FILE

BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of Buckeye Wind LLC for a Certificate to Install Numerous Electricity Generating Wind Turbines in Champaign County to be Collected at an Electric Substation in Union Township, Champaign County, Ohio	)))))))	**Case No. 08-666-EL-BGN**

REBUTTAL TESTIMONY OF DAVID M. HESSLER

Q.1. Please state your name and business address.

A.1. My name is David Hessler and I am employed at Hessler Associates, Inc., an acoustical consulting firm located at 3862 Clifton Manor Place, Haymarket, Virginia.

Q.2. Did you previously present direct testimony in this proceeding?

A.2. Yes.

Q.3. What is the purpose of your rebuttal testimony?

A.3. I am filing rebuttal testimony on behalf of the Applicant, Buckeye Wind LLC in response to testimony by Richard R. James.

Q.4. In his answer to Question 29 of his direct testimony, Mr. James recommends a 1.25 mile setback for any turbine to the nearest residential property. How many turbines can be located in the Project area if Mr. James' proposed 1.25 mile setback were adopted for the Buckeye Wind Project?

A.4. None. The center of the largest open area between residences in the Project area - a group of relatively large land parcels just north of Rt. 38 and west of N. Ludlow Road – is less than 1 mile from the nearest residences. Consequently, a 1.25 mile setback would preclude the construction of any turbines within the current site area.

Q.5. In his answer to Question 64 of his direct testimony, Mr. James states that low frequency noise is one reason why wind turbines should stay at least 1.25 miles away from homes in the Buckeye Wind Project. Do you agree with Mr. James' statement?

A.5. Not at all. The notion that wind turbines produce excessive and even harmful levels of low frequency and infrasonic noise is an idea that is cherished by wind project opponents but the reality is that the sound levels produced in the lower frequencies by typical modern wind turbines are inconsequential and of insufficient magnitude to cause such things as windows rattling, problematic interior resonances or physical sensations. These effects can and do happen with some other noise sources; most commonly simple cycle combustion turbines - with which we have decades of field experience – but a magnitude much higher than that produced by wind turbines is required before any of these adverse effects begin to occur. In Annex B of ANSI Standard B133.8 *Gas Turbine Installation Sound Emissions* the threshold for the onset of perceptible vibrations is given as a C-weighted sound level of between 75 and 80 dBC. Our own extensive experience with countless genuine low frequency noise problems indicates that complaints and annoyance due to low frequency sound completely stop at a level of about 70 dBC. At 1000 feet, a wind farm typically produces a C-weighted sound level in the vicinity of 58 to 60 dBC, which would not be an unusual C-weighted sound level for a rural area with no wind turbines whatsoever. In essence, any sound level from any source that is below a threshold of about 70 dBC becomes completely imperceptible and of no concern in terms of annoyance or any other adverse impact.

As I indicated in my direct testimony, it appears likely that the swishing sound, or amplitude modulation, sometimes generated by wind turbines has long been confused with, and mistakenly referred to as low frequency noise - when it most definitely is not. The swishing sound occurs in the mid frequencies - around 500 to 1,000 Hz.

Q.6. Mr. James indicates in his direct testimony that an appropriate noise standard for the Buckeye Wind Project is to limit turbine sound levels at a residential property to 5 dBA over the background L90 level. Is that an appropriate noise standard for this project?

A.6. No, particularly in view of the grossly conservative way he prescribes measuring the background as the quietest nighttime level during calm wind conditions. The background L90 plus 5 dBA metric is useful as an ideal design goal but it is not typically practical to use this approach as a regulatory limit, or standard, because for wind projects in rural areas mixed with scattered residences, it is seldom, if ever, possible to limit project noise to less than 5 dBA above the near-minimum background level – at least under the critical wind speed conditions we use for assessment purposes; i.e. at wind speeds usually in the 5 to 6 m/s range.

Q.7. What was the role of the L90 plus 5 dBA criterion in your noise impact study for the Buckeye Wind Project?

A.7. An increase of 5 dBA above the background L90 sound level was used as an ideal design goal in optimizing the site layout to minimize noise impacts and subsequently as an assessment tool to identify those areas where project noise might be clearly audible. A series of modifications to the site layout were modeled in an effort to locate the turbines so that all non-participating residences would fall outside of the L90 plus 5 dBA threshold. To be conservative, the specific background sound level used as a basis for this calculation was the near-minimum L90 sound level measured under critical wind speed conditions when the turbine sound power level is highest relative to the background level. This situation represents a design case that occurs only a small percentage of the time when the background level is momentarily low and under the particular wind conditions when project noise is most apt to be perceptible.

Q.8. Was it possible to arrange the site so that all non-participating residences were beyond the L90 plus 5 dBA threshold?

A.8. No. Based on our experience with dozens of projects similar to the Buckeye Wind Project, where the turbines must be intermixed with scattered residences in a rural area, it is seldom, if ever, possible to limit project noise to less than 5 dBA above the near-minimum background level. It is common and essentially inevitable for there to be many homes that fall within this design threshold. Projects located in extremely remote and uninhabited areas are usually the only ones that can satisfy this criterion. However, the vast majority of proposed wind sites don't have the luxury of enormous buffer distances.

Q.9. What has been the result of this at completed projects that you're familiar with where the model predictions have indicated that numerous residences would experience project sound level of more than 5 dBA above the background L90?

A.9. Some complaints have occurred but they are usually few in number compared to the number of potentially affected homes, approximately 4 to 6 complaints per several hundred homes and appear to be highly dependent on the absolute magnitude of the project sound level. It has been our experience that serious complaints usually occur when the mean or typical project sound level is in the 45 to 50 dBA range as determined from post-operational sound monitoring at complainants' homes.

Q.10. What were the regulatory or allowable sound level limits at these projects?

A.10. Typically 50 dBA at non-participating residences.

Q.11. Have you seen complaints at levels below 45 dBA at these or other projects?

A.11. There will always be some complaints if the project is audible at all, but I can only recall a few instances where a level of less than 45 dBA was considered a significant problem.

Q.12. What kinds of sound levels are predicted for the Buckeye Wind Project at non-participating residences?

A.12. Although there are many hundreds of houses in general proximity to proposed turbine locations at this site, very low sound levels in the 30's dBA are expected at almost all of them. As a result of iterative noise mitigation modeling, in which an absolute ideal design goal of 40 dBA (in addition to the relative L90 plus 5 dBA metric) was generally used, only about 5 non-participating residences are currently predicted to experience sound levels slightly in excess of 40 dBA in the nighttime design case based on a 5 m/s wind. Approximately 30 non-participating homes are expected to have sound levels somewhat above 40 dBA during the daytime design case at a critical wind speed 6 m/s. Moreover, I believe the mean predicted level would be less than 45 dBA at all non-participating houses even during wind speeds of 8 m/s or more when the turbine sound power level is maximum. This is an important distinction between this project and the others alluded to above. The predicted absolute magnitude of the sound levels at the Buckeye Wind Project are substantially lower than the sound levels at those other projects where a few serious complaints about noise have been observed. Consequently, we would expect less of an impact from noise here.

Q.13. If the Power Siting Board were to adopt a noise standard for this project for non-participating residences, what standard would you recommend?

A.13. Based on my experience, I think every wind project should have as an ideal design goal a project-only sound level of 40 dBA at residences in concurrence with WHO guidelines - but a design goal is different from a firm regulatory limit, which must reasonably protect the public at large from legitimate annoyance and, at the same time, not stand completely in the way of economic development. Even the nighttime, outside level of 40 dBA recommended by the WHO is essentially a design goal with an interim target of 55 dBA. From that perspective, and in light of what I have found, in terms of the specific sound levels associated with complaints when testing newly completed wind projects, I think a reasonable noise standard for any wind project would be an operational mean sound level of 45 dBA at non-participating residences. Sound levels below that, in my experience, have generally resulted in fairly mild impacts, while levels consistently above that, as permitted by the common 50 dBA regulatory limit, have led to what I would consider justified complaints.

Q.14. Mr. James attached a paper titled the "How to Guide to Siting Wind Turbines To Prevent Health Risks From Sound" to his direct testimony. Do you have any critiques of this paper?

A.14. My principal criticism would be that the guide is unrealistic and impractical in the sense that no actual project could ever be designed and sited using its extremely conservative procedures. In particular, the use of a single 10 minute sample measured under calm conditions at night as a basis for the L90 plus 5 dBA allowable limit, would result in unnecessarily low maximum permissible project sound levels and would require very large and highly conservative set back distances.

The guide also places a heavy and totally unnecessary emphasis on low frequency noise and attempts to set a limit on it by not allowing a differential of more than 20 dB between the A and C-weighted sound emissions of a project. With regard to these two topics, I am in complete agreement with the comments, in Buckeye Exhibit 16, of Dr. Geoff Leventhall, one of the most highly respected acoustical experts in the world with regard to low frequency noise.

Q.15 Does this conclude your rebuttal testimony?

A.15. Yes, it does.

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing document was served upon the following parties of record via e-mail and U.S. Mail on this 25th day of November, 2009.

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