEIS analysis is inadequate with regard to cooling system alternatives. Joint Intervenors' Position Statement at p. 17; Testimony of Barry W. Sulkin Testimony at A9. The basis for this position is that the Staff's conclusion "rests on the erroneous conclusion that the impacts of the wet cooling system would be 'small'." Id. However, Joint Intervenors fail to explain how the NRC Staff's conclusions are erroneous and do not provide any evidence to rebut those conclusions. Id. Joint Intervenors' simply site to the requirements of an environmental impact statement and the goals of an EIS and assert that the "hard look" analysis is absent from the FEIS. Joint Intervenors Position Statement at pp. 5-6. In fact, rather than point to areas where the FEIS is lacking in analysis, the Joint Intervenors simply refer to the contradictory testimony from Mr. Sulkin and Mr. Powers – neither of which provide any further explanation or evidence.[8]

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[7] Testimony of Dr. Charles C. Coutant concerning EC 1.3 (A15-A25) submitted in this proceeding on January 9, 2009 ("Coutant 1.3 Testimony").

[8] Joint Intervenors cite Regulatory Guide 4.2 and argue that NRC Staff did not satisfy the requirements set forth in that document. Joint Intervenors' Position Statement at pp. 16-17. As demonstrated by the FEIS and SNC's Initial Position Statement, NRC Staff did, in fact, conduct an adequate analysis of the proposed project and, in doing so, satisfied the review requirements cited by Joint Intervenors. SNC's Initial Position Statement at pp. 14-22; Coutant 1.3 Testimony at A15-A25. Moreover, SNC notes that Regulatory Guide 4.2 only requires a review of alternatives that are "based on feasible technology available to the applicant during the design

B. Dry Cooling Is Not Feasible For Vogtle 3 And 4 and, Therefore, Need Not Be Analyzed In Detail Under NEPA

SNC has demonstrated that dry cooling is not a feasible alternative given the limitations of current state-of-the-art dry cooling technology with respect to its implementation on large nuclear power plants, including the AP1000 design. SNC's Initial Position Statement at pp. 22-33. Moreover, SNC has shown that the installation of dry cooling on an AP1000 unit at Vogtle would raise unit reliability concerns, result in lower unit output, incur prohibitive costs, and cause harm to the environment. Id. Finally, SNC has established that a high backpressure turbine capable of processing the AP1000 steam flow does not exist. Id. Accordingly, because NEPA does not require the consideration of unproven, impracticable, and speculative alternatives, the discussion of dry cooling in the FEIS is adequate under NEPA and 10 CFR Part 51.[9]

The Joint Intervenors' position regarding the feasibility of dry cooling rests solely on the Prefiled Direct Testimony of William Powers submitted in this proceeding on January 9, 2009 ("Powers Testimony"). The crux of Mr. Powers' testimony is that dry cooling is compatible with the AP1000 standard design and, thus, is a feasible alternative. Mr. Powers' conclusions are based on several erroneous premises. First, Mr. Powers concludes that dry cooling is

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state," which, as shown by SNC, does not include dry cooling. Regulatory Guide 4.2 at 10-1; SNC's Initial Position Statement at pp. 22-33.

[9] *See Private Fuel Storage*, LBP-03-30, 58 NRC at 479 ("NEPA does not require the consideration of alternatives that are impractical, that present unique problems; or that cause extraordinary costs.") (citations omitted)). *See also Center*, 473 F.3d at 682-83; *Midcoast*, 198 F.3d at 967; *Shoreham*, CLI-90-8, 32 NRC at 206 ("[T]here is no need to consider alternatives of speculative feasibility[.]"); *see also Kelley*, 42 F.3d at 1521 (finding the NRC properly held that alternatives to dry casks for storing nuclear fuel, neither proven nor practical, did not belong in an environmental document); *ASLB Order* at 19 ("[T]he staff's regulatory guidance instructs applicants to include alternatives that 'although not necessarily economically attractive, . . . are based on feasible technology available to the applicant during the design state.'") (citing Regulatory Guide 4.2 at 10-1)).

feasible at the Vogtle site based on the incorrect notion that standard AP1000 design can accommodate both high and standard backpressure turbines. Powers Testimony at A13-A18. Second, Mr. Powers assumes that dry cooling is compatible with facilities like Plant Vogtle, based on flawed comparisons to much smaller generating units. Powers Testimony at A19-A25. Third, Mr. Powers asserts that the climate at the Vogtle site does not impact the effectiveness of a dry cooling system, again based on flawed comparisons to much smaller generating units. Powers Testimony at A26-A29. Fourth, Mr. Powers claims, with no evidence, data or support, that the financial, economic and performance impacts on facility design, construction and operation do not favor wet cooling over dry cooling. Powers Testimony at A30-A35.

Mr. Powers' testimony is premised on a fundamental misunderstanding of the standard design for the AP1000 nuclear plant and the impacts of dry cooling on that design. Moreover, Mr. Powers offers no data, evidence or information to support Joint Intervenors' position, and instead offers only conclusory statements and faulty assumptions. Conversely, SNC's Initial Position Statement and Cuchens Testimony have shown, and as the Cuchens Rebuttal Testimony and Pierce Rebuttal Testimony will reiterate, that dry cooling is not a feasible alternative to wet cooling because (i) dry cooling an unproven technology with facilities such as the AP1000, (ii) dry cooling will diminish reliability and efficiency of the AP1000 standard turbine, and (iii) dry cooling will negatively impact costs and the output of the unit. SNC's Initial Position Statement at pp. 22-23. Given the lack of evidence in support of Joint Intervenors' position, especially in light of the detailed analysis, data and research provided by SNC, Joint Intervenors' position with regard to the feasibility of dry cooling has no merit. [10]

[10] *See Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 551 (1978) ("[T]he concept of alternatives [under NEPA] must be bounded by some notion of feasibility."); *City of Grapevine, Tex. v. Dep't of Transp.* ("*Grapevine*"), 17 F.3d 1502, 1506 (D.C. Cir. 1994) (Rule of

SNC's position on the infeasibility of dry cooling is supported by the findings of the Environmental Protection Agency ("EPA"). An examination of the EPA New Facilities Rule reveals a very detailed analysis of dry cooling based on a nearly zero intake flow and rejects the option because: (1) dry cooling costs are sufficient to pose a barrier to entry into the marketplace for some facilities; (2) dry cooling has a detrimental effect on energy production by reducing energy efficiency of steam turbines; (3) dry cooling may pose unfair competitive disadvantages by region and climate; and (4) dry cooling technologies pose significant engineering feasibility problems. Finally, the cost is conservatively estimated at more than three times the cost of wet cooling. *See* Why EPA is not Adopting Dry Cooling as Best Technology Available for Minimizing Adverse Environmental Impact, EPA New Facilities Rule, 40 Fed. Reg. 65,256, at 65,282-65,285 (Dec. 18, 2001 (codified at 40 C.F.R. § 125). Although SNC does not contend that the EPA's rejection of dry cooling as a BTA necessarily forecloses the consideration of dry cooling as an alternative as a matter of law, EPA's independent analysis is certainly credible evidence of the feasibility of the application of dry cooling technology to nuclear power plants.

The Joint Intervenors quibble the with conclusions reached by the EPA in rejecting dry cooling as the Best Technology Available ("BTA"), but cannot deny the underlying facts upon which EPA's conclusion was based. Joint Intervenors' Position Statement at pp. 18-19; Powers Testimony at A24-A25. Thus, while Joint Intervenors list a number of "reasons" the EPA was incorrect in its determination, they fail to provide any support or justification for their claims. Powers Testimony at A25. Moreover, given Joint Intervenors' concessions regarding the

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Reason limits not just the "range of alternatives" an agency must discuss, but also "the extent of which [the agency] must discuss them"); *In re Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation) ("*Private Fuel Storage*"), LBP-03-30, 58 NRC 454, 479 (2003) (discussion of alternatives need not include "every possible alternative, but every reasonable alternative").

shortcomings of dry cooling in their Position Statement, their disagreement with EPA's findings are not credible. Specifically, Joint Intervenors concede that removal of the AP1000 steam surface condensers and opening numerous 20-foot diameter holes in the turbine building walls will be required, which will obviously require some level of re-design of the turbine building and related costs. Powers Testimony at A19-A23. Joint Intervenors also concede that a smaller air cooled condenser would cost at least $200 million more than the proposed wet cooling system (i.e., the alleged cost of the 230 module ACC described in Exhibit JTI000035, p.5). Joint Intervenors further concede state that an ACC will have at least a 30 MW parasitic fan load and that the MW differential between a dry and a wet cooling system between 15-20 MW per unit at peak conditions. Powers Testimony at A28, A33.

Based on these statements, Joint Intervenors' evidence demonstrates that dry cooling is more expensive, less efficient and less productive than wet cooling. While not taking a position on the issue, NRC Staff aptly observed that "SNC and the Joint Intervenors appear to agree that compared to the proposed wet-tower design, dry cooling would A) require more land, B) cost more to implement, and C) decrease the operating efficiency of the plants." Staff 1.3 Testimony at A14. The Staff concluded that SNC and Joint Intervenors' dispute is over the magnitude of these impacts, but not their existence. Id.

1. Current ACC Designs Are Incompatible With The Standard AP1000 Design.

As demonstrated in SNC's Initial Position Statement, the technological limits on dry cooling preclude its use with much larger baseload plants such as the AP1000. SNC's Initial Position Statement at pp. 25-26. Moreover, SNC has established that the AP1000 cannot be used with a high backpressure turbine because single stage high backpressure turbines are not able to pass the steam flow specified in the AP1000 thermal cycle (the AP1000 turbine is a triple

exhaust, six flow low pressure turbine) and an AP1000 unit must use a multi-exhaust turbine. Id. SNC has also shown that a large, multi-exhaust turbine that is capable of safely operating at elevated backpressures has never been designed or manufactured anywhere in the world, and Joint Intervenors have not offered any evidence to the contrary. Id.; Joint Intervenors' Position Statement at pp. 16-19.

Joint Intervenors claim that the AP1000 standard design is compatible with dry cooling is based on their arguments that the modifications required to adapt the AP1000 to dry cooling would not require substantial changes to the AP1000 standard design and that a high backpressure turbine is interchangeable with the standard turbine. Powers Testimony at A13 and A19. This assertion is wrong on both accounts. The modifications suggested by Joint Intervenors' would require extensive changes to the entire turbine building structure, including but not limited to, the main building support steel, spring support foundation system, and turbine building base mat foundation. Cuchens Rebuttal Testimony at A6; Pierce Rebuttal Testimony at A7. Further, as explained above, a high backpressure turbine is not interchangeable with the standard turbine. Id.

a. Joint Intervenors' suggested modifications substantially impact the standard design

In order to interconnect an air cooled condenser with the AP1000, Mr. Powers concedes that removal of the AP1000 steam surface condensers will be required and opening numerous 20-foot diameter holes in the turbine building walls will be necessary for placement of the steam ducts. Powers Testimony at A19-A23. Mr. Powers further concedes that these modifications would not substantially impact the standard design for the AP1000 and that no other significant physical modifications will be required in or to the turbine building. Id. at A19, A22. Mr.

Powers clearly does not appreciate the complexity of the turbine building design, and the impact of these modifications, which is not surprising given that he does not reference any drawings, schematics and/or diagrams upon which he bases his opinion.

The removal of the steam surface condensers and creation of multiple 20-foot diameter holes in the turbine building wall would be substantial changes to the standard design. Pierce Rebuttal Testimony at A8-A9; Cuchens Rebuttal Testimony at A8. These modifications would require changes not only to the wall of the turbine building, but also to the turbine building structural steel cross bracing, and the main turbine deck support system. Id. Moreover, these modifications will cause layout changes to other equipment in order to provide a path for the steam ducts and will require the design of a support system for the steam ducts. Id.

Mr. Powers is also incorrect in his claim that substituting a high backpressure turbine for the standard turbine would not substantially interfere with the AP1000 standard design. Powers Testimony at A6, A8. The DCD specifies the turbine-generator as a TC6F 52-inch last-stage blade unit, which is a multi-stage Toshiba turbine that is designed to operate in conjunction with a single pass/multipressure condensing turbine with a design backpressure of 2.9" HgA. Pierce Rebuttal Testimony at A7. During normal operations, backpressure in excess of 5.0" HgA would exceed the functional operational limit of the AP1000 standard turbine. Cuchens Rebuttal Testimony at A6. Therefore, a high backpressure turbine that operates with an average backpressure of 8" HgA or greater (as defined in Mr. Powers' testimony at A15) would exceed the functional limitations of the AP1000 standard design and lead to the reliability and efficiency issues discussed below. Therefore, the use of a high backpressure turbine with an AP1000 unit would be contrary to the standard design. Furthermore, because the design of the turbine-generator building is based, in part, upon the configuration of the standard turbine, substantial

modifications to the turbine building, the turbine building structural steel cross bracing, and the main turbine deck support system would be required to use a high backpressure turbine. Cuchens Rebuttal Testimony at A8; Pierce Rebuttal Testimony at A8-A10.

b. <u>The AP1000 standard design is not point of departure for site specific modifications</u>

In support of his testimony that the above-described modifications do not interfere with the AP1000 standard design, Mr. Powers states that "a standard design serves as a point of departure for customizing the design for a specific site with specific site constraints." Powers Testimony at A23. The characterization of the standard design as a point of departure for customization is contrary to the NRC's policy and intent with regard to the meaning of "standard design". The NRC has repeatedly expressed its desire that the next generation of nuclear plants be standardized in order to reform the licensing process by making it more predictable and to enhance safety by making reactors of the same design more uniform. While the new Part 52 licensing regulations do carry a departure process where changes to the standard design can be made, the intent of both the NRC and the industry is that this process will be applied only when absolutely necessary in order to maximize the benefits of the standard design. Pierce Rebuttal Testimony at A5. Accordingly, Mr. Powers' suggestion that the use of an ACC with the AP1000, and the necessary design modifications, do not alter the standard design because they are "customizations" is incorrect and should be rejected.

2. The "Example Facilities" Cited by Joint Intervenors Are not Comparable to the AP1000.

Joint Intervenors cite the Midlothian power plant in Texas, the Wyodak plant in Wyoming and the Matimba plant in South Africa, as evidence that dry cooling is feasible with an AP1000 unit at the Vogtle site. Powers Testimony at A18, A26. None of these plants, however, has a comparable capacity and steam flow to the AP1000. Cuchens Rebuttal Testimony at A9.

Moreover, none of these plants utilize the triple exhaust, six-flow turbine-generator package specified in the AP1000 standard design (or comparable turbine package). Accordingly, not only are these references inconclusive as to the feasibility of dry cooling at the Vogtle site, but they are also misleading as to their comparability to any AP1000 unit.[11]

As explained by Mr. Cuchens, the Midlothian plant consists of six units of 275 MW each for a total of 1,650 MW. The Wyodak power plant consists of one 330 MW unit and the Matimba power plant consists of six 665 MW units for a total of 4,000 MW. Cuchens Rebuttal Testimony at A9. Moreover, the dry cooling systems at these plants do not comprise one large, common system, but instead are divided into independent units, one for each turbine on the site. Id. Clearly, these plants do not provide comparable examples of the dry cooling facilities that would be required for the capacity of the Vogtle units, which are 1,117 MW each. To be relevant, any comparison must include dry cooled units of equal size with similar turbine cycles rather than a group of small units compared to a large unit. *See* Regulatory Guide 4.2, at 10-1 (JTI000032). Accordingly, Joint Intervenors' comparison of existing dry-cooled units to the AP1000 is without merit and does not establish the feasibility of an ACC at Vogtle.

Finally, despite Joint Intervenors' position that dry cooling is currently being utilized with nuclear power plants similar to the AP1000 (Exhibit JTI000035), they have failed to provide any evidence to support this assertion.

3. Climate in the Vicinity of the Vogtle Site Would Substantially Impact the Effectiveness of Dry Cooling.

Joint Intervenors claim that the climate and temperature fluctuations at the Vogtle site will not adversely affect the effectiveness of dry cooling and, thus, would not impair the

[11] The same is true for the multi-unit plants references in JTI000038. Cuchens Rebuttal Testimony at A14. As shown in Exhibit SNC000057, none of the units have a comparable capacity to the AP1000.

economic viability of its use at Vogtle. Powers Testimony at A26-A29. In support of this position, Mr. Powers states that the ambient temperature at Vogtle is less than 70° F during most of the year and that peak summertime conditions generally occur less than 200 hours a year. Id. Mr. Powers further states that there would be relatively little differential in the MW output of wet and dry systems under these conditions. Id. Mr. Powers fails to recognize, however, that when the ambient air temperature rises and peak summer conditions occur, dry cooling is at its most vulnerable and demand for energy is at its highest. Cuchens Rebuttal Testimony at A16. Therefore, as the temperature rises above 70° F, a dry cooling unit becomes less efficient and, as a result, the output of the unit degrades. Given that the temperature in the vicinity of the Vogtle site exceeds 70° F over 36 percent of the hours in each year and exceeds 90° F 200 hours a year (Exhibit SNC000037), an AP1000 unit located on the Vogtle site would face significant performance degradation for a significant portion of every year. Cuchens Rebuttal Testimony at A17.[12]

4. A Dry Cooling System Would Result in Significant Harm to the Environment, Prohibitive Expenditures and Decreased Efficiency and Capacity.

a. Harm to the Environment

An ACC designed to operate in conjunction with the AP1000 standard turbine would be extremely large and, as such, would cause significant harm to the environment. SNC's Initial Position Statement at pp. 29-30. Specifically, SNC would have to clear more than half a linear mile by 300 feet just to accommodate the ACC structure for ***each*** Vogtle unit. Id. In addition, the configuration of the ACC units would require the clearing and grubbing of wooded areas,

[12] Mr. Powers also ignores the fact that lost generation actually begins to occur at 60º F, which means that any AP1000 unit at Vogtle would suffer output degradation more than half the days of the year. Cuchens Testimony at A20, Cuchens Rebuttal Testimony at A19-20.

including removal of a large number of trees, cut and fill for the construction pad, rerouting and reconstruction of site drainage features, and potentially filling certain waterbodies. Id. Finally, given the size of an ACC, the installation of dry cooling at the Vogtle site would have substantial adverse aesthetic impacts. Id. Joint Intervenors do not present any evidence their Position Statement or testimony that disproves these impacts. Joint Intervenors' Position Statement at pp. 16-22.

b. Prohibitive Expenditures

SNC has submitted very detailed analysis and data that the cost of construction of an ACC at Vogtle would be approximately $445 million for each of the Vogtle 3 and 4 units, for a total of $890 million for the entire plant (which is more than six times the cost of the wet cooling system).[13] None of these costs include any additional engineering or construction costs or the significant losses of electrical output due to the inordinately large number of fans employed with an ACC of this size. Additionally, an ACC would cost significantly more to maintain and operate over the life of the plant than a wet system. SNC's Initial Position Statement at pp. 30-31. These additional capital, maintenance and operating costs, especially in view of the speculative viability of the technology as applied to an AP1000 at Vogtle, clearly render dry cooling infeasible. Id.; *see Private Fuel Storage*, LBP-03-30, 58 NRC at 479.[14]

[13] Designing and constructing an ACC to operate at a higher backpressure than the current design but still below the AP1000 turbine alarm point at design conditions would cost approximately $420,000,000 more than the wet cooling system, but such an ACC would cause serious reliability issues and substantially decrease the output of the units. Cuchens Testimony at 17-18, 21-23.

[14] SNC's findings with regard to the cost, efficiency, and output impacts of dry cooling are supported by the EPA's finding set forth in its New Facilities Rule. *Why EPA is not Adopting Dry Cooling as Best Technology Available for Minimizing Adverse Environmental Impact*, EPA New Facilities Rule, 40 Fed. Reg. 65,256, at 65,282-65,285 (Dec. 18, 2001) (codified at 40 C.F.R. § 125).

Joint Intervenors claim that the use of a dry cooling system and a high backpressure turbine for an AP1000 at the Vogtle site would be simpler and less expensive. Powers Testimony at A30-A31. However, Joint Intervenors do not provide any data, analysis, or other evidence that supports this position. In fact, as explained by Mr. Cuchens, an ACC is not a "simpler" system than a wet system because the ACC would contain vastly more moving parts and pieces, which translates to vastly more time and money spent on maintenance, repair, and replacement of parts over the life of the plant. Cuchens Rebuttal Testimony at A18. Moreover, even Mr. Powers acknowledges that a smaller air cooled condenser would cost at least $200 million more than the proposed wet cooling system (i.e., the cost of the 230 module ACC described in his testimony and Exhibit JTI000035, p.5).

With regard to the use of a high backpressure turbine, Mr. Cuchens has previously stated in his direct testimony and Exhibit SNC000024 that application of a high backpressure turbine with an AP1000 unit, if possible, would prove to be very complicated and expensive. Cuchens Testimony at A22-A25, A31-A33. Specifically, modifications to the standard design would be required, including, but not limited to, redesign of the turbine building, the turbine building structural steel cross bracing, and the main turbine deck support system. Pierce Rebuttal Testimony at A9; Cuchens Rebuttal Testimony at A8. These modifications would naturally result in increased costs, which further establish that the use of an ACC and a high backpressure turbine with the AP1000 is not feasible. Cuchens Rebuttal Testimony at A10.

c. Decreased Efficiency and Capacity

The use of dry cooling with an AP1000 at Vogtle would significantly decrease the efficiency and capacity of the unit. SNC's Initial Position Statement at pp. 31-32. As shown in SNC' Initial Position Statement, the increase in backpressure associated with using the current

state-of-the-art ACC with the AP1000 turbine (as compared to a wet cooling system) would result in a loss of output of approximately 55 MW per unit and an additional consumptive power demand of 9-15 MW per unit, which would be a net loss of 64-70 MW per unit compared to the standard AP1000 plant. Id.[15]

Joint Intervenors maintain that there would be relatively little differential in the MW output of the wet and dry systems during most of the year whenever ambient temperature is less than approximately 70° F. Powers Testimony at A27-A29. As explained above, this position conveniently ignores those portions of the year when the temperature is greater than 70° F and the demand for electricity is highest. Cuchens Rebuttal Testimony at A16-A17. In fact, a "typical" wet cooling system will outperform a commensurate air-cooled system at temperatures above 60ºF, which means a wet cooled system will outperform the dry cooled system the majority of the year. Cuchens Rebuttal Testimony at A22. Significantly, the Joint Intervenors do not dispute the output degradation that occurs when temperatures are greater than 70° F. In fact, Joint Intervenors do not present any data or analysis that contradicts the figures shown by SNC and even Mr. Powers states that the MW difference at peak conditions would be 15-20 MW per unit. Powers Testimony at A28. The fundamental point is that for any given turbine, regardless of the backpressure limits of the turbine, a wet system would enjoy a substantial performance advantage over any of Mr. Powers' proffered dry systems for significant portions of the year.

[15] If an ACC could be designed and constructed to replicate the performance of a wet cooling system on an AP1000 unit at the Vogtle site, and thus not suffer the degradation, the size of this ACC unit would nonetheless affect the net output by increasing the consumptive power demand by anywhere from 27-33 MW per unit over that of a wet cooling system. SNC's Initial Position Statement at p. 31.

V. CONCLUSION

SNC respectfully requests that the Board rule that the FEIS adequately analyzed dry cooling as an alternative and satisfies the requirements of 10 C.F.R. § 51.45(b)(3).

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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Dated this 6th day of February, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	**Docket No. 52-011-ESP**
Southern Nuclear Operating Company	)	**ASLBP No. 07-850-01-ESP-BD01**
(Early Site Permit for Vogtle ESP Site)	)	**February 6, 2009**

CERTIFICATE OF SERVICE

I hereby certify that copies of SOUTHERN NUCLEAR OPERATING COMPANY'S RESPONSIVE POSITION STATEMENT ON ENVIRONMENTAL CONTENTION 1.3 (DRY COOLING SYSTEM ALTERNATIVES) in the above captioned proceeding have been served by electronic mail as shown below and/or by e-submittal this 6th day of February, 2009.

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