

In The Matter Of:
LIVINGSTON COUNTY ZONING BOARD OF APPEALS

January 21, 2015

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1 LIVINGSTON COUNTY ZONING BOARD OF APPEALS
 2 CASE SU-7-14
 3 PLEASANT RIDGE WIND ENERGY PROJECT
 4 January 21, 2015
 5 6:30 PM
 6 Pontiac Township High School
 7 Pontiac, Illinois
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1 (Commencing at 6:36 p.m.)
 2 **CHAIRMAN CORNALE:** Okay, we're going to go
 3 ahead and call this meeting to order. We're having
 4 a little bit of issue with some audio. We'll get
 5 that worked out. So with that, Chuck, roll call
 6 please.
 7 **MR. SCHOPP:** Okay, this is the January
 8 21st, 2015, continuation hearing of the Livingston
 9 County Zoning Board of Appeals review of Livingston
 10 County Zoning Case SU-7-14, Pleasant Ridge Energy,
 11 LLC, Pleasant Ridge Wind Energy Project. And Mike
 12 Cornale.
 13 **CHAIRMAN CORNALE:** Here.
 14 **MR. SCHOPP:** John Vitzthum.
 15 **MR. VITZTHUM:** Here.
 16 **MR. SCHOPP:** Richard Kiefer. Diana
 17 Iverson.
 18 **MS. IVERSON:** Here.
 19 **MR. SCHOPP:** Howard Zimmerman.
 20 **MR. ZIMMERMAN:** Here.
 21 **MR. SCHOPP:** Joan Huisman.
 22 **MS. HUISMAN:** Here.
 23 **MR. SCHOPP:** We have a quorum.
 24 **CHAIRMAN CORNALE:** All right, looks like

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1 they're working on the sound in the box, so we'll go
 2 ahead and get going this evening.
 3 I believe the applicant has brought with a
 4 couple witnesses this evening for some additional
 5 questions. I believe one is Mr. Hankard, one is Mr.
 6 Parzyck. I believe those two are here; is that
 7 correct?
 8 **MR. BLAZER:** They are, Mr. Chairman, but
 9 before that, we just have some preliminary matters.
 10 I've conferred with Mr. Luetkehans and with Mr.
 11 Blakeman and Mr. Griffin. We have some additional
 12 documents that we need to get into the record. And
 13 conferring with everybody, we've agreed there's
 14 just -- there's nothing to really examine anyone on.
 15 We're just going to put them into the record. I'll
 16 identify all of them for the record.
 17 First is actually correcting an error from
 18 last week. You may recall that there was a
 19 duplication on one of my exhibits during my cross of
 20 Mr. Hewson. It looked like it was a duplication of
 21 No. 260 and you ended up numbering it No. 1260.
 22 **CHAIRMAN CORNALE:** Correct.
 23 **MR. BLAZER:** It turns out it was
 24 incorrectly numbered and threw my whole numbering

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1 system off. It should actually -- and it was the
 2 Illinois statute and regulations dealing with clean
 3 construction and demolition debris. That should be
 4 Pleasant Ridge Exhibit 261. I brought new copies of
 5 that one that are properly marked. So I ask to
 6 substitute 261 for the one that you marked last week
 7 as 1260.

8 **CHAIRMAN CORNALE:** Okay, we'll accept
 9 that. For the record, we'll accept 261 in place of
 10 1260.

11 **MR. BLAZER:** And then these are the
 12 documents that are going in. The first is Pleasant
 13 Ridge Exhibit 25A and those are the FAA
 14 determination of no hazard to aircraft for all 136
 15 turbines that are proposed for this project. And in
 16 consultation with Chuck, excuse me, the way we've
 17 done it because it's -- in its entirety, the entire
 18 set of files is roughly 830 pages long.

19 So what we've done is actually print out
 20 one complete set, so we're not killing too many
 21 forests, and then the other multiple copies are --
 22 because each turbine has a group of documents,
 23 there's a cover sheet that's the actual FAA
 24 determination and then there's documentation behind

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1 it that supports that determination.

2 So for turbine 1, we have I think it's six
 3 pages, we have all six so you can see an example of
 4 what they all look like. For all of the other ones,
 5 we just have the determination page, except for
 6 turbines 133 and 134 which we were asked to also
 7 supply the complete packets. Those are the two that
 8 are the closest to the airport. So that again is
 9 Exhibit 25A.

10 **CHAIRMAN CORNALE:** All right, the county
 11 will accept Pleasant Ridge Exhibit 25A as the FAA
 12 determination of no hazards. There we go, we've got
 13 mics. Thank you. All right, Mr. Blazer, grab a
 14 mic.

15 Did I not -- I probably didn't complete my
 16 thing there. We'll accept that as Pleasant Ridge
 17 Exhibit 25A, the determination of no hazard from the
 18 FAA.

19 **MR. BLAZER:** All right, the next one is
 20 Pleasant Ridge Exhibit 98A, and those are photos of
 21 the transmission line towers that we were requested
 22 to provide.

23 **CHAIRMAN CORNALE:** All right. The county
 24 will accept Pleasant Ridge Exhibit 98A as a two page

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1 photograph of transmission lines.

2 **MR. BLAZER:** The next one is Pleasant
 3 Ridge 125. You may recall one of the county's
 4 exhibits, and I don't recall which number it is, was
 5 correspondence from the Belle Prairie Drainage
 6 District expressing some concerns about drain tile.
 7 Pleasant Ridge 125 is our response to that letter.

8 **CHAIRMAN CORNALE:** All right, county will
 9 accept Pleasant Ridge Exhibit 125 as a submittal or
 10 as a letter to the Belle Prairie Drainage District.

11 **MR. BLAZER:** The next two are related.
 12 The county's ordinance requires that we provide
 13 certificates of design compliance from a
 14 certification agency for the turbines when they are
 15 made available to the turbine manufacturer, in this
 16 case, GE. Exhibit 130A is the certificate of design
 17 compliance from TUV Nord for the GE 1.72-103
 18 turbine. 130B is a letter from TUV Nord confirming
 19 that the GE 1.79-100 turbine is under review. They
 20 say they are about 70 percent done. They expect to
 21 issue the determination or the certification by the
 22 end of March. So we're looking to get both of those
 23 in. 130A is the certificate for the 103; 130B is
 24 the letter confirming that it's coming for the 100.

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1 **CHAIRMAN CORNALE:** All right, the county
 2 will accept Pleasant Ridge Exhibit 130A as a TUV
 3 Nord letter, statement of compliance on a design
 4 assessment for the GE 1.7-103. The county will
 5 accept Pleasant Ridge Exhibit 130B as a TUV Nord
 6 SysTec. It's a letter that addresses the 70 percent
 7 completeness of the technical assessment.

8 **MR. BLAZER:** And then the last one, Mr.
 9 Chairman, is Pleasant Ridge 229 and that's actually
 10 an email string. It's a series of communications
 11 between Invenergy and Mr. Rick Reed who is the head
 12 of the Illinois Aerial Applicators Association in
 13 which we were consulting with him regarding any
 14 concerns that his association may have regarding the
 15 project in general. The only concerns he raised
 16 were with respect to marking of the MET tower --

17 **MR. LUETKEHANS:** If Mr. Blazer wants to
 18 testify --

19 **MR. BLAZER:** I -- all right.

20 **MR. LUETKEHANS:** I mean as opposed to put
 21 it in.

22 **MR. BLAZER:** That's fine. It's
 23 correspondence between Invenergy and the IAAA.

24 **CHAIRMAN CORNALE:** All right, the

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1 county --

2 **MR. LUETKEHANS:** If I may, the only

3 question I have, and I just want to maybe clear it

4 up for the record, that I think if Mike, Mr. Blazer,

5 could confirm or stipulate that the pictures that

6 are referred to in Pleasant Ridge Exhibit 229 are

7 the same picture or pictures that are in Pleasant

8 Ridge Exhibit 22.

9 **MR. BLAZER:** Yes.

10 **MR. LUETKEHANS:** Okay, thank you.

11 **CHAIRMAN CORNALE:** All right. The county

12 will accept Pleasant Ridge Exhibit 229 as a series

13 of emails between Allyson Sand and Rick Reed

14 identified within the email as the executive

15 director of the Illinois AAA.

16 All right. With that, I'll turn this over

17 to counsel. Mr. Blakeman has a few comments.

18 **MR. BLAKEMAN:** As we move into a new phase

19 of the hearing, a few reminders of some of the rules

20 that were presented in the early days of this

21 hearing. All witnesses who have signed up to

22 address the ZBA shall be sworn and shall testify

23 under oath. Even if you are represented by an

24 attorney, you will be able to present evidence and

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1 testimony or a statement.

2 As each witness or interested party

3 testifies, presents evidence or makes a statement,

4 it shall be subject to cross-examination from other

5 parties in the following order. First, members of

6 the Zoning Board of Appeals; units of local

7 government including school districts; applicant by

8 its attorneys; other interested parties represented

9 by a licensed attorney, unless that attorney

10 represents the witness, then the attorney cannot

11 cross-examine his own client; any other interested

12 parties not represented by an attorney; Livingston

13 County staff and consultants; and again the ZBA.

14 If you have exhibits to produce, if

15 possible, please have 15 hard copies so that the

16 ZBA, staff, attorneys, others, parties can have a

17 copy.

18 Now, one further matter. It has been

19 brought to my attention that some people do not

20 intend to participate in this hearing and plan to

21 wait until the county board considers the

22 application to make a statement or presentation

23 during public comment prior to the board vote.

24 Please be advised that there will be no public

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1 comment before the county board votes on the

2 application. If you have something to say or

3 present, you should present it during these

4 proceedings before the ZBA for the county board to

5 consider whatever it is you have to say or present.

6 **CHAIRMAN CORNALE:** Thank you. I believe

7 at this time the Livingston County counsel has some

8 questions that you'd like to present. Okay.

9 **MR. GRIFFIN:** Good evening. Jim Griffin,

10 attorney for Livingston County. We've asked the

11 applicant to bring Mr. Parzyck and Mr. Hankard here

12 because the county has some additional questions.

13 So I'd like to start with Mr. Parzyck if he's ready.

14 **QUESTIONS BY**

15 **MR. GRIFFIN:**

16 Q. Good evening, Mr. Parzyck. I want to ask

17 you some questions about financial assurance and

18 also setback waivers. Let me start with setback

19 waivers. My understanding is that the project is

20 relying upon setback waivers in order to site the

21 turbines in the locations that have been selected;

22 is that correct?

23 **A. That's correct, there are -- yes.**

24 Q. Do you know how many setback waivers the

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1 company's relying upon in siting?

2 **A. I do not have that information, no, I**

3 **don't.**

4 Q. That would be information, then, that we

5 would ask that you provide to the county, the -- I

6 want to know the turbine number upon which the

7 setback waiver applies to and, you know, identify

8 the participating property owner that approved the

9 waiver, and then the distance from either the

10 property line or the residence that's being waived.

11 **MR. BLAZER:** Such a list does exist, Mr.

12 Griffin. I think I can probably get that to you

13 sometime before tomorrow's hearing.

14 **MR. GRIFFIN:** Thank you, appreciate that.

15 Q. All right. As to financial assurance, Mr.

16 Parzyck, you recall that Ms. Gerwin asked you a

17 number of questions about financial information for

18 Invenergy. Several of the questions you did not

19 respond to, so I did ask your counsel to bring you

20 back because I was hoping that you could provide

21 additional information. As you know, financial

22 assurance of the company's ability to construct the

23 project is a requirement under the zoning ordinance

24 and you're aware of that, correct?

1 A. I am.

2 Q. All right. Well, first, there's been some
3 testimony that -- about a power purchase agreement.
4 Does the project currently have a power purchase
5 agreement?

6 A. It does not.

7 Q. And will the project be constructed
8 without a power purchase agreement being in place?

9 A. That's still being determined as to what
10 the exact financial transactions that will be
11 required to sell the power. There's a number of
12 different ways that it could be sold: under a power
13 purchase agreement with a large entity or utility,
14 through a hedge structure with a financial
15 institution where the power is then sold into the
16 PJM market which this project would be connected to
17 from an electrical transmission perspective.

18 So we are investigating those matters with
19 a number of different companies, utilities, et
20 cetera, and in fact some of that is dependent upon,
21 you know, how things proceed with regard to the
22 development of the project and permit.

23 Q. All right. Well, concerning the financial
24 assurance that the applicant has the wherewithal to

1 landowners and power purchase companies.

2 Now, with that, those 43[sic] wind
3 projects and our wind, solar, natural gas and
4 storage operations, we have approximately \$8 billion
5 worth of installed infrastructure across the United
6 States. And in that -- within that structure, \$2.8
7 billion worth of that installed infrastructure is an
8 equity position, the balance being debt that is
9 being held to -- that was secured to build those
10 projects.

11 So with this very robust installation
12 across the United States and this \$2.8 billion worth
13 of equity, that's the sort of structure that allows
14 us to continue to develop projects throughout the
15 United States; for that matter, the United States,
16 Canada, Mexico and Europe.

17 Now, here within Illinois we have some
18 significant installations as well. We have
19 approximately \$1.25 billion worth of wind, solar and
20 natural gas and storage within Illinois itself, and
21 of that \$1.25 billion of installed infrastructure,
22 approximately \$350 million worth of that
23 infrastructure is an equity position that Invenergy
24 holds.

1 construct the project if it were to be approved,
2 what information can you provide to demonstrate to
3 the county that the company does have such financial
4 ability to construct the project?

5 A. Certainly. Based on your desire to have
6 us come back and address this, I've done --
7 subsequent to my testimony earlier last year or late
8 last year, I've gone back and looked at, researched
9 some of the issues that were raised. And I do want
10 to say again we are a private corporation, so there
11 is no -- there are no documents in the public record
12 that I could refer to.

13 What I thought I'd be able to do is go
14 through the process that we will be going through
15 and identify some of the assets that are held by the
16 company to show that we have a long-term track
17 record and the financial wherewithal to move forward
18 with this project.

19 As I think I said in some of my earlier
20 testimony, Invenergy has over -- has 46 wind
21 projects across the United States with 4300
22 megawatts of installed wind generation capacity and
23 nearly 1900 wind turbines installed. And those are
24 all installed under long-term agreements with both

1 So we have the wherewithal with regard to
2 building, constructing throughout the United States,
3 but the difficulty in terms of saying exactly which
4 company holds what assets has to do with the
5 arrangements that we have with regard to developing,
6 owning and operating our facilities.

7 Invenergy's corporate structure is such
8 that we have a series of affiliated limited
9 liability corporations, or LLCs, similar to the same
10 structure that real estate developers, owners and
11 operators have. And within that, those affiliated
12 corporations, are LLCs for development and
13 operational assets. And with Pleasant Ridge at this
14 point, we are in the development stage. We have not
15 moved over to building the project.

16 So the development LLCs manage ongoing
17 development efforts for each project and on the
18 order that's millions of dollars per project. Thus
19 far, with the Pleasant Ridge project, we are
20 spending north of \$5 million on this project to date
21 from a development perspective.

22 When projects are being constructed, they
23 move over into operating LLCs, which in this case
24 would be Pleasant Ridge, LLC, and the assets for

1 those operating LLCs are there for construction and
2 operating and they are typically hundreds of
3 millions of dollars. On average, one could say, you
4 know, you could spend several million dollars per
5 turbine to install a project of this size.

6 So we have these -- we go from development
7 LLCs to operating LLCs, and when we make that move,
8 we would go into a company like Pleasant Ridge, LLC,
9 would be funded through a debt and equity structure,
10 and that's done on an individual project basis. And
11 that funding is put in place prior to the
12 commencement of significant capital outlays, such as
13 construction, turbine contracts, et cetera. And
14 that's the hundreds of million dollars that I'm
15 talking about.

16 And as we stand here today, the funding
17 for the Pleasant Ridge project is awaiting this
18 process that we're going through right now. So we
19 are keying things up with off-takers as we mentioned
20 earlier as well as with funding institutions, both
21 debt and equity, to go through a funding process
22 subsequent to us receiving a permit on the project.

23 Now, that is very common practice
24 throughout the industry, and most recently it was

1 date with that, and even with the letter that we had
2 submitted from CoBank in our application, indicates
3 that we expect to go through the same process as we
4 did with California Ridge. And based on our
5 experience at funding these sorts of projects in the
6 past and the interest in these sorts of projects,
7 that we would see a similar effort ongoing and be
8 successful to start construction and have that
9 secured financing prior to significant spending of
10 funds.

11 Q. Would you expect the company to take a
12 similar equity position in Pleasant Ridge as in the
13 California Ridge project?

14 A. Yes, we would.

15 MR. GRIFFIN: That's all the questions we
16 have for now. Thank you, Mr. Parzyck.

17 A. Thank you.

18 MR. LUETKEHANS: I think certain people
19 have questions of Mr. Parzyck. Is that allowed
20 or --

21 CHAIRMAN CORNALE: All right, due to the
22 procedure that we've pretty well spelled out, the
23 audience did, in fact, have their opportunity to
24 question Mr. Parzyck, so we're going to let Mr.

1 done on the project we just completed called the
2 California Ridge project which many people -- which
3 has been mentioned before. It's a similar project
4 of scale and attributes. It's 217 megawatts, 134
5 wind turbines, so very similar to what we have going
6 on here. It's located in Vermilion and Champaign
7 Counties, and county approvals were secured in both
8 counties prior to project financing. The project
9 value was approximately \$465 million, so that's kind
10 of on a par with what we're talking about on this
11 project, and of that, the equity component was
12 approximately \$65 million.

13 Now, there was very broad interest in the
14 project, and we concluded funding subsequent again,
15 as we are here, to the permits that we received from
16 Vermilion and Champaign Counties. And with that, we
17 were able to secure financial support from a whole
18 list of financial institutions: Santander,
19 Prudential, Rabobank, the Union Bank of California,
20 the Royal Bank of Canada, Lloyds and Allstate. So
21 we have a series of investors, both debt and equity,
22 that we will be going to subsequent to our permit
23 here and moving through that process.

24 And the -- the history that we've had to

1 Parzyck go at this time without those questions.

2 MR. MARK SLAGEL: I wasn't here at one of
3 the meetings and I'm on the school board and I have
4 questions regarding that. Can I come up?

5 CHAIRMAN CORNALE: I think once we start
6 this, it's going to just continue. I know that we
7 had one question for Hankard that wasn't -- that we
8 didn't get to when he presented. So with that, Mr.
9 Parzyck, go ahead.

10 Okay, I believe you have additional
11 questions for their other witness.

12 MR. GRIFFIN: Yes. Mr. Hankard.

13 QUESTIONS BY

14 MR. GRIFFIN:

15 Q. Mr. Hankard, I'm Jim Griffin. I'm an
16 attorney for Livingston County. I want to follow up
17 on your testimony that you gave earlier in this
18 case, in this zoning matter. You testified that the
19 model you ran gave results I believe to the nearest
20 tenth of a decibel; is that correct?

21 A. Yes, that's correct.

22 Q. And then you would round those numbers to
23 the nearest whole number integer, correct?

24 A. Yes.

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1 Q. All right. And I think you testified that
 2 some of the model -- so for model results that came
 3 in at 41 or, excuse me, at a point four-tenths, you
 4 rounded down, correct?
 5 **A. Correct.**
 6 Q. And five-tenths you would round up.
 7 **A. Correct.**
 8 Q. All right. Now, some of the model results
 9 showed, for example, a 41 decibel limit at 1,000
 10 hertz frequency, which is right at the Pollution
 11 Control Board limit, correct?
 12 **A. Yeah, the Pollution Control Board states**
 13 **that you shall not exceed the limit, so in this**
 14 **case, you shall not exceed 41.**
 15 Q. All right. Well, maybe that's the point
 16 of at least this series of questions. So you had
 17 test results that were at 41 point something and you
 18 rounded that down to 41.
 19 **A. Yeah, just to clarify, they weren't test**
 20 **results, they were model --**
 21 Q. Model results, excuse me.
 22 **A. Yes.**
 23 Q. All right. Preliminarily, I know there
 24 were some at the 41 decibel 1,000 hertz level that

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1 the model showed right at 41. Were there other
 2 decibel levels where the model came up with a number
 3 that was at the Pollution Control Board limit?
 4 **A. There were receptors where the predicted**
 5 **level was 41 point something; nothing 41.5 or above.**
 6 Q. But besides the 1,000 hertz frequency -- I
 7 want to know were there other model results besides
 8 41 decibels at 1,000 hertz that also were right at
 9 the maximum Pollution Control Board number?
 10 **A. Okay. The other frequency bands?**
 11 Q. Correct.
 12 **A. Yeah, in the 500 hertz band, it gets close**
 13 **to but of course not above the limit, and then in**
 14 **all of the other bands, it's really many decibels**
 15 **lower than the limit.**
 16 Q. Were any of the numbers that the model
 17 produced at the 500 hertz the same number as the
 18 Pollution Control Board limit?
 19 **A. I would have to check on that, I**
 20 **apologize.**
 21 Q. All right. So what is your justification
 22 for rounding the model result, say, that's 41.4 down
 23 to 41?
 24 **A. Sure. Well, again, it starts with the**

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1 **fact that the limits are integers and that the text**
 2 **of the Illinois Pollution Control Board regulation**
 3 **says you shall not exceed those levels. It does not**
 4 **-- the regulation itself does not give any**
 5 **recommendation as to number of significant digits**
 6 **that one should do their analysis, so we're left**
 7 **with professional judgment.**
 8 **The ISO 9613 method that we used to**
 9 **predict the noise levels, that can be carried out to**
 10 **a hundred decimal places or ten or three or anything**
 11 **that you want. Our particular software model is**
 12 **fixed at one-tenth, but you could easily do these**
 13 **calculations in a spreadsheet, and again you could**
 14 **come up with ten, you know, decimal places, anything**
 15 **that you want.**
 16 **So we're obviously not going to display**
 17 **something to ten or even three decimal places. I**
 18 **don't think that's warranted or useful. So then the**
 19 **question becomes to what degree does one round to be**
 20 **warranted and, again, useful.**
 21 **So a few examples of why we chose**
 22 **integers. The uncertainties of both the ISO and**
 23 **International Electrical Commission methods that**
 24 **were used to predict levels here, the uncertainties**

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1 **of those methods are in integers. They don't talk**
 2 **about tenths of a dB(A). As I said, the Illinois**
 3 **Pollution Control Board limits and every other**
 4 **regulation that I know of, federal regulations,**
 5 **state regulations, local noise limits, they're all**
 6 **integers. Nobody splits those kinds of hairs when**
 7 **it comes to the limits.**
 8 **We did a search for something relevant**
 9 **here, and the one thing that we came up with is, and**
 10 **I believe it's being entered as an exhibit, it's**
 11 **ISO, International Standards Organization, Method**
 12 **1680, which is a test code for measuring noise**
 13 **emissions from rotating electrical equipment, so**
 14 **fairly relevant. And it clearly states in there**
 15 **that you should round to integers.**
 16 **I started looking around at other**
 17 **consulting firms to see what they did. Robert Rand**
 18 **who you'll hear from next week, his Falmouth study**
 19 **reports noise levels in integers. Dr. Salt and**
 20 **Lichtenhan that we've heard much about, all of their**
 21 **numbers in their reports are integers. Dr. Punch**
 22 **who you'll hear from tonight in his What**
 23 **Audiologists Should Know study, all of those levels**
 24 **are integers. In fact, they're more on the 5**

1 decibel and he speaks in terms of 10 or 15 to 20
2 decibels.

3 The EPA document that -- the 1974 levels
4 document that's much referred to in my presentation
5 and in others, that's all in kind of 5 decibel
6 increments. They even say in there, the quote is,
7 "Correction for these factors were initially made in
8 5 dB intervals since the magnitudes of many of the
9 corrections are based solely on the intuition of the
10 authors." In other words, when it comes to
11 environmental noise, it's hard to get down -- when
12 you're predicting levels, it's hard to get down to a
13 very fine resolution.

14 Lastly, you know, human hearing, it's
15 generally known that we can detect a change of about
16 a plus or minus one decibel in a laboratory setting.
17 Outside, that's about a plus or minus three. So
18 people really can't even discern tenths.

19 My next question that I asked myself is:
20 Is it useful to present the data to a tenth of a
21 decibel? And I would say that about ten years ago
22 my firm, we came to the realization, we do a lot of
23 these presentations, tables of numbers presented to
24 county boards or citizens groups or what have you.

1 rounded down to get to the integer limit of the
2 Pollution Control Board standards, then the model
3 would show, then, that those were not in compliance
4 with the Pollution Control Board standards, so what
5 then could be done? Could you add additional
6 low-noise blades in order to make sure that the
7 limits were no greater, you know, the noise decibels
8 were at, say, 41.0 and not any greater than that?

9 A. Yeah, that would be I believe the client's
10 preferred method. You could always eliminate
11 turbines, you could move turbines, you can do
12 various things, but it would be their preference I
13 believe to add more LNTE blade turbines to the
14 project to reduce the predicted levels.

15 Q. In your opinion, would adding a blade or
16 multiple blades in the vicinity of a receptor that
17 was four-tenths of a decibel above the limit, would
18 that reduce the noise such that it would, you know,
19 reduce it by four-tenths of a decibel?

20 A. Absolutely. The low-noise blades target
21 the very frequency range of interest here, the 1,000
22 hertz and the 500 hertz, and they bring the levels
23 down anywhere from two to three, I think even four
24 decibels. So yes, that can be achieved in that

1 And when you look at a table of numbers that's got
2 one, even one decimal place to it, I find and I
3 think we found a lot of our clients found that it's
4 very hard to just make a lot of sense of that, and
5 as soon as you round it to integers, it becomes
6 clear. You can say, yeah, this level is below that
7 level or it's below the limit.

8 So it's been our practice on every project
9 we do, power, not power, wind, gas turbines,
10 whatever, that that's how we present our results.
11 We find that it's industry practice, it makes sense,
12 and it's what's warranted under the circumstances.

13 Last point. The California Ridge project
14 that we used to validate our modelling process on
15 this project was measured to a tenth of a decibel,
16 so we did measure to that degree of accuracy. So I
17 hope that answers your question.

18 Q. Yes, it did, but I would ask that you
19 provide the model results to the nearest tenth,
20 would you be able to do that, of a decimal? Do you
21 still have that information?

22 A. We certainly have that information, yes.

23 Q. All right. Well, if the county were to
24 determine not to accept a model result that was

1 manner.

2 Q. Okay. Well, I would ask that generally
3 the applicant -- I mean we're going to get the list
4 from Mr. Hankard of the decibel levels to the tenth.
5 And for receptors showing for which he had to round
6 down to get to the limit, I would ask that the
7 applicant -- although I understand your position
8 that that was appropriate to round down, I would ask
9 the applicant to assume that that position was not
10 agreed to by the county and identify what the
11 solution or the remedy would be so that the model
12 would demonstrate compliance at all the receptors.

13 MR. BLAZER: We have that list tonight,
14 Mr. Griffin.

15 MR. GRIFFIN: Okay.

16 MR. BLAZER: I actually have two exhibits.
17 Mr. Hankard referred to ISO 1680. I have copies of
18 that and we've marked that as Pleasant Ridge Exhibit
19 131. And then we also have marked as Pleasant Ridge
20 Exhibit 16A, this would be the updated list. The
21 current list shows I think four of the 103 turbines
22 with LNTEs and 11 of the 100 turbines with LNTEs.
23 This new list, which I've marked as 16A, shows 20 of
24 the 103s and 24 of the 100s. And that's inclusive

1 of the prior list.

2 **MR. GRIFFIN:** All right. Well, what I
3 would suggest is that everyone have the opportunity
4 to look at those two exhibits, including Mr.
5 Luetkehans, and I think you'll have to be back
6 because Mr. Luetkehans hasn't had a chance to look
7 at this and this would be new information I think
8 beyond the scope of the direct testimony, so I think
9 you may be back for another night. But let me move
10 on to some more questions I have that don't relate
11 to these exhibits that we haven't seen before.

12 **BY MR. GRIFFIN:**

13 Q. Did you -- Mr. Hankard, did you assist in
14 determining the placement of the low-noise trailing
15 edge blades that were identified on the existing
16 application?

17 **A. I reviewed the results, but I would not
18 say that I assisted in determining which turbines
19 were assigned as low noise. That's done by the
20 consultant Stantec that has kind of overall control
21 over the project layout, but I certainly reviewed
22 the results.**

23 Q. All right, a question generally about the
24 modelling process. Several of the -- and maybe many

1 turbine to a particular receptor?

2 **A. Here again, it assumes that -- the ISO
3 model, as it states in the method, that it assumes
4 that the source is upwind of the receptor or I
5 guess, better put, that the receptor is downwind of
6 the source. So the model is again assuming that
7 it's -- that if you have that house that's got four
8 turbines around it, it's downwind of each one of
9 those. Of course, that can't really be the case,
10 but that's essentially what the model assumes.**

11 Q. All right, so the model assumes the
12 conditions -- the conditions are such that the noise
13 will be maximized at the receptor that's being
14 produced by each turbine. Would that be correct?

15 **A. Yes.**

16 Q. Perhaps not stated the most artfully,
17 but --

18 **A. No, that's fine. No, that is correct. I
19 mean, generally speaking, a source is going to be
20 loudest when the receptor is downwind from that
21 source. So by making the assumption that it's
22 downwind of every source, then it is assuming in
23 that respect the loudest case condition.**

24 Q. Do you know who at Stantec assisted the

1 receptors have turbines that may surround a receptor
2 where there's clearly multiple turbines that may be
3 transmitting noise to one receptor. How do you
4 model for that when you've got multiple turbines
5 emitting noise potentially to one receptor?

6 **A. Well, the model assumes that every turbine
7 is putting out its full noise emission in all
8 directions. So it has -- really what it does is it
9 calculates the distance from -- let's say a house
10 has four turbines, one in each direction, north,
11 south, east and west, and it's going to calculate
12 the distance between each turbine and the house, and
13 really the equations just boil down to distance. We
14 know how loud the turbine is right at the turbine.
15 That's going to dissipate with distance as it gets
16 to the house.**

17 **So it's going -- the model is going to
18 calculate the contribution from each of those four
19 turbines around the house and add them up and that
20 will be the total predicted level at that house.**

21 Q. When you say the model assumes -- let me
22 ask you, what other assumptions does the model make
23 about wind direction and other things like that that
24 may affect the sound emitted from a particular

1 applicant in determining which turbines to place the
2 low-noise trailing edge blades on?

3 **A. That would be JoAnne Blank.**

4 **MR. GRIFFIN:** That's all the questions I
5 have. Thank you, Mr. Hankard.

6 **A. You're welcome.**

7 **CHAIRMAN CORNALE:** All right, I believe at
8 this time, after we asked you questions and we kind
9 of run out of some time and as we knew we were going
10 to have you back, I believe there may be some
11 questions in the audience for this specific witness.

12 Do I have any questions for Mr. Hankard?
13 All right, looks like I've got two gentlemen out
14 here. If you want, yeah, come on up. Just state
15 your name for the record.

16 **MR. HAYES:** All right, will do. My name
17 is John --

18 **CHAIRMAN CORNALE:** All right, go ahead and
19 turn that on for us.

20 **MR. HAYES:** My name is John Hayes,
21 H-A-Y-E-S.

22 **QUESTIONS BY**

23 **MR. HAYES:**

24 Q. Good evening, Mr. Hankard. Hope I

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1 pronounced your name correctly.
 2 **A. Yes, that's fine.**
 3 Q. I just have some questions about the ISO
 4 model. I just wanted to understand it better and
 5 I'm sure you can help me with some of the
 6 misconceptions. I believe at the earlier testimony
 7 you were asked if the turbines were to be considered
 8 a point source or they are considered a point
 9 source. Would you consider two turbines to be two
 10 separate point sources?
 11 **A. Yes, that's -- that is how it is modelled,**
 12 **correct.**
 13 Q. The ISO model I think could possibly be
 14 used to make sound predictions for other things,
 15 like maybe a lawn mower or tuning forks?
 16 **A. Well, it was developed with environmental**
 17 **noise in mind. So the lawn mower, yes. Perhaps not**
 18 **the tuning fork. But it -- really what it does is**
 19 **it models how sound propagates through the**
 20 **atmosphere.**
 21 Q. Sound doesn't -- from tuning forks doesn't
 22 propagate through the atmosphere?
 23 **A. Well, I guess, sure. If you want to find**
 24 **out how that propagates, you can --**

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1 Q. Yeah. Well, there's a reason for that.
 2 And I'm not trying to pull any fast ones, but if you
 3 were to strike a tuning fork, you get some -- you
 4 can get some interesting things that I'm sure you
 5 can explain, so just hold on for a second.
 6 I'm going to strike these two tuning forks
 7 and you'll hear a sound. I'm going to strike two
 8 tuning forks and you'll hear a sound, and I'm just
 9 kind of wondering an explanation for what we hear.
 10 (Demonstrating tuning forks.)
 11 There seems to be an increase in the sound
 12 level as they're vibrating. So if we had two
 13 turbines going, you know, would we experience that
 14 same thing? Can you explain what's going on here?
 15 **A. Well, every time you add a source, you add**
 16 **three decibels, and that's what the model is going**
 17 **to assume as well. So, yes, I mean when you strike**
 18 **the second one, it's going to get louder. That's**
 19 **when you've got two sources.**
 20 Q. But it was pulsating.
 21 **A. Well, that's a function of the resonance**
 22 **of the metal of the tuning fork. That's how it**
 23 **creates its sound. It pulsates.**
 24 Q. Well, I don't really think that explains

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1 it. I mean I'm not trying to say that you don't
 2 know, but you didn't answer the question correctly
 3 for some reason. Actually it has to do with
 4 interference of the two sound waves that are
 5 produced, so when you get the -- what's sometimes
 6 called a compression of one sound wave --
 7 **MR. BLAZER:** Mr. Chairman, I'm really
 8 loathe to interfere at all with this, but this is
 9 supposed to be questioning not testimony.
 10 **CHAIRMAN CORNALE:** I understand. Let's
 11 let him continue here a little bit. I think I might
 12 understand where he's going with this. Just
 13 remember, you're trying to ask the expert to
 14 identify or further explain.
 15 **MR. HAYES:** Yeah, I apologize for that. I
 16 just expected a little different answer to my
 17 question than what I got, so that was -- so I went
 18 ahead and was trying to explain it and I shouldn't
 19 have maybe done that.
 20 **BY MR. HAYES:**
 21 Q. But anyway, this sometimes with wind
 22 turbines is called amplitude modulation; is that
 23 correct?
 24 **A. Yes. Amplitude modulation is typically**

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1 **associated with a single turbine. You can get**
 2 **constructive and -- constructive and destructive**
 3 **interference between two sources. I think that's**
 4 **your point.**
 5 Q. That is my point. I was not -- well, in
 6 terms of physics, a single point source can't have
 7 interference. So considering a turbine a point
 8 source, so a single point source can't have
 9 interference, so that's where I'm kind of confused.
 10 Now, maybe considering a turbine a point
 11 source is not the best thing in the world, but I'm
 12 not sure I follow and maybe you can explain to me
 13 how a single turbine can have amplitude modulation.
 14 **A. It's generally considered because of**
 15 **inflow turbulence, for example, or passing a mast,**
 16 **you get some pressure turbulence when each blade**
 17 **passes by the mast, and that will create amplitude**
 18 **modulation.**
 19 Q. Okay. Does the ISO model that you use,
 20 does it include amplitude modulation in the
 21 calculated predicted value?
 22 **A. No, it does not.**
 23 Q. So would it be fair to say that the actual
 24 sound that's heard by someone at that residence

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1 would be louder if there was amplitude modulation
 2 occurring at that point at that time?
 3 **A. Well, I mean it's not louder. The level**
 4 **is what the level is. Whether or not they're going**
 5 **to perceive it differently than nonamplitude**
 6 **modulated sound, yes, there could be a difference**
 7 **there.**
 8 Q. Okay. Would you agree that if amplitude
 9 modulation was to occur, such as -- I realize tuning
 10 forks are not wind turbines, but there was a
 11 pulsating sound, and would you agree that people
 12 might find that annoying?
 13 **A. It depends --**
 14 **MR. BLAZER:** I think that's beyond the
 15 scope of this witness's testimony, Mr. Chairman.
 16 **CHAIRMAN CORNALE:** Mr. Hankard, why don't
 17 you go ahead and answer that question for us?
 18 **A. You know, it depends on the degree of**
 19 **amplitude modulation. And the Illinois Pollution**
 20 **Control Board anticipated impulse of sources and**
 21 **they list them as things like drop forges and**
 22 **blasting explosives, things with serious modulation.**
 23 **To put the sound of a wind turbine in the same**
 24 **category as a drop forge is just to me not a fair**

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1 **comparison at all.**
 2 Q. Are you aware of any studies that have
 3 been done on the effects of amplitude modulation?
 4 **A. Indeed, there are many studies and there**
 5 **are conference papers and the like. It's -- yes, I**
 6 **am certainly aware of that.**
 7 Q. The predicted values from the ISO model,
 8 those are for -- are using input numbers that would
 9 be values for a brand-new turbine or one that's four
 10 years old or one that's ten years old. Where are
 11 the input numbers for? What particular stage of a
 12 turbine's life?
 13 **A. I'm not a hundred percent sure what a**
 14 **manufacturer like GE does. I assume they test**
 15 **relatively new turbines. They might be testing some**
 16 **over years of time as well. I'm not quite sure to**
 17 **be honest with you.**
 18 Q. Okay. Are you aware that as turbines age
 19 that they may increase two to three decibels?
 20 **A. Yeah, there was a paper recently and I**
 21 **reviewed it and that was the theory. And when they**
 22 **tested turbines of a couple years old and compared**
 23 **them to new turbines, there was actually very little**
 24 **change, no detectable change. The only way they**

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1 **were able to get the three decibel change of which**
 2 **you speak is they actually wrap the blades with tape**
 3 **to simulate what would happen if the turbine blade**
 4 **became very irregular, pitted or somehow worn with**
 5 **time, but they were not able to measure any change**
 6 **by just comparing a new blade to a blade of a few**
 7 **years age. There was no difference.**
 8 Q. Okay. So are you saying it's not possible
 9 for a turbine as it got, say, ten years old and the
 10 blade got worn and pitted and things, that it most
 11 likely would not increase in sound level?
 12 **A. No, if a surface becomes rough and**
 13 **irregular, it's going to create small amounts of**
 14 **turbulence and that is noise, but note that the**
 15 **turbine manufacturers have a vested interest in not**
 16 **allowing this to occur because noise basically**
 17 **equals energy that's not going into electricity**
 18 **production, so --**
 19 Q. Okay.
 20 **A. -- there are blade maintenance programs**
 21 **that will occur.**
 22 Q. Okay. That will be it for the ISO model,
 23 but I had a few questions about the Cal Ridge study.
 24 In that Cal Ridge study, did you subtract the

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1 background noise from the measured values?
 2 **A. We did, yes.**
 3 Q. Would it be fair to say that a person who
 4 was hearing the sound would also hear the background
 5 noise plus the turbine noise?
 6 **A. Well, there were a few primary sources of**
 7 **background noise, so probably the primary source was**
 8 **traffic and distant trains, and that was fairly easy**
 9 **for us to mostly separate. And then there was the**
 10 **wind, which once it gets over 5 meters per second,**
 11 **roughly 10 miles per hour, it becomes difficult to**
 12 **sort the two out. And most measurement standards**
 13 **recognize this and actually kind of prohibit**
 14 **measurements under those conditions.**
 15 **So we cut the wind at 5 meters per second,**
 16 **and we were able to see in the time histories of the**
 17 **levels where the cars were and eliminate those at**
 18 **least to a reasonable degree.**
 19 Q. Okay, but my question was would a person
 20 hear that sound?
 21 **A. Well, sure. If you were standing at one**
 22 **of the residences near where we were measuring, when**
 23 **the cars come by, that's what you hear, and then**
 24 **they go away and it's back to the background level,**

1 **which would be turbines if they're operating or a**
2 **distant train if it's coming by.**

3 Q. Would you agree that a person would hear a
4 louder sound than the ISO model's predicted value
5 due to the background sound?

6 **A. You mean would they add together?**

7 Q. Yes.

8 **A. Well, sure. I mean all sources of noise**
9 **in an environment add together given their different**
10 **frequency and level and time distribution.**

11 Q. Okay. The -- you mentioned that you did
12 -- and this may not have been part of the Cal Ridge
13 study, I'm not sure, that you actually tested the
14 abandoned house at the Shirley Wind farm. Is that
15 also in that Cal Ridge location?

16 **A. No, those are two separate projects. The**
17 **Shirley one is in Wisconsin and the Cal Ridge is**
18 **here in Illinois.**

19 Q. Okay. Then -- okay. Do you by any chance
20 have your Cal Ridge study with you?

21 **A. I do.**

22 Q. Okay. I'm going to ask you to -- on page
23 23, there's a heading that says low turbine days. I
24 have no idea what that means. Can you explain to me

1 **was above 5 meters per second, they exceed the**
2 **limits, but that's because we're no longer really**
3 **measuring turbine noise. Now we're measuring**
4 **basically wind blowing through trees, along or**
5 **around grass or on the microphone.**

6 Q. Would it be fair to say the greater the
7 wind speed, the noisier the turbine is going to be?

8 **A. Up to a certain point. Turbines reach a**
9 **maximum RPM, and then as the wind continues to get**
10 **stronger, the blades pitch and the turbines don't**
11 **spin any faster and therefore don't get any louder.**

12 Q. Right. What is that maximum RPM?

13 **A. On these particular turbines, it was 16,**
14 **1-6.**

15 Q. Okay. And what I'm getting at here is it
16 seems to me when we're getting to sound levels
17 exceeding the maximum level, that occurs on the
18 windiest times, which is when we're seeing greater
19 than 5 meters per second. And I understand that
20 someone, some committee came up with these
21 recommendations. Do you know anything about where
22 that 5 meters per second came from?

23 **A. Well, that's part of an American National**
24 **Standards Institute standard that's been around for**

1 what that means?

2 **A. Yeah. It's on days when the turbines**
3 **weren't operating or at least operating at a very**
4 **low level. You can see, for example, that the RPMs**
5 **of the turbines is in -- I see a lot of zeros, ones**
6 **and twos, which means it's barely moving.**

7 Q. Okay. All right, let's see. I mean I
8 realize you just said something I was going to ask
9 you about which is related to that 5 meters per
10 second, but if you will go to say -- let's just pick
11 page 27, that table. At the -- oh, let's see. At
12 the -- I believe the column's called noise levels
13 without vehicles, so I'm assuming that means the
14 background sounds have been subtracted off?

15 **A. The vehicle background sounds, yes.**

16 Q. Okay. At the bottom of the chart, when I
17 look at, say, you know, a thousand hertz, I notice
18 that many of the values exceed the limit. And I
19 understand that you didn't include those numbers in
20 your conclusion that none of the data collected
21 exceeded the values; is that correct?

22 **A. Well, yeah. Again, if you look at the**
23 **wind speed column, you'll see that right at 5 meters**
24 **per second, yes, some of the values when the wind**

1 **decades, so it would have been that standards**
2 **committee that would have consisted of an array of**
3 **acoustical consultants got together and pored over**
4 **that issue and that's what they came up with.**

5 Q. Are you aware that when that group of
6 people made these recommendations that the majority
7 of those people were associated with the wind
8 industry?

9 **A. Well, that wouldn't really be my**
10 **recollection because I think that this was -- this**
11 **standard has been in place for decades and the wind**
12 **industry really hasn't been so, so that would seem a**
13 **little odd to me.**

14 Q. Okay.

15 **MR. HAYES:** Thank you.

16 **CHAIRMAN CORNALE:** All right, thank you.
17 I believe someone else had some questions. Do you
18 have several questions or a whole page full of
19 questions? It's 7:30. I didn't know if we want --
20 if it's all right, why don't you come up for maybe
21 10, 15 minutes, ask some questions, and then I may
22 stop you and we may take a break, okay? If you're
23 all right with that.

24 **MR. SLAGEL:** Yes.

1 **CHAIRMAN CORNALE:** Okay.
 2 **MR. SLAGEL:** Hello? My name is John
 3 Slagel, S-L-A-G-E-L.
 4 **QUESTIONS BY**
 5 **MR. JOHN SLAGEL:**
 6 Q. Okay, you're the sound guy and this case
 7 hinges on sound. Lots of people are telling me
 8 these are going to be too loud. Some people, like
 9 the union guys that work on them, say they'll be
 10 quiet and everybody else who thinks they're loud is
 11 crazy.
 12 You presented a lot of stuff and I want to
 13 be very clear on what you're stating. Will these
 14 turbines be quiet and not cause anyone issues or are
 15 you simply saying that they meet Illinois Pollution
 16 Control Board limits?
 17 **A. I am saying that they meet the Illinois**
 18 **Pollution Control Board limits.**
 19 Q. Okay, thank you. Now, on the California
 20 Ridge noise level compliance, were you responsible
 21 for the entire planning and carrying out of the
 22 study?
 23 **A. That study was conducted by myself in**
 24 **association with Paul Schomer. I did a majority of**

1 Q. Okay. So after you did the study, what
 2 was the -- did it pacify the people that had noise
 3 complaints?
 4 **A. I don't know if it pacified them.**
 5 Q. Okay. Well, I guess people were saying
 6 the turbines are too loud, and so you guys came in,
 7 do a study, correct?
 8 **A. Yes.**
 9 Q. And your study said?
 10 **A. That it meets the Illinois limits.**
 11 Q. Uh-huh. So then what was your conclusion
 12 about what to do about the residents complaining
 13 about that it was too loud?
 14 **A. I guess that was the end of my**
 15 **responsibility. That was what I was hired to do,**
 16 **determine if we met the law.**
 17 Q. Okay. So if I can summarize what you did,
 18 people were complaining about noise; you came in,
 19 you did a study and said we legally meet the limits,
 20 so nothing we're going to do about this, see you
 21 later, correct?
 22 **MR. BLAZER:** Again, I'm -- I rarely if
 23 ever object when a civilian is asking questions, but
 24 I think that's --

1 **the field work running out to the meters,**
 2 **downloading data, but when it came to choosing**
 3 **measurement locations, analysis methods, that was a**
 4 **joint effort between Mr. or Dr. Schomer and myself.**
 5 Q. Okay. What's your relationship with
 6 Stantec Engineering? Like they did the sound study,
 7 so --
 8 **A. Right. They did the modelling on this**
 9 **project, and I am kind of the acoustical consultant**
 10 **in charge, if you will. I'm the one that decides**
 11 **how we should proceed in terms of what assumptions**
 12 **to make and what modelling methods to employ, and**
 13 **then Stantec people actually run the models.**
 14 Q. Okay. Okay, so the California Ridge noise
 15 study compliance analysis, what was the purpose of
 16 the study? Why did you guys do it?
 17 **A. To determine if that project -- if the**
 18 **noise levels from that project met the Illinois**
 19 **Pollution Control Board limits.**
 20 Q. Okay. And are you going to do that on our
 21 project also when it's completed or is there a
 22 specific reason you did that project?
 23 **A. That project was the result of a noise**
 24 **complaint, so --**

1 **CHAIRMAN CORNALE:** Mr. Slagel, yeah, if we
 2 could keep it to questions, just -- you don't need
 3 to reiterate his response. Just go ahead and
 4 continue with your line of questions.
 5 **MR. SLAGEL:** Okay.
 6 **BY MR. SLAGEL:**
 7 Q. Did the residents ever record complaints
 8 when the turbines were shut down suggesting the
 9 nocebo effect?
 10 **A. No, I was actually supplied whenever --**
 11 **when we were doing our study and one of the**
 12 **residents complained about noise, I was always given**
 13 **that information, and I compared it to the turbine**
 14 **operations and the noise levels that we were**
 15 **measuring at that time, and I found that they were**
 16 **-- they understood when the turbines were working.**
 17 **They did not complain when the turbines weren't**
 18 **working.**
 19 Q. Okay. So there was no nocebo effect going
 20 on with those residents?
 21 **MR. BLAZER:** I have to object again. It's
 22 beyond the scope of this witness's testimony. We
 23 haven't established that this witness even knows
 24 what the nocebo effect is. That wasn't his

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1 testimony; that was Mr. Roberts's testimony.
 2 **MR. LUETKEHANS:** But he sat here through
 3 all of it.
 4 **CHAIRMAN CORNALE:** That is correct, it was
 5 not his -- he had no reference to the nocebo effect.
 6 Okay, so sound-related questions --
 7 **MR. SLAGEL:** Yeah, sure.
 8 **CHAIRMAN CORNALE:** -- to Mr. Hankard
 9 please.
 10 **MR. SLAGEL:** Okay, yep.
 11 **BY MR. SLAGEL:**
 12 Q. So basically when the residents
 13 complained, the turbines were running at or near max
 14 capacity every time.
 15 **A. Almost every time, that's correct.**
 16 Q. Okay. Now, from the California Ridge
 17 study, people were complaining about turbine noise
 18 as you were measuring it and found it to be under
 19 the IPCB limits, correct?
 20 **A. That's correct.**
 21 Q. So we can conclude that meeting the IPCB
 22 limits will not protect you from noise complaints
 23 from residents, correct?
 24 **A. It did not in that case.**

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1 Q. Okay. Now, this one here, I hate to
 2 rehash what's already been rehashed, so I'm just
 3 going to say I don't buy your whole rounding
 4 argument either. 41.49 is above 41.
 5 **MR. BLAZER:** I don't know if there's a
 6 question pending here, Mr. Chairman.
 7 Q. Okay, why did you round to the nearest
 8 ten, ten digit, like 40. Instead of 41.49, why did
 9 you choose 41? You could have rounded to anything
 10 apparently.
 11 **A. Yeah, but I gave I believe a pretty good**
 12 **list of reasons why we chose integers. That's the**
 13 **overwhelming -- I mean I've been doing this for 25**
 14 **years and that's how we've done it on countless**
 15 **projects and other consultants. It makes sense**
 16 **given that, you know, a 5 dB change is significant,**
 17 **so you wouldn't want to round to 5 dB. That would**
 18 **not be appropriate.**
 19 Q. Well, okay, fair enough I guess. I still
 20 don't buy it, but okay. I mean -- yeah. Okay, in 9
 21 on your conclusions of this test, you say you
 22 stopped testing when the wind is over 5 meters per
 23 second I think because the wind is too loud,
 24 correct?

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1 **A. We didn't stop testing, the meters ran**
 2 **continuously, but we didn't include that data in the**
 3 **analysis.**
 4 Q. Okay. Now, the people that are
 5 complaining about the noise, were they outside where
 6 the wind would be in their ears or were they inside
 7 their houses?
 8 **A. I presume they are at times either.**
 9 Q. Okay. So really as the wind gets faster
 10 and the turbines make more noise, the wind noise you
 11 say is hard to separate, but if you're measuring
 12 inside the house, which is where the people are
 13 complaining, the wind noise is nil, there's no wind
 14 noise in the house, right?
 15 **A. Certainly not as much. If the wind is**
 16 **buffeting the house, you'll certainly hear that, but**
 17 **it's obviously not as great as it is outside.**
 18 Q. Okay. So your test basically proved that
 19 outside, you know, on the property line here you
 20 were fairly under the IPCB limits. Whether running
 21 faster would cause more noise in somebody's house we
 22 don't know, correct?
 23 **A. Yeah, we do know that. Again, the**
 24 **turbines reach a maximum speed, and noise level is**

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1 **related to the speed of the blades, so they don't**
 2 **get any faster when the wind blows hard.**
 3 Q. Oh, so 5 meters per second is the maximum
 4 fast as the turbine will turn?
 5 **A. Well, I mean that's a wind speed and the**
 6 **turbines have a rotational speed, but, you know,**
 7 **from that same table that you were referring to,**
 8 **you'll see that some of the lower speed -- we have a**
 9 **lower wind speed on the ground, I believe on page**
 10 **27, and you'll see that many of the lower ground**
 11 **wind speeds correlate that the turbines were**
 12 **operating at full, full capacity, full speed, so we**
 13 **know how loud they are when they are operating at**
 14 **full speed.**
 15 Q. Okay. So if somebody hired you to figure
 16 out -- like you're a sound guy, they hired you to
 17 figure out, you know, there's a noise source in the
 18 area they want to build their house, so they want to
 19 say I want to put my house a certain limit away from
 20 this noise source so that I can sleep at night.
 21 Would you do a study for them finding if it meets
 22 the IPCB limits or would you use something else?
 23 **A. Certainly start with the IPCB limits**
 24 **because that's what the source could operate at.**

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1 Q. Right. So then you would say here's how
 2 far you should put your house because at this point
 3 it's within IPCB limits so you should be able to
 4 sleep at night?
 5 **A. Whether or not somebody can sleep at night
 6 is probably beyond my expertise.**
 7 Q. Yeah. Well, let's say something is right
 8 at the IPCB limits, which in different octave bands
 9 there's different decibels. What's the average --
 10 if you take and you do the average, what's the
 11 average decibel level that something meeting the
 12 IPCB limits would be at?
 13 **A. Well, that -- I believe if you take, if
 14 you assume that a source is operating right up to
 15 each of the band limits.**
 16 Q. Or let's say the turbines when you were
 17 testing them they were right at the limit, what's
 18 the A-weighted decibel?
 19 **A. Right, it's about 45, 46 dB(A).**
 20 Q. Okay. So when a guy who works on
 21 windmills says these are quiet, there's no noise in
 22 the house, and you're saying you've measured 45 you
 23 said?
 24 **A. Yes.**

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1 Q. Who's not telling the truth here?
 2 **A. 45 decibels is what you could receive at a
 3 house, so --**
 4 Q. And that's not a quiet --
 5 **A. I don't know what the guy that works on
 6 the turbine, you know, was talking about, so --**
 7 Q. Okay, thank you. Let's see. Now, you
 8 said that when you add up -- this is switching
 9 slightly to the ISO model that you used to calculate
 10 the sound model. Basically takes each turbine's
 11 distance into effect, adds up all the turbines for a
 12 given receptor, and says that's your result of sound
 13 for that receptor, right?
 14 **A. Yeah, that's a fair summary.**
 15 Q. So you add up a bunch of numbers, and for
 16 the 8,000 hertz in the Pleasant Ridge application
 17 sound study, they came out negative. How do you add
 18 up a bunch of sound contributions and then you end
 19 up with a negative volume at 8,000 hertz?
 20 **A. Well, decibels are relative to a reference
 21 quantity, which is .00002 pascals, and if your
 22 sound -- if your pressure level that your turbine is
 23 putting out is below that, you'll get a negative
 24 number. It's -- in the decibel world, a negative**

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1 **number simply means you're below the reference
 2 quantity. So it's not an invalid result; it's
 3 actually meaningful.**
 4 **CHAIRMAN CORNALE:** This is a good
 5 opportunity to stop right here.
 6 **MR. SLAGEL:** Is it?
 7 **CHAIRMAN CORNALE:** It is. I promised you.
 8 Okay, I've got 7:45.
 9 **MR. SLAGEL:** Is he going to be back?
 10 **CHAIRMAN CORNALE:** You're going to finish,
 11 you're going to get more questions, we're just going
 12 to take five minutes worth of break. Okay, I've got
 13 7:46. Okay, 7:51 come on back.
 14 (Recess at 7:46 p.m. to 7:56 p.m.)
 15 **CHAIRMAN CORNALE:** All right, if we can
 16 make our way back please. All right, Mr. Slagel, I
 17 believe you had some additional questions for Mr.
 18 Hankard; is that correct?
 19 **MR. SLAGEL:** Yes.
 20 **CHAIRMAN CORNALE:** All right.
 21 **BY MR. SLAGEL:**
 22 Q. Okay, back to the Pleasant Ridge
 23 application. Can you explain to me why in the
 24 initial application for the GE 100 turbines and the

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1 supplemental application there was an entire row of
 2 the estimates that was completely different for the
 3 sound levels?
 4 **A. Could you give me some specific reference?**
 5 Q. Well, hold on. Yes, in the 31.5 hertz
 6 column between the initial application and the
 7 supplemental, there's -- I'd say the majority of
 8 those numbers are completely different.
 9 **A. Could you pick one receptor and tell me
 10 what it was before and what it was after? I don't
 11 have that information right in front of me.**
 12 Q. I don't have it in front of me neither.
 13 So you're not aware of that?
 14 **A. I mean I know that the different -- like
 15 LNTE blades have changed, you know, the numbers have
 16 certainly changed with each different submission, so
 17 it doesn't surprise me that there was a change.**
 18 Q. No, this is pretty much the entire 31.5
 19 column and no other numbers were changed between the
 20 two applications. My point being one or the other
 21 is pretty much wrong. I want to know which one is
 22 wrong.
 23 **A. Right. And again, without looking at it,
 24 I don't know what you're referring to offhand, I'm**

1 sorry.

2 Q. And you're the guy that said, "When I'm
3 hired, it's me, I design, conduct, stand behind, I
4 don't ask how to do the study until --"

5 MR. BLAZER: Mr. Chairman.

6 CHAIRMAN CORNALE: Mr. Slagel, questions.

7 MR. SLAGEL: Okay.

8 CHAIRMAN CORNALE: Questions for him,
9 thank you.

10 BY MR. SLAGEL:

11 Q. Why did you only include the worse 107
12 sound receptors in the submitted application? It
13 seems a very odd number, very close to 100, which is
14 even.

15 A. Well, the idea is that the number -- the
16 noise levels at all of the receptors are lower and
17 so we're just looking at the highest. JoAnne came
18 up with that, JoAnne Blank from Stantec. Perhaps
19 she chose a certain -- two decibels under the limit
20 or something will include, you know, everybody
21 that's so close to the limit, and it just came out
22 to 107.

23 Q. Okay. And how many sound receptors were
24 there total?

1 bad.

2 Okay, in comparing California Ridge to
3 Pleasant Ridge and the given placement of the
4 turbines, do you think there will be fewer or more
5 noise complaints and why?

6 A. I have no ability to predict the number of
7 noise complaints.

8 Q. Okay. The turbine placement, technically
9 Invenergy could have placed these things three times
10 the height or approximately 1300 foot from homes.
11 You guys only placed two of them less than 1600
12 foot. Is that because you couldn't put them any
13 closer without hitting the IPCB sound limits?

14 A. Well, I believe there's a number of
15 factors that determine where a turbine can go, noise
16 limits being one of them, wetland areas, turbines
17 can only be so close to one another. I'm not privy
18 to all of the issues that the people that site these
19 projects have to deal with, so whether or not noise
20 was the controlling factor in all cases, I don't
21 know.

22 Q. Okay. During the California Ridge sound
23 testing, are you aware of any turbines that were
24 shut down during that time?

1 A. I believe it's in the 750 range.

2 Q. Would you be willing to give out like the
3 next couple hundred?

4 A. Is -- I forget if all that information is
5 in an appendix in the report or if it's just --

6 Q. It's not. There's just the 107.

7 A. Just the 107. I personally have no reason
8 to not release any such information.

9 Q. The reason I would like to see it is
10 because if you ask these 107 worst ones, of them,
11 there was, let's see, can barely read the numbers,
12 45 of them were zero decibels less than the limit,
13 the state limits, correct?

14 A. I think there was at the limit.

15 Q. Right, plus or minus .49. 42 of them were
16 one decibel below the limit, correct?

17 A. I haven't looked at the table in a while,
18 but that could very well be.

19 Q. 17 of them were two decibels below the
20 limit, 2 of them were three decibels below the
21 limit, and 1 of them was seven decibels below the
22 limit. And that's where the sound study stopped. I
23 would like to see some that were actually considered
24 good not the worst because these all seem pretty

1 A. There's always a turbine here or there for
2 maintenance. We were definitely aware of all of --
3 the operation of all the turbines in the immediate
4 vicinity of our testing, and as noted in the report,
5 there was a curtailment that occurred in the early
6 months, which was actually they were shut -- the
7 turbines were shut down under low wind conditions
8 and allowed to run under high wind conditions.

9 Q. Okay.

10 A. But short of that, I'm not aware of any
11 turbines that were shut down.

12 Q. Okay. Have any been shut down in that
13 area because of noise complaints ever? Not just
14 during the test.

15 A. I believe prior to our testing Invenergy
16 was working with the landowner on shutting certain
17 turbines down. I was not involved with that, so --

18 Q. Okay. On your -- the sound study, when
19 you do -- when you add up the contribution from each
20 turbine to figure its contribution to the noise, how
21 many -- how far out do you go with the number of
22 turbines impacted? Do you add all the turbines?

23 A. We do.

24 Q. Okay. When you -- you said when a wind

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1 speed gets high --
 2 **A. If I may, I'd like to clarify. That's a**
 3 **question for JoAnne. I know it was at one point in**
 4 **the analysis where we had limited it to, let's say,**
 5 **10,000 feet, almost two miles, and then we discussed**
 6 **increasing that. So whether or not every single**
 7 **turbine gets added into each house, I mean you have**
 8 **to understand that once you get beyond 5 or 10,000**
 9 **feet, you know, the atmosphere dissipates this**
 10 **noise. So these really, really distant turbines are**
 11 **not contributing anything of any significance to the**
 12 **level.**
 13 Q. Okay. I don't think we were allowed to
 14 ask JoAnne any questions about sound stuff, only
 15 flicker and comprehensive plan stuff.
 16 When the wind speed does get over, say, 5
 17 meters per second or whatever would spin the blades
 18 too fast, how do you slow them down?
 19 **A. They're slowed down by pitching the**
 20 **blades, which is turning the blades out of the wind.**
 21 Q. So like rotating the things so they're out
 22 of the wind or pitching them like an airplane?
 23 **A. Each blade can pitch, can turn, so that**
 24 **when it's at, say, zero degrees it's capturing the**

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1 **full force of the wind and at 90 degrees it would be**
 2 **capturing minimal force of the wind.**
 3 Q. Okay. Wouldn't that cause a louder sound
 4 to emit at that point?
 5 **A. No, it doesn't. It -- and then the**
 6 **testing confirms this; that, you know, again it's**
 7 **all about the speed, it's all about the tip speed,**
 8 **which means how fast is it going. So if you pitch**
 9 **the blades out to maintain a certain speed, you're**
 10 **going to maintain the noise level. That's been**
 11 **borne out by the testing that the manufacturer does.**
 12 Q. Who made the decision on the submitted
 13 application sound study to only study the center of
 14 homes not the entire Class A property as specified
 15 in the state pollution laws?
 16 **A. If you look at case law, I'm not a lawyer,**
 17 **but the case law of Illinois states that it's the**
 18 **dwelling is the Class A land and the other land is**
 19 **not necessarily Class A, so that's why we -- we're**
 20 **predicting the levels at Class A land which is**
 21 **basically the house itself.**
 22 Q. You're saying the grass that you mow
 23 around your house isn't considered Class A?
 24 **A. You know, historically what we've done as**

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1 **acoustical consultants is look at, you know, you**
 2 **could have a deck. Again, this is -- we're dealing**
 3 **with nighttime limits, so you would want to**
 4 **reasonably say what do people do at night. And so,**
 5 **yeah, you could be on a deck next to the house, but**
 6 **for the most part you're in or near your house in**
 7 **the wee hours of -- well, between 10:00 and 7:00.**
 8 Q. Right. So -- well, I guess I need to ask
 9 it as a question, but do the sound, Illinois sound
 10 limits, do they pertain to people or property lines?
 11 **A. They pertain to the land use.**
 12 Q. Right, but what is the -- like the -- let
 13 me find my paper here. So in the IPCB requirements
 14 or whatnot, it says -- the entire Part 901 is called
 15 sound emission standards and limitations for
 16 property line noise sources, so it's dealing with
 17 the sound that crosses over a property line,
 18 correct?
 19 **A. Yeah, it is dealing with sound over a**
 20 **property line.**
 21 Q. Okay. And more so, we could actually read
 22 the 901.102.B which says, "When measured at any
 23 point within such receiving Class A land, provided,
 24 however, that no measurement of sound pressure

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1 levels shall be made less than 25 feet from such
 2 property-line-noise-source."
 3 So talking again about the grass versus
 4 patio, it seems to me a Class A land is the entire
 5 Class A property that your house is on, so I'd like
 6 to hear more about what you're saying the case study
 7 in Illinois that...
 8 **A. Right, that the Pollution Control Board**
 9 **has taken up this very issue in the past and they**
 10 **have determined that it is -- that the use of the**
 11 **land is not the property line per se. So the Class**
 12 **A land, a residential property, would be the area**
 13 **around a house, not the -- not the entire extent of**
 14 **the platted land.**
 15 Q. Okay. I think we're about done here.
 16 Just give me a second to look through.
 17 **MR. SLAGEL:** That is it. Thank you.
 18 **A. Thank you.**
 19 **CHAIRMAN CORNALE:** Thank you. Were there
 20 any other additional questions for Mr. Hankard while
 21 we have him here? I don't see anybody out there.
 22 It's important if you have your questions to ask
 23 them when you have them or when the witnesses are
 24 here.

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1 **MR. HAYES:** Can I ask one more real quick
 2 or not? If you don't want me to, that's okay.
 3 **CHAIRMAN CORNALE:** You had your
 4 opportunity.
 5 **MR. HAYES:** Okay.
 6 **CHAIRMAN CORNALE:** Okay, all right, I'm
 7 sorry. Okay, Mr. Hankard, thank you.
 8 **MR. LUETKEHANS:** If I may, first of all, I
 9 would like to officially, pursuant to what Mr.
 10 Griffin said, reserve my right to question about
 11 this new information. I don't want my silence to be
 12 seen as I'm not going to be cross-examining Mr.
 13 Hankard about this new information. And I have
 14 other things I want to say about this issue, but Mr.
 15 Hankard doesn't have to sit here while we do it.
 16 **CHAIRMAN CORNALE:** Okay. We can agree to
 17 that provided that it's pursuant to the 16A
 18 submittal. Do you agree?
 19 **MR. LUETKEHANS:** Pursuant -- excuse me,
 20 it's pursuant to the 16A submittal and Pleasant
 21 Ridge Exhibit 131. Both of those are new items that
 22 none of us have heard or seen.
 23 **CHAIRMAN CORNALE:** Fair enough, okay.
 24 **MR. LUETKEHANS:** And there will be -- I

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1 don't think Pleasant Ridge Exhibit 16A is
 2 sufficient, and we'll talk about that in a minute,
 3 but things that arise out of 16A I'd agree.
 4 **CHAIRMAN CORNALE:** Okay, all right. One
 5 other thing I want to take care of. I believe in
 6 the audience there's a member that has a question
 7 for Mr. Parzyck. I disallowed it the first time. I
 8 want to stress the importance to everyone out there
 9 to please ask the questions as they -- as these
 10 witnesses are here. I understand schedule
 11 impediments, whatever. We're here. If you guys
 12 really -- try your best to make it.
 13 I believe the individual has represented
 14 himself as a school board member. If he's willing
 15 to come forward and represent yourself as a school
 16 board member, school board official, I will allow
 17 this question because -- in the greater interest of
 18 the community, all right?
 19 So, Mr. Parzyck, if you could come forward
 20 and we'll take this question. And please identify
 21 yourself and the government body that you represent.
 22 **MR. MARK SLAGEL:** Okay, thanks. Okay,
 23 thanks for letting me come back up here. I wasn't
 24 here the last time when he was here at this meeting.

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1 I apologize for that, but I have a pretty busy
 2 schedule too.
 3 **QUESTIONS BY**
 4 **MR. MARK SLAGEL:**
 5 Q. My name is Mark Slagel. I'm a member of
 6 the Prairie Central School District, and my
 7 questions are really concerning the batch plant.
 8 From my understanding, it's located across the road
 9 from our Prairie Central Junior High?
 10 **MR. BLAZER:** I'm sorry, the batch plant?
 11 **MR. MARK SLAGEL:** Yes.
 12 **CHAIRMAN CORNALE:** The concrete batch
 13 plant.
 14 **MR. MARK SLAGEL:** Is there a problem with
 15 that?
 16 **MR. BLAZER:** No.
 17 **CHAIRMAN CORNALE:** The siting of the -- of
 18 the batch plant, is that correct, the scope that
 19 you're asking?
 20 **A. (by Mr. Parczyk) I don't -- I know that**
 21 **the proposed location of the batch plant is within**
 22 **Forrest off of 47. I'm not quite sure where it is**
 23 **with respect to the school.**
 24 Q. Okay. Well, who would know the proposed

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1 location of it?
 2 **A. It's in the application.**
 3 Q. Okay. And where is that?
 4 **A. I just --**
 5 Q. The proposed site.
 6 **A. I mean I just said it's -- the proposed**
 7 **location, it's in the application, it's online,**
 8 **it's -- as I understand it --**
 9 **MR. BLAZER:** If I may, Mr. Chairman,
 10 there's a map in the record that specifically
 11 identifies where, the proposed location of the batch
 12 plant.
 13 **MR. MARK SLAGEL:** Okay.
 14 **CHAIRMAN CORNALE:** And I believe his
 15 question is site specific to that.
 16 **MR. MARK SLAGEL:** Yes.
 17 **CHAIRMAN CORNALE:** Okay, we've
 18 identified -- we've identified where the batch plant
 19 is going. And you believe from the maps that it
 20 is --
 21 **MR. MARK SLAGEL:** Yes.
 22 **CHAIRMAN CORNALE:** -- within the general
 23 proximity of the junior high school?
 24 **MR. MARK SLAGEL:** Yes.

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1 **CHAIRMAN CORNALE:** Okay.
 2 **BY MR. MARK SLAGEL:**
 3 Q. And so my biggest concern is it's -- from
 4 what I understand, it's directly across the road
 5 from the -- or maybe not directly across the road,
 6 but your entrance to get in and out of the batch
 7 plant could be directly across the street from our
 8 junior high entrance on and off the highway.
 9 And at certain times of the day when
 10 school's letting out or when school is starting,
 11 that's a terrible busy road and concerns with safety
 12 of the children and the bus routes and stuff. Are
 13 you going to have some type of a traffic plan in
 14 place to help that?
 15 **A. Yes, we will. We would work -- we would**
 16 **work with the school, if that's the case, to make**
 17 **sure that certainly the students and anybody working**
 18 **with the pick-up of students, et cetera, is safe.**
 19 **So we would have a traffic plan, we'd work with the**
 20 **school for that plan.**
 21 Q. Something that would assure us that we
 22 don't have any concerns as far as your trucks in and
 23 out.
 24 **A. Yes, sir.**

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1 Q. Okay. Do you have any idea how many
 2 trucks you'd be having in and out of there in a
 3 day's time? I'm sure it varies but --
 4 **A. It certainly does vary and it would depend**
 5 **on the time of the year and when the pour is, so I**
 6 **couldn't say exactly how many trucks it would be.**
 7 **And I would have to -- you know, I would have to be**
 8 **able to sit down with our project manager and the**
 9 **contractor that we subsequently identify and**
 10 **identify, you know, what that flow would be and then**
 11 **how that relates to, you know, the occupancy and the**
 12 **hours of the school.**
 13 Q. Okay. And that plan, is that something
 14 that will be available to us?
 15 **A. That plan will -- as we progress with our**
 16 **construction planning, would be something that we**
 17 **would sit down with the school and that plan would**
 18 **be available to the community, yes.**
 19 Q. Okay, thank you.
 20 **MR. MARK SLAGEL:** And thank you for
 21 letting me come up here.
 22 **CHAIRMAN CORNALE:** Thank you for coming
 23 back up and taking care of that.
 24 Okay, I believe at this time, Mr.

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1 Luetkehans, you have with you an individual, Mr. --
 2 Dr. Punch; is that correct?
 3 **MR. LUETKEHANS:** Yes, we have Dr. Punch.
 4 I do want to make a record here of a couple things
 5 that just happened with Mr. Hankard though.
 6 One, it became pretty obvious during his
 7 questioning that many of the questions were provided
 8 to Invenergy or at least a line of questions was
 9 provided to Invenergy beforehand. I honestly do not
 10 think that's proper without giving those to both
 11 sets of counsel in this case, and I feel like I'm
 12 the only one in the room that didn't know that this
 13 was going to happen since we already have
 14 modifications to the plan that are now proposed that
 15 I've obviously never seen before.
 16 Second, the 16A. What we still don't have
 17 on 16A and what we had for all the other turbines,
 18 or at least 107, was the actual numbers that the
 19 test results turned out to be. I -- that's not
 20 provided in here. All we know is they're, quote,
 21 well below their respected criteria. I don't know
 22 what well below means, and before cross-examining
 23 Mr. Hankard on that, I'd like to see those numbers.
 24 And I'd also like to see the test results for these

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1 numbers, which I asked for and received from Mr.
 2 Blazer and I appreciate that. The backup is what we
 3 received before the hearing the first time.
 4 This puts us in a position where my
 5 experts, one of which is flying in -- scheduled to
 6 fly in Thursday, has little or no time to rebut this
 7 information. And in fact, you know, in my mind and
 8 I know -- I'll make this objection for the record, I
 9 know I'll be denied, but we have statutory notice of
 10 at least 15 days on zoning hearings on things that
 11 are provided or going to be heard. Now we have, in
 12 essence, what is a new application with new types of
 13 blades, new types of results, and we don't have that
 14 opportunity to really examine and get that 15 day
 15 notice.
 16 I don't want my clients to have to
 17 reschedule Mr. Rand's testimony, but we've put
 18 ourselves in a place here where we have significant
 19 changes to the application after they were done with
 20 their testimony and while I'm in the middle of my
 21 testimony. And I don't have a problem with people
 22 asking questions, but I do have a problem changing
 23 this application after two and a half months of
 24 testimony or two months of testimony. That's what

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1 we've done here.
 2 And not only that, we've changed it after
 3 the county passed a moratorium on wind turbines,
 4 which is what I understand they did on January 15th.
 5 So we've really created a record here that has a lot
 6 of -- I have a lot of concerns about and a lot of
 7 problems with in our ability to properly prepare a
 8 case. I mean I have clients who have paid for a
 9 study, which I was about to turn over in the next
 10 day or two, for Mr. Rand that now I don't even know
 11 if it's the right study because I don't know what
 12 these results are relating.
 13 Also -- I also do want to -- besides
 14 reserving the right to cross-examine Mr. Hankard, I
 15 also want to reserve the right to cross-examine Ms.
 16 Blank because, as we heard today, many of the
 17 information we now have was not done by Mr. Hankard,
 18 it was done by Ms. Blank, and as someone mentioned,
 19 we were not able to cross-examine Ms. Blank on sound
 20 at all. Those questions about sound were objected
 21 to, and we now understand that she did much of this
 22 study.
 23 So those are my objections for the record.
 24 And for the record, I would move that Pleasant Ridge

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1 Exhibit 16A either be stricken or that this hearing
 2 or that the application be denied because we now
 3 have a new application and this process is
 4 completely messed up.
 5 **MR. GRIFFIN:** Let me address the assertion
 6 which was incorrect. None of the questions I asked
 7 tonight were provided to Pleasant Ridge prior to
 8 tonight. I did ask that Mr. Blazer make these two
 9 witnesses available because I had questions about
 10 financial assurances and I had questions about the
 11 rounding issue which was discussed.
 12 And the reason I told him that those were
 13 the lines of questions I intended to ask is because
 14 I wanted his witnesses prepared to give answers and
 15 not simply state that they don't have the
 16 information. So I want to make the hearings
 17 productive and so I did not want to be told that
 18 they would have to get back to me at a later date
 19 with those.
 20 **MR. LUETKEHANS:** Mr. --
 21 **MR. BLAZER:** My turn.
 22 **MR. LUETKEHANS:** No, could I just say one
 23 thing? I would ask that in the future that those
 24 questions or lines of questions be shown to me as

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1 well so I have some idea what we're coming back
 2 about because it really turns into trial by ambush.
 3 Thank you.
 4 **MR. GRIFFIN:** If I have questions for your
 5 witnesses, I will give you the lines of questions
 6 that I intend to ask so that your witnesses are
 7 prepared to answer those.
 8 **MR. LUETKEHANS:** And I guess I would ask
 9 that if you do, that those also be presented to Mr.
 10 Blazer. I mean that's only really the fair way to
 11 do this.
 12 **MR. GRIFFIN:** No, it doesn't have anything
 13 to do with fairness. It has to do with providing
 14 the county information that the county staff wants.
 15 **MR. BLAZER:** And if he has questions for
 16 any of your witnesses, I have no objection to not
 17 being told about them. I know how this process
 18 works. But with that being said, this is the second
 19 time that Mr. Luetkehans has tried this in this
 20 process. This is not a new application. This is
 21 not a modification of the application.
 22 In response to -- actually to Mr.
 23 Luetkehans's questions when he first cross-examined
 24 Mr. Hankard about rounding, we provided additional

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1 information, which we could have done in the case of
 2 rebuttal, but since we understood that Mr. Hankard
 3 was going to be asked questions about rounding, I
 4 thought it better to simply do it all now rather
 5 than wait for rebuttal. Nor would counsel for the
 6 objectors have had notice of anything I might intend
 7 to do in rebuttal.
 8 So his suggestion that this is trial by
 9 ambush is simply his obvious effort, as he clearly
 10 stated on the record, his effort to make a record
 11 for some other hearing body sometime in the future.
 12 That's fine, he can do whatever he wants. This
 13 isn't a new application. The law on these issues is
 14 very clear. This isn't a modification. This is
 15 additional information in the event someone decides
 16 that rounding is inappropriate. These are the LNTE
 17 turbines that would address that issue. Rounding is
 18 appropriate according to Mr. Hankard, but as you
 19 have seen in this case, we don't intend to leave any
 20 stone unturned. So if this board ultimately decides
 21 to recommend approval with a condition that, rather
 22 than accepting 41.1 or 41.2, that they all have to
 23 be at 41 or under, this is the way to do that.
 24 So Mr. Luetkehans has made his record. He

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1 can do what he wants with that. I have nothing else
 2 to say.
 3 **CHAIRMAN CORNALE:** All right. First
 4 thing, Mr. Luetkehans, I'm going to deny your
 5 objection to forego the hearings, okay? Mr. Blazer,
 6 I believe that it is fair and correct that the test
 7 results for these additional towers be presented to
 8 us.
 9 **MR. BLAZER:** And we've already agreed
 10 we're going to do that.
 11 **CHAIRMAN CORNALE:** Okay, fair enough.
 12 Okay, the question with JoAnne Blank and
 13 the original report --
 14 **MR. LUETKEHANS:** If I may -- if I may just
 15 on that one question, I apologize to interrupt, but
 16 my -- I would like the same test results in the same
 17 format that I received them the last time before the
 18 hearing started, just so the record is clear. And I
 19 apologize for interrupting.
 20 **CHAIRMAN CORNALE:** That -- is that within
 21 the possibility of happening before tomorrow?
 22 **MR. BLAZER:** Candidly, I have no idea, Mr.
 23 Chairman. I'll have to check tomorrow, then get
 24 back to Mr. Luetkehans, and --

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1 **CHAIRMAN CORNALE:** Okay. Mr. Luetkehans,
 2 your witness that addressed this or possibly
 3 addresses this will be the following week or is
 4 actually with us now?
 5 **MR. LUETKEHANS:** No. Right now, he's
 6 scheduled for a week from tomorrow.
 7 **CHAIRMAN CORNALE:** Okay. Can we have them
 8 by early next week?
 9 **MR. BLAZER:** I'm going to do everything I
 10 can to get them either tomorrow or Friday, but it's
 11 not up to me, so I will find out first thing
 12 tomorrow morning.
 13 **CHAIRMAN CORNALE:** Okay, we need to make
 14 sure he gets them by early next week. Mr.
 15 Luetkehans, will that be enough time if he gets them
 16 early in the week?
 17 **MR. LUETKEHANS:** I honestly have no idea.
 18 I mean the results the last time we received these,
 19 and there were more, don't get me wrong, I'm not
 20 trying to -- but I just don't know. I don't know
 21 what his schedule is. I do know that he ran many,
 22 many tests and revised these numbers, and, you know,
 23 that was provided to us in I want to say November,
 24 and I'm now just seeing some of those test results.

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1 So I'd love to say yes. I just have no idea, Mr.
 2 Chairman.
 3 **CHAIRMAN CORNALE:** Okay.
 4 **MR. BLAZER:** Well, just to be clear, Mr.
 5 Chairman, the -- what we gave Mr. Luetkehans in I
 6 believe it was October, it might have been November,
 7 was everything. No data has been changed. The
 8 results are what the results are. Nothing has been
 9 changed.
 10 All we've done here with Exhibit 16A is
 11 say for the ones that the test -- the model said
 12 somewhere between 41 and 41.4, adding these LNTEs,
 13 if you decide rounding is inappropriate, drops it
 14 down. The data hasn't changed; it's everything that
 15 he got, that Mr. Rand has been reviewing for the
 16 last three months. So what he's going to get is
 17 exactly what he already has.
 18 **MR. LUETKEHANS:** We just heard that you
 19 reran the data with the LNTEs. I need -- I want to
 20 understand what the results of that data were. We
 21 just heard Mr. Hankard say Ms. Blank ran all that
 22 again and he wasn't even sure what the numbers were.
 23 I may be wrong, okay, but --
 24 **MR. BLAZER:** You are.

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1 **MR. LUETKEHANS:** Thanks, Mike.
 2 **MR. BLAZER:** You are. You've had the
 3 data --
 4 **CHAIRMAN CORNALE:** Okay, you guys.
 5 **MR. BLAZER:** -- since November.
 6 **CHAIRMAN CORNALE:** Okay, Mr. Blazer, you
 7 need to do your best to get him the data first
 8 thing.
 9 **MR. BLAZER:** Absolutely.
 10 **CHAIRMAN CORNALE:** By the first part of
 11 the week.
 12 **MR. BLAZER:** Okay.
 13 **CHAIRMAN CORNALE:** Mr. Luetkehans, if you
 14 could get that to your individual. If he needs more
 15 time, then we may have to delay him coming and we
 16 can do that. We'll just have to -- we'll have to
 17 move a witness around or do something with respect
 18 to that.
 19 **MR. BLAZER:** But let's be clear, Mr.
 20 Chairman. Again, the data he's going to get on
 21 these 20 or 24 locations are simply the data that
 22 his expert already has but with -- and let's
 23 remember one thing. Let's say, for example, it's
 24 the 100 turbines, which is the 24. That includes

1 the original 11. There's just 13 more. But the
2 data itself, the results of the model, hasn't
3 changed.

4 **MR. LUETKEHANS:** So the results of the
5 model that was 41.4 is still 41.4? That's just what
6 you just said. Obviously that's not the case. The
7 LNTE you're saying modifies the results. I want to
8 see the results. Maybe the data doesn't change, but
9 I'm not in a position to know that without talking
10 to experts because, unlike you, I'm not an
11 acoustician.

12 **MR. BLAZER:** Well, see, but --

13 **CHAIRMAN CORNALE:** Okay, you guys, neither
14 one of you are acousticians we can all agree. Okay,
15 you're both lawyers, we can all agree with that too.
16 Okay. So we need to get the data, Mr. Blazer. This
17 is a change or a modification by changing these to
18 LNTEs. He deserves to get the data. We all deserve
19 to see the data.

20 **MR. BLAZER:** I've said repeatedly he can
21 get it.

22 **CHAIRMAN CORNALE:** We can assert from Mr.
23 Hankard's testimony that the dBs may decrease by
24 three. That's an assertion by me. Until we see the

1 all right with counsel, let's formally write these
2 questions down, submit them and have her respond in
3 writing. We'll put it in the record so that we can
4 clarify. I know one of the questions was how close
5 the turbines are and did we continue to add
6 turbines, I -- it was something with regard to that.

7 **MR. BLAZER:** Absolutely.

8 **CHAIRMAN CORNALE:** We need to know for the
9 record. We'll get it in writing. And, Mr.
10 Luetkehans, if you do have questions along those
11 lines, if you can submit them to us, we'll submit
12 them to the applicant, she'll respond. Is that --
13 is that within reason?

14 **MR. LUETKEHANS:** Honestly, right now I
15 don't know what my questions are, so let me look at
16 that and advise you. I'm not -- I mean, you know,
17 Ms. Blank -- his name is nowhere on this report just
18 for the record, and we tried to ask questions about
19 sound and Mr. Blazer objected.

20 **CHAIRMAN CORNALE:** And I probably objected
21 as well because I -- she didn't testify to having
22 any sound capabilities.

23 **MR. LUETKEHANS:** I -- and I understand why
24 you ruled the way you did. Let me just -- let me

1 data, we can't -- we can't validate it. He deserves
2 to validate it, so you are going to provide that.

3 **MR. BLAZER:** Absolutely.

4 **CHAIRMAN CORNALE:** With respect to the
5 JoAnne Blank running these numbers, I don't know
6 what we do now with that, I mean honestly, because
7 we didn't allow her to answer any questions
8 regarding sound.

9 **MR. BLAZER:** The report that's in the
10 record, Mr. Chairman, is from Stantec. It's not
11 from Hankard Environmental.

12 **CHAIRMAN CORNALE:** Okay.

13 **MR. BLAZER:** So that shouldn't come as a
14 surprise to Mr. Luetkehans. She didn't testify
15 about it because, as Mr. Hankard testified, he was
16 -- he's the acoustician who oversaw it all. She
17 just simply ran the model. If you look at the
18 report that's in the record, it's a Stantec report.

19 **CHAIRMAN CORNALE:** Okay.

20 **MR. BLAZER:** This didn't come as a
21 surprise to anyone.

22 **CHAIRMAN CORNALE:** So let's -- in an
23 effort to streamline this and save ourselves the
24 questioning of Blank here, and I think this would be

1 look at the questions. I didn't -- you know, let me
2 see the transcript from tonight and understand it
3 because I was --

4 **CHAIRMAN CORNALE:** Fair enough. That's
5 all we can ask. Okay.

6 **MR. LUETKEHANS:** Thank you.

7 **CHAIRMAN CORNALE:** With that, let's move
8 on because I believe you have a witness here and we
9 do want to hear from him.

10 **MR. LUETKEHANS:** Yeah, we would call Dr.
11 Punch. We're going to move this table, if that's
12 acceptable, just so he can see the screen.

13 **CHAIRMAN CORNALE:** Whatever you need to
14 do. Could you please raise your right hand, sir?
15 (Dr. Jerry Punch was duly sworn.)

16 **CHAIRMAN CORNALE:** Could you please state
17 your name for the record?

18 **DR. PUNCH:** Jerry Punch, Jerry L. Punch.

19 **CHAIRMAN CORNALE:** Thank you.

20 **MR. LUETKEHANS:** Mr. Chairman, before he
21 starts, I have two exhibits to hand out, both of
22 which obviously I've given to Mr. Blazer ahead of
23 time, but I will do that now.

24 **CHAIRMAN CORNALE:** Very good. For the

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1 record, the county will accept UCLC Exhibit 17, Can
 2 Wind Noise -- Can Wind Turbine Noise Harm Human
 3 Health, produced by Jerry Punch, Ph.D., Professor
 4 Emeritus, January 2015.
 5 **MR. LUETKEHANS:** I do want to say that I
 6 apologize. Some of the pages, due to my copying not
 7 due to Dr. Punch, are not exactly lined up, but I
 8 think they're all legible, so I apologize for that.
 9 **CHAIRMAN CORNALE:** Yeah, looks like we can
 10 make everything out pretty well. All right, for the
 11 record, county will accept UCLC Exhibit 16 as
 12 references Can Wind Turbine Noise Harm Human Health,
 13 again Jerry L. Punch, Presentation to Livingston
 14 County Zoning Board of Appeals January 2015, and
 15 it's a work sited five page summary, six page
 16 summary.
 17 **MR. LUETKEHANS:** And one last thing, not
 18 to take up any more time, I apologize, Mr. Schopp
 19 advised me that we have two Exhibit 14s and 15s, and
 20 for that I apologize. We would ask that the Hewson
 21 report, which I think was the later of the two, be
 22 listed as Exhibit 114 and then the c.v. of Mr.
 23 Hewson be listed as 115. We'll just add a one if
 24 that's acceptable to the board.

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1 **CHAIRMAN CORNALE:** Yeah, that's a good
 2 solution. So Hewson vitae is 115 and Hewson exhibit
 3 is 114; is that correct?
 4 **MR. LUETKEHANS:** I'll be honest, I believe
 5 that's right. Mr. Schopp might have a better
 6 handle, but I just heard it was the same thing, so
 7 I'm trying to resolve it the best I can.
 8 **CHAIRMAN CORNALE:** All right, they'll take
 9 a look at that, and if we need to clear that up
 10 later, we'll get that taken care of. You can go
 11 ahead, Mr. Luetkehans, with Mr. Punch.
 12 **MR. LUETKEHANS:** Mr. Punch will be doing
 13 his own presentation via PowerPoint, so there will
 14 not be a direct examination.
 15 **DR. PUNCH:** Thank you for reminding me
 16 that I have a remote in my pocket. I think I have
 17 to point like this.
 18 I thought before I would begin with the
 19 substance of my presentation, I would tell you a
 20 little bit about myself and sort of where I came
 21 from or come from.
 22 Professor emeritus basically means I'm
 23 retired from the faculty at Michigan State
 24 University. If you are familiar with military lingo

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1 if you were in the military, basically I was
 2 discharged honorably essentially. That's why I use
 3 the emeritus title.
 4 There are a lot of possible titles for
 5 this presentation. Basically I'm going to look at
 6 the relationship -- I was to consider the
 7 relationship between wind turbine noise, both
 8 audible and inaudible, on health, basically the
 9 adverse health effects that have been reported and
 10 so on.
 11 I have to get used to this. And I'll try
 12 to get through these as fast as I can. I have more
 13 slides than I would like to present in one sitting,
 14 but I will get through them expeditiously as
 15 possible. Some of them are only pictures which I'll
 16 talk briefly about.
 17 I don't believe my remote -- my fault, I
 18 had it backwards. Let's try it again. Well, I
 19 think it might have died already. Can you roll the
 20 slides from back there?
 21 Okay. Educationally, I have a degree in
 22 psychology, a bachelor's degree, from Wake Forest
 23 University, a master's in hearing and speech
 24 sciences from Vanderbilt University, and a Ph.D.

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1 from a little school up the road, Northwestern
 2 University, in audiology.
 3 I have been all my career and continue to
 4 be clinically certified to practice audiology,
 5 certified by the American Speech-Language-Hearing
 6 Association, abbreviated ASHA. I did retire in
 7 2011, May of 2011, from faculty. I still maintain
 8 an office and work out of that office part-time. I
 9 have over 40 years experience as an audiology
 10 clinician.
 11 I'm a teacher, researcher, I've been an
 12 administrator, chair of a department for six years,
 13 that is a speech and hearing department, I worked at
 14 a professional association for about four years in
 15 my career early on, I worked in a hospital setting
 16 and I have worked in an industrial setting. I've
 17 spent the last 25 years, however, as an audiology
 18 faculty member at Michigan State University.
 19 Next slide please. A little bit about my
 20 experience, and I really think it's important to
 21 understand how I got into this. At the request of
 22 Rick James, and I know he hasn't testified here but
 23 a lot of you have heard his name -- I should say,
 24 first of all, that I have known Rick James for about

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1 20 years. He taught some classes in a course I
 2 myself taught on hearing conservation or hearing
 3 loss prevention, basically occupational hearing
 4 loss.
 5 And Rick asked me in about 2000 -- I think
 6 it was early 2009 to accompany him on a trip to the
 7 first wind farm ever installed in the state of
 8 Michigan in Huron County. Basically that's the
 9 thumbnail of the thumb of Michigan.
 10 At that point, again it was the first --
 11 the first farm so-called, I say so-called because I
 12 don't look at this as farming, but first wind
 13 project in the state. And there was a family up
 14 there who were having complaints about the wind
 15 turbines nearby, they had been installed for many
 16 months, and they found that they needed to go to a
 17 motel and live, and basically didn't abandon their
 18 home, but they couldn't live in it, they couldn't
 19 sleep in it. The husband, the wife, two -- I
 20 believe two teenaged daughters, they all just got up
 21 and left any hour of the night when they found they
 22 couldn't sleep.
 23 I went with a very open mind, I want you
 24 all to believe that, because I really was very

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1 suspicious of these kind of complaints about wind
 2 turbines, although I had no reason to believe one
 3 way or the other. I'm very much a wind advocate or
 4 at least not a wind advocate so much as a green
 5 energy advocate. But Rick just assumed as an
 6 audiologist I might have an interest because I have
 7 had an interest in community noise for many years
 8 and have done some work in that area.
 9 I was -- I came back and wrote an article,
 10 I'll get into this a little more later, Rick and I
 11 wrote an article along with a student on -- really
 12 on wind turbine noise because it was apparent to me
 13 that -- let me go backwards. I'll get to this point
 14 in a couple slides down the road. I just want to go
 15 through this list really quickly.
 16 After we wrote this article, I was asked
 17 to chair a committee, a technical work group, in the
 18 state of Michigan to come up with some guidelines,
 19 siting guidelines for onshore wind turbines in the
 20 state. They had a guideline that allowed 55 dB(A).
 21 And I was asked to chair that meeting. And after
 22 that -- that went on for a year and a half or so,
 23 and after that I was asked to present some comments
 24 and make some presentations to various zoning boards

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1 and commissions in several Michigan counties.
 2 More recently, I've published an invited
 3 blog which summarizes some of our views. That is
 4 with Rick. Also asked him to be a coauthor on that
 5 set of articles as well.
 6 I've been a witness as a health expert,
 7 not necessarily a medical expert because I'm not a
 8 medical doctor but as one who has an interest in
 9 health, particularly as it relates to the ear and
 10 hearing, in legal cases in, including Illinois, six
 11 states. You can see the list there.
 12 I continue to do ongoing literature
 13 review. Just today I discovered another article
 14 that I wasn't aware of. It happens to be a 1985
 15 article, but that's neither here nor there. Let's
 16 see if this works now.
 17 My first view of a wind turbine was in
 18 Huron County on this trip with Rick James. Rick was
 19 driving, he stopped his van, and down the road, I
 20 don't know how well you can see this slide, but I
 21 could count maybe five, four or five wind turbines
 22 in the -- straight down the road in the distance.
 23 He asked me how far away do you think those turbines
 24 are, and I said -- pretty naively, I said maybe a

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1 mile, mile and a half. We clocked it on the
 2 odometer and they were five miles away, okay?
 3 This particular project had 46 turbines,
 4 total of 69 megawatts, and pretty much what you see
 5 in the slide is what we saw, turbines with
 6 interspersed farms, some houses not very far away
 7 from some of the turbines.
 8 Again, I'm having a little problem with my
 9 technology here.
 10 This family that I told you about earlier
 11 that abandoned their home on certain evenings to
 12 sleep in a motel didn't really do a lot of farming.
 13 They owned a farm, they had spent many thousands of
 14 dollars on renovating the house, particularly on the
 15 inside, and were -- it was a family lot and family
 16 home and they wanted to raise their daughters there.
 17 Actually he's a businessman and he doesn't really
 18 get income from farming but rather from his business
 19 in which he hires a number of people in this area of
 20 Huron County.
 21 Looking to the left, you can see some --
 22 several turbines. I count maybe four or five. In a
 23 very clear representation of this slide, I can count
 24 five or six.

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1 Looking again to the left about, I don't
 2 know, maybe 80 yards away or so, this is the home,
 3 the outside of the home. 1350 feet from the
 4 residence was the nearest turbine. It basically
 5 abuts the back yard of the property. You're looking
 6 I guess at what's the front of the house or side of
 7 the house.

8 After making that trip, we interviewed --
 9 I interviewed the family very informally and just
 10 asked them about their issues and didn't really take
 11 notes. I wasn't asked to do anything other than
 12 observe on that trip. Rick made some sound
 13 measurements and later we talked about those, but
 14 basically I came back fairly intrigued with how can
 15 someone suffer the problems that they talked about.
 16 Mostly it was sleep disturbance, there was some
 17 other issues relating to maybe headaches and
 18 queasiness and those sorts of descriptions, but Rick
 19 and I again wrote this article, published it in
 20 Audiology Today. It made the cover of the journal.
 21 That was in the July/August issue of 2010.

22 Since that time, we've published this
 23 three part series. Again, this is a review article.
 24 These are not I will say original research, these

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1 are review articles, but the Audiology Today
 2 article, I'm looking at it now, is pretty basic
 3 because we only touched the surface in that article,
 4 we only had a certain amount of space to do so, but
 5 I think there was only one article that mentioned
 6 infrasound. And since that time there's been a lot
 7 of information that's become available on infrasound
 8 or sound that we really can't hear or interpret as
 9 sound. There's -- for anyone who wants to look at
 10 that, the upper URL is the place to start to get to
 11 the three part series if you're interested.

12 Okay. So I want to try to address
 13 basically seven questions. These were largely
 14 developed as a result of my having read the -- what
 15 I'll call the deposition testimony of Drs. Roberts
 16 and Ellenbogen. Different hearings call for
 17 different kinds of information, but these are the
 18 ones that I think were emphasized and which I think
 19 I can respond to in a reasonable kind of way.

20 One issue is: Is annoyance really a
 21 health issue? Because it seems very simple,
 22 everybody gets annoyed at a lot of things in life.
 23 Why is annoyance a health issue as many of us are
 24 saying and not simply a nuance issue?

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1 Secondly, can -- I think Dr. Roberts might
 2 have said this. Is it possible that just because we
 3 can see the turbines we have negative reactions to
 4 them and complaints about them? A study by Pedersen
 5 in the early 2000s basically claimed that that was
 6 true. And the wind industry in general, I don't
 7 mean Pleasant Ridge, I don't mean Mr. Blazer, I mean
 8 the wind industry in general, has made a point that
 9 that is the case. Because people can see it, that
 10 they're annoyed by it, even though we're talking
 11 about noise annoyance.

12 Thirdly, we heard mentioned tonight nocebo
 13 effects and psychological expectations really
 14 explain adverse health effects from wind turbine
 15 noise. You'll see AHEs throughout this
 16 presentation. Always means adverse health effects.

17 Fourth, what evidence is there? And I
 18 think this is the key and the substance of -- the
 19 most substantive of my talk is about the fourth
 20 question. What evidence do we have that noise
 21 generated by wind turbines leads to adverse health
 22 effects in humans? How is it possible that sounds
 23 we can't hear, that is, infrasound, can hurt us?
 24 That's been the subject of a lot of controversial

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1 debate recently. What basis is there for medically
 2 diagnosing adverse health effects from exposure to
 3 wind turbines? I've heard said that, well, doctors
 4 don't recognize it, physicians don't recognize it as
 5 a diagnostic entity; therefore, it really has no
 6 meaning. So I'm going to address that just briefly
 7 tonight.

8 What -- finally, what minimum setback
 9 distances and maximum-allowable noise levels are
 10 recommended to prevent adverse health effects? And
 11 I want to rely for most of or all these -- most of
 12 all these questions on peer reviewed literature,
 13 although I will say that there are some that aren't
 14 really in peer reviewed literature that are in other
 15 sources, like government reports, conference
 16 presentations by reputable -- what I would deem to
 17 be reputable professionals, scientists. And
 18 finally, I'll talk just -- I'll give you really a
 19 quick wrap-up of what our take-away messages are
 20 just by giving you a short summary.

21 Just preliminarily, I think there are at
 22 least these groups of people in the world. Pro-wind
 23 folks talk about let's install wind turbines
 24 wherever possible, wherever it's feasible. There's

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1 really no scientific evidence saying that these
 2 turbines cause health, adverse health effects.
 3 Besides, what you can't hear with respect to
 4 infrasound, you can't be hurt by that.
 5 Anti-wind, and I think we all would agree
 6 that there are at least these two groups, don't
 7 install wind turbines anywhere. Wind really isn't
 8 an economically viable source of renewable energy
 9 anyway when you look at the financial aspects of it,
 10 and all the government subsidies should just simply
 11 stop.
 12 I think there's at least a third group.
 13 I'd like to put myself in this group. After coming
 14 back from that Huron County trip and doing all the
 15 review of literature that I've done trying to remain
 16 as objective as possible, I don't take any view on
 17 pro versus anti except to say that if we're going to
 18 install wind turbines, let's do so where it's
 19 feasible but not too close to people. Let's don't
 20 hurt people.
 21 In my view as an audiologist, it's a
 22 behavioral scientist, and I would say that what
 23 really matters is a human receptor, not necessarily
 24 always sound level meters and models and those sorts

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1 of things, although I don't discount the necessity
 2 of using models in some situations.
 3 A pro-health person would say that there
 4 is sufficient anecdotal and scientific evidence
 5 existing to say that wind turbines either directly
 6 or indirectly cause these adverse health effects,
 7 and we believe what you can't hear can hurt you.
 8 I found it interesting. Looking at the
 9 Wisconsin Wind Siting Council report, there are two
 10 quotes I'd like to take from that and just briefly
 11 mention them. The majority report, one of the
 12 statements in that report said, "The majority of
 13 individuals living near utility-scale wind systems
 14 do not report stress, sleep deprivation or chronic
 15 adverse health effects attributed to wind turbines."
 16 I think that's true. The majority of
 17 people really don't complain. I don't know that
 18 that means they don't have a problem or they're
 19 just -- and they're just unwilling to report it, but
 20 it's true that they don't report, the majority
 21 really don't report it. And if you looked at the
 22 situation in total, I think it looks like the
 23 majority really doesn't have a problem, okay?
 24 The minority report said that, "After

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1 complaining for a number of years and getting
 2 inadequate or no resolution to the problem,
 3 residents have abandoned their homes or suffer in
 4 frustrated silence." And I believe that is true. I
 5 know that is true because I've talked to a number of
 6 families, not in Wisconsin, but in Iowa, in
 7 Michigan, and in Oregon I believe. Oregon, yes.
 8 And I know there's hundreds and even --
 9 well, I won't say thousands, I haven't counted them,
 10 but there are at least many, many hundreds of
 11 reports of people abandoning their homes because of
 12 wind turbine noise, presumably noise. Some say it
 13 might be electrical magnetic fields, but those are
 14 very rare reports, and the studies don't really
 15 support that nearly as well as they support wind
 16 turbine noise being at the crux of the problem.
 17 First question. Why is annoyance a health
 18 issues and not simply a nuance issue? People who
 19 believe that annoyance is just a simple everyday
 20 affair might tell you that -- well, I know it's been
 21 said in this set of meetings that everybody gets
 22 annoyed, there are things that annoy us all the
 23 time, but I'm here to tell you I believe, and I will
 24 tell you why, that it's -- it really is not simply

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1 nuance. It can lead under certain conditions to
 2 health problems. I don't know about you, but I
 3 thought that was a rather funny slide.
 4 There are two opposing views on noise
 5 annoyance and health, and I don't want to sit here
 6 and read these slides, but basically I'll try to
 7 paraphrase at least. The industry in general admits
 8 that they're annoying because there's studies by
 9 Pedersen and others that talk about annoyance. They
 10 measured the percentage of people who were very
 11 annoyed and annoyed by wind turbines, and the wind
 12 industry has basically accepted that. It was even
 13 in the Colby, et al., report, which is typically
 14 referred to as the AWEA and CanWEA report, in 2009,
 15 which the wind industry has repeatedly talked or
 16 quoted from to support its view that wind turbines
 17 are not causing health problems although they are
 18 annoying in fact.
 19 Another view is the effects of annoyance,
 20 and this is by -- at least one study, in addition to
 21 the World Health Organization, puts annoyance at a
 22 very higher level by saying that there are
 23 physiological, biochemical responses that involve
 24 heart problems, including blood pressure and -- high

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1 blood pressure and even heart disease that start
 2 with annoyance. So it looks to be a little more
 3 serious matter than we might be led to believe.
 4 I can go through this quickly by pointing
 5 out just the italicized words in this slide. There
 6 are a number of studies and I've given you the
 7 references here. Please feel free to go to them and
 8 make your own interpretation.
 9 Amplitude modulated noises and impulsive
 10 noises. You all know very well what impulsive
 11 noises are. Noises that -- thumping noises,
 12 whooshing noise, noises that are very transient,
 13 very short-lived, or impulse noises, are more easily
 14 heard and annoying than constant level sound.
 15 That's been known for many years. I knew that when
 16 I was in my master's program back in I guess the
 17 '60s.
 18 Tonal sounds. Sounds that contain tones
 19 are more annoying than sounds that contain energy
 20 across a broad range of frequency, which we really
 21 define as noise. Unpredictable and uncontrollable
 22 sounds are more annoying than other sounds.
 23 Nighttime certainly sounds are more annoying than
 24 daytime sounds.

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1 And sounds in the countryside, in the
 2 rural countryside, are more annoying to people than
 3 urban noise. People who move to the countryside
 4 like peace and quiet. People get used to the city.
 5 I've lived in both cities and country and I much
 6 prefer country, but I actually could live in the
 7 city, but it takes a while to get used to it. Once
 8 you move to the country, you don't want the kinds of
 9 noises that might be produced even by a wind
 10 turbine.
 11 Just some data real quickly. Studies.
 12 This was one study, Pedersen again, the Journal of
 13 Acoustical Society is a very highly referenced
 14 journal, and again the wind industry cites these
 15 data as well as people on the other side.
 16 A Dutch set of data was compared with a
 17 Swedish study, and at levels above 35 decibels, 9 to
 18 30 percent of people said wind turbine noise is
 19 annoying; 5 to 20 percent, depending on the country
 20 and the level, said that it's very annoying. And
 21 these numbers are mutually exclusive. So from, if
 22 you add the first two numbers, 9 and 5, 14 percent
 23 to 50 percent of people find it annoying, okay. And
 24 the wind industry doesn't really point that fact

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1 out, but that's what the data tells us.
 2 Look at this as more a -- it does have
 3 numbers on it, but look at this figure as a figure
 4 that compares annoyance from wind turbines with
 5 annoyance from different transportation noises. And
 6 you'll see that it takes much less sound level to
 7 produce or to -- well, to produce annoyance, to
 8 cause annoyance from wind turbines than it does from
 9 other sources.
 10 I've just listed here, certainly not going
 11 to name them or list -- I mean read them, a lot of
 12 research links annoyance and low frequency noise.
 13 We know that wind turbine noise contains very, very
 14 low frequencies, from around measurable levels,
 15 measurable frequencies around .2 or .5 hertz, less
 16 than 1 hertz, up to 3 or 400 or even up further than
 17 that, like 300 to 400 hertz, very significant
 18 amounts of energy.
 19 Some of these are earlier studies. A few
 20 were on -- one was on hearing -- excuse me, hearing,
 21 ventilation and air conditioning systems. One was
 22 on occupational setting noises. The others are all
 23 on wind turbines per se. Okay, so there is a lot of
 24 data, I think almost all of it in the -- I think

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1 Harrison was a literature review. The other studies
 2 were, at least in the right column, were peer
 3 reviewed, peer reviewed journal studies, published
 4 in peer reviewed journals.
 5 I found it interesting, here again, that
 6 in Exhibit 55 and 63, I believe those numbers still
 7 stand here in this set of meetings, the Pleasant
 8 Ridge exhibits included one by Masotti and Hodgetts;
 9 another, the Health Canada study most recently. If
 10 you look at what they conclude, that is, the studies
 11 themselves, the reports themselves, and what the
 12 reports actually contain, there is some -- a
 13 discrepancy in the details of the report and the
 14 actual overall conclusions drawn from the report.
 15 In the first study, they say that research
 16 links noise to adverse health effects, including
 17 sleep deprivation and headaches. Sleep deprivation
 18 itself, of course, can lead to other more serious
 19 problems, including cortisol level changes that are
 20 measurable physiologically, inability to
 21 concentrate, mood changes and so on.
 22 The Health Canada study admitted or said
 23 that the wind -- that wind turbine noise, they
 24 abbreviate it WTN, annoyance was statistically

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1 related to measured long-term cortisol levels and
 2 systolic and diastolic blood pressure. So they had
 3 some physiologic studies that they reviewed, and
 4 they basically are saying that, yeah, annoyance does
 5 relate, in fact, to health problems. That's the
 6 Health Canada study which is being purported to be a
 7 very much pro-wind type of study.

8 Quickly, the definition of annoyance. You
 9 can get all kinds of definitions depending on which
 10 dictionary, but I pulled them from several different
 11 dictionaries. An unpleasant state, you can talk
 12 about irritation, frustration, anger and even
 13 violence in some cases, can certainly lead to a
 14 deterioration of health and well-being.

15 Get my slide up. The World Health
 16 Organization has defined since the 1940s health as
 17 being not just the absence of disease or infirmity,
 18 but a complete physical, mental and social state
 19 of -- complete physical, mental and social
 20 well-being. So according to the World Health
 21 Organization, basically there is support for saying
 22 that annoyance can lead to a deterioration of
 23 health.

24 One theory and one model, if you will, one

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1 illustration of how noise can cause health problems
 2 is illustrated here in this particular slide. There
 3 are several examples and I thought this one was
 4 pretty understandable and is consistent with the
 5 World Health Organization model or definition of
 6 health.

7 Noise can cause annoyance, whether you
 8 measure it or just take subjective readings of it
 9 from people, and that can lead to health problems,
 10 which might consist of things like burnout,
 11 sleepiness, depression and so on. You can
 12 measure -- with annoyance, you can typically measure
 13 cortisol, elevated cortisol levels, which are an
 14 indication of stress.

15 You can have all kinds of -- and see the
 16 relationships here? The one at the top is
 17 effort-reward. This particular study contained
 18 people in preschool teaching careers basically. It
 19 says -- and this, again, is consistent with World
 20 Health Organization. If you like your job, you can
 21 tolerate a lot more of occupational noise than if
 22 you don't like your job. I think we all kind of can
 23 believe that.

24 So I'll leave you with this idea that

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1 noise and -- that is, health and noise may not --
 2 annoyance from noise may not be in all cases a
 3 direct relationship, but certainly there is an
 4 indirect channel to be followed there between the
 5 two.

6 Second question, and this is a very short
 7 answer, I'll give you one or two slides on this one,
 8 Can visibility account for negative reactions to
 9 wind turbines? What makes this difficult is as you
 10 get closer to homes, wind turbines are more -- yeah,
 11 are more visible, but the noise levels are also
 12 louder. So as distance decreases, annoyance
 13 increases, whether you're talking about visibility
 14 or noise annoyance. So it's difficult to separate
 15 them for that reason.

16 Noise annoyance seems to be worse when
 17 there's also visual annoyance, and certainly it's
 18 more -- it's worse when there are sound
 19 characteristics that make it annoying.

20 One recent study is interesting to me. I
 21 just came across this about a month ago. It's a
 22 2012 study. The conventional case that people are
 23 annoyed because of visibility only gets turned on
 24 its heels a little bit because this study, I believe

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1 Italian study, said that -- what they did, basically
 2 they used pictures and sound, audible sound, from
 3 wind turbines in a laboratory. And they used
 4 auditory only, visual only and auditory-visual
 5 combined as their conditions.

6 They found that seeing the wind turbine
 7 may actually reduce or mitigate noise annoyance
 8 while hearing it may increase the visual annoyance,
 9 which is kind of the opposite of the conventional
 10 view, suggesting a need I think to reconsider that
 11 view.

12 I like this one. It's now a mantra of the
 13 wind industry that, well, people just are
 14 psychologically upset by wind turbines. They're
 15 given bad information. There's a lot of really
 16 negative information about wind turbines on the
 17 Internet and they're getting all their information
 18 from that, those sources; and therefore, the reason
 19 they have these, quote, health effects is because
 20 they have these psychological expectations and these
 21 negative impressions of wind turbines.

22 There are four studies, all conducted in
 23 2013, at least I believe two or maybe three of them
 24 are in peer reviewed journals, and I don't want to

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1 go into the conditions because it will take me quite
 2 a while, but basically it's a study by Chapman in
 3 Australia. Chapman and colleagues in Australia
 4 compared wind company data with government reports
 5 of complaints.
 6 Crichton and colleagues in New Zealand did
 7 two studies, one is based on high and low expectancy
 8 groups who were told, who were told -- were given
 9 information from the Internet that either wind
 10 turbines cause problems or that they don't cause
 11 problems. Low expectancy of problems versus high
 12 expectancy of problems, okay?
 13 And the other study by -- I think it was
 14 definitely in the same year, I think it was a later
 15 study in that year, showed or rather studied the
 16 effects of psychological expectations, a very, very
 17 similar kind of set of conditions. Taylor and
 18 colleagues in England looked at the issue of whether
 19 people with negatively-oriented personalities tend
 20 to regard what they call nonspecific or unexplained,
 21 nonspecific symptoms, their euphemism for wind
 22 turbine syndrome, whether they regarded a situation
 23 differently based on their personality types. And
 24 the wind industry is using these studies to make the

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1 case that it's all psychological basically, it's all
 2 in your head.
 3 I just have one slide showing the
 4 criticisms that I would have of these studies, and I
 5 don't mean to -- I'm not cherry picking. These are
 6 the studies that the wind industry is using mainly.
 7 There might be a few that I haven't really seen or
 8 heard about, but I think these are the main ones
 9 because they were in -- at least two or three of
 10 them in peer reviewed journals.
 11 So very quickly, Chapman, basically
 12 because residents are typically discouraged by the
 13 wind companies from complaining and because any
 14 complaints that come forward tend to be delayed, the
 15 records that they chose to look at were probably not
 16 reflective of all the complaints, so it was a very
 17 limited observation study.
 18 Crichton studies, both of them, really did
 19 not even use infrasound in a laboratory setting that
 20 they purported to be using. They didn't use
 21 infrasound because their speakers wouldn't produce
 22 it. They didn't produce any graphs of it. They
 23 didn't describe the equipment, but a studio woofer
 24 does not produce sounds below about 18 hertz at

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1 best. They didn't get down to a low level enough
 2 even to give the subjects in their study, who
 3 happened to be college students, real infrasound to
 4 which to compare with the so-called sham conditions
 5 where they really weren't given any infrasound at
 6 all, any purported infrasound.
 7 Another problem I had with that study is
 8 that university students are probably the least
 9 vulnerable group to these kind of problems we hear
 10 about. They're not young, very young, they're not
 11 very old, and they're not very sick. And these are
 12 the groups that the World Health Organization says
 13 are the most likely to be sensitive to wind turbine
 14 noise or to noise.
 15 Actually the World Health Organization
 16 does not address wind turbine noise per se, they
 17 address noises from other sources, but because
 18 infrasound is now known to be a more deleterious
 19 kind of noise to be exposed to than some of these
 20 other low frequency sounds, even the World Health
 21 Organization's lower limits might need to be reduced
 22 for wind turbines.
 23 Finally, Taylor did not even use wind
 24 turbines on an industrial scale size-wise. Nobody's

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1 ever said, that I know of, that noise from small
 2 scale wind turbines below -- well below sometimes 1
 3 megawatt capacity, causes any problems at all. So
 4 they were kind of addressing a problem that isn't
 5 even talked about. So I don't find it surprising at
 6 all that people with negative personality types
 7 would tend to say they cause problems.
 8 By the way, they viewed DVD material
 9 instead of Internet material, pretty much like the
 10 first study that Crichton did. I'm sorry, the DVD
 11 was in the second Crichton study. It doesn't matter
 12 here. But basically it's not surprising to see
 13 results from the Taylor study come out the way they
 14 did because we know that there is a power of
 15 suggestion. We know that there is personality type
 16 data all over the place in psychological literature
 17 that says a negative person is going to be negative
 18 about anything basically; a positive person is going
 19 to be positive about most things.
 20 So those studies to me seem very weak.
 21 And I would say in all the jobs I've taken in
 22 places, mainly in the Midwest, I've always done some
 23 teaching and some research and I view myself as a
 24 researcher. I sit on the board of the Institutional

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1 Review Board reviewing research grants at Michigan
 2 State University. As a researcher who has
 3 published -- I won't go into that here, but who has
 4 published quite a bit in the literature, peer
 5 reviewed literature, in audiology particularly, I
 6 don't find those studies very convincing. So I
 7 don't think that they're very valid studies, the
 8 ones that I just went through. I hope you've read
 9 that by now because I've read enough of these too.

10 What evidence is there that noise from
 11 wind turbines leads to adverse health effects? And
 12 again, we're talking just about humans here. Well,
 13 there is a lot of anecdotal evidence and I know
 14 that's pooh-poohed by the wind industry, but
 15 every -- every known health condition in the world
 16 starts with adverse health effects. Or reports,
 17 adverse health reports let's say.

18 And there are lots of them on the Internet
 19 and newspaper articles, and in two -- at least two
 20 documentary movies, Wind Fall and Wind Rush. I urge
 21 you to watch those if you care to. I know Wind Fall
 22 I believe is on Netflix. I don't know if you can go
 23 to the theater and see those movies, but you can
 24 certainly find them on the Internet, at least one of

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1 them.

2 Some of this evidence is in expert
 3 testimony in legal proceedings, although I don't
 4 have any of that information to go through tonight.
 5 It's too tedious.

6 Government documents, some of which was
 7 sanctioned by the Department of Energy, some of it
 8 early on and some more recently, some by the
 9 military.

10 Then we have scientific and professional
 11 presentations at conferences. Basically these are
 12 typically scientists or many times leading
 13 scientists who will later publish their reports, but
 14 not all the material presented at -- well, you
 15 probably know this -- at these kind of meetings is
 16 published, but we do have peer reviewed scientific
 17 literature that supports the view that there is a
 18 relationship between wind turbine noise and adverse
 19 health effects.

20 Another fussy slide, but I put together
 21 some basic quotes from a person from Ontario who saw
 22 what was happening in Wisconsin. I testified in
 23 that hearing and I looked -- one day I decided to
 24 look randomly through the public comments and this

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1 is what I came up with and this is totally random.
 2 I thought, though, it expressed the issues very well
 3 from the standpoint of a layperson who has lived
 4 around wind turbines for a number of years. They're
 5 all over -- there are a lot of -- there's a lot of
 6 development in Canada in the wind industry, probably
 7 ahead of the U.S., although I can't really comment
 8 on that with authority.

9 She said, she or he, I think it was a she,
 10 said I've been involved with and witnessed firsthand
 11 the heartbreak, she mentioned heartbreak, of
 12 abandoning homes. People can barely function in
 13 their lives. Some had to stop working at their
 14 jobs. Some people had a loss of sense of balance,
 15 but there was -- this comes up a lot. When people
 16 leave the environment, then they tend to get better.
 17 Fortunately these effects tend to be temporary, and
 18 when you go back into the situation, they tend to
 19 recur.

20 Quality of life is affected. We came here
 21 to hear the birds and bees and the frog calls and
 22 the insects buzzing, and now we get passing -- and
 23 we occasionally have passing cars and dogs barking,
 24 but this is really different. Wind turbines are a

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1 really different experience. It's turned a pastoral
 2 existence into a ghetto nightmare. That was just
 3 her comment.

4 The World Health Organization recognizes
 5 the risks of noise, the health risks of noise in
 6 general. As an audiologist, I don't believe and I
 7 don't think anybody believes or is proposing that
 8 wind turbine noise causes hearing loss. We do not
 9 believe it does, okay? It takes about 85 dB(A) on a
 10 daily basis for possibly years before hearing loss
 11 occurs. So hearing loss is really not a big issue
 12 here, but these other things that went with wind
 13 turbines tend to be coming up over and over again in
 14 other reports.

15 Academic performance of children in
 16 schools. I was interested in the comment tonight
 17 about turbines located near a school. Please don't.
 18 Not too close to schools. Kids are trying to
 19 concentrate and I think it's a bad thing.
 20 Particularly with very young kids. I think these
 21 kids may be a little older than young. I think
 22 junior high kids are in the, what, seventh to ninth
 23 grade or sixth to ninth or something like that.

24 Dr. Nina Pierpont always comes up, and you

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1 have heard her name before I'm pretty sure, a
 2 practicing pediatrician. She's a Fellow of the
 3 American Academy of Pediatrics. She described
 4 symptoms of 38 members of ten families in New York
 5 who came into her practice, either children were
 6 having problems or the adults in the family were
 7 having problems. She published a book, and yes, it
 8 was self-published, the wind companies like to point
 9 that out, in 2009 coining the term wind turbine
 10 syndrome. And I ask the board, maybe have you seen
 11 this list of symptoms before? I don't want to go
 12 through them.

13 But she named ten symptoms, some of which
 14 tend to be linked to the vestibular system. We now
 15 think that not only the vestibular but the cochlea,
 16 or the hearing component of the ear, the inner ear,
 17 is being stimulated, particularly in the case of
 18 infrasound produced some of these adverse health
 19 effects. I've heard over and over people say I feel
 20 a pain or pressure that's really hard to describe.
 21 Some people have ear sensations. They can't really
 22 point to wind turbines as a problem, except when
 23 they leave the area, they tend to get over the
 24 problem.

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1 I basically have given you already this
 2 information, particularly at the bottom. I will say
 3 relative to the middle bullet point that the
 4 industry has been very critical of Pierpont. They
 5 basically are critical based on the fact that she
 6 published a book and not a scientific paper. It
 7 was, though, a credible epidemiological study if you
 8 consider, and I do, case series as a starting point
 9 for reporting conditions that may have widespread
 10 applicability in the population.

11 I interviewed a Michigan family, not the
 12 family that I talked to you about in Huron County
 13 but another family, which filed a lawsuit last year
 14 I believe. The family, there was a female adult, a
 15 male adult and a male child. I think he was about
 16 11 years old at the time. Construction worker,
 17 built his own home. And a picture window, he was
 18 building a -- renovating his home to add kind of an
 19 A-frame picture window room, which was a rec room,
 20 combination of other kinds of rooms as well, and
 21 they've had to abandon their home.

22 When I interviewed them and I compared
 23 their -- these are very detailed answers to a
 24 questionnaire that I developed with Rick James,

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1 but -- and with Wisconsin folks who've dealt with
 2 this issue for a while. I won't go through the list
 3 obviously, but the female had eight of the ten
 4 symptoms of wind turbine syndrome, the male adult
 5 six symptoms, and the child six as well.

6 A family in Iowa, this was a questionnaire
 7 interview that I did via mail, and then the family
 8 read what I had typed up as their answers to verify
 9 these are the correct answers. And what I got was,
 10 this is just a male and female, a farmer who -- the
 11 man's a farmer and I don't know the occupation of
 12 the female, but he's had to leave his farm. And
 13 he's coming back to work the farm, the animals are
 14 still on the farm, but he's coming back to work the
 15 farm periodically. But he suffers eight of the ten
 16 symptoms and that's a lot. A syndrome is usually
 17 three or four, maybe five symptoms. So this is
 18 consistent I think with wind turbine syndrome, if
 19 you want to use that term.

20 Very important to know that sleep
 21 disturbance, you probably already know this, is the
 22 most well-documented symptom. Even Leventhall back
 23 in 2003, who tends to testify in cases of wind
 24 development in favor of wind companies, has said

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1 that there is sleep disturbance. I've even seen an
 2 article more recently, not on this list, that he did
 3 in -- I forget, I'm sorry, I forgot the year, I
 4 think a little earlier than -- definitely earlier
 5 than 2003, in which he said it actually causes
 6 health effects, low frequency noise causes health
 7 effects.

8 Almost all these on the right column are
 9 very recent studies. There was a lot known even
 10 before I think 2003 about infrasound that we don't
 11 talk much about, but at any rate, a lot of this
 12 information has come from studies that have been
 13 done much more recently than the early ones.

14 The National Institutes of Health, NIH,
 15 lists the negative effects of sleep disturbance,
 16 very much health-related effects in some cases,
 17 learning and concentration, memory, heart disease,
 18 hypertension and so on, growth and development in
 19 children, even fertility in puberty, particularly
 20 when pregnant women are exposed to noise in general.
 21 I'm -- we're not talking about noise in general.
 22 We're talking about sleep disturbance.

23 I'm on 10:20 time, Eastern time, after
 24 driving all day, so I tend to have a few senior

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1 moments here, I'm sorry.
 2 And there's a lot of research linking
 3 sleep disturbance and quality of life to low
 4 frequency noise. And those again all are studies,
 5 except maybe two or so. Two or three are on wind
 6 turbine noise per se and not just noise in general.
 7 Again, these are peer reviewed studies. I think
 8 Hanning in the upper right might have been a review
 9 paper quoting others, but Hanning is a well-known
 10 sleep expert, and he has said that there is a real
 11 link between quality of life and sleep disturbance
 12 due to low frequency noise.
 13 Epidemiologists would say, well, you need
 14 some epidemiologically strong studies or designs to
 15 be able to call these effects real. There are
 16 some -- at least a few studies cross-sectional in
 17 design where you compare somebody who lives near and
 18 far from -- another group who lives far from wind
 19 turbines in New Zealand and Maine here in the U.S.
 20 and in Ontario. The Shepherd group looked at mainly
 21 quality of life issues, people living one and a
 22 half -- within, excuse me, 1.2 miles or 2
 23 kilometers.
 24 Nissenbaum in Maine, 1.4 kilometers or .87

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1 miles, which is what he had in his study, that was
 2 his study, cut-off point of groups that he studied,
 3 had worse sleep problems, sleepiness during daytime,
 4 as well as mental health of course, using a
 5 standardized questionnaire, set of questionnaires.
 6 And Paller recently in Ontario for the
 7 first time showed a relationship between wind
 8 turbine noise and vertigo, tinnitus, even though
 9 that was in Pierpont's original list of wind turbine
 10 symptoms. So those are three pretty, I think, very
 11 solid studies that should cause us pause I think.
 12 There's been sort of a recent concern
 13 expressed that people who live near wind turbines
 14 are essentially experiencing some of the same
 15 symptoms that people experience when they get motion
 16 sickness, even though it doesn't involve movement.
 17 We know about the inner ear and the fluids in the
 18 ear, they do move, and they stimulate what's called
 19 hair cells inside the inner ear, so you might get
 20 the same effects.
 21 Kennedy did some -- with Naval pilots, did
 22 a study in which he found if he basically shook Navy
 23 pilots at .2 hertz, very slow like wave motion in
 24 the ocean, okay, on a ship, that that makes people

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1 seasick. And Schomer who I think most people have a
 2 high regard for, even on both sides of the issue in
 3 this room, at least two sides of the issue, believes
 4 that motion sickness is similar to these health
 5 effects that people report from being exposed to
 6 wind turbine noise, particularly infrasound, even
 7 though only acoustic energy and not bodily movement
 8 is involved. So it's an interesting hypothesis and
 9 that's -- that idea only got airing in 2013 I think
 10 for the first time.
 11 So what we know and don't know. Certainly
 12 a significant number but -- a nontrivial number or
 13 percentage of the population suffers significant
 14 adverse effects from exposure. We don't yet know
 15 what percentage of the population suffers these
 16 health effects, and we certainly don't know what
 17 levels and durations of exposure result in these
 18 effects.
 19 We do know that symptoms are highly
 20 variable. Any two people are going to have probably
 21 different symptoms. Sometimes you have a husband
 22 and wife at home. Husband -- as I showed you on the
 23 slide earlier, one has a problem, the other has
 24 virtually no problems. But if one has a problem and

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1 they have to move, typically the family's going to
 2 move with them.
 3 This is a challenge. The fact that
 4 it's -- the symptoms are highly variable is kind of
 5 a challenge I think to epidemiological research. It
 6 could be done. We don't have to aim toward just
 7 dizziness, just headaches, just nausea, et cetera,
 8 but it is a challenge because it's so highly
 9 variable. It's a lot easier to study something when
 10 it's stable, and this is not necessarily a stable
 11 entity. There's very wide variation among people.
 12 How is it possible that sounds we can't
 13 hear can hurt us? We're talking here of course
 14 about infrasound. And you all have heard about Salt
 15 and his work. I was going to mention it again here.
 16 I want to go through this more briefly. You have
 17 the slides, the board has the slides to refer to,
 18 and I stand by those statements.
 19 We can -- there are things that we can't
 20 touch, taste, see or smell that definitely hurt us.
 21 Toxic fumes that we can't smell, for example,
 22 ultraviolet rays that we can't see and so on.
 23 There's a lot of those things. Why is it, then,
 24 that we can't believe that there might be things we

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1 can't hear that could hurt us?
 2 Infrasound seems to be the root cause of
 3 many of the health complaints. It's understandable
 4 that audible sounds might keep a person from
 5 sleeping at night. I'm coming to believe, and this
 6 is just my hunch based on what I've read in the
 7 literature and how I interpret the literature, I
 8 think some of these symptoms that people report are
 9 coming from the infrasound as well. They might wake
 10 up disturbed at night and not even be able to
 11 identify a sound at all, and that's really what is
 12 at the basis of that statement.
 13 So if you know about Salt, we'll go on
 14 from there. I think the thing that Dr. Roberts
 15 criticized that I take objection to is that the
 16 research that Salt's colleagues -- Salt and his
 17 colleagues have done at the Washington University
 18 School of Medicine in St. Louis is based primarily
 19 on guinea pig ears. It turns out that guinea pigs,
 20 gerbils, rhesus monkeys, cats, to a lesser extent
 21 dogs, have ears very similar structurally to humans.
 22 In fact, I talked to Salt on the phone and he says
 23 that rodents in generally tend to have very good
 24 similar structures, very similar structures to human

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1 ears.
 2 We cannot subject humans to the kind of
 3 research that Salt and his team conducts, okay. If
 4 you would allow him to do surgery on your ear and
 5 put a probe, microphone or probe, let's say, a
 6 stimulus and a probe, a needle, if you will, into
 7 the inside of your inner ear, which is far back into
 8 your skull, two, one on each side of course, then
 9 you could volunteer, but I don't think you're going
 10 to find many humans are going to volunteer for that
 11 kind of research. We know a lot about what we know
 12 from animal research, because it's unethical or
 13 impossible to do research, these kind of studies, on
 14 humans.
 15 So I'd like to try to -- if I can get the
 16 slide to come up, I'd like to -- can you advance the
 17 slide or do we still have a person in the control
 18 room? I don't know if that was me or you. I don't
 19 know if you've heard any of this before here. I
 20 don't think you have as a board. I will run through
 21 this as quickly as possible.
 22 In the inner ear -- and we have the outer
 23 ear, the middle ear and the inner ear. In the inner
 24 ear, there are inner hair cells and outer hair

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1 cells. The inner hair cells are not big, are not
 2 constructed to be sensitive at all to infrasound, to
 3 very low frequency sound. It's a protective
 4 mechanism. But the outer hair cells are sensitive.
 5 And Salt's work says that people -- not
 6 people. He's saying people probably but based on
 7 guinea pig research. He sees in these animals
 8 responses, physiological responses, electroacoustic
 9 responses in the ear at -- responses to infrasonic
 10 frequencies that are 40 dB below that that we
 11 interpret as sound, so 40 dB below those sounds that
 12 are heard, okay? And he believes infrasound, even
 13 below -- even though it's below the threshold of
 14 audibility, can be perceived. It's perceived as
 15 something else. It's perceived as a weird sensation
 16 based on the messages getting to the brain from the
 17 outer hair cells.
 18 This is -- I don't know if you want to
 19 take the time to look at this closely or not, but
 20 basically the -- I believe I have a laser pointer
 21 here. This line is wind turbine noise, okay? It's
 22 two different studies. This is the sensitivity of
 23 the inner hair cells and the outer hair cell
 24 sensitivity. Any sounds above that, above these

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1 lines, can be heard, and these are well-known to be
 2 audible frequencies. As you get lower in frequency,
 3 particularly in the infrasonic range, you have a
 4 possibility that the outer hair cells are being
 5 stimulated here and could hear infrasound. So this
 6 is just another way to depict graphically what I've
 7 tried to say verbally.
 8 The outer hair cells are picking up
 9 information. It's going to various areas of the
 10 brain, but probably not to the primary auditory
 11 center that interprets whatever stimulates it as
 12 sound. It's something else. It can be tinnitus
 13 possibly, it can be nausea, it can be dizziness,
 14 whatever.
 15 This is, I think, an interesting thought.
 16 That Salt's work shows that there's a larger
 17 response to low frequency sounds when high frequency
 18 sounds are absent. He found that again in guinea
 19 pigs. And I know a lot of research has been done on
 20 guinea pigs that we know is now true in humans. I
 21 think this is probably also true in humans. That
 22 means that infrasound could have its worst impact at
 23 night when people are asleep in their bedrooms or
 24 trying to sleep at home. He thinks that vestibular

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1 physiology, the balance organism of the inner ear,
 2 could be responsible for some of these symptoms as
 3 well as the cochlea, the hearing component of the
 4 inner ear.
 5 So his studies really establish a
 6 biological plausibility which is a first step toward
 7 epidemiological proof that infrasound reaches the
 8 brain even though we don't hear it. So he's says
 9 what you can't hear can't hurt you is false. What
 10 they say, okay?
 11 Amplitude modulation. Again, Salt's
 12 laboratory work shows that he thinks, and this is
 13 his thought based on his research, that infrasound
 14 is the basis for complaints of people living near
 15 wind turbines primarily because of amplitude
 16 modulation giving a feeling in a lot of people of
 17 throbbing and rumbling sensations.
 18 Low frequencies take lower sound levels to
 19 be amplitude modulated than high frequencies, and he
 20 even shows that low frequencies if present can
 21 modulate higher frequencies. So even if you don't
 22 hear infrasound, it can amplitude modulate sounds
 23 that are various sounds, okay? It's an interesting
 24 thought.

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1 This is very quickly just a schematic of
 2 the ear down in the lower left, the cochlea right
 3 here, up and through the brain stem, the mid brain
 4 and the cerebral cortex. Most of the information
 5 from the ear gets to the auditory centers, which is
 6 here and over here on this side, both sides of the
 7 brain.
 8 Some of that information from the outer
 9 hair cell can be traced, again at least in the
 10 guinea pig, and I think in human cadavers it can be
 11 traced, okay, so we know that's true in humans, it's
 12 going to other centers other than the primary
 13 auditory cortex where stimulation would occur as
 14 sound or it would be interpreted as sound.
 15 And this is just a picture of the brain
 16 showing you some of those auditory centers. The
 17 primary auditory center is here. There are
 18 association areas that information is sent to. In
 19 general, we're -- we need multiple stimulation to
 20 the brain to accomplish almost anything we do. Even
 21 our left hand/right hand coordination when we drive
 22 a steering wheel -- when we drive a car using the
 23 steering wheel, the brain is telling the two how to
 24 act together.

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1 I even tried on the way here today to
 2 cross my hands on the steering wheel like this, and
 3 it was only a matter of a few seconds that I could
 4 easily. And you've done that probably. You could
 5 coordinate yourself. So I'm just making the point
 6 that stimulation from various parts of the brain
 7 doesn't just go to one part of the brain -- I'm
 8 sorry, from the various parts of the body, including
 9 the ear, not just goes to one part of the brain but
 10 to multiple sites in the brain. And these multiple
 11 sites can be interpreted because they are novel
 12 stimulated to the brain. They're not easily
 13 interpreted and meaningful.
 14 I see that time is really short. I'm
 15 going to try to --
 16 **MR. LUETKEHANS:** Mr. Chairman, it's 9:35.
 17 We're bringing back Dr. Punch tomorrow. I have no
 18 objection, you know, having him finish this first
 19 thing tomorrow night if that's what the board would
 20 like.
 21 **CHAIRMAN CORNALE:** Okay.
 22 **MR. BLAZER:** Mr. Chairman, my -- and I
 23 hate to ask, but our cross is going to be quite
 24 lengthy. I would hate to have to ask Mr. Luetkehans

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1 and his clients to fly Mr. Punch back after
 2 tomorrow. So it looks like he has about 20 pages
 3 left. I have a feeling most of it is summary. I
 4 would suggest we try and finish tonight if possible.
 5 And he's nodding at me he thinks that he can do
 6 this.
 7 **CHAIRMAN CORNALE:** Okay, we run into a
 8 functional issue as far as we don't have the ability
 9 to present this in Fairbury with a projector and
 10 with --
 11 **MS. FEHR:** Yes, they do.
 12 **MR. BLAZER:** Again, I think he's
 13 indicating that he can finish tonight.
 14 **CHAIRMAN CORNALE:** Dr. Punch, if you had
 15 to guess, and I really -- I don't mean to cut your
 16 presentation short because you have a lot of
 17 information in here. Are we looking at, you know,
 18 is it 20, 25 minutes more or -- I know it's hard for
 19 the audience, it's hard for everybody.
 20 **DR. PUNCH:** Can we do it in ten minutes I
 21 think? I think I can do it in --
 22 **CHAIRMAN CORNALE:** If you could do it in
 23 ten minutes, 10, 15 minutes, is that okay with the
 24 board? Guys?

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1 **DR. PUNCH:** I'll do my best.
 2 **CHAIRMAN CORNALE:** All right.
 3 **DR. PUNCH:** I don't see these last two
 4 questions taking very long.
 5 **CHAIRMAN CORNALE:** Okay, okay, that's
 6 fine.
 7 **DR. PUNCH:** So what medical basis is there
 8 for diagnosing these reported adverse health effects
 9 from wind turbine noise? There is a physician, Dr.
 10 Robert McMurtry. I sort of superimposed his
 11 credentials under biographical information here,
 12 this box with his picture. This is just a screen
 13 shot of the article in a peer reviewed journal,
 14 Bulletin of Science -- Bulletin of Science,
 15 Technology and Society. He does come up with some
 16 diagnostic criteria which can be used to diagnose
 17 what he calls health effects in the environs of
 18 industrial wind turbines. And I want to go through
 19 this as quickly as possible.
 20 He says there are three sets of criteria,
 21 first, second, third order of criteria. If a person
 22 lives within 5 kilometers of an industrial wind
 23 turbine, if there's altered health status following
 24 exposure to the noise or wind turbines, and if there

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1 is a reduction or amelioration of symptoms when a
 2 person goes away from wind turbines, and the fourth
 3 one, if the symptoms recur when returning, then if
 4 you meet three out of four of those criteria, you're
 5 on your way to being able to diagnose wind turbine
 6 syndrome.
 7 Now, he goes further than that. He says
 8 that if there's a compromise of quality of life,
 9 sleep disturbance, annoyance and simply a preference
 10 in some people to -- if there's a preference in a
 11 person to leave the residence either temporarily or
 12 permanently to get some sleep, then that's another
 13 sign. Three out of four of those meet the second
 14 order of criteria.
 15 He lists a bunch of -- six categories, a
 16 bunch of symptoms under those. He says that if you
 17 meet at least three of these following symptoms,
 18 then you probably have what I will call wind turbine
 19 syndrome, okay. And these go on, and that's the
 20 six -- systemic is the sixth category. So these are
 21 the kind of symptoms. Again, very close but not
 22 identical mirror to Pierpont's wind turbine
 23 syndrome.
 24 We don't have to worry about -- these are

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1 just a listing of -- oops, sorry -- the first and
 2 second order symptoms. The family I mentioned
 3 earlier in Michigan have all these symptoms, all
 4 three members of the family, of the first and second
 5 order symptoms or conditions. The third order, the
 6 female primarily had the most and -- or had the most
 7 conditions, and the male had a few. He was
 8 predisposed by having a hearing loss and he had
 9 surgery on his middle ears, so that might have been
 10 related to his problem. Even the child had a couple
 11 of these problems. And it goes on. This is the
 12 second part. I couldn't get it all on one slide.
 13 These are symptoms that meet the McMurtry,
 14 Robert McMurtry's criteria for diagnosing wind
 15 turbine syndrome. The family in Iowa, the only
 16 difference is, and you can look just on the checked
 17 boxes on the right, both people, the adults in the
 18 family, reported both symptoms on this detailed
 19 questionnaire covering the first and second order
 20 conditions or criteria. And then the male, some on
 21 the first page; and male and the female, several
 22 symptoms. And remember, you only have to get three
 23 out of all these to be diagnosed under this third
 24 order according to this doctor who has a very good

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1 reputation as a physician and a health expert in
 2 Canada.
 3 Our seventh and final question is: What
 4 minimum setback distances and maximum allowable
 5 noise levels are recommended to prevent adverse
 6 health effects? I can do this quickly. I'm just
 7 going to read the first part of this at the top.
 8 There are the studies underneath. There are
 9 probably a lot more. One or two of those I believe
 10 may be review articles, but there's some other
 11 epidemiological scientific studies there as well,
 12 particularly the last two. Distances recommended
 13 are between half a mile and 2.5 miles with 1.25 or
 14 one and a quarter miles, which is 2 kilometers,
 15 being the most common recommendation in the
 16 literature for distance, if you're going to use
 17 distance as a measure, as a means of determining
 18 where to site wind turbines in relationship to
 19 residences.
 20 Noise level recommendations tend to be
 21 agreeing with the World Health Organization's
 22 numbers between 30 and 40 decibels on the A-weighted
 23 scale. Some put extra penalties for impulse noise,
 24 periodic noise, but basically the range is 30 to 40

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1 decibels, which is again in compliance with the
 2 World Health Organization guidelines which say that
 3 nighttime noise in the area, the range, of 30 to 40
 4 dB(A) starts to affect sleep, particularly sleeping
 5 issues, including arousals and so forth, and it gets
 6 more serious, particularly for more vulnerable
 7 populations, with anything over 40 dB(A), and it
 8 gets really serious with over 55 dB(A).
 9 Just conclude this by saying, I guess from
 10 an audiological point of view, you have people,
 11 behavioral point of view, there are plenty of places
 12 to put these wind turbines. I know that there are
 13 issues with regard to the capacity and the amount of
 14 electricity. We all need electricity. We all
 15 adore, I must say, electricity. My electricity went
 16 out for four days a year ago and I had to get out of
 17 the house basically. So we all want more
 18 electricity and more sources, but there are other
 19 places besides people's homes.
 20 These are places that I would say do not
 21 put them. Cary Shineldecker's home on the left near
 22 Ludington, Michigan, I like the picture, it's a very
 23 pretty picture, the fog rolling in on the upper
 24 right, but it's too close to the home in my view, or

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1 it could be, it could be, in terms of health
 2 effects. And the one on the lower right has been
 3 abandoned completely.
 4 What are our take-away messages? I think
 5 annoyance can lead to health issues based on
 6 particularly the World Health Organization's
 7 definition of health. That there can be some
 8 interaction between visibility and noise annoyance,
 9 but visibility alone does not seem likely as an
 10 explanation for why people are complaining about
 11 wind turbines. Psychological expectations as well
 12 don't appear to be adequate to explain these
 13 reactions and effects.
 14 The fourth question. There's lots of
 15 evidence ranging from anecdotal peer reviewed
 16 literature that shows that there's a strong
 17 relationship between wind turbine noise and adverse
 18 health effects, and it could be the primary direct
 19 effect or it could be possibly an indirect effect.
 20 Basically on Salt's -- based on Salt's
 21 work primarily, the fact that the inner ear responds
 22 to infrasound that's below what we can hear or
 23 interpret as sound suggests that the brain centers
 24 are receiving information that it has difficulty

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1 interpreting, therefore resulting in negative
 2 sensations.
 3 There is a set of criteria by which wind
 4 turbine syndrome or adverse health effects from
 5 living near wind turbines can be medically
 6 diagnosed. In fact, Dr. Steven Rauch, R-A-U-C-H, in
 7 Massachusetts has begun to see patients and
 8 diagnosed them as having wind turbine syndrome.
 9 Finally, the seventh point or the seventh
 10 conclusion here I've just quoted you earlier, so I
 11 won't have to go through them again. There are
 12 these ranges from .5 to 2.5 miles and 30 to 40
 13 decibels on the A scale that have been recommended
 14 widely in the literature, including the World Health
 15 Organization, when it comes to siting near
 16 residences.
 17 Thank you for your patience.
 18 **CHAIRMAN CORNALE:** Thank you, Dr. Punch.
 19 Tomorrow evening as we get going, we'll certainly
 20 open the floor up for you for a few more comments
 21 that you might want to make if you didn't get -- if
 22 you think about something that you didn't talk about
 23 enough on here.
 24 So with that, we'll meet again tomorrow

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1 evening 6:30 in Fairbury, so we'll be back at the
 2 Walton Centre tomorrow evening at 6:30. All right,
 3 need a motion to recess.
 4 **MR. VITZTHUM:** I make that motion.
 5 **CHAIRMAN CORNALE:** Vitzthum motions. Can
 6 I have a second?
 7 **MR. ZIMMERMAN:** Second.
 8 **CHAIRMAN CORNALE:** All right, Howard
 9 seconds. All in favor?
 10 **ALL MEMBERS:** Aye.
 11 **CHAIRMAN CORNALE:** Opposed? All right,
 12 see everybody back tomorrow night.
 13 (Adjourned at 9:48 p.m.)
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 24

1 STATE OF ILLINOIS)
2 COUNTY OF FORD)SS

3
4 I, June Haeme, a Notary Public in and for
5 the County of Ford, State of Illinois, do hereby
6 certify that the following Livingston County Zoning
7 Board of Appeals, Case SU-7-14 hearing was taken at
8 the Pontiac Township High School, 1100 Indiana
9 Avenue, Pontiac, Illinois, on January 21, 2015.

10 That the said deposition was taken down in
11 stenograph notes and afterwards reduced to
12 typewriting under my instruction and that the
13 deposition is a true record of the testimony given.

14 I do further certify that I am a
15 disinterested person in this cause of action; that I
16 am not a relative, or otherwise interested in the
17 event of this action, and am not in the employ of
18 the attorneys for either party.

19 IN WITNESS WHEREOF, I have hereunto set my
20 hand and affixed my notarial seal this 26th day of
21 January, 2015.

22
23

24 JUNE HAEME, CSR
NOTARY PUBLIC

25 "OFFICIAL SEAL"
26 June Haeme
27 Notary Public, State of Illinois
28 My Commission Expires:
29 September 27, 2016

30
31
32
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34

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