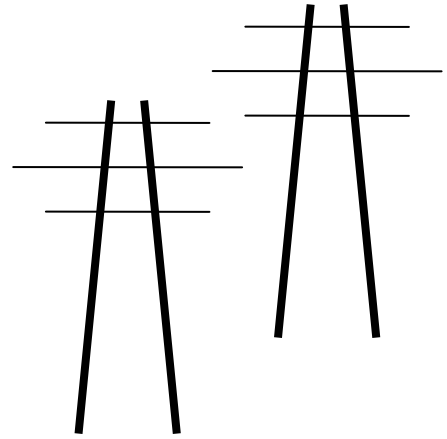


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December 18, 2019

Daniel Wolf, Executive Secretary
Minnesota Public Utilities Commission
121 – 7th Place East, Suite 350
St. Paul, MN 55101

via email and eDockets

John Wachtler, Energy Program Director
Commerce – EERA
85 – 7th Place East, Suite 500
St. Paul, MN 55101

via email and eDockets

RE: Improper Ground Factors Skew Modeling and Misrepresent Probability of Compliance in ALL 13 Projects Identified by EERA as “LWECS In Permitting Process” or “LWECS Permitted”

Nobles 2 (WS-17-597)
Freeborn (WS-17-410)
Blazing Star (WS-16-686)
Lake Benton II (WS-18-179)
Community Wind North (WS-08-1494)
Jeffers Wind (WS-05-1220)
Fenton Wind (WS-05-1707)
Buffalo Ridge (WS-19-394)
Three Waters (WS-19-576)
Plum Creek (WS-18-700)
Mower County (WS-06-91)
Dodge County (WS-17-307)
Bitter Root/Flying Cow (WS-17-749)

Dear Mr. Wolf and Mr. Wachtler:

In reviewing the EERA 2019 Project Status handout for the Power Plant Siting Act Annual Hearing,¹ I’ve noticed that every project listed by Commerce-EERA as “LWECS Permitted” and “LWECS in the Permitting Process” all utilize, improperly, ground factors of 0.5, and in three

1

<https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPop&documentId={90D27E6E-0000-C116-8738-B4CA09BD8487}&documentTitle=201911-157604-01>

instances, an absurd 0.7 ground factor. This is not acceptable. Why is this occurring? It's not hard to guess. In both Minnesota and Wisconsin, projects utilizing the appropriate ground factor of 0.0 were not able to demonstrate compliance with the states' noise standards, and subsequently, the developers provided modeling at 0.5 ground factor in those dockets rather than adjust the design of the project to allow for compliance with state law. **This is particularly important where the turbines are now larger and noisier than those of Bent Tree, where exceedences were demonstrated at 1,150 and 1,525 feet.**

A ground factor of 0.0 is to be used for wind modeling because the wind noise source is elevated high in the air, and ground conditions do not impede the direct path from a greatly elevated source to the "receptor." See attached testimony of Dr. Paul D. Schomer, from the Highland Wind CPCN proceeding (WI PSC Docket 2535-CE-100) and testimony of Mike Hankard, from the Badger Creek Solar CPCN proceeding (WI PSC Docket 9697-CE-100).

Below are the 13 projects listed in the "EERA 2019 Project Status" handout for the PPSA Annual Hearing, pps 3-4 (not including the withdrawn Bitter Root project), and I've listed the dockets, by name and number, the ground factor used, and the citation:

Name	Docket	G.F.	Cite	eDockets ID
Nobles 2	WS-17-597	0.5	p 3, Appendix C	201710-136496-03
Freeborn Wind	WS-17-410	0.5	p 7, Attachment E	20198-155331-04
Blazing Star	WS-16-686	0.7	p 52, Attachment B	20189-146376-01
Lake Benton II	WS-18-179	0.5	p 6-4, Appendix C	20185-142740-01
Community Wind	WS-08-1494	0.5	p 2, Appendix F	20193-151362-03
Jeffers Wind	WS-05-1220	0.5	p 2, Appendix F	20193-151486-04
Fenton Wind	WS-05-1707	0.5	p 2,4 Attachment 6	20191-149027-08
Buffalo Ridge	WS-19-394	0.5	p 6-5, Appendix C	20197-154454-07
Three Waters	WS-19-576	0.7	p 8-13, 43, Appendix D	201910-156475-03
Plum Creek	WS-18-700	0.7	p 48, Appendix B	201911-157475-05 201911-157475-06
Mower County	WS-06-91	0.5	p D-5, Appendix D	201912-157979-03
Dodge County	WS-17-307	0.5	p 6-4, Appendix C	201910-156623-03
Bitter Root	WS-17-749	0.5	P 8, Part 4	20184-141999-08 20184-141999-04

Below is a lightly edited summary of the wind modeling ground factor that I'd filed earlier in the Power Plant Annual Siting Act Annual Hearing record, explaining why ground factor matters:

+++++

I. BECAUSE NOISE MODELING WOULD DEMONSTRATE LWECS IN THE SITING PROCESS ARE LIKELY TO VIOLATE STATE NOISE STANDARDS, DEVELOPERS ARE USING WRONG GROUND FACTOR FOR MODELING, GIVING FALSE IMPRESSION OF PROBABLE COMPLIANCE.

Freeborn Wind (PUC Docket 17-410) was the first wind project to be sited acknowledging application of the PPSA, and more importantly, the first contested case for siting. Two prior

contested cases were held on wind projects, one a territorial dispute between developers circa 1995, and more recently, the Goodhue Wind project and applicability of county ordinance under Minn. Stat. §216F.081.

The ALJ's Recommendation in the Freeborn Wind case was that the permit be denied:

SUMMARY OF RECOMMENDATIONS

The Administrative Law Judge concludes that Freeborn Wind has failed to demonstrate that the proposed Project will meet the requirements of Minn. R. 7030.0040, the applicable Minnesota Noise Standards. Therefore, the Administrative Law Judge respectfully recommends that the Commission either deny Freeborn Wind's Application for a Site Permit, or in the alternative, provide Freeborn Wind with a period of time to submit a plan demonstrating how it will comply with Minnesota's Noise Standards at all times throughout the footprint of the Freeborn Wind Project.

The wind promotional lobby was horrified that they might have to demonstrate compliance with the rules, and flat out stated they could not:

[Judge's ruling against Minnesota wind farm causes alarm for advocates](#)²

From that article:

Freeborn Wind's developer, Invenergy, has objected, saying Schlatter's interpretation of state noise rules would be "impossible" to meet. Last week, two wind-industry trade groups and three of Invenergy's competitors also filed objections to Schlatter's recommendation, as did four clean-energy and environmental groups.

The judge's "interpretation of the Minnesota Pollution Control Agency's (MPCA) noise standards would have a detrimental impact on other current and future wind-energy projects throughout the state," the Minnesota Center for Environmental Advocacy wrote in its objection.

[Wind industry says Minnesota pollution control stance will stifle its growth](#)³

And from that article:

The wind-energy industry said an opinion filed by Minnesota pollution-control regulators defining wind-turbine noise will stifle its growth.

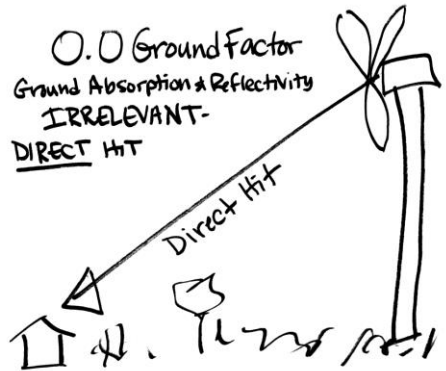
² <http://www.startribune.com/judge-s-ruling-against-minnesota-wind-farm-causes-alarm-for-advocates/485312391/>

³ <http://www.startribune.com/wind-industry-says-minnesota-pollution-control-stance-will-stifle-its-growth/493181151/>

The Minnesota Pollution Control Agency (MPCA) said the state's limit for wind-farm noise applies not only to sounds from turbines but also should include background noise such as road traffic, said the filing with the Minnesota Public Utilities Commission (PUC).

The MPCA comment, filed September 11, 2018, and referred to in this article is attached below.

For Freeborn Wind, ground factor, a primary input assumption for noise modeling, was set at 0.0, and all evidence and testimony regarding the predictive modeling was based on this 0.0 ground factor. In an apparent admission that these many wind projects cannot comply with noise standards and cannot demonstrate compliance through modeling utilizing a 0.0 ground factor, the industry is now uniformly improperly utilizing a 0.5 or 0.7 ground factor. Why is this improper? Because wind turbines are elevated, and the sound goes directly to the “receptor” on the ground:



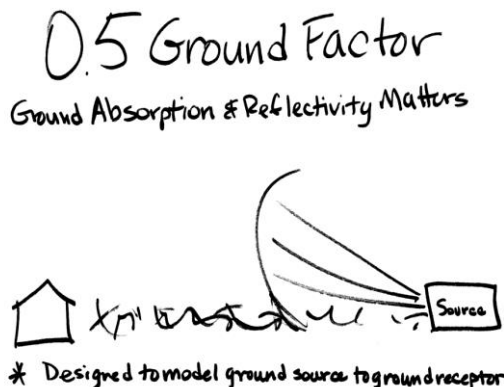
Ground factor represents conditions on the ground and things that can come between the noise source and the “receptor.” See ISO 9613-2 (standards for noise modeling):

7.3 Ground effect (A_{gr})

7.3.1 General method of calculation

Ground attenuation, A_{gr} , is mainly the result of sound reflected by the ground surface interfering with the sound propagating directly from source to receiver.

From ISO 9613-2. Here’s a depiction of how that works, from ground source to ground receptor:



As the chart on page 2 above shows, 0.5 and 0.7 are currently being used in all projects before the Commission. The use 0.0 of ground factor for wind is what should be standard practice, and a 0.5 ground factor is NOT appropriate for wind because the source is elevated. Use of a 0.7 ground factor is not scientifically justified.

That use of a 0.5 ground factor is not appropriate for wind turbine noise modeling was inadvertently confirmed by Applicant's Mike Hankard in the [Badger Hollow solar docket, also in Wisconsin \(PSC Docket 9697-CE-100\)](#)⁴:

7 A The model that we use has been shown to predict
8 conservatively with 0.5. I mean, 0.5 ground factor
9 is used in probably -- well, with the exception
10 perhaps of wind turbine projects which are different
11 because the source is elevated. But for projects
12 like a typical power plant, a solar plant where the
13 sources are relatively close to the ground, I would
14 say 90 to 99 percent of the studies use 0.5. And
15 when consultants like myself go out and measure these
16 plants after they're constructed to verify our
17 modeling assumptions, that assumption checks out as
18 being, if anything, overpredicting the levels. So
19 there's no need to -- there would be no justification
20 to use something like a .2 or .3 which would predict
21 yet higher levels because we're already demonstrating
22 that the model is probably overpredicting. So that
23 would not be justified for those reasons.
24 MR. NOWICKI: Thank you. No further
25 questions.

The testimony of Dr. Paul D. Schomer in the Wisconsin Highland Wind docket⁵ elaborates on the development of ISO 9613-2, that it is for measuring a ground source to a ground "receptor," and not designed for elevated noise sources with a direct path to "receptors," the purpose and use of the ISO 9613-2 standard and modeling assumptions, and the inappropriateness of use of a 0.5 ground factor for modeling predicted noise from wind turbines. Attached. I have also attached the AFCL Comment in the Freeborn Wind docket (WS-17-410) that addresses 0.5 ground factor improperly used in that docket.

⁴ <http://apps.psc.wi.gov/vs2017/dockets/content/detail.aspx?id=9697&case=CE&num=100>

⁵ Online, selected pages from hearing transcript: https://legalelectric.org/f/2019/11/Schomer_Pages-from-Transcript-Schomer-see-p-572.pdf

The statements of probable compliance and justifications made in the noise modeling “studies” for the projects listed above are false and misleading, as are any statements that 0.5 is the generally accepted ground factor.

Like the Freeborn Wind project, the Highland Wind project could not meet Wisconsin’s state noise standards (45 dB(A) in Wisconsin) using the 0.0 ground factor assumption, and so the developers moved the goal posts and produced noise modeling using a 0.5 ground factor with a claim that the project did meet state noise standards. This is deception, garbage in-garbage out modeling, backwards engineering, moving the goalposts until the desired result appears.

I have asked the Commissioners, on the record, whether they understand what 0.5 ground factor means, and have received repeated, and feisty, assurances that yes, they do know what it means. If Commissioners do understand, they are accepting this deception, and by permitting projects that likely will not comply, they’re inflicting sound exceedences on those living near the turbines.

In Bent Tree, we’ve seen buyouts of two landowner families due to noise exceedences at **1,150** and **1,525** feet from the nearest turbine. The buyouts were hammered out only after **SEVEN** years of complaining with no action by the Commission until pushed by landowner persistence. Unfortunately, the rights of landowners are funneled through an ineffective and inadequate Complaint process, reliant on repeated landowner complaints and extreme efforts, rather than the Commission holding applicants to state standards at the outset, in permitting. By allowing use of a 0.5 ground factor, by issuing permits for projects despite developer unwillingness and/or inability to demonstrate that they can meet the noise standards, the Commission is inviting further legal action.

Worse yet than acceptance of modeling based on a 0.5 ground factor is the utter absurdity of use of a 0.7 ground factor, as is seen for the Three Waters (WS-19-576) and Plum Creek (WS-18-700). There is no excuse for this.

The Power Plant Siting Act’s directive regarding public participation, applicable to siting of wind projects, is particularly important, as the Commission is failing to deal with the need for compliance with noise standards, leaving it to the public to address this failure. Also a problem is moving the filing of noise, shadow flicker, decommissioning and complaint process to “compliance filings,” after a permit has been granted. At that point, the public is shut out, and there’s no iterative substantive or critical review of the filings. Landowners and residents are at a severe disadvantage, as most members of the public have no way to identify these problems, and certainly cannot afford to intervene, much less hire expert witnesses to address these issues.

+++++

I am filing this letter in all of the above-identified dockets to provide actual and constructive notice of the deceptions present in each of the projects utilizing other than 0.0 ground factor. Minn. R. 7829.0250.

It should not fall to the public to spot this, or other, deceptions and inadequacies – that is the job of the Commission and Commerce-EERA. Further, no project should be permitted without agency vetting, independent verification of studies, particularly noise, shadow flicker, and decommissioning, etc.. The Commission should hold public and contested case hearings for discovery and cross-examination of witnesses presenting the studies and application.

Wind projects can be designed to comply with Minnesota's noise standard. It is the Commission's job to regulate utilities, to assure that projects comply with state law. The Commission must not site non-compliant projects, must require demonstration of probable compliance, and must use precautionary and preventative siting to avoid impacts and consequences. Once a turbine is up and not in compliance, then what? There aren't many options other than removing the turbine or buying out the landowner. With Bent Tree exceedences at 1,150 and 1,525 feet, careful siting makes good sense.

Very truly yours

A handwritten signature in cursive script that reads "Carol A. Overland". The signature is written in dark ink and is positioned above the typed name.

Carol A. Overland
Attorney at Law

cc: All parties to all above-identified dockets via eDockets
Dorene Hansen, Association of Freeborn County Landowners
Marie McNamara, Goodhue Wind Truth

September 11, 2018

Daniel P. Wolf, Executive Secretary
Minnesota Public Utilities Commission
127 7th Place East, Suite 350
St. Paul, MN 55101-2147

Filed electronically via edockets.state.mn.us

Re: In the Matter of the Application for Freeborn Wind Energy, LLC for a Large Wind Energy Conversion System Site Permit for 84 MW in Freeborn
County Docket No. MPUC IP-6946/WS-17-410

Dear Mr. Wolf:

Freeborn Wind Energy, LLC (Freeborn) and others have filed comments in this docket regarding the interpretation of Minnesota's noise standards, as applied to Large Wind Energy Conversion System (LWECS) projects. The Minnesota Pollution Control Agency (MPCA) has the authority to adopt or amend state noise standards (Minn. Rules Ch. 7030) under Minnesota Statutes 116.07. This letter is intended to help the Commission understand the MPCA's position regarding the application of the state noise standards to LWECS projects.

First, Freeborn and other wind developers contend that LWECS projects meet the state noise standards in Minn. Rules Ch. 7030.0040 as long as the noise generated from any individual turbine, or a combination of turbines, is below the applicable noise standard, absent the consideration of other sound or noise sources. The MPCA disagrees with this position. The plain language of the adopted standards support the MPCA's position, as the scope of the standards reads "These standards describe the limiting *levels of sound* established...for the preservation of *public health and welfare*." (Minn. Rule 7030.0040, emphasis added). This position is consistent with the letter sent from the MPCA to the Department of Commerce (DOC) on October 8, 2012, where the MPCA states our interpretation of standards as health-based standards for *total, ambient* sound. Thus, the MPCA recommends that the Commission should determine compliance of LWECS projects under the state noise standards by determining if *total* sound levels at nearby residences or other receptors – that is, existing sound levels plus the additional noise from a given turbine or LWECS project – exceed the standards in Minn. Rules Ch. 7030.0040.

We understand that the Commission and the DOC may have, or appear to have, applied the state noise standards in Minn. Rules Ch. 7030 differently in the past for some LWECS site permit actions. Nevertheless, as stated above, the MPCA has historically, and consistently, interpreted and applied said noise standards for *total* sound. The total sound levels at a residential receptor, or any receptor, should meet state standards as laid out in Minn. Rules Ch. 7030.0040, regardless of the source(s) contributing to the total sound levels.

The MPCA also recommends that the Commission continue to include compliance with the state noise standards in its site permits for LWECS projects. Maintaining the compliance provision ensures that a state agency retains regulatory authority to compel compliance with the state noise standards. Since the MPCA for noise standard exceedances would be very difficult. Currently, the MPCA only engages with facilities on compliance with noise standards for facilities that have an air quality permit from the MPCA. In the case of LWECS projects, we do not have a regulatory relationship with LWECS project developers or owners, and would have a very difficult time enforcing the state noise standards on LWECS project developers or owners. The Commission's siting permits include a provision requiring compliance with the state noise standards, which provides a direct mechanism to ensure ongoing compliance.

Finally, the MPCA finds that the Department of Commerce's proposed a reasonable "cause or contribute" approach to address compliance in situations where ambient/background sound is already near or exceeding state standards at one or more nearby residential receptors. The MPCA worked with the Department of Commerce on the approach, and it represents the approach the MPCA uses for the consideration of total, ambient sound standard. Noise from individual wind turbines, LWECS projects in general, or other non-natural sources may only comprise a small fraction of the *total* sound level; completely restricting noise from these projects would, therefore, be an undue burden to developers and utilities. We believe EERA's proposed approach, which allows individual turbines or LWECS projects to contribute to a total sound of no greater than one dBA above the relevant noise standard (as described in Minn. Rules Ch. 7030.0040), is reasonable and appropriate, and that the Commission should apply the approach to siting permits, going forward.

The MPCA appreciates the opportunity to provide this feedback. If you have any questions, feel free to contact me directly at 651-757-2500 or Frank.Kohlasch@state.mn.us.

Sincerely,



Frank L. Kohlasch, Manager
Air Assessment Section
Environmental Analysis and Outcomes Division

FLK:cbg

cc: John Wachtler, DOC
Louise Miltich, DOC
David Thornton, MPCA
James Kelly, MDH
Jessie Shmool, MDH

1 A Yes.

2 MR. REYNOLDS: Okay.

3 EXAMINER NEWMARK: And these Exhibits 1
4 through 4 as well?

5 MR. WILSON: Your Honor, I think given the
6 discussion of this document, it probably ought to go
7 in as an exhibit.

8 MR. McKEEVER: Yes.

9 MR. LORENCE: I'm going to ask a couple
10 questions on it, so you may want to hold off on
11 that.

12 EXAMINER NEWMARK: Okay. Let me just have
13 him answer. Are Exhibits 1 through 4 -- sir?
14 Mr. Schomer, Exhibits 1 through 4, were they
15 filed -- are they correct to the best of your
16 knowledge?

17 THE WITNESS: I'm sorry?

18 EXAMINER NEWMARK: Your Exhibits 1 through
19 4, are they correct to the best of your knowledge?

20 THE WITNESS: Yes.

21 EXAMINER NEWMARK: Okay. Thanks.

22 All right. Commission staff.

23 CROSS-EXAMINATION

24 BY MR. LORENCE:

25 Q Dr. Schomer, on page 12 of your surrebuttal

1 testimony, and I'm looking on lines 6 through 8.

2 A Uh-huh. I guess I'm not fast enough. All right. I
3 got to page 12.

4 Q On lines 6 through 8 you say, ISO 1996 requires what
5 is termed "downwind" or weather-enhanced propagation
6 conditions so that model predictions are only
7 infrequently exceeded. Do you see that sentence?

8 A Yes.

9 Q I have never seen ISO 9613-2 before today. Could you
10 tell me where that's required in this -- in this ISO
11 9613?

12 A Those are the questions we just answered, but I can
13 go through it again.

14 Q Well, you talked about the downwind stuff, but you
15 say it says that it's only infrequently exceeded, and
16 I'm wondering if it says that in here anywhere?

17 A That's what the downwind nomenclature means, and I
18 believe it's in either 9613 -- I know it's in either
19 9613 or in 1996, which 9613 incorporates by
20 reference.

21 Q I have one more question, and again this shows my
22 complete ignorance on this standard. In Section 7.3,
23 that's called ground effects, and again there's not a
24 page number here, but if you could turn to that.

25 A Okay. 7.3. 7.3, ground effects, yes.

1 Q Is this section equivalent of the ground factor that
2 we've been talking about the last two days?

3 A This section is -- makes use of the ground factor.
4 It's not equivalent. This is where the ground factor
5 comes in. What you have is on the next page there's
6 graphs showing the -- what the sound propagation is
7 in different octave bands. And then in the
8 implementation there's a table on the next page,
9 Table 3, and in Table 3 if you look in there, there's
10 A sub S or A sub R in the middle column at the top,
11 and that's for the source or receiver region. We've
12 been talking about there's really three factors, the
13 .5 or the zero whatever. You have a factor for the
14 source region, a factor for the middle, and a factor
15 for the receiver region. And if you look at the
16 formulas under A sub R of the middle column, you'll
17 see a G. That's the ground factor that goes between
18 zero and 1.

19 Q And that's the ground factor we have been talking
20 about for two days?

21 A There's three of them technically: one for the
22 source, one for the receiver, and one for the middle.

23 Q So if we turn back one page where it begins with the
24 letter A, then it says hard ground.

25 A Hard ground, yes.

1 Q That first paragraph ends -- it says, for hard ground
2 G equals zero. So this is the ground factor zero
3 that we've been talking about, correct?

4 A Correct.

5 Q And then for porous ground in B, it's G equals 1?

6 A Correct.

7 Q And then for mixed ground, it says it's someplace in
8 between zero and 1. Do you see that?

9 A I see that.

10 Q So this is the ground factor we've been talking about
11 here?

12 A Yes. But to understand that is a question that was
13 earlier. You've got a source up in the air and not
14 on the ground, so does this standard really apply.
15 And my answer was, it's the best we have, but you
16 can't apply it exactly the way you would if it was on
17 the ground because the source is as high in the air,
18 it changes what the propagation is. So that the
19 definition of what is hard and what is soft, you have
20 a source that's 100 meters in the air on average.
21 That's not on the ground as one of the other
22 counsel's pointed out.

23 Q But it has to get to the ground -- the sound has to
24 get to the ground eventually, doesn't it?

25 A It has to get to the ground eventually.

1 Q And once it's on the ground, won't it travel along
2 the ground?

3 A No. It's only -- the only thing you have is an
4 effect of the microphone height at your receiver.
5 The other -- it doesn't -- it doesn't come down to
6 the ground and then travel across the ground like
7 this. It doesn't do that. What you're interested in
8 is the path that goes straight from this up in the
9 air source to your receiver, which may be near the
10 ground, but you don't have any other path. If you
11 do, it's because you don't have good propagation.
12 Then it's poor propagation conditions.

13 MR. LORENCE: Thank you. I have no
14 further questions.

15 MS. BENSKY: Your Honor, can I follow up
16 on that? This is really important, and I want to
17 make sure I understand.

18 RECROSS-EXAMINATION

19 BY MS. BENSKY:

20 Q So are you saying that if we have a flat -- if we
21 have a flat ground, if there's a source that's close
22 to the ground emanating sound, that sound can just go
23 and be absorbed in the ground, correct?

24 A Ground absorption -- what happens, and this is more
25 related to people's experience. You know, if we went

1 through all the details, it would be complicated, but
2 I think people's experience is useful here. First of
3 all, the first rule is that if you're downwind, it's
4 louder than if you're upwind, and there's -- the
5 reason is the downwind, and this is going to seem
6 strange, we think of sound almost as rays, sound rays
7 rather than waves.

8 And let's put it this way. Let's say you
9 were behind the barrier. You expect it to be
10 quieter. It's quieter because there's no direct path
11 from the sound to you. It has to come around the
12 corner just like if you had a -- something to stop
13 the sun or a reflector of light. You go behind it,
14 it's not as light as in front of it. Sound is the
15 same thing. If you have a barrier or something that
16 prevents the sound from getting to you, it's quieter
17 than if you don't have that. Well, on a sunny day
18 and you're upwind, you don't hear things. But if
19 you're downwind, you do.

20 Another thing -- example, if you're out in
21 a boat, do you hear things far away out in a boat?
22 You've seen that? This is the hard surface of the
23 water, and frequently above the water there's a
24 temperature inversion because of the cooling and
25 heating of the water. And those two can form two

1 layers that the sound gets trapped in, and then you
2 have very -- you hear the people whispering on the
3 shore, and it's like they're 10 feet away from you.
4 I'm sure many of you have experienced this. This has
5 to do with the propagation downwind versus upwind,
6 has to do with the propagation.

7 The physics is complicated, but the
8 effects -- same thing. Ever hear sources very early
9 in the morning? You wake up at 5:00 a.m. and you
10 hear a distant train or horns or the wheels? Have
11 you experienced that? That again has -- at that time
12 of day, you've got a direct path from the source,
13 which is -- you don't hear the rest of the day to
14 you. It has to do with the physics of the situation.

15 I'm not going to attempt to go into the
16 physics, but I'm trying to give you different
17 examples out of your daily life that show you this is
18 what goes on. We don't want to really go into the
19 details of what's going on.

20 Q So if there's a source up in the air that's emitting
21 sound, the sound's going to come down and it's going
22 to hit the receptor before it hits the ground and
23 absorbs; is that correct?

24 A It's going to hit the receptor directly. There will
25 be -- it gets confusing.

1 Q That's for sure.

2 A The ground is important only that it gives a
3 reflection that can enhance or interfere with the
4 direct path. But it does hit the microphone, that's
5 the first thing it hits in time. The sound will
6 arrive at the microphone before -- it comes directly
7 from the source, so it will arrive first.

8 Q So somebody standing outside near a wind turbine or
9 any source up in the air, that sound wave is going to
10 travel down, and it's going to hit that person's ear
11 before it goes down to the ground and gets absorbed?

12 A Well, won't be totally absorbed but, yes, it does hit
13 you before it's absorbed. And I think your point is
14 good, that as you're traveling along the ground, from
15 ground to ground it will be absorbing some of the
16 sounds, and that alone is -- that's part of the
17 reason that the air-to-ground path is louder.

18 Q And so do you think it's proper to assume no
19 absorption and use that 0.0 coefficient for this
20 reason?

21 A That's part of the reason. Part of the reason is
22 the -- in order to have a prediction that is what is
23 called for in the standard, which is a prediction
24 that is -- if you like the term conservative, a
25 prediction that predicts what's going to happen 90

1 percent of the time or 95 percent of the time or some
2 percentage of the time, I actually think that from
3 the data that I know of, the prediction is probably
4 the -- about 85 percent of the time would be
5 included, and 15 percent of the time you would be
6 above what's being predicted with the 0.00
7 prediction. It's not the most conservative
8 prediction in the world by any means.

9 Q But considering we have to use this model because we
10 don't have anything better, the best way to use this
11 model for a source that's 100 meters in the air is to
12 use that 0.0 coefficient?

13 A 0.00 is the best you can do with this.

14 MS. BENSKY: Great. That's very helpful.
15 Thank you.

16 MR. REYNOLDS: Couple questions on
17 redirect.

18 REDIRECT EXAMINATION

19 BY MR. REYNOLDS:

20 Q Dr. Schomer, is it the heart of it that the challenge
21 of creating a model to reflect what the citizens of
22 Forest will actually experience, is that the heart of
23 why it's better to have conservative estimates than
24 not conservative estimates of sound? Because we're
25 trying to figure out what's going to happen to the

1 citizens in Forest.

2 A I think there's probably lots of reasons I can think
3 of for doing this. Again, we're dealing with a low
4 frequency sound primarily. The A-weighted sound is
5 going to correlate with it as it does with nearly all
6 noise sources.

7 I think it's important to understand how
8 the ear hears because that's all a part of this, and
9 the ear doesn't hear all frequencies equally. It
10 doesn't process all frequencies equally, and it gets
11 very different at low frequencies. The ear gets very
12 different at low frequencies, and this is one of the
13 reasons I would say this is important. We -- I think
14 Mr. Hessler testified that the threshold of hearing
15 changes, or maybe it was in that paper that was
16 passed out, but the threshold of hearing is very
17 different from one person to another.

18 But what's even more important is that at
19 the middle frequencies, like 1,000 hertz, a change of
20 10 decibels is a doubling or a cutting in half of
21 loudness. At these low frequencies, like let's say
22 10 hertz, at 10 hertz, about a 2 dB change is a
23 doubling of loudness. So at low frequencies,
24 anything that you're off gets magnified by the ear.
25 If you're off by 5 dB at low frequencies, that's a

1 factor of four in loudness. Whereas if you're off by
2 5 dB at a middle frequency in a prediction, that's
3 not even a factor of two in loudness. So errors get
4 magnified at the low frequencies just because of how
5 we hear.

6 Q That was one of the reasons for looking at the more
7 conservative model. Are there any others?

8 A Well, let's see. I've talked about the standard
9 calling for it. I've talked about it makes sense
10 from the -- from the way the rule is written.
11 Certainly it makes sense from being conservative from
12 just the standpoint of how the ear hears. I think
13 that just what we've talked about, the health effects
14 and the fact that there's people that may be affected
15 just like in one other community, somehow it seems
16 like it calls for us to be cautious.

17 I think that if -- if it were some other
18 area where government was involved directly, let's
19 say, we're going to install -- we're going to license
20 fire detectors that only work 90 percent of the time
21 and 10 percent of the time people aren't warned about
22 the fire protector, but that's good enough. People
23 wouldn't say that's good enough, so the fire
24 protection has to work all the time. And I think
25 when we're talking about people literally being

1 driven out of their homes, we have to be a little bit
2 cautious.

3 MR. REYNOLDS: Thank you. I don't have
4 anything else.

5 EXAMINER NEWMARK: Highland?

6 MR. WILSON: No.

7 EXAMINER NEWMARK: All right. What are we
8 doing with our ISO 9613-2?

9 MS. BENSKY: I'd like to move it into
10 evidence.

11 EXAMINER NEWMARK: All right. Any
12 objections?

13 MR. LORENCE: I guess I'd like to talk
14 about that for a second.

15 EXAMINER NEWMARK: Okay.

16 MR. LORENCE: We've kept out all kinds of
17 reports and exhibits today because they didn't come
18 in at the proper time. Professor Schomer could have
19 put it in at any time with his exhibits. I
20 recognize that counsel here is not -- is not -- his
21 witness is not asking this. But I guess I would ask
22 the ALJ that under the theory that, you know, we've
23 been keeping out late-filed things and this is
24 awfully dense information, whether this should go in
25 the record.

1 EXAMINER NEWMARK: Okay.

2 MR. LORENCE: And I just as a second aside
3 for counsel, I'm not positive, but I think that
4 these are usually under copyright, and is this
5 something that we would be able to place on our
6 website and make available to the world if -- I
7 don't want to get you in any kind of copyright
8 trouble if that's the case.

9 MR. MCKEEVER: I'll just say I got it on
10 the internet.

11 MR. LORENCE: Yeah.

12 MR. REYNOLDS: And this is the standard
13 that has been used by all the measurers of sound, so
14 this is -- this is kind of the bible of sound
15 measurement.

16 MR. LORENCE: And I guess that reinforces
17 my question then. Anybody could have put it in.
18 Any of the experts could have put it in from direct
19 testimony on it. So whether we get it here at this
20 late hour or not, I'll defer to the decision, but
21 I'm -- given what we've done today with other
22 things, I just wanted to raise that point.

23 MS. BENSKY: I guess the nature of this
24 exhibit is totally different. This exhibit doesn't
25 give any opinions. It's just a standard that

1 everybody -- all the sound people in this case have
2 used and relied upon. So I think it would be
3 helpful to have it in. And even if it wasn't in, I
4 think it's the type of material that could be quoted
5 and briefed anyway, so --

6 EXAMINER NEWMARK: Let's not get into
7 that.

8 MR. WILSON: I think at the risk of making
9 it look like Ms. Bensky and I are on the same
10 team --

11 EXAMINER NEWMARK: We would like to see
12 that.

13 MR. WILSON: I agree.

14 EXAMINER NEWMARK: Okay.

15 MR. WILSON: It should come in.

16 EXAMINER NEWMARK: I understand.

17 MR. WILSON: There's a lot of testimony on
18 it.

19 EXAMINER NEWMARK: Let me say the
20 overarching concern I have or rationale for letting
21 it in is we've cited to equations and all kinds of
22 portions of this document which I think can only be
23 correctly or adequately explained or referenced by
24 having the document. So for the abundance of
25 caution for making the record even larger, I think

1 it would enhance the Commissioner's review of the
2 testimony we've just heard. So what's the number
3 for this one? It's 9, Schomer 9, is that --

4 MR. REYNOLDS: I thought it was 5.

5 EXAMINER NEWMARK: Well, I don't know if
6 we ever marked your other ones. I might have
7 mentioned on the record because Mr. Schomer, I was
8 not accepting his Exhibits 5 through 8, and I am
9 pretty sure I referenced that at the beginning of
10 the hearing. So we're just going to call this 9.

11 MS. BENSKY: Okay.

12 (Schomer Exhibit No. 9 marked and received.)

13 EXAMINER NEWMARK: All right. I think
14 you're done.

15 THE WITNESS: Thanks.

16 EXAMINER NEWMARK: You're excused.

17 (Witness excused.)

18 EXAMINER NEWMARK: 3 o'clock. Let's take
19 15 minutes.

20 (Break taken from 3:05 p.m. to 3:20 p.m.)

21 EXAMINER NEWMARK: Well, got enough people
22 back, I guess. You want to start off the record?

23 MR. MCKEEVER: Yeah.

24 (Discussion held off the record.)

25 EXAMINER NEWMARK: All right. Next?

1 A I do recall that.

2 Q Do you believe that it would have been appropriate to
3 apply a ground factor of 0.2 or 0.3 to your analysis
4 of the Badger Hollow project?

5 A No.

6 Q Why not?

7 A The model that we use has been shown to predict
8 conservatively with 0.5. I mean, 0.5 ground factor
9 is used in probably -- well, with the exception
10 perhaps of wind turbine projects which are different
11 because the source is elevated. But for projects
12 like a typical power plant, a solar plant where the
13 sources are relatively close to the ground, I would
14 say 90 to 99 percent of the studies use 0.5. And
15 when consultants like myself go out and measure these
16 plants after they're constructed to verify our
17 modeling assumptions, that assumption checks out as
18 being, if anything, overpredicting the levels. So
19 there's no need to -- there would be no justification
20 to use something like a .2 or .3 which would predict
21 yet higher levels because we're already demonstrating
22 that the model is probably overpredicting. So that
23 would not be justified for those reasons.

24 MR. NOWICKI: Thank you. No further
25 questions.