BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY PREVAILING WIND PARK, LLC FOR A PERMIT OF A WIND ENERGY FACILITY IN BON HOMME COUNTY, CHARLES MIX COUNTY AND HUTCHINSON COUNTY, SOUTH DAKOTA, FOR THE PREVAILING WIND PARK PROJECT	*	**APPLICANT'S FIRST SET OF DATA REQUESTS TO INTERVENOR SHERMAN FUERNISS** **EL18-026**

Below, please find Prevailing Wind Park, LLC's ("Applicant") First Set of Data Requests to Intervenor Sherman Fuerniss. Please submit responses within 10 business days or promptly contact the undersigned to discuss an alternative arrangement.

1-1) Provide copies of all data requests submitted by the PUC Staff to you in this proceeding and copies of all responses to those data requests. Provide this information to date and on an ongoing basis.

See attachment.

1-2) With respect to the Project, please:

a) Identify, if any, concerns you have regarding the Project's satisfaction of the criteria for the Project to receive a facility permit from the South Dakota Public Utilities Commission; and

1) Concerns about the legality of depriving property owners of the full traditional and customary use of the full extent of their private property due to the proximity of the proposed wind turbines.

2) Concerns about the negative economic impact on property owners resulting from the inability to make full traditional and customary use of the full extent of their private property due to the proximity of the proposed wind turbines.

3) Concerns about diminished quality of life and impaired health, safety, and welfare from the proximity of the proposed wind turbines sited according to outdated recommendations.

b) Identify any other concerns you have regarding the Project.

Concerns include increased acoustic energy from all directions from this project, potential exacerbation of sleeping problems leading to detrimental health issues, and detrimental effects on quality of life and welfare that have not been quantified now or after continous and prolonged exposure to increased acoustic energy.

1-3) Identify whether you own property or reside in the vicinity of the Prevailing Wind Park Project ("Project") and, if so, the location (by section, township, and range) of such property and/or residence.

My immediate family owns 320 acres in 14-96-62 of Choteau Creek Township South and 40 acres in 18-96-61 of Choteau Creek Township South. My extended family owns 160 acres in 10-96-62 of Choteau Creek Township South which is managed by myself as an integral part of our operation.

Our family resides in the east one-half of 14-96-62 of Choteau Creek Township South.

1-4) If you have a residence in the vicinity of the Project, identify whether you live at the residence throughout the entire year and, if not, how many months of the year you reside at the residence.

Our family lives and works on our property twelve months of the year.

1-5) Identify how you use your land, including, but not limited to, whether you use your land for agricultural purposes.

Our land is used primarily for animal husbandry making extensive use of intensive and rotational grazing by means of portable break-wires and frequent movement of livestock requiring continual maintenance of both perimeter and internal fencing. Cattle movement and fencing are both accomplished mainly on foot on all areas of the property. Land not used for grazing is hayed and a small amount is used for crop production.

1-6) Identify any sensitive or unique features of your property that you assert would be impacted by the Project.

The vast majority of our property is grassland including native prairie and land replanted to native prairie grasses. Our prime native prairie would be bracketed on all sides by wind turbines.

Our farm is also home to a bow-truss barn built in 1923 by my grandfather which is still in use.

The herd of Braunvieh cattle we raise is unique to the area, perhaps to state of South Dakota.

1-7) Describe any mitigation measures that could address your concerns with respect to the Project.

Preventative measures could include, but are not limited to, not building the project, requiring 2 mile setbacks from nonparticipating residences or 2 kilometer setbacks from nonparticipating property owners perimeter property lines - whichever is greater - as measured to the nearest reach of the turbine rotor, and 40dBA max daytime levels not to be exceeded more than 10% of the time and 30dBA max nighttime levels not to be exceeded more than 10% of the time as measured at nonparticipating property owners perimeter property lines.

1-8) Identify any documents, information, education, training, or professional experience you have relied upon to form your opinions concerning the Project. Where you have relied upon documents or other tangible materials, please provide such documents and/or materials.

Prevailing Wind Park, LLC application for a permit to the South Dakota Public Utilities Commission; three years experience living 1.25 miles from the Beethoven wind project; Bryce, R. (2010) Power Hungry, New York, NY,PublicAffairs, Perseus Books Group; Hansen, C., Doolan, C. and Hansen, K. (2017) Wind Farm Noise: Measurement, Assessment and Control, Chichester, UK, John Wiley and Sons Ltd.; Crampton, G. (Ed.) (1990) Motion and Space Sickness, Boca Raton, Florida, USA, CRC Press Inc.; Salt, A. and Kaltenbach, J.(2011) Infrasound From Wind Turbines Could Affect Humans, Bulletin of Science Technology & Society 2011 31: 296, online version http://bst.sagepub.com/content/31/4/296; Punch, J. and James, R. (2016) Wind Farm Noise: A Four-Decade History of Evidence that Wind Turbines Pose RIsks, from https://hearinghealthmatters.org/hearingnewswatch/2016/wind-turbine-noise-health/; Thorson, P., Persson Waye, K., Ogren, M., Smith, M., Pedersen, E., Forssin, J. (2018), Creating sound immission mimicking real-life characteristics from a single wind turbine, from https://sciencedirect.com/science/article/pii/S003682X17312008; McMurtry, R. and Krogh, C., (2014) Diagnostic criteria for adverse health effects in the environs of wind turbines, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4221978/#_ffn_sectitle, ; www.masterresource.org ; https://www.researchgate.net ; Salt, A.and Lichtenhan, J.(2014) How Does Wind Turbine Noise Affect People? Acoustics Today,winter2014,http://www.windturbinesyndrome.com/wp-content/uploads/2014/04/Salt-et-al.-on-Wind-TurbineSyndrome.

1-9) Identify any expert witnesses you plan to have testify on your behalf, and for each expert witness, describe the subject matter regarding which the witness will testify.

None.

1-10) Are you asserting the Project will negatively impact property value? If so, provide copies of any appraisals that have been conducted for your property within the last ten (10) years.

The value of anything is determined by agreement between a willing seller and a willing buyer. It would seem logical that the pool of willing buyers who intended to reside on a small farm surrounded in close proximity by multiple wind turbines would be smaller than the pool of willing buyers for such a property not surrounded by wind turbines. While the pool of willing buyers who would not reside there may be larger, the pool of willing sellers to such buyers in this case would be zero. The smaller the pool of potential buyers the less likely agreement of value would be found. There have not been any appraisals of which I am aware.

1-11) Identify any communications, written or otherwise, you have had with units, officials, and/or representatives of local, state, and/or federal governments or agencies concerning the Project.

a) For any written communications, provide a copy of the communication; and

See attachments.

b) For any unwritten communications, provide the date of the communication, the persons involved, and the subject matter of the communication.

Dated this 30th day of August 2018.

By /s/ *Lisa Agrimonti*

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BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. EL- 18-026

IN THE MATTER OF THE APPLICATION BY PREVAILING WIND PARK, LLC FOR A PERMIT OF A WIND ENERGY FACILITY IN BON HOMME COUNTY, CHARLES MIX COUNTY AND HUTCHINSON COUNTY, SOUTH DAKOTA FOR THE PREVAILING WIND PARK PROJECT

RESPONSE OF SHERMAN FUERNISS TO DIRECT TESTIMONIES

26 September, 2018

I would like to submit the following as response/rebuttal to a number of filed testimonies and statements concerning Docket EL 18-026.

1) In response to Dr. Mark Roberts' supplemental direct testimony, especially exhibits 2, 2a, 2b and 2c, I would like to submit the peer-review of the Australian National Health and Medical Research Council Draft Information Paper "Evidence on Wind Farms and Human Health" conducted, at the request of the NHMRC, by Dr. Colin Hansen (see attachment). Dr. Hansen is also currently involved in a 5-year project funded by the NHMRC titled "Establishing the physiological and sleep disruptive characteristics of wind farm versus traffic noise disturbances in sleep".

On page 45 of the book 'Wind Farm Noise: Measurement, Assessment and Control' Hansen, C., Doolan, C. and Hansen, K.(2017) John Wiley and Sons, Ltd. the authors quote Hanning, C. 2015 Submission to the Australian Senate Select Committee on Wind Turbines, Technical report, University Hospitals of Leicester as follows:

> "… in considering the evidence, NHMRC adopted inappropriately strict evidential criteria. This is the reactionary approach to public health risks and is clearly not in the public interest. Action in the defense of the public health does not require certainty. In addition, they have turned the burden of proof on its head. It is the wind industry's duty to prove the safety of its activities not that of the public."

2) In response to Mr. David Hessler's answer to the Staff Question: Can you please summarize your overall opinion of the sound study submitted on behalf of the project? Answer: "In general, the noise modeling methodology and assumptions are satisfactory …", I would submit that pages 230-231 of 'Wind Farm Noise: Measurement, Assessment and Control' Hansen et al.(2017) list nine "uncertainties and issues associated" with the ISO9613-2 model used for the Applicant's sound study as follows:

- "It has only been validated for distances between source and receiver of less than 1 km.
- The model is only valid for octave band analysis for octave band centre frequencies ranging from 63-4000 Hz. Of course, it is also valid for calculating overall A-weighted sound pressure levels over the frequency range covered by the 63-4000 Hz octave bands.
- Downwind propagation is assumed by the ISO model, but only wind speeds between 1 and 5 m/s (measured between 3 and 11 m above the ground) are valid.
- Significant deviations from the ISO model may be expected for wind speeds above the 5 m/s limit (Kalapinski and Pellerin 2009).
- The ISO model has only been validated for source heights of less than 30m above the ground.

- No allowance is made for the attenuation effects of scattering due to atmospheric turbulence.

- The ISO standard states that the expected accuracy of sound level predictions are plus/minus 3dB for source heights less than 30 m and for distances between the source and receiver that are less than 1000 m. It is expected that the errors will increase as the source-receiver distance increases. Also as the source height increases above 30 m the calculation of the excess attenuation due to the ground becomes less accurate.

- The ISO model assumes that sound propagation is from point sources, which makes the calculated sound levels within about 200 m of the closest turbine subject to greater errors than those estimated above.

- As for all models, the ISO model assumes that the turbine sound power levels as a function of wind speed at rotor height are accurate. In most cases, turbine sound power levels are derived from measurements made on flat ground with a smooth horizontal air flow into the turbine rotor. These conditions deviate considerably from those generally found in practice. In many cases, turbines are mounted on hilltops in hilly terrain, so the inflowing air can deviate considerably from horizontal. In addition, local turbulence due to the uneven terrain and uneven heating of the air near the ground results in an air flow into the turbines that is often far from smooth. Inflow turbulence and non-horizontal inflow can both add to the rated turbine sound power levels."

Moller, H. & Pedersen, C. S. (2011). Low-frequency noise from large wind turbines. The Journal of the Acoustical Society of America, 129(6), 3727-3744. DOI:10.1121/1.3543957 also have this to say regarding ISO 9613-2 and ground reflection:

> "On this background, it is reasonable to suspect that the addition of 1.5 dB for the ground reflection is too low at low frequencies, and that higher values up to a theoretical maximum of 6 dB would be more appropriate. Thus, the procedure used to calculate outdoor sound pressure levels at the neighbors is likely to underestimate the low-frequency sound."

3) In response to Mr. Hessler's answer to Staff Question:"What about Ms. Jenkins' proposed conditions of 35 dBA?", I would submit that page 33 of 'Wind Farm Noise: Measurement, Assessment and Control' Hansen et al. (2017) gives examples of "Maximum Allowed Calculated External Noise Levels" which include:

> "An allowed A-weighted (see section 2.2.11) nighttime limit of 35 dBA or La90+5 dBA, whichever is lower, when La90 is determined using several 10-min measurements during the quiet night hours between 10pm and 4am when the wind is blowing slightly (<2 m/s at 1.5 m above the ground) from the wind farm to the residence and the wind farm is not operating. Daytime levels can be 5 dBA higher."

Page 33 also contains Table 1.7 ISO 1996-1971 recommendations for allowable community Laeq noise limits. Limits for a rural district are: Day 7am-7pm, 35dBA; Evening 7pm-11pm, 30 dBA; and Night 11pm-7am, 25 dBA.

In their conclusions Moller and Pedersen (2011) write:

"Indoor levels of low-frequency noise in neighbor distances vary with turbine, sound insulation of the room, and position in the room. If the noise from the investigated large turbines has an outdoor A-weighted sound pressure level of 44 dB (the maximum of the Danish regulation for wind turbines), there is a risk that a substantial part of the residents will be annoyed by low-frequency noise even indoors. The Danish evening/night limit of 20 dB for the A-weighted noise in the 10-160 Hz range, which applies to industrial noise (but not to wind turbine noise), will be exceeded somewhere in many living rooms at the neighbors that are near the 44 dB limit. Problems are much reduced with an outdoor limit of 35 dB."

Also concerning noise limits, Hansen et al.(2017) state on pages 32-33 of 'Wind Farm Noise: Measurements, Assessment and Control':

"However, noise measurements by the authors of this book indicate that for modern wind farms with turbine powers of 3 MW and greater, the setback distance should be much larger than 2 km if intrusive noise at noise-sensitive locations is to be at acceptable levels at night when people are trying to sleep. In addition there should be a minimum setback distance of 4 to 5 times the total turbine height (nacelle height plus blade length) to the nearest neighbour's property line."

4) In response to Staff's question to Mr. Hessler concerning C-weighted sound levels and low frequency sound Question: Would you agree with this recommendation?, which Mr. Hessler answers in part with "The low frequency sound emissions … are below the ability of normal instrumentation to measure.", I would submit that section 6.2.7 on page 317 of 'Wind Farm Noise: Measurement, Assessment and Control', Hansen et al.(2017) describes the use of infrasound sensors, also referred to as microbarometers, by Woolworth et al.(2017) and in addition states:

"The infrasound monitoring system described by Annan et al., (2015) consists of infrasound sensors, a wind-filtering apparatus, data-logging equipment and signal processing capabilities. It was demonstrated that this system performed well in isolating wind turbine noise from other sources of infrasound such as marine storms, aeroplanes, urban noise and wind noise. Through use of four infrasound sensors arranged in a square topology with 50-m spacing, the direction of arrival of infrasound signals could be monitored and it was found that this correlated well with the direction of the wind farm.

A range of infrasound sensors (such as Infiltec) are commercially available and in cases where the infrasonic and low-frequency range is of prime importance (such as at large distances from a wind farm), they can prove to be more cost effective than a microphone.

Other advantages of these sensors are their low power consumption and ruggedness, as discussed above. The main disadvantage is that they can only be used to measure noise at low and infrasonic frequencies."

5) In response to Mr. Hessler's answer to Staff's question about larger turbines producing more or worse low frequency noise Question: Would you agree with this assertion?, I would submit the following from the conclusions of Moller, H., & Pedersen, C. S. (2011). Low-frequency noise from large wind turbines. The Journal of the Acoustical Society of America, 129(6), 3727-3744. DOI: 10.1121/1.3543957 :

"The results confirm the hypothesis that the spectrum of wind turbine noise moves down in frequency with increasing turbine size. The relative amount of emitted low-frequency noise is higher for large turbines (2.3-3.6 MW) than for small turbines (< 2MW). The difference is statistically significant for one-third-octave bands in the frequency range 63-250 Hz. The difference can also be expressed as a downward shift of the spectrum of approximately one third of an octave. A further shift of similar size is suggested for turbines in the 10-MW range.

When outdoor sound pressure levels in relevant neighbor distances are considered, the higher low-frequency content becomes even more pronounced. This is due to the air absorption, which reduces the higher frequencies a lot more than the lower frequencies. Even when A-weighted levels are considered, a substantial part of the noise is at low frequencies, and for several of the investigated large turbines, the one-third-octave band with the highest level is at or below 250 Hz. It is thus beyond any doubt that the low-frequency part of the spectrum plays an important role in the noise at the neighbors."

6) In response to references to studies concerning population of upland game species after establishment of wind farms, I would submit that this is a straw man argument. Out of state hunters from urban and suburban areas have visited our farm to hunt pheasants for the last 15 years. The number of birds to hunt and the number birds taken is of secondary importance to the ambience and experience of the hunt. These visitors enjoy the quiet, the scenery, the serenity, the sunrises, the sunsets and the comaraderie and fellowship. They no longer hunt very near our property but go 10 to 40 miles away for the majority of their hunting.

7) In response to Staff's consideration of the thoroughness and completeness of the permit application, I would submit that there are still misidentifications of land use and participating/nonparticipating residences, as well as lack of consideration for rural cemeteries

8) In response to the South Dakota Department of Health's comments on health impacts and studies, I am submitting as an attachment a copy of an open letter to the members of the panel developing the revised WHO Environmental Noise Guidelines for the European Region.

This concludes my responses at this time.
Sherman Fuerniss