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Re: Southern Alliance for Clean Energy Comments in Response to TVA's Draft Supplemental Environmental Impact Statement for a Single Nuclear Reactor at the Bellefonte Site, Jackson County, Alabama.

December 21, 2009

The Southern Alliance for Clean Energy (SACE) respectfully submits these comments in response to the Tennessee Valley Authority's Draft Supplemental Environmental Impact Statement (SEIS) regarding the proposed construction of a single nuclear reactor at the Bellefonte site in Jackson County, Alabama.

SACE is a regional non-profit organization with members in Alabama, throughout the TVA region, and across the Southeast that are concerned about the impacts energy choices have on our health, economy and environment. We have serious concerns about TVA's proposal to build a new reactor at the Bellefonte site. The uncertainties associated with new nuclear reactors continue to escalate, putting ratepayers, taxpayers, and the environment at increasing risk. These risks are not adequately addressed in the Draft SEIS. We strongly recommend that TVA pursue the No Action Alternative.

Energy efficiency and renewable energy alternatives should be given full consideration as reasonable alternatives under NEPA.

TVA's analysis of energy efficiency and renewable energy as potential alternatives to the proposed new nuclear reactor is wholly inadequate to fulfill NEPA's requirements to rigorously explore and objectively evaluate all reasonable alternatives.¹ To date, TVA has not released any analysis that would support its contention that these resources do not merit full consideration or to refute the numerous independent analyses that indicate the significance of these resources in TVA's service territory.

The analysis contained in the Draft SEIS provides no indication that TVA has made a full and fair consideration of these resources. Instead, TVA dismisses these resources as unreasonable alternatives through statements with little or no substantive support. The whole of TVA's analysis regarding renewable energy alternatives consists of the unsupported statement that:

Renewable resources (wind and solar) are intermittent in nature and have capacity factors typically well below 50 percent. There is uncertainty

¹ 40 CFR 1502.14

about when the wind and solar generation resources will be available. Wind and solar generation potential is limited in the TVA region. In order to obtain meaningful amounts of power from these sources, TVA would need to purchase wind and solar power generated in other regions and bear the increased transmission costs. For these reasons, renewable resources are not considered reasonable baseload alternatives.²

With regards to energy efficiency as a potential resource to meet future energy demand, TVA provides no discussion of energy efficiency's potential in the valley, the ability of TVA to implement programs to achieve efficiency goals, or the benefits and costs associated with pursuing this resource. TVA's analysis of energy efficiency in the Draft SEIS essentially consists of three sentences:

Reducing peak demand and energy needs lowers the need for additional capacity in the future. Energy Vision 2020 examined the potential merits of a large number of different energy efficiency and DSM measures and TVA is updating these analyses in its ongoing IRP process. These resource options could reduce demand, particularly peak demand, substantially in the future, but will take time to implement and their results are uncertain.

These statements do not fulfill NEPA's requirement that a SEIS "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public."³ It is at the heart of NEPA that the rationale for these decisions be documented with rigorous and objective evaluation so that regulators and the public can understand the selection of one alternative over another. TVA, either through this Draft SEIS or through other publicly available documents, has not shown that this evaluation was undertaken. In fact, to date TVA has not publicly released any analysis of either the energy efficiency or renewable energy potential in the TVA operating region.

While unreasonable alternatives do not require as rigorous an evaluation, this does not condone TVA's arbitrary designation of renewable energy as an unreasonable alternative to meeting the purpose and need of the proposed project.⁴ The inadequacy of TVA's arbitrary designation is further highlighted by the fact that jurisdictions around the United States are pursuing energy efficiency and renewable energy as the *preferred* alternative to meeting future growth in energy demand. Both the Northwest Planning and Conservation Council (NWPCC) and Pacificorp, whose planning processes are being used as benchmarks in TVA's currently underway planning process, have developed plans to meet future energy resource development needs with a combination of demand-side resources and wind energy as the primary supply-side resource.⁵

² Draft Supplemental Environmental Impact Statement, p. 47.

³ 40 CFR 150

⁴ Draft Supplemental Environmental Impact Statement, p. 47.

⁵ Northwest Power and Conservation Council, *Draft Northwest 6th Power Plan*. September 2009; and Pacificorp, *2008 Integrated Resource Plan, Volume 1*. May 2009. Notably, electricity rates in this region are similar to those in the Tennessee Valley Authority region.

In addition, there are a significant and growing number of regions in the United States that have concluded that energy efficiency and renewable energy are viable, cost effective alternatives to meeting future energy demand. For example, the state of North Carolina, of which TVA serves a small percentage and that has similar resources as the remainder of the TVA region, has recently enacted a Renewable Energy Portfolio that calls for meeting 10% of customer energy needs with energy efficiency and renewable energy resources by 2018.⁶ These goals are well within the reasonable range of potential indentified by private and publicly owned utilities across the nation and TVA has not provided any analysis to suggest that such goals are unattainable in the TVA region.

Further, independent analysis indicates substantial renewable energy resources within the TVA service territory. Analysis conducted by the Southern Alliance for Clean Energy that compiled data from various independent and federal sources concluded that the Southeast United States could generate more than 15% of forecasted electricity demand by 2015 with renewable energy resources.⁷ In addition to wind and solar, this analysis included biomass resources, a potential resource that the Draft SEIS remarkably fails to consider altogether in spite of the clear potential within the TVA service territory.

TVA further contends in the Draft SEIS that some of the environmental impacts of wind and solar energy “are equal to or greater than those of a nuclear plant.”⁸ TVA’s contention has no basis in any analysis made publicly available by TVA and is in direct contention with other analyses completed across the nation.⁹ In fact, Power Scorecard shows that nuclear power has the largest environmental impact of various energy technologies.¹⁰ The Department of Energy has stated that nuclear power is the most water-intensive traditional energy supply technology.¹¹ Weighing the environmental impacts of various alternatives goes to the heart of NEPA and such claims must be supported by substantive analysis. Without substantive analysis, NEPA is rendered toothless, leaving alternatives analysis at the whim of subjective decision-making by TVA.

In addition to renewable energy resources, energy efficiency and demand response are not given fair consideration as alternatives to TVA’s proposed nuclear reactor. Energy efficiency is widely regarded as the cleanest, fastest and most cost-effective resource for meeting future energy demand and jurisdictions across the nation are committing to meeting significant percentages of demand growth through energy efficiency as opposed to building new generating capacity.

⁶ North Carolina Session Law 2007-397 (Senate Bill 3).

⁷ Yes We Can: Southern Solutions for a National Renewable Energy Standard, Southern Alliance for Clean Energy, February 2009. Available at: <http://www.cleanenergy.org/images/files/SERenewables022309rev.pdf>

⁸ Draft Supplemental Environmental Impact Statement, p. 48.

⁹ See, for example: *Environmental Impacts of Renewable Energy Technologies*. Union of Concerned Scientists, 1992. Available at: http://www.ucsusa.org/clean_energy/technology_and_impacts/impacts/environmental-impacts-of.html.

¹⁰ *Power Scorecard*, Environmental Defense, UCS, NRDC, et. al., Attachment A, 2003. Available at <http://powerscorecard.org/scorecard.cfm>.

¹¹ United States Department of Energy (DOE), *Energy Demands on Water Resources, Report to Congress on the Interdependency on Energy and Water*, December 2006.

In contrast to the national trend, the Southeast currently ranks as one of the least energy efficient regions in the nation. Tennessee and Alabama, two of TVA's primary states of service, consistently rank among the worst in per-capita residential electricity consumption.¹² This not only indicates TVA's half-hearted approach to energy efficiency in recent years, but also indicates there is a significant energy efficiency resource to be developed in the TVA service territory.¹³ This has been confirmed by numerous studies that conclude that states within the TVA service territory can meet significant percentages of future energy demand through energy efficiency.¹⁴

In spite of this, TVA has yet to aggressively pursue energy efficiency as a resource. To date, TVA has not released any publicly available information that would indicate it has seriously considered efficiency as an alternative to building costly baseload generation or to refute studies that show energy efficiency as a potentially significant resource in the TVA service territory. TVA concedes that reducing peak demand and energy use lowers the need for additional capacity, and recognizes the benefits of well-diversified resource mix to address uncertainties associated with any one kind of energy resource,¹⁵ but dismisses demand response and energy efficiency programs apparently because TVA considers these programs will take time to implement and could have uncertain results. Unlike pursuing renewable energy supplies, building a new nuclear reactor does not diversify TVA's energy mix since the utility is already heavily reliant on coal and nuclear power.

This is not an acceptable rationale for discounting efficiency over building new nuclear reactors that could take eight to ten years or more before generating electricity, if they're ever even built. It should not be overlooked that after spending \$4.6 billion developing the site decades ago, TVA abandoned plans to build reactors at the Bellefonte site and no electricity was ever produced.¹⁶ The analysis conducted by the TVA does not offer any substantive consideration of such significant risks associated with building new nuclear reactors. The timeline to license and construct a new reactor is very uncertain and costs have significantly escalated making the decision to build new reactors likely a very risky and uneconomic choice.

TVA's aggressive pursuit of energy efficiency has the potential to significantly reduce, or even eliminate the need for future baseload generation, including the proposed nuclear reactor at the Bellefonte site. Based on the estimated potential of energy efficiency in the TVA service territory, and supported by the experience of utilities across the nation, TVA must give full consideration to this resource, both alone and in combination with renewable energy resources, as a reasonable alternative to the proposed nuclear reactor.

¹² Energy Information Administration national data, 2006

¹³ See: Brown, M and J A Laitner, et al, *Energy Efficiency in Appalachia: How Much More is Available and at What Cost, and by When?* Appalachian Regional Commission, March 2009,

¹⁴ See: Chandler, S and M A Brown, *Meta-Review of Efficiency Potential Studies and Their Implications for the South*, Georgia Tech Ivan Allen College School of Public Policy, Working Paper # 51, August 2009. See also: Beck, F and D Kostiuik, *Powering the South: A Clean and Affordable Energy Plan for the Southern United States*, Renewable Energy Policy Project, 2001; and: *Southeast Energy Opportunities: Power of Efficiency*, World Resources Institute, April 2009.

¹⁵ Draft Supplemental Environmental Impact Statement, p. 47.

¹⁶ TVA Annual Report, 2000 Financial Statement, Note 2.

While it is unclear exactly how TVA came to its conclusion that efficiency and renewable energy resources are not viable alternatives, TVA apparently relies on *Energy Vision 2020*, completed in 1995, as a basis for these conclusions. TVA's reliance on this information is misplaced. In the past 15 years, energy efficiency and renewable energy technologies have improved significantly, revealing greater opportunity and value to TVA than what is reflected in *Energy Vision 2020*. For example, technical improvements in wind turbines have steadily increased the capacity factor of wind resources over the past 15 years and improved modeling can now predict with relative certainty when wind and solar resources are available. With regards to energy efficiency, the past 15 years have seen numerous analyses showing both that energy efficiency can cost-effectively meet future energy demand and that achieving this potential is possible in a variety of regulatory and environmental circumstances.

In contrast, no new nuclear reactors have been built in the U.S. and the AP1000 design, one of the proposed designs under consideration by TVA, has not been built anywhere in the world. Further, according to a 2009 report by economist Mark Cooper, the most recent cost estimates for new nuclear reactors are, on average, four times higher than estimates from just eight years ago.¹⁷ This is unlike other energy choices, such as wind and solar, that have seen costs decline over the past decades as the technologies improved.

Our contention that *Energy Vision 2020* is outdated is supported by the fact that TVA has initiated a renewed integrated resource planning process, not yet complete, that will guide the agency's decision-making with regards to meeting future energy demand through 2030. Making a final determination of the need for an additional nuclear reactor at the Bellefonte site before this planning process is complete means that up-to-date analysis of various alternatives will not be factored into the decision-making process. Such a decision-making process does not live up to the purpose of NEPA to require a full and fair consideration of all reasonable options. At a minimum, TVA must delay deciding on whether to build the proposed nuclear reactor at the Bellefonte site until this resource planning process has resulted in a comprehensive plan that fairly considers all viable resource options, including the potential to meet future energy demand with cost-effective energy efficiency and renewable energy resources.

In sum, TVA has given no substantive support for its conclusions that energy efficiency and renewable energy do not represent reasonable alternatives to the proposed nuclear reactor. Based on multiple estimates of these resources in the TVA service territory and analyses completed in other regions of the nation, these resources should be considered reasonable alternatives until TVA can show otherwise through quantitative analysis. It is the goal of NEPA to ensure that the decision-making process is transparent and that all reasonable alternatives are considered before proceeding with the proposed action. TVA's Draft SEIS does not fulfill this mandate, instead drawing unsupported conclusions as to the potential for renewable energy and energy efficiency to meet future energy demand in the TVA region, conclusions that are in direct conflict with those drawn by other, similarly situated utilities in the region and throughout the United States.

¹⁷ *The Economics of Nuclear Reactors: Renaissance or relapse?*, Mark Cooper, Institute for Energy and the Environment, Vermont Law School, 2009. Figure I-1, p. 11. Available at: [http://www.vermontlaw.edu/Documents/Cooper%20Report%20on%20Nuclear%20Economics%20FINAL\[1\].pdf](http://www.vermontlaw.edu/Documents/Cooper%20Report%20on%20Nuclear%20Economics%20FINAL[1].pdf).

Significant water impacts would result from building a new nuclear reactor

Nuclear power plants have a large impact on water quantity and quality. Nuclear power plants release radioactive contaminants and hazardous chemicals into surrounding water resources, contribute greatly to thermal pollution, negatively impact aquatic life, and require enormous volumes of water in order to operate—requiring more water use than other traditional forms of energy production and significantly more water than energy efficiency measures and clean energy technologies such as solar and wind.¹⁸ The No Action Alternative is the only option that will not degrade water resources.

According to the Draft SEIS, one Babcock & Wilcox (B&W) reactor will withdraw 48 million gallons per day and one AP1000 reactor will withdraw 36 million gallons per day from the Tennessee River (via the Guntersville reservoir).¹⁹ Since the AP1000 is estimated to have 50-75% evaporative loss, this means that approximately 17-25 million gallons of water will be consumed, or lost. The B&W design is even more water consumptive. Since the net consumptive water use is 21 million gallons per day as reported in the Draft SEIS for the Guntersville Watershed, this makes the proposed Bellefonte plant, regardless of which reactor design is built, the largest water consumer in the area – likely consuming more water than all other municipal or industrial water users combined.²⁰ The plant will be competing with other important water users in Alabama and the region. Yet, the Draft SEIS does not consider this significant, nor does it analyze the impacts this could have during severe drought conditions, such as the region recently experienced.

TVA already operates the two Sequoyah reactors about 10 miles from Chattanooga, the Watts Bar reactor (with plans to build one more), and three reactors at the Browns Ferry plant, which is downstream of Bellefonte, all along the Tennessee River. The Draft SEIS does not discuss the cumulative impact of having possibly eight nuclear reactors operating on one river basin, let alone all of the other facilities in the basin. Nor does it discuss the cumulative impacts to the Chattanooga area that will be within fifty miles of five nuclear reactors. TVA must address these cumulative impacts to water resource and human health.

The Tennessee River, upon which Bellefonte is located, is already stressed from a variety of industrial and municipal users. The full extent of this degradation is not adequately addressed in the Draft SEIS. For instance, the Tennessee River Basin as a whole is considered to be the single most biologically diverse river system for aquatic organisms in the United States, and harbors the highest number of imperiled species of any large river basin in North America with 57 fish species and 47 mussel species considered to be “at-risk.” Many fish and mussel populations throughout the entire Tennessee River Basin including the middle Tennessee River, which encompasses Guntersville Reservoir, site of Bellefonte, are greatly reduced from their historical numbers. The declines cited by fisheries and aquatic invertebrate experts are due to the incremental impacts from dams, urbanization, industrialization, and nuclear power facilities. The TVA COL application to the U.S. Nuclear Regulatory Commission (NRC) for two AP1000 reactors even stated that within the Guntersville Reservoir alone, there has been a 44% decline of

¹⁸ United States Department of Energy (DOE), *Energy Demands on Water Resources, Report to Congress on the Interdependency on Energy and Water*, December 2006.

¹⁹ Draft Supplemental Environmental Impact Statement, Table 3-2, p. 81.

²⁰ Draft Supplemental Environmental Impact Statement, p. 80.

freshwater fish captured in TVA sampling since 1984.²¹

Another problem with water discharged from nuclear power plants is its temperature. This water is warmer than the water into which it is discharged, and the resulting “thermal plumes” cause stress on aquatic life, which can include commercially important fish and shellfish. Warmer water temperatures proximate to a nuclear power plant result in conditions that effect the feeding and breeding patterns of various species. For instance, nuclear power plants aggravate the problem of low dissolved oxygen levels through its heated discharge to lakes and rivers. The State of Tennessee voiced concerns to the NRC about this impact on mussel beds downstream from the Sequoyah nuclear plant, which suffered from even lower oxygen levels as it is also downstream from the Watts Bar nuclear plant.²² What about the impacts even further down stream, such as the Bellefonte location?

Global warming impacts have not been addressed

Nuclear power plants are vulnerable to the effects of heat and drought. Drought conditions forced one of Browns Ferry’s reactors to shut down due to high temperatures in the Tennessee River. That plant is downstream of the proposed Bellefonte reactors. Yet there is no discussion of the impacts Bellefonte operation may have on the ability for Browns Ferry to operate. TVA must evaluate this before issuing a Final SEIS.

The predicted effects of global warming in the region, such as summer heat waves or droughts, could negatively impact the ability for the proposed reactor at Bellefonte to generate electricity under those conditions if the Tennessee River is impacted. This deficiency was demonstrated by the 2006 summer heat wave, when nuclear power plants in France, Germany, and across Europe, and in the United States, had to power down because the water temperatures were too high. These effects also happened in the TVA region. During the summer of 2006, extreme heat forced TVA to begin interrupting power to some industrial customers for the first time since 2003. TVA had also been forced to lower levels in its Tennessee River reservoirs to generate power and provide cooling water for plants.²³ The Draft SEIS has no mention of the predicted impacts of global warming in terms of temperature and drought on the Tennessee River and how that could impact the operation of a Bellefonte reactor. TVA should evaluate these concerns.

Significant concerns with the proposed reactor designs exist

TVA should not pursue building the proposed Toshiba-Westinghouse AP1000 or the original Babcock & Wilcox (B&W) reactor designs. Both designs are problematic and essentially untested in the U.S. and are likely to result in wasting TVA customers’ money and potentially posing safety risks to the community. The two designs share something unique—none have ever been built here in the U.S. In the AP1000 case, none have ever been built anywhere in the world. Only four of the B&W Mark-C design reactors were ever ordered (two were for Bellefonte) and none were ever completed in the U.S. The Muelheim-Kaerlich reactor in Germany was built but only operated for three years, closing in 1988. It should be noted that the Draft SEIS appears to

²¹ TVA, Bellefonte Units 3&4 COLA (Environmental Report), Rev 0, Section 2.4.2.4.

²² U.S. NRC, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Final Report, NUREG-1437, May 1996, vol 1. p. 4-23.

²³ Daniel Cusick and Mary O’Driscoll, E&ENews, ENERGY MARKETS: Soaring temps set demand records in East, force TVA disruptions, 8/1/06.

be misleading in regard to the status of the completion of Bellefonte Units 1 & 2. The Draft SEIS states that in 1988 when TVA abandoned plans to complete the reactors, Unit 1 was 90% complete and Unit 2 was 58% complete.²⁴ But in the Federal Register notice announcing the intent to complete the SEIS, the status of completion was listed at 55% and 35% complete respectively.

The AP1000 design has suffered unexpected setbacks, most notably with the recent announcement from the NRC about serious safety concerns with some components of the design.²⁵ It has not yet been determined how significantly this will delay the approval of the final design control document or how this may impact the ultimate cost of the reactor. These issues must be addressed before TVA issues a Final SEIS.

Of further concern in terms of the site and the proposed facility is the possibility of flooding in the Gunterville Watershed. We have heard concerns with statements made in the Draft SEIS that indicate that all safety related structures are located above the Probable Maximum Flood (PMF) levels or have been flood-proofed.²⁶ We have been told that TVA must complete re-assessment of the site hydrology, including the PMF, and the NRC must review the analysis before such a claim can be made. It is possible that the revised hydrology analysis could result in a PMF higher than assumed in the design of Bellefonte Units 1 and 2, which could require additional construction that is not assumed in the Draft SEIS. Without a completed hydrology analysis, the Draft SEIS cannot address the potential impact of any additional construction.

Conclusion

In summary, TVA should not pursue building any new nuclear reactor designs at the Bellefonte site. As mentioned in our comments, the Draft EIS did not adequately address NEPA requirements by failing to address numerous important issues including lack of sufficient analysis of more affordable, less-environmentally damaging energy resources that exist, most notably energy efficiency; the likely significant negative impacts to the Tennessee River basin; disregard for the concerns with the two proposed reactor designs; possible issues with the location of safety systems in terms of the Probable Maximum Flood levels; and failure to analyze global warming impacts. This significant oversight of numerous serious issues with building either reactor design at the Bellefonte site clearly shows that the No Action Alternative is the only reasonable and sound choice that TVA should pursue.

Thank you for considering our concerns. If you have any questions, please do not hesitate to contact us.

Sincerely,

Sara Barczak, Program Director
High Risk Energy Choices
Southern Alliance for Clean Energy

²⁴ Draft Supplemental Environmental Impact Statement, Section 2.2.2.

²⁵ U.S. NRC press release, NRC Informs Westinghouse of Safety Issues with Design Shield Building, 10/15/09. Available at <http://www.nrc.gov/reading-rm/doc-collections/news/2009/09-173.html>

²⁶ Draft Supplemental Impact Statement, Table S-1, page S-5.