

1 come out to, say, per acre or something like that for
 2 Charles Mix County, taking into consideration all those
 3 trust lands that aren't taxed?
 4 MS. AGRIMONTI: Objection.
 5 THE WITNESS: This is not even relevant to this.
 6 We're on a whole new ground.
 7 MR. FUERNISS: Okay. I'll withdraw the question
 8 it if that's the proper thing to do.
 9 Thank you.
 10 MR. DE HUECK: Ms. Jenkins?
 11 MS. JENKINS: No questions.
 12 MR. DE HUECK: Ms. Pazour.
 13 MS. PAZOUR: I have a question, but I would
 14 like to ask Ms. Edwards because I'm not sure on how to
 15 ask it.
 16 MS. EDWARDS: Can we take 30 seconds? I can't
 17 give legal advice, but I can see what you want to know
 18 from me.
 19 MR. DE HUECK: Yep. Go ahead.
 20 (A short recess is taken.)
 21 MR. DE HUECK: Ms. Pazour, go ahead.
 22 RE-CROSS-EXAMINATION
 23 BY MS. PAZOUR:
 24 Q. Did you have any public meetings outside of the
 25 Commission -- Commissioners meetings with Prevailing

1 Winds?
 2 A. **No. I stepped out of that meeting with Mr. Peter**
 3 **Pawlowski, but no other meetings, other than public**
 4 **meetings.**
 5 Q. Like in the beginning of August?
 6 A. **I did not.**
 7 MS. PAZOUR: Okay.
 8 MR. DE HUECK: With that, Mr. Mushitz.
 9 THE WITNESS: Mushitz.
 10 MR. DE HUECK: Mushitz. Thank you for your
 11 testimony, and you may step down.
 12 (The witness is excused.)
 13 MR. DE HUECK: We will move on to Staff's
 14 witness. He was scheduled today so that's why we're
 15 breaking the order for Mr. Almond at this time allowing
 16 Staff's witness to take the stand.
 17 MS. EDWARDS: Staff calls David Hessler.
 18 David Hessler,
 19 called as a witness, being first duly sworn in the above
 20 cause, testified under oath as follows:
 21 DIRECT EXAMINATION
 22 BY MS. EDWARDS:
 23 Q. Mr. Hessler, welcome back to South Dakota. Will you
 24 please introduce yourself for the record.
 25 A. **Yeah. My name is David Hessler. I'm an acoustical**

1 **consultant with Hessler Associates, and I've been asked**
 2 **by the Public Utilities Staff to provide impartial**
 3 **technical advice on noise for this project.**
 4 Q. Did you submit prefiled testimony in this docket?
 5 A. **Yes, I did.**
 6 Q. Have you testified before this Commission before?
 7 A. **Two previous times.**
 8 Q. Have you reviewed the other testimony submitted by
 9 other witnesses in this docket?
 10 A. **Yes, I have.**
 11 Q. Both direct and rebuttal?
 12 A. **Yes.**
 13 Q. Have you also reviewed all responses to data
 14 requests?
 15 A. **I believe I've read most of them, if not all of**
 16 **them.**
 17 Q. Did you rely upon that information when formulating
 18 your opinion?
 19 A. **Yes.**
 20 Q. Are you familiar with the testimony of Mr. Howell,
 21 Chris Howell?
 22 A. **Yes. Mr. Chris Howell, the -- he's the acoustical**
 23 **engineer for the project.**
 24 Q. Would you agree that it is -- based upon his
 25 testimony yesterday, would you agree that it is either

1 inappropriate or impossible to assess the potential noise
 2 impact on the -- strike that.
 3 What is your over all assessment of the positions
 4 and arguments advanced by Mr. Howell in his testimony?
 5 A. **Well, I think what you were getting at there for a**
 6 **minute was the first point, which is he contends that**
 7 **it's impossible to predict or assess the public reaction**
 8 **to a project, and so their study focused entirely on**
 9 **simply demonstrating whether the project was going to**
 10 **meet the 45 dBA Bon Homme County noise limit.**
 11 **But they did no work or -- evaluating what the**
 12 **predicted sound levels meant or looked into any kind of**
 13 **low frequency issues. None of that. So I was critical**
 14 **of the -- of Mr. Howell's work in that regard.**
 15 Q. Now just now when you stated "their study" are you
 16 referring to that of the Applicant?
 17 A. **Yeah. The Applicant's noise study, which was**
 18 **prepared by Mr. Howell.**
 19 Q. Are you familiar with a Mr. Steven Cooper?
 20 A. **Yes.**
 21 Q. And who is Steven Cooper?
 22 A. **He's an acoustical engineer out of Australia who**
 23 **with relevance here has recently done some experiments**
 24 **that I find very convincing that demonstrate that people**
 25 **with certain sensitivities are affected by extremely low**

1 frequency pulsations from wind turbines.
 2 He did a blind study where he recorded sound at a
 3 wind farm in Australia and then replicated that sound in
 4 a laboratory setting, and people with known
 5 sensitivities, people that lived on the site that were
 6 bothered by it, could tell when this completely inaudible
 7 sound was played with 100 percent accuracy; whereas, a
 8 group of other people didn't hear anything.

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

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

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

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

23 Q. I'll take your word for it.

24 A. Okay. All right.

25 Q. Are you familiar with Mr. Howell's Rebuttal

1 A. Well, her area is physiology and that sort of thing.
 2 It's out of my area, but I would -- there was another
 3 witness, Mark Hopkins, I believe, who reviewed her
 4 testimony. And he's a physiologist and answered her
 5 point by point, and I had to agree. I found his
 6 testimony very compelling.

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

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

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

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

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

20 So what we found from many years of experience
 21 testing completed projects is that you have to monitor
 22 for usually two weeks and then try to determine what the
 23 project alone level is exclusive of the background level.
 24 The background level's very significant in these
 25 projects. It's as high as the project many times.

1 Testimony as it relates to the testimony of Mr. Richard
 2 James?

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

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

8 A. I actually did agree with Mr. Howell there because
 9 what he was talking about was Dr. Punch was recommending
 10 that the noise limit for the project should be expressed
 11 in terms of an L_{max} statistical noise level.

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

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

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

22 Q. Have you read the Direct and Rebuttal Testimony of
 23 Intervenor witness Professor Alves-Pereira?

24 A. Yes.

25 Q. And what is your opinion of that?

1 For example, in our assessments we'll usually
 2 monitor for about two weeks prior to any construction,
 3 and what we find is that the sound level is directly --
 4 directly correlates to the wind speed. And so when it's
 5 windy the sound level's 45, 50 dBA before anything's
 6 built.

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

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

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

25 Now one point I'd like to make about that is when we

1 do these tests the methodology is kind of up to me
2 because it's never prescribed anywhere. So what I like
3 to do is we ask the project who has called or complained
4 or who's upset about this project in any way, and we're
5 going to monitor at their houses.

6 Now that -- in every case I can think of that's a
7 number between zero and three. Usually there's about
8 maybe two people. And most of these projects cover
9 25 square miles. They involve hundreds of houses. But
10 that's what we find.

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

16 In doing that, we can talk to all of those people.
17 So I've heard the grievances of people that don't like
18 it, and then I've also talked to the people at all these
19 other houses that are receiving sound levels of 46 and
20 47 dBA and most people just say it's -- it's nothing.
21 You hear it. Nothing.

22 So my impression after 15 wind projects of seeing
23 that same thing repeated is that there's going to be some
24 people very upset. It's going to be a small number.
25 There's a few projects that everybody to my knowledge is

1 fine with. But most people aren't that bothered. And
2 that's kind of the facts on the ground.

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

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

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

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

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

1 for this 40.

2 Q. Were you present in the room this morning for all of
3 the testimony?

4 A. This morning, yes.

5 Q. Did you hear the back and forth about whether there
6 may or may not have been a suggestion for a 35 dBA at
7 some point?

8 A. Yes. I did see that, and I did see a copy of that
9 e-mail the day before yesterday, basically stating that
10 the wind turbine developer at that time, that fellow,
11 Roland Jurgens, I think, said the 35 was a great idea and
12 that would protect everyone.

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

18 Q. When you say "huge," what are -- what are you
19 talking, generally speaking?

20 A. Did I say huge?

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

23 Q. Okay.

24 A. And most projects are not that sparsely populated
25 that that's doable.

1 Q. Okay.

2 A. And I would further add I talked about the
3 background level a few minutes ago. When the wind is
4 blowing, and the wind has to blow for the project to
5 operate, the background level is fairly high. It's
6 between 40 and 50. So to design to 35 would be --
7 there's really no need for that.

8 The background level's going to cover up the project
9 at that kind of a level. All you're going to hear is the
10 wind blowing in the trees. There's kind of a bottom
11 limit to how quiet you need to make it, and, generally
12 speaking, we find that's around 40. Once you go below
13 that, there's diminishing returns. You're not getting
14 any further improvement really.

15 Q. Okay. I'm going to draw your attention to
16 Exhibit A33, which I'll provide for you.

17 Mr. Hessler, are you familiar with that exhibit?
18 Take a minute to look at it.

19 (Witness examines document.)

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

22 (Witness examines document.)

23 A. Okay. Yeah. 45 dBA.

24 Q. Can you identify what the title of that exhibit is
25 for the record?

1 **A. The Applicant's proposed conditions.**
 2 **Q.** Is that an exhibit that you -- or a proposal that
 3 you weighed in on or had any input on prior to today?
 4 **A. I haven't seen this exact document, but I understood**
 5 **from the beginning that the Applicant had committed to**
 6 **meeting Bon Homme County 45 noise limit, not only in that**
 7 **county but the other two counties in which the project**
 8 **was sited.**

9 MS. EDWARDS: Thank you. No further questions.

10 I will tender him for cross.

11 MR. DE HUECK: We're going to take a recess at
 12 this point for our court reporter. Let's come back at
 13 10:30.

14 (A short recess is taken.)

15 MR. DE HUECK: We're back in session.

16 Mr. Hessler is on the stand and now subject to
 17 cross-examination. And you're still under oath,
 18 Mr. Hessler.

19 Prevailing Winds, you may proceed.

20 MS. SMITH: Thank you.

21 CROSS-EXAMINATION

22 BY MS. SMITH:

23 **Q.** Good morning, Mr. Hessler.

24 **A. Good morning.**

25 **Q.** As I understood your written testimony, you did not

1 take issue with the noise modeling methodology and
 2 assumptions that were used by Burns & McDonnell in
 3 preparing their analysis for the project; is that
 4 correct?

5 **A. That's correct. They used the same assumptions and**
 6 **even modeling software that I used.**

7 **Q.** Okay. Thank you. And you also agreed that the
 8 modeling showed compliance with the Bon Homme County
 9 requirement of 45 dBA?

10 **A. That's correct.**

11 **Q.** You mentioned a criticism of not taking into account
 12 community perception. Is that accurate?

13 **A. That's correct.**

14 **Q.** And community perception would be a subjective
 15 analysis; is that true?

16 **A. In general, yes. But it is possible to make a**
 17 **judgment as to how impacted people are likely to be.**

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

1 **the possible impact.**

2 **Q.** And you indicated that ambient noise levels vary
 3 from 40 to 50 typically when the wind is blowing in your
 4 Direct Testimony just now; correct?

5 **A. That's right. And the background studies that we**
 6 **do, we find that just about in every site the background**
 7 **level ranges from 20 to 50, purely a function of wind**
 8 **speed. So when wind is blowing there's a significant**
 9 **background noise that's often overlooked by a lot of**
 10 **people that are opposed to wind turbines.**

11 **They think the background is 30 dBA or 25 dBA. But**
 12 **that's when it's calm and the project is not operating so**
 13 **it's not relevant.**

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

17 **A. That's correct.**

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

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

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

1 **A. I have seen instances of that.**

2 **Q.** In this case you stated in your testimony, and I
 3 believe you restated here, that 45 dBA is an appropriate,
 4 reasonably fair noise limit for wind projects at
 5 nonparticipating residences; is that accurate?

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

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

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

13 **A. Those numbers come from our experience at completed**
 14 **projects. Like I briefly described, we measure at the**
 15 **complainant locations and a number of other locations so**
 16 **we know what the sound level is at the people that are**
 17 **complaining. And that's why we say it's -- the situation**
 18 **is generally okay up to 45. Not ideal. But below 40 we**
 19 **see very few complaints.**

20 **Q.** When you -- in your own testimony, your written
 21 testimony, you indicate that a lot of fear and resistance
 22 to wind projects is created during the development phase
 23 by -- largely attributable to highly biased, even scary
 24 anti-wind websites.

25 **Do you remember that testimony?**

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

3 Q. And you noted that once those projects are
4 operational and you also testified here today that most
5 of those fears are found to be unfounded.

6 Is that accurate?

7 **A. That has been my experience, yes.**

8 Q. What's been proposed on Exhibit A33 -- and do you
9 still have that in front of you? It's that one sheet --

10 **A. Yes, I do.**

11 Q. -- of the Applicant's proposed conditions?

12 **A. Yes.**

13 Q. You indicated you had seen similar language before.

14 Is that accurate?

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

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

22 **A. That's correct.**

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

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

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

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

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

14 **A. Not to the extent of this case.**

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

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

19 Q. So it's based on anticipatory complaints for the
20 project?

21 **A. Yes.**

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

25 **A. Correct.**

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

4 **A. That's correct.**

5 Q. And are you basing your statements regarding
6 potential health effects solely on that article?

7 **A. That article I found to really put me over the --**
8 **I've read a lot of articles and attended a lot of**
9 **conferences where this issue has been discussed, but I**
10 **find that to be pretty unequivocal, that experiment that**
11 **he recently did.**

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

15 Q. You're not making a medical judgment here? You're
16 not speaking as a medical practitioner regarding that
17 topic; is that true?

18 **A. No, not at all. I'm -- in my mind I'm thinking of**
19 **the Shirley Wind Project in Wisconsin that I went to, and**
20 **we did a study there to try to figure out what was**
21 **driving the complaints there, the nausea and the ill**
22 **feeling complaints.**

23 **And we went to the houses of those people. We**
24 **talked to them. We took measurements. They weren't**
25 **making it up. And so something's going on.**

1 **And what we found in that study was that you could**
2 **detect the wind turbine blade passing frequency, which**
3 **is, as I mentioned, around 1 hertz but the magnitude of**
4 **it is incredibly small and it's really hard to believe**
5 **that that has any effect but I'm convinced from Cooper's**
6 **work that that's what it is.**

7 Q. So just to make it clear, you're convinced based
8 solely on Cooper's work that that's the --

9 **A. I think he finally made the link. Or demonstrated**
10 **the link.**

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

12 MR. DE HUECK: Mr. Almond.

13 CROSS-EXAMINATION

14 BY MR. ALMOND:

15 Q. Just following up on that last question, what did
16 Cooper demonstrate the link between?

17 **A. That the extremely low frequency pulsations produced**
18 **by wind turbines can be -- they're completely**
19 **inaudible -- can be perceived by people who have a**
20 **sensitivity to it but not by everybody.**

21 Q. And you believe that study gives credence to the
22 complaints of the Shirley Wind individuals and their
23 complaints of -- I guess I'll let you say the complaints
24 because you're the one that was there but --

25 **A. Yeah.**

1 Q. What were the complaints?
 2 A. **That they just felt some funny feeling and had a
 3 little dizziness and vertigo and just couldn't take it
 4 and had to leave their houses. They couldn't get relief
 5 until they left the project area.**
 6 **And but out of the 15 projects we've gone and
 7 measured that's the only one where that complaint, that
 8 specific kind of complaint, was made. At all the rest of
 9 them it was simply the audible noise, thumping noise.**
 10 **You could hear it at night. It was bothering me, that
 11 kind of thing. There was no health complaints at any
 12 other site.**
 13 Q. And did you listen to Mr. Fuerniss's testimony in
 14 this matter?
 15 A. **I have not heard -- I believe I read the written
 16 testimony. Is that what you're referring to?**
 17 Q. Are you aware of the physical symptoms and the
 18 complaints that Mr. Fuerniss has been -- has been feeling
 19 the last 18 months? Have you read anything about that or
 20 heard him testify about that?
 21 A. **No. That's news to me.**
 22 Q. You stated that you believe that the number of
 23 individuals affected by this inaudible infrasound is
 24 quite small, and that's based off of the fact that you've
 25 studied -- what's that based off of?

1 A. **It's based partially off of the sites that I've been
 2 to and talked to everyone, but more than that, it's
 3 there's 90,000 megawatts of wind power in this country
 4 right now. That's over 50,000 turbines. And the only --
 5 and we're still talking about Shirley, which was from six
 6 or seven years ago.**
 7 **If this problem were common at all, it would be in
 8 the forefront of every project's Application and would
 9 really be a totally disruptive issue.**
 10 Q. So if I'm understanding -- maybe I'll just ask you.
 11 Are you aware of any literature or research that
 12 discusses people making the same types of complaints as
 13 those made in Shirley in other wind farms around the
 14 world?
 15 A. **Yeah. I'm only familiar with a handful of sites. I
 16 think Falmouth in Massachusetts. I'm having a hard
 17 time -- I'm thinking there's just a couple.**
 18 Q. Just so we know about the complaints that were
 19 taking place in Shirley and that you're saying aren't a
 20 national or worldwide significant number of, what are
 21 those complaints specifically?
 22 A. **Well, as I mentioned, they described it as just kind
 23 of a dizziness, a mild nausea, and it was particularly --
 24 one woman said right here in this corner of the kitchen
 25 in that chair it's real bad. So I sat there the whole**

1 **night, but I couldn't hear anything at all. I couldn't
 2 measure anything. But, you know, she wasn't just saying
 3 that. She must have just had a sensitivity to it.**
 4 Q. Are you aware of any studies that have actually
 5 measured the number of people that have that sensitivity
 6 to infrasound?
 7 A. **No. That would be good to know, but, no, I don't
 8 know of any organized or scientific counting.**
 9 Q. And given this missing link that was found by
 10 Mr. Cooper, do you anticipate those types of studies will
 11 start being performed in the near future?
 12 A. **I think work will continue along those lines because
 13 it's a big issue. And up until that work the discussions
 14 mainly centered around theories about the inner ear
 15 and -- but nothing that was demonstrable.**
 16 **But now I've found that work to be excellent, and,
 17 yeah, I would expect it to continue.**
 18 Q. And to date aren't most studies talking about wind
 19 farms and adverse effects, aren't they typically talking
 20 about annoyance?
 21 A. **Well, there's really two things going on. There's
 22 audible noise around the mid-frequencies, 500 hertz, a
 23 thousand hertz. That's just the sound of the blades
 24 squishing, and it sounds like a -- like a washing
 25 machine, kind of.**

1 **And then there's low frequency, and that's
 2 completely at the bottom end of the frequency spectrum.
 3 It's a totally separate issue.**
 4 Q. Yeah. As far as your opinion that you don't believe
 5 many people are affected by the infrasound and the
 6 sensitivities to it, would you agree that that -- the
 7 population hasn't really been studied -- or the wind
 8 farms haven't been studied to actually determine what
 9 percentage of people are affected by infrasound?
 10 A. **Well, I think when they are affected it's -- it
 11 becomes known. And the fact that it does not appear to
 12 be a problem at 95 percent of operating projects tells me
 13 it must be rare.**
 14 Q. So you're saying you have knowledge that 95 percent
 15 of projects these complaints of nausea, dizziness,
 16 vertigo haven't taken place, or you just haven't heard of
 17 it?
 18 A. **I haven't heard of it.**
 19 Q. Okay. And in the academic literature about adverse
 20 effects caused by wind turbines, isn't what people are
 21 asked about annoyance and they aren't specifically asked
 22 about nausea, dizziness? I mean, large studies determine
 23 population amounts and --
 24 Do you understand the question I'm asking?
 25 A. **It sounds like you're maybe talking about the Health**

1 **Canada Study. It was a large study about the Canadian**
2 **Health Department.**

3 Q. Well, most of the studies I guess I have read --
4 and, again, correct me if I'm wrong -- is that when they
5 go out and study and survey the population they ask them
6 basically are you annoyed by the project.

7 Would you agree that that's how most studies are
8 created or the method most studies that are analyzed for
9 the purposes of the peer review stuff?

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

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

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

19 MS. SMITH: Objection. Calls for speculation.

20 MR. DE HUECK: Can you rephrase?

21 MR. ALMOND: Yeah.

22 Q. Based off your review of the studies that have been
23 performed and how they've been conducted, isn't it true
24 that when they've asked whether or not an individual's
25 been annoyed, there's no distinction about where the

1 annoyance comes from, whether it's nausea, dizziness,
2 vertigo, or just they don't like the project?

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

4 Q. Can you get Exhibit A33 back in front of you.

5 A. **Okay.**

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

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

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

15 A. **I don't know about colleagues, but we do that**
16 **ourselves.**

17 Q. What's an on/off compliance test?

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

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

25 Q. Would you agree that that would maybe be a better

1 way to measure compliance with a 45 or a 40 or whatever

2 noise standard?

3 A. **To my mind it's a more -- it's a simpler, more**
4 **unequivocal way of doing it. The problem is that a lot**
5 **of projects aren't happy about turning off the turbines.**

6 Q. But it's for a short amount of time to get the
7 measurements; right?

8 A. **Yeah. I know. That's what I tell them.**

9 Q. Earlier you were testifying about how the background
10 noise, specifically noise caused by the wind, often masks
11 the noise created from the turbines.

12 Do you recall that testimony?

13 A. **Yes. That's what I was just alluding to on these on**
14 **and off tests. When you arrive at the site it sounds**
15 **tremendously loud. I'm thinking of one case in**
16 **particular. And they turned off all the turbines. The**
17 **level was the same. It sounded exactly the same. It was**
18 **just the trees around the house blowing.**

19 Q. And in terms of complaints from those individuals
20 living around projects regarding wind turbine noise, in
21 your experience have you found most often the complaints
22 come at night?

23 A. **Yeah. Yeah. It's --**

24 Q. Rather than --

25 A. **It's audible at night and I can hear it and it's**

1 **bothering me and never heard anything about a daytime**
2 **issue.**

3 Q. And is there a reason we would expect more
4 complaints to happen at night?

5 A. **Well, people are trying to sleep and want it to be**
6 **quiet.**

7 Q. What about the atmospheric conditions that
8 frequently exist at night? Can that lead or is that
9 perhaps an explanation for why we see more complaints at
10 night?

11 MS. SMITH: Objection. Vague. I don't know
12 what he means by atmospheric conditions that frequently
13 occur at night.

14 MR. DE HUECK: Either do I, but maybe

15 Mr. Hessler does.

16 A. **Yeah. Yeah. At night sometimes there's temperature**
17 **inversions and things that enhance or allow sound to**
18 **propagate more easily. But it's not every night.**
19 **Sometimes that happens.**

20 **But, no. I don't think that's the reason. It's**
21 **just at night people have the expectation of quiet. If**
22 **they have the windows open and they hear -- it sounds**
23 **like a washing machine going, they don't like it.**

24 Q. What are stable atmospheric conditions?

25 A. **That's when it's cold or above the surface warmer --**

1 **excuse me. I always get this mixed up. It's hot above**
 2 **and cold below.**
 3 Q. And in stable atmospheric conditions is the wind
 4 typically stronger the higher you go up?
 5 A. **No. Actually to get truly stable conditions you**
 6 **need very low wind speeds to stratify the atmosphere**
 7 **thermally. But in stable conditions it's warmer above so**
 8 **that the speed of sound is faster so it refracts the**
 9 **sound waves so they travel more easily.**
 10 **But in windy conditions that kind of atmosphere can**
 11 **exist, and windy conditions are when turbines run.**
 12 Q. Is it common for the atmospheric conditions to exist
 13 where it's calm at ground level but there are strong
 14 enough winds at the height of a turbine that the wind
 15 turbine's still operational?
 16 MS. EDWARDS: I'm going to object simply because
 17 we did not proffer him as a meteorological expert.
 18 MR. DE HUECK: I'm going to overrule your
 19 objection, allow you to answer.
 20 A. **That does happen, but I wouldn't call it common. I**
 21 **think it happens seasonally, more commonly than other**
 22 **times, but it's not an every day or every week**
 23 **occurrence, I don't think.**
 24 Q. And in a given year how frequently?
 25 A. **It depends on the site and everything else.**

1 Q. And under that scenario the sound around a residence
 2 would be -- the sound created from the wind at least
 3 would be relatively quiet or nonexistent because the wind
 4 wouldn't be blowing at ground level; right?
 5 A. **Yeah. That scenario is brought up in every project.**
 6 **That happens occasionally, but I wouldn't base the entire**
 7 **design on that or anything.**
 8 Q. And during these very quiet ground levels and if --
 9 MR. ALMOND: Well, you can strike that, Cheri.
 10 Q. If you have a rural community like we have here in
 11 this project and if those conditions exist, what would
 12 you expect would be the largest generator of noise?
 13 A. **It would depend on how far away you're observing the**
 14 **turbines. If you're very far away, the turbine sound**
 15 **signal's so weak that it doesn't make any difference. If**
 16 **you're very close at a 1,000-foot setback, then you'd**
 17 **notice. You'd notice it more strongly.**
 18 Q. And at what distance would you be able to start
 19 noticing the turbines?
 20 A. **I can't say.**
 21 Q. Can you give us a rough distance?
 22 A. **Are you asking when they first become fairly audible**
 23 **over the background as you approach a project, for**
 24 **instance?**
 25 Q. Yes.

1 A. **I'm going to say -- it's hard to put a specific**
 2 **number on. When we do operational surveys we put**
 3 **monitors that are a minimum of two miles away from the**
 4 **nearest turbine to get the background noise, and that's**
 5 **what we get. There's no turbine influence at that level.**
 6 **And so maybe a mile. You might be able to discern**
 7 **the project under certain conditions.**
 8 Q. In changing gears here, during your testimony
 9 earlier you said that one-and-a-half-mile setbacks
 10 basically -- generally make projects not viable.
 11 Do you recall that testimony?
 12 A. **Yes. Yes.**
 13 Q. Have you analyzed this project to determine whether
 14 or not a mile and a half setback is viable for the
 15 project?
 16 A. **No.**
 17 Q. Okay. And have you seen any evidence in the record
 18 that suggested that if anyone tried to implement a
 19 mile-and-a-half setback to this project?
 20 A. **No.**
 21 Q. So just as a general notion, mile-and-a-half
 22 setbacks aren't typically that viable?
 23 A. **Yeah. Most project sites are fairly densely**
 24 **populated, and there's just not that much room between**
 25 **houses.**

1 Q. Do you think it would be more viable if you were to
 2 separate a mile-and-a-half setback or distinguish a
 3 mile-and-a-half setback for nonparticipants versus
 4 participants?
 5 A. **I would like to see that. In fact, I thought about**
 6 **advocating for that here, but that would create a**
 7 **precedent for all future projects. All you have to do is**
 8 **be an Intervenor, and you can get all kinds of elbow room**
 9 **so it's not really a practical suggestion.**
 10 Q. But you thought about advocating for a
 11 mile-and-a-half setback?
 12 A. **Two-mile.**
 13 Q. You thought about advocating for a two-mile setback
 14 for --
 15 A. **For Intervenor. But that's not a practical**
 16 **suggestion.**
 17 Q. Well, if there was a waiver system that allowed
 18 nonparticipants to waive the setback requirement, what
 19 would be impractical about it?
 20 A. **Yeah. I'm not sure I follow the question. But what**
 21 **I was suggesting was that for those that were clearly**
 22 **unhappy with this project, I thought it was a good idea**
 23 **if the project -- if we could appeal to the project to**
 24 **try to increase -- to maximize those setback distances**
 25 **for those individuals that -- but on further reflection,**

1 **you can't give special treatment to certain people. It's**
 2 **just -- it would set such a precedent that it would**
 3 **happen in every future project.**

4 Q. But a situation in which a two-mile setback with
 5 waivers existed wouldn't give preferential treatment to
 6 certain people, would it?

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

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

13 Have you seen that?

14 A. **Not here, but I know of that.**

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

17 A. **Yeah.**

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

20 MR. DE HUECK: Sustained.

21 MR. ALMOND: In his direct this witness has
 22 testified about proposed regulations. He's given
 23 opinions on some distances, setback distances, et cetera.

24 I think talking to him about setback distances
 25 in this hearing and setback distances with other

1 projects, especially given that he's testified at other
 2 projects are what he's using as support -- partially as
 3 support for some of his opinions, is fair game to talk
 4 with him about his experience with those setbacks.

5 MR. DE HUECK: Which I think you've done, and
 6 now we've moved into some sort of abstract personal
 7 feeling regarding outside the scope of Direct Testimony.

8 Q. In your past experience looking at wind projects,
 9 are you aware of -- are you aware of good neighbor
 10 agreements?

11 Do you know what that term is?

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

14 MR. DE HUECK: Correct.

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

18 A. **Which Massachusetts study?**

19 Q. Talking about health effects of wind turbines, the
 20 Massachusetts government got a panel together to study
 21 wind turbines.

22 Are you familiar with that Massachusetts study?

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

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

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

4 THE WITNESS: Somewhat.

5 Q. And we heard from Dr. Roberts and Dr. Ellenbogen in
 6 that study the Massachusetts government got everyone
 7 together and studied wind farms, and the purpose of which
 8 was to see what regulations should be put in place.

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

12 A. **The Massachusetts noise -- state noise limit is to**
 13 **measure the background L90 statistical. That's the near**
 14 **minimum background level. And then the project can be**
 15 **10 above that.**

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

18 Q. So whatever the L90 level is, the project can go 10
 19 above that?

20 A. **That's right.**

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

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

25 Q. Miles?

1 A. **Yeah.**

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

5 A. **I don't recall. And the reason is it was irrelevant**
 6 **to the problems there. They were merely about the low**
 7 **frequency content, which isn't represented or captured in**
 8 **any way by the A-weighted limit.**

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

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

13 Q. Yeah.

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

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

19 A. **The Wisconsin Public Service Commission. By the**
 20 **way, that study was -- the whole impetus of that study**
 21 **was from my recommendation to study it during a hearing**
 22 **for another wind project.**

23 **They planned to use the same turbines, and people**
 24 **from the Shirley site were at this hearing saying, you**
 25 **know, look at our site. You know, watch out, and don't**

1 **let this happen again.**

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

6 **And it was a very unique test in that it was done**
7 **cooperatively by four different acoustical consulting**
8 **firms, some with kind of known opposition views.**

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

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

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

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

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

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

2 **A. Okay.**

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

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

8 **Q.** Do you see the third paragraph where it says,
9 "Hessler Associates recommends approval of the
10 Application if the following noise condition is placed on
11 approval"?

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

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

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

20 **A. Halfway down, yes.**

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

1 **MR. DE HUECK:** Any objection?

2 **MS. SMITH:** No objection.

3 **MS. EDWARDS:** No objection.

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

7 **MR. ALMOND:** Very sorry.

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

9 So I-36, is that what you said?

10 **MR. ALMOND:** Yeah.

11 **MR. DE HUECK:** Will be admitted. Thank you.

12 **Q.** Let's step away from the Shirley project.

13 I want to talk a little bit about what you started
14 with Ms. Edwards talking about in terms of the community
15 response to a project.

16 Do you remember that part of your testimony?

17 **A. Yes.**

18 **Q.** And there are ways in which to gauge how a
19 community's going to respond to a project when it comes
20 to noise and how that noise is going to affect the
21 community; right?

22 **A. I believe so, yeah.**

23 **Q.** And are those -- and do the ANSI standards talk
24 about what calculations should be done to gauge community
25 response to a project?

1 **A. There is an ANSI standard that addresses that, but**
2 **it wasn't written with wind turbines in mind. It was**
3 **picturing some coal plant or a gas turbine or something,**
4 **which is a much simpler situation.**

5 **Our approach is, as I went through before, was to do**
6 **an initial survey, find out what the background is going**
7 **to be at the wind speeds required to operate the project,**
8 **and then see how the predictions under those same wind**
9 **speeds compare. And depending on that differential, you**
10 **can get an idea of whether it's going to be very audible**
11 **or inaudible.**

12 **Q.** Has that type of study been conducted for this
13 project?

14 **A. No. No. That's completely missing from the**
15 **Applicant's noise study.**

16 **Q.** And you would like to see that type of study in
17 order to gauge the community's response to a project;
18 correct?

19 **A. I think it's the duty of the engineer to do that. I**
20 **don't know why it keeps getting left out of these. This**
21 **is the third one in a row.**

22 **Q.** And without doing that, do you think we're able to
23 gauge whether or not this project's going to injure the
24 social condition of those living in it?

25 **MS. SMITH:** Objection. Calls for a legal

1 conclusion.

2 MR. ALMOND: It's a question.

3 MR. DE HUECK: Well, you're basically asking it
4 will comply with that regulation.

5 MR. ALMOND: And experts are capable of
6 testifying to that.

7 MS. SMITH: He's not a legal expert. He's here
8 to talk about sound studies in his analysis that he's
9 conducted.

10 MR. ALMOND: It's an ultimate conclusion
11 opinion. Experts are offered to provide ultimate
12 conclusions, ultimate opinions. That's what I'm asking
13 him to do.

14 MR. DE HUECK: But not as to whether or not they
15 will be in compliance with a particular law.

16 MR. ALMOND: I have not asked him about a law.
17 I've asked him a question.

18 MR. DE HUECK: It sounds like it.

19 Ask again, Reece. Or maybe --

20 MR. ALMOND: Cheri, can you just repeat the
21 question so we can hear what I asked again.

22 (Reporter reads back the last question.)

23 MR. DE HUECK: So asking if it will comply with
24 the law.

25 Can you --

1 MR. ALMOND: I have not referenced the law. I'm
2 not asking if it complies with the law. I'm asking that
3 question.

4 MS. EDWARDS: I guess I would just object as
5 vague and ask maybe the inquirer to be more clear on the
6 social condition.

7 MS. SMITH: And I'm going to object because it
8 is --

9 MR. ALMOND: I'll rephrase the question.

10 MS. SMITH: May I object?

11 It's basically stating 49-41B-22.1 -- or 2.

12 Excuse me. And so he's basically asking him to opine on
13 the statute compliance.

14 MR. DE HUECK: Yes. So let's sustain the
15 objection.

16 Ask another question.

17 Q. How the community responds to a project deals with
18 the social well-being of the community; right?

19 MS. SMITH: Objection. That's not why he was
20 brought here to testify, on the social feelings of the
21 community.

22 MR. ALMOND: He's been testifying about
23 community response. I'm just trying to figure out why
24 we're curious about the community response and why it's
25 important to look at that.

1 He's offered opinions that this Applicant should
2 have done that. I'm curious as to why.

3 MR. DE HUECK: Just go ahead and answer this
4 one.

5 **A. Well, when I do an assessment I think the purpose of**
6 **it is to assess what's going to happen, not just to find**
7 **out if it's going to be in compliance with some**
8 **regulatory limit. That's one paragraph from our 26-page**
9 **report normally.**

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

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

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

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

22 Q. Yeah. That was a poorly asked question.

23 **A. I knew what you were talking about.**

24 Q. The predicted sound measurements.

25 **A. Yeah.**

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

4 **A. Yes.**

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

7 **A. Well, not 20, but -- yeah. Wind turbine noise is**
8 **highly variable. And depending on, you know, the wind's**
9 **not blowing in a nice laminar manner, it's turbulent, it**
10 **changes all the time.**

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

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

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

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

19 **A. Yes.**

20 Q. And what was the purpose of that paper?

21 **A. To recommend noise design goals, which namely are 45**
22 **under most normal circumstances and an ideal target of**
23 **40.**

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

1 **A. No. I don't think so.**
 2 (Exhibit 37 is marked for identification.)
 3 **Q.** I'm going to hand you what has been marked as
 4 Exhibit I-37. What is exhibit -- what is -- I just
 5 handed you what has been marked Exhibit I-37. What is
 6 that?
 7 **A. You know, it's an article that I wrote in**
 8 **collaboration with my dad who's also in the company in**
 9 **2010 that was published in the Noise Control Engineering**
 10 **Journal, January 2011.**
 11 MR. ALMOND: At this point I'd like to move for
 12 the admission of Exhibit I-37.
 13 MS. EDWARDS: No objection from Staff.
 14 MR. DE HUECK: Any objection?
 15 MS. SMITH: No objection.
 16 MR. DE HUECK: It will be admitted as I-37.
 17 **Q.** Can you turn to page 97 of that paper for me. What
 18 is that Table 1 at the top of that page?
 19 **A. It's titled Typical Worldwide Wind Turbine Noise**
 20 **Limits.**
 21 **Q.** And it looks like the different jurisdictions are
 22 all outside the United States in that table. Would you
 23 agree?
 24 **A. They are, yes.**
 25 **Q.** And if you flip back to the previous page, it

1 states, "Wind turbine development in European countries
 2 and in other parts of the world has been proceeding for
 3 some time now while widespread development has only
 4 really started in the U.S. within the last five years or
 5 so."
 6 Do you see that language?
 7 **A. Yes. Uh-huh.**
 8 **Q.** So would you agree that it would be appropriate to
 9 look to other jurisdictions and European and other
 10 countries to see what's going on when it comes to wind
 11 regulations?
 12 **A. Yeah. That's why we did that, this paper.**
 13 **Q.** Precisely.
 14 And looking at Table 1 for one example, for example,
 15 at the very top is Alberta, Canada. It says, "Criteria
 16 values, 50D/40N."
 17 What does that mean, the 50D/40N?
 18 **A. 50 during the day, and 40 at night.**
 19 **Q.** And the D and N, is that what it means for the
 20 entire list of --
 21 **A. Yeah.**
 22 **Q.** Are you aware of any regulations on this project
 23 that deal with infrasound or low frequency noise?
 24 **A. No. There are none on this project or any other**
 25 **project I can think of.**

1 MR. ALMOND: Thank you, Mr. Hessler. I don't
 2 have any other questions for you.
 3 THE WITNESS: All right. Thank you.
 4 MR. DE HUECK: Mr. Fuerniss.
 5 CROSS-EXAMINATION
 6 BY MR. FUERNISS:
 7 **Q.** Hello, Mr. Hessler. You and I have one thing in
 8 common. At least we both have had the privilege to work
 9 with our fathers in the business.
 10 That's kind of a neat thing, don't you think?
 11 **A. I think it's great.**
 12 **Q.** I just have one question. This goes way back
 13 earlier in your testimony. You talk about some people
 14 being much more sensitive than others.
 15 Does that sensitivity -- can that increase with
 16 prolonged exposure, or do you have a level of sensitivity
 17 and that's it or --
 18 **A. I'm not sure that's really known or understood. I**
 19 **think I've seen papers speculating or thinking that maybe**
 20 **the more exposure the more sensitivity would develop.**
 21 **But I don't know myself.**
 22 MR. FUERNISS: Thank you.
 23 THE WITNESS: Sure.
 24 MR. DE HUECK: Ms. Jenkins.
 25 MS. JENKINS: Yes. I have some questions.

1 CROSS-EXAMINATION
 2 BY MS. JENKINS:
 3 **Q.** Yes. I have some questions. On your Direct
 4 Testimony, your prefiled, I was looking at your resume,
 5 and at the very end of that section is -- you talked
 6 about a project in Maine? Freedom, Maine?
 7 **A. Was it Clinton, Maine?**
 8 **Q.** Freedom.
 9 **A. Freedom.**
 10 **Q.** It was called the Beaver Ridge Wind Project. Maybe
 11 let's find the exhibit. It's Exhibit DMH-1 in his --
 12 MR. ALMOND: S3.
 13 MS. EDWARDS: S3.
 14 **A. Okay. All right. It's pretty bad when I have to be**
 15 **reminded of my own resume.**
 16 **Yeah. Yeah. I remember that project. That was in**
 17 **the town of Clinton, Maine, I believe.**
 18 **Q.** Can you just tell a little bit about what your -- it
 19 looks like you appeared before the Maine State Government
 20 of Energy and Utilities Committee. It says, "A peer
 21 review of operational sound testing by others."
 22 **A. Oh, yeah. I remember that one now.**
 23 **Yeah. I was engaged by the state, very similar to**
 24 **this case, to look at somebody else's Application, the**
 25 **noise study for an Application for this wind project, and**

1 **give my opinion on it.**
 2 Q. And do you remember any specifics like the size of
 3 the project?
 4 A. **I think it was fairly small. All I remember was the**
 5 **panel. It looked like a bunch of sea captains up there**
 6 **in Maine.**
 7 Q. Can I refresh your memory?
 8 A. **Please do. The whole project is kind of vague to me**
 9 **now.**
 10 Q. Okay. I believe it was three turbines?
 11 A. **Yeah.**
 12 Q. By Patriot Renewables?
 13 A. **Okay.**
 14 Q. Maybe they built it and sold it. I'm not sure.
 15 Starting to sound familiar?
 16 A. **Go on.**
 17 Q. Well, my understanding is that there were four
 18 different -- I believe it was four, might have been
 19 three, different residences that were experiencing either
 20 health concern or not being able to sleep on their top
 21 floor.
 22 And so a sound study was done there, and that must
 23 be this study that you peer reviewed?
 24 A. **What I recall is it was a noise study prepared for**
 25 **the permitting application, and I just reviewed it and**

1 **commented on its shortcomings or good parts. That's all**
 2 **I remember about it really.**
 3 Q. Okay. The project was built in 2008, and the
 4 study -- your peer review was in 2013.
 5 A. **Okay.**
 6 Q. Still nothing?
 7 A. **Yeah. That just goes to show how many wind turbine**
 8 **projects I've been mixed up in.**
 9 Q. Okay.
 10 A. **Yeah. I'm not recalling the situation you're**
 11 **talking about with people having problem -- I don't**
 12 **remember anything about that.**
 13 Q. Okay. The reason it came up was -- when I saw you
 14 were going to testify, I was looking for your most recent
 15 note on your resume, and that was in 2014. And so I
 16 researched it a little bit.
 17 A. **Yeah.**
 18 Q. And the reason I bring it up now is that you said
 19 that it was just a handful of people that are having
 20 health concerns. And in this -- in my research I just
 21 went to the --
 22 MS. SMITH: I'm going to object. At this point
 23 it sounds like Ms. Jenkins is testifying. Unfortunately,
 24 I think we have to interrupt.
 25 MR. DE HUECK: Yeah. Go ahead, Staff.

1 MS. EDWARDS: I guess since it's my witness, I
 2 should probably attempt to weigh in.
 3 Because we are a neutral party, I attempt to
 4 afford a great deal of latitude. I would say this is
 5 impeachment but going down that track going a little too
 6 far.
 7 MR. DE HUECK: So, Ms. Jenkins, it is as if
 8 you're introducing your own testimony as to what you
 9 think happened out in Maine into the record now so we
 10 want to avoid that.
 11 Additionally, the witness has basically told you
 12 he's got no clue and doesn't look very successful in
 13 remembering it.
 14 Q. Okay. So I'll just summarize that, that you earlier
 15 said that you have witnessed only a handful of people
 16 with health effects, complaints, out of all the projects
 17 in the United States --
 18 A. **Yeah.**
 19 Q. -- and you don't remember this project, your latest
 20 one that you reviewed. I'm sorry. I'm not trying to be
 21 unkind. I'm just trying to --
 22 A. **No. You have every right. I'm so sorry I can't**
 23 **remember that project.**
 24 Q. Okay.
 25 A. **It was a very small project, and I think I just**

1 **looked over someone's work and testified for 10 minutes**
 2 **on it. I never went to the site or anything. I don't**
 3 **know too much about it really.**
 4 Q. So to do a sound study or to peer review a sound
 5 study you don't need to see the site or know the
 6 complaints or anything?
 7 A. **I'm fairly certain that this study had nothing to do**
 8 **with the complaints. I don't remember anything about**
 9 **that. I would remember that. If there was problems,**
 10 **somebody went out, did a survey, tried to understand the**
 11 **problems. That doesn't ring any bells at all to me.**
 12 **Yeah. I'd have to pull out the file for this**
 13 **project, and I just don't remember it.**
 14 MR. DE HUECK: Ms. Jenkins, do you actually have
 15 a copy of what it is you're referring to?
 16 MS. JENKINS: Well, I could go to the website
 17 where the -- where the people in the community were
 18 attempting to get their sound levels up to the state
 19 level.
 20 MR. DE HUECK: Okay. I think we have just a bit
 21 of confusion going on. I'm not sure. But I think we
 22 should just move on.
 23 MS. JENKINS: Okay. Let me just make sure
 24 there's nothing else I can ask.
 25 MR. DE HUECK: Go ahead.

1 (Pause.)

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

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

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

10 A. **Well, the noise study is supposed to explain and
11 show you what the site is like. Like in our reports we
12 put a site description. We have maps. We show what's
13 going on at the site, where the houses are, where the
14 turbines are. You know, it's supposed to explain it to
15 the degree where you don't have to go out there and find
16 out for yourself.**

17 **Now this report was very vague on that. The sound
18 contour map was printed on a white paper. There was no
19 map. I couldn't tell where the houses were, whose house
20 was which, so it was a shortcoming of the study.**

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

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

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

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

6 MS. JENKINS: Okay. Thank you.

7 MR. DE HUECK: Ms. Pazour.

8 MS. PAZOUR: No.

9 MR. DE HUECK: That will bring us over here to
10 Commission questions. I'm down here with Commissioner
11 Nelson.

12 I have a quick question if that's okay.

13 Help me understand this because the Cooper
14 study's got me thinking. And I think I recall you saying
15 that often -- whether on or off, the wind turbines, the
16 sound can be the same just due to the wind itself.

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

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

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

25 THE WITNESS: They're not carried on the wind.

1 They just radiate out from the source.

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

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

10 And I think it's the repeated pulsations of
11 that, those waves going out, that some people are
12 sensitive to. It's like on a boat, you know, and
13 seasick. Just kind of that low rocking. I think it's
14 related to that.

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

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

22 MR. DE HUECK: Okay. Thank you.

23 THE WITNESS: Okay.

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

1 THE WITNESS: Always a pleasure.

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

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

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

13 You know, it's extremely difficult to even
14 detect. That's why there's no practical way to put a
15 regulatory limit on it. C-weighting only goes down to
16 10 hertz, and this is happening at less than 1 hertz. So
17 it's off the chart. So C-weighting is not going to
18 capture it or do anything.

19 How it is measured is to use very specialized
20 low frequency microphones that can measure down to less
21 than 1 hertz and very specialized instrumentation. It's
22 also complicated by the fact that whenever you try to
23 measure sound in windy conditions the wind blowing over
24 the microphone creates a false signal, and that happens
25 in the low end of the frequency spectrum.

1 So it's very easy for any kind of measurement
2 to get completely covered up by nonrelated,
3 self-generated noise. Very difficult to measure. So
4 there's no way I could think of to place a regulation or
5 a limit on it.

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

9 THE WITNESS: It can be. That's essentially not
10 putting any weighting on the frequency spectrum, not
11 subtracting some number. But it's very, very difficult
12 in practical terms to even detect.

13 In that Shirley study we had to measure in the
14 middle of the night, inside the houses, out of any wind.
15 And even then it was hard to pick up.

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

18 THE WITNESS: Oh, yes.

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

23 THE WITNESS: Yeah. You could see a little
24 blip, but it was so small that we said how is this a
25 problem? It's orders and orders of magnitude below the

1 threshold of human perception. But evidently it's the --
2 the frequency of the pulses that go out apparently have
3 an effect.

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

9 THE WITNESS: Yeah. It is.

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

12 THE WITNESS: I did read through it, yes.

13 COMMISSIONER NELSON: Could you pull out
14 Exhibit A5-1, which is Exhibit 1 attached to his Rebuttal
15 Testimony.

16 Yes. A5-1.

17 And if you could go to page 10.

18 THE WITNESS: Okay.

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

1 extent." And then it says, "Infrasound was generated
2 mainly by the wind and not by the turbines."

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

9 So that's my first question.

10 THE WITNESS: Okay.

11 COMMISSIONER NELSON: Help me understand how far
12 this travels.

13 THE WITNESS: Well, it can travel for long
14 distances. Not always. The conditions have to favor it
15 and so on.

16 COMMISSIONER NELSON: So help me -- unpack that.

17 THE WITNESS: Yeah. Well, I can see in the
18 picture here, in the lower left picture titled C, they've
19 got a black dome sitting on the ground on a white circle.

20 Do you see that?

21 COMMISSIONER NELSON: Yes.

22 THE WITNESS: That is a method that we use to
23 measure wind turbines outdoors where the microphone is
24 laying horizontally on this reflective surface, and then
25 this huge wind screen is put over it.

1 Now that only works to a certain extent, and it
2 does not allow measurements down at 1 hertz. That's all
3 covered -- even with this setup the measurements are
4 blown away by wind self-generated wind noise. Because
5 I've used this exact equipment before.

6 That's why they say all they measured was wind.
7 Because you really can't pick it up. But no. I think it
8 can travel 700 meters or more under other circumstances.

9 Let me see. At Shirley one of the houses was
10 very far from any turbines. Miles away. We did measure
11 inside of that house out of the wind to avoid this
12 contamination. I don't think we were able to detect
13 anything at that house, though.

14 COMMISSIONER NELSON: So I'm --

15 THE WITNESS: That doesn't --

16 COMMISSIONER NELSON: -- going to press you a
17 little harder because this is terribly important to me.

18 So somewhere between 700 meters and your quote,
19 "miles," this dissipates. So help me understand what's
20 going to determine how far it goes and what causes it to
21 dissipate, and how can we quantify that?

22 THE WITNESS: It travels a long distance. I
23 can't put a number on it for you. These are the kind of
24 frequencies that -- like elephants communicate with each
25 other over huge distances, if you've ever heard about

1 that. This is as low as it gets in terms of frequency.

2 So in theory it takes a very long time. Now how
3 far, I don't know. Can't help you.

4 COMMISSIONER NELSON: Well, ultimately, I have
5 to make a decision here based upon how far this could
6 travel and how far it's going to affect folks, if it
7 affects folks. I mean, that's a whole nother question.

8 THE WITNESS: Right.

9 COMMISSIONER NELSON: I'm trying to just figure
10 out how far does it actually go.

11 THE WITNESS: I wish I could give you a figure
12 on that. I know it would be useful to you.

13 COMMISSIONER NELSON: Okay. Thank you for that.

14 Shifting gears just a little bit. Can a sound
15 be heard without that sound changing the ambient dBA
16 level?

17 THE WITNESS: Yes. If the sound has a
18 distinctive character to it, then you can identify and
19 pick it out even though the magnitude of it, whether it's
20 on or off, may be about the same.

21 COMMISSIONER NELSON: Like a wind turbine.

22 THE WITNESS: Yeah. Which has a -- that washing
23 machine sound. Yeah.

24 COMMISSIONER NELSON: So we had -- well,
25 Ms. Jenkins, Intervenor, testified yesterday, again

1 contrary to what I heard from you this morning, that her
2 house is three miles away from a wind turbine, and inside
3 of her house she can hear the wind turbine three miles
4 away.

5 THE WITNESS: That's surprising to me.

6 COMMISSIONER NELSON: Okay. So we'll set that
7 aside. But it would be -- let's say you're outside. It
8 may be possible to actually hear a wind turbine because
9 of the unique sound, even though it doesn't raise the dBA
10 level. Is that accurate?

11 THE WITNESS: Right. If you're able to identify
12 that distinctive sound and you know what you're listening
13 for and so on.

14 COMMISSIONER NELSON: Just so I'm clear,
15 changing again, you've recommended for this project an
16 ideal design goal of 40 dBA, and that would be measured
17 over the two-week period that the Applicant has proposed;
18 is that correct?

19 THE WITNESS: Right. I don't know of any other
20 way to do it.

21 COMMISSIONER NELSON: You talked earlier about
22 the fact that that might impact 11 different receptors
23 based on their sound study. I just quickly looked at
24 their revised sound study, and it looks like it would
25 only impact two of the nonparticipants.

1 Did you separate out participants and

2 nonparticipants as you looked at that?

3 THE WITNESS: At least in my copy it doesn't
4 distinguish between who was who.

5 COMMISSIONER NELSON: And were you looking at
6 the revised -- the latest sound study?

7 THE WITNESS: Yes. I saw one Intervenor house
8 identified in the table in the back, but that's the only
9 one. And that's what I was looking for when I wrote my
10 Direct Testimony. I wanted to know what the levels were
11 at the Intervenor's house, but I couldn't tell which
12 house was which.

13 COMMISSIONER NELSON: I think -- I hate to let
14 you go, but I think that's all -- only because what I
15 really want to know I haven't found out, but that's all
16 the questions I've got.

17 Thank you.

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

20 MR. DE HUECK: Chair Fiegen. No questions.

21 Commissioner Hanson, any questions?

22 COMMISSIONER HANSON: Yes, I do.

23 Good almost afternoon, Mr. Hessler. You came
24 out swinging in your remarks at the beginning. At least
25 on page 3 you faulted the Applicant for the graphical

1 presentation, called it fairly primitive, and said you
2 can't even distinguish -- identify where the specific
3 residents are.

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

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

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

21 THE WITNESS: Hours.

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

25 THE WITNESS: That's right.

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

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

12 COMMISSIONER HANSON: Interesting.
13 My wife is 220 miles away, and she can hear my
14 thoughts right now.

15 THE WITNESS: I know. Mine too.

16 COMMISSIONER HANSON: She'll call me up and tell
17 me I'm wrong without --

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

22 THE WITNESS: I did hear about that.

23 COMMISSIONER HANSON: And that's fairly typical.
24 So kids would be more sensitive, would one assume, than
25 adults would to the challenges that low frequency would

1 have from wind turbines? I mean, that's just one premise
2 but --

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

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

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

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

15 COMMISSIONER HANSON: There's no high frequency.

16 THE WITNESS: No. Most of the noise, the
17 churning sound, is about 500 hertz to 1,000 hertz.
18 That's in the middle of the audible frequency range.
19 Above that there's no significant noise.

20 COMMISSIONER HANSON: Interesting. Appreciate
21 that.

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

1 THE WITNESS: Yeah.

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

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

7 COMMISSIONER HANSON: You wouldn't be surprised
8 what?

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

11 COMMISSIONER HANSON: You state about the very
12 small minority of the people and that it is extremely
13 rare, small handful of sites, quite rare, et cetera.

14 Again, very small. And yet it's very real. At least you
15 express that it's very real.

16 So in balancing that are we to assume that for
17 the greater good some people are going to suffer?

18 THE WITNESS: Yeah. That's -- that's up to you
19 guys. Yeah.

20 Well, just to reiterate, you know, if this
21 commonly happened, it would be all over the news. It
22 would be well understood, and everyone would know that a
23 new wind project was going to cause this.

24 But that's not the case. It's only occurred at
25 certain specific sites out of many, many, many projects.

1 So based on that alone, I'm concluding that it must be a
2 rare sensitivity.

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

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

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

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

18 COMMISSIONER HANSON: Right.

19 THE WITNESS: Probably very similar to this.

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

24 THE WITNESS: Oh, yeah. Definitely.

25 COMMISSIONER HANSON: I grew up three houses

1 away from a railroad track, and I can sleep through the
2 horns and a thunderstorm and everything else, but a clock
3 ticking on the wall or a water dripping really bothers
4 the heck out of me.

5 So with that type of a challenge, I can go move
6 that clock. I can fix the water faucet. Do we suggest
7 earplugs for the folks out in the country?

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

13 COMMISSIONER HANSON: In your experience, do
14 most of the people who are bothered at first adapt to it?

15 We're talking about the people who are really
16 bothered. Do they ever adjust to it, or do they -- as
17 you suggested, some people move?

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

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

25 THE WITNESS: Okay.

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

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

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

13 COMMISSIONER NELSON: Thank you.

14 THE WITNESS: Yeah.

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

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

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

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

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

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

4 MS. EDWARDS: All right.

5 REDIRECT EXAMINATION

6 BY MS. EDWARDS:

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

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

14 Q. You also stated once this morning that Mr. Cooper
15 had finally demonstrated a link. Did you have reason to
16 believe prior to that study that link was already there,
17 or was this all new to you?

18 A. **Prior to that study I thought something was**
19 **happening but wasn't entirely convinced what was going**
20 **on, and that study kind of put me to the other side where**
21 **it's pretty clear that those pulsations can be perceived**
22 **by certain people.**

23 **I mean, I thought that before, but there was never**
24 **any evidence, although there's been many, many studies**
25 **and papers about it.**

1 Q. So with that in mind and with your testimony in
2 response to Commissioner questions that it's a fairly
3 small number of people, would you -- in the project that
4 you've worked on have you seen it just -- people be
5 irreparably split in the community and just fight in the
6 streets forever or --

7 A. **Yeah. It is very divisive, yeah. Almost all**
8 **projects, especially before they're built. At this stage**
9 **there's a lot of dread and apprehension about it. That's**
10 **mostly attributed to -- attributable to the internet**
11 **sites.**

12 Q. In response to Ms. Jenkins's questions about that
13 study in I believe it was Maine?

14 A. **Yeah.**

15 Q. There was some confusion about what your role was.
16 Could there have been another sound expert that was
17 involved that would answer what she was getting at and
18 that was outside of your role?

19 A. **Well, what I do know about that is it was somebody**
20 **else's work that I was asked to look at. I didn't do the**
21 **study or anything. I just was commenting on it.**

22 Q. Do you recall based upon the noise assessments you
23 reviewed what the max dBA was at a receptor?

24 A. **You mean what was the highest predicted on any other**
25 **project?**

1 Q. This project.
 2 A. **On this project. Okay.**
 3 **Right now I believe it's 41.9, which I would call**
 4 **42.**
 5 Q. Would you expect 42 dBA would, in your experience,
 6 cause people to change their daily lives and behavior?
 7 A. **Hard to say. That's a pretty low level getting down**
 8 **towards the ideal point of 40. But there's still a**
 9 **possibility of complaints. In between 40 and 45 there's**
 10 **a definite possibility of complaints.**

11 MS. EDWARDS: Thank you very much. I have no
 12 further questions.

13 MR. DE HUECK: Recross, Prevailing Winds?

14 MS. SMITH: No, I don't have any. Thank you.

15 MR. DE HUECK: Mr. Almond.

16 MR. ALMOND: Briefly.

17 RECROSS-EXAMINATION

18 BY MR. ALMOND:

19 Q. I think you were talking with Commissioner Hanson
 20 about the number of complaints with the physical symptoms
 21 of nausea, dizziness, et cetera that you talked about
 22 Shirley or attributed to this infrasound, that there are
 23 wind farms all around the country, you've studied 15 of
 24 them or maybe more but you haven't heard many
 25 complaints.

1 Wouldn't you expect that the number of complaints
 2 might be skewed if there are confidentiality provisions
 3 and certain contractual provisions that would prevent
 4 people from living around turbines from making such
 5 complaints?

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

8 MR. DE HUECK: I agree.

9 A. **I would say that I've seen cases --**

10 MR. DE HUECK: Dr. Hessler, I'm sorry. Don't
 11 answer the question.

12 THE WITNESS: Okay.

13 Q. Your opinion on the quantity of people affected by
 14 infrasound is based off of those -- is based off
 15 complaints that people have made; correct?

16 A. **It is based off of our experience at Shirley and our**
 17 **experience at all other projects where we did not hear**
 18 **about that, and the fact that I have -- I'm not aware of**
 19 **any other projects where that was an issue, out of 50,000**
 20 **wind turbines out there in this country.**

21 Q. Are you aware of your other projects whether or not
 22 anyone was prohibited from making complaints?

23 A. **I don't know, but my understanding is that**
 24 **participants --**

25 MS. SMITH: Objection. This is speculation.

1 THE WITNESS: Yeah. Yeah. I would agree with
 2 that.

3 MR. ALMOND: Based on that, I don't have any
 4 other questions for you, Mr. Hessler.

5 MR. DE HUECK: Mr. Fuerniss.

6 RECROSS-EXAMINATION

7 BY MR. FUERNISS:

8 Q. Yes. Commissioner Nelson is trying to get at the
 9 bottom of how far this could go, the infrasound
 10 especially.

11 Could that be affected or enhanced by more or less
 12 hilly terrain, valleys, so forth? Would that make a
 13 difference?

14 A. **In theory if the turbine were on a hilltop and there**
 15 **was a valley in between and your house or some point of**
 16 **observation was on the next hill, you would -- there**
 17 **would be a loss of ground absorption attenuation because**
 18 **of the valley in between so the sound would get over**
 19 **there more than it would over flat ground.**

20 **However, I don't think ground absorption has any**
 21 **real effect at that low end of the frequency spectrum.**
 22 **So now that I've reasoned it out in my head as I was**
 23 **talking, I would say it doesn't make too much**
 24 **difference.**

25 Q. Okay. When you're talking 40 dBA or 45 dBA, which

1 metric are you using? Are you talking L90?

2 A. **Well, that's interesting you should say that because**
 3 **that is the descriptor that we use to actually try to**
 4 **measure an operating project because it filters out cars**
 5 **going by and sporadic contaminating events and gets out**
 6 **the underlying steady -- and it is more or less steady**
 7 **sound level.**

8 **So we use the L90 at houses and then the L90 miles**
 9 **away as a background, and then we subtract the two to get**
 10 **what is the project doing. And if you try to use any**
 11 **other statistical like the average, the Leq or the L10 or**
 12 **the Lmax, you're getting progressively worse in your**
 13 **ability to detect the project alone and you're only**
 14 **detecting other things that are unrelated to the**
 15 **project.**

16 Q. Okay.

17 A. **That was a good question.**

18 Q. Would it be appropriate to recommend different
 19 levels for time of day, daytime, evening, nighttime?

20 A. **Well, the trouble with that, it's not practical to**
 21 **change the noise emissions in the project. They are what**
 22 **they are 24 hours a day. There's no way to substantially**
 23 **change the sound at night, for instance, to lower it,**
 24 **other than possibly putting some or all of the units in a**
 25 **low noise mode.**

1 **But the improvement in doing that isn't all that**
 2 **dramatic, in my experience.**
 3 Q. Are there some jurisdictions that do, in fact,
 4 require different levels from day and night?
 5 A. **Yeah. Many, many ordinances are -- expresses**
 6 **day/night. But when it comes to wind turbines you just**
 7 **have to take the nighttime level as the design and forget**
 8 **about the daytime. Because, like I said, the sound level**
 9 **is the sound level, and you don't have any control over**
 10 **it really.**
 11 Q. Okay. One last question. Are you familiar with
 12 bone attached hearing aids? And if you are -- one
 13 question at a time.
 14 Are you familiar with those?
 15 A. **I'm familiar with hearing aids. My wife really**
 16 **relies on them, but I'm not an expert on it.**
 17 Q. Okay. So you wouldn't be able to address that for
 18 us then?
 19 A. **I don't think so.**
 20 MR. FUERNISS: Thank you.
 21 MR. DE HUECK: Ms. Jenkins.
 22 MS. JENKINS: Just a couple questions.
 23 RECROSS-EXAMINATION
 24 BY MS. JENKINS:
 25 Q. I'm sorry, but I missed. The Shirley Wind Farm when

1 you visited that, what year was that?
 2 A. **2010 -- it's right here. December 24, 2012.**
 3 Q. Thank you. Can infrasound be measured inside a
 4 house?
 5 A. **That's probably the only place it can be measured.**
 6 Q. Okay.
 7 A. **Because you're out of the elements there.**
 8 Q. And was your -- the main project that I mentioned
 9 earlier, was your role at that project the same as your
 10 role is here? Did you review this sound study?
 11 A. **I reviewed a sound study. What it was about, I**
 12 **can't recall. I'm taking it off my resume.**
 13 Q. I'm sorry. You could just refresh your memory
 14 because you might need it again.
 15 A. **I'll have to pull the folder out back at the office.**
 16 **Big embarrassment.**
 17 Q. Yeah. When you do a sound study or when a sound
 18 study is ordered is it done at a certain time of year,
 19 or how do you choose when you're going to do a sound
 20 study?
 21 A. **You typically want to do them during the cold**
 22 **weather season of the year when the leaves are off the**
 23 **trees just to minimize the contamination from leaves**
 24 **rattling and -- and summertime you get crickets and all**
 25 **kinds of stuff that messes up the measurements. So**

1 **during the winter.**
 2 Q. Okay. When you do a sound study is there -- do you
 3 get a report from the -- like the operation maintenance
 4 facility of how the wind turbines are operating, meaning
 5 are they operating at the speed of the conditions or are
 6 they -- do you have proof of that?
 7 A. **Yeah. We get a log of what the megawatt output was**
 8 **for all the units as a function of time over the survey**
 9 **so we can identify if there's any down for maintenance or**
 10 **anything else.**
 11 Q. And can you tell whether they're operating at the
 12 normal level they would when they just do it on their
 13 own?
 14 A. **Yeah. Because we also get the wind speed throughout**
 15 **the survey, and once the wind speed gets above usually**
 16 **7 meters per second, they're at full power.**
 17 Q. Okay. I think there's just one more.
 18 MS. JENKINS: No. I have no more questions.
 19 Thank you.
 20 THE WITNESS: All right. You're welcome.
 21 MR. DE HUECK: Ms. Pazour.
 22 RECROSS-EXAMINATION
 23 BY MS. PAZOUR:
 24 Q. I have a question for you. Like infrasounds next to
 25 a wind turbine, like with somebody that's sensitive to

1 noise, would that be more bothersome for them?
 2 A. **If that person had this particular sensitivity that**
 3 **we've been talking about, then yes.**
 4 Q. Like somebody with like a -- like a hearing aid.
 5 A. **No. No. I don't think that would make any**
 6 **difference.**
 7 Q. With the ear or nothing?
 8 A. **Huh-uh.**
 9 MS. PAZOUR: Okay.
 10 MR. DE HUECK: Did you have anymore questions?
 11 CHAIRWOMAN FIEGEN: She can just word it, and
 12 you'll make a decision.
 13 MR. DE HUECK: Just throw it out there. Throw
 14 it out there.
 15 Q. I guess, is it possible between infrasounds and
 16 reversible systems that the inner ear could feel
 17 infrasounds?
 18 A. **That sounds like a question for one of those doctors**
 19 **mixed up in this thing.**
 20 MS. PAZOUR: Okay.
 21 MR. DE HUECK: Okay. Mr. Hessler, thank you for
 22 your testimony. You're excused.
 23 (The witness is excused.)
 24 MR. DE HUECK: We'll break for lunch and plan on
 25 getting things rocking at 1:45.