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

EL18-026

PREFILED TESTIMONY OF RICHARD R. JAMES

ON BEHALF OF INTERVENORS

EXHIBIT
Int. I-1

Q: Please state your name, title, affiliation, and address.

A: My name is Richard R. James. I am the Principal Acoustician for E-Coustics Solutions, LLC, in Okemos, Michigan.

Q: What is the purpose of your testimony?

A: I am testifying to the acoustic issues of appropriate thresholds for audible and in-audible wind turbine sound at non-participating properties in the footprint of the proposed Prevailing Wind Park Project (PWPP) and to the computer modeling used by the applicant to assess impact of noise.

Q: What is your educational and professional background?

A: I have a degree in Mechanical Engineering with emphasis on noise control and acoustics. I have attached a set of documents that provide the details of my professional work. (See Exhibit 1.) The first page of that packet summarizes my work with focus on wind turbines since 2006 when I formed my current company, E-Coustic Solutions, LLC, (E-CS). It summarizes my published papers and qualifications to speak to wind turbine noise measurement, modeling and the impact of wind turbine noise on people in various jurisdictions. The next page is an excerpt from a Business Week article on my work with my clients using a computer model I developed with my first company based on the work I did for my undergraduate thesis. This model was accepted in government hearings in 1976. It was capable of modeling both in-facility worker noise and community noise. I was one of the first acousticians to use computer models for new facility design long before there were established national standards for such work. Other parts of the package cover my professional credentials and affiliations, list my publications and list hearings that I have participated in over the past 10 years.

Q: What experiences have you had that qualify you as a health expert in cases involving wind turbine noise?

A: I began looking at wind turbine noise as a special case of noise source shortly after closing my last company in 2006. Several early projects resulted in media exposure and I began to get requests from many places, some international, to advise local agencies or intervenors on proper siting methods. Because of that early work I have been involved in many major lawsuits about wind turbine noises where I have had access to not only my research work but also that of the opposing acousticians through discovery. I was also involved with the early studies that found that modern utility scale wind turbines emitted a pressure pulsation caused by the blade when it passes in front of the tower back in 2009.

This experience led to my work for the intervenors in the Wisconsin Brown County Shirley Wind case which Mr. Hessler referred to in his written testimony submitted in prior proceedings before the PUC. Subsequent to that I have been associated with other acousticians around the world, such as Steven Cooper of Australia's Acoustics Group who have reproduced my work and expanded upon it.

This experience gives me a unique set of experiences that I have used to advise my clients for projects currently under development or for lawsuits related to existing projects.

Q: What materials have you reviewed in this matter?

A: I have reviewed:

1. The sound study conducted by Burns & McDonnell Engineering Company, dated May 18, 2018;
2. The contour maps of the Project depicting the 45 dBA Leq boundaries from the sound study model;
3. The pre-filed testimony of Chris Howell, summarizing his and the Burns and McDonnell Engineering report assessing noise from the Prevailing Wind Park Project (PWPP);
4. The pre-filed testimony of Dr. Mark Roberts regarding Prevailing Wind Park;
5. The testimony of David M. Hessler, dated May 4, 2018, regarding his review of the Dakota Range Wind Project and recommendations for noise thresholds;
6. The testimony of David M. Hessler, dated March 28, 2018, regarding the Crocker Wind Farm; and
7. Bon Homme County's Article 17, regulation of wind energy systems (WES).

Q: After reviewing those materials, what is your overall impression regarding any potential health risks posed by the proposed Project?

A: The project, as proposed, has a significant potential to cause adverse health effects related to sleep disturbance and annoyance to audible sounds from the wind turbines, especially at night. The recommended thresholds by Howell and Hessler of 45 dBA Leq, are not appropriate for rural communities. This is especially true for communities that have no prior experience with utility scale noise sources operating 24/7/365 that produce fluctuating, pulsatile, tonal infra and low frequency sound. Wind turbine noise emissions have specific characteristics that make them more likely to cause these adverse effects than other common rural noise sources. Thus, criteria intended for urban/suburban communities where traffic noise is the typical nighttime noise source (urban hum) are not

suitable for communities were people have an expectation of quiet. People in rural communities have lifestyles that are based on the quiet nature of most rural communities at night. This is reflected in ANSI-ASA S12.9 Part 4 "Noise Assessment and Prediction of Long-term Community Response" Appendix F, which cautions:

> **"F.3.4.1** In newly created situations, especially when the community is not familiar with the sound source in question, higher community annoyance can be expected. This difference may be equivalent to up to 5 dB.
>
> **"F.3.4.2** Research has shown that there is a greater expectation for and value placed on "peace and quiet" in quiet rural settings. In quiet rural areas, this greater expectation for "peace and quiet" may be equivalent to up to 10 dB.
>
> **"F.3.4.3** The above two factors are additive. A new, unfamiliar sound source sited in a quiet rural area can engender much greater annoyance levels than are normally estimated by relations like equation F.1. **This increase in annoyance may be equivalent to adding up to 15 dB to the measured or predicted levels." (Emphasis added)**

The community's response to the wind turbine noise will be as if the wind turbines were 15 dB louder than what is being predicted. This caution was in the EPA's 1974 Levels Document and also is present in current ISO standards followed in the EU and other countries. It is accepted acoustical practice that is overlooked by wind energy developers and their consultants.

Q: Are there sound level limits that you find more appropriate for rural communities?

A: In 2008 I worked with George Kamperman, one of the senior acousticians who led in the development of community noise limits for urban and suburban communities in the 1960s and 70s, to determine what the proper sound limits should be for wind turbines in quiet rural communities. Wind turbines were never considered when the community noise limits were set and especially it was not anticipated that they would be located in quiet rural areas near homes. So we decided to apply the same type of analysis to wind turbine noise as had been done for other common community noise sources in the past. We looked at when the turbines would operate, what the nighttime background sound levels would be in the receptor's location, and how much sound they emit in each frequency band. Then applying methods for calculating sound propagation that reflect how low frequency sound differs from higher frequency sound, we estimated the distances needed to prevent the noise of ten (10) wind turbines of the 1.5 MW class common in the late 2000s from causing nighttime annoyance inside a home with windows open.

We determined that the maximum sound level for audible sounds should be 35 dBA

(Leq) and 50 dBC, especially for nighttime wind turbine noise. We also limited the new noise source to be no more than 5 dBA louder than the pre-operational background sound level at night. Typical nighttime background sound levels are under 30 dBA (L90) in these communities so the 35 dBA acts as an upper limit.

The Kamperman/James document was subsequently reviewed in a paper titled: "Noise: Wind Farms," by three experts (Shepherd (Psychoacoustics), Hanning (Sleep Medicine Specialist) and Thorne (low frequency acoustician)) and published in the 2012 edition of the Encyclopedia of Environmental Management. They review the special character of wind turbine noise and in the Appendix update the criteria that Mr. Kamperman and I prepared in 2008 to address the fluctuating character of wind turbine noise. I have attached a copy as Exhibit 2 of their paper for the details behind these criteria.

Q: Are there other acousticians who have made similar recommendations for noise thresholds in rural communities?

A: Yes, there are many who have made similar recommendations. In 2017, Dr. Paul Schomer, the Emeritus Director of the Acoustical Society of America's Standards Committee published a paper titled: "A possible criterion for wind farms" at the 173rd meeting of the Acoustical Society of America. (*See* Exhibit 3.) Dr. Schomer, in his capacity as Director of the ASA Standards Committee has directed the work of the American National Standards Institute (ANSI) groups that produce the S12 consensus standards on how to measure noise and how noise affects people for over 30 years.

In his 2017 paper, he reviews how proper application of the ANSI standards for assessing the impact of a new noise source on a community to avoid adverse impacts results in a criterion of 36 to 38 dBA Leq. Dr. Schomer explains how the character of wind turbine noise requires lower limits than other common community noise sources.

He also bases his recommendation on the findings of a major study conducted by Health Canada (the Canadian equivalent to the US Centers for Disease Control (CDC). That study looked at a sample of just under 2000 people living within 3-5 km of six wind projects in Ontario. It found that the percent of people who report they are highly annoyed by wind turbine noise jumps dramatically from less than 2% when the modeled sound levels are 35 dBA Leq or less to over 10% for levels between 35 and 40 Leq. Health Canada defines High Annoyance to noise as an adverse health effect in accordance with the World Health Organization (WHO) and other bodies. The limits for new wind projects in Canada are set at 40 dBA Leq (worst case one hour). Thus, if PWPP is permitted to produce higher sound levels, it should be expected that annoyance will also be higher for those closest to the turbines.

Other countries, such as the U.K., Australia, and New Zealand, also use 40 dBA Leq

as the upper limit for wind turbine projects. Some, like Germany and other European countries have limits of 35 dBA Leq for rural communities. Limits like these have not prevented wind energy development in those countries. The developers have to select locations where there is sufficient distance to prevent noise from exceeding the limits or work out private easement contracts with neighbors.

Q: Has the use of a limit of 40 dBA Leq been found adequate to prevent adverse effects?

A: No. This might be anticipated from the Health Canada finding that 10% of people find sound levels in the range of 35 to 40 dBA Leq are highly annoyed, increasing to about 14% for higher sound levels. Jurisdictions that set the threshold at 40 dBA Leq must deal with ongoing complaints, threats of legal action and other indicators that 40 dBA Leq is not sufficiently protective. Proper siting criteria can prevent this.

Q: How can, what appears to be a small change in sound level from 40 Leq to my 35 dBA Leq or Dr. Schomer's 36-38 dBA Leq, make such a difference in acceptability?

A: While it may appear that the difference is only a few decibels, it is important to remember that a 3 dB change in sound levels represents a doubling or halving of the acoustic energy. Thus, a change from 40 dBA to 37 dBA Leq is equivalent to turning off half of the wind turbines in a project designed to meet the 40 dBA Leq limit. This implies that the 3 dB change increases the setback distances by a substantial amount.

Based on my experience reviewing Ontario projects designed for 40 dBA Leq the closest homes to wind turbines have setbacks of about 1800 feet. To meet a 37 dBA Leq limit these setbacks would be increased to about 2500 feet. To meet the 35 dBA Leq limit the setback distance would be on the order of 3600 feet. To prevent annoyance during nighttime periods from multi-turbine projects Mr. Kamperman and I calculated the setback would need to be 1.25 miles (2km).

This is primarily because the rural areas are so quiet at night that even at these distances wind turbines can be audible inside homes where people are sleeping, especially those that sleep with windows open. To avoid this disturbance, the people would need to change their behavior to how suburban people cope with noise by having windows closed much of the time and using air conditioning for summer cooling.

In parts of Germany and Poland noise limits have been replaced with arbitrary setback distances based on the diameter of the wind turbine's rotors. The setbacks are equivalent to ten (10) times the rotor diameter. Thus, for a wind turbine with a 110 meter diameter blade the setback would be about 3600 feet. This is equivalent to the setbacks

derived for 35 dBA Leq limits discussed above but avoids the complexity of sound modeling.

Q: Should these limits be applied to the property lines or to the homes?

A: I am a strong supporter of property rights and believe that noise that exceeds known safe levels should not be imposed on people just because they live near a neighbor who wishes to host wind turbines. This position influences my response to this question.

If a person owns property that is primarily agricultural with a residential home, they should still have the entire property protected to prevent future restriction on how the land can be used. For example, in the future they decide to subdivide their property for residential purposes. If the limit was set to the home, it is possible that the future development would be in a location where the noise is excessive for residential land use. If the limits are set for the homes, not the property lines, then wind project's noise emissions physically trespass on the neighbor's property without any compensation for the non-participating neighbor. The phrase "Noise Trespass" has been used in states like Michigan and Ohio were the debate over setting limits for the property line vs home are debated.

The question may be easier to answer if we look at other forms of pollution than noise. Take water pollution for example. If a farmer raises livestock and that livestock causes pollution of a stream passing through the property, the adjacent property owner is deprived from using the stream for normal purposes. In most states that I am aware of, the pollution is controlled at the emitter's property line. The same should be true for noise pollution. The landowner hosting the wind turbine may have a right to have a wind turbine on his/her property but does not have any rights to allow that sound energy to trespass onto the properties of neighbors. The obligation to prevent that trespass is on the property owner hosting the wind turbine(s) and the utility operator.

There is nothing that prevents the utility developer from working out an agreement with non-participating property owners to compensate them for allowing higher sound levels on parts of their property that are between the home and property line that they know will not be used for residential developments. Thus, the property line should be the default for protecting neighbors. If the utility developer/operator is willing to provide compensation for the "Noise Trespass" they can work out arrangements to protect that part of the property that is residential or may become residential in the future.

Q: What other characteristics of wind turbine sound emission affect adjacent properties?

A: The limits using dBA criteria are focused on sound that is in the speech frequency range. Sounds that are heard. The A-weighting process de-emphasizes low frequency

sounds from 500 Hz and below. That includes sound that is felt. Like the bass beat from a neighbor's home when they play the stereo loud. Modern utility scale wind turbines like those proposed for PWPP have most of their acoustic energy in the range from under 1 Hz to 500 Hz that is ignored by the dBA calculations. This sound is called infrasound (0-20Hz) and low frequency sound (20-250Hz). Low frequency sounds, including infrasound, are problematic because they propagate much further than higher frequency sound with little loss of energy. That results in people hearing a rumble (very low frequency noise) or roar (low frequency sound above 100Hz) that penetrates their homes, especially at night when the house is quiet. Infra and low frequency sounds are not blocked by normal home construction methods for walls, roofs and windows.

Infra sound is a special case of low frequency sound where the energy has to be very high for the sound to be audible, but some people can "feel" the sound as body vibrations, pressure changes, migraines, tinnitus, dizziness, and other non-auditory effects. This is not limited to wind turbines. It also is a characteristic of helicopter sound emissions or large fans in high rise office buildings when they need maintenance. (In that last case the term is Noise induced Sick Building Syndrome.)

Dr. Schomer's 2015 paper titled: "A theory to explain some physiological effects of the infrasonic emissions at some wind farm sites" (attached as Exhibit 4) explains how these inaudible levels of wind turbine sound, which are presented as pressure pulsations inside of homes, can trigger these non-auditory sensations and symptoms. The phrase "Wind Turbine Syndrome" was coined by Dr. Nina Pierpont, MD. to describe them. These symptoms cannot be explained as occurring due to audible sound levels in the speech frequency range. See the attached Exhibit 5, which is a one-page summary of wind turbine blade pass frequency and effects, for an explanation of how these pulsations are produced.

Mr. Hessler refers to a study in his written testimony that he participated in for the Wisconsin Public Service Commission for the Shirley Wind Project in Brown County Wisconsin. That study was conducted in the homes of my clients who had filed complaints with the WI PSC during a hearing on a second wind project in another part of the state. The study that Mr. Hessler points to was designed by me for my clients and accepted by the PSC. I developed the test protocol, selected the homes to be tested, and picked the acousticians who would conduct it. Because the complainants were my clients, I did not participate, but was given full access to the data and did an independent analysis for the PSC which confirmed the presence of pulsating infrasound.

This study confirmed that inside the homes, wind turbine pulsations created by the loss of lift on the blades as the blade passes into the wind deficit region in front of the tower

was present at levels almost the same as outside the homes. I have attached as Exhibit 6 a set of graphs showing the infrasound that I prepared for the Brown County Health Department showing the infrasound using two types of instrumentation. The graph on the first page shows the spectrograms from multi-hour micro barometer tests in the home with the highest infra sound during the test Mr. Hessler describes. (This was R1 of the study at 3600 feet from the nearest wind turbine). The infrasound pulsations are seen as horizontal bands of energy and are explained in the notes. The last page shows a simultaneous test at R1 and another home located about four (4) miles away where the occupants experience pressure related headaches when the turbines are operating even though none of the wind turbines are visible. The infrasound traces are still present at this distance although somewhat attenuated. It is this ability to propagate long distances that makes the infra sound component of wind turbine noise so problematic.

Brown County's Health Department declared the entire region within 2.5 miles of the Shirley Wind project to be a "Human Health Hazard" zone. This is an official classification under Wisconsin law.

The owners of two of the homes (R1 at 3600 feet and R3 at one mile) abandoned their homes shortly after the project started to operate due to symptoms that included nausea and dizziness. Those homes are still vacant. R2 was abandoned to the mortgage company who resold it to a different family.

Q: Has this study been duplicated?

A: Yes, several times by myself and other acousticians, most notably Steven Cooper of Australia's Acoustics Group. Cooper's Cape Bridgewater study is very detailed and lengthy but can be obtained at http://www.pacifichydro.com.au/english/our-communities/communities/cape-bridgewater-acoustic-study-report/.

He finds that the test subjects in his three test homes were able to reliably sense the starting and stopping of the wind turbines without visual cues. One test subject was functionally deaf due to childhood illness damaging the auditory nerves. This test subject was able to sense the operation of distant wind turbines without any auditory or visual cues. Mr. Hessler refers to this study as one that resulted in him rethinking his position on inaudible infrasound as a source of adverse health effects.

Dr. Schomer references this study in his paper (referenced earlier) and also conducted a peer review of it. His peer review concludes:

> "The results are that there is a cause and effect relationship between turbine power output and subject response, and, at the same time there is no correlation between subject

response and either sound level or vibration level. These results show that there is a non-visual, non-audible pathway by which wind turbine emissions can cause some specific effects in some people. These results say nothing about the nature of these effects. Nothing internal to the body is discussed. We again reiterate to government and to wind farm operators, if you don't believe the results, replicate the study using clearly independent consultants.

"Some may ask, this is only 6 people, why is it so important? The answer is that up until now windfarm operators have said there are no known cause and effect relations between windfarm emissions and the response of people living in the vicinity of the windfarm other than those related to visual and/or audible stimuli, and these lead to some flicker which is treated, and "some annoyance with noise." This study proves that there are other pathways that affect some people, at least 6. The windfarm operator simply cannot say there are no known effects and no known people affected. One person affected is a lot more than none; the existence of just one cause-and-effect pathway is a lot more than none. It only takes one example to prove that a broad assertion is not true, and that is the case here. Windfarms will be in the position where they must say: "We may affect some people." And regulators charged with protecting the health and welfare of the citizenry will not be able to say they know of no adverse effects. Rather, if they choose to support the windfarm, they will do so knowing that they may not be protecting the health and welfare of all the citizenry."

Q: Has this been duplicated in a controlled laboratory test?

A: Yes. Mr. Hessler references such a study in his testimony. This was reported in a paper presented by Steve Cooper at the Acoustical Society of America's December 2017 conference and published in the Proceedings of Meetings on Acoustics (POMA) in a paper titled: "Subjective perception of wind turbine noise - The stereo approach."

Steve Cooper designed a laboratory where he could accurately reproduce the sounds he measured in the Cape Bridgewater homes in both frequency and time domain, down to 3 Hz. He created an audio sample from one of his Cape Bridgewater measurements that reproduced the pulsations at the infrasonic rate of the blade pass frequency. He did blind testing of people who included some who live in wind projects and by others who did not think they were sensitive to such sounds.

Cooper's controlled experiments reproduced the acoustical characteristics found inside homes where sensitive people have filed complaints of sensations and other non-auditory complaints. Inaudible sound pulsations occurring at infrasonic rates emitted

by wind turbines were shown to cause perceptible sensations in test subjects who self-identified as being sensitive to wind turbine infra sound. Those who self-identified as being sensitive to wind turbine infra sound were able to reliably detect when the sample was played or not and could also detect the direction from which the sound came (blindfolded and sitting in a swivel chair). Some of the test subjects who did not identify as "sensitive" were also able to detect the presence of the infra sound pulsations.

Mr. Cooper's study shows that:

1. It is possible to reproduce in a controlled laboratory experiment the acoustic characteristics of wind turbine sound pressure pulsations occurring at infrasonic rates found in homes of people living near utility scale wind turbines who have filed complaints of adverse sensations and health effects.

2. These inaudible acoustic conditions reliably trigger in self-identified "sensitive people" sensations and adverse effects associated with the complaints by people who live in or near the footprint of utility scale wind turbines.

Wind turbine sound emissions consisting of dynamically modulated pressure pulsations at infrasonic rates synchronized to the blade pass frequency were shown to cause sensations and other adverse effects under controlled laboratory conditions.

There are other studies of this type being conducted but they do not use a real audio sample from a home where people have reported the sensations. Those studies rely on what is being called a "surrogate sample" that does not include the dynamically modulated pressure pulsations, they only reproduce the frequency and sound pressure levels measured in the homes. Thus, they do not include the most important characteristic of pulsating noise. These studies report that the test subjects do not respond to the sound. This is a strong piece of evidence that it is the pulsations and not the infra and low frequency sound levels that are important in producing sensations. It also explains why people do not report these sensations when exposed to steady infra sound from the natural environment.

Q: Do you have any comments on the Burns-McDonnell Sound Study for the Prevailing Wind Park Project?

A: Yes. First as indicated by my testimony above I disagree with the idea that a threshold of 45 dBA Leq is protective for people living near the wind project. Second, I reviewed the information on the computer model prepared for the report. I find the model is deficient in many ways. One significant way is that it fails to include two important sets of tolerances. The sound power data used as input to the model is derived using a method that has about a ± 2 dB tolerance for measurement repeatability. This tolerance should have been added to the sound power levels used as input to the model to account for known

variability in measurement data. Also, the model uses the formulas and protocols from ISO 9613-2 which states it is not applicable for noise sources that are more than 30 meters above the ground or receiver elevation. Even if the model was appropriate for wind turbine noise the model has known tolerances of ± 3 dBA. This should have also been applied as an adjustment to the Burns-McDonnell sound model. Given these two tolerances the predicted sound levels are as much as 5 dBA low.

Further, the values used for ground attenuation are not disclosed. The proper value for ground attenuation is "0" to turn off any calculations of ground effect. This is because the height of the wind turbines means that the sound emitted by them radiates directly from the blades to the homes without interaction with the ground. The ISO ground attenuation calculations are intended for ground-based noise sources where the sound radiates along a line from source to receiver just above the ground.

Dr. Schomer has in the past, identified additional problems with wind turbine noise prediction using the ISO model methods. He was a member of the committee that developed the ISO 9613-2 standard and its ANSI equivalent (ANSI/ASA S12.62). He has repeatedly stated in hearings and conferences that the model does not properly predict the propagation of low frequency noise. The ISO model range for accuracy is focused on sound in the frequencies that are most important for other types of ground-based community noise sources. In testimony he gave for the White Pines project in Ontario he stated that the model is likely to underestimate the sound propagation from wind turbines by as much as 11 dBA. This is in addition to the issue of tolerances for the calculations. As I have stated above I have also measured wind turbines operating at levels 10 dBA Leq or more above the predicted sound levels.

Q: What does this mean for the Prevailing Wind Park project?

A: It means that the predicted sound levels at receptors in and near the PWPP are at least 5 dBA less than what should be expected if the project was operating and the sounds measured and compared to the model's predictions. I have conducted such studies and routinely find that the wind turbines exceed the modeled sound levels by 5 dBA and in some cases, especially when the operating mode includes high blade angles or wind turbulence, the model under predicts by 10 or more dBA.

The flaws in the model make it likely that if the project is approved as designed there will be many complaints of annoyance and some of adverse health effects along the lines of what occurred at Shirley Wind and Cape Bridgewater.

Before any decisions are made on permitting this project the applicant should be required to submit a new model that applies the known tolerances to the input data. It should also show the contour lines for 30, 35, and 40 dBA. These new sound levels should

then be viewed as indicators of what the community will experience on a day when the wind turbines are operating under optimum conditions for the lowest noise emissions. They are not precision predictions. Review of the model should be done keeping in mind that the operating values can be as much as 10 dB higher than what is predicted, under operating conditions that would be considered normal.

The likely complaint times will be at night when winds at the blades are strong with high wind shears at the hub elevation, but calm or no winds at the ground (called a stable nighttime atmosphere). Studies have shown that these weather conditions occur as frequently as 2 out of 3 nights during warm seasons. Since the ground level winds are calm there is no wind induced noise or leaf rustle to mask the wind turbine noise. This condition is recognized in many jurisdictions (e.g. Ontario) as the "worst-case" condition for complaints.

Q: Do you have any comments on Dr. Roberts' testimony.

A: Yes, however I understand the Dr. Punch will be addressing that testimony in more detail. What I would add is that, in my opinion as an acoustician, Dr. Roberts is not qualified to speak to the issue of acoustics or human response to wind turbine noise. Acoustical engineers are trained in how to measure sound and relate those measurements to human and community response. I saw nothing in his background that qualifies him to speak to these issues.

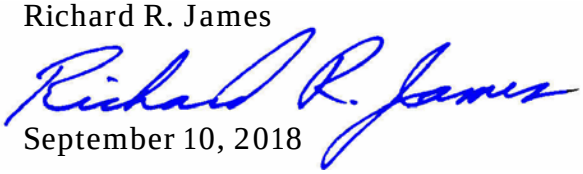
Dr. Roberts' testimony is not reliable when read by an experienced acoustician who understands the particular character of wind turbine noise that leads to it being highly annoying at sound levels well below other common community noise sources.

Q: Do you have anything further to add at this time?

A: The foregoing written testimony is to be presented to the South Dakota Public Utilities Commission for SD PUC Docket EL 18-026.

I reserve the right to revise and expand upon these written comments during the hearing.

Richard R. James



September 10, 2018

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

EL18-026

PREFILED TESTIMONY OF JERRY L. PUNCH

ON BEHALF OF INTERVENORS

EXHIBIT
Int. I-2

Q: Please state your name, title, affiliation, and address.

A: My name is Jerry L. Punch, and I am a Professor Emeritus in the Department of Communicative Sciences and Disorders (CSD) at Michigan State University (MSU) in East Lansing, Michigan. As a retired faculty member, I maintain an office in the Department, which is located in the Oyer Speech and Hearing Building, 126 Red Cedar Road, East Lansing, MI 48824. My home address is 4469 Satinwood Drive, Okemos, MI 48864.

Q: What is the purpose of your testimony?

A: I have been asked to provide testimony as an audiologist on behalf of Intervenors in the matter of the Prevailing Wind Park wind project ("Project"). My testimony as an expert witness will address the potential health risks posed by noise from the Project, if approved according to the application and regulations described in Article 17 of Bon Homme County zoning ordinances and the affidavit of Peter Pawlowski, dated August 9, 2018.

Q: What is audiology?

A: Audiology is the study of hearing and hearing disorders. It is a health-related discipline that focuses on sound, the anatomy and physiology of the ear, hearing disorders, and the clinical aspects involved in diagnosing and treating hearing disorders. As an audiologist, I am knowledgeable of the anatomy and physiology of the ear; sound generation, propagation, and perception; and the ear and how it processes sound. I also have knowledge of research design and interpretation of research findings, and I have had a long-standing interest in community noise issues. This background has led me to understand the relationships between noise and the impacts it can have on human health.

Q: What is your educational and professional background?

A: My full CV is appended as Exhibit 1. I hold a PhD degree in Audiology from Northwestern University and have held a number of professional positions in audiology over the past 50 years. I have had an extensive and eclectic career as a clinical audiologist; clinical supervisor; researcher; teacher; and administrator in academic, professional association, hospital, and industrial settings. My academic coursework included the study of the biological sciences through enrollment in MA and PhD-level courses in anatomy and physiology of hearing and

enrollment in a PhD-level course in physiological psychology. My work experiences include internships and paid employment as an audiologist in multiple otolaryngology clinics as a graduate student; instruction of ENT residents at Indiana University School of Medicine on the clinical aspects of audiology; and instruction of undergraduate-level courses in the anatomy and physiology of hearing. Over the years, I have taught a large variety of undergraduate- and graduate-level courses in clinical audiology. Those courses include a graduate-level course on Research Methods, which I taught at MSU for approximately five years prior to my retirement in 2011. I have also taught a graduate-level seminar on ethics in research and clinical practice. For seven years in the recent past, I served as a representative of the five departments of the College of Communication Arts and Sciences on MSU's Institutional Review Board (IRB). The IRB is charged with reviewing and approving research applications of MSU researchers, with the aim of protecting human subjects who participate in research studies conducted in various disciplines.

Q: What are your current professional credentials and affiliations?

A: I am a member of the American Speech-Language-Hearing Association (ASHA), the American Academy of Audiology, the American Auditory Society, and the Acoustical Society of America (ASA). I hold the Certificate of Clinical Competence in Audiology from ASHA, which I have maintained since 1968 through various formal programs of continuing education. I am also an ASHA Fellow. Fellowship is one of the highest honors the Association bestows. To be awarded Fellowship, nominees must have made outstanding contributions to the discipline of communication sciences and disorders. ASHA Fellows make up less than one percent of the membership of that national organization. Although I am officially retired from MSU, I maintain an office in my academic department and continue to conduct audiological research and to consult on wind turbine projects as a health expert.

Q: What experiences have you had that qualify you as a health expert in cases involving wind turbine noise?

A: I have had a considerable number of such experiences. Since about 2009, I have coauthored a review article on wind turbine noise in *Audiology Today*, served as Chairperson of the Wind and Health Technical Work Group, at the invitation of the Michigan Department of Energy, and

presented invited comments in public hearings and hearings of zoning boards and commissions in several states, including Michigan, Illinois, Indiana, and New York. I coauthored a three-part, invited blog on the *HearingHealthMatters.org* website (Punch & James, 2014). I have been qualified as a health expert in MI by meeting the legal challenge in a Daubert hearing, and served as a health-expert witness in legal cases at local, state, and federal levels in Ohio, Wisconsin, Michigan, Iowa, Illinois, Oregon, Indiana, and New York. This information is detailed in the Forensic Activities section of my CV. I have interviewed multiple individuals and families who have reported adverse health effects, including some who have abandoned homes or are considering abandonment because of health complaints due to wind turbine noise. I have conducted ongoing reviews of the scientific literature on the health effects of wind turbine noise, and in 2016 I coauthored an extensive peer-reviewed article on the HearingHealthMatters.org website with Richard James. The title of that article is *Wind turbine noise and human health: a four-decade history of evidence that wind turbines pose risks*, which I append as Exhibit 2. That paper contains all of the literature references in my testimony. The purpose of the 2016 article was to review the scientific literature that disputes 12 positions commonly taken by the wind industry. Among those positions are statements suggesting that acoustic energy below audible threshold cannot harm people ("What you can't hear can't hurt you"), the complaints are based on psychological expectations, and that there is not sufficient scientific evidence to establish a cause-effect relationship between wind turbine noise and adverse health effects.

Q: What materials have you reviewed in this matter?

A: I have reviewed Bon Homme County's Article 17, drafted on July 27, 2015 to regulate wind energy systems (WES); the sound study conducted by Burns & McDonnell Engineering Company, dated May 18, 2018; the 45-dBA Contour maps of the Project; the direct testimony of Chris Howell, summarizing his noise assessment in the matter of Prevailing Wind Park; the direct testimony of David M. Hessler, dated May 4, 2018, regarding the Dakota Range Wind Project; the pre-filed supplemental testimony of Dr. Mark Roberts regarding Prevailing Wind Park; the direct testimony of David M. Hessler, dated March 28, 2018, regarding the Crocker Wind Farm; and the affidavit of Peter Pawlowski, signed August 9, 2018.

Q: After reviewing those materials, what is your overall impression regarding any potential health risks posed by the proposed Project?

A: In my opinion, those materials paint an overly optimistic picture by indicating or suggesting that limiting wind turbine noise to an average level of 45 dBA will avoid significant adverse health impacts and significant community annoyance. Based on my professional background and experience with people living near existing wind projects, numerous anecdotal reports, the scientific literature, papers presented at scientific and professional meetings, and governmental and agency reports, I believe that a substantial proportion of people living in the vicinity of the proposed Project can be expected to experience not only annoyance, but also a variety of adverse health effects. Those effects, which vary widely among affected individuals, are commonly observed worldwide. They include sleep disturbance, annoyance, headaches, dizziness, vertigo, nausea, motion sickness, ear and bodily sensations, fatigue, stress, depression, memory deficits, inability to concentrate, and reduced quality of life. In a given individual, these effects can occur alone or in combination with other effects. In short, a design goal of a 45 dB average level will not adequately protect the health of residents who live in the boundaries of the proposed Project.

Q: You seem to imply that not all residents will be affected adversely. In what percentage of residents would you expect these adverse reactions to occur?

A: Certainly, not everyone will experience or report negative consequences. Landowners who lease their farmland to host wind turbines ("participants") are less likely than others to complain, partially because they earn an income from their leasing agreements with the wind company, but also because they are often constrained by lease agreements that restrict them from complaining or speaking negatively about their experiences. Likewise, not all non-participants will experience negative impacts, or they may not overtly complain if they do. Some of these individuals have signed waiver agreements with the wind company, occasionally accompanied by a financial payment, which virtually ensures that they will be less likely to complain. One factor that makes the noise tolerable for many people is that the noise is intermittent because the wind is often not sufficiently strong to run the turbines. For almost all exposed residents, though, the turbines inevitably generate relatively a loud thumping, or whooshing, noise, and some residents experience ill effects from the low-

frequency noise and infrasound. The result, for what I would estimate at being around 15%-25% of exposed residents, is extreme annoyance and sleep disturbance. In the longer term, some of the other symptoms I've mentioned begin to emerge. In some cases, a few residents may suffer serious cardiovascular problems such as high blood pressure.

Q: Some of the symptoms you describe seem naturally to occur with aging. How can wind turbine noise be distinguished from aging and pre-existing conditions as the cause of such complaints?

A: One line of evidence comes from the World Health Organization (WHO, 2009), which focuses primarily on low-frequency community noise. That organization states that, based on multiple research studies, such noises can lead to stress, and subsequently to health problems. The pathways from noise to adverse health effects may be direct or indirect. It indicates that several studies have established a closer relationship between subjective responses to community noise and cardiovascular outcomes when the annoyance is sleep-related than when it is non-sleep-related (p. 78). In addition, there are many anecdotal and scientific reports of residents who have experienced sleep disturbance, as well as headaches, dizziness, ear pain or pressure, and inability to concentrate, when near the turbines. When they leave the project area temporarily or for a few days or more, their symptoms subside, and when they return, those symptoms, including sleep disturbance, reappear. Similar observations can be made regarding pre-existing conditions, which are sometimes reported to worsen after turbines become operational. If it can be determined that the additional stresses experienced when near the turbines can be relieved by leaving the area, and that they reoccur when the individual returns to the area, that is a good indication that the turbines are responsible for their deteriorating state of health. The scenario in which symptoms subside and recur with changes in location with respect to the turbines, which many have experienced repeatedly, is similar to the research design known the case-crossover design. Case-crossover studies are described in the 2016 Punch and James paper (Exhibit 2). The types of evidence I've described indicate that there is a strong association between exposure to wind turbines and the health complaints, and they strongly suggest that the link is causative. The main point is that all possible precautionary steps need to be taken to ensure the Project will not substantially impair the health of those living in and around the Project.

Q: How do you view your role in this matter, as it relates to an ability to establish a causative link between wind turbine noise and adverse health impacts?

A: I distinguish between general causation and specific causation, as they differ based on the targets of interest: the general population versus targeted individuals, respectively. Physicians, including those with epidemiological backgrounds, have the medical expertise to diagnose and treat the health symptoms of their individual patients who have been exposed to wind turbine noise. The chief recommendation of physicians who have become involved with patients who suffer adverse health effects from wind turbine noise is to move away from the source of the problem. On the other hand, acousticians, audiologists, occupational health and safety experts, and environmental experts have the expertise to analyze the available research and other evidence needed to conclude that wind turbine noise causes adverse health impacts in the general population. These individuals are often called upon as experts in legal proceedings such as this one. That is the role in which I see myself in this matter.

Q: Dr. Mark Roberts, in his supplemental direct testimony, has testified on the role of epidemiological research in establishing a causative link between wind turbine noise and AHEs. What is your reaction to that testimony?

A: My reaction is essentially the same as that already described in Exhibit 2. Dr. Roberts' testimony rests primarily on his credentials in epidemiology and apparently not on his first-hand experience with people who have been exposed to wind turbine noise over long periods of time. Also, he appears to be acquainted with only that body of literature on the subject that is favorable to the wind industry, and to his testimony in its behalf. He points to peer-reviewed epidemiological research as the only basis for proof of cause-effect relationships. Although he espouses the Bradford Hill criteria as relevant, he essentially dismisses most of the nine criteria by naming them, without discussing their implications. Those criteria, with descriptions from Punch & James, 2016, were: (1) strength (strength of observed relationships), (2) consistency (consistency, or repeatability, of relationships, based on observations by different persons, in different places, under different circumstances, and at different times), (3) specificity (causation is indicated if the association is limited to specific individuals and to particular sites

and types of disease and there are no associations with other factors), (4) temporality (there is a clear temporal relationship between outcomes and periods of exposure and non-exposure), (5) biological gradient (a dose-response relationship exists), (6) plausibility (causation is more likely when certain outcomes are biologically plausible, or possible, a caveat being that plausibility depends on the biologic knowledge of the day; this element is best expressed in the statement: "When you have eliminated the impossible, whatever remains, however improbable, must be the truth" (p. 10), (7) coherence (the cause-and-effect interpretation of data should not seriously conflict with generally known facts of the natural history and biology of the disease), (8) experiment (experimentation or semi-experimental evidence, even if only occasional, can reveal the strongest kind of evidence for causation), and (9) analogy (the recognition that similar cause-effect relationships have occurred under similar conditions). Hill states:

> What I do not believe (is) ...that we can usefully lay down some hard-and-fast rules of evidence that must be obeyed before we can accept cause and effect. None of my nine viewpoints can bring indisputable evidence for or against the cause-and-effect hypothesis and none can be required as a sine qua non. What they can do, with greater or less strength, is to help us to make up our minds on the fundamental question – is there any other way of explaining the set of facts before us, is there any other answer equally, or more, likely than cause and effect?... No formal tests of significance can answer those questions. Such tests can, and should, remind us of the effects that the play of chance can create, and they will instruct us in the likely magnitude of those effects. Beyond that they contribute nothing to the 'proof' of our hypothesis (p. 299).

Hill makes this final observation in his essay:

> All scientific work is incomplete – whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time (p. 300).

In summary, my reaction to that portion of Dr. Roberts' testimony is that, like many of his epidemiological colleagues who testify on behalf of wind energy projects, he chooses to disregard Hill's intent to emphasize that experimentation (Hill's eighth of nine criteria) is only one of many criteria that are useful is establishing causation between external agents and disease processes.

Q: Can you give specific examples of how the Bradford Hill criteria apply to wind turbine noise and adverse effects on health?

A: Yes, I believe that the available evidence, which includes both research and common-sense observations, meets all nine of the Bradford Hill criteria, and that, in their totality, that evidence supports a causative relationship between wind turbine noise and adverse health effects. This evidence includes, respectively: (1) widespread reports of complaints, (2) consistency of reported symptoms, (3) and (4) concurrence of symptoms with wind turbine operation, (5) an observable dose-response relationship between exposure levels (or distance) and symptoms, (6) the role of disturbances of the hearing and balance mechanisms of the inner ear in causing identified symptoms, (7) coherence with WHO (2009) and other relevant guidelines, (8) in addition to cross-sectional studies, experimentation is established by the fact that symptoms decline or disappear when receptors leave the area and recur when they return to the area, and (9) Sick Building Syndrome as the analogy. Based on these observations, Dr. Roberts' efforts to raise epidemiology as the only cause-and-effect threshold sets the standard so high that we may never expect to reach resolution on this and many similar matters. Dr. Carl Phillips, also an epidemiologist, states in a paper prepared for the Wisconsin Public Service Commission (dated July 3, 2010):

> Some recent commentators (Colby et al. 2009; Roberts and Roberts 2009) have attempted to dismiss this evidence because none of it is based on the epidemiologic study types that they understand. It is true that other study designs would have told us more, and still could. But dismissing the evidence we have makes little sense given that a huge portion of all knowledge, including formal scientific inference, is based on data that is not from studies designed according to certain preferred approaches. It should be obvious that "does not tell us everything we want to know" does not mean "has no information content". Those making this argument either do not understand scientific inference or are pretending they do not. Claiming that there is no evidence even though there are reports of individuals suffering is akin to claiming that there is no evidence that people get injured as a result of text-messaging while engaged in other activities because, even though the pathway is obvious and there are numerous accidents occurring from some activities, there is often not a "real study" that allows us to make various quantitative estimates. (p. 7).

Q: Do you have additional reactions to Dr. Roberts's supplemental direct testimony in this case?

A: Yes, I would like to make one other point. Dr. Roberts raises the nocebo argument. He is arguing that the complaints people make regarding adverse effects of wind turbine noise are psychologically motivated by expectations resulting from negative messages surrounding

turbines. That argument continues to persist as one of the wind industry's primary explanations for adverse health impacts. In our 2016 paper, James and I, after evaluating these claims, concluded that none of these explanations is as plausible as the notion that a variety of adverse reactions are *physiological* effects caused directly or indirectly from exposure to low-frequency noise and infrasound from wind turbines. While psychological expectations and the power of suggestion can influence perceptions of the effects of wind turbine noise on health status, no scientifically valid studies have yet convincingly shown that psychological forces are the major driver of such perceptions. We describe in some detail in our article the scientific shortcomings of the several studies that have been done, all of which conclude that the nocebo effect is the culprit. I encourage interested individuals to read those details.

Q: How does your background qualify you to testify on the general causal mechanism that explains these adverse health effects?

A: First, I would note that two of the seven panelists commissioned by the American Wind Energy Association to conduct the 2009 review of literature by Colby and colleagues on the noise and health effects of wind turbines were audiologists. Audiologists have the educational background to understand the functioning of the inner ear, and it is that knowledge that led me to become interested, over the last decade, in the relationship between ear physiology and the health impacts of infrasound and low-frequency noise from wind turbines on people. Like many others who have studied this relationship, I believe that most of these adverse reactions are mediated by disturbances of the hearing and balance mechanisms of the inner ear resulting from the low-frequency noise emitted by industrial wind turbines. The inner-ear components affected include the cochlea, which is the organ of hearing, and the vestibular system, which includes the semicircular canals, utricle, and saccule. These organs are responsible for balance, or equilibrium. While the cochlea is responsible for the perception of audible sounds, the vestibular system is sensitive to movement and changes in head position, and can be stimulated by infrasound to induce perceptions of unsteadiness, dizziness, vertigo, and motion sickness in some people.

Q: Earlier, you emphasized sleep as being critical to health. How does wind turbine noise lead to sleep disturbance, in your opinion?

A: Wind turbine noise is a significant disruptor of sleep because our ears, unlike our eyes, are always open, especially to unusual or novel stimuli, including "bumps in the night" that might threaten our safety. During operation, the turbines produce audible noise, mostly in the infrasonic and low-to-mid-frequency range. That audible noise results in the perception of both a relatively constant whirling sound and a periodic whooshing sound, caused by a combination of the blade movement against the air and the blades passing in front of the tower. When the three blades are rotating at a typical 20 revolutions per minute, that sound occurs once per second. Those audible sounds can annoy people and disrupt their sleep patterns. The turbines also generate a pulsating sound at infrasonic rates that are based on blade rotational speed, meaning that the sound spikes, or peaks intermittently. These noises, and the unpredictability of the prevailing winds, are responsible for sleep disturbance in a substantial number of people. The peakiness of the noise is especially annoying and disturbing, and is the reason sleep disruption is not adequately predicted from, or correlated with, long-term average decibel levels, designated as LAeq.

Q: If dB LAeq is not used to quantify noise levels of wind turbines, what metric might better predict sleep disturbance?

A: LAmax, or the maximum noise level produced during a given nighttime period, appears to be the optimal measurement metric to protect sleep. The WHO (2009) Night Guidelines suggest that a 40 dB LAmax level should be the maximum allowable level during nighttime hours. That document uses the term "LAmax" a total of 93 times, which is an indication that the WHO considers the concept highly important as a metric for quantifying nighttime noise. If used, any compliance-monitoring procedures should allow some degree of repetition to occur, and to eliminate other noise sources as the origin of the emissions, before noncompliance is declared. Because there are sufficient audible differences among wind turbine noise and other sources of noise—including traffic noise, thunder, wind, and wildlife—the various sources are easily distinguishable.

Q: Are there other noise measurement metrics that could effectively protect sleep?

A: Yes, possibly. Dr. Paul Schomer currently recommends that wind turbine noise should be limited to an average level of 36-38 dBA, based on a 24-hour measurement period. Although he

offers that recommendation for the purpose of avoiding substantial annoyance at all hours of the day and night, it is a potential alternative to 40 dB LAmax in an effort to minimize or avoid sleep disturbance. Dr. Schomer's credentials as the former Director of the Standards Division of the Acoustical Society of America, and his use of four independent sources in deriving his recommendation, give considerable weight to his recommendation. The major concern I have with that approach is that verification is required to show that a 24-hour metric can sufficiently protect sleep during nighttime hours. Wind companies typically prefer to use the Leq metric because it is more easily compared to available data, and generally resist accepting levels lower than 45 or 40 dBA as a design goal for its wind projects.

Q: The Charles Mix County zoning commission seemingly has joined Bon Homme County in establishing minimum setback distances. Rather than establishing the highest permissible noise level to protect the health of residents, would it not be simpler to establish the minimum permissible distance?

A: Undoubtedly, distance is the most effective means of avoiding negative health impacts from wind turbine noise. The short distances from the property line, such as the 500 feet or 1.1 times the system height, whichever is greater, and from residences, such as the 2,000 feet or 3.5 times the system height, whichever is greater, that have been agreed to in this Project are entirely inadequate. Such short distances are intended to reduce risks from physical failures such as blade throw, ice throw, or falling towers. They do almost nothing to protect residents from exposure to low-frequency noise and infrasound. Researchers who have offered distance as an index to obviate health effects have typically recommended 2 kilometers, or 1.25 miles, as a minimally safe distance from the nearest turbine. Although that distance will not prevent annoyance and health effects for everyone, I think it is a reasonable compromise aimed at protecting health and well-being. We have to recognize, though, that studies have shown that some residents within several miles of an industrial wind project complain that the noise is disturbing, presumably because infrasound travels great distances and is not easily attenuated. The problem with distance as a predictor is that different residences at the same distance from the turbines will experience different noise emissions, depending on the turbine array, topography, variable wind speeds, and other factors. In the end, the actual level of noise

emissions is the critical variable that needs to be controlled, as distance in itself cannot assure that the noise will not be invasive for residents in the footprint of the wind project.

Q: In your opinion, is there any important information omitted from, neglected, or erroneously stated in the documents you reviewed for the Prevailing Wind Park project?

A: Yes. Similar to Mr. Hessler's observation in his Dakota Range report, I noticed that an important component missing from the Burns & McDonnell Engineering Company's sound study for this Project is a discussion of the annoyance and adverse health impacts of the Project. Like almost all reports commissioned by wind companies, it does not discuss the fact that annoyance can lead to adverse health effects, as established by Berglund et al. (1999); the WHO (2009); Shepherd, Hanning, and Thorne (2012); and Fast et al. (2016). The WHO (2009) has described annoyance as a critical health effect, in that in some people it is associated with stress, sleep disturbance, and interference with daily living. In fact, the Burns & McDonnell report ignores much of the information in the WHO 2009 guidelines, which were revised downward from the 1999 guidelines as a result of new medical research into adverse health symptoms due to noise. Burns & McDonnell describe wind noise as a masker that can "drown out" the sounds created by the turbines. Although this may be true in rare cases, it is typically not true at night when wind speeds are high at the turbine heights and low at ground level. Also, the design goal of 45 dBA (Bon Homme County ordinance), or 43 dBA (Charles Mix County— Pawlowski affavidit) is higher than what most independent researchers consider protective of health.

Q: Did you find any shortcomings in Mr. Howell's study of background sounds?

A: Yes, in several respects. To me, the most surprising point Mr. Howell made is that he reports measured L90 background sound levels as high as 45 dBA, which is unusually high for a rural area. A table showing all measured levels would have revealed the frequency of such occurrences. Instead, he reports only a range of 21.5-45 dBA. He also understates the sound impact of wind turbine noise by comparing it to levels of normal conversational speech. Comparing the noise from wind turbines to speech using an A-weighted scale is misleading because the levels of low-frequency noise and infrasound from turbines is substantially greater than for speech, as speech energy begins to drop off precipitously at about 150 Hz and below, and the levels of turbine noise continue to rise below that frequency. Using A-weighting

attenuates low frequencies below 1000 Hz, and effectively filters out infrasound, leading to a gross underestimate of infrasonic energy. Also, related to the fact that Bon Homme County does not specify how sound measurements should be performed, Mr. Howell does not indicate whether the design goal is met by measurements over a specified time period. They could be taken over hours, minutes, or days, and could cover the daytime hours, nighttime hours, or a full 24-hour day. Again, it is essential to limit sound levels to those that fully protect residents' sleep, as sleep is a major determinant of good health.

Q: Based on your professional experience and expertise, what restrictions should be placed on the Project to ensure that it will not substantially impair the health of those living around it?

A: As a general rule, no wind turbine should be located closer than 1.25 miles from the property line of any residence. This distance should preferably be applied to all residences, both participating and non-participating. If placed closer to participating residences than 1.25 miles, those residents should be adequately informed, in writing, of the potential for high annoyance and health risks. With regard to permissible noise levels, the WHO recommendation of 40 dBA Leq(night,outside) should not be exceeded at any residence, particularly at non-participating households. To provide adequate protection from sleep disturbance, nighttime noise levels should be limited to 40 dB LAmax. A metric of dB LA10(night, outside), the noise level exceeded 10% during nighttime hours and measured at the façade of the residence, may be a reasonable substitute for LAmax if considered by acoustical experts to be easier to apply for the purpose of compliance.

Q: Does this conclude your testimony?

A: Yes.

The foregoing written testimony is to be presented to the South Dakota Public Utilities Commission for SD PUC Docket EL 18-026.

Dated this 6th day of September 2018.

_____

Jerry L. Punch

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 — EL18-026

= =

Transcript of Hearing
October 11, 2018
8:30 a.m.
Volume III, Pages

= =

BEFORE THE PUBLIC UTILITIES COMMISSION,
KRISTIE FIEGEN, CHAIRWOMAN
GARY HANSON, VICE CHAIRMAN
CHRIS NELSON, COMMISSIONER

COMMISSION STAFF
Adam de Hueck
Karen Cremer
Greg Rislov

A P P E A R A N C E S

Mollie Smith and Lisa Agrimonti,
appearing on behalf of Prevailing Wind Park;

Reece Almond,
appearing on behalf of Intervenors Gregg Hubner, Marsha Hubner, Paul Schoenfelder, and Lisa Schoenfelder;

Sherman Fuerniss,
appearing pro se;

Karen Jenkins,
appearing pro se;

Kelli Pazour,
appearing pro se;

Kristen Edwards and Amanda Reiss,
appearing on behalf of Staff.

Reported By Cheri McComsey Wittler, RPR, CRR
Precision Reporting, 213 S. Main, Onida, South Dakota

The following transcript of proceedings was held in the above-entitled matter at the South Dakota State Capitol Building, 500 East Capitol Avenue, Pierre, South Dakota, on the 11th day of October, 2018, commencing at 8:30 a.m.

MR. DE HUECK: Good morning, everyone. My name is Adam de Hueck. I'm the Hearing Examiner for Docket EL18-026, In the Matter of Prevailing Wind Park, LLC for an Application for a Wind Energy Facility Permit.

We are on day three. The Applicant has concluded their direct case in chief. Yesterday we heard from our three lay witness Intervenors, and today we're moving on to Mr. Reece Almond's case in chief. And we will also hear from a Staff witness today.

With that, Mr. Almond, you may go ahead and call your first witness.

MR. ALMOND: We call Mike Soukup.

Mike Soukup,

called as a witness, being first duly sworn in the above cause, testified under oath as follows:

DIRECT EXAMINATION

BY MR. ALMOND:

Q. Good morning, Mr. Soukup. Can you introduce yourself to the Commissioners, please.

A. Hello. My name is Mike Soukup. I live 7 miles north of Tyndall or about 13 miles east of the wind farm, proposed wind farm.

Q. And, Mr. Soukup, are you involved in the Bon Homme County government?

A. Yes, I am. To give you a little history, I've been

on the zoning board since 1998 and I've been Chairman of the County Commission for '17 and '18 and the years of '15 and '16 I was Chairman of the zoning board.

Q. I missed the dates. How long have you been on the County Commission?

A. Eight years. Chairman for the last two years.

Q. Thank you. And I understand there's the County Commission board. You referenced the planning Commission. Is there another entity known as the Board of Adjustment?

A. Yeah. They switch into that.

Q. Can you just explain the roles of those three separate entities?

A. You know, legally I can't quite explain how that goes. We've always done it and just have a system, and it works.

Q. Who sits on the Board of Adjustment?

A. Well, it would be the Commissioners.

Q. The County Commissioners sit on the board?

A. Yeah.

Q. Of adjustment?

A. I hope I answered that right but we've done it for eight years.

Q. So you have the County Commissioners and you have the Zoning Board?

A. The same five people. We have five individuals on the Zoning Board, and usually one on the Zoning Board is a County Commissioner. And then that guy is also on the County Commission board of five. One Commissioner for each district.

Q. Now which of those -- you have the County Commission board and you have the Zoning Board. Which of those acts as the Board of Adjustment?

A. The Commissioners.

Q. Commissioners. County Commission.

Then are you familiar with this wind farm project that's at dispute or being discussed in this proceeding?

A. Yes, I am.

Q. How close do you live to that project area?

A. Oh, I suppose 12, 13 miles. My great-grandfather's homestead is in the middle of that wind farm.

Q. And have you or any members of your family received any sort of financial benefit from this project?

A. No.

Q. And --

A. Probably about a third cousin over would be in that hand print -- footprint of the wind farm.

Q. And have you or any -- or have you signed any sort of agreements related to this project?

A. No. No.

Q. Okay. In front of you is Exhibit I 14. It should be open to Exhibit I 14 in the binder. Are you familiar with that document?

A. Looks good.

Q. The one in the binder. Exhibit I 14. There should be a sticker down at the bottom --

A. Oh, there it is. I was reading that --

Q. Sorry. Can you tell us what Exhibit I 14 is?

A. Well, I guess it's definitions of what the proposed deals are.

Q. Is Exhibit I 14 the Bon Homme County Zoning Ordinances?

A. Is what now?

Q. Is Exhibit I 14 the Bon Homme County Zoning Ordinances?

A. To the best of my knowledge, I would say yes.

Q. If you look at the top of page 1, can you tell us when these zoning ordinances were adopted originally?

A. Well, it says -- you mean what the date is on the top, Bon Homme County adopted on 4-13 of '99.

Q. To your knowledge is that when the Bon Homme County Zoning Ordinances that are in front of you were adopted?

A. That was a long time ago. I would say yes. Like I said, I've been involved since 1997. It's been a long, drawn out --

Q. Why don't you flip to Article 17 of those zoning ordinances for me.

A. Where is that at then? Okay. Exhibition [sic] 17.

Q. No. Within the zoning ordinances, within Exhibit I 14, if you could flip to Article 17 of your zoning ordinances.

A. I don't know what page I'm supposed to go to -- part of these?

Q. It's page 57, I believe.

MR. MUSHITZ: What page?

MR. ALMOND: 57.

A. Okay.

Q. Have you located Article 17 of the ordinances?

A. Yeah. I'm fairly nervous sitting up here.

Q. That's fine. Take your time. I don't want you to be nervous. Can you tell the Commissioners what Article 17 is?

A. Well, I don't know how to really explain it. I guess I read through it before when we adopted it. It's just improvements on our zoning issues, yes.

Q. And what does Article 17 relate to specifically?

A. The wind farms.

Q. And do you recall when Article 17 was adopted?

A. Well, according to my records, it was on that Tuesday, October 20 of 2015.

Q. Sometime in 2015?

A. Yeah. Because we had a Commission meeting in the morning, and then we came back that evening.

Q. And I'm not interested in exact dates. We'll just say 2015. Is that fair?

And if I'm looking at the dates you gave me previously you were on both the planning Commission -- or the Zoning Board and the County Commission at that time?

A. At that time, yes. I was not the Chairman of the Commission but I was on the Zoning Board. And a Commissioner.

Q. And just generally when ordinances are adopted, what's the general process that gets played out?

A. I guess we heard input from both sides, and that's how we adopted it with advice from the public.

Q. And how was the idea to adopt Article 17 first brought to the county?

A. Well, that was several years ago. I think after we did that first wind farm some individuals had came forward that we should try to make something -- an improvement on that so that's what became of that Article 17.

Q. And the first wind farm, are you referring to the Beethoven Wind Farm?

A. Correct.

Q. And you said some individuals came forward to make improvements on something. What --

A. Oh, I would say a handful. About every time we always had a handful either in favor or against.

Q. And in terms of the improvements that were looking to be made, can you just give a flavor of what those improvements were.

A. Oh.

Q. Not the ones that were actually made but just what people were looking for?

A. Yeah. That's kind what have we did on Article 17. With our advice everything seemed to be up to par.

Q. Prior to the adoption of Article 17 did Bon Homme County have an article of their ordinances dedicated exclusively to wind energy systems?

A. It is hard for me to answer that question exactly. You know, we've always talked about it, but I can't say -- you know, it's always been on the back burner, the wind farm, for many years.

Q. And in --

A. I've got to apologize. I didn't brief up on that history from, you know, way back.

Q. And in the adoption of Article 17 I assume you didn't pull out a computer and just start typing Article 17 from scratch, did you?

A. No. It probably took a few months, I'm sure.

Q. Rather than starting from scratch, did the county utilize the draft model ordinance that was on the PUC's website?

A. We did a lot of our stuff with District III. So I guess -- I'm just a farmer. I didn't go to college. But we kind of acted on -- you know, asked them for advice and helped guide us -- guidance us.

Q. Well, why don't we compare the draft model ordinance to Article 17 to see if we can conclude that that's kind of the document that the county used from scratch. Okay?

A. Okay.

MS. AGRIMONTI: Objection. The witness has testified he doesn't know and if there's a comparison between the ordinances, I believe Mr. Almond can make that argument in his brief.

MR. DE HUECK: I'm going to let Mr. Almond make this comparison.

Q. So also in front of you is what's been marked as Exhibit I 23.

A. Okay. Two separate sheets?

Q. Are you on Exhibit I 23?

A. Yeah. 2018.

Q. Can you compare Section 17 -- okay. So I want you to put Exhibit I 14 and Exhibit I 23 side by side. And

I'd like you to compare Section 1701 of the zoning ordinance to the PURPA section of the PUC ordinance. And you don't need to read it out loud, but read it to yourself.

So what I'd like to you do is compare Section 1701 of Article 17 with the PURPA section of the draft model ordinance. Just compare the language of each.

(Witness examines documents.)

A. Okay. I read them both.

Q. Now go to Section 1703 of Article 17 and compare that to Section 2 of the model ordinance.

A. Now what do you want to know?

Q. I'd like you now to compare Section 1703 of Article 17 to Section 2 of the draft model ordinance.

(Witness examines documents.)

A. Yes.

Q. Would you agree with me that the language of both Article 17 and the draft model ordinance is substantially the same?

A. Yes.

Q. So for Article 17 why don't you flip down -- I'll help you.

A. Okay.

Q. To Section 1723 of Article 17.

A. Ain't there a few pages?

Q. In comparing Section 23 of Article 17 -- first what is Section 1723 of Article 17? What's the title of it?

A. On the setbacks?

Q. Section 1723. Setbacks?

A. Yeah.

Q. Now go ahead and compare Section 1723 titled setbacks with page 6 of the draft model ordinance.

A. Okay.

Q. Where it talks about setbacks.

(Witness examines documents.)

A. Okay. I read it, that Section 1723.

Q. Do you think Section 1723 matches the language from the draft model ordinance regarding setbacks?

A. Unless I made a mistake when I read it, I think it's the same.

Q. That's what I thought when I read them too so I don't think you made a mistake?

A. Yeah. I read sentence by sentence but I'm very nervous and I could easily make a mistake up there.

Q. No. And I get that. I think that's the point; it's the same language; right?

A. Looks the same to me. I just read it.

Q. And we could continue this process, but for the sake of time while you were considering Article 17 and what to adopt it, did you know something that's the state

standard? Was there a state standard?
A. You know, back that many years ago I remember that word, state standard, but I cannot sit here and say that I remember.
Q. I mean, did you refer to the state standard during these meetings?
A. I'm pretty sure we did.
Q. And what was the state standard that you were referring to? Was it the draft model ordinance there?
A. I would say yes.
Q. Okay.
A. That was three years ago. And then in that summer of 2015 my dad died so we were in and out of the hospital quite a bit.
Q. And it makes sense?
A. Yeah.
Q. If the PUC has a draft model ordinance, it would make sense that a county would start with that when drafting the zoning ordinance; right?
A. Right.
Q. I think you need to --
A. As far as my opinion we did everything up to par. I can't say that we -- we can't make a mistake because everybody watches us.
Q. Okay. So we can set aside --

MR. ALMOND: Well at this time I'd like to move for the admission of Exhibit I24.
MR. DE HUECK: Absent any objection, I'm going to go ahead and admit it.
MS. EDWARDS: Is that the draft model ordinance?
MR. DE HUECK: Yeah.
MS. REISS: Staff would object just based on the fact that no appropriate foundation was laid. The County Commissioner never said that he reviewed it. He just reviewed the language and answered questions as to whether it matched or not.
MR. DE HUECK: Anything from the Applicant?
MS. AGRIMONTI: I'd join in the objection.
MR. ALMOND: Would you like a response from me.
MR. DE HUECK: Go ahead.
MR. ALMOND: I believe his testimony was that he just relied on the state standard which was this PUC model ordinance.
MR. DE HUECK: With that, I'm going to go ahead and admit it.
Q. You can set aside the model ordinance now and we're going to change topics. Okay?
A. Okay.
Q. Earlier when deciding whether or not to -- or in adopting Article 17 you mentioned you heard from the

public and took in public input. Who were some of the more active participants in the public input process?
MS. AGRIMONTI: Objection. I'd like to have a standing objection to this investigation into how a zoning ordinance was adopted.
I understand the Commission's ruling and I won't continue to interpose objections but I would like it to be maintained.
MR. DE HUECK: So noted.
MS. AGRIMONTI: Thank you.
Q. Who were involved -- who were the more active public participants in that public input process?
A. Mainly Mr. Hubner, who I've known forever. And his wife.
Q. Anyone else?
A. Mr. Van Gerpen from Avon.
Q. Anyone else from the public that was involved in the public input process?
A. Those would be the main two to three.
Q. Was anyone on behalf of the wind industry involved in the public input process?
A. Yes. Mr. Roland Jorgenson [sic] was there, and a couple of landowners that will eventually have windmills were at the meeting.
Q. Do you know the names of those landowners?

A. Well, I would say through the summer -- Mr. Bowder (check) and I don't know who else to say on the -- I guess just supporters of the wind farm.
Q. And you mentioned Mr. Roland Jurgens. Who is he?
A. I guess he's the project manager of the wind farm.
Q. You say the wind farm, which wind farm are you referring to?
A. Actually he was involved with both of them. I'm pretty sure he was on the -- with the first wind farm, the Beethoven Wind Farm.
Q. When you say both of them, are you referring to Beethoven and?
A. Right.
Q. This wind farm?
MS. AGRIMONTI: Objection. Vague. I would note that we have various entities that have owned -- or two entities that have owned the project that was before the Commission, and I'd just like the record to be clear what developer was being discussed in 2015 versus the Applicant in this proceeding.
MR. DE HUECK: Does Mr. Almond need to rephrase that then?
MR. ALMOND: I think to the extent Ms. Agrimonti wants to clear up the record, she can do so on cross-examination.

MS. AGRIMONTI: I can do it that way. It seems to me we'd have a clearer record if we know what developer we're talking about when questions are being asked.

MR. DE HUECK: Yes.

So, Mr. Almond, please refer to the correct developer while asking questions.

But before I go any further, Mr. Soukup, could you please scoot your microphone a little closer to your mouth. Because you end up turning sideways and get a ways away. And you can move that around if you want to continue sit sideways. It's absolutely fine.

Thank you.

Q. Again, so who is Mr. Roland Jurgens?

A. One of the -- the wind developer for this last wind farm.

Q. When you say this wind farm, which one are you referring to?

A. The one we're talking about today.

Q. And did he hold himself out to the county as overseeing all development activities for the project?

A. Well, when he would come to our meetings he would tell us the future plans of what they wanted to do.

Q. Okay.

A. Briefed us on what was coming in the future.

Q. And Mr. Jurgens was involved in the public input process, as we've discussed.

A. Yes.

Q. Who's Eric Elsberry?

A. He's our zoning administrator. I suppose he's been there the last three years. Our other guy retired so we hired him and put him in there. And he does a very good job.

Q. And as the zoning administrator, do members of the public submit input and comments to Mr. Elsberry?

A. Yes, they do. And if there's any questions he usually calls District III for some advice because there's a wide variety of knowledge you need to know.

Q. I'm going to ask you to turn to Exhibit I24 for me, please. It's in the binder under the tab I 24.

A. With them yellow tags? There's 23 and there's 25. Right there? I 24. Okay.

Q. And is Exhibit I24 an e-mail from Roland Jurgens to the zoning administrator Eric Elsberry?

A. Yes, it is. I'm reading it right now. Hi, Eric."

Q. And this e-mail was sent in October of 2015, around the same time the county was looking to adopt Article 17; right?

A. Yes. I would say the Commissioner meeting was a week before that. And then according to what we looked

on our records, we started acting on the first meeting of November, which would be November 3 of 2015.

Q. I want to take -- take your time and familiarize yourself with that e-mail, please.

MS. AGRIMONTI: I object. This document to the extent the witness is just being asked to review a document. No foundation has been laid for it. I would request that foundation be laid before we investigate and ask questions about this document.

MR. ALMOND: Ms. Agrimonti, I believe you stipulated to the foundation of this document.

MS. AGRIMONTI: I stipulated to the document being an e-mail from Mr. Jurgens to Mr. Elsberry. The witness has not -- stated he's never seen this document before. It's also a document from a prior Applicant with this PUC than Prevailing Winds so it's not relevant, but I don't believe you've laid the foundation that this witness can speak to the document.

MR. DE HUECK: Continue reviewing the document.

I'm going to allow Mr. Almond to ask his questions just based on this mail. I'm assuming, yes, this gentleman cannot speak to the conversation that took place in this e-mail, but maybe there's some information within that he -- Mr. Almond's got some sort of line of questioning that will make sense.

(Witness examines documents.)

A. Okay. I've read it.

Q. As part of the public input process Mr. Roland Jurgens suggested to the county that a 35 dB nonparticipant noise restraint is absolutely the best way to protect nonparticipants?

MS. AGRIMONTI: Objection. He's just asking the witness to state what is in the document. The document speaks for itself.

MR. DE HUECK: Yeah. But I'm going to let the factual basis for these questions just merely go to the weight of what this witness responds and gives to the Commission. And we'll go from there.

Q. Would you like the question repeated?

A. What do you really want to know now.

MR. ALMOND: Cheri, can you ask the question again.

(Reporter reads back the question.)

MS. AGRIMONTI: Further objection of hearsay.

MR. DE HUECK: Well, and I'm just going to advise Mr. Almond you're basically testifying, and you're leading your direct examination. So let's try to avoid leading questions and leave them more open-ended.

Q. Did Mr. Jurgens propose a noise limitation to be placed on nonparticipants as part of the public input

process?
A. I can't answer that. I can't remember. That was three years ago.
Q. Looking at exhibit -- what's been marked as Exhibit I24, go to the fifth paragraph for me. Follow along as I read it out loud.
MS. AGRIMONTI: Objection. The witness has not seen this document except for today. He has not laid any foundation that the document in front of him influenced his decision or that he was even aware of it. To have Mr. Almond read into the record what isn't otherwise admissible is improper, it's not relevant, and the foundation has not been laid.
MR. ALMOND: May I respond?
MR. DE HUECK: You may.
MR. ALMOND: We've heard this witness who is the County Commissioner also sitting on the Zoning Board. We've heard that the Zoning Board and the County Commission receives public input in whether or not to adopt zoning ordinances. We've heard as part of that public input process people submit e-mails to Mr. Eric Elsberry, the zoning administrator for the county.
This is an e-mail from Mr. Jurgens to Eric Elsberry, the zoning administrator clearly providing public input into the process of the adoption of Article

17. As a County Commissioner and the board of -- a member of the planning board he's capable to speak to those public input that is submitted into the process.
MS. AGRIMONTI: The witness has not seen the document --
MR. DE HUECK: I got this.
So Mr. Elsberry should be on the stand because it's clear from his statement and from observing him he's never seen this. He's completely unfamiliar with this document. So I am not going to let you read it into the record.
I think you could formulate your questions without even having this e-mail in front of us right now.
MR. ALMOND: Well, I asked the question of whether or not Mr. Jurgens submitted public input, and I'm now attempting -- to the county, and I'm now attempting to impeach the witness.
MR. DE HUECK: He's never seen this public input. But Mr. Elsberry probably has. So I think --
MR. ALMOND: Very clear. Just so we're very clear on this record, I'm going to move to admit Exhibit I24. And, as I'm understanding it, I'm not allowed to use Exhibit I24 either for admission or for impeachment purposes with this witness.

MR. DE HUECK: Can the parties help me out. Did we have this one?
MR. ALMOND: No. It's not admitted.
MR. DE HUECK: Not admitted.
MS. AGRIMONTI: It's not admitted. And the Applicant does agree that it is a document from Mr. Roland Jurgens to Eric Elsberry so that that foundation -- I'm not suggesting that the document isn't what it is. But it is hearsay, and there's no foundation for this witness to opine on it.
MR. DE HUECK: In agreement. It's not admitted at this point in time.
MR. ALMOND: And, just to be clear, I cannot use this document for impeachment purposes with this witness?
MR. DE HUECK: I have not seen you try to do that yet.
Q. Did the county receive public input from Mr. Roland Jurgens suggesting a 35 dBA limit for nonparticipants?
A. To my knowledge I cannot remember that. It was three years ago.
Q. Looking at Exhibit I -- what's been marked as Exhibit I24 in front of you read along as I read for you. "The 45 dB participant, 35 dB nonparticipant noise restraint is absolutely the best way to protect nonparticipants."

Did I read that correctly?
A. You're on the page of this I 24?
Q. Yes. It's the fifth paragraph.
A. Read that again for me.
Q. "The 45 dB participant, 35 dB nonparticipant noise restraint is absolutely the best way to protect nonparticipants."
Did I read that correctly?
A. That's what's wrote in the book.
Q. What was that?
A. That's what is written here.
Q. Okay. What noise limitation did the county ultimately adopt for nonparticipants?
A. I'd have to go through the book and you'd have to show me what page. When we did that three years ago we did it.
Q. Do you frequently look to your zoning ordinances?
A. Well, I haven't been on the board for a couple of years and that -- we had read through, and this is all -- you know, we deal with many things, gravel to machinery to personnel and whatever. We go through that book, and I guess I'll apologize. I did not read through this zoning book before I came here today.
I carried it in my briefcase for years. Got it -- but our big concern now was the hog barns. You know, you

ask me questions about hog barns and setbacks, and I can answer them.

Q. Well, let's look to Article 17 and find the noise setback for nonparticipants. Can you turn to Article 17 of your zoning ordinances for me?

A. What page is that on?

Q. It starts on page 57.

A. Okay. I'm on page 57, Article 17. What do you want to know?

Q. I want to know what the county's noise restriction is for nonparticipating residences of a wind energy system, a large wind energy system?

A. Well, I know it's in here but I'm not going to be able to tell you right offhand where that paragraph is. Because we did study that three years ago.

Q. And I'll help you out. It's Section 1741.

A. Okay. "Noise level produced by" --

(Witness examines document.)

A. Okay. Now what do you want to know here?

Q. Yeah. What is the noise limitation placed on large wind energy systems for nonparticipating residences?

A. I guess I will admit the truth. This is a little above my head. You know, we went through this three years ago and according to the zoning administrator and everything, other counties, it worked.

Q. Looking specifically at the first line of Section 1741 it says, "Noise level produced by the large wind energy system shall not exceed 45 dBA average A-weighted sound pressure at the perimeter of occupied residences."

What does that 45 dBA average A-weighted sound pressure mean?

A. Well, they monitor that and not supposed to go over it; right, is my understanding.

Q. And the 45 dBA average A-weighted sound pressure, I understand you're saying that they monitor it and they can't go over it, but what is it?

A. Well, it's the sound from the windmills.

Q. And it says average A-weighted. How is it averaged?

A. I cannot answer that. That is over my intelligence.

Q. Is there a certain time period over which it's averaged that you're aware of?

A. No.

Q. In that same Section 1741 deals with shadow flicker. Do you see that?

A. Yes, I do. To the bottom. I read that.

Q. Why did the county think it needed to regulate shadow flicker?

A. I guess with advice from other counties and other wind farms there has been issues with shadow flicker. So according to District III and whatever, they understand

that. That's why it was put in there.

Q. And what are the issues you said there had been issues?

A. That shadow flicker. You know, I personally don't -- I do understand it, but I don't. I mean, I know what it is and that's why it was put in there, to the best of my knowledge.

Q. You said there had been other issues. Do you know what those other issues are?

A. No.

Q. Okay.

A. But when we -- from some county or whatever, they said that -- you know, we kind of relied on everybody else's advice is how we acted on that, other --

Q. In adopting the ordinances, did the county ever consider the concepts of infrasound or low frequency noise?

A. Oh, I'm sure that was brought up. About everything you've talked about has been brought up in them three years prior a little bit.

Q. And in anywhere in those Article 17 of your ordinances does the county place any sort of limitations or restrictions on infrasound or low frequency noise?

A. I did not read up on that. I cannot answer that.

Q. Well, you have Article 17 in front of you so feel

free to -- if you can find --

MS. AGRIMONTI: Objection. Argumentative.

MR. ALMOND: I'm attempting to refresh the witness's recollection of his zoning ordinances.

MS. AGRIMONTI: I think it's an unfair test to ask him to read the entire ordinance and answer the question. It's either in the ordinance or it's not.

MR. DE HUECK: I agree. And he gave the answer he's unaware.

A. I guess we adopted this three years ago, and at that time we started up we thought everything was up to par at that time three years ago.

I've flipped through it here and there. You know, we've heard about this many times and flipped through, whatever, should be good. And you're asking me these in depth questions, and they are over my intelligence.

Q. At some point was it communicated to the county that the PUC model ordinance should not be used as a resource?

A. I honestly can't recall that.

MR. ALMOND: I don't have anymore questions for you, Mr. Soukup. Thank you for coming in.

THE WITNESS: Okay. But I do recall the night at Avon when it was 100 degrees and your speaker system did not work. Remember that? And I sat there for three.

MR. DE HUECK: Mr. Soukup, you're not quite done

yet. What I have to do now is to tender you for cross-examination. Which means that now we let the Applicant ask you questions, and then I'll turn it over to these other Intervenors in room and then we'll go to Staff and then the Commission will have an opportunity to ask you some questions as well. So, with that, Prevailing Winds would you like to cross-examine this witness?

MS. AGRIMONTI: I have no questions. I thank you for coming in today.

MR. DE HUECK: Mr. Fuerniss, do you have any cross-examination?

CROSS-EXAMINATION

BY MR. FUERNISS:

Q. Mr. Soukup, I don't think you're giving yourself enough credit when you say this is over your intelligence.

Don't you think perhaps you just haven't looked into this lately, that it's not fresh you're mind?

A. I will apologize. You know, I should have brought that -- in fact, I borrowed my zoning book to one of the other Commissioners to read through it two weeks ago. And I should have brought that book along. This morning I was waiting in the hall. I could have read it about twice and refreshed my memory. You know, this was all

stuff from three years ago. I remember that October 20 night meeting. And there was quite a few people spoke that night. I'm sure Gregg was there that night. I'm sitting here. You know, I know everybody here with the wind farm and I drive right by Karen's farm on my way here and -- you know, cut through your neighborhood, I should say, and --

Q. And maybe this came out, Reece got this out, I don't know, but do you remember any specifics that the public was asking for, as far as putting into the ordinance for the wind farm?

Do you remember any specific requests that were made that it should have this or it should have that?

A. You know, I guess I'm very nervous, but as I sit here I remember Karen speaking in Tyndall at least three different times; right? And you was in Tyndall once or twice.

Q. But do you remember what was specifically being asked for?

A. Three years ago? The main specific thing was you guys just wanted to stop it.

Q. But you don't recall --

A. No.

Q. By what means or what specific regulations or anything like that that were being asked for?

A. You know, I remember taking notes that night you guys all talked in Tyndall. I said who was in favor, say your name. Karen, yes and -- or no. And I kept track of that because I sat right next to the Chairman that night. And, you know, that meeting was two and a half hours long. I guess there was a lot of things that was asked for. I don't really remember anything specifically.

MR. FUERNISS: Okay. Thank you.

MR. DE HUECK: Ms. Jenkins.

MS. JENKINS: No questions.

MR. DE HUECK: Ms. Pazour.

MS. PAZOUR: No questions.

MR. DE HUECK: Staff.

MS. REISS: Thank you. Just briefly.

CROSS-EXAMINATION

BY MS. REISS:

Q. Thank you for being here, Commissioner. I just have a couple of quick questions for you. Prior to today, did anyone help you prepare your testimony for today?

A. No. I met with the State's attorney two days ago and she said when to be here and I said what room and that was it. And if I would have been prepared I would have brought that book and read it instead of sitting here looking like an idiot.

Q. Great. And in response to some of Mr. Almond's

questions you responded that the Commission looked towards counties and other entities for zoning ordinances. Do you remember that?

A. In that area -- we had paid attention to what some of the other counties up north had done.

Q. Uh-huh.

A. And like I said that was three and a half years ago.

Q. Yeah.

A. Almost four. So we did give it a lot of thought, and at that time everything we did in that book we thought we was up to par and District III thought it was up to par. Everything -- we did not want to make any mistakes.

Q. Sure.

In your experience as a County Commissioner -- I believe you said 17 years? How many years was it?

A. Zoning is 21. Commissioner 8.

Q. 21 years?

A. Yeah.

Q. So in your experience on the Zoning Board is it abnormal for the county to look towards other resources, counties?

A. Oh, yeah. We're issuing with these hog barns right now, which is a big gray area trying to figure out what -- and no county can figure out the correct answer,

setbacks and smell and whatever.
Q. So just to clarify it's a normal practice for the county to look to other entities or it's not normal?
A. Yeah. I would call other Commissioners. Other Commissioners call me all the time about something.
Q. Sure. And I guess my last question is after looking at other resources did the county independently review the information in the ordinance before passage?
A. I think I'm sure our Chairman had called some other counties and we just thought everything we did was up to par.
MS. REISS: Okay. No further questions.
MR. DE HUECK: That will bring us to Commission questions. And I'll go down to Chairman Fiegen and see if she has any questions for you.
CHAIRWOMAN FIEGEN: I don't have any questions. And thank you for coming to your State Capitol and leaving your farm for a little bit. We are praying for better weather every single day.
THE WITNESS: Next week.
CHAIRWOMAN FIEGEN: Thank you.
THE WITNESS: Next week.
MR. DE HUECK: Commissioner Hanson.
COMMISSIONER HANSON: No thank you.
MR. DE HUECK: Commissioner Nelson.

COMMISSIONER NELSON: Thanks for being part of the process. No questions.
MR. DE HUECK: Mr. Almond do you have any redirect?
MR. ALMOND: No.
MR. DE HUECK: With that, you may step down. Thank you for testifying.
THE WITNESS: Thank you. And you earned your money that night at Avon. That was a tough one. Between the heat and the speaker problem.
(The witness is excused.)
MR. DE HUECK: Mr. Almond, you may call your next witness.
MR. ALMOND: Call Keith Mushitz.
Keith Mushitz,
called as a witness, being first duly sworn in the above cause, testified under oath as follows:
CROSS-EXAMINATION
BY MR. ALMOND.
Q. Will you introduce yourself to the Commission, please.
A. I'm Keith Mushitz. Geddes, South Dakota. Chairman of Charles Mix County.
Q. You're Chairman of Charles Mix County Commission?
A. Charles Mix County Commission, yes.

Q. And does Charles Mix County have any zoning ordinances?
A. It does not.
Q. Are you aware of the project that's being considered as part of this proceeding?
A. For Prevailing Winds, yes.
Q. And when did you first learn about this project?
A. Six months ago, roughly.
Q. And how did you come to learn of the project?
A. They petitioned the county, let us know that they had an Application out. But beings how we're not zoned they're really not required to do a lot. They did let us know what some of the tax base would be from the project. Wanted to meet with the highway superintendents for road agreements.
Q. You said they petitioned the county? Is that what you said?
A. No.
Q. Okay. Maybe I misheard you.
A. No.
Q. They just reached out to the county let them know about the project?
A. Right. There would be haul road agreements to be considered and things like that.
Q. And in response of learning of this project, what

did the county do?
A. We're not zoned. We really didn't do nothing, other -- after there was some protests, we looked into zoning but that's not going to work in Charles Mix County.
Q. And you say after some protest. Tell me about that.
A. Your clients were not in favor of wind power or the placement of it. Whatever.
Q. When you say your clients who are you referring to?
A. This row of gentlemen and Mr. Fuerniss.
Q. Cuss their names and can you get a little more closer to the microphone?
A. Mr. Sherman Fuerniss, I know he spoke before the Commission before and Mr. Hubner. And I'm not real good with names so I don't know the rest of them by name.
Q. And when did the members of the public protest about this project?
A. When it was prevented -- when it was presented by Prevailing Winds, I guess.
Q. And you said there was some consideration of zoning. Tell us about that.
A. Some people thought we should do some emergency zoning, but after more so meeting on other matters, not necessarily wind matters, zoning is not just not going to -- we had zoning once and it got voted out it's not a

good fit for Charles Mix County. There's 40,000 acres that we have no control over.

Q. Did the County Commission start the process of implementing the ordinance zoning?

A. We looked into it. We never ever read any ordinances. We did District III draw an ordinance up but we never acted on anything.

Q. And when you said you looked into it, is that what you meant by looking it is you had District III?

A. We actually had a draft written up, yes, sir.

Q. And did you do anything else to look into it?

A. Don't understand.

Q. Well, did you hold any public hearings or any public meetings about?

A. Yes.

Q. Adopting emergency zoning ordinances?

A. Yes, we did.

Q. Tell us about those meetings.

A. Well, we had people that were wanting to have the wind project and we had people that were not in favor of the wind power and we just let them air it out.

Q. And approximately how many meetings took place considering the adoption of emergency zoning ordinances?

A. One special meeting that was just for public comment and then one of our Commission meetings had pretty much a

full house but it wasn't designated as just a wind power meeting. Those two for sure.

A little later on we had just strictly a zoning meeting which did end up getting wind power comments.

Q. And you said ultimately the emergency zoning never went forward. Did any type of zoning get adopted in Charles Mix County?

A. It has not.

Q. Is Charles Mix County currently considering adopting zoning regulations?

A. We -- I don't believe the matter will be brought up again.

Q. So for the time being, there's not going to be any zoning in Charles Mix County in the near future?

A. I highly doubt it, sir.

Q. Did the County Commission make any sort of agreements or affirmations about this project?

A. The county signed a document with Prevailing Winds as to where they would have -- how much they would use for setbacks. I'm sure you've looked at the document. We accepted that document, yes.

Q. And if you turn to Exhibit 1-22 for me in that binder in front of you.

A. I 22.

I 22 or just Exhibit 22?

Q. Looking at page 3 of Exhibit 1-22, the Affidavit of Peter Pawlowski, do you see that?

A. Yes, sir.

Q. And is that that agreement you were just referring to?

MS. AGRIMONTI: Objection. Mischaracterizes the document.

MR. DE HUECK: Go ahead, Reiss.

Q. What is that document?

A. That is the document that we approved.

Q. So this is the document that Charles Mix County approved for this project?

A. Yes, sir.

Q. When was the first time you seen this document?

A. At one of the meetings in the -- one of the public meetings that we had in the evening. I don't know the date.

Q. Yeah. And did you -- at some point the County Commission approved this document.

A. Correct. At the end of the meeting.

Q. At the end of the meeting. Have you ever seen this document prior to that meeting?

A. I think I've heard that the document was around. Had I read it? No, sir.

Q. Okay. And from the county's perspective, what does

it mean to approve this document?

A. Well, it was Prevailing Wind said that they would go with these setbacks and distances when they put their project up within Charles Mix County. That looked acceptable to us.

Q. And what information did the county rely on to --

A. We looked --

Q. To form the conclusion that it looked acceptable?

A. We looked at other county zoning -- wind power zoning ordinances. This has greater distance than some for setbacks, less than others. It's between, you know, the most severe and the most lenient. The county did not have the resources to do their own independent studies.

Q. And which counties did you look to?

A. I think we had pretty much a list of every county in the state that has zoning on wind power.

Q. And give some examples of the --

A. Farther distance was 2 to 3 miles and the least distance I believe was 1,000 feet.

Q. Okay. Aside from just looking at other county zoning ordinances, did the county rely on anything else in deciding to approve of this document?

A. No. Not really, sir.

Q. Okay. And if you go to the noise reference on page 2 of the Affidavit, page 4 of Exhibit 1-22, do you

see the section that says, "Noise"?
A. Page 4? Attachment 2 --
Q. We're on the same exhibit?
A. Yes, sir.
Q. And then the last page of that exhibit.
In looking at the last page of Exhibit 1-22 can you locate the noise?
A. Yes, sir.
Q. And it says the noise from the wind turbines will not exceed 43 dBA at any existing nonparticipating residence. Can you give us anymore information on what that means?
A. That is the sound emitted by the turbines, 43 decibels, 45 decibels.
Q. And is this the -- strike that.
From the county's perspective, is there any additional information that the Commission should be aware of as it relates to noise?
A. No, sir. This was in a lot of the other zoning ordinances as a standard.
Q. So as you read that noise limitation what happens if -- if the noise from the wind turbines goes over 43 dBA?
A. As to what happens?
Q. Would they be in -- essentially violation of this

approved limitation?
A. I would assume so, yes.
MR. ALMOND: Okay. No further questions.
MR. DE HUECK: Cross-examination, Ms. Agrimonti.
MS. AGRIMONTI: Yes. Thank you. Very limiteded.

CROSS-EXAMINATION

BY MS. AGRIMONTI:

Q. Thank you for attending today.
You referenced public meetings where various individuals came and spoke about the possibility of a zoning change or adoption of zoning. Do you recall that?
A. Yes.
Q. And did you listen to everyone who wanted to speak about their concerns with respect to wind turbines?
A. As much time as we had, yeah. One meeting went on all night long I think if we didn't close it down.
Q. And you considered all those comments in determining whether to move forward with emergency zoning?
A. Yes.
Q. I 22 we've been talking about the exhibit of -- that Mr. Almond was asking you questions about. You agree that that is a document that binds only Prevailing Wind Park; isn't that correct?
A. Correct.

Q. Didn't obligate the county in any way?
A. Correct.
MS. AGRIMONTI: I have no further questions.
MR. DE HUECK: Mr. Fuerniss.

CROSS-EXAMINATION

BY MR. FUERNISS:

Q. Good morning, Keith.
A. Good morning.
Q. A little bit of housekeeping here. You stated that you think I'm a client of Mr. Almond's; is that correct?
A. I guess I don't know that for sure. I know you're not -- do not want wind towers around your property.
Q. Well, would it surprise you to know that he is not my attorney and neither Karen's nor Kelly's?
A. I apologize for making that assumption.
Q. Just to be clear there's not an attorney in this room that's within my pay grade.
Were you on the County Commissioners when the Beethoven project was built?
A. Yes, I was.
Q. Was there any kind of similar Affidavit or any kind of agreements at that time to do that project?
A. When that project came in there was no -- very little objection to it. I mean, we never had no public meetings or nobody wanted one.

Q. Do you know how --
A. We did not sign nothing on that project.
Q. Yeah. The county didn't have?
A. No.
Q. Any kind of agreement or statements?
A. You're correct.
Q. Okay.
So would you have any idea of how that project got placed within the bounds of Charles Mix County? Have you -- I've got to ask one question at a time; right?
Do you have any idea how it came about that it was put where it is?
A. No. I really don't. I suppose it's where they could generate the most wind from, I'm assuming.
Q. And have you been up there and looked at those turbines that are in Charles Mix County?
A. Up close or from my place that's 40 miles away.
Q. Up close. I mean, driven by, driven through?
A. Just off of highway going to trip 18.
Q. Okay. So that would put you some 3 miles at least probably from --
A. Or 46. I've never drove to any of the towers.
Q. Okay. And do you recall at both the -- I think when you say public input meetings you're mostly talking about the regular Commissioner meetings for the most part? You

guys did have a couple of special meetings during the summer but for the most part these were regularly scheduled Commissioner meetings?

A. Correct.

Q. Okay. Do you remember particulars or what specifics in regards to regulations that the people were asking for in a potential zoning ordinance? Some of the numbers that were mentioned?

A. They varied quite a bit, yes, sir.

Q. But do you remember what some of them were?

A. Yes. I think I heard a three-quarter-of-a-mile setback. I've heard mile setback. I've heard half-mile setback. Depends whether you was for or against the project.

Q. Do you remember a particular county zoning ordinance that we referenced?

A. No. I do know that one ordinance -- I don't know the exact county. One of them had very far setbacks. I do remember that part.

Q. You're referring --

A. I don't know which county it was for sure.

Q. You're probably referring to the Walworth County ordinance which has a 2 mile setback?

A. Could be. I don't know, Sherman. I don't know.

Q. Well, that was one that was --

A. Uh-huh.

Q. Thank you, Keith.

MR. DE HUECK: Ms. Jenkins, any questions?

CROSS-EXAMINATION

BY MS. JENKINS:

Q. Sir, do you remember me attending one of your regular meetings?

A. Yes, I do.

Q. Okay. And do you remember what my concerns were?

A. It was health concerns, I believe, with the wind power.

Q. Okay.

MS. JENKINS: Thank you.

MR. DE HUECK: Ms. Pazour.

CROSS-EXAMINATION

BY MS. PAZOUR:

Q. Good morning, Keith.

A. Good morning.

Q. Do you remember me being at the meetings?

A. Yes, I do. And your daughter.

Q. Do you remember me giving you literature?

A. Yes. As far as the health concerns again on wind towers, yes.

MS. PAZOUR: Okay. Thank you.

MR. DE HUECK: Commission questions.

Commissioner Hanson.

Staff.

MS. REISS: Thank you.

CROSS-EXAMINATION

BY MS. REISS:

Q. Good morning, Mr. Mushitz?

A. Correct.

Q. I have just have a couple of questions for you. If you could turn your attention to Exhibit 1-22, and that would be the Affidavit of the Peter Pawlowski.

You mentioned in response to Mr. Almond's questions that the first time you saw this Affidavit was at the Commission meeting; is that correct?

A. Yes, ma'am.

Q. Did you speak to Mr. Pawlowski at any time before this Affidavit was presented at the Commission meeting?

Let me clarify. Did you speak to him about the terms of this Affidavit?

A. No.

Q. Okay. You mentioned I believe in response to Mr. Fuerniss's question that the Beethoven project did not have a similar Affidavit; is that correct?

A. Correct.

Q. Are these affidavits normal practice for Charles Mix County?

A. This is only the two wind projects that ever come in so what is normal?

Q. All right. But there's not another type of project that would utilize an Affidavit like this?

A. No.

Q. Okay.

MS. REISS: Okay. No further questions.

MR. DE HUECK: Commissioner Hanson.

COMMISSIONER HANSON: Thank you. Good morning, Mr. Mushitz -- or Commissioner, I should say.

THE WITNESS: Either way.

COMMISSIONER HANSON: Mr. Chairman, were you subpoenaed to come here today?

THE WITNESS: Yes, sir.

COMMISSIONER HANSON: You spoke -- as you were going through the process you said that there were 40,000 acres that you had no control over in the county.

And I'm assuming that's reservation property; is that correct?

THE WITNESS: Trust lands.

COMMISSIONER HANSON: Trust lands. Okay. And of course you don't have authority over municipalities either, do you?

THE WITNESS: No, sir.

COMMISSIONER HANSON: Okay. I think that's all

I have. I appreciate your testimony. Thank you.

MR. DE HUECK: Commissioner Nelson.

COMMISSIONER NELSON: Thanks for being part of the process. No questions.

MR. DE HUECK: Chair Fiegen.

CHAIRWOMAN FIEGEN: Thank you.

MR. DE HUECK: Any redirect.

MR. ALMOND: Briefly.

REDIRECT EXAMINATION

BY MR. ALMOND:

Q. You were asked about the public input process, the meetings. Was there a meeting, a County Commission meeting in which you and Mr. Peter Pawlowski left the meeting to go out in the hallway and have a private conversation?

A. Yes, sir.

Q. Tell us about that private conversation.

A. Within the meeting maps had been showed of a setback map. And, of course, I was over here, Mr. Pawlowski was over there. There was so much comment going on I wanted a question clarified. We stepped out. I asked him how many towers would be affected with a 2,000 foot setback. And the lines were real close on paper. He thought two and possibly three would be affected the way they were presented on the paper at that time.

We came back in the meeting, and I told the meeting that that's what we had discussed outside the door.

Q. Was there any other discussion out in the hallway?

A. No, sir. I wanted that question clarified.

Q. Aside from that particular meeting, have you had any other conversations with Mr. Pawlowski or anyone else outside of a public meeting?

A. No, sir.

MR. ALMOND: Okay. Nothing further.

THE WITNESS: I was invited to a site and didn't even go so --

MR. ALMOND: No further questions.

MR. DE HUECK: Recross, Prevailing Winds.

MS. AGRIMONTI: No questions.

MR. DE HUECK: Mr. Fuerniss?

RECROSS-EXAMINATION

BY MR. FUERNISS:

Q. Commissioner Hanson brought up the trust lands in Charles Mix County.

How does that affect property taxes in Charles Mix County?

A. There is no taxes on trust land.

Q. So there's 40,000 acres, give or take, that the county receives no income from.

Did the Commission just for funsies figure out what

the projected tax payments to Charles Mix County might come out to, say, per acre or something like that for Charles Mix County, taking into consideration all those trust lands that aren't taxed?

MS. AGRIMONTI: Objection.

THE WITNESS: This is not even relevant to this. We're on a whole new ground.

MR. FUERNISS: Okay. I'll withdraw the question it if that's the proper thing to do. Thank you.

MR. DE HUECK: Ms. Jenkins?

MS. JENKINS: No questions.

MR. DE HUECK: Ms. Pazour.

MS. PAZOUR: I have a question but I would like to ask Ms. Edwards because I'm not sure on how to ask it.

MS. EDWARDS: Can we take 30 seconds. I can't give legal advice but I can see what you want to know from me.

MR. DE HUECK: Yep. Go ahead.

(A short recess is taken.)

MR. DE HUECK: Ms. Pazour, go ahead.

CROSS-EXAMINATION

BY MS. PAZOUR:

Q. Did you have any public meetings outside of the Commission -- Commissioners meetings with Prevailing Winds?

A. No I stepped out of that meeting with Mr. Peter Pawlowski, but no other meetings, other than public meetings.

Q. Like in the beginning of August?

A. I did not.

MS. PAZOUR: Okay.

MR. DE HUECK: With that, Mr. Mushitz.

THE WITNESS: Mushitz.

MR. DE HUECK: Mushitz. Thank you for your testimony, and you may step down.

(The witness is excused.)

MR. DE HUECK: We will move on to Staff's witness. He was scheduled today so that's why we're breaking the Order for Mr. Almond at this time allowing Staff's witness to take the stand.

MS. EDWARDS: Staff calls David Hessler.

David Hessler,

called as a witness, being first duly sworn in the above cause, testified under oath as follows:

DIRECT EXAMINATION

BY MS. EDWARDS:

Q. Mr. Hessler, welcome back to South Dakota. Will you please introduce yourself for the record.

A. Yeah. My name is David Hessler. I'm an acoustical consultant with Hessler & Associates and I've been asked

by the public utilities Staff to provide impartial technical advice on noise for this project.

Q. Did you submit prefiled testimony in this Docket?

A. Yes, I did.

Q. Have you testified before this Commission before?

A. Two previous times.

Q. Have you reviewed the other testimony submitted by other witnesses in this Docket?

A. Yes, I have.

Q. Both direct and rebuttal?

A. Yes.

Q. Have you also reviewed all responses to data requests?

A. I believe I've read most of them if not all of them.

Q. Did you rely upon that information when formulating your opinion?

A. Yes.

Q. Are you familiar with the testimony of Mr. Howell, Chris Howell?

A. Yes. Mr. Chris Howell, the -- he's the acoustical engineer for the project.

Q. Would you agree that it is -- based upon his testimony yesterday would you agree that it is either inappropriate or impossible to assess the potential noise impact on the -- strike that.

What is your over all assessment of the positions and arguments advanced by Mr. Howell in his testimony?

A. Well, I think what you were getting at there for a minute was the first point, which is he contends that it's impossible to predictor assess the public reaction to a project, and so their study focused entirely on simply demonstrating whether the project was going to meet the 45 dBA Bon Homme County noise limit.

But they did no work or -- evaluating what the predicted sound levels meant or looked into any kind of low frequency issues, none of that. So I was critical of the -- of Mr. Howell's work in that regard.

Q. Now just now when you stated their study are you referring to that of the Applicant?

A. Yeah. The Applicant's noise study, which was prepared by Mr. Howell.

Q. Are you familiar with a Mr. Steven Cooper?

A. Yes.

Q. And who is Steven Cooper?

A. He's an acoustical engineer out of Australia who with relevance here has recently done some experiments that I find very convincing that demonstrate that people with certain sensitivities are affected by extremely low frequency pulsations from wind turbines.

He did a blind study where he recorded sound at a

wind farm in Australia and then replicated that sound in a laboratory setting and people with known sensitivities, people that lived on the site that were bothered by it could tell when this completely inaudible sound was played with 100 percent accuracy; whereas, a group of other people didn't hear anything.

Q. So then is it your testimony that certain people would be more sensitive than others?

A. I believe some people do have a sensitivity to the pulsations produced by all wind turbines really, every model, every size. It's just the nature of the thing that it produces a pulse around just under 1 hertz, which is extremely low and well below the capability of any conventional sound instrument to measure.

Q. If you had -- based upon your training and experience, if you had to guess without anybody talking what's the noise level in this room today?

A. I would say with the fan going it's maybe 40 dBA. In fact I have a sound level meter on my phone if you -- can I?

Q. I'll take your word for it.

A. Okay. All right.

Q. Are you familiar with Mr. Howell's Rebuttal Testimony as it relates to the testimony of Mr. Richard James?

A. Yes, I am. And I have to say I agree with Mr. Howell on his comments there, that in most instances counter to what Mr. James was putting forward.

Q. How about Mr. Howell's testimony as it rebutted that of Mr. Jerry Punch?

A. I actually did agree with Mr. Howell there because what he was talking about was Dr. Punch was recommending that the noise limit for the project should be expressed in terms of an LAmax statistical noise level.

That sounds good. That makes sense on paper. But that's coming from someone that's never measured a wind project.

If we were to put a sound monitor at the site today when there's no project, the Lmax would go over 40, 45, or even 50 a thousand times a day. Every dog bark, plane flying, everything would cause an exceedance of that level.

So it's not practical to use that to actually measure a complete project.

Q. Have you read the direct and Rebuttal Testimony of Intervenor witness professor Alves-Pereira?

A. Yes.

Q. And what is your opinion of that?

A. Well, her area is physiology and that sort of thing. It's out of my area, but I would -- there was another

witness, Mark Hopkins, I believe, who reviewed her testimony. And he's a physiologist and answered her point by point, and I had to agree. I found his testimony very compelling.

Q. Would you be referring to Dr. Mark Roberts?

A. Mark Roberts. Thank you. I drew a blank there for a moment.

Q. What statistical descriptor would you associate with the 40 dBA noise limit?

A. If there were to be a 40 dBA limit on this project or any other project, the only practical descriptor would be a long-term average measured over a period of days or weeks.

And the reason for that is that the sound of the project varies with wind and atmospheric conditions so a short measurement of 10 minutes wouldn't tell you anything. The project might not even be operating.

So what we found from many years of experience testing completed projects is that you have to monitor for usually two weeks and then try to determine what the project alone level is exclusive of the background level. The background levels vary significant in these projects. As as high as the project many times.

For example, in our assessments we'll usually monitor for about two weeks prior to any construction,

and what we find is that the sound level is directly -- directly correlates to the wind speed. And so when it's windy the sound levels 45, 50 dBA before anything's built.

So when the project comes in you have to be careful not just to accept the level that's measured as being completely from the project. A lot of times that's only one component of it. So the difficulty is separating the two, and that's why a long-term measurement campaign is needed, supplemented by monitors that are miles from the project recording the simultaneous background level. It's not an easy thing to do.

Q. Ballpark number, how many wind farms have you evaluated?

A. Well, one of the Intervenor data requests was exactly that question so I had to go back and look. We've measured 15 newly operational projects all over the country, one in Jamaica, and what we have done in all of those cases is performed these two or three-week surveys with background monitors, and it's not easy but you can tease out what the project level is doing on a long-term average basis.

Now one point I'd like to make about that is when we do these tests the methodology is kind of up to me because it's never prescribed anywhere. So what I like

to do is we ask the project who has called or complained or who's upset about this project in any way, and we're going to monitor at their houses.

Now that -- in every case I can think of that's a number between zero and three. Usually there's about maybe two people. And most of these projects cover 25 square miles. They involve hundreds of houses, but that's what we find.

So we measure at those locations, and then I pick five to seven other locations that are on the sound map the locations of the houses that are receiving the maximum sound level and so we set up instruments at all of those locations.

In doing that, we can talk to all of those people. So I've heard the grievances of people that don't like it, and then I've also talked to the people at all these other houses that are receiving sound levels of '46 and 47 dBA and most people just say it's -- it's nothing. You hear it. Nothing.

So my impression after 15 wind projects of seeing that same thing repeated is that there's going to be some people very upset. It's going to be a small number. There's a few projects that everybody to my knowledge is fine with. But most people aren't that bothered. And that's kind of the facts on the ground.

Q. What is your overall recommendation, having heard the testimony and read all of the filings?

A. Well, the project was designed to the county 45 limit and is meeting that. I think the highest predicted level at anyone's house right now is 41.9.

Now there's been an extraordinary push back from folks that don't want this project so -- you know, normally we recommend 45 independent of what the county says. Now we think 45 is a fair limit for most projects just based on our experience and seeing how many complaints there are and what the levels are at those houses.

But, at the same time, we've recommended for many years that every project should shoot for an ideal design goal of 40. That would serve to much better protect the community against complaints and annoyance.

Now here, because almost all the houses are already below 40, it seems to me that it's -- wouldn't be inconceivable to modify the project slightly so that -- so as to achieve the 40 here. I think there's 11 houses that are over right now, and many of those are just over by a tenth or two tenths of a dB, which isn't significant. So I would like to see the project shoot for this 40.

Q. Were you present in the room this morning for all of

the testimony?
A. This morning, yes.
Q. Did you hear the back and forth about whether there may or may not have been a suggestion for a 35 dBA at some point?
A. Yes, I did see that, and I did see a copy of that e-mail the day before yesterday. Basically stating that the wind turbine developer at that time, that fellow, Roland Jurgens, I think, said the 35 was a great idea and that would protect everyone.

Well, that's true. 35's extremely quiet and no one would be bothered, but I'm not sure he knew what he was advocating for because the setbacks to achieve that would be huge and most of the projects I'm familiar with just wouldn't be viable with that kind of a limit.

Q. When you say huge, what are -- what are you talking, generally speaking?
A. Did I say huge?

They would be on the order of a mile and a half or something like that.

Q. Okay.
A. And most projects are not that sparsely populated that that's doable.
Q. Okay.
A. And I would further add I talked about the

background level a few minutes ago. When the wind is blowing, and the wind has to below for the project to operate, the background level is fairly high. It's between 40 and 50. So to design to 35 would be -- there's really no need for that. The background level's going to cover up the project at that kind of a level. All you're going to hear is the wind blowing in the trees. There's kind of a bottom limit to how quiet you need to make it, and generally speaking we find that's around 40. Once you go below that there's diminishing returns. You're not getting any further improvement really.

Q. Okay. I'm going to draw your attention to Exhibit A 33, which I'll provide for you.

Mr. Hessler, are you familiar with that exhibit?

Take a minute to look at it.

(Witness examines document.)

A. Well, it's the first time I've seen it. Let me just look at it for a sec.

(Witness examines document.)

A. Okay. Yeah. 45 dBA.
Q. Can you identify what the title of that exhibit is for the record?
A. The Applicant's proposed conditions.
Q. Is that an exhibit that you -- or a proposal that

you weighed in on or had any input on prior to today?
A. I haven't seen this exact document, but I understood from the beginning that the Applicant had committed to meeting Bon Homme County 45 noise limit, not only in that county but the other two counties in which the project was sited.

MS. EDWARDS: Thank you. No further questions. I will tender him for cross.

MR. DE HUECK: We're going to take a recess at this point for our court reporter. Let's come back at 10:30.

(A short recess is taken.)

MR. DE HUECK: We're back in session. Mr. Hessler is on the stand and now subject to cross-examination.

And you're still under oath, Mr. Hessler.

Prevailing Winds, you may proceed.

MS. SMITH: Thank you.

CROSS-EXAMINATION

BY MS. SMITH:

Q. Good morning, Mr. Hessler.
A. Good morning.
Q. As I understood your written testimony you did not take issue with the noise modeling methodology and assumptions that were used by Burns & McDonnell in

preparing their analysis for the project; is that correct?
A. That's correct. They used the same assumptions and even modeling software that I used.
Q. Okay. Thank you. And you also agreed that the modeling showed compliance with the Bon Homme County requirement of 45 dBA?
A. That's correct.
Q. You mentioned a criticism of not taking into account community perception. Is that accurate?
A. That's correct.
Q. And community perception would be a subjective analysis; is that true?
A. In general, yes. But it is possible to make a judgment as to how impacted people are likely to be.

For example, when we do impact assessments, and we've done probably over 70, we do a thorough background study for a matter of weeks and correlate the sound level to wind speed measured at the top of the met towers to get the wind speed at the turbine height and then predict the project level under identical wind conditions. And it's the differential between what's there now and what's going to be there at the project that really determines the possible impact.

Q. And you indicated that ambient noise levels vary

from 40 to 50 typically when the wind is blowing in your Direct Testimony just now; correct?

A. That's right. And the background studies that we do, we find that just about every site the background level ranges from 20 to 50, purely a function of wind speed. So when wind is blowing there's a significant background noise that's often overlooked by a lot of people that are opposed to wind turbines. They think the background is 30 dBA or 25 dBA. But that's when it's calm and the project is not operating so it's not relevant.

Q. And as far as community perception when you're talking about your ideal limits, the concept is to avoid complaints; correct?

A. That's correct.

Q. Is it true in your testimony that you noted that there isn't really a regulatory sound level that would satisfy everyone?

A. Yeah. That's correct. You can never sit back and be comfortable and everybody be all right with a wind project.

Q. So someone may complain regardless of how low the level is that is set; is that correct?

A. I have seen instances of that.

Q. In this case you stated in your testimony, and I

believe you restated here, that 45 dBA is an appropriate reasonably fair noise limit for wind projects at nonparticipating residences. Is that accurate?

A. Yeah. We consider that a reasonable limit under normal circumstances. When there's not a lot of opposition.

Now here I would lean more towards our ideal recommendation of 40.

Q. And that's just simply based on complaints that have been lodged in advance of the project being constructed?

A. Those numbers come from our experience at completed projects. Like I briefly described, we measure at the Complainant locations and a number of other locations so we know what the sound level is at the people that are complaining and that's why we say it's -- the situation is generally okay up to 45, not ideal, but below 40 we see very few complaints.

Q. When you in your own testimony, your written testimony, you indicate that a lot of fear and resistance to wind projects is created during the development phase by largely attributable to highly biased even scary aunt I wind websites. Do you remember that testimony?

A. Oh, yeah. That's absolutely true. All you have to do is Google wind turbine noise, and it's horrific.

Q. And you noted that once those projects are

operational and you also testified here today that most of those fears are found to be unfounded. Is that accurate?

A. That has been my experience, yes.

Q. What's been proposed on Exhibit A 33 -- and do you still have that in front of you? It's that one sheet?

A. Yes, I do.

Q. Of the Applicant's proposed conditions?

A. Yes.

Q. You indicated you had seen similar language before. Is that accurate?

A. I had seen in the noise study where it summarized what the applicable regulations were, which was the 45 in Bon Homme County and then the voluntary agreement to that in the other two counties.

Q. You also testified on behalf of the Staff in the Crocker Wind Farm Docket and the Dakota Range Wind farm dockets; is that right?

A. That's correct.

Q. And in those matters there was a condition agreed to among Staff at 45 dBA for nonparticipating residences; is that true?

A. That's correct. And I think on one of them the area was so sparsely populated that I think all the predicted levels were below 40 to begin with so the 45 limit was

largely irrelevant.

Q. And on this case it would be reasonable for the Commission to impose a limit of 45. That would be a reasonable and fair limit in this case as well, would it not?

A. In what I would call normal circumstances it's a reasonable and fair limit, but where there's quite a bit of opposition, as there obviously is here, I think further consideration should be given to that.

Q. Was there not opposition in the last two dockets?

A. Not to the extent of this case.

Q. And you're basing that on simply numbers? Are you aware of the number of Intervenors I guess I should ask?

A. I'm basing it on the amount of time it took me to read all the Intervenor submittals.

Q. So it's based on anticipate tore complaints for the project?

A. Yes.

Q. With respect to the potential for health effects, you referenced an article regarding -- or by Steven Cooper; is that correct?

A. Correct.

Q. And it talked about the potential for a small minority of people to be susceptible to vertigo and nausea symptoms due to wind projects; is that true?

A. That's correct.
Q. And are you basing your statements regarding potential health effects solely on that article?
A. That article I found to really put me over the -- I've read a lot of articles and attended a lot of conferences where this issue has been discussed but I find that to be pretty unequivocal, that experiment that he recently did.

So to me it's very clear that some people are susceptible and are very adversely affected, but it's a very small minority.

Q. You're not making a medical judgment here? You're not speaking as a medical practitioner regarding that top is that true?
A. No, not at all. I'm -- in my mind I'm thinking of the Shirley wind project in Wisconsin that I went to and we did a study there to try to figure out what was driving the complaints there, the nausea and the ill feeling complaints. And we went to the houses of those people, we talked to them, we took measurements. They weren't making it up. And so something's going on.

And what we found in that study was that you could detect the wind turbine blade passing frequency, which is as I mentioned around 1 hertz but the magnitude of it is incredibly small and it's really hard to believe that

that has any effect but I'm convinced from Cooper's work that that's what it is.
Q. So just to make it clear you're convinced based solely on Cooper's work that that's the --
A. I think he finally made the link. Or demonstrated the link.

MS. SMITH: I don't have any further questions.

MR. DE HUECK: Mr. Almond.

CROSS-EXAMINATION

BY MR. ALMOND:

Q. Just following up on that last question, what did Cooper demonstrate the link between?
A. That the extremely low frequency pulsations produced by wind turbines can be -- they're completely inaudible -- can be perceived by people who have a sensitivity to it but not by everybody.
Q. And you believe that study gives credence to the complaints of the Shirley Wind individuals and their complaints of -- I guess I'll let you say the complaints because you're the one that was there but --
A. Yeah.
Q. What were the complaints?
A. That they just felt some funny feeling and had a little dizziness and vertigo and just couldn't take it and had to leave their houses. They couldn't get relief

until they left the project area.

And but out of the 15 projects we've gone and measured that's the only one where that complaint, that specific kind of complaint, was made. At all the rest of them it was simply the audible noise, thumping noise. You could hear it at night. It was bothering me, that kind of thing. There was no health complaints at any other site.

Q. And did you listen to Mr. Fuerniss's testimony in this matter?
A. I have not heard -- I believe I read the written testimony? Is that what you're referring to?
Q. Are you aware of the physical symptoms and the complaints that Mr. Fuerniss has been -- has been feeling the last 18 months? Have you read anything about that or heard him testify about that?
A. No. That's news to me.
Q. You stated that you believe that the number of individuals affected by this inaudible infrasound is quite small, and that's based off of the fact that you've studied -- what's that based off of?
A. It's based partially off of the sites that I've been to and talked to everyone, but more than that, it's there's 90,000 megawatts of wind power in this country right now. That's over 50,000 turbines. And the only --

and we're still talking about Shirley, which was from six or seven years ago.

If this problem were common at all, it would be in the forefront of every project's Application and would really be a totally disruptive issue.

Q. So if I'm understanding -- maybe I'll just ask you. Are you aware of any literature or research that discusses people making the same types of complaints as those made in Shirley in other wind farms around the world?
A. Yeah. I'm only familiar with a handful of sites. I think Falmouth in Massachusetts. I'm having a hard time -- I'm thinking there's just a couple.
Q. Just so we know about the complaints that were taking place in Shirley and that you're saying aren't a national or worldwide significant number of, what are those complaints specifically?
A. Well, as I mentioned, they described it as just kind of a dizziness, a mild nausea, and it was particularly -- one woman said right here in this corner of the kitchen in that chair it's real bad so I sat there the whole night but I couldn't hear anything at all. I couldn't measure anything. But, you know, she wasn't just saying that. She must have just had a sensitivity to it.
Q. Are you aware of any studies that have actually

measured the number of people that have that sensitivity to infrasound?

A. No. That would be good to know, but, no, I don't know of any organized or scientific counting.

Q. And given this missing link that was found by Mr. Cooper, do you anticipate those types of studies will start being performed in the near future?

A. I think work will continue along those lines because it's a big issue. And up until that work the discussions mainly centered around theories about the inner ear and -- but nothing that was demonstrable. But now I've found that work to be excellent, and yeah, I would expect it to continue.

Q. And to date aren't most studies talking about wind farms and adverse effects, aren't they typically talking about annoyance?

A. Well, there's really two things going on. There's audible noise around the mid frequencies, 500 hertz, a thousand hertz. That's just the sound of the blades squishing, and it sounds like a -- like a washing machine, kind of.

And then there's low frequency, and that's completely at the bottom end of the frequency spectrum. It's a totally separate issue.

Q. Yeah. As far as your opinion that you don't believe

had people are affected by the infrasound and the sensitivities to it, would you agree that that -- the population hasn't really been studied -- or the wind farms haven't been studied to actually determine what percentage of people are affected by infrasound?

A. Well, I think when they are affected it's -- it becomes known. And the fact that it does not appear to be a problem at 95 percent of operating projects tells me it must be rare.

Q. So you're saying you have knowledge that 95 percent of projects these complaints of nausea, dizziness, vertigo haven't taken place, or you just haven't heard of it?

A. I haven't heard of it.

Q. Okay. And in the academic literature about adverse effects caused by wind turbines, isn't what people are asked about annoyance and they aren't specifically asked about nausea, dizziness? I mean large studies determine population amounts and -- do you understand the question I'm asking?

A. It sounds like you're maybe talking about the Health Canada Study. It was a large study about the Canadian Health Department.

Q. Well, most of the studies I guess I have read and again correct me if I'm wrong is that when they go out

and study and survey the population they ask them basically are you annoyed by the project? Would you agree that that's how most studies are created or the method most studies that are analyzed for the purposes of the peer review stuff?

A. I would say that was the case some years ago when some of the studies in Sweden were -- survey kind of studies. That's the way their questions were posed.

It wasn't until later that this infrasound issue started emerging.

Q. Right. So if people responded they were annoyed, they may have been annoyed because of nausea, dizziness, whatever or they may have been annoyed because they just didn't like it; right?

MS. SMITH: Objection calls for speculation.

MR. DE HUECK: Can you rephrase?

MR. ALMOND: Yeah.

Q. Based off your review of the studies that have been performed and how they've been conducted, isn't it true that when they've asked whether or not an individual's been annoyed, there's no distinction about where the annoyance comes from, whether it's nausea, dizziness, vertigo, or just they don't like the project?

A. Yeah. I guess I would agree with that.

Q. Can you get Exhibit A 33 back in front of you.

A. Okay.

Q. And that's the Applicant proposed condition, specifically Proposed Condition No. 27. And I want to talk to you a little bit about the measurement of this condition. And it's over a two-week period; right?

A. That's how long we normally measure for because then we're assured of getting periods of high wind, calm wind, different atmospheric conditions.

Q. Have some of your colleagues suggested a method, an on off compliance test?

A. I don't know about colleagues but we do that ourselves.

Q. What's an on off compliance test?

A. When the wind is blowing and the project is operating at or near capacity, in many cases we'll get to the test location and then radio in for them to turn off all the turbines and then take measurements of what's happening without the project.

And I will add it is amazing that it sounds the same.

Q. Would you agree that that would maybe be a better way to measure compliance with a 45 or a 40 or whatever noise standard?

A. To my mind it's a more -- it's a simpler more unequivocal way of doing it. The problem is that a lot

of projects aren't happy about turning off the turbines.
Q. But it's for a short amount of time to get the measurements; right?
A. Yeah. I know. That's what I tell them.
Q. Earlier you were testifying about how the background noise, specifically noise caused by the wind, often masks the noise created from the turbines.
Do you recall that testimony?
A. Yes. That's what I was just alluding to on these on and off tests. When you arrive at the site it sounds tremendously loud. I'm thinking of one case in particular. And they turned off all the turbines. The level was the same. It sounded exactly the same. It was just the trees around the house blowing.
Q. And in terms of complaints from those individuals living around projects regarding wind turbine noise, in your experience have you found most often the complaints come at night?
A. Yeah. Yeah. It's --
Q. Rather than --
A. It's audible at night and I can hear it and it's bothering me and never heard anything about a daytime issue.
Q. And is there a reason we would expect more complaints to happen at night?

A. Well, people are trying to sleep and want it to be quiet.
Q. What about the atmospheric conditions that frequently exist at night? Can that lead or is that perhaps an explanation for why we see more complaints at night?
MS. SMITH: Objection. Vague. I don't know what he means by atmospheric conditions that frequently occur at night.
MR. DE HUECK: Either do I, but maybe Mr. Hessler does.
A. Yeah. Yeah. At night sometimes there's temperature inversions and things that enhance or allow sound to propagate more easily. But it's not every night. Sometimes that happens.
But, no. I don't think that's the reason. It's just at night people have the expectation of quiet. If they have the windows open and they hear -- it sounds like a washing machine going, they don't like it.
Q. What are stable atmospheric conditions?
A. That's when it's cold or above the service warmer -- excuse me. I always get this mixed up. It's hot above and cold below.
Q. And in stable atmospheric conditions is the wind typically stronger the higher you go up?

A. No. Actually to get truly stable conditions you need very low wind speeds to stratify the atmosphere thermal lie. But in stable conditions it's warmer above so that the speed of sound is faster so it refracts the sound waves so they travel more easily.
But in windy conditions that kind of atmosphere can exist and windy conditions are when turbines run.
Q. Is it common for the atmospheric conditions to exist where it's calm at ground level but there are strong enough winds at the height of a turbine that the wind turbine's still operational?
MS. EDWARDS: I'm going to object simply because we did not proffer him as a meteorological expert.
MR. DE HUECK: I'm going to overrule your objection, allow you to answer.
A. That does happen, but I wouldn't call it common. I think it happens seasonal lie, more commonly than other times, but it's not an every day or every week occurrence, I don't think.
Q. And in a given year how frequently?
A. It depends on the site and everything else.
Q. And under that scenario the sound around a residence would be -- the sound created from the wind at least would be relatively quiet or nonexistent because the wind wouldn't be blowing at ground level; right?

A. Yeah. That scenario is brought up in every project. That happens occasionally, but I wouldn't base the entire design on that or anything.
Q. And during these very quiet ground levels and if --
MR. ALMOND: Well, you can strike that, Cheri.
Q. If you have a rural community like we have here in this project and if those conditions exist, what would you expect would be the largest generator of noise?
A. It would depend on how far away you're observing the turbines. If you're very far away, the turbine sound signal's so weak that it doesn't make any difference. If you're very close at a 1,000 foot setback, then you'd notice. You'd notice it more strongly.
Q. And at what distance would you be able to start noticing the turbines?
A. I can't say.
Q. Can you give us a rough distance?
A. Are you asking when they first become fairly audible over the background as you approach a project, for instance?
Q. Yes.
A. I'm going to say -- it's hard to put a specific number on. When we do operational surveys we put monitors that are minimum of two miles away from the nearest turbine to get the background noise, and that's

what we get. There's no turbine influence at that level.
And so maybe a mile. You might be able to discern the project under certain conditions.

Q. In changing gears here, during your testimony earlier you said that one and a half mile setbacks basically -- generally make projects not viable. Do you recall that testimony?

A. Yes. Yes.

Q. Have you analyzed this project to determine whether or not a mile and a half setback is viable for the project?

A. No.

Q. Okay. And have you seen any evidence in the record that suggested that if anyone tried to implement a mile and a half setback to this project?

A. No.

Q. So just as a general notion, mile and a half setbacks aren't typically that viable?

A. Yeah. Most project sites are fairly densely populated and there's just not that much room between houses.

Q. Do you think it would be more viable if you were to separate a mile and a half setback or distinguish a mile and a half setback for nonparticipants versus participants?

A. I would like to see that. In fact, I thought about advocating for that here, but that would create a precedent for all future projects. All to do is be an Intervenor and you can get all kind of elbow room so it's not really a practical suggestion.

Q. But you thought about advocating for a mile and a half setback?

A. 2 mile.

Q. You thought about advocating for a 2 mile setback for --

A. For Intervenors but that's not a practical suggestion.

Q. Well, if there was a waiver system that allowed nonparticipants to waive the setback requirement, what would be impractical about it?

A. Yeah. I'm not sure I follow the question. But what I was suggesting was that for those that were clearly unhappy with this project, I thought it was a good idea if the project -- if we could appeal to the project to try to increase -- to maximize those setback distances for those individuals that -- on further reflection you can't give special treatment to certain people. It's just -- it would set such a precedent that it would happen in every future project.

Q. But a situation in which a two mile setback with

waivers existed wouldn't give preferential treatment to certain people, would it?

A. I'm not sure I follow the waiver aspect of that question. What waiver?

Q. Well, if an individual can waive that setback, for example. In this project I don't know if you're that familiar with it but certain individuals have waived setback requirements. Have you seen that?

A. Not here, but I know of that.

Q. You're aware of the wind industry there are agreements where individuals waive setback requirements?

A. Yeah.

MS. EDWARDS: Objection. This is outside the scope of his direct. He didn't testify about setbacks.

MR. DE HUECK: Sustained.

MR. ALMOND: In his direct this witness has testified about proposed regulations. He's given opinions on some distances, setback distances, et cetera. I think talking to him about setback distances in this hearing and setback distances with other projects, especially given that he's testified at other projects are what he's using as support -- partially as support for some of his opinions, is fair game to talk with him about his experience with those setbacks.

MR. DE HUECK: Which I think you've done, and

now we've moved into some sort of abstract personal feeling regarding outside the scope of Direct Testimony.

Q. In your past experience looking at wind projects, are you aware of -- are you of good neighbor agreements? Do you know what that term is?

MS. SMITH: Objection. This is also outside the scope of his testimony.

MR. DE HUECK: Correct.

Q. With the Applicant's medical experts there was a lot of discussion about that Massachusetts study. Are you familiar with the Massachusetts study?

A. Which Massachusetts study?

Q. Talking about health effects of wind turbines, the Massachusetts government got a panel together to study wind turbines. Are you familiar with that Massachusetts study?

MS. SMITH: Objection. This is outside the scope of his testimony as well. He's not testifying as a health expert.

MR. ALMOND: I'm merely asking if he's familiar with the study.

MR. DE HUECK: Are you familiar with the study?

THE WITNESS: Somewhat.

Q. And we heard from Dr. Roberts and Dr. Ellenbogen that study the Massachusetts government got everyone

together and studied wind farms and the purpose of which was to see what regulations should be put in place.

My question to you because nobody else has been able to answer it is what is Massachusetts regulations as far as noise limits on wind farms?

A. The Massachusetts noise -- state noise limit is to measure the background L90 statistical. That's the near minimum background level. And then the project can be 10 above that.

So it starts at a very low level, and then they have a big adder. It's unusual.

Q. So whatever the L90 level; the project can go 10 above that?

A. That's right.

Q. How far does the type of infrasound and low frequency noise that Steven Cooper was studying travel?

A. That's a good question. It travels very far. Miles.

Q. Miles?

A. Yeah.

Q. Again, shifting gears, going back to this Shirley project that you've studied, what was the regulatory limit in that Shirley project?

A. I don't recall. And the reason is it was irrelevant to the problems there. They were merely about the low

frequency content, which isn't represented or captured in any way by the A-weighted limit.

Q. If I were to give you the report that was generated from that project, would that help refresh your recollection?

A. As to what the A-weighted limit was?

Q. Yeah.

A. I think it's in the report. I don't know if it was mentioned.

Q. After conducting your study in Shirley did you give a recommendation? What was the body that was overlooking the Shirley project, the governmental body?

A. The Wisconsin Public Service Commission. By the way, that study was -- the whole impetus of that study was from my recommendation to study it during a hearing for another wind project. They planned to use the same turbines and people from the Shirley site were at this hearing saying, you know, look at our site. You know, watch out and don't let this happen again.

So I said, well, it sounds like, you know, we need to investigate what's going on at Shirley, so that was the impetus for the study and that it was, I think, funded by the Public Service Commission.

And it was a very unique test in that it was done cooperatively by four different acoustical consulting

firms, some with kind of known opposition views.

Q. So just so I understand correctly, the Wisconsin Public Service Commission was considering whether or not to approve a wind farm project. And before it was doing that -- before it would do that you recommended that we should go study this other project?

A. That's right. And what I expected to find was that the low frequency signal was extremely strong at that site or something odd was happening there. But the signal was detected but at incredibly low amplitude.

Q. I just handed you a document titled The Cooperative Measurement Survey and Analysis of Low Frequency Sound and Infrasound at the Shirley Wind Farm in Brown County, Wisconsin.

Is this the report that was generated following the study of the Shirley Wind Farm we've been talking about?

A. I think this was the final version. There was a lot of drafts.

Q. And if you turn to page 8, please.

A. Okay.

Q. What ultimately did you recommend to the Wisconsin Public Service Commission in terms of a noise limit?

A. I don't really remember recommending much of anything. We couldn't really determine what was going on at that site.

Q. Do you see the third paragraph where it says Hessler associates recommends approval of the Application if the following noise condition is placed on approval?

A. Okay. Oh, that's right. Yeah. We -- this number comes from talking with Paul Schomer who was one of the other guys there.

Yeah. It's 39 and a half is the number in here, which is essentially 40 or the 40 limit that we've been recommending all along as an ideal goal.

Q. I want you to flip to page 9. Is that your signature there on the bottom?

A. Halfway down, yes.

MR. ALMOND: At this time I'd like to offer and move for the admission of Exhibit I 36, the document entitled Cooperative Measurement Survey and Analysis of Low Frequency and Infrasound at the Shirley Wind Farm in Brown County.

MR. DE HUECK: Any objection?

MS. SMITH: No objection.

MS. EDWARDS: No objection.

MR. DE HUECK: And I have no objection other than I think maybe next time hand a copy to me. That would be good.

MR. ALMOND: Very sorry.

MR. DE HUECK: No. It's okay.

So I 36, is that what you said?
MR. ALMOND: Yeah.
MR. DE HUECK: Will be admitted. Thank you.
Q. Let's step away from the Shirley project.
I want to talk a little bit about what you started with Ms. Edwards talking about in terms of the community response to a project. Do you remember that part of your testimony?
A. Yes.
Q. And there are ways in which to gauge how a community's going to respond to a project when it comes to noise and how that noise is going to affect the community; right?
A. I believe so, yeah.
Q. And are those -- and do the ANSI standards talk about what calculations should be done to gauge community response to a project?
A. There is an ANSI standard that addresses that, but it wasn't written with wind turbines in mind. It was picturing some coal plant or a gas turbine or something, which is a much simpler situation.
Our approach is, as I went through before, was to do an initial survey, find out what the background is going to be at the wind speeds required to operate the project, and then see how the predictions under those same wind

speeds compare. And depending on that differential, you can get an idea of whether it's going to be very audible or inaudible.
Q. Has that type of study been conducted for this project?
A. No. No. That's completely missing from the Applicant's noise study.
Q. And you would like to see that type of study in order to gauge the community's response to a project; correct?
A. I think it's the duty of the engineer to do that. I don't know why it keeps getting left out of these. This is the third one in a row.
Q. And without doing that, do you think we're able to gauge whether or not this project's going to injure the social condition of those living in it?
MS. SMITH: Objection. Calls for a legal conclusion.
MR. ALMOND: It's a question.
MR. DE HUECK: Well, you're basically asking it will comply with that regulation.
MR. ALMOND: And experts are capable of testifying to that.
MS. SMITH: He's not a legal expert he's here to talk about sound studies in his analysis that he's

conducted.
MR. ALMOND: It's an ultimate conclusion opinion. Experts are offered to provide ultimate conclusions, ultimate opinions. That's what I'm asking him to do.
MR. DE HUECK: But not as to whether or not they will be in compliance with a particular law.
MR. ALMOND: I have not asked him about a law. I've asked him a question.
MR. DE HUECK: It sounds like it.
Ask again, Reiss. Or maybe --
MR. ALMOND: Cheri, can you just repeat the question so we can hear what I asked again.
(Reporter reads back the last question.)
MR. DE HUECK: So asking if it will comply with the law.
Can you --
MR. ALMOND: I have not referenced the law. I'm not asking if it complies with the law. I'm asking that question.
MS. EDWARDS: I guess I would just object as vague and ask maybe the inquirer to be more clear on the social condition.
MS. SMITH: And I'm going to object because it is --

MR. ALMOND: I'll rephrase the question.
MS. SMITH: May I object?
It's basically stating 49-41B-22.1 -- or 2. Excuse me. And so he's basically asking him to opine on the statute compliance.
MR. DE HUECK: Yes. So let's sustain the objection.
Ask another question.
Q. How the community responds to a project deals with the social well-being of the community; right?
MS. SMITH: Objection. That's not why he was brought here to testify, on the social feelings of the community.
MR. ALMOND: He's been testifying about community response I'm just trying to figure out why we're curious about the community response and why it's important to look at that. He's offered opinions that this Applicant should have done that. I'm curious as to why.
MR. DE HUECK: Just go ahead and answer this one.
A. Well, when I do an assessment I think the purpose of it is to assess what's going to happen, not just to find out if it's going to be in compliance with some regulatory limit. That's one paragraph from our 26-page

report normally.

No. I think you want to model the project, see what the sound levels are going to be at people's houses. And I always say I think -- I think there's going to be a problem or I think it's a low probability of complaints, a high probability, whatever it is goes into my report.

My clients aren't often happy with my reports, but that's the purpose of an assessment.

Q. All right. Shifting gears again, you've reviewed the modeled limits provided by Burns & McDonnell; correct? Mr. Howell?

A. Yeah. I looked at the -- at the noise prediction, the sound contour map, yes.

Q. Yeah. That was a poorly asked question.

A. I knew what you were talking about.

Q. The predicted sound measurements.

A. Yeah.

Q. Would you agree that the modeled levels can have spikes in the order of 15 to 20 dBA above the model levels?

A. Yes.

Q. So if you're looking at a modeled level of 35, you could experience spikes up to 55 dBA?

A. Well, not 20, but -- yeah. Wind turbine noise is highly variable. And depending on, you know, the wind's

not blowing in a nice laminar manner, it's turbulent, it changes all the time.

That's why in every test you can only test over a long-term average. You can't capture every exceedance.

Q. Well, the on/off condition test we don't need to measure over a long period of time; correct?

A. No. No. Most of the time the noise is fairly steady but it does -- it certainly does vary over time.

Q. Have you written a paper on recommended noise level design goals for wind turns?

A. Yes.

Q. And what was the purpose of that paper?

A. To recommend noise design goals, which namely are 45 under most normal circumstances and an ideal target of 40.

Q. And you didn't attach that paper to your testimony, did you?

A. No. I don't think so.

(Exhibit 37 is marked for identification.)

Q. I'm going to hand you what has been marked as Exhibit I 37. What is exhibit -- what is -- I just handed you what has been marked Exhibit I 37. What is that?

A. You know, it's an article that I wrote in collaboration with my dad who's also in the company in

2010 that was published in the noise control engineering journal January 2011.

MR. ALMOND: At this point I'd like to move for the admission of Exhibit I 37.

MS. EDWARDS: No objection from Staff.

MR. DE HUECK: Any objection?

MS. SMITH: No objection.

MR. DE HUECK: It will be admitted as I 37.

Q. Can you turn to page 97 of that paper for me. What is that table 1 at the top of that page?

A. It's titled typical worldwide wind turbine noise limits.

Q. And it looks like the different jurisdictions are all outside the United States in that table. Would you agree?

A. They are, yes.

Q. And if you flip back to the previous page, it states "wind turbine development in usual even countries and other parts of the world has been proceeding for some time now while widespread development has only started in the U.S. within the last five years or so do you see that language?

A. Yes. Uh-huh.

Q. So would you agree that it would be appropriate to look to other jurisdictions and European and other

countries to see what's going on when it comes to wind regulations?

A. Yeah. That's why we did that, this paper.

Q. Precisely.

And looking at table 1 for one example, for example, at the very top is Alberta, Canada. It says, "Criteria values, 50D/40N. What does that mean, the 50D/40N?

A. 50 during the day, and 40 at night.

Q. And the D and N, is that what it means for the entire list of --

A. Yeah.

Q. Are you aware of any regulations on this project that deal with infrasound or low frequency noise?

A. No. There are none on this project or any other project I can think of.

MR. ALMOND: Thank you, Mr. Hessler. I don't have any other questions for you.

THE WITNESS: All right. Thank you.

MR. DE HUECK: Mr. Fuerniss.

CROSS-EXAMINATION

BY MR. FUERNISS:

Q. Hello, Mr. Hessler. You and I have one thing in common. At least we both have had the privilege to work with our fathers in the business that's kind of a neat thing don't you think?

A. I think it's great. I just have one question. This goes way back earlier in your testimony. You talk about some people being much more sensitive than others.

Does that sensitivity -- can that increase with prolonged exposure, or do you have a level of sensitivity and that's it or --

A. I'm not sure that's really known or understood. I think I've seen papers speculating or thinking that maybe the more exposure the more sensitivity would develop. But I don't know myself.

MR. FUERNISS: Thank you.

THE WITNESS: Sure.

MR. DE HUECK: Ms. Jenkins.

CROSS-EXAMINATION

BY MS. JENKINS:

Q. Yes. I have some questions. On your Direct Testimony, your prefiled I was looking at your resume and at the very end of that section is you talked about a project in Maine? Freedom, Maine?

A. Was it Clinton, Maine?

Q. Freedom.

A. Freedom.

Q. It was called the Beaver Ridge Wind Project. Maybe let's find the exhibit. It's Exhibit D M H-1 in his --

MR. ALMOND: S 3.

MS. EDWARDS: S 3.

A. Okay. All right. It's pretty bad when I have to be reminded of my own resume. Yeah. Yeah. I remember that project. That was in the town of Clinton, Maine, I believe.

Q. Can you just tell a little bit about what your -- it looks like you appeared before the Maine State Government of energy and utilities committee. It says a peer review of operational sound testing by others:

A. Oh, yeah. I remember that one now. Yeah. I was engaged by the state, very similar to this case, to look at somebody else's Application, the noise study for an Application for this wind project and give my opinion on it.

Q. And do you remember any specifics like the size of the project?

A. I think it was fairly small. All I remember was the panel. It looked like a bunch of satisfy captains up there in Maine.

Q. Can I refresh your memory?

A. Please do. The whole project is kind of vague to me now.

Q. Okay. I believe it was three turbines?

A. Yeah.

Q. By patriot renewables?

A. Okay.

Q. Maybe they built it and sold it. I'm not sure. Starting to sound familiar?

A. Go on.

Q. Well, my understanding that there were four different -- I believe it was four, might have been three different residences that were experiencing either health concern or not being able to sleep on their top floor. And so a sound study was done there, and that must be this study that you peer reviewed?

A. What I recall is it was a noise study prepared for the permitting Application, and I just reviewed it and commented on its shortcomings or good parts. That's all I remember about it really.

Q. Okay. The project was built in 2008, and the study -- your peer review was in 2013.

A. Okay.

Q. Still nothing?

A. Yeah. That just goes to show how many wind turbine projects I've been mixed up in.

Q. Okay.

A. Yeah. I'm not recalling the situation you're talking about with people having problem -- I don't remember anything about that.

Q. Okay. The reason it came up was -- when I saw you

were going to testify, I was looking for your most recent note on your resume, and that was in 2014. And so I researched it a little bit?

A. Yeah.

Q. And the reason I bring it up now is that you said that it was just a handful of people that are having health concerns. And in this -- in my research I just went to the --

MS. SMITH: I'm going to object. At this point it sounds like Ms. Jenkins is testifying. Unfortunately, I think we have to interrupt.

MR. DE HUECK: Yeah. Go ahead, Staff.

MS. EDWARDS: I guess since it's my witness I should probably attempt to weigh in.

Because we are a neutral party I attempt to afford a great deal of latitude. I would say this is impeachment but going down that track going a little too far.

MR. DE HUECK: So, Ms. Jenkins, it is as if you're introducing your own testimony as to what you think happened out in Maine into the record now so we want to avoid that.

Additionally the witness has basically told you he's got no clue and doesn't look very successful in remembering it.

MS. JENKINS: Okay. So I'll just summarize that, that you earlier said that you have witnessed only a handful of people with health effects, complaints, and out of all the projects in the United States.

A. Yeah.

Q. And you don't remember this project, your latest one that you reviewed. I'm sorry. I'm not trying to be unkind. I I'm just trying to --

A. No. You have every right. I'm so sorry I can't remember that project.

Q. Okay.

A. It was a very small project and I think I just looked over someone's work and testified for 10 minutes on it. I never went to the site or anything. I don't know too much about it really.

Q. So to do a sound study or to peer review a sound study you don't need to see the site or know the complaints or anything?

A. I'm fairly certain that this study had nothing to do with the complaints. I don't remember anything about that. I would remember that. If there was problems, somebody went out, did a survey, tried to understand the problems. That doesn't ring any bells at all to me.

Yeah. I'd have to pull out the file for this project, and I just don't remember it.

MR. DE HUECK: Ms. Jenkins, do you actually have a copy of what it is you're referring to?

MS. JENKINS: Well, I could go to the website where the -- where the people in the community were attempting to get their sound levels up to the state level.

MR. DE HUECK: Okay. I think we have just a bit of confusion going on. I'm not sure. But I think we should just move on.

MS. JENKINS: Okay. Let me just make sure there's nothing else I can ask.

MR. DE HUECK: Go ahead.

(Pause.)

Q. Okay. I think my last question would be just to understand the process, if you do a sound study you don't necessarily -- or peer review a sound study, you don't necessarily have to go to the project site?

A. No. Like in this case there wasn't a whole lot of need to go to the site.

Q. And can you tell me how you can deduce that if you don't remember the project?

A. Well, the noise study is supposed to explain and show you what the site is like. Like in our reports we put a site description. We have maps. We show what's going on at the site, where the houses are, where the

turbines are. You know, it's supposed to explain it to the degree where you don't have to go out there and find out for yourself.

Now this report was very vague on that. The sound contour map was printed on a White paper, there was no map. I couldn't tell where the houses were, whose house was which, so it was a shortcoming of the study.

Q. Okay. And you don't remember testifying before the board or at that hearing -- before the Maine State Government Energy, Utilities, and Technology Committee on behalf of Patriot Renewables and the Beaver Ridge Wind project in 2014?

A. Yeah. I remember being there and I remember what the room looked like but I forgot what the substance of the testimony was about.

Q. Okay. So you don't really remember the case?

A. I don't remember the case. It was --

MS. JENKINS: Okay. Thank you.

MR. DE HUECK: Ms. Pazour.

MS. PAZOUR: No.

MR. DE HUECK: That will bring us over here to Commission questions. I'm down here with Commissioner Nelson. I have a quick question if that's okay.

Help me understand this because the Cooper study's got me thinking. And I think I recall you saying

that often -- whether on or off, the wind turbines, the sound can be the same just due to the wind itself.

So a noisy night, you could turn off the turbines and you're still going to be at, say, 45 dBA just based on the wind itself. And the turbines don't run unless it's windy; correct.

THE WITNESS: That's absolutely correct. It was surprising even to me.

MR. DE HUECK: Yeah. That is. So does wind itself carry these sound we can't hear, infrasounds?

THE WITNESS: They're not carried on the wind. They just radiate out from the source.

MR. DE HUECK: So could tell wind itself be the source of infrasound?

THE WITNESS: No. For example, in the Shirley study we used very specialized instrumentation to be able to detect the blade passing frequency. And that's every time a blade goes bit tower of the three blades so that the frequency of that is about .7 to 1 hertz. And that was detectable.

And I think it's the repeated pulsations of that, those waives going out, that some people are sensitive to. It's like on a boat, you know, and satisfy sick. Just kind of that low rocking. I think it's related to that.

MR. DE HUECK: I understand that it could be related to that. But so does the wind -- let's say we remove the turbines and we still have -- it's a windy night and could infrasounds from the wind --

THE WITNESS: No. No. It takes this specific source to generate it. No. Wind noise is very broadband.

MR. DE HUECK: Okay. Thank you.

THE WITNESS: Okay.

COMMISSIONER NELSON: Thank you, Mr. Hessler for being here to help us sort this out.

THE WITNESS: Always a pleasure.

COMMISSIONER NELSON: Looking at your Direct Testimony on page 8, there was a question about -- I think Mr. Fuerniss had recommended that sound levels be measured using satisfy weighted sound levels, and you said, no, no, no, that that would be inappropriate.

So my ultimate question is how is infrasound measured? What is the scale? What is the instrumentation? Have you done it? Help me understand all of that.

THE WITNESS: Yeah. No. That's a very good question.

You know, it's extremely difficult to even detect. That's why there's no practical way to put a

regulatory limit on it. C-weighting only goes down to 10 hertz, and this is happening at less than 1 hertz. So it's off the chart. So C-weighting is not going to capture it or do anything.

How it is measured is to use very specialized low frequency microphones that can measure down to less than 1 hertz and very specialized instrumentation. It's also complicated by the fact that whenever you try to measure sound in windy conditions the wind blowing over the microphone creates a false signal, and that happens in the low end of the frequency spectrum. So it's very easy for any kind of measurement to get completely covered up by nonrelated, self-generated noise. Very difficult to measure.

So there's no way I could think of to place a regulation or a limit on it.

COMMISSIONER NELSON: So we've heard reference to dB(G). Is that the measurement that is used for infrasound?

THE WITNESS: It can be. That's essentially not putting any weighting on the frequency spectrum, not subtracting some number. But it's very very difficult in practical terms to even detect. In that Shirley constituted we had to measure in the middle of the night, inside the houses, out of any wind. And even then it was

hard to pick up.

COMMISSIONER NELSON: And so you have attempted to measure it. Is that --

THE WITNESS: Oh, yes.

COMMISSIONER NELSON: Do I take it from your testimony that using the Shirley example that you weren't comfortable that you accurately captured what was going on?

THE WITNESS: Yeah. You could see a little blip, but it was so small that we said how is this a problem. It's orders and orders of magnitude below the threshold of human perception. But evidently it's the -- the frequency of the pulses that go out apparently have an effect.

COMMISSIONER NELSON: Within the last week I saw a presentation on the folks that are trying to capture neutrinos and when I read through this I for some reason thought of that. And we're trying to capture something that's apparently very difficult.

THE WITNESS: Yeah. It is.

COMMISSIONER NELSON: Did you read through Dr. Roberts's Rebuttal Testimony?

THE WITNESS: I did read through it, yes.

Q. Could you pull out Exhibit A5-1, which is Exhibit 1 attached to his Rebuttal Testimony.

COMMISSIONER NELSON: Yes. A 5-1. And if you could go to page 10.

THE WITNESS: Okay.

COMMISSIONER NELSON: In the lower left corner there's a bullet point, and this is talking about the results of some work that was done in Germany. And that bullet point says, "At a distance of 700 meters from the wind turbines it was observed by means of measurements when the turbine was switched on the measured infrasound level did not increase or only increased to a limited extent."

And then it says infrasound was generated mainly by the wind and not by the turbines.

There's two things here that contradict what you have said already today. And I'm trying to sort this out. I mean, at some point infrasound has to dissipate. This study seems to indicate that by 700 meters it has dissipated. I heard you testify today that infrasound travels for "miles."

So that's my first question.

THE WITNESS: Okay.

COMMISSIONER NELSON: Help me understand how far this travels.

THE WITNESS: Well, it can travel for long distances. Not always. The conditions have to favor it

and so on.
COMMISSIONER NELSON: So help me -- unpack that.
THE WITNESS: Yeah. Well, I can see in the picture here, in the lower left picture titled C they've got a black dome sitting on the ground on a white circle. Do you see that?
COMMISSIONER NELSON: Yes.
THE WITNESS: That is a method that we use to measure wind turbines outdoors where the microphone is laying horizontally on this reflective surface and then this huge wind screen is put over it.
Now that only works to a certain extent, and it does not allow measurements down at one hertz. That's all covered -- even with this set up the measurements are blown away by wind self-generated wind noise. Because I've used this exact equipment before.
That's why they say all they measured was wind. Because you really can't pick it up. But no. I think it can travel 700 meters or more under other circumstances.
Let me see. At Shirley one of the houses was very far from any turbines, miles away. We did measure inside of that house out of the wind to avoid this contamination. I don't think we were able to detect anything at that house, though.
COMMISSIONER NELSON: So I'm --

THE WITNESS: That doesn't --
COMMISSIONER NELSON: -- going to press you a little harder because this is terribly important to me. So somewhere between 700 meters and your quote, "miles", this dissipates. So help me understand what's going to determine how far it goes and what causes it to dissipate and how can we quantify that?
THE WITNESS: It travels a long distance. I can't put a number on it for you. These are the kind of frequencies that like elephants communicate with each other over huge distances, if you've ever heard about that. This is as low as it gets in terms of frequency.
So in theory it takes a very long time. Now how far, I don't know. Can't help you.
COMMISSIONER NELSON: Well, ultimately I have to make a decision here based upon how far this could travel and how far it's going to affect folks, if it affects folks. I mean, that's a whole nother question.
THE WITNESS: Right.
COMMISSIONER NELSON: I'm trying to just figure out how far does it actually go.
THE WITNESS: I wish I could give you a figure on that. I know it would be useful to you.
COMMISSIONER NELSON: Okay. Thank you for that.
Shifting gears just a little bit. Can a sound

be heard without that sound changing the ambient dBA level?
THE WITNESS: Yes. If the sound has a distinctive character to it, then you can identify and pick it out even though the magnitude of it, whether it's on or off may be about the same.
COMMISSIONER NELSON: Like a wind turbine.
THE WITNESS: Yeah. Which has a -- that washing machine sound. Yeah.
COMMISSIONER NELSON: So we had -- well, Ms. Jenkins, Intervenor, testified yesterday, again contrary to what I heard from you this morning, that her house is 3 miles away from a wind turbine and inside of her house she can hear the wind turbine 3 miles away.
THE WITNESS: That's surprising to me.
COMMISSIONER NELSON: Okay. So we'll set that aside. But it would be -- let's say you're outside. It may be possible to actually hear a wind turbine because of the unique sound even though it doesn't raise the dBA level. Is that accurate?
THE WITNESS: Right. If you're able to identify that distinctive sound and you know what you're listening for and so on.
COMMISSIONER NELSON: Just so I'm clear, changing again, you've recommended for this project an

ideal design goal of 40 dBA and that would be measured over the two-week period that the Applicant has proposed; is that correct?
THE WITNESS: Right. I don't know of any other way to do it.
COMMISSIONER NELSON: You talked earlier about the fact that that might impact 11 different receptors based on their sound study. I just quickly looked at their revised sound study, and it looks like it would only impact two of the nonparticipants.
Did you separate out participants and nonparticipants as you looked at that.
THE WITNESS: At least in my copy it doesn't distinguish between who was who.
COMMISSIONER NELSON: And were you looking at the revised -- the latest sound study?
THE WITNESS: Yes. I saw one Intervenor house identified in the table in the back but that's the only one. And that's what I was looking for when I wrote my Direct Testimony. I wanted to know what the levels were at the Intervenor's house but I couldn't tell which house was which.
COMMISSIONER NELSON: I think -- I hate to let you go but I think that's all -- only because what I really want to know I haven't found out but that's all

the questions I've got. Thank you.

THE WITNESS: You're welcome. Sorry I couldn't help you with that one.

MR. DE HUECK: Chair Fiegen. No questions. Commissioner Hanson, any questions?

COMMISSIONER HANSON: Yes, I do.

Good almost afternoon, Mr. Hessler. You came out swinging in your remarks at the beginning. At least on page 3 you faulted the Applicant for the graphical presentation, called it fairly primitive, and said you can't even distinguish -- identify where the specific residence are.

You faulted the study for focusing entirely on the noise limit of 45 dBA rather than assessing, addressing in any way. So you said, Focusing entirely on the dBA and not assessing or addressing in any way the other aspects, potentially low frequency and sound emissions. And I appreciate the questions that Commissioner Nelson asked in regard to that and the others.

I'm curious. You said -- I also appreciate the way you tried to be fair. I think that you placed a lot of weight on the other side of the scale as well, almost to the point to which you seemed to favor wind farms and wanted to support them and so I -- I'm trying to figure

out where that scale lands but --

You said you sat in a home I believe it was in Wisconsin, was it, and listened -- sat there all night or -- I don't know if it was all night --

THE WITNESS: Hours.

COMMISSIONER HANSON: And that the husband could not hear it, you could not hear it, but the wife could hear it.

THE WITNESS: That's right.

COMMISSIONER HANSON: I don't want to sound misogynistic here, but isn't it somewhat typical especially on a farm that work with machinery -- even though wives work beside their husbands on farms and such, is that men typically lose their hearing a little bit before women do?

THE WITNESS: Well, this wasn't audible sound from the project. It was just a sensitivity to a feeling of low pressure, low frequency pulsations. Nobody could hear anything. Everybody admitted that. It was the sensing of it.

COMMISSIONER HANSON: Interesting.

My wife is 220 miles away and she can hear my thoughts right now.

THE WITNESS: I know. Mine too.

COMMISSIONER HANSON: She'll call me up and tell

me I'm wrong without --

Are you familiar with kids in school who carry phones and they have the frequency dialed so that people over 40 or 50 years old cannot hear the frequency but they can?

THE WITNESS: I did hear about that.

COMMISSIONER HANSON: And that's fairly typical. So kids would be more sensitive -- would one assume than adults would to the challenges that low frequency would have from wind turbines? I mean that's just one premise but --

THE WITNESS: Well, it's -- the phone thing is ultrasound. It's very high frequency sound, and that is usually the first thing to go as people age. So that's why there's a built in advantage there to that whole concept.

But we're talking about the other end of the frequency spectrum, and that typically does not decay with age.

COMMISSIONER HANSON: Interesting. So higher frequency, have you studied that from wind turbines, from --

THE WITNESS: No. There's no high frequency.

COMMISSIONER HANSON: There's no high frequency.

THE WITNESS: No. Most of the noise, the

churning sound, is about 500 hertz to 1,000 hertz. That's in the middle of the audible frequency range. Above that there's no significant noise.

COMMISSIONER HANSON: Interesting. Appreciate that.

You spoke also at adverse health effects such as sleep disturbance and vertigo which really can be crippling to people from the standpoint of going through their lives.

THE WITNESS: Yeah.

COMMISSIONER HANSON: What about children with ADHD? Have you studied any of that or familiar at all with those effects?

THE WITNESS: No. I don't know about that but I wouldn't be surprised.

COMMISSIONER HANSON: You wouldn't be surprised what.

THE WITNESS: If they were sensitive to it or affected by it.

COMMISSIONER HANSON: You state about the very small minority of the people and that it is extremely rare, small handful of sites, quite rare, et cetera. Again, very small. And yet it's very real. At least you express that it's very real.

So in balancing that are we to assume that for

the greater good some people are going to suffer?

THE WITNESS: Yeah. That's -- that's up to you guys. Yeah. Well, just to reiterate, you know, if this commonly happened, it would be all over the news. It would be well understood, and everyone would know that a new wind project was going to cause this.

But that's not the case. It's only occurred at certain specific sites out of many, many, many projects. So based on that alone, I'm concluding that it must be a rare sensitivity.

COMMISSIONER HANSON: Commissioner Nelson would love to sit and chat with you an extended period of time, enjoy the conversation and what we're learning here.

For folks who have lived out in the country for a long long time and just simply enjoy the -- enjoy the sound of the wind going through the trees, granted turbines may be at a similar volume but of a different pitch and so they hear it instead of the -- it starts to irritate them.

For those folks who live out in the country I'm going to assume they would be far more susceptible to hearing noises and problems and being discomforted by them than folks who live in the city.

THE WITNESS: Well, every wind project that I can think of that we worked on has been in a rural area.

COMMISSIONER HANSON: Right.

THE WITNESS: Probably very similar to this.

COMMISSIONER HANSON: So is my assumption correct that folks who live out in the country are going to be bothered more by noise -- by a new introduction of a new noise than folks in the city, for instance?

THE WITNESS: Oh, yeah. Definitely.

COMMISSIONER HANSON: I grew up three houses away from a railroad track, and I can sleep through the horns and a thunderstorm and everything else but a clock ticking on the wall or a water dripping really bothers the heck out of me.

So with that type of a challenge I can go move that clock. I can fix the water faucet do. We suggest ear plugs for the folks out in the country?

THE WITNESS: No. And, as I mentioned, there's always -- I can't -- there might have been one or two that there were no reported complaints. But there's always a few people that are bothered, and they're really bothered, really bothered.

COMMISSIONER HANSON: In your experience, do most of the people who are bothered at first adapt to it? We're talking about the people who are really bothered. Do they ever adjust to it or do they, as you suggested, some people move?

THE WITNESS: I think people end up getting used to it like your railroad, but I don't know. I've never done any follow up study to see if people are still upset about it years later. I don't know.

COMMISSIONER HANSON: All right. Thank you very much for your testimony. Appreciate it. And enjoyed it. Thank you.

THE WITNESS: Okay.

COMMISSIONER NELSON: And an additional question. If I'm standing a mile away from an operating wind turbine, I can hear the whoosh and I know what it is. I know where the whoosh is coming from.

If you're measuring infrasound or attempting to measure infrasound, how can you tell the origin of it? Or can you?

THE WITNESS: Well, this infrasound has a distinctive frequency signature. It would be a .7 hertz, which corresponds to the -- how often the blades go by the tower. So you would look -- you would see it in the industry.

COMMISSIONER NELSON: Thank you.

THE WITNESS: Yeah.

MR. DE HUECK: Well, I think -- Reece, how long is your -- well, okay. Do you have -- how long would your redirect be? How long -- a while? Should we break

for lunch? Okay. It's 12:07. 1:30 we come back?

MR. ALMOND: As we discussed earlier this morning we were hoping to have the telephonic witnesses start right after lunch so we can get them set up during the lunch break. If we don't want to finish I get that we can take a break but --

MR. DE HUECK: Well, okay. That will work.

MR. ALMOND: I don't have very much.

MR. DE HUECK: Okay. Let's go ahead and do some redirect and recross.

MS. EDWARDS: All right.

REDIRECT EXAMINATION

BY MS. EDWARDS:

Q. Mr. Hessler, you stated there is a lot of opposition to this project. Was that based off of your knowledge of other projects you've worked on?

A. Yeah. I would say there was a high level of apprehension about this project just by the sheer volume of all the testimony and Intervenor witnesses and so on compared to other projects.

Q. You also stated once this morning that Mr. Cooper had finally demonstrated a link. Did you have reason to believe prior to that study that link was already there, or was this all new to you?

A. Prior to that study I thought something was

happening but wasn't entirely convinced what was going on, and that study kind of put me to the other side where it's pretty clear that those pulsations can be perceived by certain people. I mean, I thought that before, but there was never any evidence, although there's been many, many studies and papers about it.

Q. So with that in mind and with your testimony in response to Commissioner questions that it's a fairly small number of people, would you -- in the project that you've worked on have you seen it just -- people be irreparably split in the community and just fight in the streets forever or --

A. Yeah. It is very did I advice I have, yeah. Almost all projects, especially before they're built. At this stage there's a lot of dread and apprehension about it. That's mostly attributed to -- attributable to the internet sites.

Q. In response to Ms. Jenkins's questions about that study in I believe it was Maine?

A. Yeah.

Q. There was some confusion about what your role was. Could there have been another sound expert that was involved that would answer what she was getting at and that was outside of your role?

A. Well, what I do know about that is it was somebody

else's work that I was asked to look at. I didn't do the study or anything. I just was commenting on it.

Q. Do you recall based upon the noise assessments you reviewed what the max dBA was at a receptor?

A. You mean what was the highest predicted on any other project?

Q. This project.

A. On this project. Okay. Right now I believe it's 41.9, which I would call 42.

Q. Would you expect 42 dBA would, in your experience, cause people to change their daily lives and behavior?

A. Hard to say. That's a pretty low level getting down towards the ideal point of 40. But there's still a possibility of complaints in between 40 and 45 there's a definite possibility of complaints.

MS. EDWARDS: Thank you very much. I have no further questions.

MR. DE HUECK: Recross. Prevailing Winds.

MS. SMITH: No, I don't have any. Thank you.

MR. DE HUECK: Mr. Almond.

MR. ALMOND: Briefly.

RECROSS-EXAMINATION

BY MR. ALMOND:

Q. I think you were talking with Commissioner Hanson about the number of complaints with the physical symptoms

of nausea, dizziness, et cetera that you talked about Shirley or attributed to this infrasound, that there are wind farms all around the country, you've studied 15 of them or maybe more but you haven't heard many complaints.

Wouldn't you expect that the number of complaints might be skewed if there are confidentiality provisions and certain contractual provisions that would prevent people from living around turbines from making such complaints?

MS. SMITH: Objection. This is outside the scope of his testimony.

MR. DE HUECK: I agree.

A. I would say that I've seen cases --

MR. DE HUECK: Dr. Hessler, I'm sorry. Don't answer the question.

THE WITNESS: Okay.

Q. Your opinion on the quantity of people affected by infrasound is based off of those -- is based off complaints that people have made; correct?

A. It is based off of our experience at Shirley and our experience at all other projects where we did not hear about that, and the fact that I have -- I'm not aware of any other projects where that was an issue, out of 50,000 wind turbines out there in this country.

Q. Are you aware of your other projects whether or not

anyone was prohibited from making complaints I don't know, but my understanding is that participants --

MS. SMITH: Objection. This is speculation.

THE WITNESS: Yeah. Yeah. I would agree with that.

MR. ALMOND: Based on that, I don't have any other questions for you, Mr. Hessler.

MR. DE HUECK: Mr. Fuerniss.

RECROSS-EXAMINATION

BY MR. FUERNISS:

Q. Yes. Commissioner Nelson is trying to get at the bottom of how far this could go, the infrasound especially.

Could that be affected or enhanced by more or less hilly terrain, valleys, so forth? Would that make a difference?

A. In theory if the turbine were on a hilltop and there was a value I in between and your house or some point of observation was on the next hill, you would -- there would be a loss of ground absorption attenuation because of the value I in between so the sound would get over there more than it would over flat ground.

However, I don't think ground absorption has any real effect at that low end of the frequency spectrum. So now that I've reasoned it out in my head as I was

talking, I would say it doesn't make too much difference.
Q. Okay. When you're talking 40 dBA or 45 dBA, which metric are you using? Are you talking L90?
A. Well, that's interesting you should say that because that is the descriptor that we use to actually try to measure an operating project because it filters out cars going by and sporadic contaminating events and gets out the underlying steady -- and it is more or less steady sound level.

So we use the L90 at houses and then the L90 miles away as a background, and then we subtract the two to get what is the project doing. And if you try to use any other statistical like the average, the Leq or the L10 or the Lmax, you're getting progressively worse in your ability to detect the project alone and you're only detecting other things that are unrelated to the project.
Q. Okay.
A. That was a good question.
Q. Would it be appropriate to recommend different levels for time of day, daytime, evening, nighttime?
A. Well, the trouble with that, it's not practical to change the noise emissions in the project. They are what they are 24 hours a day. There's no way to substantially change the sound at night, for instance, to lower it, other than possibly putting some or all of the units in a

low noise mode.

But the improvement in doing that isn't all that dramatic, in my experience.
Q. Are there some jurisdictions that do, in fact, require different levels from day and night?
A. Yeah. Many, many ordinances are -- expresses day night. But when it comes to wind turbines you just have to take the nighttime level as the design and forget about the daytime. Because like I said, the sound level is the sound level, and you don't have any control over it really.
Q. Okay. One last question. Are you familiar with bone attached hearing aids and if you are -- one question at a time.

Are you familiar with those?
A. I'm familiar with hearing aids. My wife really relies on them but I'm not an expert on it.
Q. Okay. So you wouldn't be able to address that for us then?
A. I don't think so.

MR. FUERNISS: Thank you.

MR. DE HUECK: Ms. Jenkins.

MS. JENKINS: Just a couple questions.

RECROSS-EXAMINATION

BY MS. JENKINS:
Q. I'm sorry, but I missed. The Shirley Wind Farm when you visited that, what year was that?
A. 2010 -- it's right here. December 24, 2012.
Q. Thank you. Can infrasound be measured inside a house?
A. That's probably the only place it can be measured.
Q. Okay.
A. Because you're out of the elements there.
Q. And was your -- the main project that I mentioned earlier, was your role at that project the same as your role is here? Did you review this sound study?
A. I reviewed a sound study. What it was about, I can't recall. I'm taking it off my resume.
Q. I'm sorry. You could just refresh your memory because you might need it again.
A. I'll have to pull the folder out back at the office. Big embarrassment.
Q. Yeah. When you do a sound study or when a sound study is ordered is it done at a certain time of year or how do you choose when you're going to do a sound study?
A. You typically want to do them during the cold weather season of the year when the leaves are off the trees just to minimize the contamination from leaves

rattling and -- and summertime you get crickets and all kinds of stuff that messes up the measurements. So during the winter.
Q. Okay. When you do a sound study is there -- do you get a report from the -- like the operation maintenance facility of how the wind turbines are operating, meaning are they operating at the speed of the conditions or are they -- do you have proof of that?
A. Yeah. We get a log of what the megawatt output was for all the units as a function of time over the survey so we can identify if there's any down for maintenance or anything else.
Q. And can you tell whether they're operating at the normal level they would when they just do it on their own?
A. Yeah. Because we also get the wind speed throughout the survey and once the wind speed gets above usually 7 meters per second, they're at full power.
Q. Okay. I think there's just one more.

MS. JENKINS: No. I have no more questions. Thank you.

THE WITNESS: All right. You're welcome.

MR. DE HUECK: Ms. Pazour.

RECROSS-EXAMINATION

BY MS. PAZOUR:

Q. I have a question for you. Like infrasounds next to a wind turbine, like with somebody that's sensitive to noise, would that be more bother some for them?

A. If that person had this particular sensitivity that we've been talking about, then yes.

Q. Like somebody with like a -- like a hearing aid.

A. No. No. I don't think that would make any difference.

Q. With the ear or nothing?

A. Huh-uh.

MS. PAZOUR: Okay.

MR. DE HUECK: Did you have anymore questions?

CHAIRWOMAN FIEGEN: She can just word it, and you'll make a decision.

MR. DE HUECK: Just throw it out there. Throw it out there.

Q. I guess is it possible between infrasounds and reversible systems that the inner ear could feel infrasounds?

A. That sounds like a question for one of those doctors mixed up in this thing.

MS. PAZOUR: Okay.

MR. DE HUECK: Okay. Mr. Hessler, thank you for

your testimony. You're excused.

(The witness is excused.)

MR. DE HUECK: We'll break for lunch and plan on getting things rocking at 1:45.

(A lunch recess is taken.)

MR. DE HUECK: Welcome back, everyone. We're going to get back in our proper order. We're back in session in EL18-026. I guess we are missing an Intervenor but I'm sure she'll be here soon. And we'll let Reiss continue with his case in chief and call his next witness.

MR. ALMOND: Intervenors call Rick James.

MR. DE HUECK: Mr. James, we can see you up there on the Skype TV. And welcome to South Dakota James James thank you.

MR. DE HUECK: My name is Adam de Hueck. I'm the hearing examiner for this proceeding and I'm going to go ahead and swear you in.

(The oath is administered by Mr. de Hueck.)

MR. DE HUECK: You are sworn in. Go ahead, Mr. Almond.

DIRECT EXAMINATION

BY MR. ALMOND:

Q. Mr. James, can you introduce yourself to the Commission and briefly describe your education and

experience?

A. My name is Richard James. I go by the name Rick for all practical and business persons, Rick James. I'm an acoustician who has been working in the field of measurement noise and the impact of noise on people since the late '60s, officially 1972 after I formed a new company.

I started working for Chevrolet motor division and left them to form my own company in 1972.

In the intervening years my companies -- and I had two -- became the consultants who were considered the subject matter experts for noise to corporations like General Motors, good year, Anheuser-Busch, major corporations who had both employee issues and who desired to keep their names out of the newspaper for noise complaints with community noise.

So my focus has always been on how do you design a new project or how do you operate a project so as to minimize the adverse impacts on a community and on workers although it's less of an issue here. And I am very much a pro business acoustician but my focus is not on getting the project done one way or the other. It's getting a project done that's compatible with a host community.

In 2006 due to some serious health issues with my

heart, my partner and I closed my old company, James Anderson and associates and I decided that I would go into semi retirement. Shortly thereafter, actually almost immediately there after I started getting calls from people in Michigan where wind projects had been proposed. One of those wind projects is actually one that Mr. Hessler worked on back in the late 2000s.

My first analysis of that was these machines don't belong in quiet rural areas. They're going to cause a problem. And I presented that to the County Commissioners but they decided to build the project my way.

Since then I have focused mainly on wind turbine noise, although I do other types of complaint driven noise generally as an expert related to hearings like this or lawsuits. I don't seek out just general business. At 70 years old I need a little bit of time off.

Over the past 10 years I've really become very interested in one issue of why is it that wind turbines which don't produce high levels of audible noise as measured on a dBA scale generate so much complaints and why are we seeing symptoms such as dizziness, tinnitus, migraines, pressure, odd sensations that have nothing to do with audible sound? And so that's led me into the

area of kind of going into detail into infrasound.

Q. I think that's a good recap of your experience unless you want to add anything in addition to that that you think --

A. Well, I was just going to add one thing. In 2009 I had an opportunity to use very high end acoustical equipment, and that was the first time we managed to measure the infrasound pulses from wind turbines.

The measurement methods that I used were the same ones that the Shirley Wind study team used. And since then I have focused basically on that type of measurement, along with micro barometers.

So I'll open it up for any of your questions, Mr. Reiss.

Q. Thank you, Mr. James. Did you prepare prefiled testimony in this matter?

A. Yes, I did.

Q. And that prefiled testimony has been marked as Exhibit I-1. I understand you want to make a change to that testimony?

A. Yes, I do.

Q. And what change to the testimony do you want to make?

A. This is on page 1, line 24. The question is, "what experiences have you had that qualify you as an and it

currently reads health expert in cases involving wind turbine noise."

I would ask that the words "a health" be scratched out and be replaced with "an acoustical." So it would read what experiences have you had that qualify you as an acoustical expert in cases involving wind turbine noise.

Q. Are there any other changes to your prefiled testimony that you'd like to make?

A. None that are substantive.

Q. And long with your prefiled testimony were there exhibits attached to that?

A. Yes, there were. There were five exhibits.

Q. I count six?

A. Six. Excuse me.

Q. And those have been marked as Exhibits 1-1 A through F.

A. That's correct.

Q. And during the course of this proceeding did you have an opportunity to respond to some questions raised by the PUC Staff via a data request?

A. Yes, I did.

Q. And I don't know if you have Exhibit I-34 in front of you.

A. Yes, I do.

Q. Okay. And are those the responses that you provided

in response to questions raised by PUC Staff?

A. Yes, they are.

Q. At least responses next to your name?

A. Yes.

Q. And if I were to ask you all of the questions that are included in your prefiled testimony, as well as those questions that the PUC Staff asked you, would you give the same answers today?

A. Yes, I would.

MR. ALMOND: At this time I'd move for the admission of Exhibit I-1 as well as exhibits I-1 A through F.

MS. EDWARDS: No objection from Staff.

MR. DE HUECK: I'll hear any objection from Prevailing Wind.

MS. SMITH: No objection.

MR. DE HUECK: So admitted, Mr. Almond.

Q. Mr. James, were you listening in to the testimony from earlier this morning?

A. I was able to hear parts of it.

Q. And there was some discussion about the measurement of infrasound, how to do it, et cetera. Have you ever measured infrasound?

A. Yes, I have.

Q. And how far have you measured infrasound -- let me

ask you a different question.

Have you ever measured infrasound generated by a wind turbine?

A. Yes, I have. Very specifically I understand turbine from a sound as contrasted to other types of infrasound from wind. Low frequency trucks, et cetera.

Q. And in your -- how many times have you measured infrasound generated by wind turbines?

A. I probably measured infrasound in over 50 homes ranging from projects here in the U.S., ridge top projects out west to -- in Oregon, New York, Massachusetts, Maine, West Virginia, Michigan, Wisconsin, Illinois. Pretty much almost all of the states.

And those measurements are always inside a home because it is almost impossible to get an accurate infrasound measurement outside of a home.

Q. And in your experience -- and I think a question was asked earlier, approximately how far infrasound from a wind turbine can travel, can you answer that question?

A. Yes. And if you'd give me permission, I'd like to reference one of my exhibits, which gives a visual depiction, and that is -- I guess it would be my Exhibit 5, which was three pages of densely annotated color charts.

Q. And I think you're referring to what your Exhibit 6

was which was Exhibit I-1 F. And it's a three-page exhibit with colorful graphs. Is that what you're referring to?

A. That's what I'm referring to, yes. Colorful graphs.

Q. Okay.

A. Pictures.

If we could look at page 3 of that exhibit, I'll explain it because I'm sure that it's not self-explanatory to most people.

These two graphs, the top one and the bottom one, represent measurements using a micro barometer and that's an instrument designed specifically to measure infrasound that was left in a home. In both cases -- the one on top represents a home that's actually the same home that Mr. Hessler was talking about, R-1 from Shirley Wind, where the people living in it were very sensitive to the infrasound, and the top one shows a period of about, oh, let's say 12 hours or so from the left to the right.

The bottom one is a home 4 miles away over much of the same period. If you look at the big circle with -- the big white circle with the dashes, those two correlate to the same time period.

What we're looking at in the top graph, you'll see these horizontal bands of light blue lines. Those are the spikes or the tones produced by the wind turbine

blade as it passes in front of the tower, releasing the energy causing a pulse. And when we look at it over compressed into like a 12-hour window they begin to look like narrow bands. This is actually specific enough in this case you can see where the solid circle is on the top, you can see the waive. And that shows that the wind turbines that were being measured were changing in RPM.

So we can trace -- using this kind of a method we can trace very specifically the sound from a wind turbine as contrasted to other sounds.

If we look over at the right-hand side of that graph, just to the right of the white solid circle, we see a period where wind turbines aren't operating. And so the comparison between what's happening in the home when the wind turbines are operating within that dashed circle and then when they're not is dramatic. We see that there's no longer any tones. There's also a lot less scatter on the bottom, the red and yellow spikes along the bottom.

We come down to the bottom graph, this shows a home for the same period of time roughly four miles away. And we can see within the dashed circle there that even at 4 miles these horizontal bands which represent the wind turbine tones are still distinctive.

So what this shows is that even at a distance of 4

miles infrasound inside a home is measurable, and the occupant of that home, the reason we were there was reporting to the Brown County board of health that she was suffering headaches whenever the wind turbines operated.

Now when I investigated the home I found that it was impossible to see the wind turbines from their home. They're actually down in a little valley with a hill separating them from the wind turbines so there wasn't even a line of sight.

My point here is that people who say that wind turbine noise blends in with the background, infrasound or that it's not measurable beyond a short distance, really that's a result of them not having the right tools and not having the right analysis methods, properly analyzed a simple instrument like a micro barometer produces very clear graphs.

And this has now become a norm within measuring wind turbine from a sound micro barometers are the preferred tool because of their simplicity and the durability of infrasound sonic microphone is very delicate, very expensive. A micro barometer is durable enough you can drive a truck over it if you need to.

So that's my explanation for how far. And also to show just how clearly wind turbine from a sound can be

defined when properly measured.

Q. And have you had the opportunity to review that German study that was attached to Dr. Roberts's Direct Testimony?

A. Yes, I did.

Q. That discussed the measurement of infrasound and seemed to suggest that infrasound dissipated at 700 meters?

A. Yes.

Q. Do you have a response for that?

A. Yes. And I believe this corresponds fairly well with what Mr. Hessler said this morning.

When you have a microphone outside, any air movement over that microphone will generate what's called pseudo noise. It looks like noise but it's really just the air movement causing the microphone diagram to move. So it's not surprising that they were doing tests outside and couldn't find any difference between the wind turbines on or off because they weren't measuring -- they weren't measuring wind turbine infrasound. They weren't measuring ambient wind turbine sound or nonwind turbine sound. They were really just measuring the artifact of wind blowing over the microphone.

This is a common mistake. I've seen it in Australian studies I've seen it in others. The other

mistake in that report is that they started with the premise that unless the sound pressure levels were sufficient to be audible -- this is the threshold of audibility -- that they weren't of any significance.

And what we have found in fact we've known since the 1980s when Dr. Neal Kelly first did an experiment using pressure pulsations what we found is when the infrasound is pulsed, when it occurs as a whoomp whoomp whoomp although you feel it rather than hearing it, that the human vestibular system can pick that up.

And the sensations when they're picked up, when people have that sensitivity -- we can get into Dr. Schomer's paper later that explains how that happens. But when the vestibular system is triggered the body tends to produce nausea. It's an impact caused by the eyes are giving a certain input. The body sensations don't pick up movement. But we have vestibular data saying something's moving.

The end result of that is people get dizzy or they get nauseous or they have headaches.

Q. Thank you, Mr. James.

Q. Are you familiar with the Steven Cooper study that we've been discussing quite a bit this morning?

A. Yes. I've worked with Steven Cooper since my first paper in 2010 demonstrating how to measure the infrasound

sonic pulses. Steve modeled his study at Cape Bridgewater after the design that we used at Shirley and at other studies.

I also helped him in his analysis of his data and I'm quite familiar with it.

Q. And did you hear testimony from Mr. Hessler this morning that said once he saw this Cooper study it really linked up in his opinion the issue of infrasound and the complaints related there to? I guess can you just expand on that or comment on that and how that relates to everything you've just been talking to about infrasound?

A. Okay. Yes. I can expand upon it.

As I said back in the 1980s Dr. Neal Kelly working for the Department of energy and NASA did a study of early model wind turbines and the complaints of -- the similar complaints of dizziness, nausea, tinnitus, headaches, et cetera, and he concluded that it was from an infrasound sonic pulse caused by the blade passing in front of the tower.

The wind industry was aware of that. It was presented at conferences but has chosen instead to argue and do so very effectively that unless the pressure pulses exceed the threshold of audibility that they can't be perceived. The source of that is an acoustician in Brittain called Dr. Jeff Leventhal who said if you can't

feel it you can't hear it. I mean, if you can't hear it, you can't feel it.

The problem here is Dr. Kelly moved him wrong four years after he made that statement. But that concept of that infrasound has to exceed the thresholds of audibility has been promoted very heavily through other acousticians who have picked up on it, not done the proper research and have repeated test after after test saying well I've tested wind turbines in Australia and they don't exceed the threshold of audibility so there can't be any problem.

But there is a problem. In fact, the German paper you referenced earlier made an interesting comment. They said they noticed some tones it the very low frequent infrasound but those didn't matter. Actually those are the ones that matter. So that whole German paper and many of the others that are similar to it have consistently ignored the place where the problem is, looked at places where the problem is not and then concluded there is no problem, which whether for the purposes of pleasing a client or through improper research has led to the confusion we have.

We know that -- we know that infrasonic pulses can be perceived. My home office where I'm sitting right now is on the flight path between Detroit and Lansing for

helicopters. The Governor comes in and out of this area all the time. I can hear that helicopter coming thump thump thump of its blades long before it's audible.

I've had many people who were combatants in either Vietnam or the Iraq wars who said they can also feel infrasound long before it's audible. With people --

I wrote a paper in 2012 often sick building syndrome, the other evidence, when people are in large buildings and the large high-rise buildings, knowledge worker high-rise offices, if the fan is a little bit out of balance, it causes a pulse and people begin to make the same complaints.

Acousticians who have dealt with these low frequency problems over the years have no problem understanding why people in homes in wind projects are having complaints. It's the acousticians who have not dealt with that who seem to be causing the confusion.

Q. Thank you, Mr. James. I want to switch topics now away from infrasound and focus -- talk a little bit more on your prefiled testimony, page 3 and the ANSI standard ASA S 12.9 and this notion of modeling the community's response to a new project.

And I think we heard some testimony earlier from Mr. Hessler so if you could just explain how that concept ties into this project.

A. Well, there are standards that we follow as acoustical professionals to try to guide our work. One of them is the standard ANSI ASA -- I'm reading line 69 of page 3, S 12.9 part 4, noise assessment and prediction of long-term community response.

This is a standard designed, for example, when I was designing noise for new automotive plants that I would refer to as a way to determine what would be the type of levels that would be acceptable.

That standard includes a caution in part 4 of appendix F that says F 3.4.4 "in newly created situations especially when the community not familiar with the sound source in question higher community annoyance can be expected and that difference is worth up to 5 dB."

Also if there's in quiet rural communities there's a greater expectation for piece and quiet worth 10 decibels. And if you take the two factors and for a project like Prevailing Winds both would apply what this is saying is that guidelines that would be compatible in the Suburban environment for example 45 dBA need to be reduced either by 10 or 5 dB to result in the same level of annoyance for a quiet rural environment.

And it's this part of -- it's this part of our professional standards that seem to be routinely ignored by people like Mr. Howell. We can't quibble -- we can't

equate annoyance potential for a community that is rural, residential to one that is more adjusted to noise. If people come to the wind turbine project, then they have no expectation of quiet. But they move there with the expectation of peace and quiet. The project's coming to them. Therefore, the burden should be on the project developer to not increase annoyance.

And levels of 40, 45 dBA, as I show in my testimony with the Health Canada will result in about one out of every 10 people -- one out of every 15 people people being highly annoyed. And highly annoyed means they're annoyed enough that over a long-term we have health effects, whether the annoyance is due to sleep or due to dizziness or nausea, whatever the high annoyance may be, the result is that over periods of weeks or months it leads to deteriorating health.

And that's what this whole section of ANSI is trying to avoid. When you have people whose live style is for quiet -- they sleep with their windows open. They enjoy the outdoors, then a new noise source that may have been more than acceptable in an urban environment or Suburban environment becomes a serious source of complaints.

Q. And have you seen the ambient measurements taken for this project area?

A. Yes, I have.

Q. And what are the -- what's your opinion in terms of this area and the ambient measurements of the area?

A. Well, I looked at the table that Mr. Howell presented. I know he summarizes it as ranging from 21 to 45 dB. And the only columns on those that are of significance for background sound are those labeled L90, the 90th percentile. The LEQs are of little use for anticipating annoyance. But he says the range is 21 to 45.

Well, 45 dB is an outlier. There's no way that a normal, rural community background sound would be that high. But if we look at the table for trends we can see that even at 10 o'clock in the morning, 5 o'clock in the afternoon, and at midnight the sound levels in most of those measurement sites were between 22 dB and maybe 28, 29 dBA. And that's what I find in rural communities.

The other thing is that that includes the sound of normal wind. Not high winds. And then I heard Mr. Hessler this morning talking about wind noise masking wind turbines. That's not the time when people have their complaints. They complain about it when it's a quiet night, no wind at the ground and the wind turbines overhead are whooshing away.

So this background sound level issue is critical. We know that if -- we know that if the project was

designed to not increase that level significantly then we'd have few complaints but we see a project here that looks like it's going to raise the levels anywhere from 10 dB or higher at many of these homes and that is -- that is just a prescription for complaints once the project is permitted and operating. There will be complaints.

Q. And just to be fair, you've never been to the project area, have you?

A. No, I haven't but I've been to many similar projects in Iowa, Illinois, Indiana. All over the -- principally east of the Mississippi. But I've also been involved in projects out in Oregon. And in many of these cases because they were parts of formal proceedings I was privy to the data that the opposing parties' acousticians had taken and able to re-analyze it.

And based upon what I have seen in those studies and what I can see about Prevailing Winds, I think I have a reasonably good understanding of the Prevailing Wind project.

Q. And you said there was no way that one measurement was 45 -- and to be fair to Mr. Howell you don't know exactly what was there next to that measuring tool. There could have been a grain elevator or something like that. But you're exaggerating when you say no way;

right?

A. Well, no way that that's a background sound. A truck could have driven by that had a bad muffler. When we're taking averages with a sound level meter a single loud noise has a very significant impact.

So let's say the sound level was 30 and a truck drives by at 55 but it's only there for a minute, that could easily give you a 45 average over the limit or an L 90 could mean that they parked the truck and was there for the full 90 percent of the time.

Either way a 45 dBA sound level at -- in a rural community means that something not related to the background sounds -- background sounds are those things you hear from a distance they're not the things up close.

They're when you walk outside at night you can hear the barking dog in your neighbor's farm a quarter mile or a half-mile away. Those sounds that you hear are the background sound and that's what our auditory system uses as the basis for assessing annoyance. It's always comparing the sound it's hearing to those quiet periods. And that's why when you put a noise source into a quiet community you can expect complaints.

Q. And the question was raised earlier about whether or not once a noise source is introduced to a quiet area if the area will just get used to that noise source. Can

you respond or answer that question?

A. Yeah. I can respond to that. I'll first respond with a study that was done in Britain back in the 2000s in which they found that given time, complaints don't decrease. They increase. Or the people become so resolved to the fact that no one will listen to their complaints that they what I say suffer in silence. Or they abandon their homes.

Ontario where there are many projects designed to meet a 40 dBA criteria now have abandoned homes all over the rural communities because people have just left them. Or they were elderly and when they passed away the family just left them to deteriorate.

Having the experience of dealing with people who are the -- who are living in wind projects and who find something objectionable, I call them the complainant, has made me really sensitive to how the ANSI standards about expectation of peace and quiet come into play. And so -- I'll see if that answered your question.

Q. Thank you, Mr. James.

Were you listening in when Mr. Hessler opined on the number of people who have complained about infrasound or complained about the symptoms that they believe were caused by infrasound and that he believes that the number of people who -- you know, who have that sensitivity to

infrasound is very small? Did you hear that testimony?

A. Yes. Yes, I did.

Q. Do you want to respond to that?

A. Well, many of the projects that I've studied are projects that Mr. Hessler and his father developed. And while he may not be aware that complaints occurred, I am constantly in contact, usually as the recipient of e-mails saying here's another day when I couldn't take it.

What happens in the communities -- in the Wisconsin communities in the middle of the state have had wind projects now for almost 10 years. A, the complaints have not stopped. B, the complaints have increased. And, C, the reason why nobody does anything about it is once a project is permitted no one has the funds to contest it.

In Brown County, for example, they declared a 2 and a half mile radius around Shirley Wind as a human health hazard. That's a Wisconsin legal definition for an area that has a problem and they want to notify the public.

When the operator of Shirley Wind was asked to respond to that they just denied that there was any problem. That denial has gone on now for almost eight years leaving the Brown County board of health having monthly meetings on noise and concluding that even the city of Green Bay and the town of -- the County of Brown

do not have the funds to pursue a lawsuit against the utility.

So what answer is there? The answer is it needs to be done right the first time. Once that project is permitted, if the complaints occur, there is no solution that is economically viable, and the I am balancing of funding between the operators and the local communities or for that matter a complainant trying to file a lawsuit is so unbalanced that there will be very little chance of success.

Get it right the first time or you live with it forever.

Q. And have you seen how the Applicant wants this project to be measured in order to comply with a 45 dBA limitation? Have you seen that?

A. I don't know if I remember. I heard Mr. Hessler talking this morning about several weeks worth of measurement and an average level or something like that.

Q. Yeah. The measurement is over a two week level.

A. Yes. That completely misses the point annoyance. Is not about a long-term average --

MS. SMITH: I'm going to object. I'm not sure what the witness has seen what is being asked. And I would also say is going far beyond the scope of the Direct Testimony.

MR. DE HUECK: I was thinking the same thing, that we're having new Direct Testimony introduced on today's date. Though I appreciate you fleshing out some of the unanswered questions just as the Applicant does when they call a witness as well. This one just talks a lot more.

So just keep in mind that we don't need new filed testimony today orally. And, additionally, if you could clarify how sound will be measured for this project before we go any farther.

Q. Do you have access to Exhibit A 33, the PUC's web portal in front of you?

A. I will pull it up here. Prefiled exhibits. It's A --

Q. 33. It's proposed condition --

A. A 33. Okay. Proposed conditions.

Q. Yep. Number 27. If you could read that quickly, please.

A. Okay. That was basically what I understood.

Q. And if you could explain whether you believe that's an appropriate way to measure any limitation on noise and why or why not.

A. That is not an appropriate way to measure wind turbine noise. The reason being that if you measure over a period of at least two weeks the average level will

always be low because there's periods when the wind turbines don't operate.

And the condition that we're trying -- or the characteristic of wind turbines that cause annoyance have nothing to do with the long-term average. They have to do with short-term fluctuations. If for example we did a long-term average and it came out to 40 dBA Leq but we then looked at how the sound fluctuated around that, we would see that there were periods when it might have been 55, periods where it might have been 35. It's these fluctuations above and below the average that cause the annoyance, cause sleep disturbance and are the root of the complaints.

So using a long-term measurement as a criteria is essentially an open door to the project creating annoyance and there being no method whatsoever then to ask for mitigation because over a two-week period it will always average less than 45, particularly if we're looking at a project that was designed where we now say the maximum levels are 42, let's say dBA Leq.

It's the fluctuation that is important, and that's why in my testimony I referenced the use of Lmax or an L10 or some other measurement that looks at the peaks. When someone describes a wind turbine -- and Mr. Howell did -- a whooshing sound.

A whoosh when you describe it means that there is a sound that rises and then falls. What we should be trying to do is eliminate that whooshing sound by controlling how much it can rise. And in our Michigan cases which I think Dr. Punch referenced we said 45 dBA.

Q. I think you've answered the question.

And I've got to push back on you here a little bit because if you read Condition No. 27, it actually I think calls to not take into account when the wind turbines are operational.

If you can look at line 4.

A. Yes, it does. But wind turbines operate over a broad range.

Mr. Hessler, for example, in his Naroof (check) document said that measurements will be plus or minus 5 dB around the predicted mean. So there will be periods during that two weeks where that wind turbine -- let's say it was 40 -- is running at 35, and there will be periods where it's running at 45. And the complaint times are when it's running at 45, not the average over those times.

If we were going to use an Leq or an average as a criteria, it should be a short-term average, a 10 minute average, because anything else is not looking at the characteristic we're trying to control, which is the

fluctuating low frequency noise.

MR. ALMOND: Thank you, Mr. James. I don't have anymore direct for you. We will turn this witness over for cross.

MR. DE HUECK: Mr. James, I'm now going to turn you over for cross-examination, and we'll begin with the Applicant, Prevailing Winds.

THE WITNESS: Okay.

MR. DE HUECK: We're just going to move our video camera over to the attorney who will be questioning you.

(The camera is adjusted.)

THE WITNESS: I have no audio on this end.

MS. SMITH: I think we're all just very quiet Mr. Hessler -- or Mr. James. I apologize.

CROSS-EXAMINATION

BY MS. SMITH:

Q. Mr. James, my name is Mollie Smith. You will see me. I'm raising my hand, if you can see me. I'm over here.

Do you have anyone in the room with you?

A. No, I don't.

Q. And do you have any documents in front of you other than your filed exhibits or the filed exhibits in this case?

A. No, I do not.
Q. You haven't conducted any acoustic modeling related to the Prevailing Winds project; is that correct?
A. No, I have not.
Q. And I would -- that was not part of the scope of your work why you were retained?
A. No, it was not.
Q. And you also did not conduct any analysis of existing sound levels at the project site; is that correct?
A. That is correct. I relied upon the information from Mr. Howell.
Q. And you did not conduct any site specific surveys of either low frequency or infrasound for the project area. Is that also correct?
A. I relied upon the information from Mr. Howell's reports.
Q. In your testimony you indicate that the purpose of your testimony is to provide your opinion regarding appropriate thresholds for audible and inaudible wind turbine sound at nonparticipating properties; is that correct?
A. That would be fair to say, yes.
Q. So given, as you just noted that you didn't conduct any site-specific studies, you're relying solely on the

information that's either provided by others in this Docket -- you're not relying on your own data for the project; correct?
A. As I explained earlier, I have studied many projects similar conditions with similar wind turbines, and I relied upon that plus Mr. Howell's data.
Q. Okay. In your testimony you indicate that you believe the noise limit should be imposed at the property line; is that correct?
A. That's correct. The reason for that is so that the --
Q. You did not cite -- excuse me.
You didn't cite any specific data to support that, did you, in your testimony? Did you cite any specific data in your testimony to support that statement?
A. I stated that -- yes, I did, in my testimony.
Q. Can we go to your testimony, please.
MR. ALMOND: Can the witness be allowed to answer the questions without being interrupted.
MR. DE HUECK: Everything's fine as is.
A. Page 6, line 174?
Q. Yes. And so I'm looking at the first lines -- 175 through 177. It says "I am a strong supporter of property rights and believe that noise that exceeds known safe levels should not be imposed on people just because

they live near a neighbor who wishes to host wind turbines. This position influences my response to this question."
There's no citation here for any source to support that statement, is there?
A. Just my belief that I've grown up in the United States where property rights are protected by the government.
Q. So that's your personal opinion?
A. I think that's personal and legal.
Q. You're not testifying as a medical expert, is that true?
A. That's correct.
Q. And you're not a licensed physician. Is that also correct?
A. That would be obvious, yes.
Q. And you are not testifying as an economics expert. Is that also true?
A. That's correct.
Q. And you're not testifying as a psychology expert. Is that also true?
A. Only to the extent that acousticians are cross trained in both health and psychology because otherwise when you investigate complaints you are hampered.
I have 45 years of investing complaints, and I've

learned a lot about people and psychology that would not be tossed in a court. So, yes, I have some background, but it's experience.
Q. It's experience. You're not a licensed psychologist?
A. That's right.
Q. And yet in your testimony you provide statements regarding health effects from wind turbines. Is that true?
A. That is correct. Because as an acoustician I've been trained to read medical journals to interpret them for my purposes.
Q. Object. I didn't ask -- you offered health effects testimony in your written testimony; is that true?
A. Only those within the scope of my profession.
Q. Are your opinions based on complaints that you have heard from people?
A. My opinions are based upon complaints and my own personal experiences.
Q. And again, you're not a medical doctor; is that true?
A. That's true. But I don't see the relevance to your question.
Q. So you have not conducted a medical examination on any of the people that have provided complaints to you;

is that also a fair statement?
A. No. But I've reviewed the medical records that the doctors provided.
Q. I only asked you if you --
Did you rely on other people's work for this as well, other people's studies for your opinions?
A. Yes. The reports from medical doctors who have examined my clients.
Q. Would you agree that anyone who is relying on other people's work that the -- what they're relying on has to also be credible?
A. That is true. But that's the -- that's the purpose of an expert to make that decision --
Q. I'm just going to ask you, Mr. James, if you can just answer my question because I don't -- you'll have your opportunity to elaborate if your counsel so chooses to ask you additional questions.
You provided some exhibits with your testimony; is that correct?
A. That is correct.
Q. And I believe -- and I may have not the same numbering so I will try to look at the versions that are online. Mine are sort of 5 and 6 to your testimony, which may be -- I'll see if I can find yours.
So I think it is listed as maybe I 1 E and I 1 F.

It may also be 5 and 6 on yours. I have two different labels.
A. Okay. Just give me the titles. I'll be able to go from there.
Q. Let's see here.
So I believe that 5 -- what I'm looking at is -- one was one that you referenced previously with the colored charts, so I think that was the last exhibit to your testimony.
A. Okay.
Q. Then the one right before that one, which also has a wind turbine and a chart.
A. Those are the two you're looking at now?
Q. Yes.
A. Okay.
Q. Neither of those exhibits address health effects; is that correct?
A. They explain the --
Q. Do they address health effects?
A. No, they're not on health effects. No, they're not.
Q. Okay. Thank you. And if you look back one exhibit, so that would be 3 or D, I believe -- so this is a possible criterion for wind farms.
A. Okay.
Q. That also does not address health effects, does it?

A. Indirectly it does.
Q. It does not directly address health effects, does it?
A. The recommendation from Dr. Schomer included the consideration of health effects. He mentions the Health Canada Study, which is about health effects --
Q. Does this paper itself address health effects? Not the citations? Does the paper itself address health effects? Do they offer any opinions on health effects in this document?
A. Without having to read it very carefully, I'll say it was not directly about health effects. It was about the criteria needed to prevent them.
Q. If we look then at the noise wind farms article so that would be 2 or B to your --
A. Okay.
Q. If you could turn to the last page in that article. And I -- hold on. I think it would be actually page 13.
A. Yes.
Q. Make sure I'm looking at the correct one here.
So if we look under conclusions at the -- I'm going to read the last sentence of the first paragraph under the conclusion. It says, "Unfortunately then for policymakers there appears to be no proportional relationship between wind turbine noise levels and health

as these outcome factors will be influenced by characteristics associated with both the noise and the listener."
Is that accurate?
A. That is an accurate way of stating a complex set of relationships, not just --
Q. I'm just asking if that is an accurate recitation of the statement in the article.
A. It can't be answered yes or no.
Q. Are those the words on the page?
A. Those are the words on the page, yes.
Q. And if you'll turn then to Exhibit 4, this may also be D. This is called a theory to explain some physiological effects of the infrasonic emissions at some wind farm sites.
A. Okay. I'm going to that now.
Q. And if you'll look at pages 1,364 I think it is, Section 6, it says, "Additional research and data collection recommendations."
A. Okay.
Q. If you look under that it says, "research to date does not tend to just study the effects on humans reported anecdotally in what is probably a minority of wind farms."
Is that an accurate statement?

A. I think Dr. Schomer believed that at the time he wrote the paper. Since then he's seen Steve Cooper's --
Q. I'm just asking about the --
(Discussion off the record.)
MS. SMITH: Mr. de Hueck, for Cheri's sake and mine, could you direct the witness to please answer my questions.
MR. DE HUECK: Yes.
Mr. James, I know you want to elaborate on every single question that's asked of you, but in order for our court reporter to adequately capture this, we can't talk over each other. And I believe Ms. Smith would just like you to specifically answer her questions as asked.
Thank you.
THE WITNESS: Okay.
Q. Mr. James, in that section under additional research and data collection recommendations they're actually making recommendations for additional research to do regarding reports; is that correct?
A. That is correct.
Q. And they provide even a test case in their Appendix A; is that true?
A. That is correct.
Q. Mr. James, you've been retained as an expert witness in other proceedings; is that correct?

A. That is correct.
Q. I believe you mentioned that you participated in a case in Oregon; is that true?
A. That's correct.
Q. So would that be Williams versus Invenergy, LLC?
A. That is correct.
Q. I'm going to -- Ms. Agrimonti is going to send you -- and maybe we can hand this out too.
Give us just a second, Mr. James. We're just handing out -- and Ms. Agrimonti is sending to you what I'm referencing as Exhibit A 36.
And, Mr. James, if you can let me know when you receive it.
A. I have it up in front of me.
Q. Okay. And this is an Opinion and Order from United States District Court, District of Oregon case; is that true?
A. That is correct.
Q. From 2016?
A. That is correct.
Q. In this case were you excluded from testifying regarding the causal health effects from wind turbines?
A. I was excluded from testifying to the cause and effect of wind turbines only to the extent of not having supporting literature because we weren't able to submit it.

Q. Can you turn to page 11 of the case.
A. I assume these are numbered sequentially?
Q. Yes. I believe it's in the lower right-hand corner that you'll see the number.
A. Yes.
Q. And if you'll look at the very last two sentences of the page -- so the initial -- you'll see a 13. It says James. And that James, is that you that it's reference?
A. Yes, it is. Yes.
Q. I'll read the bottom. It says, "He has a long career studying the noise and sound pressure produced by industrial wind turbines. However, he is not a doctor or epidemiologist. As a result, he does not have the training to opine that the infrasound and audible noise created by wind turbines activates physiological mechanisms in the body which produce adverse health effects."
Do you see that language?
A. Yes, I do.
Q. And we were discussing the information that had been submitted. The Court also noted that the documentation that you were relying on for your opinions was also not credible; is that true?
A. I don't -- I don't remember that specifically. Can you point to that?

Q. Certainly. So if we look first at -- let's stay on the same page. I believe you had referenced in your earlier testimony a Dr. Kelly; is that true?
A. That's right. I referred to him earlier in my testimony today, Dr. Neal Kelly.
Q. And so if we look down at the bottom of page 11 over on the left-hand column towards -- at the very bottom, the bottom paragraph, it says, "However, like James's other sources, the Kelly study has significant scientific shortcomings. First, Kelly takes data from only seven subjects. He admits that the experiment would have to be repeated with a much larger number of evaluators population to confirm his results as scientific knowledge. Moreover, there's no evidence that Kelly's study was published in a reputable scientific journal or that it was subject to any manner of peer review."
And I'll skip down to the last sentence. "The study does not support the proposition that wind turbine infrasound is capable of producing broader adverse health effects, including anxiety, panic attacks, and sleeplessness."
Is that accurate?
A. That's what it says.
Q. And if you'll turn back to the prior page, there's a

reference to the Cape Bridgewater study as well. And I believe that's on page 10. Do you see that?

A. That is correct. Yes.

Q. If you look at page 9, it also addresses the Cape Bridgewater study and Mr. Schomer's review of the Cape Bridgewater study on pages 8 and 9. Do you agree?

A. I agree there's that -- they're talking about it but what are you pointing to?

Q. If you look at the bottom of page 8, it says "The Court agrees with defendants that the Schomer documents do not represent reliable scientific knowledge which James may use as a foundation for his expert conclusions."

Is that accurate? It's at the bottom of page 8.

MR. ALMOND: Objection. Vague. Are you asking if it's -- the statement's accurate, or you're accurately reading the statement or --

MS. SMITH: Yes. I apologize. I should be clearer.

Q. Am I accurately reading the statement on the bottom of page 8?

A. You're accurately reading it. I don't agree with the Court's agreement, but that's fine. Dr. Schomer is the Emeritus Director of the Acoustical Society of --

Q. I think that's all. I just needed to know if I read

it correctly.

Mr. James, have you been excluded or had your testimony in part excluded in any other cases?

A. Not in any significant manner other than issues where it treads into medical.

Q. So any -- would it be fair to say that you have been disqualified as an expert from testifying regarding health effects?

A. Only those that are medical. Not health effects that are visually confirmable.

Acousticians have to be able to listen to the complaints --

Q. I'm just going to stop you there.

MS. SMITH: And I would say that at this point I would move to strike any testimony by Mr. James regarding health effects attributable to wind turbines.

MR. DE HUECK: I'll allow Mr. Almond to respond and Staff if you so wish.

MR. ALMOND: Yeah. In Mr. James's Direct Testimony, written Direct Testimony, he discusses an acoustician's responsibility to be aware of vague health effects -- the general health effects caused by certain wind turbines, facilities, et cetera when looking at projects.

Specifically he talks about -- I mean, it's all

throughout his background in his prefiled testimony. Certainly he can't make any medical diagnosis. He's not doing so here. I don't think he's given the opinion that he's making any diagnoses or anything like that.

So I'd need to know exactly what opinion it is or what statement Mr. James has made that Ms. Smith is looking to strike, I guess.

MS. SMITH: Mr. James is making assertions of a causal relationship between wind turbines and health effects. He is not qualified to do so. He is not --

As his own testimony, he is not a medical doctor. He's not an epidemiologist. He's not a psychologist. There's no basis for him. The literature he's relying on is not supportive of that either, as we're seeing. He doesn't have any basis to make those statements.

MR. DE HUECK: Go ahead, Staff.

MS. EDWARDS: As much as I would like to speed it along, I would argue it goes to weight, not admissibility, and it's an issue that's -- I would intend to brief in my prehearing brief -- posthearing.

MR. DE HUECK: Just in terms of Mr. Fuerniss Mr. Jenkins and Ms. Pazour, I'm assuming you're in agreement with Mr. Almond?

Ms. Smith, I'm going to agree with you. He

should not be testifying about any health effects or rendering any expert opinion regarding medical causation or -- along the lines of what you've stated.

However, I'm concerned what is it that we're going to strike and who's responsible for pointing that out? Certainly it's not Cheri to go back through the transcript and strike it out. So how do we actually deal with figuring out what statements need to be stricken?

To some degree I'd like to allow some of the exhibits he relies on because they're based on infrasound. Not necessarily saying I want to allow it to show that it's causing health effects, but the guy's an expert in infrasound and measuring that type of stuff as an acoustician -- thank you.

MS. SMITH: I can address the exhibits.

From my read of the exhibits, I don't believe that those would support the causation assertion anyway. So to the extent that I'm not -- I don't have a problem with the exhibits themselves coming in, but his testimony -- and I would be happy to propose in a written format -- take his testimony and strike the portions that I believe should be stricken and provide that tomorrow.

MR. DE HUECK: Let's do that.

MS. SMITH: Would that be appropriate?

MR. DE HUECK: That would be appropriate. So

I'm going to go ahead and sustain your objection and your motion to strike, grant that, and we'll figure it out at that point in time.

MS. SMITH: All right. Thank you.

MR. DE HUECK: And then also I'd like to prohibit any -- oh, Commissioner Hanson.

COMMISSIONER HANSON: No. I was waiting for you. I was just signaling you that I had something to say pertaining too before you made your final decision here.

I think that he certainly should be allowed to provide us with his opinion of observable health effects. Certainly not any medical. And I'm parsing it here, but even I would be able to say that Commissioner Nelson was obviously happy to hear something because that's observable.

I wouldn't be able to say what physical reaction he had within his body, any medical effects from it and hearing or things of that nature, but anyone can talk about the health effects that are observable, readily observable.

So I know that makes it more difficult.

MR. DE HUECK: It doesn't make it too much more difficult. I just don't want to get into the gray water of allowing an expert testifier to enter into lay witness

testimony and start elaborating on matters of common knowledge because that's not why he's been here to testify.

COMMISSIONER HANSON: Excellent.

MR. DE HUECK: So, with that, where did we leave off? You're in the middle of cross-examination.

MS. SMITH: That probably concludes my cross-examination at this point.

MR. DE HUECK: So we'll move over to Mr. Fuerniss. Did you have cross-examination?

MR. FUERNISS: No.

MR. DE HUECK: Ms. Jenkins.

MS. JENKINS: No.

MR. DE HUECK: Ms. Pazour?

MS. PAZOUR: No.

MR. DE HUECK: Staff.

MS. EDWARDS: Yes.

CROSS-EXAMINATION

BY MS. EDWARDS:

Q. Earlier you stated that you were discussing I believe it was somebody else's study, that there were other types of infrasound from wind that needed to be parsed out.

Did I understand that right?

A. The term I used was pseudo noise, I believe. When air -- microphone on a sound level meter is very, very sensitive. If air moves over that microphone and causes a false sound, pseudo noise.

That's why we put these foam balls on top of the microphones, to try to block that wind. Infrasound goes right through the foam balls. So any movement of air around the microphone generates a false signal, particularly in the infrasonic range.

So when they're measuring outside even after they take all of their cautions with foam balls, it's very common to see no difference between wind turbine on or off just because what they're really measuring is the air moving over the diaphragm.

And then Mr. Hessler, I think, agrees with me on this. The proper place to take an infrasound measurement if you want to avoid that is inside the home where the complainant says when I sit in this chair I feel these sensations.

Q. Okay. Earlier you stated that one out of 15 people are -- and correct me if I misstate this. Are at risk of being annoyed; is that correct?

A. Yes. The Health Canada Study found that when the model sound levels were 35 dBA and below, 2 percent of the population were highly annoyed. Between 35 and 40,

10 percent were highly annoyed. And between 45 and above, 14 percent and higher.

That's where I got my numbers from and that's from the Health Canada Study and there was a chart in my testimony graphing those results.

Q. Okay. So you anticipated my next question and answer which was where did the number come from.

Would you say that the majority of your experience with wind turbine noise and its effects on people comes from firsthand observations and measurements at operational projects?

A. For my own?

Q. Correct. Firsthand.

A. Yes. Yes. But I've corroborated that. I have a number of colleagues who do similar work and we compare our notes, we compare our findings and we compare our methodologies.

Q. Have you ever --

A. And we corroborate each other's work.

Q. Okay. Have you ever conducted a sound monitoring survey of at least one week at an operational wind project?

A. No. Because I find it pointless. If you -- if you aren't standing at the microphone -- or standing in the area where the microphone is located so you can hear at

your own ears -- that's called an observed measurement -- then you have no idea what caused the high as, the lows, the in-betweens.

Unobserved monitoring, which is what is used for two week measurements, requires an awful lot of guesswork afterwards. Whereas, if you're on site and you're measuring the sound, you have your own senses to corroborate the meter's measurements. You know whether there's wind. You know whether there's insects. You know whether a car went, by dogs barked. And, therefore, observed measurements are the preferred measurement in acoustics, as codified in ANSI 12.93, measurements with an observer present. And I focus on that kind of measurement.

As to whether that measurement represents other conditions, I rely upon operational data for the noise source, whether it's a wind turbine or a machine in a factory, to let me know other times when that noise might have been in a similar operating mode.

Q. Have you ever worked on a wind turbine project for any group or individual that was not opposed to or complaining about the project?

A. No. And that is because when I wrote my first paper in 2008 the wind industry decided I was persona non grata. They don't hire consultants that recommend 35

Leq. I don't even get the offers.

Q. Thank you.

On page 7 of your Direct Testimony you refer to a sound study that was carried out at the Shirley Wind Farm in Brown County, Wisconsin.

Are you familiar with what I'm talking about?

A. Oh, yes. That was at my client's home.

Q. You indicated that this same study alluded to by Mr. David Hessler who just testified for PUC Staff in his Direct Testimony -- is that correct?

A. That is correct.

Q. You --

A. That's the same study -- when he made the suggestion to the Public Service Commission that a study be done my clients contacted me, the attorney for them contacted me, and we developed the protocols and we selected the acousticians and Hessler & Associates is one of the companies that I recommended be involved in that test along with Schomer, Walker, and Rand.

Q. You also indicate that you -- you also indicate that you essentially orchestrated the study and developed the test protocol for it; correct?

A. Yes. The test protocol was based on my 2011 or 2012 paper showing the need for certain types of instruments and measurement techniques to detect the infrasound. I

was also -- I was also appointed by the PSC to do a peer review of that test, and I submitted that to the PSC with data showing the pulsations in all three homes, although strongest at the home R-1, I believe, the N's farmhouse that Mr. Hessler also focuses on.

Q. You just said you were appointed by the PSC. You were hired by the Commission?

A. Part -- yeah. Part of the agreement between the PSC and my clients to have access to their house was that I have access to all of the data from the test that Schomer, Hessler, Rand, and Walker conducted and have that for my own review and then report back to the PSC on what I found.

Q. Was the PSC your client?

A. No. The client was the Intervenors but the PSC was the coordinator for the -- I guess for initializing the project. And my clients would not allow anyone in their homes unless I had an opportunity to review the work of the study team.

Q. But you did not actually participate in the study; correct?

A. No. Because since they were my clients I had already done testing in the homes. I knew what would be found. It would have been inappropriate for me to be one of the testers. Everyone would have said it was biased.

MS. EDWARDS: Thank you, Mr. James. No further questions.

THE WITNESS: Okay. Thank you.

MR. DE HUECK: Okay, Mr. James. This is where we go to Commission questions, meaning the Commissioners get to cross-examine you so while Katlyn comes up here to move the camera down to Chairman Fiegen I'll just go ahead and kickoff with the only question that I have.

And it is you've testified a lot and reported to a lot of commissions and governments across the United States. You've done that in situations such as this when the wind farm has yet to be built; correct.

THE WITNESS: That is correct.

MR. DE HUECK: And so are you aware of any Commission or government that has created a condition to encapsulate your theories on infrasound?

THE WITNESS: Infrasound is still something that hasn't been addressed in any regulatory setting.

And there's a reason for that. Before we started putting wind turbines in quiet rural areas there was never a source of infrasound that caused pulsations so it's not studied. It hasn't been studied. The funding is not available and it is just now as with Mr. Cooper's work we're beginning to develop the methods where we can duplicate the sensations in a laboratory.

It's very much an unstudied area, but it's one that from my point of view should be a major concern since the people who are affected are severely affected.

Some of my clients, for example, the people that owned the house that Mr. Hessler tested in, have left it. That house has sat vacant for years. And they only return when there's a need to do another test.

MR. DE HUECK: Okay. Thank you.

So to date you're not aware of any permit being denied based on infrasound?

THE WITNESS: Not infrasound specifically.

MR. DE HUECK: Okay. Thank you. And now I'm going to move over to Chairman Fiegen to allow her to cross-examine you.

CHAIRWOMAN FIEGEN: So it seems like you have been in the field for a while, although in the U.S. -- you know, wind development has really increased the last, I don't know, five to 10 years. I mean, if you look at the chart, it certainly has increased quickly. Yet there's not a lot of research done and so do people mostly -- do people in the U.S. mostly look at research in foreign countries and has -- and I know I can't introduce new evidence so -- yeah. I guess that's my question.

THE WITNESS: I guess to your first question

about wind turbines are new, yes, they're new. But because of serendipity and a number of other factors, I've been intimately involved in many of the early wind projects in Maine, New Hampshire, Vermont, out in the east, and have tracked at what's happened at those. Also in Wisconsin we started a wind project in 2008 the one that Mr. Hessler and his company worked on.

So my experience I think is somewhat unique. There's three other acousticians in the country that I would say have similar experience. But all of this has been funded by local families. There is no research money available to fund my work. Steve Cooper is in the same boat. His whole lab and everything else was funded out of his own money.

Research money doesn't go to people who have ideas that may inhibit current government policies and with the current government policy promoting wind the chance of getting funding for the kind of work I do is nil so that also means that there's limited research available.

CHAIRWOMAN FIEGEN: Okay. Thank you.

MR. DE HUECK: Mr. James, up next will be Vice Chairman Hanson.

THE WITNESS: Okay.

COMMISSIONER HANSON: Good afternoon, Mr. James.

THE WITNESS: Good afternoon.

COMMISSIONER HANSON: I want to look at the witness box when I'm talking to you.

On page 5 of your prefiled testimony online 153 you state, "While it may appear that the difference is only a few decibels, it is important to remember that a 3-D B change in sound levels represents a doubling or halving of the acoustic energy."

So obviously to a layperson -- and we've had these in previous wind dockets, discussions of a variety of different dockets and projects. However, it's always curious to me, in your example then of moving down to a 40 dBA you state that it's equivalent to turning off half of the wind turbines in a project designed to meet the 40 dBA.

If three dBA change is doubling or halving, what is the -- going from a 45 to a 40 dBA? Do you know that?

THE WITNESS: Well, it's 5 decibels. It could be the equivalent of somewhere between a quarter, maybe a third. These are logarithms. I can't do them in my head, but it would be a very significant change.

And that's why these debates get so heated between a 40 or 45 dBA limit. It represents a big change in the number of wind turbines that can be put into any given area of a project.

COMMISSIONER HANSON: Well, you just stated that it would be a change of about a quarter?

THE WITNESS: It would be about a third of the wind turbines. Let me give you a simpler example.

If I have a noisy fan in front of me and I have my sound level meter and the noisy fan is 40 dBA and I have another noisy fan right alongside of it and I turn that on, then the sound level's going to go up 3 decibels to 43.

If I started out with four noisy fans and they were 45 and I cut them in half, turned two off, then it would drop to 43. So when we talk about small changes in decibels we're talking about big changes in acoustic energy. And that's the point I was trying to make.

And it's also why I think the answer to this is having nonparticipants negotiate agreements in easements and get compensation for the noise pollution.

There's no easy way to site a wind turbine at levels that are going to satisfy everybody. So the proper method in my mind is to set criteria that are safe and then allow monetary negotiations to occur for easements.

COMMISSIONER HANSON: Okay. Now thank you. I understand that. But I'm not quite following. I thought originally you said a change of 45 to 40 was a quarter.

And then I believe you said that it was a change of a third -- of turning off one-third of the machines. Am I hearing you incorrectly?

THE WITNESS: Well, like I said, the relationships are logarithmic. So as long as we move in 3 decibel moves, it's easy to estimate but when you have a 5 dB, I'd say that's harder. I would say it's equivalent to turning off one out of every -- one-third -- that would be equivalent to turning off about two-thirds of the machines to drop 5 decibels. Or to increase the setbacks greater, which is really the answer. To increase the distance.

COMMISSIONER HANSON: Okay. Intuitively I'm having a little bit of a challenge with that because if you're shutting off -- did you just say two-thirds of the machines to turn off 5?

THE WITNESS: To have an equivalent drop in sound level -- or to have a wind project -- the average sound level over the whole wind project because we're talking about not just one location but the whole project, to get a reduction of 5 decibels would require turning off about two out of every three of the machines. And then not being measured -- not taking a measurement right near one of the currently operating machines.

My point -- my point in that statement was to

show how difficult it becomes to put wind turbines into rural residential areas as the limits are reduced unless there is a safety valve to compensate people for the noise and allow them to enter into separate negotiations for an easement across their property.

COMMISSIONER HANSON: Thank you. And I -- I appreciate your clarifications and explanations as you've gone through this. However, if you're at 45 dBA and you decrease by 5 to 40 dBA and in order to accomplish that you have to eliminate two-thirds of the machines, that means one-third of them are creating the 40 dBA. And I know -- I understand it's not quantity there necessarily. One machine could produce 40 dBA.

THE WITNESS: If you're close to it.

COMMISSIONER HANSON: Correct. But you're also saying that you're eliminating those that are closest to the receiver by --

THE WITNESS: In my example I wasn't being that precise. I was trying to give an example of the over all magnitude of the problem of putting a large number of wind turbines into an area and why a couple decibel difference in the criteria makes a big difference to the Applicant.

COMMISSIONER HANSON: Thank you. And you're certainly not advocating that the Applicant should remove

two-thirds of their machines.

THE WITNESS: No. I'm advocating that those machines that are up -- in the model we see some levels about -- above 40. But they seriously look at getting those levels down into 40. And that for the people who are in the impacted range that are nonparticipants, that they work out easement agreements.

COMMISSIONER HANSON: I understand that. Thank you for your participation and information. Appreciate it.

THE WITNESS: Okay. Thank you.

COMMISSIONER NELSON: Mr. James, this is Commissioner Nelson.

I understand that you heard most of Mr. Hessler's testimony this morning; correct?

THE WITNESS: I heard probably 80 percent of it, yes.

COMMISSIONER NELSON: Did you hear the portion where he explained to me that from his perspective it is very, very very difficult to measure infrasound?

THE WITNESS: Yes. But he's been doing that with instruments with microphones.

As illustrated in the example I gave and described earlier with all the blue lines and colors I've moved over to using a micro barometer which is much less

sensitive to air movement et cetera and it makes it much easier to get clear readings.

With the right instruments infrasound is easy to measure. With the standard acoustical instruments it's very complicated and very expensive.

COMMISSIONER NELSON: So we've been talking about this whole issue of the test or study of the Shirley Wind Farm and you developed the testing protocols but apparently he didn't use your testing protocols; is that correct?

THE WITNESS: No. No. They followed the testing protocols exactly and that was to use infrasonic rated microphones, make recordings and use what's called narrow band analysis to do the subsequent analysis of that data. And they executed the methods that I had recommended exactly.

COMMISSIONER NELSON: And so why didn't you recommend using the micro barometer.

THE WITNESS: Because at that time I wasn't aware that it was a much less expensive tool. It became clear to me after that when I had calls from people to come do testing that I needed a different way. So doing some research into how other fields of science test infrasound particularly for weather detection, tsunami detection, et cetera that micro barometers are available.

They're highly reliable, very durable and relatively inexpensive and not subject to the same artifacts that a microphone was.

COMMISSIONER NELSON: So help me understand just a little bit about how a microbarometer works. I understand a typical barometer measures pressure.

THE WITNESS: That's correct.

COMMISSIONER NELSON: And so a microbarometer does the same thing.

THE WITNESS: Except that it measures the little ripple -- the pressure you see when someone says the pressure outside is X inches of mercury is the overall pressure.

A microbarometer is designed to measure the little ripples that occur at that pressure level. It's a variant on a standard barometer with the exception that instead of measuring the overall pressure it just measures the rapid pressure changes as a breeze goes by, for example, or a pressure pulse from a wind turbine is picked up. And it has very little sensitivity to audible sound, literally no sensitivity to audible sounds.

It's measuring the pressure changes that rise above and below the barometric pressure at any given point.

COMMISSIONER NELSON: In the charts you were

pointing out to us very early on in your discussion I will be honest when I saw those exhibits when they were initially submitted they looked Greek to me so I didn't study them.

Now that you've explained them I'm going to go back and study them and if I remember correctly, one of the axis on there talked about different frequencies; is that correct?

THE WITNESS: That's correct.

COMMISSIONER NELSON: And so does the microbarometer test various frequencies and if so what frequency range?

THE WITNESS: The microbarometer I'm using tests between 0 and 20 hertz.

COMMISSIONER NELSON: So you can identify the specific sources of the infrasound that you're testing; correct?

THE WITNESS: That's right. Because -- and it's only because wind turbines turn at the same RPM which means the blade moves in front of the tower at the same point.

Usually within the wind project they operate at similar RPMs. And when you take the microbarometer readings and you compress hours worth of this data and plot them as I have, what you get are these horizontal

lines that show the specific frequency -- or the specific rotation speeds of the wind turbines and in this particular case I think that was .7 hertz. .7, .75 hertz.

COMMISSIONER NELSON: So what is the scale of measurement of the infrasound?

THE WITNESS: Well, the scale of measurement's on the right-hand side. That's in decibels just like we would measure other sounds but without any A-weighting without any G-weighting, without any filtering of the sound we're just looking at all of the sounds 0 to 20.

The analysis method called Fast Fourier Transform, narrow band analysis, allows us to take that long string of pressures -- it samples 50 times a second, and convert it into frequencies as we can see depicted in the chart in the upper right-hand corner. We can see the little graph with the spikes and then the arrows pointing to where those traces are in the spectrogram.

And it is only by using these kind of tools that you can detect those pulses. Not that the pulses are that faint because they're up in the 50 -- maybe 50 to 60 dB range. But those are sufficient as -- as Steve Cooper's study presented, those are inaudible but some people will pick those up and feel a pressure pulse or they'll get a migraine or they'll get dizzy. They will

have these symptoms that can't be explained --

Excuse me. Turn those off.

Can't be explained by normal audible sound effects.

COMMISSIONER NELSON: And I'm not looking for a medical conclusion because I don't think you're qualified to do that, but of individuals that you have observed that have made these type of complaints and where you have measured the level of infrasound in their home, what level of infrasound have you associated with complaints.

THE WITNESS: When the average sound pressure level of the tones gets over 50 dB then we see people with serious complaints. The most sensitive people can respond at 40 but I'm talking about average.

Remember I said it's a pressure pulse so if we have a wind turbine blade coming down and it creates a pulse, there's a high-rise much above 50 -- in fact let's say the average was 50. The pulse would probably be 65 to 70 and then a long period without anything. So the average doesn't look that high. It's the peak or the crest of the pulse that's triggering the physiological response.

COMMISSIONER NELSON: And so, again, so the pulse at 50 dB is where you have received or observed complaints; correct?

THE WITNESS: Yes. Yes. There are some that are very sensitive who even at 40 average will have complaints, but when it gets to 50 people start complaining. And in homes where you get over 60 they start talking about leaving their home when it's over 60 by any significant amount on a regular basis they will leave their home and it's because they just give up.

COMMISSIONER NELSON: Thank you. I appreciate going through that discussion.

I want to shift now to the dBA measurements that are being proposed for this wind project. And you indicated that -- and you explained why you don't believe a two week measurement works. You've suggested a 10-minute average. Is it correct that you would only do that 10-minute average when the turbines are at full speed.

THE WITNESS: That would be the point of making the measurement, yes. That's why the -- Mr. Hessler was asked this morning about an on/off test. The proper way to take a test of a machine like a wind turbine is to find an ANSI S 12.9 Part 3 compliance test, and on a day when the wind turbines are operating at full power and there's no wind at the ground -- this is a stable atmospheric condition. It's very common in the Midwest, the national renewable energy labs has done studies in

prairie states saying it's roughly two out of every three nights where this condition occurs with calm winds with high upper-level winds. So the wind turbines running but there's no leaf rustle to mask them.

You take that condition. You have the wind turbines operating. They're turned off. Another reading is taken and as long as there's a 6 decibel or so difference between the on and the off, you can be fairly sure in saying that the on condition measurement was the wind turbines not background sound. If it's over 10, then it's absolute, if there's a 10.

And as long as we have Mr. Hall's data showing that levels in the community are 22 to 28 at night, if the wind turbine sound was 40 and it was turned off I would expect the sound then to drop to 28 and we would know then the contribution of the wind turbine without any concern over whether other things had contaminated or affected the sound.

There's operational data, SCADA data S C ADA, that I have used in hearings where I can correlate my readings with the exact operating mode, the speed, the blade angles, the power output, et cetera, and all of that can be brought to bear for a simple on/off test to make sure that the test is fair and assesses only wind turbine noise and not other types of noise. And it can

all be done in one night, not two weeks.

COMMISSIONER NELSON: But from what you're explaining to me it's got to be the right night and nobody really knows when that is going to be; correct?

THE WITNESS: That's right. It may mean that we set up the instruments and we have to spend some evenings waiting for the conditions to be right, yes. But that's still a lot less time than two weeks.

COMMISSIONER NELSON: The condition that you described, windy up above, still down below, so I'm a South Dakotan for my entire life. Wind in South Dakota -- we've got a windy state. Is the phenomenon that you described, is that something that occurs everywhere? Because I know that wind is not the same everywhere.

THE WITNESS: It's a phenomena created by solar heating. Let me explain how that happens.

During the day the sun warms the ground. The warm ground causes air near it to rise and this mixes with the upper-level winds creating a smooth gradient. The wind speed increases. The more you go from the ground up the wind speed goes up.

At night when the sun goes down the ground cools. Now we have cool air at the bottom, warm air up above and cool air sinks so we have this layer of maybe

100 feet deep. Sometimes less than that. Sometimes you can see the top of the trees wiggling but there won't be enough breeze at the ground to induce leaf Russell.

The National Renewable Energy Lab study and I think one of the places they did the test was South Dakota, either that or one of the other plain states showed that that occurs about two out of three nights during the warm season. And it is a characteristic that meteorologists in other cases where I've testified have agreed. And in acoustics we use that condition as the best test condition.

For example, the model, the ISO model that Mr. Hall used for his prediction makes the assumption that the weather conditions are calm wind at the ground and if you'll read it, it will say a stable atmospheric environment. That is the ideal condition for testing noise and that is what I'm saying would be the condition for testing wind turbines knowing from my own experience and from what I have learned about meteorology over my 45 years that there will be many nights when the wind turbines will be at full power even though the wind at the ground level is moderate.

COMMISSIONER NELSON: I think the last -- and I appreciate that discussion. I think the last question. You made the statement in relation to infrasound and you

said, and I think I quote this correctly, "it's unstudied but a major concern."

How can we make sound decisions on something that is unstudied?

THE WITNESS: You can't. All you can do is -- the precautionary principal says that we err on the side of safety. If we know that we have people complaining about the distances of a mile and a quarter or two miles, then we have to take that into consideration until the science those us that that isn't a problem.

And this is something that's always baffled me. Why are the project -- why are we permitting projects near homes when there's still other areas where we could have wind turbines out at greater distances while the research goes on.

So my position has been under the precautionary principal that until we know enough about why these problems occur, that we should be more cautious in allowing wind turbines near residential homes.

COMMISSIONER NELSON: Thank you.

MR. DE HUECK: Commissioner Hanson.

CHAIRWOMAN FIEGEN: Go ahead. I have one more question whenever.

MR. DE HUECK: We'll go down to Commissioner Fiegen. And I'll just announce for the room Cheri really

needs a break. She's been at it for a long time. So when we're done with Commission questions we're going to take a recess.

CHAIRWOMAN FIEGEN: In your testimony, Mr. James, your written prefiled testimony, you talk about Michigan and Ohio and a noise trespass.

Have they used that in relation, the noise trespass in Michigan and Ohio?

THE WITNESS: In Michigan, yes. A number of communities have passed ordinances that encourage that to happen. Basically encourage -- they set restrictive limits, 45 not to exceed, for example. That's an Lmax. And then they let the developer negotiate with the landowners for easements.

CHAIRWOMAN FIEGEN: And they haven't used it in Ohio.

THE WITNESS: I don't know. Ohio's still arguing over things that -- actually in a case that Mr. Hessler and I were involved in called Buckeye Wind back in the early 2000s. They're still arguing over that case.

CHAIRWOMAN FIEGEN: Thank you.

COMMISSIONER NELSON: My apology to Cheri. I have another couple of questions.

Help me understand how infrasound dissipates

over distance, if it does.

THE WITNESS: Infrasound is a -- I'll call it infrasound is not absorbed by air. The energy infrasonic rate is not absorbed by air as the audible sounds are.

The farther you get away from a high frequency noise, even speech, not only is distance a factor but that energy's being absorbed by ear molecules.

Infrasound doesn't do that. Infrasound isn't blocked by physical things, for example. It goes through a house as though the house wasn't even there. And I believe that Mr. Hessler's work at Shirley Wind showed that the levels outside the house and inside were almost roughly the same.

Infrasound is a particularly long propagating. But elephants for example in Africa use infrasound to communicate, a deep bellow. And they can communicate over hundreds of kilometers. We use infrasound to detect distant nuclear bombs, for example. The micro barometer that I use is used by the U.S. government with detectors to detect when bombs are set off halfway around the world.

An infrasonic pulse if it's sufficiently strong enough can go around the world and have almost as much intensity as afterwards. There's anecdotal evidence when

Krakatoa erupted microbarometers all over the world went off and they showed the echo of that eruption propagating around the earth several times. So infrasound is just one of those things that is hard to stop.

And even though wind turbines aren't like a nuclear bomb, the sound is more than sufficient to propagate miles. I have measured infrasound tones at distances of 6 miles. I have colleagues who have measured in the distances of 50 miles. Where you can clearly see the tones that we see in my examples.

And, again, this depends on how many wind turbines. One wind turbine isn't going to be detectable 50 miles away. But a bank of 200 wind turbines will be clearly distinguishable at much greater distances than the single one. And when we start talking about these projects getting larger and larger we get to the point like we have up in Ontario where there's no place within southern Ontario where we can't put up a microbarometer and detect wind turbine tones.

COMMISSIONER NELSON: So when you measured infrasound at 6 miles what was the level?

THE WITNESS: It was down around 40. Average 40.

COMMISSIONER NELSON: And so presumably as you would move further out it would ratchet down and at some

point hit zero.
THE WITNESS: No, it doesn't hit zero. It just blends into the other infrasound that's there. I mean just the fact that the earth is rotating and friction in the atmosphere produces some infrasound. So you get to the point where there's a background infrasound even when you don't have wind gusts and other things triggering it. But at this point when I'm asking what is the distance we should be concerned of, the board of health in Brown County, which has debated this for eight years now basically has said that the radius of the human health hazard is 2 and a half miles around the wind project. And that seems to encapsulate most of the people who are sensitive and it takes people who are really sensitive beyond that, one of which I have an example in my exhibit, to sense it. But for practical purposes, any time you're within a mile is going to be very significant and even at 2 and 2 and a half miles we'll have people who if they are sensitive will report those sensations. Whether it triggers, you know, an adverse reaction or not depends on them. I have an acoustician friend Dr. Malcom Swinbanks who has published papers about his own sensitivity. And he uses his sensitivity to infrasound pulsations as an expert for the U.S. Department of Defense in protecting our military against infrasound.

Because he can feel it, he doesn't have to look at his meter to know whether it's present.
I know three other acousticians who also can sense these pressure pulsations. It's not as rare as Mr. Hessler might like to make it out. If my limited number of acousticians friends include three that are using it as tools, then it's more prevalent in the population than we might expect.
COMMISSIONER NELSON: Thank you.
COMMISSIONER HANSON: Mr. James, all of the positions and thoughts and premises that you're using seem to boil down to a conclusion, and I would like to read what I believe is your conclusion. I've written that down, and I -- it may be a little bit lengthy, but I'd just like you to pause and wait until I ask you if that is correct or not.
You're obviously a strong supporter of property rights. And on page 6 line 174 there's a question pertaining to that. And all this seems to boil down to your position that sound levels that are generated from the wind turbines may not exceed the ambient sound level existing at the property line of nonparticipants unless the utility developer operator is willing to provide compensation for the what you call noise trespass -- or the what I would call sound as opposed to noise; is that

correct?
THE WITNESS: That's close. You're probably -- you're probably right sound trespass but noise means unwanted sound. If a person didn't bother them, then it wouldn't be a trespass.
What I'm concerned about is uncompensated easements. And when we begin to have government bodies set a standard that goes to a home, not to the property line, it results in uncompensated easements. And that's what concerns me.
COMMISSIONER HANSON: I'm a strong believer in property rights as well. But there's -- and semantics aside from noise and sound, when you get into something of that nature, does my air conditioning unit outside my house, do I need to compensate my neighbor for the noise that that creates or the airplane that flies overhead or the street construction work or on and on and on that take place throughout the world daily in everyone's life.
I mean, that just seems so extraordinarily unworkable and unrealistic. It's when the noise is -- is really in a trespass sense. And I know you're trying to get to that point, but I just don't see that you're reaching that.
THE WITNESS: You know, I -- I understand the issue of air conditioners but let me use that as an

example.
The air conditioning industry since I was a young kid back in the '50s has done extensive work in making the sound of an outdoor air conditioning condenser compatible with community noise standards or community lifestyle.
When I bought my new air conditioner a couple of years ago it came with all sorts of noise data showing the impact on my neighbor and how that impact would be acceptable. Also in my community there are other sounds at night that raise the level up to about 30, 35 dBA. So my expectation here is that the -- my neighbor if they put in a wind turbine -- or an air conditioner will also put in one that has been designed to be compatible with the acoustic environment of the community.
Wind turbines haven't been designed for that. Wind turbines are still in their early years. That doesn't mean that some day they won't have one. It just means that right now a wind turbine is like an old air conditioner in 1950 with a noisy fan or noisy pump and other mechanical sounds, that until they can design wind turbines that are more compatible with being close to homes, they should put their hardware out in areas where people aren't there. Or if a person willing to accept the noise compensate them.

In my career with workers, there are a number of jobs where the noise was unbearable, but my employers -- or my clients who were their employers would pay them extra and they would take that extra money as compensation for the noise.

People have a -- people have a right to privacy, but if you say are you willing to exchange it for X number of dollars a year, there willing to do it. And that allows each property owner to participate in the process to the extent they want. And that's why I kind of lean towards it.

COMMISSIONER HANSON: Thank you.

THE WITNESS: Yeah. If wind turbines were air conditioners, it may be different.

COMMISSIONER HANSON: Thank you, Mr. James. I understand that we have moved a great deal with, for instance, automobiles or -- you can hardly even hear them when you're standing right next to them.

THE WITNESS: That's right.

COMMISSIONER HANSON: And there's been a great deal of -- however, you would have to accept that there have been significant advances in the wind turbines of today as compared to 20 or 30 years ago. I won't take exception with your premises and argue those premises that's up to the other folks here. But I'll give it as

much weight as I can to what you've said where I feel that it's justifiable to do so. So thank you for your presentation.

THE WITNESS: Okay. Well, thank you.

MR. DE HUECK: We will recess until 4 o'clock.

(A short recess is taken.)

MR. DE HUECK: We are back in session.

Mr. James is on the witness stand.

Mr. James, you're still under oath. We finished with cross-examination first round. We're going back to Mr. Almond for redirect.

REDIRECT EXAMINATION

BY MR. ALMOND:

Q. First question, Mr. James. Have you ever been permitted to testify in the United States Court to give opinions on noise generated by wind turbines' effects on people?

A. Yes.

Q. And can you provide a citation to the Commission of what that case was?

A. The case --

Q. Maybe not the citation but can you tell us the case name and where it was located at?

A. Yeah. The case was here in -- well there's been many cases where I've been qualified but there's one

where I went through a Daubert hearing in a court here in Michigan. It was McBain, Michigan I can get the specific reference for the record later I don't have it in my hands but in that case I was -- after the Daubert hearing I was qualified as an acoustician.

In fact, if everyone would turn to my Exhibit 1, my bio materials, I have the exact quote from that decision on that page so that people can follow along. It's the page bio materials for Richard R. James, November 8, 2017.

At the bottom of that page there is a table showing some of the example qualifications and at the very bottom is the Michigan court case where I went through a Daubert hearing, and the judge concluded that I was an acoustician with expertise in measurement of wind turbine noise and its effects on people and I was qualified to opine that the Plaintiff's symptoms were caused by the Defendant's wind turbines after that special Daubert hearing.

In Alberta, Canada I've also been simply qualified to speak to not only the noise but also human response to noise, and that is the typical qualifications that I have been granted in other jurisdictions.

Q. And what was the name of that Michigan case?

A. I will have -- it was -- I remember my clients'

names. If you want -- let me pull it up here. I can get it.

Q. Well, no. Let's not do that. Unless the Commission would like him to.

MR. DE HUECK: Just provide it to us later.

Q. We'll just provide it later. Okay?

A. I will.

MR. ALMOND: I don't have any other questions for you, Mr. James.

THE WITNESS: Okay. Thank you.

MR. DE HUECK: Mr. Fuerniss, any cross-examination based on Commission questions?

MR. FUERNISS: No.

MR. DE HUECK: Ms. Jenkins.

MS. JENKINS: No.

MR. DE HUECK: Ms. Pazour.

MS. PAZOUR: No.

MR. DE HUECK: And Staff.

MS. EDWARDS: Briefly.

RECROSS-EXAMINATION

BY MS. EDWARDS:

Q. Can you turn to Staff Exhibit S-5? Do you have all the exhibits in front of you?

A. I will get them up here again. Let's see. Staff exhibit -- S 4, S 5 additional data requests.

Q. Yes. S 5.
A. Okay. Opening it up here. I think everyone else is opening it too because it's slow to respond.
Q. Just let me know when you get there.
A. I will. It's opening slowly.
Okay. I have the document open.
Q. Okay. And I would like to?
A. Which page?
Q. Direct your attention to page 8 of 27.
A. Okay. Is that 2-8? Or 2-7? Is that the page with question 2-7?
Q. Right.
A. Or 2-8.
Q. I'm looking at the question before that which would be 2-6 but I'm looking at the answer so --
A. Okay. Okay. Okay. I believe that was the response by Dr. Alves-Pereira.
Q. Correct. And do you see at the very end there where she responded that there are currently no scientifically valid studies providing numerical data on safe distances that can effectively protect families against ILFN contaminated homes?
A. That is very true because acousticians have ignored low frequency and infrasound since the '70s when I started out and they concluded that audible -- A-weighted

sounds would be the focus of regulations. We've underserved the communities by ignoring the low frequency end of the spectrum.
Q. How could you set a limit if there's no statistically reliable data?
A. Well, to be very honest, the same way we set the criteria back in the 1970s. Acousticians who were familiar with different types of problems got together and pooled their data and came up with, for example, the EPA has an L D N on 55 for urban environments. It was based upon consensus among acousticians and their experiences in the field. And acousticians have plenty of experience with IFLN but governments don't because they've all focused on dBA criteria.
Q. Okay. You testified, and I don't remember in response to which Commissioner question that there's nowhere you can go in Ontario and not be subject -- or not be able to pick up infrasound; correct?
A. I said southern Ontario. Basically if you go from the western edge of southern Ontario on lake Huron over to the east of Toronto along Lake Eerie any area along there there is I think 1,700 wind turbines in that area. Anywhere in that area you will measure the tones from wind turbines as long as you don't have such high wind levels, et cetera, that they mask them.

Q. And earlier you testified that 15 percent of the population would be susceptible to infrasound. So would not then 15 percent of the population of southern Ontario be ill?
A. No. That was 15 percent were subject to the audible sound. 15 percent found levels of 40 Leq and higher were susceptible.
In my -- let's look at Shirley Wind. When Shirley Wind -- when the Brown County Health Department began to explore it the initial complaints were three families. By the end of their investigation they had 70 families that had reported either audible sound or infrasound related symptoms. And this was for a small project with eight wind turbines in a relatively small dairy farming community.
So what is the percentage that are affected? We don't know. Health Canada, for example, their study found that at one and a quarter mile -- so we're talking 2 kilometers they asked people within that distance if they had tinnitus, ringing in the ears, migraines, dizziness, et cetera. Well, we know that the general population -- that the percentage of the general population with dizziness and tinnitus, et cetera is roughly around 1 out of 10 people, and yet at a mile and a quarter from the wind turbines in the Health Canada

Study they were reporting 20 percent and higher prevalence rates.
They couldn't explain what caused it. They tended to ignore it. But I used to say a mile and a quarter was a safe distance. Safe meaning safe. Now I can't say that. The Health Canada data calls it into question because we can't explain why these symptoms of low frequency noise, tinnitus, migraines, pressure pulsations, et cetera, nausea are so prevalent at that distance.
Audible sound would have died off by a mile and a quarter. It would only be the low frequency and infrasound that's present in those homes. So the more with learn about the problem the more we begin to see that even what would be considered large setbacks may not prevent some of the complaints.
MS. EDWARDS: Thank you. No further questions.
MR. DE HUECK: Any Commission follow up?
Okay. Commissioner Nelson has a question for you.
THE WITNESS: Okay.
COMMISSIONER NELSON: Earlier I asked you to try to explain dissipation to me. And I understood your answer.
So it would appear that the dissipation of

infrasound would occur uniformly over distance since there appears to be no impediments to it. Is that accurate?

THE WITNESS: Yes. It -- it -- it propagates with very decrease in sound level over great distances, which is an advantage if you're an elephant trying to communicate to another elephant but it's a disadvantage if you're looking at a noise source that produces infrasonic pulses because that problem propagates much farther than the audible sounds.

COMMISSIONER NELSON: So how many -- since it dissipates at a uniform rate over distance, how many dB does it decrease per mile?

THE WITNESS: Well, it -- again, it -- sound drops off proportional to the distance. If we're talking about audible sound.

COMMISSIONER NELSON: No we're not talking about audible sound. We're talking about infrasound.

THE WITNESS: Well audible sound decreases at 6 dB per doubling of distance. Infrasound is more like 1 or 2 dB per doubling of distance.

And in my tests I kind of lean towards the 2 mile, mile and a quarter as the separating difference between a lot of people, a significant number, let's say 10 percent, having complaints and after that it becomes

much more spotty.

COMMISSIONER NELSON: Let me delve into your answer 1 or 2 dB per doubling of distance.

So between 5 feet and 10 feet it reduces 1 and 2 -- 1 or 2.

THE WITNESS: Yeah.

COMMISSIONER NELSON: That doesn't make sense.

THE WITNESS: Well, let's say it starts out at 100 at 1 meter away. And I'll use meters because it's smooth. 1 meter away it's 100. So at 2 meters it will be let's say 98. At 4 meters it becomes 96. At 8 meters it becomes 94.

And so you can see that as we get to a significant distance like 500 meters it now in order to get another decibel of reduction we've got to go 500 more meters.

COMMISSIONER NELSON: Okay. So I understand that math. And so then my question is is it 1 or is it 2 decibels? That's a big difference.

THE WITNESS: Yes. It depends upon the atmospheric conditions, and it depends upon the surface conditions but -- and that's why I say 1 or 2. Because it -- depending on where you're measuring, it could be either.

But for the levels emitted by wind turbines the

infrasound is significant enough to trigger the sensations of the distances of a mile and a quarter to two miles in those sensitive individuals.

COMMISSIONER NELSON: Have you measured infrasound -- the level of infrasound at a turbine?

THE WITNESS: Right at a turbine it wouldn't be very high and that's because the sound's occurring up above and it's radiating out.

I mean, a wind turbine the sound is radiating off the blades and, therefore, when you're close to it -- actually one of the quietest places near a wind turbine is right at the base of the tower.

COMMISSIONER NELSON: And I understand that. So at what distance would the infrasound be maximized?

THE WITNESS: It becomes more repattable (check) when we're out at distances let's say a thousand feet. And for a one hertz infrasonic tone it takes a thousand feet for the wavelength to form. So within that you can get numbers -- within that distance the numbers can vary all over but as you get a little further away the wave form is fully developed and the propagation becomes somewhat measurable.

But it depends on how it's reflected off the ground, how it's reflected off the ionosphere and other atmospheric conditions. And it's very variable. Low

frequency noise problems are hard to trace because of these issues.

And wind turbine sounds fit into that category. One day it could be perfectly fine. The next day it could be much noisier just due to -- I'm assuming they're operating the same. Just due to how the atmospheric boundary layers are reflecting the sound.

COMMISSIONER NELSON: So I'm going to ask have you measured infrasound 1,000 feet away from an operating turbine?

THE WITNESS: Yes. Multiple times.

COMMISSIONER NELSON: And what level would you typically find there?

THE WITNESS: Probably in the 60s to 70s average with peaks up around 85. That was my first paper was at that distance.

COMMISSIONER NELSON: And what would cause the distance between it being 60 or it being 85?

THE WITNESS: Well, the 60 is the average, but remember a pulse and then quiet so what we're doing is we're averaging a very large short-term sound with a lot of quiet after it so that average drops down. But it's the peak of the pulse that's causing the sensations.

COMMISSIONER NELSON: Right. And I know you explained that already so I assumed that the numbers you

were giving me were just the peak numbers. So 85 would be the peak?

THE WITNESS: Yeah. 85. Whereas the average would be 50 to 60.

COMMISSIONER NELSON: Thank you.

MR. DE HUECK: Reiss, any redirect after Commissioner Nelson's question?

No.

Mr. James, thank you for your testimony --

MS. SMITH: Excuse me, Mr. de Hueck, I got skipped, and I didn't want to interrupt.

Is it okay? I just have one question.

MR. DE HUECK: Yep.

RECROSS-EXAMINATION

BY MS. SMITH:

Q. Mr. James, you had previously talked about the Shirley Wind Farm in response to some of the questions that you were asked; is that correct?

A. That's correct.

Q. And you mentioned that the board of health declared the wind farm a human hazard. Is that true?

A. The exact term is human health hazard.

Q. Human health hazard.

Are you aware that that designation was rescinded in 2015 due to insufficient evidence of a link between wind

farms and people's health issues?

A. No. I'm not. In fact, 2015 the --

Q. I just asked if you were aware of that.

A. I'm aware that it was not rescinded at that point.

Q. Was it ever rescinded?

A. No. The board has maintained that in spite of efforts to have it rescinded.

MS. SMITH: I have no further questions.

MR. DE HUECK: Thank you for your testimony, Mr. James. That will conclude it.

MR. DE HUECK: I'm going to turn to Mr. Almond to call his next witness.

(A short recess is taken.)

MR. DE HUECK: EL18-026 is back in session. Mr. Almond, you may call your next witness.

MR. ALMOND: Intervenors call Jerry Punch.

MR. DE HUECK: Good afternoon, Mr. Punch. My name is Adam de Hueck. I am the Hearing Examiner in this matter. I'll be swearing you in today. Are you ready?

THE WITNESS: I'm ready. Thank you.

(The oath is administered by Mr. de Hueck.)

DIRECT EXAMINATION

BY MR. ALMOND:

Q. Why don't you introduce yourself to the Commission and give a brief recap of your education and experience.

A. Well, I'm an audiologist. I have two higher degrees, a master's degree in hearing and speech science from Vanderbilt --

MR. DE HUECK: Can you slow down a little bit for the court reporter and identify yourself.

A. I'm Jerry Punch. I live in open us, Michigan where I'm seated right now. I appreciate the opportunity to not to have to make the trip to South Dakota by the way.

I have been an audiologist since 1967 so I have really about 50 years experience as an audiologist. My educational background is with a master's of science degree in hearing and speech sciences from Vanderbilt university and a Ph.D. in audiology from Northwestern University. I've been a teacher, a clinician, a researcher, an administrator in a number of settings, mostly academic settings.

The last 20 years 21 years I've been at Michigan State University. I retired from that position, from the faculty there in 2011.

Would you like me to go into the issue of how I got involved with wind turbine noise at this point?

Q. Sure. Why don't you explain how you got involved.

MR. DE HUECK: Mr. Punch, this is the Hearing Examiner. I'm going to interrupt you for just a second. When you look down we can't really see your lips so if

you can either back up while you speak or alternatively if you can adjust your camera down.

(Discussion off the record.)

Q. First why don't you just -- what is an audiologist?

A. Well, audiology is the study of hearing and hearing disorders essentially, hearing loss. Much of my work has been involved, particularly my research has been involved with hearing aid research with diagnostic testing to quantify the amount of hearing loss in people.

As I say, I've been certified as an audiologist and still am since the 19 -- late 1960s. I've done a lot of clinical work with patients. As someone already mentioned in the previous testimony, I basically -- I'm losing my train of thought already. It's not that time of day for me.

Basically what I was saying is wind turbines is kind of a new area. I got involved in about -- excuse me. In 2008 or 2009 when, in fact, Rick James asked me to go to a wind project in lower Michigan. It was in the thumb area of Michigan where a family was abandoning their home or leaving their home at night to be able to sleep because of the turbine noise.

By the way, my affiliation with Rick has been over many years. When I was chair of the department for about six years I actually hired Rick as an as an adjunct

instructor to teach a couple of not courses but give a couple of lectures in a hearing conservation course, a graduate seminar in hearing conservation at Michigan State University.

And so Rick and I had known each other for sometime before 2008 or '9. So we basically -- I went there thinking I'm not sure what my role is here. I'm an audiologist. I understand sound. They were complaining of the noise. And I've had a lifelong interest or career long interest in occupational hearing loss and in community noise so I thought it would be interesting. I was thinking about retiring in a few years and I thought, well, this is something of interest to me. I could possibly become involved if it seems important to do so or interesting.

And the family, we just interviewed them, more or less, informally. Two daughters, two teenage daughters, again, they were leaving their home at night to sleep in a hotel or motel. And I came away actually thinking honestly that what's the problem here? I heard the turbines. They were moving somewhat during the afternoon that I was there. I felt a little bit of sensation. It didn't feel that strange at the time. I was only there, as I said, a couple hours or so, three maybe. And I came away thinking, well, I need to understand -- I want to

understand what's going on. So I rented -- rented. I checked out a book from the library, Paul Gipe's book on wind energy, Wind Energy Comes Of Age. And it was fairly favorable toward wind energy. It did not -- it barely mentioned noise, though, as an issue, and the book was based a lot on the information that was available from the wind turbines that had been installed in European and I think Scandinavia countries and so forth and California at that time by the time had become involved with wind energy.

So not getting a whole lot from the book in terms of an explanation of what the family was complaining about, I began to search the literature, first the internet and then some other sources of let's say journal articles and so on, and I ended up writing an article. Rick was a co-author on the article along with a student we involved in our measurements and writing the report.

The study was published in Audiology Today, which is basically a monthly magazine of the American Speech Language Hearing Association in the summer of 2010, I believe. And so as a result of that, I was asked to chair a group in Michigan, which now the Department of Energy essentially in the state to develop --

My audio died. Are you hearing me?

Q. Yes.

MS. SMITH: I'm sorry. I'm kind of wondering what the question is because I don't think it's quite -- I'm sorry. I don't know where this started.

Q. I think we were just kind of rambling a bit about your background there, Dr. Punch. So let me try to hone you in here.

Did you file -- or did you prepare prefiled testimony in this matter?

A. I did.

Q. And is that what has been marked as Exhibit I-2?

A. I'm looking at my list here I'm sorry I didn't become acquainted with this earlier. I-2.

A. Yes.

Q. And do you have any changes or corrections you want to make to that testimony?

A. No, I don't.

Q. And along with that testimony did you include two exhibits which were your CV and then an article written by you and Mr. James?

A. I did, yes.

Q. And you also provided some responses to some questions asked by PUC Staff; is that correct?

A. I did, yes.

Q. And I'll represent to you that that those are on Exhibit I-34, specifically Intervenors Responses to

Staff's Second Set of Data Requests to Intervenors.

If I were to ask you those same questions that are asked in your prefiled testimony as well as the questions asked by PUC Staff and Intervenors Responses to Staff's Second Set of Data Requests to Intervenors, would you provide the same answers here today?

A. I would, yes.

MR. ALMOND: At this time I would move for the admission of Exhibit I 2 as well as Exhibits I 2 A and I 2 B.

MR. DE HUECK: Do you have an objection?

MS. SMITH: Can we revisit this after cross?

MR. DE HUECK: Certainly.

MR. ALMOND: I think the process we used previously was to admit it and have her move to strike it.

MS. SMITH: If you would like to do it that way, that's fine by me.

MR. DE HUECK: You're right. Yes. Okay. So, Staff, do you have anything to add?

MS. EDWARDS: I have no objection.

MR. DE HUECK: So we're going to go ahead and admit the exhibits and testimony.

(A short recess is taken.)

MR. DE HUECK: Okay. We're back in session.

The court reporter is all squared away so we can continue.

Q. (BY MR. ALMOND) Dr. Punch, did you have the opportunity to review Dr. Roberts's prefiled testimony in this matter?

A. Yes, I did.

Q. And do you recall Mr. -- Dr. Roberts's prefiled testimony him stating that he's not aware of any reliable evidence providing any link between infrasound and adverse health effects?

A. I did. Yeah I do.

Q. Do you have any response to that claim?

A. Well, I heard him say I'm not aware at least three times with respect to that question. Or I read that.

There's I think mountains of evidence as we provided in our article, the 2016 article, that included as exhibit -- I've lost the numbers here but my second exhibit.

You've heard testimony and I would agree with it that from Rick especially that there's lots of field evidence. There's lots of anecdotal evidence. There is some evidence in the literature -- like Dr. Roberts made the point that only epidemiological evidence is useful in drawing conclusions about causation between wind turbine noise and adverse health effects.

He also said paradoxically that -- when asked how likely is it that -- and I'm paraphrasing. How likely is it that such epidemiological studies will be done in the future. And he said not very likely. And I think I agree with this in the sense that they're expensive, they require a lot of preparation, government funding and Mr. James has already responded to that issue of there's just not government funding available for that kind of research.

So my point is we have to take what we have. Just like the Bradford Hill criteria doctor that is -- Sir Austin Bradford Hill who addressed the medical society in Britain in 1965 listing nine criteria which include experimentation but there are eight other criteria that he talked about that it becomes sort of the -- if you will, the Bible of epidemiology, as I understand that. As I understand it. Indicating that we don't need just epidemiological research to answer questions about causations -- causation of disease processes and/or disorders and external patients.

He went through those criteria, but he didn't -- he just named them. He didn't talk about what they are about. And I think he basically ignored the message that I would read into -- or read from Bradford -- Bradford Hill's address, and that is, again, we use what we can to

draw inferences. We use what is available.

Not that we shouldn't do more research. Some of it might be clinical research design. Some of it might be epidemiological. But these studies that will really address the question definitely about infrasound or just even audible sound and things like dose response, how much sound does it take before people really do come down with the various complaints and problems that they complain about.

That was one of my major takeaways from his -- his comments there. He also did talk about -- he basically uses government studies to rely on for his inference or conclusion that there is no causative relationship between adverse health effects and wind turbines. Yet he uses -- he talked about peer reviewed studies. But these government studies he relies on don't seem to be peer reviewed, per se, min the way that he defines per reviewed. So I found that rather unacceptable.

He holds folks like me and Mr. James and others to a standard of peer reviewed epidemiological research to establish those relationships yet he does not really have -- he can't point to specific studies other than the Health Canada study perhaps as others have also done to support his view that there are no relationships, no causative relationships here.

Q. And just I want to jump to kind of your over all opinions and conclusions in your prefiled testimony. You recommended two separate alternative noise limitations; is that correct?

A. I did yes.

Q. One was a 40 dBA Leq night outside, the other 40 dBA L A max; is that correct?

A. That's correct.

Q. Can you just explain the rationale for those two recommendations?

A. Well, the 40 dB Leq comes from mostly -- emanates really with the 2009 World Health Organization document on night noise guidelines. And that's the point at which it was said -- it was said -- it was decided and used by the World Health Organization to be a threshold at which there are substantial and nontrivial numbers of people who are affected by low frequency noise.

They did not study in the 2009 document really wind turbine noise. That needs to be understood. Wind turbine noise has its own specific characteristics. But if 40 dB Leq is needed for protection against things like road traffic noise and airport noise -- or airport noises and other kinds of noises, then because infrasound is a component of wind turbine noise, the 40 dB actually seems to be a conservative threshold to me.

45 I know is the design goal for this particular project, but 40 is really a very conservative goal. It should be lower. And I know Rick James talks about, recommends, 35 dB Leq but I realize the stress that puts on wind companies to build the projects and I'm not really trying to stop them from building the projects. I just want to protect people as much as possible.

Let me point out the 40 dB Leq is the level that -- I was about to get into this earlier, that the task force that I chaired in the state of Michigan some years ago was about to recommend -- that task force was shut down. I won't go into that unless you want me to. But there was some lobbying I think about shutting us down because --

Q. I don't need you to go into that.

A. Okay.

Q. But --

A. All right. So 40 dB is the level that's certainly recommended by the World Health Organization. It is very close to the levels that the -- that Dr. Schomer, Dr. Paul Schomer, has come up with recently based on four different sources of information, data. They recommend 36 to 38 dB Leq.

And he recommends it to be measured over a 24-hour period basically. That is a little different from the

World Health Organization 40 dB level because they recommended that as an annual average, which I think it impractical -- implying by annual that you actually leave the sound level meter out for a year. We don't do that, of course. You take samples over a year.

If I can get down to the 40 dB L E max is an attempt -- and I made this attempt in another case earlier in New York to try to look at the WHO documents, both the 1999 and the 2009 documents.

Q. Can you back up just a little bit from the camera?

A. Sure. I was actually taking a couple notes and trying to read my notes that I just wrote down just a minute ago. Anyway --

Q. Let's not take any notes okay?

A. Okay. All right.

A. Okay. Can I go ahead with my --

Q. Yeah. The 40 dB L A max.

A. 40 dB L A max. If you review the -- even the 1999 WHO standards I think they talk about the 45 dB L A max inside. And again the 40 dB L A max, one, is an attempt to account for all the peaks and valleys that occur in wind turbine noise. Much of it is infrasound. Some of it, of course, is also audible sound.

I think even more conservative number might be in order because we're talking about -- when we talk about

infrasound we're talking about sound that does not attenuate very well and certainly not very rapidly, and as you've heard many times already in this hearing, it dissipates over very long distances.

There's almost no barriers that can stop it. So even if you have your windows closed, it could be as bad inside as outside. And because the World Health Organization dealt with low frequency noises that did not include infrasound, I think an even lower number like 40 instead of 45 dB LA max would be appropriate to account for the peaks and valleys that do cause the annoyance in real time for people.

And my concern -- and particularly in the 2009 WHO document, the concern there is with sleep. Sleep disturbance.

Q. In addition to noise limitations, you also recommended a 1.25 mile setback. Why is it necessary to have both a noise limitation and a distance setback?

A. Well, a distance setback would be ideal if we could show a really close correlation with the noise levels that people are exposed to at those distances. But because there are differences in terrain even changes in the weather patterns, differences in noise turbine arrays, the way they're arrayed with respect to one another, each other, you can't predict exactly what the

noise levels are going to be from knowing the distance.

But I think the 1.25 miles or 2 kilometers that's been recommended many times in the literature starting with Pierpont in 2009 would be sort of a minimum distance. 1.5 probably better, obviously. Again, trying to give fairness as much as I can be fair to the wind companies, 1.25 seems a rather respectable conservative number.

But because the distance does not correlate very well with the noise levels at those distances, both would be my recommendation. It's not that hard to set the distance as a limiting factor or a minimum distance along with a maximum noise level. But certainly noise level always has to stay in the equation.

MR. ALMOND: Thank you. I don't have any further questions for you at this time and I'll tender you for cross.

MR. DE HUECK: Mr. Punch, we're now going to subject you to cross-examination starting with the Applicant, Prevailing Winds.

MS. SMITH: Dr. Punch I'm just waiting so they can shift the camera over so that you can see me as opposed to others that are watching.

(Discussion off the record.)

CROSS-EXAMINATION

BY MS. SMITH:

Q. Dr. Punch, do you have anyone with you in the room?

A. I don't.

Q. And other than the documents that were filed in this matter including your testimony do you have any other documents in front of you?

A. I had taken some handwritten notes. I'm putting those aside. I'm not using them. I don't have any other notes. I have a laptop to my right with some files I thought I might need, but I think everything is on the exhibit list that we might need.

Q. Okay. Thank you. You mentioned -- you indicated you're an audiologist; correct?

A. Correct.

Q. And you're not an engineer, not a professional engineer. Is that also true?

A. True. True.

Q. And you're not an acoustician as Mr. James is; correct?

A. Not as he is, no.

Q. You don't perform modeling analyses for wind projects, for instance, to determine sound levels?

A. I've never done that.

Q. And you're not qualified to do that; is that correct?

A. I don't really know, to be honest, in terms of acoustical standards. Probably not. I have certainly done measurements in communities about community noise, race tracks, for example, and public events like concert hauls and so forth. I have made noise measurements part of my training as an audiologist was how to make noise measurements.

Q. Okay. Are you a licensed audiologist?

A. I am not because I am a retired audiologist I didn't want to pay the $350 a year when I knew I wouldn't be practicing clinical work. Licensing only applies to clinical work, working with patients who have hearing problems.

Q. Certainly. And so have you ever been licensed?

A. I have been licensed the whole time with my career that I was involved in clinical work, yes.

Q. Okay.

A. In a couple states.

Q. Are you licensed to practice medicine?

A. Of course not.

Q. Based on your testimony earlier I understand that an audiologist deals with hearing related diagnoses or treatment. So, for instance, hearing loss treatment. Is that true?

A. That's true.

Q. And so an audiologist can determine if somebody has hearing loss but they cannot necessarily determine or diagnose diseases, for instance, from the ear. Is that true?

A. Well, I think a medical doctor would say we can't diagnose in the sense that we can tell where the lesion -- the site of the lesion is by audiometric testing battery that we can perform, some of which is electrophysiologic, some of which is audiological through earphones and so forth but we can't determine what the actual cause of, say, sensory neuro hearing loss really is.

Many times in reports we put in audiometric results are highly consistent with presbyacoustic hearing loss or noise-induced hearing loss, for example, and that is helpful to physicians in making their diagnosis. But they have additional tests they can perform, including their own physical exam.

Q. So if you -- as I understand your testimony, if you identified an issue, that may be referred to a physician in order to make a further testing diagnosis to determine the actual cause?

A. Yes. We work closely with otolaryngologists, ENT specialists, in that we get referrals from them, and we refer to them with respect to diagnostic and sometimes

treatment issues. If medical or surgical treatments seem applicable, then certainly we refer to a medical specialist.

Q. And as an audiologist you don't have any expertise to diagnose nonhearing related maladies like heart disease or diabetes; is that true?

A. That's true. True.

Q. In your testimony you state that you're testifying as an expert witness regarding the potential health effects posed by noise from the project; is that correct?

A. True.

Q. I believe if you want to turn to pages 3 and 4 of your testimony, do you have that in front of you?

A. What exhibit is that? I do not have it -- I have it on the computer.

Q. Certainly. I believe it is Exhibit 2. I 2. Sorry.

A. I 2?

Q. I 2.

A. I 2 A? I'm sorry. Prefiled testimony?

Q. Yes.

A. Okay. Okay. I have it.

Q. And if you look at page 3. 3 and 4.

A. Okay.

Q. I'm looking at lines 58 and 59. Do you see those?

A. 59 ends the question and 60 starts an answer.

Q. Yes.
A. On my -- okay.
Q. That's correct. And, as I understand that portion of your testimony starting at line 60 through 81 you're identifying your qualifications to testify as a health expert regarding wind turbine noise. Is that true?
A. Well, the question was what experiences do I have to qualify me as a health expert, yes. In that sense it's true.
Q. And as I'm looking at your testimony, you indicate that you coauthored an article on wind turbine noise in Audiology Today.
Is that the article you were referencing with Mr. James that you --
A. That was the first article. That's not the same article as I included as my Exhibit 2.
Q. Certainly. You talk about chairing a technical work group. Is that true?
A. Yes.
Q. Testifying before zoning boards and commissions. Is that also correct?
A. I have, yes.
Q. Coauthoring a blog on a website. Is that also true?
A. The article, wind turbine -- well, Exhibit 2 is an article that is published on a website. I called it a

blog. I'm not sure it's really a blog. It's really a -- it's like a journal of the hearing health -- technology and health matters. Okay.
Q. Okay. And then testifying in other matters; is that true?
A. Yes.
Q. And interviewing individuals?
A. I have interviewed individuals, yes.
Q. And then the article that you've coauthored with Mr. James that you do have is Exhibit 2-2; is that correct?
A. Sure. Yes.
Q. So other than your interviews with people where you were interviewing them and asking them about their complaints as you described earlier in your testimony, you're relying primarily on other people's information to have your opinions; is that true?
A. Well, to a large extent I have my own experiences visiting and talking with people and doing some more formal interviewing than I had mentioned earlier.
Q. Okay. As far as -- as far as the people that you interviewed, did you perform medical examinations of those people?
A. No.
Q. And you have identified a number of maladies that

you think can occur due to wind turbines; is that true?
A. Yes. Most of which are documented all of which are documented in the literature.
Q. And that's your -- you reference those on page 5 of your testimony; correct?
A. Are you talking about the symptoms or the complaints or the health problems?
Q. Yes.
A. Okay.
Q. So, for instance, you note sleep disturbance, annoyance, headaches, dizziness, vertigo, nausea, those types of symptoms?
A. Absolutely, yes.
Q. People that don't live near wind turbines also can experience those same health effects. Is that true?
A. Admittedly, yes of course.
Q. And there's multiple reasons why someone might suffer a headache, for instance. Is that also true?
A. Many reasons I understand, yes.
Q. So if someone is seeking treatment for certain symptoms part of the process as we discussed earlier would be to diagnose potential causes of that particularly symptom. Is that true?
A. True.
Q. And you would also rule out other potential causes

so that you can identify hopefully the true cause; is that correct?
A. Yes. And you're talking about individuals. I don't diagnose individuals. I talk -- my work is involved with what I call causation assessment or risk assessment, not individual diagnosis.
Q. No. That would be what a physician would do; is that correct?
A. Individual diagnosis, yes.
Q. And an audiologist does not have the training to rule out nonhearing related symptoms as you've stated earlier; correct?
A. Nonhearing related symptoms? Rule out?
We can take the patient's -- or client's or patient's word for it, like the physicians have to do, that they have a headache, for example, but we can't officially diagnose it.
Q. On page 5 of your testimony you indicate that landowners who participate in a wind project or sign waiver agreements with a wind company are less likely to experience or report negative effects from turbines; is that correct?
A. I believe it is.
Q. So a person's perception of a wind project can influence their reaction to the wind project. Is that

true?
A. Of course.
Q. On page 6 of your testimony you state that you estimate around 15 to 20 percent of exposed residents will experience extreme annoyance and sleep disturbance. Is that true?
A. Right.
Q. You don't site a source for that statement in your testimony, do you?
A. There is no source that says the range is 15 to 25 percent. I was offering an opinion and also an estimate, and that is my estimate.
Q. In your testimony you indicate that you have been retained as an expert witness in the past. Is that true?
A. Yes.
Q. Are you familiar with the case of Williams versus Invenergy, LLC?
A. Yes.
Q. And do you have in front of you what's been marked as I -- oh, A 36?
A. I have it on the list I'll have to find it. I'm sorry. I --
Q. I apologize. It's A 36. It would have been sent to you by e-mail.
A. Oh, I think that was sent to Mr. James's e-mail

address because I'm in his study in his home. I don't know --
Q. I apologize. So do we need to send it to your e-mail now?
A. I have my computer available to do that, if you will.
Q. Okay. We will send it to you.
A. I need to log in.
Q. Okay.
A. Again.
A. I think I have it now.
Q. Okay. If you have it up just let us know when you're ready.
A. It's open. I'll need to be leaning to the right to access it. Okay.
Q. Okay.
A. Okay.
Q. Were you retained by the plaintiff in this action to provide expert testimony on health effects of wind turbines?
A. Yes, I was.
Q. And was your testimony excluded by the court?
A. As I recall, it was. I heard -- I should say I was present to hear Mr. James's testimony, and I think we were -- I know we were involved in the same case, and for

the same reasons my testimony was excluded because of the Daubert hearing issue that we discussed.
Q. Okay. So if you'll look on page 14 of the -- and so the -- as I understand it, the page numbers are on the lower right-hand side.
A. Yeah. I'm almost there.
Q. Okay.
A. Okay. I have page 14.
Q. So if we look under A, Qualifications, do you see that subsection?
A. I do. Yes, I do.
Q. And I'll just warn you Cheri's looking at me so we have to be careful not to talk over each other. Cheri is our court reporter.
I see a line that says, "Punch's qualifications are impressive to be sure." Is Punch you, Dr. Punch?
A. I would assume.
Q. And if you look down at the bottom of the page it says, "However," and then up at the top of 14, "Punch is neither a medical doctor nor an epidemiologist who could opine on the cause of Williams' symptoms solely on the basis of these qualifications. Therefore, for Punch's causation testimony to be admissible he must support his causation opinion with reference to foundational literature which establishes the causal relationship

through the Application of scientific knowledge."
Have I read that accurately?
A. You have.
Q. So if we turn then to page 15?
A. Okay.
Q. And were you -- before I get there were you present for the discussion of the reason -- I believe you said you heard Mr. James's testimony?
A. From another room I was listening on another computer, yes, on the website.
Q. Did you hear the discussion and us read through the reasons why the Cape Bridgewater study was found by the Court to not support an opinion of causation?
A. I have to say I only caught part of that. I'm not fully aware of what was said in total.
Q. If I indicate that Mr. James agreed that I read the portions that were referencing the Cape Bridgewater study and the Dr. Kelly article and Paul Schomer's articles as not being sufficient to form a basis for causation, would you accept that based on what's in the document?
A. I would accept that you --
Q. Read it correctly.
A. I'm accepting that you read it correctly, yes.
Q. I won't repeat those then.
A. Okay.

Q. If we look at then on page 15 at the bottom on the left-hand column it says -- and are you there? I should ask before I start.

A. Am I here? Yes.

Q. It says here, "Neither the Pierpont nor Schomer information constitutes an epidemiological study or shows a significant statistical relationship between turbine generated infrasound and adverse health effects. The third article by Sult and Huller (check) supports its theory of causation by demonstrating some low frequency sounds stimulate hair cells in the cochleas of guinea pigs. However, the Salt and Huller article, like Punch's other exhibits, fail to demonstrate the statistical relationship between low frequency wind turbine infrasound and human health effects."

Did I read that accurately?

A. I wasn't actually reading with you. I have no reason to doubt that you read it accurately. Is that acceptable?

Q. That's acceptable.

And the Pierpont study is the book by Neenah Pierpont called Wind Turbine Syndrome? Is that true that they're referencing?

A. True.

Q. And there's testimony in your -- in your Direct

Testimony you have certain references to Mr. Howell's study on -- the acoustical study that was performed by Mr. Howell. Is that accurate?

A. I did make some comments on that, yes.

Q. Okay. And you made recommendations of certain distances and certain sound levels that you believe are appropriate; is that true?

A. I don't recall whether that was in -- with respect to Mr. Howell's testimony or someone else's, but I think that's -- that makes sense, yes.

Q. And I should --

A. I'll take it as true.

Q. I should restate that you did make those opinions not necessarily in response always to Mr. Howell but of your own determination?

A. That's right.

Q. And as I understood your testimony earlier, you indicated that you had offered a distance of -- a mile distance in addition to a dBA level because you didn't know how you would determine sound at a specific level. Is that true -- or a specific distance. Is that accurate?

A. Yes. I said basically that the two don't correlate always because of differences like terrain and weather conditions and times of year. All kinds of things,

variations, factors, can influence the noise levels that are picked up or expose people to certain noise levels at that particular distance.

In other words, different people at 1.25 may not experience the same noise levels. I didn't quite make that clear earlier, I think.

Q. Are you aware that -- as Mr. Howell did in this case, that it's possible to model in advance the estimated sound levels at specific distances from wind turbines?

A. As I said earlier, I don't do the model but I understand what modeling is about and I understand from other acousticians in addition to Mr. James that modeling is not always accurate.

MS. SMITH: I have no further questions at this time. I would move to strike all of Dr. Punch's testimony. He does not have the qualifications to opine regarding health effects, nor does he have the qualifications to opine regarding acoustical analyses of wind project and appropriate wind turbine levels.

MR. DE HUECK: So from my perspective I'm going to stand by my prior ruling and apply it to Mr. Punch in that he may not testify as to health related effects. However, I think he is allowed to testify as an expert to infrasonic sounds and inaudible noises from his

experience and his training and research.

MR. ALMOND: May I have the opportunity to voir dire the witness specifically related to this court case that she was just referring to, as there's a pretty significant paragraph in there where the Court says -- "Dr. Punch is provided to give an opinion on causation that wind turbines produce audible noise which may disturb individuals and interfere with sleep," which is on page 16 of this court case we're going over that has not been discussed yet.

MR. DE HUECK: Can you point me to where you're --

MR. ALMOND: Page 16 of of the Williams versus Invenergy.

MR. DE HUECK: Where is it?

MR. ALMOND: C, Admissible Subjects of Testimony. Just read that section.

MR. DE HUECK: Yeah. The first sentence, that's what I was trying to say. We're not going to talk about adverse health effects.

MR. ALMOND: Of infrasound and not audible -- or low frequency sound pulses.

That paragraph goes on to say that "Given his expertise as an audiologist, he is qualified to give opinions that wind turbines produce audible noise which

may disturb individuals and interfere with sleep."
MS. SMITH: May I respond? Because nothing that we've discussed here so far indicates that an audiologist tests for infrasound. They test for hearing loss. Hearing has to be audible. Therefore, I do not believe that he is qualified to speak regarding infrasound.
MS. EDWARDS: I'd just like to weigh in that, if permissible, I would like to further voir dire the witness on the same issue.
MR. DE HUECK: Go ahead.
MS. EDWARDS: Thank you. Mr. -- rather, Dr. Punch, are you familiar with the case out of -- or, rather, docket out of New York involving the Cassadaga Wind Farm permit.
THE WITNESS: I am.
MS. EDWARDS: Did you offer testimony in that case?
THE WITNESS: I did, yes.
MS. EDWARDS: Was your status as an expert challenged?
THE WITNESS: I don't think my credentials per se were challenged. I don't recall that they were.
MS. EDWARDS: Was there a Motion to have your testimony excluded?
THE WITNESS: Well, if you have evidence that's

true, your documentation would be better than my recollection. I don't recall it. No. I don't recall it.
MS. EDWARDS: Would it be accurate to state that the Public Service Commission found that it went to weight and persuasiveness rather than admissibility and allowed your testimony in?
THE WITNESS: That sounds consistent with what I recall. But I'm not -- I'm not a lawyer either, and I don't really fully understand the weight of those -- you know, the substance of those labels.
MS. SMITH: I would say that this -- we're really just doing legal argument through the witness because that particular case had a standard where they allowed -- they decided they didn't -- were not going to apply the traditional standards of admissibility and they allowed the witness in and it went to weight.
Here we have been applying the rules of admissibility. They need to be an expert witness in order to testify. Otherwise, anyone could come up and give their opinions regarding articles on the internet, and we've been attempting to differentiate between the two.
MR. DE HUECK: Okay. So still applying a legal standard here is my ruling, and it's similar to what we

did earlier.
He may not talk about adverse health effects as, say, a doctor or another medical professional because clearly he is not. But he has clearly stated that he has been studying audiology for a long long time, and he's got a background and a resume to support that.
On that note I believe infrasound and other inaudible noises go hand in hand with his study, and he's clearly very fluent in that matter, which is beyond someone just someone talking about what they've read on the internet. So I believe his background will allow him to testify in terms of infrasound.
Additionally, I see what Reece has pointed out, and if you read the whole paragraph it makes sense to me. They're not saying that he can medically go on to expound about sleep related health effects but that if he has, such as the WHO, literature that talks about health effects, he's qualified to tell us about those reports and what they said.
MS. SMITH: And just to be clear, as I understand -- I understand with the reading here that noise can cause sleep disturbance -- the relationship between noise and sleep disturbance was allowed by the court in this particular case.
So is your ruling that that's allowable? That's

the extent of what's allowable?
MR. DE HUECK: That would be the extent.
MS. SMITH: Okay. Just wanted a clarification. Thank you.
MR. DE HUECK: So I'm considering it pretty limited testimony, avoiding anything that is assessing the risk of health problems.
MS. SMITH: All right. As long as we're stopped, I will offer that we'll do the same approach that we did before. We will provide our proposed striking redaction of the testimony that's been submitted, and we'll look at the transcript as well.
MR. DE HUECK: Yes.
MS. SMITH: Thank you. I have no further questions then.
MR. DE HUECK: Okay.
Moving on for cross-examination to Mr. Fuerniss.

CROSS-EXAMINATION

BY MR. FUERNISS:

Q. Hello, Dr. Punch. You have referenced the World Health Organization. Is it true that they're currently reviewing their noise standards and looking in particular at noises from wind turbines?

A. That's true. I learned that yesterday.

MR. FUERNISS: Thank you. I have no further questions.
MR. DE HUECK: Ms. Jenkins.
MS. JENKINS: No questions.
MR. DE HUECK: Ms. Pazour.
MS. PAZOUR: No questions.
MR. DE HUECK: Staff.
MS. EDWARDS: No questions.
MR. DE HUECK: Okay. Dr. Punch -- or, Mr. Punch, now we're going to subject you to Commissioner cross-examination. We're going to get you over to Kristie Fiegen.
Before she begins I just have one question.
That Pierpont lady, she came up with infrasound and studied it and published some things. Would it surprise you to know that she had changed her position and determined that wind turbines do not carry infrasound? In other words, she backed off of her former position that you would have relied on in that court case?
THE WITNESS: Well, I relied on a number of things. But it would surprise me, yes. It would surprise me.
MR. DE HUECK: So you have not heard that?
THE WITNESS: I have not.

MR. DE HUECK: Okay.
CHAIRWOMAN FIEGEN: I have none.
MR. DE HUECK: Vice Chairman Hanson.
No questions.
Commissioner Nelson.
COMMISSIONER NELSON: Dr. Punch, your Exhibit 2, which I think has been labeled as Intervenor 2 B, the wind turbine noise and human health paper, on the bottom of page 2 --
THE WITNESS: I'm sorry. Is that Exhibit 2?
COMMISSIONER NELSON: It was Exhibit 2 on your testimony.
THE WITNESS: Right.
COMMISSIONER NELSON: It's been labeled as 2 B.
THE WITNESS: Well, they're numbered by letters and then a number.
COMMISSIONER NELSON: Yep. I-2 B. And if you go to the second page.
THE WITNESS: Okay.
COMMISSIONER NELSON: Bottom of the second page, probably second to the last sentence that starts, "In fact."
THE WITNESS: Just getting to the second page. Okay. Yes. Okay.
COMMISSIONER NELSON: "In fact much research and

some already rendered legal decision so convincingly that some segments of the population suffer damaging effects from exposure to wind turbine noise."
Can you cite for me the legal decisions that you're referring to there?
THE WITNESS: I don't think they're necessarily the legal decisions that were made in cases I've been involved with. They're cases that I've discussed with Rick James, and he's discussed some cases of others who he knows -- other acousticians who have been involved in these cases.
I cannot cite at this point -- I was basing that on information I had then, but I don't recall what I was basing it on at this point.
I think probably I was thinking for sure about the Wisconsin case. We mentioned the Shirley Wind case in this article, in fact. This was written in 2015 or '16. And that case was on going since, I don't know, 2012 at least, if not earlier. So the fact that it had been ruled a human health hazard was a legal decision in a court case essentially, in a hearing at least.
There are other cases in Europe. There are cases now that anyone about then in Canada, particularly Ontario, Australia, I think, Ireland where there are real community pushback -- there's real community pushback to

install turbine operations.
And even in Canada I think -- my understanding is that in the province of Ontario the new premier, Doug Jones -- excuse me. Doug Ford was elected in large part because of the community's complaints and upset with respect to all the turbines that are going up in that area of the country.
COMMISSIONER NELSON: Yeah. But that has nothing to do with a convincing legal decision.
So I want to go back to your reference to the Shirley Wind Farm issue where that area was declared to be a public health area.
THE WITNESS: Human health hazard, yes.
COMMISSIONER NELSON: Okay. And that decision was made by a court of law; is that correct?
THE WITNESS: Well, it was made by the Public Service Commission, I think, based on evidence from the Department of Health. I was not involved in that case. Let me make that clear.
COMMISSIONER NELSON: But that's the one that you're referring to in this paper; correct?
THE WITNESS: Okay. Correct. I believe so. I believe so.
COMMISSIONER NELSON: No further questions.
THE WITNESS: Again -- okay.

MR. DE HUECK: With that, Mr. Almond, do you have any redirect?

MR. ALMOND: No.

MR. DE HUECK: Prevailing Winds, do you have any recross based solely on Commissioner Nelson's question?

MS. SMITH: No.

MR. DE HUECK: Staff.

MS. EDWARDS: No.

MR. DE HUECK: Okay. Mr. Punch, thank you for your testimony today. You may be dismissed.

(The witness is excused.)

MR. DE HUECK: And moving on, Mr. Almond, you may call your next witness.

MS. AGRIMONTI: Mr. de Hueck, I'm sorry. I just realized the time. We're hitting 5:30, and I know we'll go until 7:00. I didn't know if this was the right time to break, or if you had a different time in mind.

(Discussion off the record.)

MR. DE HUECK: Reece, why don't you go ahead. Call your next witness we'll at least get your portion done and then think about a break before cross-examination.

MR. ALMOND: Intervenors call Paul Schoenfelder.

Paul Schoenfelder,

called as a witness, being first duly sworn in the above cause, testified under oath as follows:

DIRECT EXAMINATION

BY MR. ALMOND:

Q. Why don't you introduce yourself to the Commission?

A. My name is Paul Schoenfelder. I live at 40228 296th Street, Wagner, South Dakota.

Q. And do you own land in or around the project footprint?

A. I do.

Q. How long -- sorry.

A. Sorry. Own a farm together with my wife. I in 2000 received a deed to a portion of what's my wife's family farm.

Q. How many acres do you own?

A. 160.

Q. And how long did you say you've lived there?

A. My wife grew up on the family farm. We moved to Boise, Idaho and then in -- let's see 2017 my wife returned to the area, to the farm, and then I moved to the area in January of 2018.

Q. And what do you do for a living?

A. Right now I'm working on building two businesses in the area. We -- I lived out in Idaho for 24 years. I

worked as a recreation manager for the city of boys I parks and recreation department. Wife and I worked on a business model, plan tried to figure out a way to basically get back to South Dakota get back to the farm. So right now since January I moved back. I'm in the process of building a business on the farm site.

Q. And what about your wife? What does she do?

A. She's a training manager for a company called D T S. She works remotely the company she works for is based out of Orlando Florida she works out of our home remotely.

Q. Do you have any children?

A. We do. We have four adult children. Our adult child, Zachary, our third child, moved back to South Dakota in June.

Q. Where does he live?

A. He lives on the farm with us. He purchased a camper and moved on to the farm site. We're in the process of renovating the farmhouse, and so for the last few months we've been living in the camper since we don't have a flush toilet. So until I get my rough-in permit, my rough-in inspection and get my shower back in place, we're living in the camper on the farmsite.

Q. The other three children live outside of South Dakota?

A. Yes. All three live in Idaho.

Q. And do you have any concerns with this project?

A. I have numerous concerns with the project.

Q. I should first clarify are you an Intervener in this proceeding?

A. Yes. I am an Intervenor in this case. Several concerns. My primary concern is my health, the health of my family.

We have several wind turbines proposed within a mile of our home. I know several people that live near the Beethoven wind project have had very credible health concerns associated with that. I've visited the Beethoven area. Again it's only a few miles from my home. Sound, shadow flicker, vibration. Those are things that are definitely concern for me. Long-term we're planning to live in this house I have to assume for the rest of our lives. It faces towards the east. To the southeast we've got multiple wind turbines. So health issues are huge.

You know, from an aesthetics standpoint, this is where where he want to live. This is where we've spent the last 10 years trying to figure out how to get back to.

I wake up every morning and look to the east and based on the maps vision where the wind turbines are proposed, I know that physically it would be a different

environment. So along with my own health concerns, I guess I'm afraid for the health of my neighbors. I fear for their physical and psychological well-being, having multiple large wind turbines in the neighborhood.

Q. And what county do you live in?

A. Charles Mix County.

Q. And did you participate in the I guess attempted zoning process and all the County Commission meetings that we talked about with Mr. Mushitz?

A. Yes. Pretty much throughout the process. I started attending some meetings in April. Shortly thereafter the idea of zoning was brought up and again attended multiple meetings in which zoning was discussed by the county.

Q. And from start to finish just give the Commission kind of your impression of the process that took place.

A. Well, the first meeting I attended was in April. I believe it was April 19. It was a County Commission meeting attended by Mr. Powers who discussed his health concerns.

MS. AGRIMONTI: Objection. I'm going to ask that the witness please not recite what others may have said at a meeting. He was asked about his impression, not what people said.

THE WITNESS: I apologize.

MS. AGRIMONTI: That's okay. I'm sorry for

interrupting. I want to make sure I have an opportunity to interject an objection during a narration.

A. I attended meetings in April. My primary take away from that meeting was that the County Commissioners did not have a great deal of information about the proposed project. My impression was that they were surprised at what the setbacks potentially were in neighboring Bon Homme County. It was expressed by County Commissioners that they -- they were surprised that setbacks would be that close to occupied residences.

I expressed my concerns that there was a lack of information about the project available. There was a lot of unknowns. I didn't know exactly what the plans were. I've been trying to follow the project earlier, you know, through 2016, through 2017, but still didn't have a great deal of information. I attended several meetings, at least two or three meetings during the month of May in which the topic was brought up to the County Commissioners. Several members of the community attended those meetings. Again, I was struck by the general lack of knowledge of wind, large wind facility regulations, practices. We discussed setbacks with the County Commission. It was expressed several times that two mile setbacks may be appropriate. County Commissioners expressed that --

Q. And let's not talk about what any County Commissioners said.

MS. AGRIMONTI: Yeah. I'm going to move to strike the testimony of the witness. He has provided, I believe, speculation about what the County Commissioners knew or did not know in his recounting of what was said or not said at a variety of meetings.

MR. DE HUECK: So it's pretty blended in there with what he took away from the meetings. I'm going to allow him to continue I'm not going to strike any testimony up to this point but we need to just focus on what you observed, how you felt, and not speculate as to what they said or how they felt or --

THE WITNESS: Yes.

Q. So summarizing you said you attended meetings in the months of April and May. Did you get a sense or a feeling of whether or not the County Commissioners were attentive to the concerns of the residents?

A. I got the impression they were very very attentive to the input that they were sleeving from the public.

Q. Okay. So then after May did you continue to attend meetings?

A. I did. I attended.

Q. Tell us about those.

A. I attended the meeting in June. That was the

meeting that was attended by a representative from District III economic development, Mr. McGinnis. He talked about -- I got to be careful. I honestly want to be very careful.

MR. DE HUECK: Well, here's the easy way to do it. You're doing a lot of what's called narrative, and you just start -- which is great and appreciate it, but your attorney can ask a lot more questions and kind of help guide what comes out of your mouth.

So I'm going to allow Reece to ask more questions and for you to give shorter answers. You can talk just as much. It's just he's going to be there to help you guide it along so we're going to break up your long narratives into smaller sections through your attorney.

THE WITNESS: Thank you.

Q. So this June meeting in which a District III representative was there, at that meeting did you have a sensor an impression of how the Commissioners were responding to the concerns of the citizens?

A. I believe they put a lot of weight on what Mr. McGinnis brought forward. My take away was that if the county was going to set about regulations greater than those that existed in Bon Homme County, that they would subject the county to litigation, that there was a

rationale that was used to develop the Bon Homme County regulations regarding large wind turbines and that if the county were going to do anything more restrictive than that they would have to provide peer reviewed research or they would subject the county to litigation.

Q. And did you continue to attend county meetings as the process continued on?

A. I did. I attended another meeting later in June.

Q. And what was the purpose of that meeting about?

A. That meeting was to take more public input. There were several members of the community that came in and expressed larger setbacks, one mile setbacks and two mile setbacks were what they would like to see, what they would expect, that they felt would be necessary to protect them.

Q. And did you have a sensor impression of how that information was -- or how the Commissioners responded to those requests?

A. Continued to be very well received. Expresses that -- at the public -- we felt as members of the public other public people that I heard there that those things were being heard and that the idea of larger setbacks, one mile setbacks for residences was certainly -- certainly under consideration.

Q. And did there come a point in time where you felt

that the County Commissioners were no longer as receptive to the requests of their citizens?

A. I attended a meeting in July which was also attended by Mr. McGinnis, members of -- I guess I refer to them as Prevailing Winds project, Thorstad, their legal counsel, also several people who were investors and/or had easements for the project.

At that time the tenor of the Commission seemed to change.

Q. How so?

A. When the topic of one mile setbacks was brought up the Commission seemed to be stepping away from that. Mr. McGinnis brought a map that he had put together. I assumed it was Mr. McGinnis put together that showed the southern part of Charles Mix County overlaid with residences with multiple rings representing setbacks. Overlaid with that were proposed turbine locations and that was reviewed.

Several times -- you know, it was -- it was -- it felt difficult to express something, you know, other than what would now have been significantly reduced setbacks.

I requested at that meeting that a map show -- a map of nonparticipating residents. Because as it was looked at, people observed that most of the county if you overlaid one mile or two mile setbacks that occupied most

of that southern part of the county. I requested a map that would also represent nonparticipating or withdraw nonparticipating households. Mr. McGinnis, I believe --

Q. Did you receive a copy of the map that you requested?

A. I did not receive a copy of that map. I also did not see a copy of the map that included nonparticipating residences.

Q. Okay. After that meeting, did you attend any additional meeting?

A. I did. At that meeting in July it was suggested that -- it was suggested that an agreement --

Q. You said the July meeting this is the one you were just talking about?

A. Just talking about, the July meeting. It was suggested that Prevailing Winds Staff visit with --

Q. Let's hold on -- off on that testimony, okay?

A. Sure.

Q. So when you left this meeting in July what was your kind of take away from it?

A. My take away was that -- my take away was that the Prevailing Winds Staff was having more influence on the County Commission than the residents of the county.

Q. Okay. And then did you continue to attend County Commission meetings there after?

A. I did.

Q. And did your impression or your sense change at any point as you attended those additional meetings that the County Commission was providing -- was receiving the Prevailing Winds' input more favorably than that of its residents?

A. Yes. That was my impression. It built from that July meeting and continued in future meetings that I had attended.

Q. When was the last Commission meeting that you attended with respect to this project?

A. I attended an August meeting of the Commission, which zoning was discussed. And then I also attended a September -- early September meeting that was actually with township representatives and the County Commission to discuss zoning.

Q. What was that September meeting about?

A. That was about zoning in general. There was a draft zoning ordinance being brought forward and there were -- there were, I don't know, approximately -- there were several people -- 40 people from the community, several of them representing the townships discussing all aspects of zoning.

Q. And was the discussion of wind energy zoning -- or was wind energy zoning considered during that meeting?

A. In that September meeting wind energy zoning was by and large dismissed because at that point what was referred to as an agreement had been signed and the county would not entertain any zoning changes or emergency zoning with regards to large wind facilities.

Q. And you referenced the agreement. Have you come to learn that was the Peter Pawlowski Affidavit that we've been discussing in this hearing?

A. Yes.

Q. Okay. You've attended this entire hearing process; is that right?

A. Yes.

Q. Earlier a question was asked about the level of social disruption that has occurred in the area. What is your sense on the social disruption that has occurred and that will -- whether you think it will likely continue on?

MS. AGRIMONTI: Objection. Vague.

MR. DE HUECK: You may go ahead and answer that.

A. I've been -- I've been aware of this project since 2016, and I've seen that it's generated quite a bit of anxiety. I attended the public meeting in Avon in July of 2018, and I think if you attended that meeting what you saw at that meeting is really indicative of what I've seen in the community, if not even more so. I've seen a

great deal of anxiety.

My -- my sister-in-law owns property adjacent to ours. Her intention -- she's developing that property with the intention to move to that property. When she learned that there may be turbines --

MS. AGRIMONTI: Objection. He's testifying to what other people think or believe.

MR. DE HUECK: Yes. So don't continue down the road of that. Just your own personal.

A. I've seen people who I fear would -- who have been so emotionally bothered that I fear for their health. The idea that wind turbines are going to be placed in the area. I've seen high levels of anxiety. I've felt personally a lack of information, a lack of accurate information. I can't -- I guess I could speak for others because I've talked to quite a few people, but my feelings have been echoed by others. They feel that it's esthetically disturbing.

Q. Have you observed any strains on friendships or relationships in the community?

A. Absolutely. I've seen neighbors who don't look each other in the aye. I see conflicts. I see people brought to tiers. I see people who feel ashamed because they -- because of the position they've taken for or against it.

MS. AGRIMONTI: I'm going to object to that

testimony as well. He's speculating as to how people feel.

MR. DE HUECK: I agree. However, I'm not going to strike that testimony. I don't think it's incredibly -- just, Reiss, continue to ask some questions.

MR. ALMOND: I don't have any other questions for Mr. Schoenfelder thank you for testifying.

THE WITNESS: Thank you.

MR. DE HUECK: As you've seen we're now going to turn you over for cross-examination. We'll start over here with the Applicant.

MS. AGRIMONTI: Thank you.

CROSS-EXAMINATION

BY MS. AGRIMONTI:

Q. Mr. Schoenfelder, just a couple of questions. You've reviewed the proposed layout for the project in this proceeding; is that right?

A. I have. I've seen the map change a couple times, but I'm pretty familiar with it.

Q. And do you know how close the nearest turbine is to your home?

A. I would say approximately three-quarters of a mile.

Q. And you stated that you were actively involved in Charles Mix County with respect to whether a zoning

ordinance ought to be put in place; is that right?

A. Yes.

Q. And you would agree that all interested persons who have a stake in whether zoning would be appropriate or not have a right to speak and influence the political process?

A. Yes.

Q. And in fact that's what happened in Charles Mix County?

A. Could you restate that question?

Q. Yeah. You would agree that both -- or all sides, there were townships that weighed in on whether zoning was appropriate. There were people like yourself who had opinions about setbacks. There were participants who believed there should be certain rules in place for their development of their property and there was Prevailing Wind Park and all of those entities weighed in to this Charles Mix process. Would you agree?

A. Yes.

MS. AGRIMONTI: I have no further questions.

MR. DE HUECK: Mr. Fuerniss, do you have any questions for Mr. Schoenfelder?

CROSS-EXAMINATION

BY MR. FUERNISS:

Q. Mr. Schoenfelder, you mentioned the potential impact

of a wind farm on your home, your homestead and your business do you feel it would also potentially impact -- you said that your -- that was your wife's home she grew up there. Would there possibly be an impact on the cemetery that her family's buried in?

A. I believe so. Absolutely.

MR. FUERNISS: Thank you.

MR. DE HUECK: Ms. Jenkins, do you have any questions.

MS. JENKINS: I have one.

CROSS-EXAMINATION

BY MS. JENKINS:

Q. Do you think that we -- that the process to get this Application approved or denied, has it gone according to how you would expect for people like us Intervenors?

MS. AGRIMONTI: I'm going to object. I don't believe that the witness would have any expectation or basis on which to make a prediction about how this process ought to go.

MS. JENKINS: Maybe I have to restate that.

MR. DE HUECK: You do. I think you're trying to ask him his level of satisfaction with the process that he's gone through? Or something along those lines?

Q. Do you understand?

A. I believe I understand the question.

Q. Okay.

A. I have been disappointed in the amount of -- or the lack of information available about the project. I have been dissatisfied with the -- with the type of information that I've been able to access. I've never been contacted by Prevailing Winds even though I live in the impacted area. My wife's never been, you know, contacted.

I've attempted to contact Prevailing Winds. See very little response. I hear -- I am surprised and disappointed at the length of time between when the Application is submitted through this process and when it will be approved.

My personal opinion is that the County Commission doesn't have the -- didn't have the time, didn't have the tools in order to adequately and in depth look at this project.

I fear that it moved very quickly for the people in the area and it moved very quickly for our county officials.

Q. Thank you. And can you describe how you feel about it since the Application came in and the process for the Intervenors to prepare for the case and the burden? Do you feel like there's a burden?

A. Well, if you look at the mounds of paper, there's a

lot of information. And it's a very complicated process. I think for individuals to try and navigate that process, it's very difficult and I think there's a lot of people that would be shut out of the process simply due to the lack of understanding of how the process works.

Q. And do you feel that the necessary permits from the different entities that are required --

A. Again, having a lack of understanding of how the process works, I was somewhat surprised that certain things -- the WAPA study being primary among them. I submitted a letter to WAPA in 2016. It was by happenstance I saw the announcement in the Wagner post that that deadline for information to be submitted to WAPA was drawn to a close.

It seems like it's very important, impactful project, and a lot of people, myself included, my family, not aware of what the process was and still look at it to a certain extent shaking our head wondering how is this happening so quickly.

Q. Okay. And then one final question, I think.

Do you feel like the resources that we as Intervenors have are comparable to the resources that -- of the Applicant's?

A. Absolutely not.

Q. Okay. And the question B to that is do you feel

that if the necessary permits that they needed to finalize this project -- do you feel like they probably should have been obtained before they filed an Application with the PUC and caused us to have to spend money to protect our interests?

MS. AGRIMONTI: Objection. Relevancy.

MR. DE HUECK: You can go ahead and answer that. If you understood the question.

A. I think that there are still unknown factors in the Application that there's still holes in the Application. And I don't know how -- how those could be addressed. I still don't understand how they could be addressed or redressed through the process leading up to either approval or denial of the Application.

Q. Okay. And do you have any other concerns?

A. Well, again, I have personal concerns. I'm trying to start a business in the area. And a business is based on -- on sort of the uniqueness of the area. I'm trying to -- I'm working on opening a brewery. We'd love people to come out and enjoy the area and understand that you have products that are -- that are produced in this area, that this is where it comes from. And when I -- I'm kind of -- I'm a history buff so whenever I go up to the hill I go up to Fort Randall anybody who's in the car gets to hear me point out Lake Andes. Lake Andes from the hill.

Lewis & Clark documented Lake Andes because it's a natural lake.

Well, then you turn and look farther to the east. What you don't see is the rolling plains that was there 250 years ago. What's become the dominant feature is a band of large wind turbines. And then you envision that large band of wind turbines stretching for miles farther to the south across Highway 46.

And then you look off towards Nebraska. I drive down to Elgin, Nebraska, and I'm -- I'm not stricken by the rolling hills. I'm struck by the large wind turbines, and that's not -- that's not where I grew up. I grew up in Mitchell. I didn't grow up in an industrial wind farm so that's some concern.

MS. JENKINS: Thank you.

MR. DE HUECK: Ms. Pazour.

MS. PAZOUR: No comment.

MR. DE HUECK: Staff.

MS. REISS: No thank you.

MR. DE HUECK: And that brings us to Commission questions starting with Commissioner Hanson.

COMMISSIONER HANSON: Good evening, Mr. Schoenfelder. It's understandable that there will be mixed feelings about a large industrial project of this nature within an area for a number of different reasons.

And that there will be some significant feelings expressed by the inhabitants that are affected by it.

We've read a number of things and certainly we've witnessed some emotional presentations to us when we were there for the public meeting.

Can you tell us just I'm curious -- and it's not necessarily going to weigh a tremendous amount on the decision but I'd like to know, have you witnessed -- let's look at degrees, for instance. Have you personally witnessed altercations from the standpoint of shouting matches between people?

THE WITNESS: I've witnessed I would say strong words. I don't know if I would describe them as shouting matches.

COMMISSIONER HANSON: Have you witnessed any physical altercations?

THE WITNESS: I have not.

COMMISSIONER HANSON: Okay. I'm just curious to the fabric of the town and relationships. Have you seen people that are no longer willing to do business at particular areas or people who have estranged relationships of that nature?

THE WITNESS: Yes. Yes, I have.

COMMISSIONER HANSON: Okay. Thank you.

Well, to what degree have you seen that? Is it

just one or two or --

THE WITNESS: Again I guess trying to avoid hearsay.

COMMISSIONER HANSON: Sure. That's a little difficult. I understand.

THE WITNESS: People say I -- I don't want to -- I don't want to do business with that person. I don't want to tell them how I feel because I fear that I'll estrange them and they won't do business with me.

COMMISSIONER HANSON: Is this, I'm assuming -- when you socialize and to whatever extent, church and sports events in the high school, things of that nature, is this a number one topic of discussion or is Trump's latest tweet the --

THE WITNESS: What to me is almost more disturbing is that there is a lack of information that people don't know that more than anything else I hear is that still happening? Or I don't want to talk about it because it's already done. It's already -- a done deal is the word you hear so often. It's a done deal. As if this -- all these proceedings are completely irrelevant. That people when asked if they would attend that meeting in Avon in July said there's no point it's already approved and I don't want to rock the boat. That's -- that's been repeated several times.

COMMISSIONER HANSON: All right. Thank you.

COMMISSIONER NELSON: Thank you for being here.

Just to make sure I've got you placed properly on the map, I'm seeing a parcel owned by the Vernon sip life estate. Is that where you're at.

THE WITNESS: That is correct.

COMMISSIONER NELSON: Perfect. You referred in your testimony to the mountains of paper that were involved in this process.

THE WITNESS: Uh-huh.

COMMISSIONER NELSON: But you ended by saying that there are holes in the Application.

THE WITNESS: Uh-huh.

COMMISSIONER NELSON: And do you believe that those holes have not been filled by the mountains of paper that have been involved here?

THE WITNESS: A couple things I guess that come to my mind immediately. The one is WAPA environmental study. It was my understanding that that was a precursor for approval for this project. Again, submitted letters to that process. Still waiting to hear what that says.

Environmental cultural asset survey. Even in the Application I read that that's being worked on. Then again then the accelerated process of the zoning in my own county led to believe that zoning would move forward,

that there would be opportunities for public input when there is to the best of my knowledge that agreement and Affidavit that was produced between Prevailing Winds and the county didn't receive public input. So again still feeling like there's a lack of information out there and misinformation but definitely still things lacking and not understanding how the process works.

COMMISSIONER NELSON: Do you understand that those first two items that you mentioned will in fact need to be completed before any permit would ever be valid from this Commission.

THE WITNESS: I do absolutely.

COMMISSIONER NELSON: And that that information at least that which is not confidential information will ultimately be public.

THE WITNESS: Yes.

COMMISSIONER NELSON: The last question, I want to follow up on Commissioner Hanson's question about relationships.

Have any of your relationships been damaged through this process?

THE WITNESS: Yes.

COMMISSIONER NELSON: Are there people that you don't talk to because of this?

THE WITNESS: There are people I feel less

comfortable talking to. There are relationships that have been strained personally for me. Neighbors. Yes.

COMMISSIONER NELSON: And do you feel ill will towards those who support the project?

THE WITNESS: I am -- I made a commitment early in this process that I would want to be treated the way other people want to be treated. I hope that other people feel the same way. These are my neighbors. A lot of those neighbors are taking the stands for a lot of different reasons. They're not evil people. I just -- I -- I refuse to -- I refuse to hate anyone through this process.

COMMISSIONER NELSON: Thank you. And I appreciate your sharing that. And that was a tough question for me to ask, and I appreciate your answer.

Thank you.

THE WITNESS: Thank you.

MR. DE HUECK: Chair Fiegen.

CHAIRWOMAN FIEGEN: Thank you for being here. Thank you for being part of the process. When I was a legislator and then I came to the PUC the process here is completely different than the legislative process, and it is difficult to maneuver but we're quasi-judicial and yeah. So it's completely different. And so thank you.

THE WITNESS: No problem. It's my pleasure.

CHAIRWOMAN FIEGEN: Two quick questions. The closest wind tower number to your property is -- do you know what number it is or could Reece --

THE WITNESS: I could look at the map in a heartbeat.

Between 23 and 58. I couldn't tell you exactly which one's closer. They're both approximately three-quarters of a mile from my home.

CHAIRWOMAN FIEGEN: Okay. How many acres there does your family own?

THE WITNESS: In total 320.

CHAIRWOMAN FIEGEN: 320. And then you talked about looking at building a business and --

THE WITNESS: Uh-huh.

CHAIRWOMAN FIEGEN: It's always neat when people come back -- come back to South Dakota and raise their families and retire here, whatever. We love that.

THE WITNESS: Uh-huh.

CHAIRWOMAN FIEGEN: Tell me a little bit about the business that you're looking at developing and will people come to your facility? Will they be outside? Will they be in your home? Are you building a shed? Help me understand the dynamics of that business and like how many acres. Where will it be? Right next to your home?

THE WITNESS: And I apologize. You're going to get me started.

The first thing is the family farm. So we're working on the family farmhouse. We sharecrop that land. So we're involved in the process. We received revenue from that farm. We would never want to do anything that would significantly diminish that. Farms are important both economically and culturally. So we want to make sure that that family farm can continue working with a couple of families who do the real work and they've done it for 10, 15, 20 years plus and we want to maintain that relationship.

We also want to build a farm based business. Basically producing products on the farm, woodworking products, hand crafted products, and then distribute it from the farm.

And then the primary business that we're working on is a brewery. From the legislative side I would say the legislature did a good job this spring because they changed some of the brewery laws so now we're able to do what's called self distribution. In the past you -- if you didn't sell beer on the sight you had to work through a distributor, approximately 35 percent of what you -- the cost of production goes to that distributor. So being able to self distribute is huge up to 1,500

barrels. So we started the process we have a building permit we're clearing the ground for a brewery building. It will be a pole barn.

We know that the margins -- you make a lot more money if you can sell it on site so we are hoping to get people on site to come out and buy our beer.

We also know that brand loyalty is huge in the small brewery market so we want to create an environment where people can come out, sit on the porch patio that would be incorporated into this building. We are trying to situate the patio of that building so it's got a prairie view, emphasizing the farmhouse origin and nature of our products is a big part of that marketing strategy. And knowing that also then we can self distribute that and push that out of the area, that we can push the lion's share of our products out. But if we get people to identify with us, they'll become loyal to our brand.

CHAIRWOMAN FIEGEN: Thank you. I certainly appreciate understanding how you're using the land that you came back to. Thank you.

MR. DE HUECK: Mr. Schoenfelder, in following up with both Commissioner Hanson and Commissioner Nelson regarding the social climate of your community, you talked a lot about strained relationships, high anxiety among community members, annoyance between the two sides.

Have you ever felt a threat to your personal safety?

THE WITNESS: Up to this point -- concerns but not a threat. I mean, that's kind of a subtlety but it's something I've thought about but it's not --

MR. DE HUECK: It's not there on the streets.

THE WITNESS: Personally threatened.

MR. DE HUECK: Like a riot isn't looming.

THE WITNESS: Yeah.

MR. DE HUECK: You can still gather under one roof, yes. Feel that hostility and whatnot.

THE WITNESS: Yeah. There's a high level of sensitivity, anxiety.

MR. DE HUECK: The community's been able to keep civility amongst each other because you're good people.

THE WITNESS: Yes. For the most part -- I mean, I've been to these County Commission meetings where, I mean, some of the Intervenors are personally attacked and insulted. Not physically attacked.

MR. DE HUECK: Yeah.

THE WITNESS: But demeaned. That's -- yeah. That's disturbing.

MR. DE HUECK: Yep. Thank you.

With that, we'll go back to your attorney for redirect.

MR. ALMOND: None.

MR. DE HUECK: And we had Commissioner questions so Prevailing Winds, do you have any cross based on those questions?

MS. AGRIMONTI: No. Thank you, Mr. Schoenfelder.

MR. DE HUECK: Mr. Fuerniss, no. Ms. Jenkins.

MS. JENKINS: Of course I have one.

CROSS-EXAMINATION

BY MS. JENKINS:

Q. Did you give the business plan to the county or have you presented that to them?

A. We went to the County Commission I want to say in 2014, presented a model of what we had in mind and they said that from their perspective -- my understanding their perspective was that we would be able to move forward with our plan.

MS. JENKINS: Okay. Thank you, Paul.

THE WITNESS: Thank you.

MR. DE HUECK: Ms. Pazour.

MS. PAZOUR: None.

MR. DE HUECK: Staff.

MS. EDWARDS: No.

MR. DE HUECK: Go ahead.

MR. ALMOND: Do you intend to brew brown ale?

A. I will say my wife's family's Belgian. We'll brew a lot of Belgian styles.

MR. DE HUECK: We'll take a short break, come back at 6:25. That's about a 10-minute break.

(The witness is excused.)

(A short recess is taken.)

MR. DE HUECK: The hearing has resumed.

Mr. Almond, you may call your next witness.

MR. ALMOND: Call Gregg Hubner.

Gregg Hubner,

called as a witness, being first duly sworn in the above cause, testified under oath as follows:

DIRECT EXAMINATION

BY MR. ALMOND:

Q. Gregg, why don't you introduce yourself for the Commissioners.

A. Gregg Hubner, spelled H-U-B-N-E-R. My address is 29976 406th Avenue, Avon, South Dakota.

Q. How long have you lived at that address?

A. Since 2012.

Q. And what do you do for a living?

A. I'm a licensed real estate broker and a certified general appraiser and I farmed up until last year. I have rented my land out now.

Q. Do you own any land in or around the footprint of

the project?
A. Yes.
Q. Using the map behind you over your shoulder can you point out to the Commissioners where your residence is?
A. Right here this long yellow line it's right at the bottom (indicating). I see it's under my wife's name, Marsha.
Q. And in addition to your residence, do you own other land in the project footprint area?
A. Yes.
Q. And using Exhibit I 29 back there, can you see the Hubner name on various parcels of land?
A. Yes. From the house I own 240 acres where the house are -- is, excuse me, and my brother owns the next four quarters north and then I own some land to the west of it and then some more to the east of it. And then my brother and I own a couple quarters up north but I think it's just out of the project. Because it's right near Beethoven so I think it's right up in that white there.
Q. And how many total acres do you own -- do you and your brother own and if you can split up who owns what approximately?
A. Well, I have -- yeah. I think I have about 1120 acres and my brother has about 840 acres, I think. There's about 1,900. And we own that one piece together.

So roughly the two of us -- but we each own our own land but together we own about 1,985 acres.
Q. Okay. And at some point were you asked to sign up to participate in the project?
A. Yes. I was asked to sign up for the Prevailing Winds project in the spring of 2015.
Q. And how were you asked to sign up?
A. Well, I was called by Ron Hornstra and he wanted to make an appointment, which they did. And so him and Roland Jurgens came to our house. I think it was in -- I think it was in March of '15.
Q. And if you'd take a look at Exhibit I-16 for me.
A. Okay. Yes. I've got that.
Q. And tell me what Exhibit I-16 is.
A. Well, they brought this document with them the day they were at my house, and this was their shall you call it addendum or estimator projection of what my payment would be and how it would work out. And for some reason they put my brother's land and my land together because I think someplace on here it says 1,985 acres.
But anyway -- yeah right here on the bottom, long table on top. It says 1,985 acres. And they did all the calculations over their 25 year projected time and they projected us to get 12 turbines. This was all based on 12 turbines. And that's up in the top table. Yeah. So

12 times whatever they were going to pay per turbine for $25 years would total about 2.886 million dollars and that was their projection or estimate.
Q. So did you take it to mean that if you signed up, there was a possibility you were going to get 2.896 million dollars?
A. Well, there might have been a possibility but I thought it was a pretty slim possibility. Since my brother and I were actually small farmers. We're small landowners compared to nowadays. And 12 percent at that time when they were projecting 100 turbines was 12 percent of the project. So that wasn't the reason I didn't sign but I mean it was pretty unlikely to me that we were going to get 12 turbines on this small piece of land.
Q. Was it ever expressed to you why 12 was used?
A. No.
Q. Okay. I'm going to do some quick math but 1,985 acres divided by 12 does that come out to about 165 acres per turbine?
A. I think that's the math, yes.
Q. Was this -- did you have any other interactions with Mr. Jurgens or Hornstra regarding this exhibit?
A. No.
Q. And this meeting took place at your house?

A. Yes.
Q. In March of 2015?
A. It was either February or March but it was in the early spring of '15.
Q. And during that meeting did you sign up for the project?
A. No.
Q. So after that meeting did you then become engaged with the county process and follow this project, how it went through the county process?
A. Yes.
Q. And can you give a brief broad brush strokes summary of your involvement in the county process from the spring of 2015 to I guess today?
A. Well, we got pretty involved in the county process after they came to our place. To be honest I had never been to a County Commissioners meeting in my life before this started. Probably a zoning meeting either so shame on me, we'll say.
But give you just a little bit of history it won't take over 30, 40 seconds. When they built the Beethoven project we were also approached to sign up for that. And 320 acres my brother and I own upright next to it was right next to it. So they wanted that and we decided not to do that.

But we had built this house in 2012, and before we built the house we knew the Beethoven -- you know, they had been around since 2009 actually. In 2010 I was first approached by my name, not by Roland or Ronnie but by my neighbor in 2010. And I said no, I'm not interested and so before we built our house then in the fall of 2011 I called the same neighbor and I said we're going to build my house we're going to move from town we're going to build this home where I want to retire just a mile grew up. --

MS. AGRIMONTI: I'm going to object to the extent the witness is stating what other people said.

MR. ALMOND: He hasn't done it yet but I think he's about to get there so if you can avoid that, Gregg.

THE WITNESS: I was trying not to.

MR. DE HUECK: You were saying that your neighbor said there was nothing going on so that's --

A. Okay. I got information to find out from a B&H representative -- that won't work either.

Q. Did you have an understanding of whether or not there was going to be --

A. I was assured, don't worry about wind turbines. There's nothing happening.

MS. AGRIMONTI: Same objection.

MR. DE HUECK: Okay. We won't strike it. Let's

just move on.

Q. Let's go back to the original question. Walk us through the county process and your involvement in the process after that spring of 2015.

A. Okay. Okay. So we built the house. We moved into the house. And Beethoven came along and we can see it from our house it's about 9 miles away. And we thought well that's okay. Well then in 2015 when they came around with the second project the house was already built. So we thought, well, you know, these things come and they're, you know, very seldom don't they build them so we thought the only thing we can do to protect ourselves -- the second best thing we can do is get safe long setbacks so that we can stay in our house.

And so we started attending zoning and Commissioners meetings in the spring summer of 2015. I looked up in my records. We attended -- my wife and I and several neighbors and people that were interested -- eight meetings in 2015 and at the fall of 2015 is when they did the draft -- or excuse me. The Article 17. And so this was kind of leading up to that and advocating for setbacks through that Article 17 process. That's what happened in 2015.

Q. And during the Article 17 process was a state standard utilized during these meetings?

A. Yeah. It was -- at all of our meetings we were talking a two mile setback. And I've, you know, written some stuff in my prefiled stuff that would explain why we thought we wanted two miles. And, you know, it's very similar to what Paul testified to just a little while ago. You know, the first meeting it sounded like they were listening. But the second meeting not so much. And by the third meeting it's like they didn't even hear what we said. I mean we took them volumes and volumes of stuff to read and I mean it just -- they were being highly persuaded, highly influenced by in my opinion Prevailing Winds, District III, and they had their mind set up on this state standard, 1.1 times, 1,000 feet from the house, and there was nothing you could say, nothing you could do, nothing you could show them to make any difference.

And going through the process, the hearing process at the zoning and also the public hearing meeting for the County Commissioners, the vast majority of people that spoke against the Article 17 were people that were living in the project, and the vast majority of people that spoke for Article 17 were people that were adjacent -- or not adjacent what's the word I'm looking for. Landowners.

Q. Absentee?

A. Absentee. It's later today I would have been better this morning. But anyway absentee landowners or people that live in Sioux Falls, investors these type of people were for it.

So in my opinion we never had much of a chance because they always got what they wanted and there was never talk of compromise. As a matter of fact they painted it like -- at the public hearing at the Commissioners they painted it. If you go through some of the recorded stuff that I have sent in, two miles is way too long we're against the two mile setback. Two miles doesn't work anywhere and they never talked about a mile or half-mile or anything but 1,000 feet or two miles. And so we just got totally wiped out by the people that persuaded them more than we did.

Q. And how many County Commissioners are there in Bon Homme County? First I should say you live in Bon Homme County; right?

A. Yeah. Bon Homme County. Western edge.

Q. How many County Commissioners are there?

A. We have five one -- one for every town.

Q. What town?

A. Avon, Springfield, Tabor, Tyndall, and Scotland districts. We're in the Avon District, and that is the only district that has any Beethoven towers and it's also

the only district that is going to have any Prevailing Winds towers is the Avon district.

Q. Who's the Commissioner for the Avon district?

A. Our Commissioner is Bruce Voigt.

Q. And was Bruce Voigt participating in any of the processes?

A. Well, Bruce Voigt is on the managers board of Prevailing Winds. And it's only been that way since the last election so I assume he took auction January 1 of '17.

MS. AGRIMONTI: Objection. The witness is assuming.

THE WITNESS: Okay.

A. He got elected in the last general election.

Q. Okay.

A. Whenever he would have taken office that's how long he's been there.

Q. And has he voted on any matters that related to this project?

A. No. He -- he can't vote. And that's another problem I have with this process is that if you're for this project or against this project it doesn't make any difference. If you're in the Avon district where all the turbines are you have no representation.

Q. We talked a little bit about the state standard.

Was your understanding of the use of the state standard -- or was it your understanding the state standard came from the PUC draft model ordinance?

A. Yes. I've done extensive research on all of those things, and the draft model ordinances ordinance which was made in 2008 and implemented in 2009, and it was never law or -- you know, it was just more of a suggestion. And I think counties used that back when wind came in to our state back in 2008, 2009.

Q. Did you observe the Bon Homme County Commission utilize those state standards?

A. Yes.

Q. I'll call them?

A. Because as they were doing the process I would look through and read and compare and, yes, it was based on that ordinance.

Q. Changing topics here, can you flip to Exhibit I 18 for me, please.

A. Okay. I have it.

Q. And what is Exhibit I 18?

A. This is a -- an sPower production front and back. I think it's actually two pages but it's an sPower production with a map on it where the blue lines represent the footprint of this new prevail winds park.

Q. And the land that is colored orange or red, can you

tell me who owns that land?

A. Well, I had a neighbor, went to one of the meetings in trip and brought this map back home and showed it to me. And I looked at it and it hit me, struck me kind of funny because it doesn't take me very long to figure out that all of this land at the bottom belongs to my brother, myself, and one piece to my neighbor Greg Wyly. And then all the land, the next little piece up to the left, is Indian land. And then we go up to Sherman Fuerniss's land on the very north part. And there was I think another piece of Indian land and there was maybe one we didn't identify.

Basically this map was showing about three or four people I contend that it was to make it look like we're the only ones who didn't sign up. I don't know what else it would have meant.

MS. AGRIMONTI: Objection. Speculation.

MR. DE HUECK: I agree.

MS. AGRIMONTI: So I'd move to strike.

MR. DE HUECK: We can strike that very last part. But you can continue to take him down that line of questioning.

A. I guess before the hearing's up I would like to see sPower tell me what this map is since my land is front and center.

Q. We might get a chance to do that?

A. Okay.

Q. But let's continue with your examination.

Can you flip to Exhibit I 29 for me, please.

A. Okay.

Q. Do you see a data response 4-2?

A. Yes.

Q. The data request asks the Applicant to provide the names of the 35 landowners who will have a turbine on their property and in doing so identify the county in which the landowner owns the land in which the turbine will be placed and you see the answer is see Attachment 4-2?

A. Yes.

Q. Turn over your right shoulder. What does it say on the top right corner?

A. Of this?

Q. Of that board.

A. 4-2. Attachment 4-2.

Q. And since receiving that have you had the opportunity to go through and count all the landowners that have turbines placed on their land?

A. Yes. I did.

Q. And have you created a table showing the different turbines and the landowners associated with each turbine?

A. Yes. As best I could. Yep.

(Exhibit 38 is marked for identification.)

Q. I'm handing you what's been marked as Exhibit I 38. Is this the table that you've prepared after reviewing Attachment 4-2?

A. Yes.

Q. And is this table showing the different turbine numbers and the landowners associated with each turbine number?

A. Yes. There's a couple turbines that were like right on the border. Could possibly be mistaken here but it's as best I could do.

Q. And if you flip to the second page, did you then add up the different number of turbines that each particular landowner would get?

A. Yes.

MR. ALMOND: At this time I'd like to move for the admission of Exhibit I 38.

MS. AGRIMONTI: I will not object to the extent it is the witness's interpretation of what he believes is shown on the map.

MS. REISS: No objection.

MR. DE HUECK: So admitted for as Ms. Agrimonti stated.

Q. And what was the purpose of performing this

analysis?

A. Well, what's come up in our rural community in the last, say, month was the talk about all of the people that aren't getting turbines that thought they were. So that's why I wanted to know who was actually getting the turbines. And I think, according to what I heard from --

MS. AGRIMONTI: Objection.

MR. ALMOND: You can't talk about what you heard.

THE WITNESS: At this hearing?

MR. ALMOND: Oh, you want to talk about what someone said at this hearing?

MS. AGRIMONI: Let me just interpose an objection. To the extend he wants to use this exhibit to talk about people who thought they were going to get turbines but who aren't, hearsay, speculation. So if that's where he goes, that's my objection.

Q. Go ahead.

MR. DE HUECK: Try to help him down a road he can go.

Q. What have you heard during this hearing?

MS. AGRIMONTI: Objection.

MR. DE HUECK: Yeah. We're going to be in the same boat. That would be hearsay.

MR. ALMOND: It's not out of court.

No. We'll go elsewhere.

Q. So I'll ask again what were you trying to illustrate with this analysis?

A. I heard somewhere --

Q. Well, hold on, Gregg.

A. I'm sorry. I heard this week it's in the Docket it's somewhere.

Q. Hold on, Gregg. No. No.

A. Can I assume anything?

Q. No.

MR. DE HUECK: Reiss, you can pry a little bit on what he's heard while we've been in trial, if that's helpful.

Q. While you've been attending this trial what have you heard?

A. The number of turbines -- the number of leases that sPower Prevailing Winds has. I heard the number this week. Or it's probably on the Docket.

Q. Well, you can actually refer to Exhibit I 29. You should be open to it. No. 4-3 gives you that information.

A. I-29? 4-3?

Yeah. That's what I'm trying to say if I just turn the page over. There's 136 full rights agreements. Those would be agreements where they could put turbines

on. And so in relationship to the 136 that coughed turbines, I was interested in how many actually got turbines and that's why I made this paper.

So 136. And I think it was 29.

MS. AGRIMONTI: I object to this line of questioning. I don't understand the relevance to the factors that are before the Commission in terms of who got turbines and who didn't.

MR. ALMOND: We were done with the line of questioning so I'll end there.

MR. DE HUECK: Okay.

MR. ALMOND: I don't have any other questions for you, Gregg. You are an Intervenor so I don't want to not allow you to say anything that you want to.

Is there anything you want to tell the Commission at this point, given this opportunity.

A. Well, basically I wrapped in this because all the work that we did in the county we were there eight times in 2015, six times in 2017. In 2016 we didn't go at all because we felt after they did the Article 17 and did it with basically no consideration for the residents at all, we basically gave up. We did nothing in 2016. Never went to one meeting.

And then they came along in August of 2016, had the PUC meeting, and then a week or 10 days later pulled

their permit, and it's also in the exhibits here where Mr. Pawlowski testifies that the reason they pulled it they didn't have their land signed up. And it's always bothered me that they would bring the PUC clear to Avon and put on this big show as if this was going to happen and they never had the land signed up. And I knew that was the fact but they never -- it took them two years to actually admit that.

And so it's always been about second best which is protection of our home our neighbor's home, creation, safety, shadow flicker, red lights. It's always been we're trying to get some protection. We got no protection from the county.

The county is not capable -- the county doesn't do enough work -- the county doesn't have enough time -- and this was probably evidenced here this morning -- to do the due diligence that they need, you know, to do setbacks and do shadow flicker and study sound and all this stuff we've been going through for, you know, three days already. They don't have -- I don't mean to be disparaging but they don't have a clue as to what all this is.

And we would take them information after information after information, and we'd talk to them and we'd give them stuff and it made absolutely no difference. And

then not having a County Commissioner to represent us. We have just totally given up on our county because they have done everything that the wind energy system has wanted them to do.

Every time we went to a meeting if we would get -- if we would just show up and they wouldn't know it the next time you'd show up at a meeting they'd have a wall stacked with investors, attorneys, and Prevailing Winds people. And it was totally intimidating, totally. I could go on and on about each individual meeting. I won't have to. But that's the way it's always been.

As soon as you opposed or brought in a witness -- we brought in Geronimo ohm powers one day we brought in Vickie may one day and at the very next meeting they showed up and basically refuted and tried to dismiss the whole thing. So we got no protection from our county. They're not capable and they've been highly influenced by the wind industry. And you can go to any county in the state and they're going to tell you the exact same thing.

So that's why we're here, and we're trying to -- you know, everybody wants to paint us as aunt I wind aunt I wind aunt I wind that's not it. We're for safe and responsible wind energy if they want it. I mean I'd never put it on my land but my neighbor has the right to do with his land what he wants to a point. To a point.

Until he starts putting flicker on my land or into my bedroom window or making noise where I can't sleep. That point has been crossed.

And I used the analogy -- I thought of this a few weeks ago. The to be owe industry it took 40 years of people dying from lung cancer before they finally did something. Now I can't legally light up a cigarette and start puffing smoke in this room. Why is that?

If I lit a cigarette and then burned another one and another one, I'd have smoke in this room and it's illegal and everybody's going to go home and probably nobody's going to get lung cancer. Probably not. But why is that law in existence? Because we protect people. We protect them.

And so when you talk about protecting people you need to protect all the people. Not the big corporations or the big money but the people. Because that's what we're supposed to do, and that's the way a lot of our laws are written.

That's why I can't smoke a cigarette. I don't smoke, but that's why I can't light up a cigarette in here because we're to protect. And that's why we're at the PUC because we don't get protection, and we will never get protection at our county level.

I don't think I have anything else to say.

MR. ALMOND: Thank you, Gregg.

THE WITNESS: Yep.

MR. DE HUECK: So it's 7 o'clock so what I'd like to do is break for the evening, come back refreshed, and be at our best tomorrow morning. If that works for my three Commissioners.

CHAIRWOMAN FIEGEN: So can we start earlier tomorrow?

MR. DE HUECK: 8:15.

(Discussion off the record.)

MR. DE HUECK: I guess we'll move into cross-examination. So if we were recessed we're back in session now.

Go ahead, Prevailing Winds.

MS. AGRIMONTI: Thank you, Mr. de Hueck.

CROSS-EXAMINATION

BY MS. AGRIMONTI:

Q. Mr. Hubner, are you aware of the predicted shadow flicker and sound level predictions for your residence?

A. I've read them, but I can't tell you right now what they are.

Q. All right. Please turn to Exhibit A22-1. Page 2.

A. I've got the wrong book here.

Q. I'd like you to go to the response to 1-2 A. It's the paragraph that begins "another concern." It's about

the fourth paragraph down. Do you see that?
A. Where it says identify.
Q. Where it starts, "Another concern relates to compliance with setbacks."
Do you see that?
A. I'm on page 1.
Q. I'd like you to be on page 2, please.
A. Oh, okay. Another concern.
Q. Yeah. And in that paragraph you talk about a belief --
And let me ask you first, did you participate in drafting these responses, Mr. Hubner?
A. I did.
Q. All right. And it states that there is another concern relating to the Campbell County wind farm and that it relates to seven instances where the turbines were built in violation of setbacks; is that right?
A. Yes.
Q. So that's the concern for the Campbell County wind farm is they were not built in conformance with required setbacks?
A. Well, that's a concern I would have too is if they don't follow the law here, you know, how do I know they're going to follow the law here.
Q. I'm trying to understand a couple of other lay

witnesses who are identified as potential witnesses for the Intervenors including yourself and they're going to talk about the Campbell County wind farm and I want to make sure I understand what the concern is. And I read this response to say it's about violation of setbacks. Is that an accurate summary?
A. Yes.
Q. Thank you.
All right. Please go to page 13 of the exhibit. You're actually ahead of me. Give me just a second.
Can you please tell me what this document is? The top of it says timetable?
A. These are the meetings that we attended at our county level.
Q. For what purpose was this table put together?
A. I just do a lot of -- I just do a lot of documentation of all this stuff.
Q. All right. Did you create it for the purposes of responding to this discovery request or was it already something in your files?
A. No. I had done this about maybe a year ago or less than a year ago.
Q. All right.
A. Would have been after February. So it would have been sometime this spring probably.

Q. I note in there a variety of meetings both with Commission and zoning do these all relate to Bon Homme County?
A. Yes. These are all Bon Homme County.
Q. And I note that in 2017 there are two meetings listed, one for zoning and one Commission where it says, "Gregg proposes one mile with waivers."
Can you please explain what that is.
A. Yes. I would like to. What happened there was the draft model ordinance that, you know, Article 17 was based on was taken down by the PUC.
Q. Mr. Hubner I'm just asking -- maybe I've asked a poor question. What was your proposal with respect to one mile with waivers? What kind of setback was it?
A. Okay. It was a mile from a residence with waivers and we know what they are; right?
Q. Yeah. Thank you.
A. All right.
Q. Okay. Please turn to page 28.
A. Okay.
Q. What is this letter?
A. It looks like a -- oh, that's a letter I sent to the Real Estate Commission and without reading the whole letter because it was September '15, I was -- I had been trying for years to get the South Dakota Real Estate

Commission to add in their property disclosures statement on the house just a little paragraph that says does the seller of the property -- is there a wind farm in the area or a proposed wind farm or do you know of a wind farm in the area so that if somebody bought your house they would know even if it wasn't built yet they would know if a turbine was -- turbines were coming in.
Q. All right. And that effort hasn't been successful, has it?
A. No. Not at all.
Q. Please turn to page 15 of the exhibit. I'm going to back up a little bit.
A. Okay.
Q. One second. All right. On the paragraph that begins "today"?
A. Yep. Right in the middle?
Q. Yeah.
A. Yep.
Q. I'm going to read a portion of the last paragraph. It says and you're responding to your concerns about the Bon Homme zoning ordinance is that right Article 17 in this letter?
A. There's no date on this letter, is there?
Q. I didn't see one.
A. Well, this would have been -- if it starts out -- it

starts out talking about in the spring of '15 so I'm assuming this is a spring or summer 2015 letter.
Q. Okay.
A. Okay.
Q. All right. At the end of that paragraph you state that, "there should be concerns about reduced property values and then "not only would I want my property taxes and valuation reduced I plan to sue B.H. Wind or Ronnie Hornstra personally for the loss I'll have to take on my property."
Did I read that right?
A. Yes.
Q. And have you otherwise made threats to commence legal action against any of the wind developers in the area?
A. Not that I know of. I'm not sure B&H wind is in existence anymore.
Q. I'm sorry what did you say sir?
A. I'm not sure B&H wind is even in existence anymore.
Q. And do you know what the closest turbine is to your residence?
A. Yeah. According to a map that was provided to me during this hearing, it was in the 4,500 foot range, I think.
MS. AGRIMONTI: Thank you. I have no other

questions.
MR. DE HUECK: Mr. Fuerniss.
MR. FUERNISS: I don't have any questions.
MR. DE HUECK: Ms. Jenkins.
CROSS-EXAMINATION
BY MS. JENKINS:
Q. Gregg, you heard my testimony yesterday?
A. Yep.
Q. And did you also have the concerns of the -- the county not following proper procedure, Bon Homme County?
A. Well, I never contended their procedure. I mean, I -- whether they made a mistake or didn't make a mistake as they were doing this. How they did it was really not an issue for me. It's what they did and who they listened to.
Q. Okay. And do you have anything else that you want to talk about?
A. Oh, not really.
MR. ALMOND: I don't think we've got time.
MS. JENKINS: Thank you.
MR. DE HUECK: Ms. Pazour.
MS. PAZOUR: Not at this time.
MR. DE HUECK: Staff, do you have cross-examination?
MS. REISS: Yes. Thank you.

CROSS-EXAMINATION
BY MS. REISS:
Q. Mr. Hubner, you mentioned that one of your concerns was the setback distance; correct?
A. Correct.
Q. And did you have concerns about sound or shadow flicker at all?
A. Yeah. Shadow flicker definitely. Sound definitely, yes. All three.
Q. Okay. You mentioned the one mile setback as your -- or as a recommendation. Would you have any recommendation for sound or shadow flicker?
MR. ALMOND: I'm going to object. Misstates his testimony.
MS. REISS: Can I rephrase.
MR. DE HUECK: Yeah.
Q. What was the setback you requested in your testimony?
A. The setback I requested in my testimony? Today? Here? Now?
Q. In response to a question Ms. Ago -- or Ms. Ago had pointed you to a document. Let me pull it up.
A. You're referring to the one mile with waivers or --
Q. Yes.
A. -- or you talking about? Okay. So that's one mile

with waivers from a residence.
Q. Yes.
A. Yes.
Q. Would you have any recommendations to alleviate your concerns with sound?
A. Well, from what I've heard today, 35 decibel top limit would be -- would be very good. I've been duck hunting already and I've heard turbines for 3 miles. And I'm assuming at one mile I'm going to hear turbines. So 35 decibel one mile from a residence 1,500 feet from a property line would be a minimum for me.
Q. Okay. Would you have any recommendation in regard to shadow flicker?
A. Zero. On the property or on the house.
Q. Okay. And if the Applicant could commit to those sound and shadow flicker levels related to your property would it alleviate some of your concerns?
A. Some of them.
MS. REISS: No further questions.
MR. DE HUECK: That brings us over here to Commission questions. And I'll call -- I'm starting with Commissioner Nelson.
COMMISSIONER NELSON: Gregg, just a couple of questions. I've asked a lot of questions about infrasound in the proceeding. Do you have any evidence

that you or your wife have a sensitivity to infrasound?
THE WITNESS: I have no evidence, but if I could just say another sentence, from reading a lot of this, we do have a health condition in the family that could be sensitive to infrasound.
COMMISSIONER NELSON: I promised myself I wasn't going to ask any questions about the zoning process because I don't believe that's properly before us, but I'm going to ask one.
Was there ever an attempt to refer the 2015 Bon Homme zoning changes to a vote of the people?
THE WITNESS: No.
COMMISSIONER NELSON: No other questions. Thank you.
MR. DE HUECK: Chairman Fiegen.
CHAIRWOMAN FIEGEN: Thank you. I did not know your background. And so were you here -- you were here yesterday when I -- or maybe two days ago. I can't remember now. When I asked about housing eligibilities?
THE WITNESS: Yeah.
CHAIRWOMAN FIEGEN: So I couldn't remember how much land do you own all by yourself with Marsha, your wife?
THE WITNESS: The 1,120 acres or whatever.
CHAIRWOMAN FIEGEN: Okay. And then do you have

another 1,900.
THE WITNESS: No.
CHAIRWOMAN FIEGEN: It's all -- okay. So out of that 1,100 how many housing eligibilities would there possibly be? And because of your background -- yeah. That's my question.
THE WITNESS: Well, I think the word housing -- the term housing eligibility is more for the more metropolitan if you want to use that term, Sioux Falls, Brookings, Watertown. They go in their counties and they establish housing eligibilities so that you can put so many houses on a quarter of land. And each county's got a different set.
Okay. In Bon Homme County we don't call them housing eligibilities but there are zoning laws that you have to have so many minimum acres to build a house. And I think that it's five acres if I'm not mistaken.
So you can't plat off anything less than 5 acres and build a house unless of course you can get a waiver.
CHAIRWOMAN FIEGEN: I'm going to go back to the Staff's questions. When they asked you questions about what you would be comfortable with on a -- when you proposed that one mile setback, I guess, and then the Staff kind of asked you a little bit of questions you did talk about your goal was to negotiate at the County

Commission meeting, I believe, and what you said it was two miles or 1,000 feet and you wish they would have negotiated.
THE WITNESS: I wish they would have tried to compromise in some way.
CHAIRWOMAN FIEGEN: Compromise. Okay.
THE WITNESS: Yeah.
CHAIRWOMAN FIEGEN: So when you answered the Staff questions was that property lines or was that your resident that you built?
THE WITNESS: What I have -- I started out for two miles. And after we fought that for two years and got nowhere, and it looked like this next project was going to come in, that's when I made an effort to go back one more time and say here I'd like you to do a mile from a residence. And I don't think at the county at that time I mentioned 1,500 feet from the property line. But since being involved in a couple PUC hearings and learning about, you know, ice throw and owners manuals of turbines and all of that stuff it occurred to me that the property line and the right of way line to a highway would be a minimum of 1,500 feet.
If you have a bunch of bear land, you know, a 1,500 foot property is going to allow some of your neighbors to put turbines on their land. If your bear

land is next to they're bare land, you know, 1,500 foot would work. It's a minimum but it -- to summarize, a mile from a residence, 1,500 feet from a property line, 35 decibels.
CHAIRWOMAN FIEGEN: From a residence? 35?
THE WITNESS: Yeah.
CHAIRWOMAN FIEGEN: Thank you.
MR. DE HUECK: Commissioner Hanson.
COMMISSIONER HANSON: Good evening.
THE WITNESS: Hi.
COMMISSIONER HANSON: Over the years I have read a lot of literature.
THE WITNESS: So have I.
COMMISSIONER HANSON: From a gentleman by the same name as you who lives in your vicinity. Would that be you?
THE WITNESS: It's possible.
COMMISSIONER HANSON: I'm surprised when you gave your resume you didn't say author on it as well.
I don't have any questions for you. You've been very patient sitting there going through the process. Appreciate it.
THE WITNESS: Thank you.
COMMISSIONER HANSON: And that's all I have to say other than good evening.

MR. DE HUECK: Mr. Almond, do you have any redirect? No.

Mr. Hubner, thank you for your testimony.

THE WITNESS: Thank you.

(The witness is excused.)

MR. DE HUECK: That's concludes our hearing today. We will reconvene --

MS. AGRIMONTI: Just one housekeeping matter, Mr. de Hueck.

Ms. Smith cross-examined two witnesses with an Exhibit No. 36. It's a court case. We would move admission.

MR. DE HUECK: Oh. We had this discussion earlier, and I could have swore you guys already got it in.

Yes. The court case will be admitted. Thank you for catching that.

MS. AGRIMONTI: Thank you.

MR. ALMOND: Can I say no objection.

MR. DE HUECK: Yeah.

So reconvene at the same time? Is that okay?

CHAIRWOMAN FIEGEN: Well, I'd love to start at 8:00 but --

MR. DE HUECK: 8:30. We'll show up at 8:30 and be ready to go.

B

C

D

E

F

G

I

J

K

M

N

P

Q

R

S

T

Y

Z