## In Re:

SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

## DAY 4 - AFTERNOON SESSION ONLY <br> November 1, 2012

SUSAN J. ROBIDAS, N.H. LCR
(603) 622-0068 shortrptr@comcast.net (603) 540-2083 (cell)

November 1, 2012 - 1:35 p.m. Concord, New Hampshire AFTERNOON SESSION ONLY

IN RE: SITE EVALUATION COMMITTEE:
DOCKET NO. 2012-01: Application
of Antrim Wind, LLC, for a Certificate of Site and Facility for a 30 MW Wind Powered Renewable Energy Facility to be Located in Antrim, Hillsborough County, New Hampshire.
(Hearing on the merits)

PRESENT:
SITE EVALUATION COMMITTEE:

Kate Bailey, Engineer
(Presiding Officer)
Amy L. Ignatius, Chrmn. Harry T. Stewart, Dir. Johanna Lyons, Designee

Craig Green, Designee Brad Simpkins, Dir.
Ed Robinson, Designee Richard Boisvert, Designee Brook Dupee, Designee

Public Utilities Comm.
Public Utilities Comm. DES - Water Division
Dept. of Resources \& Econ. Dev.
Dept. of Transportation DRED-Div. Forests \& Land
Fish \& Game Department Div. Historic Resources Dept. Health \& Human Svs.

COUNSEL FOR THE COMMITTEE: Michael Iacopino, Esq. COUNSEL FOR THE PUBLIC:

Peter C. L. Roth, Esq. Sr. Asst. Atty. General N.H. Atty.Gen. Office

APPEARANCES: Reptg. Antrim Wind, LLC:
Susan S. Geiger, Esq. (Orr \& Reno) Douglas L. Patch, Esq. (Orr \& Reno) Rachel Goldwasser, Esq. (Orr \& Reno)

Reptg. Antrim Board of Selectmen: Galen Stearns, Town Administrator Michael Genest, Selectman Town of Antrim

Reptg. Harris Center for Cons. Edu.: Stephen Froling, Esq.

Reptg. Antrim Planning Board: Martha Pinello, Member

Reptg. Audubon Society of N.H.: David M. Howe, Esq.
Amy Manzelli, Esq. (BCM Environment \& Land Law)

Reptg. Industrial Wind Action Group: Lisa Linowes

Reptg. North Branch Group of Intervenors:
Richard Block
Loranne Carey Block

\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS PANEL: BUTLER|MARTIN]
(Whereupon the hearing resumed after the lunch break at 1:35 p.m.)

MS. BAILEY: Good afternoon. We will continue the proceedings with the panel of Mr. Butler and Mr. Martin. Is that correct?

MR. PATCH: Yes.
MS. BAILEY: All right.
Mr. Patch, you may proceed.
MR. PATCH: Thank you.
DIRECT EXAMINATION
BY MR. PATCH:
Q. Would you please, each of you, state your name and address.
A. (Butler) Daniel T. Butler. My business address is 249 Western Avenue, Auburn -Augusta, Maine.
A. (Martin) My name's Patrick Martin. I work at 400 Southborough Drive, South Portland, Maine.

MS. BAILEY: Excuse me. Will
the reporter please swear the witnesses in.
(WHEREUPON, PATRICK M. MARTIN and DANIEL
T. BUTLER were duly sworn and cautioned
by the Court Reporter.) PATRICK M. MARTIN, SWORN DANIEL T. BUTLER, SWORN

BY MR. PATCH:
Q. And by whom are you each employed and in what capacity?
A. (Butler) I'm employed with TRC, and I am the manager of the Civil and Transmission Engineering Department.
A. (Martin) I also work for TRC. I'm a civil engineer.
Q. And could you give the Committee a brief summary of your qualifications.
A. (Butler) I'm a civil engineer. I've been registered in New Hampshire for about 20 -21 years, and I've had -- I have approximately 26 years experience.
A. (Martin) I'm a registered civil engineer in Maine. I have about 12 years of experience in a wide variety of land development projects.
Q. And what is your role in the Antrim Wind Project?
A. (Butler) $I$ am the engineer of record.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. (Martin) I was the design engineer for the project. I oversaw the design of the road and the equipment pads.
Q. And are you the same Daniel Butler and Patrick Martin who submitted prefiled testimony in this docket?
A. (Butler) Yes.
A. (Martin) Yes.
Q. And that was dated January 31st of 2012. And that's been marked as Exhibit AWE 1, and that's in Volume 1, Tab 7?
A. (Butler) Yes.
Q. And did you also submit supplemental prefiled testimony that was dated, I believe, October 11th, 2012, which has been marked as Exhibit AWE 9, and also Tab 7 in the fourth supplement?
A. (Martin) Yes, that's correct.
A. (Butler) Yes.
Q. And do you have any corrections or updates to either the original prefiled or the
supplemental prefiled testimony?
A. (Butler) No.
A. (Martin) No, sir.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. If you were asked the same questions in both of those testimonies today under oath, would your answers be the same?
A. (Butler) Yes.
A. (Martin) Yes.

MR. PATCH: The witnesses are available for cross.

MS. BAILEY: Thank you.
Mr. Frohling.
MR. FROHLING: No questions.
MS. BAILEY: Is Mr. Beblowski
here?
MR. FROHLING: He's not.
MS. BAILEY: Is Mr. Jones
here?
(No verbal response)
MS. BAILEY: Ms. Sullivan?
(No verbal response)
MS. BAILEY: Ms. Longgood?
MS. LONGGOOD: Nothing.
MS. BAILEY: Mr. Stearns or
Mr. Genest?
MR. STEARNS: No questions.
MS. BAILEY: Ms. Osler from
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
the Gregg Lake Association?
(No verbal response)
MS. BAILEY: No questions.
Mr. Levesque or Ms. Pinello?
MS. PINELLO: No questions.
MS. BAILEY: Okay. It's your turn. Oh, no questions.

MS. PINELLO: No questions.
MS. BAILEY: Thank you.
Ms. Manzelli?
MS. MANZELLI: Yes, thank you.
CROSS-EXAMINATION
BY MS. MANZELLI:
Q. Gentlemen, my name is Amy Manzelli. I represent New Hampshire Audubon in this matter. They're an intervenor. Good afternoon.

I want to start by directing your attention to your prefiled direct testimony from January 31st, 2012.

You discussed rock outcropping in your testimony; right?
A. (Martin) Where is that reference, please?
Q. Sure. Looking at Page 5.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. (Butler) Line 4?
Q. Lines 4 and 5, yeah. I just want to make -make sure everyone was at the right page first.
A. (Martin) Yes.
Q. Okay. Can you provide approximate proportions of rock outcrop and rock outcrop complex that will be disturbed during construction?
A. (Butler) I know I can't.
A. (Martin) I don't think so. These descriptions are actually soil descriptions from the Soil Conservation Service Manual. We haven't done an analysis of how much rock will be required to be removed from the site yet.
Q. When will that be done?
A. (Martin) We haven't been asked to do that.
Q. Does it need to be done to construct this facility?
A. (Martin) Not in my opinion.
Q. Of the 57.9 acres described on Line 7 that will be disturbed, do I understand correctly -- let me ask you this: Of the
57.9 acres that you reference as -- that will be disturbed, is any of that rock outcrop or rock outcrop complex?
A. (Martin) Yes, I believe so.
Q. Can you state what percentage of the 57.9 acres is rock outcrop or rock outcrop complex?
A. (Martin) No. We haven't done that analysis.
Q. Okay. And you can't quantify it in terms of how many acres either?
A. (Martin) Not today.
Q. Can you say whether it's more or less than 10 acres?
A. (Butler) I can't.
A. (Martin) No, I don't know. We haven't looked at that. I don't know how to answer that question otherwise.
Q. Have you been to the site?
A. (Martin) Yes, I have.
Q. Did rock outcrop and rock outcrop complex dominate the 57.9 acres?
A. (Martin) No.
Q. But it was there?
A. (Martin) Yes.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. Less than half of it?
A. (Martin) Yes.
Q. Same document, the January 31st, 2012, prefiled testimony. Turning now to Page 7 -let me just back up as I'm thinking over what you testified about the rock outcrop.

Will any rock outcrop or rock outcrop complex be blasted in the 57.9 acres?
A. (Martin) Yes, there will be rock removal required. How the contractor chooses to do that is somewhat up to him. It may be blasting; it may be another method.
A. (Butler) It's his means and methods.
Q. And what would the other methods be?
A. (Martin) There are chemical methods; there are pressurized water methods.
Q. What are the chemical methods?
A. (Martin) I don't know, off the top of my head, specifically what that is. I'm aware of their existence.
Q. Who on the Antrim Wind Energy team would be qualified to speak to that?
A. (Martin) I'm not aware that anybody would. That's a very specialized method of rock
[WITNESS PANEL: BUTLER|MARTIN]
removal used in very particular locations. It's something that the contractor would have to evaluate if it was something that they might want to use.
Q. So it --
A. (Martin) It's not on anybody's radar right now, though.
Q. If the project were to be certificated and get all the required approvals and go
forward, a contractor would be hired. We don't know who that contractor is yet, though?
A. (Martin) I don't.
A. (Butler) Don't know.
Q. Okay. So a contractor would be hired. And that contractor alone would determine the method of removing the rock outcrop and rock outcrop complex?
A. (Martin) I don't think that's exactly right.

I'm sure he would coordinate it with the client. Any method he chooses would have to be approved.
Q. By who?
A. (Martin) Would that be the Town or the DOT
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

Or - -
A. (Butler) Is there a blasting plan?
A. (Martin) There is. Is that DES?
A. (Butler) DES. I believe DES has approvals for blasting plans.
Q. And those approvals have not yet been sought?
A. (Butler) I don't think so.
A. (Martin) No, that's farther down the road. That's -- nobody would have done that yet.
Q. And where exactly down the road would that be done?
A. (Martin) Once a contractor has been selected, that would probably be one of the first things they would need to do.
Q. And when would a contractor be selected?
A. (Martin) That's up to the client.
Q. Can you state, based on your experience, when it's likely that the contractor joins the team?
A. (Martin) After permits are issued.
Q. So, getting back now to Page 7, Lines 17 and 18, you state there that the project will result in a relatively small amount of new impervious areas distributed between --
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
(Court Reporter interjects.)
Q. It states there that the project will result in a relatively small amount of new impervious areas distributed between four expansive, largely undeveloped watersheds. I read that correctly?
A. (Martin) Yes.
Q. Is one of the watersheds the Willard Pond watershed?
A. (Martin) Yes.
Q. And can you provide the area of impervious surface that will be located in the Willard Pond watershed?
A. (Martin) That would be in the stormwater report, yes.
Q. Can you provide that information to me now?
A. (Martin) I can try to find it, sure.
Q. Or if you can tell me, does -- does the stormwater management report quantify the area within the Willard Pond watershed that will be covered with impervious surface?
A. (Martin) I need to verify that.
Q. Okay. Thank you.
(Witness reviews document.)
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS PANEL: BUTLER|MARTIN]
Q. And if you or Antrim Wind counsel could remind us which AWE exhibit is the Stormwater Management Plan contained in?
A. (Martin) It's in Volume 2. I don't know which reference that is.

MR. PATCH: That would be AWE 2.

MS. GEIGER: Not sure which tab.

MR. PATCH: Is there an appendix number for that?

WITNESS MARTIN: It's
Appendix 2B.
Q. Thanks very much.

MR. PATCH: If I could approach the witness and maybe try to help?
A. (Martin) It's . 037 acres.
Q. What page are you reading from, please?
A. (Martin) I don't think this has a number. It is in the Appendix $A$ of the stormwater report.
Q. Does Appendix $A$ of the stormwater report have a title other than Appendix A?
A. (Martin) Yes, ma'am. It is the "Watershed

Analysis Calculations."
Q. Thank you.

Moving along in your testimony, turning to Page 9, directing your attention to Lines 4 through 6, could you read the sentence that begins with "Culverts..."?
A. (Martin) "Culverts, level spreaders and additional retention areas that are needed based on the project's impacts will be maintained during operations in accordance with state requirements."
Q. Thank you.

How does the decommissioning plan deal with those features you just read off?
A. (Martin) I'm not familiar with the decommissioning plan. I'm a designer.
Q. So you're not familiar with what the fate of the culverts would be, for example?
A. (Martin) I can assume.
Q. What would your assumption be?
A. (Martin) I assume that they would be removed from the site and disposed of in a legal manner.
Q. Is that the standard practice?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Sure. Yeah.
Q. And would you make that same assumption for the level spreaders and additional retention areas?
A. (Martin) Yes. The level spreaders are just made of stone. They can be removed or possibly spread on the site. That's up to the decommissioning plan, whoever approves that. And the -- what was the third?
Q. The additional retention areas.
A. (Martin) Yeah. Those can just be graded back to original grade.
Q. And just to confirm, your testimony is that that's not necessarily what the decommissioning plan calls for, because you're not familiar with it, but these things we just discussed would be standard practice?
A. (Martin) My testimony is, I don't know what the decommissioning plan says, but this is standard practice.
Q. Now -- sorry. Backing up just a bit to Page 7, Lines 18 to 20. There's discussion of a permeable road base; is there not?
A. (Martin) On 18 to 20. Yes, ma'am.
Q. And in the Stormwater Management Plan, Section 4.3.2, there is discussion of the permeable road base; right?
A. (Martin) I'll take your word for that.
Q. Okay. And are you aware that under New Hampshire law, gravel and crushed stone are defined as being "impervious"?
A. (Martin) Gravel roads are.
Q. And crushed stone?
A. (Martin) Crushed stone roads are.
Q. Okay. So what will be the composition of this road base that makes it permeable?
A. (Martin) It's a particular crushed stone. It has very few fines in the mix. This method is -- was actually requested by the DES to be included in the project.
Q. So is there some sort of process that you've gone through with the DES to classify this road as permeable?
A. (Martin) We might not be talking about the same thing here.
A. (Butler) I think you're talking surface. This permeable base is below the surface. It allows water to flow underneath the roadway.
[WITNESS PANEL: BUTLER|MARTIN]

And I think what you're talking about is surface gravel or gravel roadways.
Q. So describe to me, then, the composition of this road and how and to what extent it will be permeable.
A. (Martin) The permeable base is made up of the open, graded stone. On top of that is the regular -- you know, the standard gravel road, crushed stone and fine. So it compacts really well.

It's permeable, as Mr. Butler said, in that runoff flows through the base under the road, but it's not permeable in the sense that rainwater infiltrates into the road.
A. (Butler) We have the detail in the drawings. I can't...
Q. Well, my question relates more to the nature of the top of the road. Do I understand correctly that the top of the road is not permeable at all?
A. (Martin) That's correct.
Q. And so while stormwater may infiltrate on the sides of the road and then flow under it, stormwater that falls onto the road will flow
on top of it and not infiltrate into it?
A. (Martin) That's correct.
Q. And could you please state, either in linear measurement or in percentage of the road, what amount of the road will have this permeable road base? I'm given to understand from your testimony that it won't be in the -- underneath the entire road; correct?
A. (Martin) No, it won't. It's only proposed under certain sections. And fairly flat sections where you can expect water to flow through the road, we designed it there. We also included it in areas where we're forced to cross wetlands.
Q. If I can --
A. (Martin) I cannot quantify it.
Q. Okay.
A. (Martin) It's delineated on the plans. The road is stationed, so you can -- what I would do is just go through the plans, read off the stations, calculate the length that way. I haven't done that yet.
Q. I'm not the expert here, so that's why I'm asking you. How long would it take you to do

## [WITNESS PANEL: BUTLER|MARTIN]

that calculation?
A. (Martin) Fifteen minutes, 20 minutes.
Q. Okay. Is that calculations that you could provide before the conclusion of the hearing in this matter?
A. (Martin) Yes.
Q. Thank you.

MR. PATCH: So is the request that we provide that? Should we reserve an exhibit?

MS. BAILEY: I haven't heard such a request.

BY MS. MANZELLI:
Q. Would you please quantify the area which will have the permeable road base.
A. (Martin) Yes, ma'am.
Q. Thank you.

MR. IACOPINO: Mr. Patch, I assume that will be the next numbered exhibit when it comes in.

MR. PATCH: Okay.
MR. IACOPINO: It's really
treated as a record request.
MS. MANZELLI: Thank you.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

BY MS. MANZELLI:
Q. Do you agree that -- continuing to look at the Stormwater Management Plan on Page 5, there's a statement that implies that all volumes of the New Hampshire Stormwater Management Plan -- excuse me. Let me make sure I'm using the right title for the document.

On Page 5 there's a statement that the New Hampshire stormwater manual, Volumes 1, 2 and 3 -- that the project had been designed to meet the standards set forth there. Am I characterizing that statement accurately?
A. (Martin) Yes, that's right.
Q. Later in the application -- excuse me. Later in the Stormwater Management Plan and in your testimony, there's particular mention of Chapters 2 and 4 of the New Hampshire stormwater manual; correct?
A. (Martin) I imagine so.
Q. So, was every section of the New Hampshire stormwater manual followed?
A. (Martin) Yes, generally. There are some specific requirements that apply more to a
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
subdivision type of plan that wouldn't apply to a road like this. So we worked with our DES reviewer to figure out how to address that as best we could for this project.
Q. So -- I don't want to put words in your mouth, so you tell me if this is accurate. Is every requirement set forth -- or excuse me. Every standard in the New Hampshire stormwater manual that's set forth there, that's applicable to this project, was the project designed to meet all of those?
A. (Martin) Yes.
Q. And just so I'm clear, I know you understand, because it's in the plan and in your testimony, that the stormwater manual has three volumes, one, two, three?
A. (Martin) Yes.
Q. When you reference, in particular, Chapters 2 and 4, do you recall what volume that referred to?
A. (Martin) I believe it's Volume 2. I'm not a hundred percent sure on that. That's where most of the design standards are.
Q. That is what I assumed. Thank you for
confirming.
Do you agree that invasive species are a public health issue?
A. (Martin) I guess that depends on the species.
Q. Some?
A. (Martin) I assume so. I'm not a biologist or a botanist.
Q. Do you agree that invasive species are a water quality issue?
A. (Martin) Yes.
Q. And on Page 9 of your testimony, in Lines 10 through 11, there's a reference to native mix reseeding; right?
A. (Martin) Yes.
Q. Prior testimony in this matter, I understood, was that native mix reseeding would be used to the extent possible. That's not a quote. That's my summary of what $I$ think $I$ heard.

Can you explain whether only native mix reseeding will be done or whether there's some option for something other than native mix reseeding to be used?
A. (Martin) The only circumstance $I$ can think of right now where we wouldn't use that would be
if we needed to establish growth very quickly, like in conditions now, winter or fall. And again, I'm not a botanist, so I haven't memorized a native species list. But it's possible that, like our rye grass, something that grows very quickly would be used then. But that would be something that we could negotiate with the DES.
Q. And is that something that could be avoided with -- through planning?
A. (Martin) Yes.
Q. And what -- aside from using a native mix reseeding, what other efforts will be used to prevent invasive species?
A. (Martin) Other than that, $I$ would say that the regular cleaning of the construction vehicles to make sure they don't, you know, bring seeds or species in from other sites. That's the limit of my knowledge on that. That's really more of an environmental monitor's job.
Q. Is the regular cleaning of vehicles that you just mentioned documented somewhere in the Antrim Wind Application? I don't need a
particular citation. I just would like your confirmation whether it's in there or not, to your knowledge.
A. (Martin) Not to my knowledge. That would come in a different section than the engineering part.
Q. So it's -- just to confirm what you're saying, it might be in the Application, but it's not in the part of the Application that your testimony deals with?
A. (Martin) Correct.
Q. Now, turning to your supplemental prefiled testimony from October 11th -- I can give you the page and line if you'd like. But generally, I'd like you to let us know where the water -- in which watershed the radar-activated lighting system will be located -- excuse me -- the radar-activated lighting system tower will be located.
A. (Martin) That tower is going to be in the neighborhood of Structure 10. And I believe that's going to fall in the Gregg Lake watershed.
Q. Is there something that you could do to be
sure that's where it will be located?
A. (Martin) Yes.
(Witness reviews document.)
A. (Martin) I was mistaken. That was the Willard Pond watershed.
Q. Thanks for verifying.

Now, moving along, in this matter, the Wildlife Impact Assessment says, "Stormwater runoff will be treated at this site through utilizing undisturbed forested buffers." To the best of your knowledge, is that statement accurate?
A. (Martin) That's one of the methods that we use.
Q. Will this site retain existing grades and elevations?
A. (Martin) Throughout the site?
Q. Yup.
A. (Martin) No, there's going to be a road there.
Q. Okay. So will there be elevation differences between the edge of the disturbed site and the adjacent undisturbed forest?
A. (Martin) No. The edge of the disturbance is
where disturbance stops.
Q. And where disturbance stops, there's going to be no elevation change between --
A. (Martin) No, beyond that is undisturbed land. That's exactly what's out there now.
Q. Right. But where it's disturbed -- say, for example, let's look at the five -- the outermost 5 feet of disturbance.
A. (Martin) Okay.
Q. Is there going to be an elevation change along that 5 feet and the undisturbed forest?
A. (Martin) I don't think I understand the question.
Q. So is there going to be a drop-off of any sort, either way, even if it's only -- even if it can only be measured in inches?
A. (Martin) Okay. No. The roadbed -- well, the road slopes will be graded down to meet the existing ground, so there won't be any drop-off there.
Q. Okay. And to achieve the situation where there is no change in -- there's no drop-off either way, will the disturbed area need to be made bigger than what is proposed right
now?
A. (Martin) No.
Q. Now, also looking at the wildlife impact -or referencing the Wildlife Impact Assessment, it mentions the bedrock outcrops in the very steep slopes, and that those are considered constraints to engineering design. Do you agree with that statement?
A. (Martin) Yeah, generally.
Q. Can you describe how these constraints will be addressed?
A. (Martin) Well, best option would be to avoid them.
Q. Are they avoidable?
A. (Martin) I believe so, yeah.
Q. Well, didn't you just testify earlier that some of the rock outcrop in the 57 some-odd acres would be impacted?
A. (Martin) I think I need to hear the question again. I don't think I understood it.
Q. Sure. Are the rock, the existing bedrock outcrops, a constraint to this project?
A. (Butler) I don't believe they're constrained.
A. (Martin) No. They're a factor that you need
to account for, but --
A. (Butler) Exactly.
A. (Martin) -- it's just rock.
Q. So how will they be accounted for?
A. (Martin) We designed the road to avoid as much of those areas as possible. When that's not possible, then the rock will be removed.
Q. How close will turbine pads be located to bedrock outcrops that will remain undisturbed?
A. (Martin) I'm not sure how to answer that. Some of them will be built on rock outcrops.
Q. Okay. How does the Application address climate change?
A. (Martin) To my knowledge, it does not.
Q. And do you agree that climate change is already bringing increasingly frequent extreme weather events to New Hampshire?
A. (Martin) My personal opinion?
Q. I'm asking if you are aware of this.
A. (Martin) My personal opinion is yes. That has nothing to do with my professional opinion of this project.
Q. Are you aware that climate change is expected
to exacerbate water quality?
A. (Martin) Yes, I'm aware of that.
Q. Are you aware that climate change is expected to affect water availability?
A. (Martin) I'm aware of that.
Q. Are you aware that climate change is expected to test our readiness to deal with droughts and flooding?
A. (Martin) Yes, ma'am.
Q. Are you aware that climate change is expected to overwhelm the existing stormwater infrastructure in many places?
A. (Martin) Yes.
Q. Are you aware that climate change is increasing -- is expected to have increasingly frequent storms with extreme precipitation?
A. (Martin) Yes.
Q. Are you aware that EPA categorizes New Hampshire in the highest level of increases in the frequency of storms with extreme precipitation?
A. (Martin) I was not aware of that.
Q. Do you agree that 50-year storms are coming \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
more frequently than 50 years recently?
A. (Martin) I haven't seen any evidence on that.
Q. But you are aware that climate change is expected to cause increasingly frequent storms with extreme precipitation?
A. (Martin) I believe that's expected, yes.
Q. Do you believe that's occurring already?
A. (Martin) I haven't seen any evidence of that.
Q. And you agree that the data used in the Stormwater Management Plan regarding the frequency of storm events is from 1986?
A. (Martin) I don't know for certain, but that sounds about right.
Q. Is there something that you could do quickly to be certain?
A. (Martin) No. I would have to go to the website where we get our precipitation data.
Q. Do you know, just sitting here quickly, if it wasn't from a 1986 source, what other source it would be from?
A. (Martin) I don't know the date of the source I used.
A. (Butler) It's from a source acceptable to the State of New Hampshire, the DES.
Q. Well, in fact, it's a DES publication, the "Water Resources Primer," that states that increasingly frequent storms with extreme precipitation are expected, the statement you agreed to.
A. (Martin) To my knowledge, they've not changed their design standards yet.
Q. And based on your experience, do design standards always keep up with scientific knowledge?
A. (Martin) No.
Q. And are you familiar with the "New Hampshire Water Resources Primer"?
A. (Martin) No.
Q. So that wasn't incorporated into your analysis in this matter?
A. (Martin) No.
Q. Thank you, gentlemen. I have no further questions for you.
A. Thank you.

MS. BAILEY: Thank you.
Mr. Allen -- I mean --
sorry -- Ms. Allen or Mr. Edwards?
(No verbal response)
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS PANEL: BUTLER|MARTIN]

> MS . BAILEY: Not here.
> Mr . Block.
> CROSS-EXAMINATION

BY MR. BLOCK:
Q. Yes. Good afternoon, gentlemen.

Referencing your prefiled direct
testimony on Page 10 of the original -- of the January 31st testimony, I'd like to read line -- parts of Lines 10 through 14, which says, "Any blasting that is necessary will be done by an experienced, licensed contractor who will operate in strict compliance with a project blasting plan which will be provided to the Town and reviewed and approved by the New Hampshire Department of Safety. Blasting plans typically include advance notification."

Can you let us know how residents in the area will be notified of blasting activities?
A. (Martin) I would assume that they would establish a radius around the blasting area and notify all of the property owners in that radius.
Q. Do you know how that notification will occur?
A. (Martin) I don't. This is typically conducted by the contractor. It's not something that we would ordinarily deal with as engineers.
Q. So you -- so you don't know if there will be advance notice to residents or anything.
A. (Martin) I understand that advance notice is required.
Q. Is advance notice to individuals living in the area or just to the Town, because it does say "provided to the Town."
A. (Martin) I don't know the answer to that.
Q. Okay. I was just wondering if -- do you know whose responsibility it is, therefore, to let residents know?
A. (Martin) It will be the responsibility of either the contractor or the client, and I assume that they will be requirements of whatever permit is issued for the blasting or approval of the blasting plan process.
Q. Do you know who approves the blasting plan process?
A. (Martin) The Department of Safety.
Q. The state's Department of Safety. Okay.

Thank you.
Actually, I'd like you now to reference Exhibit NB 4, the Susan Morse testimony. MR. IACOPINO: Just a minute, Mr. Block.

MR. BLOCK: Electronically that's NB 4.

BY MR. BLOCK:
Q. And specifically in that testimony, I'd like to look at her Exhibit SM 8, towards the back of that, and the sixth and seventh page of that exhibit. Electronically, that's Pages 56 and 57.
A. (Martin) Could you please repeat where we could find that?
Q. Exhibit SM 8, towards the back.
A. (Martin) Those photographs?
Q. There's some photographs --
A. Photographs? Okay.
Q. They're photographs.
A. Okay. Thank you.
Q. And it's the sixth and seventh page. And the captions for all of them are, "Large boulders along proposed road." There are six
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
photographs there.
A. (Butler) Yeah.
A. (Martin) Yes, sir.
Q. I'm just wondering, have you seen this type of house-side boulders or glacial erratics on other projects you've worked on?
A. (Martin) Yes, we have.
Q. And in those instances, what was done? Were they blasted away, or was the road or turbine site moved in response to this kind of terrain?
A. (Martin) Depending on the project, either is possible. Both have happened.
Q. Okay. If you could take a look at the next page after that, there's a -- the top picture says, "Large boulder on summit of Willard Mountain."
A. (Martin) Yes.
Q. Have you been up there and seen this? It's a cabin-side glacial erratic on the summit, right close to the proposed site of Wind Turbine 10.
A. (Martin) Yes, I've seen it.
Q. And that's about 50 yards. Do you know what
the prognosis for that will be?
A. (Martin) I don't know specifically. If I recall correctly, the road has been adjusted to avoid it. But I can't -- I'm not a hundred percent sure on that.
Q. Okay. I'm just wondering if that -- if something like that would be in the way, being only 50 yards from the stake there -if that would be in the way of the turbine or if that could remain.
A. Yeah, I see what you're saying. Yeah, in that case, yeah, it would have to be removed. Probably be reduced to stone and used in the road construction.
Q. Okay. Just one more question, going back to your prefiled testimony, back to Page 10 again. And Line 15 and 16 says, "At the end of construction, all areas that are not developed into the final operational components of the project will be restored to their pre-construction condition." And I guess my question is, how do you plan to restore glacial erratics and boulder fields on Willard Mountain?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. (Martin) Well, using the last one for an example, that one is actually located where the -- pretty close to where the tower was going to be, so it would be removed. That would be part of the final operational component of the project.
Q. Okay. And what about the ones along the way if you have to skirt close to them?
A. (Martin) If there's no way to avoid them with the road, then they would be incorporated into the road, and that would make them part of the operational components of the project.
Q. Do you have a preference for avoidance over disruption of the rocks? Is there any level of priority on that?
A. (Martin) It would depend on the nature of the rock. If it's just an erratic like that, if there's no way to avoid it, then, like I said, it would have to be removed, reduced to stone and incorporated into the road. I can't say if one is preferable to the other.
Q. All right. Thank you. No more questions from me.
A. (Martin) Thank you, sir.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS PANEL: BUTLER|MARTIN]

MS. BAILEY: Thank you.
Ms. Linowes?
MS. LINOWES: I have no questions. Thank you.

MS. BAILEY: Mr. Roth.
CROSS-EXAMINATION
BY MR. ROTH:
Q. Thank you. Only a couple.

You mentioned in your earlier cross-examination an environmental monitor. Can you talk about what an environmental monitor is and whether there's one provided in this project?
A. (Martin) An environmental monitor is a specialist in erosion control. Frequently they are required as part of one of the conditions of the project to just stay on the site while construction is going on and make sure that all the erosion and sediment control methods are being built correctly and are functioning properly.
Q. Okay. Is there anything in the permits that have been taken thus far or the plans as you know them that requires an environmental
monitor for this project?
A. (Martin) I believe there is. I need to check for sure, though.

MR. IACOPINO: That would be Committee Exhibit 12, the DES exhibits.
A. (Martin) Yes. Right here.
(Witness reviews document.)
A. (Martin) Did you get that? It's in Section 12, second page under Project Specific Conditions. Item No. 8 covers that.
"Requires an environmental monitor to be on site."
Q. Okay. And who hires the environmental monitor?
A. (Martin) I believe the client or the developer, yeah.
Q. So is it someone independent from the construction firm?
A. (Martin) Yes.
Q. Okay. And someone independent from the developer?
A. (Martin) If the developer is paying him, I don't think he's very independent. It's not someone who works for the developer, but...
Q. Okay. Thank you.

Now, are you familiar with the Kibbe project?
A. (Martin) Only vaguely.
Q. I'm going -- I'd like you to look at AWE 15. And there are a series of photographs. And the first four photographs are of Kibbe Mountain, so described. Can you look at those briefly? And there's a moose kind of wandering around in a strange state of confusion.
A. (Martin) I don't think I can speak to the state of mind of the moose.
Q. I don't think anybody can, actually.

Can you tell whether he's been disturbed?
A. (Martin) He looks happy to me.
Q. The question $I$ have for you is: Looking at this site, can you tell whether this has been revegetated?
A. (Butler) There is some vegetation.
Q. This first picture, for example, would you expect Antrim Wind at a, quote, restored state, you know, revegetated state, to look
something like this?
A. (Butler) It would look better.
Q. You would hope; right?
A. (Butler) This is at elevation 3,000. And Antrim, I believe -- what are we dealing with in elevations?
A. (Martin) Nothing close to that.
A. (Butler) This is the growing season. A lot shorter and type of vegetation is different.
Q. So is it fair to say that it's sometimes difficult to get vegetation to take when you try to revegetate?
A. (Butler) It's really dependent on where you are. And again, Kibbe is a different -- this is a different location, different --
Q. I understand. But what I'm suggesting -what I'm asking you is it sometimes difficult to get the revegetation to take?
A. (Butler) Yes.
Q. Okay. Some places it's more successful than others; correct?
A. (Butler) Yeah.
A. (Martin) And sometimes you just need to be more persistent.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. Okay. Now, look down further below those first four. You'll come to a picture that says "Stetson," and then you'll see one that's Mars Hill. Are you familiar with either of those sites?
A. (Martin) I wasn't involved in any of those projects.
Q. Okay. Do you see the level of vegetation in those pictures?
A. (Martin) Yes.
Q. Is that kind of an ideal, from your perspective?
A. (Martin) It looks like a good start. I don't think that's been fully vegetated.
Q. Okay. Thank you.

Have you ever heard the expression "best laid plans of mice and men," and so on?
A. (Martin) Yes, I have.
Q. Okay. And in general, what does that expression mean to you?
A. (Martin) If at first you don't succeed, try, try again.
Q. Well, I suppose that's the corollary, isn't it?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS PANEL: BUTLER|MARTIN]
A. (Martin) Can you repeat your question, please?
Q. What do you think the expression, "the best laid plans of mice and men" -- I guess it's something like "often go astray," if I'm getting it right -- what does that mean to you?
A. (Martin) That if your plan doesn't go as expected, then you need to address why.
Q. That's an interesting perspective. I always took it as things don't always turn out as you plan. Does that -- does that sound more like it?
A. I'm a glass half full kind of guy.
[Laughter]
Q. Okay. Is it fair to say -- I'm looking at the your testimony of January 31st, Page 9 through 11. And you talk about the Applicant will retain an experienced general contractor, a qualified logging company, an experienced licensed contractor for blasting, et cetera.

Now, you guys do plans. But somebody else is going to hire and supervise the
contractor; correct?
A. (Martin) Yes, that's correct.
Q. And so your opinions in here are with respect to the plan, but it is premised upon using qualified experienced people; correct?
A. (Martin) It's also a condition of the DES permit.
Q. Okay. And sometimes the contractors that are retained may appear to be qualified and experienced, but it doesn't work out so good; correct?
A. (Martin) I agree that's sometimes the case.
Q. Okay. That's all.

Now, this is kind of a shot in the dark here. Following up on questions by the previous questioner, how many 50-year storms have we had in New Hampshire since 2000?
A. (Martin) I don't know that.
Q. Do you know since 2005?
A. (Martin) I don't know that either.
Q. Or since 2010?
A. (Martin) No, sir.
Q. Okay. Now, there was some testimony earlier about the 16 -foot road and the 34 -foot road.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

Are you familiar with those sections of the road?
A. (Martin) Yes, I am, sir.
Q. Okay. And it was -- there was discussed that in some places there's going to be a 50- to a 100-foot clearing, sort of, I suppose, wide with the road more or less, you know, in the middle. Maybe not always in the middle, but --
A. (Martin) Generally true, yes.
Q. Okay. So do you agree with that statement that there's going to be a 50- to

100-foot-wide clearing?
A. (Martin) Yes.
Q. Okay. And as part -- are part of those clearings going to be cuts and fills?
A. (Martin) Yes, that's how you build the road.
Q. Right. And is this road -- in terms of the technical specifications of it, this isn't an ordinary road for Jeeps or Formula One cars or anything like that, is it?
A. No, they're rarely seen on farm sites.
Q. No, that's true. But what is this road being built for?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. (Martin) Officially for construction of the projects, and beyond that, maintenance.
Q. Okay. And isn't it true that, with respect to a road for this type -- for this type of project, you need to have very particularly gentle grades?
A. (Martin) I believe our grades are appropriate for the site.
Q. Okay. And if you were to have two points on the road, the differential between those two points and -- I'm trying to get you to envision this. Whether there's a little hill or a little dip, that has to be very tightly controlled because of the size of the machinery that's being brought up on this road; isn't that correct?
A. (Martin) Yes, that's correct.
Q. And similarly with the curves, don't the curves on the road need to have particularly wide radii?
A. (Martin) Yes, all of that was taken into account during our design.
Q. Okay. So this isn't just a usual, typical road up a mountainside for automobile traffic
or light truck traffic, is it?
A. (Martin) I don't entirely agree with that, no. The same design requirements are -- I mean, they're the same for any road, no matter its use.
Q. Have you been up the Mount Washington Road?
A. (Martin) I have not.
Q. That's all I have. Thank you.
A. (Martin) Thank you, sir.

MS. BAILEY: Thank you.
Questions from the Committee?
Mr. Simpkins.
DIR. SIMPKINS: Yes, I just have a quick question.

INTERROGATORIES BY DIR. SIMPKINS:
Q. This is for either one of you.

On Page 10 of 11 of your prefiled direct testimony, Line 3, you mentioned a qualified logging company will clear and remove trees where necessary, and $I$ was just curious if you could describe what those qualifications will be.
A. (Martin) I can't say for sure. I would imagine that, if $I$ were hiring a logging
company, I would want to look for years of experience, maybe check in with some previous clients to see if they did a good job, check to see if the State has any complaints against them, that sort of thing.
Q. Okay. And are you aware that in New Hampshire there's no qualifications for loggers, no certification or no licensing other than voluntary?
A. (Martin) No, I was not aware of that. DIR. SIMPKINS: Thank you. No further.

MS. BAILEY: Mr. Stewart.
INTERROGATORIES BY DIR. STEWART:
Q. I'm in Commission 12 , which is the Department of Environmental Services' letter dated August 31st, 2012, from Rene Pelletier.
A. (Martin) Is that the letter of approval?
Q. Yes. And that was my first question. What is this letter?
A. (Martin) Yeah. Okay. I have it here.
Q. Okay. What does this letter recommend?
A. (Martin) "DES recommends approval of the Application with the conditions that are
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
enclosed with this letter. The following is a list of the program permit numbers" -- oh, I guess that's not applicable.
Q. That's fine. Thank you.

There was a question earlier in No. 14 of the alteration of terrain comments -- or conditions, really. It concerns best management practices for blasting.
(Witness reviews document.)
A. (Martin) Yes, sir.
Q. Can you explain what that condition requires and how you would comply with that condition?
A. (Butler) Yeah. We don't think that's our job, basically. I think --
Q. Well, whose job is it?
A. (Butler) Well, $I$ think one of the things that we can do is we can assist the owner. But in terms of selection of the logging firm, is to ensure that they can provide this information, and the fact that they can include this information and do it.
Q. Do you agree that the best management --
A. (Butler) I mean, it should be adhered to.
Q. Would your company be the inspector on the
job of the Applicant, or do you not know that?
A. (Butler) No, don't know that.
Q. Okay. Would the resident engineer on a project oversee compliance with this requirement?
A. (Butler) Well, I would suspect that one of the -- if we were the owner's engineer, which we're not -- we don't know if we are, in fact, going to be the owner's engineer.

But one of the things that we would do is work with the owner to get the logging company to provide this as a submittal. Some of these things -- best management procedures, blasting procedures, I mean, loading practices -- we would ask the blasting company to provide that information and work with the owners to, I guess, really, just making sure that the information is appropriate. I mean, is that what your question is?
Q. Well, pretty much. I mean, I'm trying to understand how the Applicant is going to comply with this blasting condition, and I
just assumed that the resident engineering firm would be responsible for oversight of that.
A. (Martin) This is not something I've been asked to do before. But your assumptions make sense to me. Again, the blasting plan would have to be developed and approved by the State. The resident engineer or the owner's engineer would probably work with the blasting company, as well as the developer, to work out a plan and then make sure that all these steps are followed. And I would assume that the State would have a monitor there as well.
Q. All right. I wouldn't assume that.
A. (Martin) Okay.
Q. It would be on the Applicant, generally.

Similarly, Conditions 16 and 17 --
Condition 16 requires a construction BMP, inspection and maintenance plan, and 17, with regard to turbidity sampling plan to ensure water quality standards... again, I was assuming the resident engineer or the company overseeing the project, construction manager,
would assist with this. Is that accurate?
A. (Butler) And if that's us, yes. I mean, it would be the engineering firm, the owner's engineer. The owner's engineer would assist with this.
Q. Have you done that on other projects, those functions?
A. (Butler) We've had individuals provide this. Me personally, no.
Q. Okay. Thank you. I have no other questions. MS. BAILEY: Mr. Robinson.

MR. ROBINSON: Just one
question.
INTERROGATORIES BY MR. ROBINSON:
Q. Say the project's up and running. Year five, one of the turbines has to be replaced. And say it's the furthest turbine from Route 9. How difficult or how much of the road would have to be reopened up to bring a new turbine in and replace it, and how long would -- how difficult would that be?
A. (Martin) I don't believe the road would have to be reopened at all. Excuse me. The 34-foot width would still be there. It's
just that we'll be vegetating the outer length of that to reduce it to gravel of 16 feet. So the road base is still structurally present, and it would be able to be used for a maintenance type of project like that.
Q. So the end travel way would not have to be widened to bring equipment in to replace a blade or whatnot?
A. (Martin) Can you repeat that, please?
Q. The end travel way of 16 feet, 12 feet -16 feet?
A. (Martin) Yes, 16 feet.
Q. Sixteen feet. That is wide enough to allow the necessary equipment to bring in a new turbine?
A. (Martin) No, sir. What I'm saying is that we're building a 34-foot wide construction road, and at the end of the construction, the outer --
A. (Butler) Nine feet.
Q. -- 9 feet, I think, of that will be revegetated and restored. So the 34 -foot width will still be structurally there. If
it needs to be used temporarily for a maintenance item like that, the trucks could drive on it. They would just be driving on grass or -- or plants instead of gravel. MR. ROBINSON: Okay. Thank you.

MR. MARTIN: Yes, sir. MS. BAILEY: Mr. Green.

MR. GREEN: Thank you.
INTERROGATORIES BY MR. GREEN:
Q. How much of the engineering have you folks done so far on the site?
A. (Martin) I don't think I understand where you're going with that.
Q. Well, what $I$ was looking for is, have you determined, like, some of the grades that the roadway will be at, if you're going to have ditching in there or not?
A. (Butler) That's all in the permit drawings, permit level --
Q. Yeah, could you tell me what the steepest grade is on that access road?
A. (Butler) Thirteen percent.
Q. Thirteen percent? And how about your plan to
have ditches on either side, I assume?
A. (Butler) Yes.
Q. And how steep are those -- or the steepest one I'd say?
A. (Martin) They generally follow the same slope as the road.
Q. Okay. And what $I$ heard here is, it sounded to me like you used the 50-year storm -- is that correct -- or the calculations for the storm runoff?
A. (Martin) Twenty-five or 50.
(Witness reviews document.)
A. (Martin) Are you referring to our culvert sizing?
Q. Yes.
A. (Martin) Here we go. We used the 25-year storm for that, sir.
Q. How about the ditches?
A. (Martin) Those require a 10-year design [sic] storm.
Q. And then the other question $I$ had is: Are you involved -- are you going to be involved in putting up the blasting spec for the contractor, developing the blasting spec?
A. (Martin) We have not been asked to do that. Typically the blasting contractor would do that, and the engineering -- the owner's engineer would review it.
Q. Okay. All right. And then the other question $I$ had here was, have you done any coring of the ledge in the area?
A. (Martin) No, I don't believe any geotechnical work's been done yet.
Q. Okay. And I guess my last question is having to do with the level spreaders that you talked about.
A. (Martin) Yeah.
Q. Are those going to be revegetated afterwards?
A. (Martin) No, that's a permanent stormwater management BMP.
Q. So it's going to be stone?
A. (Martin) Yes.
Q. Okay. Thanks.

MS. BAILEY: Chairman
Ignatius.
CHAIRMAN IGNATIUS: Thank you.
INTERROGATORIES BY CHAIRMAN IGNATIUS:
Q. Initially -- you had just said that the road
[WITNESS PANEL: BUTLER|MARTIN]
specs permit application as shown, the maximum slope was 13 percent. The testimony says it will be a maximum slope of 12 percent. Do you know what the right number is?
A. (Martin) I believe it says a maximum of 12 percent, with two short segments of 13 percent.
Q. You're right. That's where the computer stops at one page and you got to jump to the next to get it. Right, it does say that. Thank you.

I know that you're not doing a blasting plan, but do you know any rough approximation of how much blasting is going to be necessary?
A. (Martin) I don't know that at this point, no.
Q. In order to create the -- is it a 50-foot corridor you need for putting in the crane construction road initially? Does all of that in this kind of terrain have to be blasted?
A. (Martin) No, only -- I don't know how much, but it's not the whole thing. A lot of that
is built and filled. A lot of that is built through cut slopes that are in the soil that need to be excavated. So the blasting would only be required where we hit, you know, bedrock or ledge.
Q. All right. And when would all of those plans be finalized in a project like this?
A. (Butler) Yeah, I would suspect after permitting.
Q. The testimony says that you would require for blasting -- there would be a requirement of a state plan and approval. It says that, typically, advance notice is given for blasting.

Do you know, is it the expectation that it's not going to be required, a notice of blasting, just that it typically is, but not necessarily?
A. (Martin) I think I included "typically" in there because I'm not -- I'm not overly familiar with the requirements of New Hampshire specifically. And the blasting plan was not something that we've been asked to address yet. So $I$ was just speculating to
give you a general idea of how things worked.
Q. So if there were a requirement in a permit that there be a mandate that advance notice of blasting be given, would that be a problem?
A. (Martin) Not at all.
Q. And on the width of the corridors, there's a section of your testimony that, in the space of one paragraph, refers to 30 feet, 40 feet and 50 feet for different purposes. And I'm not sure I followed each one. I think it's on Page 10. If you could just describe -there is a reference to -- between Lines 8 and 10, I think, there's a discussion of clearing typically done to establish an approximately 30-foot corridor; then in some cases with a collection system, you go to a 40-foot corridor, and for the crane roads, 50 feet.

Rather than me pick away at that, can you just describe what's really expected for this project, the width of the corridors to be built?
A. (Martin) Sure. And actually, they address
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS PANEL: BUTLER|MARTIN]
three different roadway configurations or design criteria. Where we're building only the 16 -foot access road, that would typically require about 30 feet to build that road.

In the areas where the collection system is going to be overhead, there's more clearing required so the wires can run from pole to pole. And then finally, where the crane roads are going to be constructed, that's a 34-foot road width. So, typically roughly 50 feet would be required for that.
Q. So if we were to look at the large, long map behind you, perhaps you can just show us what you're referring to. Or maybe there's an easier question first.

During the initial construction phase to build the turbines, would the entire length of the road be the 50-foot corridor?
A. (Martin) No. The initial -- I need to step away from my mic.
Q. Yeah, please.
A. (Martin) The initial stretch of the road up to the first structure pad is going to be the 16-foot width. So that would require roughly

30 feet of clearing.
Beyond that, we'd be constructing the 34-foot crane access road, and that would be the wider clearing.
Q. So how does the crane get up to the first turbine pad without starting from the beginning of the road?
A. (Martin) It's brought up in pieces on a flatbed and assembled on site.
Q. And the access road, Route 9, is where on that? Is it the green road?
A. (Martin) This is Route 9 right here.
Q. Okay. On the far left of your diagram?
A. (Martin) Yes. The green is the existing utility corridor.
Q. Okay. Thank you.

All right. So that you can build from
Route 9 up to the first turbine pad can only -- only needs to be the 16-foot road, and so the 30-foot clearance?
A. (Martin) That's correct. Roughly 30 feet.
Q. Yeah. Then, from the first turbine on out, tell us where the road gets wider or narrower again.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. (Martin) Beyond that, it's all 34 feet for the crane. It will be driven from site to site at that point.
Q. All right. Then what ends up being at locations for the -- what you call the collection system? I assume that's overhead wiring for the electricity?
A. (Martin) Yeah, it's a combination of overhead and underground.
Q. All right. So what area of that road is the 40-foot clearing?
A. (Martin) Well, it goes back and forth from underground to above ground, and I don't have the station locations on that. Might show up better on this one.
(Witness reviews document.)
A. (Martin) Based on just a quick review of the plans, it looks to me like it's going to be underground from Structure 10 to Structure 1. There might be one or two sections that are above ground there. That's not something I'd be able to pinpoint quickly at this point.
Q. Well, I'm not trying to pin you down on a lot of details. I'm just trying to really get a
sense in my own mind of what it's going to end up looking like during the construction phase; how much is going to be -- how wide things are going to be, and then, once the revegetation and putting in gravel phase begins, what things are going to end up looking like.

And so for areas that you have underground, do you not need the wider corridor because there's no overhead collection to be taking up space? So that can be narrow, and then it widens out again in places where you can't underground it?
A. (Martin) No, that's not quite correct. Again, beyond the first turbine location it's going to need to be 34 feet wide for crane access. And that's more than enough to account for any overhead electrical runs.

Beyond that, you know, toward the beginning where it's going to be 16 feet, there are sections -- most of that is going to be overhead, I believe, and that will need to be wider up to the substation to
accommodate the overhead wire.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. Can you ballpark what the width of this room is?
A. (Martin) I'd really rather pace it off. Yeah, I was going to say like 25 or 30 feet maybe .
Q. From side to side, where you are to where Mr. Stewart is, right, that direction?
A. (Martin) Ballpark, yeah.
Q. That helps. I'm not very visual about these things.

So during the construction phase, it would be -- did you say 25 or so you thought this was? So, about double for the construction phase. And then once you're done, this plus maybe a third again as much for the continuation post-construction? No. I'm sorry. That's the clearance, not the road itself. The final road would be considerably less than this, the width of this room?
A. (Martin) Yes, that's correct.
Q. I don't think I made any of that clearer. I apologize.

Okay. You also said in your testimony \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS PANEL: BUTLER|MARTIN]
that the access road has two spur roads. Can you show us on that diagram what you're referring to?
A. (Martin) Yes. I'm -- we're calling this a spur road. This is the main road. The first spur road approaches Structures 2 and 3. The second one comes down here and provides access to Structure 7.
Q. All right. So the little loop that's at 7 --
A. (Martin) Well, it's a -- it's not a loop. It's a dead end. But essentially, yeah.
Q. And the only access to public road is Route 9?
A. (Martin) That's correct.
Q. Thank you. Nothing else.
A. Thank you.

MS. BAILEY: Okay.
Mr. Iacopino.
INTERROGATORIES BY MR. IACOPINO:
Q. How long ago were you employed to work on this project?
A. (Martin) I think the design phase was about a year ago.
Q. And in the process of your design process,
were you asked to consider alternative ways to run this -- to develop the project?
A. (Martin) No. The client did all the background research, as far as I know. We were provided with turbine locations, obviously that's going to drive the efficiency of the project. And we were hired to build the road to provide access.
Q. So the turbine locations were already set when you came onboard.
A. (Martin) Yes.
Q. Okay. The other set of questions I have are as much out of curiosity as anything else.

You were asked a question about if they had to reconstruct the road in order to get up there to remove a turbine. Is this area -- would it be accessible, and could a turbine be removed and replaced by the use of helicopters?
A. (Martin) Yeah, I suppose so.
Q. I mean, I've been up there once. But you guys, I take it, have been up there a lot more. Is it the type of terrain that could accommodate that?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. (Martin) It would have a hard time finding a place to land. But if it was just -- if it was just flying something in -- I mean, I'm not an expert on helicopters or that kind of construction, but $I$ assume it's possible.
Q. Have you ever worked on a site where lift towers or wind turbines were, in fact, installed through the use of helicopters?
A. (Martin) I have not.
A. (Butler) No.
Q. Thank you.

MS. BAILEY: Redirect,
Mr. Patch? Actually, we're about at the right time for a break. Would you rather do that and do the redirect after?

MR. PATCH: That would be good, and we might be able to condense it.

MS. BAILEY: Okay. All right.
We'll take a 10-minute break. And can we get back here at 3:00? Thank you.
(Whereupon a brief recess was taken at 2:53 p.m., and the hearing resumed at 3:06 p.m.)

MS. BAILEY: We're back on the \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS PANEL: BUTLER|MARTIN]
record. But before we proceed with the redirect, Chairman Ignatius has a very important fact.

CHAIRMAN IGNATIUS: We got the definitive measurement.

MS. BAILEY: Of the room.
CHAIRMAN IGNATIUS: It's
beyond me how somebody has one of those huge measurements [sic] in their briefcase, but...

MR. FROHLING: I forgot to put it back where it belongs.

CHAIRMAN IGNATIUS: And so the exact width of this room is 30 feet 10 inches, you think? Is that right? So whoever had that number in the bingo pool is the winner.
[Laughter].
MR. ROTH: So that means the construction road is going to be wider than this room?

MS. BAILEY: Yes.
Okay. Enough merriment.
Mr. Patch.
MR. PATCH: Thank you.

## REDIRECT EXAMINATION

BY MR. PATCH:
Q. This is for either of you who would like to answer the question. But there was a question to you about when you were retained by AWE and basically what you did with regard to the design of the roads. And I wonder if you could just elaborate on what the process was once you were retained and you were given the number of turbines and the turbine locations. Did you just come up with a road, or were there iterations that you went through?
A. (Martin) No, I think I actually oversimplified that one. Thank you for asking that. There was kind of an iterative process. There were several components of the project that needed to be considered, one of which was avoiding the wetlands. You know, once the wetlands were finally delineated, we adjusted the road to make sure we minimized our impacts on those. We adjusted the location and the profile of the road to account for cuts and fills because we
wanted to achieve essentially a balanced site, so you're not bringing material in or out. Everything stays on site, ideally. We also spent a bit of time trying to find the best location for the substation, because there's are lots of wetlands in that area as well. So that was another thing that we had to play around with. So it was definitely an iterative process.
Q. In response to a question, you provided some testimony with regard to the assembling of the crane. Do you have anything you'd like to explain further with regard to that? I mean, the location where you indicated that the crane was going to be assembled, I mean --
A. (Martin) Oh, was that in relation to the possible maintenance of the Structure 10?
Q. Yes.
A. (Martin) Yeah. Just thinking off the top of my head, I assumed that we would drive the crane up from the same place where we would be for the initial construction. And then thinking about it a little bit more, there's
no reason we couldn't keep the crane on the flatbed, use the 16 -foot road all the way to the last structure and then assemble it to do the maintenance. And that would, again, minimize some of the impacts on the vegetation that has been established there or re-established.
Q. You were asked some questions about the portion of your testimony where you sort of delineated transport roadway widths of 30,40 and 50. And I think in response to questions about that, you talked about the location of undergrounding or above-grounding of the lines down from the turbines. And I wonder if you have anything you'd like to add on that particular issue.
A. (Martin) Yeah, $I$ was able to go over the plans during the break, and I think I can clarify that a bit more. Back me up on this one.

But for the -- most of the projects, the conduit will be underground under the road. Actually, it comes above ground at the first spur road where the met tower is. So this
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
would be the slightly wider section. And then it goes underground when we reach the PSNH right-of-way and comes into the substation at that point. So the only area where the road would be 16 feet without above-ground conduit would be from the beginning to the substation. And that would be the narrowest clearing width.
Q. And so the width from the substation up to where the turbines begin, what would the width of the road be?
A. (Martin) The width of the road from the substation to the first turbine, the road width will be 16 feet. The clearing width will be roughly 40 feet to account for the overhead conduit. From the first structure to the first spur road, we're still overhead, but we'd be building a 34 -foot road for crane access. So that would be the wider, 50-foot width. Beyond that is all crane access road, so even though conduit is underground, we'd still have the 50-foot width.
Q. That's all our questions. Thank you.
A. Thank you, sir.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

MS. BAILEY: Okay. Thank you. The panel is dismissed. Thank you for your testimony.

Is the Applicant ready to put on Mr. O'Neal?

MR. PATCH: Yes.
(WHEREUPON, ROBERT D. O'NEAL was duly sworn and cautioned by the Court Reporter.)

ROBERT D. O'NEAL, SWORN
DIRECT EXAMINATION
BY MR. PATCH:
Q. Good afternoon, Mr. O'Neal. Would you please state your name and address.
A. I am Robert O'Neal, and my business address is Three Clock Tower Place, Maynard, Massachusetts.
Q. And by whom are you employed and in what capacity?
A. I'm a principal at Epsilon Associates.
Q. And could you give the Committee a brief summary of your qualifications.
A. Sure. I've been doing community noise work and meteorology work for 26 years now, the
[WITNESS: O'NEAL]
last eight years specifically focusing on wind energy projects.
Q. And what is your role in the Antrim Wind Project?
A. Epsilon Associates was retained to do a sound-level study for the project.

Are you the same Robert D. O'Neal who submitted prefiled testimony in this docket, dated January 31 st of 2012 , which has been marked as Exhibit AWE 1? Excuse me. It's actually Volume 1, Tab 10.

MS. BAILEY: Mr. O'Neal, could you pull the microphone closer to you? THE WITNESS: Sure.

MS. BAILEY: Thank you.
THE WITNESS: I'll try not to
hit it with my --
MS. BAILEY: Maybe it's not on.

THE WITNESS: You're right.
MS. BAILEY: We were having trouble with the sound.

THE WITNESS: Go figure. Is
that better?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

MS . BAILEY: Yes.
A. I'm sorry. What was the question?

BY MR. PATCH:
Q. Are you the same Robert D. O'Neal who submitted prefiled testimony in this docket which has been marked as part of Exhibit AWE 1, Tab 10?
A. Yes, I am.
Q. And did you also submit supplemental prefiled testimony dated October 11th of 2012, which has been marked as Exhibit AWE 9, again, Tab 10?
A. Yes, I did.
Q. And do you have any corrections or updates to either of those two testimonies?
A. I have one very minor update to my supplemental prefiled testimony, the October 11th testimony, on Page 5 of 16.
Q. Okay. If you could go ahead and explain the update.
A. Sure. Towards the bottom of the page, Lines 16 through 22, there's a brief discussion about some of the technical data that the turbine manufacturer, Acciona, supplied with
regard to the sound levels for this machine. And they supplied two rounds of sound data, and we've had some additional discussions with them since I filed this supplemental testimony. And the gist of it is that the uncertainty in their sound levels is still plus or minus two decibels, not the plus or minus one which I incorrectly stated here in the supplemental. The difference, now, however, is that Acciona is guaranteeing those levels. So in other words, their expected level from the turbine sound power level is 107.4 decibels, plus or minus 2 dBA. But that's now guaranteed. So that's the one correction I wanted to make.
Q. And with that correction, if you were asked the same questions contained in both of your prefiled testimonies under oath, would your answers be the same?
A. Yes, they would.
Q. Now, I have a couple of questions to ask you about testimony that was filed after -- or actually at the same time that your October 11th testimony was filed. Beginning
on Page 3 of his supplemental testimony, dated October 11th in this docket, Mr. Tocci provided testimony regarding background sound-level measurements that he or his company had taken from August 22nd through the 29th at Gregg Lake and at Willard Pond, which you have not had the opportunity to address in your prefiled testimony.

Is there anything you would like to say in response to Mr. Tocci's testimony with regard to those background sound-level measurements?
A. Yes. I'll just make a couple of brief remarks.

In that first couple of pages of the background testimony, you can see some of the sound levels that his firm measured at both Gregg Lake and Willard Pond during one week in late August. And in general, the L90 sound levels -- and the L 90 is basically the residual sound level, so the quietest sound level during a 10-minute period -- those 490 sound levels, in general, those two locations as you can see from the graphs on Page 4 and
[WITNESS: O'NEAL]

5 there, range from about 20 decibels to 55 decibels during the course of that week. And certainly there's been some discussion, and there is certainly some insect noise that contributes to some of those levels.

So, with that said, Mr. Tocci recommends a design goal of a baseline of 15 decibels plus some delta, some increment above that baseline. And I guess I do have a little problem with that, in the sense -- for a couple reasons. One, 15 decibels was never measured. You never see that anywhere in these data nor in the data that Epsilon collected in the two and a half weeks we were out there in 2011.

If you look at the high-level met tower wind speeds that were shown by Mr. Tocci in his testimony on Page 9, the wind speeds during that night were very light -- in other words, they were 1 to 4 meters per second up at 57 meters above the ground. These turbines won't run --

MR. BOISVERT: ExCuse me.
Could you translate meters per second and
miles per hour for us, please? I don't think in those terms.

THE WITNESS: Absolutely.
Since the turbines generally started in Europe, they always use meters per second. So, 5 meters per second is roughly 10 miles an hour. It's about a two-to-one conversion, approximately. All set?
A. Okay. So I guess the point is on these sound levels, in particular -- and a lot of times the turbine wouldn't have even been running. And so the suggestion of a background level of 15, which is extremely, extremely quiet, something you might find in a very, very remote wilderness area, plus a background over that $I$ have difficulty with.

In addition, Willard Pond is a recreation area which, as I understand, is certainly primarily for daytime use. And these are nighttime sound levels we're talking about here.

BY MR. PATCH:
Q. In that same testimony, Mr. Tocci's testimony, at Page 18 he had said that the
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]

Epsilon data, the data your company collected in connection with this project, would understate the project sound impact unless it were corrected.

MR. ROTH: I'm going to object to the form of the question. He's leading the witness.

MR. PATCH: I understood, Madam Chair, that I was supposed to specifically direct the witness to portions of the testimony, so that's what I'm trying to do.

MS. BAILEY: I'll allow you to proceed.

BY MR. PATCH:
Q. Is there anything you would like to say in response to that specific testimony that I just cited?
A. Well, I guess, again, the comment is that I think this -- certainly insects did and do typically influence sound levels. That's a fact. No one's going to argue with that.

I think what this does is, it points out one of the difficulties of trying to suggest
a delta over background sound criteria versus an absolute sound criteria. If you look at the worst-case sound levels that were predicted for this project, there were a few of the nearest homes that are perhaps going to be in the 40 to 41 decibel range.

Everybody else is going to be in the 20 and 30 decibels. And so $I$ guess that is another reason that $I$ would suggest that an absolute level is more appropriate for this project, as has been done by the SEC in previous cases before them, such as Lempster and Groton.
Q. And then the final question that $I$ have, on Pages 19 through 21 of his supplemental testimony, Mr. Tocci provided specific criteria that he thought should be established for this project. Is there anything you would like to say in response to that specific testimony?
A. Just a couple of quick comments. No. 1, on Page 19, he talks about applying delta over background criteria to residences that are under 30 decibels. So in other words, where the project impacts are in the 20s -- and
again I -- at those sound levels, the project is going to be so low, that it would not be appropriate.

On Page 20 there's a table with some adjusted baseline sound levels with insect sound removed, which again the comment is similar to before. We have baseline levels suggested of $15,17,19$ decibels, which are extremely, extremely rare, and very low. And so, again, not appropriate.

Finally, on Page 21 there's a remark about some of the New Hampshire Audubon trails where the wind turbine noise may be audible. And I guess the suggestion of audibility as a criteria is not appropriate. It should not be a criteria for sound. Audibility is pretty much everywhere, in anything we do. You know, we could suggest lots of instances where sounds are audible around Willard Pond and Gregg Lake. Standing out there, I heard gunshots from a nearby firing range, for example.

So again, I strongly disagree with the suggestion that audibility is something that
[WITNESS: O'NEAL]
should be taken into consideration for a criteria.
Q. Okay. Thank you.

MR. PATCH: The witness is available for cross.

MS. BAILEY: Thank you.
Mr. Froling.
MR. FROLING: No questions.
MS. BAILEY: Mr. Beblowski
here?
(No verbal response)
MS. BAILEY: Mr. Jones?
(No verbal response)
MS. BAILEY: Ms. Osler?
(No verbal response)
MS. BAILEY: Ms. Sullivan?
(No verbal response) Ms. Longgood?
MS. LONGGOOD: Yes, I have some questions. I would like to, for the Committee's sake, to go up to the map and show where $I$ live and -- as close to the turbines just so that you have a visual.

MS. BAILEY: Okay.
MS. LONGGOOD: I don't know if
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
that's the best map. I've seen some where the sound leveling was done. But thank you.

MR. IACOPINO: Ms. Longgood, when you're up here, just keep your voice up, because you'll be away from the microphone.

MS. LONGGOOD: I'll just show, and then I'll go back and sit down.

This is the Location 3, and my home is down there, 800 feet in. And this was just done above where my driveway begins, and my driveway is an 800-foot driveway in. So I'm in fairly close proximity.

MR. IACOPINO: Could you tell us what the number is on that?

MS. BAILEY: The exhibit number.

MR. IACOPINO: Upper right-hand corner, there's an orange sticker.

MS . LONGGOOD: AWE 41.
MR. IACOPINO: Thank you.
MS. LONGGOOD: You're welcome. CROSS-EXAMINATION

BY MS. LONGGOOD:
Q. Being a layperson, $I$ don't have a tremendous \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
amount of knowledge regarding this. But in reading some of the information, you stated that L3 was located 4,200 feet from Turbine 5; is that correct?
A. That is correct.
Q. Okay. The information that $I$ was given by Mr. Kenworthy, the closest turbine to my home is Turbine 5 , which is 3,843 feet, which is closer than your sound leveling.

And then you did state that there is absolute sound, not over ambient. I don't understand that. Could you explain that so that I get a clearer understanding of what the impact might be on my residence.
A. Sure. All set?
Q. Right. I'd like to know at night, too. It is extremely quiet where $I$ live, just -- I don't even hear traffic down on -- the driveway sits me way down, kind of in a hollow by the beaver pond.
A. Sure. Well, as depicted in the -- you have to help me out in terms of what exhibit this is. But the sound-level study, which was an appendix in part of the Application,
[WITNESS: O'NEAL]
appendix --
MR. PATCH: Just stop for one minute so $I$ can get you that number. I believe that's part of AWE 1, and it would be Appendix 13A. It's the sound-level Assessment Report.

THE WITNESS: Correct. That's what I'm referring to.

MR. PATCH: Okay.
A.

So, in Appendix 13A of the Application --
MR. IACOPINO: Actually, that would be AWE 3.

MR. PATCH: Okay. Sorry.
Yeah, that's actually an appendix that's contained in Volume 3.
A. So I guess one of the ways I can try to help answer that question is, as you pointed out, we collected some actual measurement data at that $L 3$ location, which is fairly close to your house, for two and a half weeks. And if you go to Appendix A in that Application, there's a very detailed graph with a lot of information there that shows how the sound level varied over the course of two and a
[WITNESS: O'NEAL]
half weeks. You can see the sound level varied from -- anywhere from, say, mid-20s, say about 24, 25 decibels, up to, you know, over 65 decibels from different sources of sound. So that's why it's difficult when someone says, you know, "What will the sound be at my house?" The answer is always, "To some degree, it's going to vary," which we all know.

BY MS. LONGGOOD:
Q. It's my understanding, during that period of time you did the sound measurements, that a logging operation was going on at the time during the day. I don't know if that might have impacted part of that, but I did note that during the time that the collections were there.
A. Okay. I don't recall a logging operation anywhere near the meter. There may have been one somewhere off in the distance.

So I guess to then try to answer your question, the predicted sound levels -- if I may get up to the map for one second?
Q. Certainly.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. I know Ms. Longgood knows where she lives. But for the Committee, she pointed out location 43 , which is where the actual sound-level meter was that we collected the data. And all these blue squares that are on the map here, they represent residences that were provided by the Applicant in their GIS data base.

So Ms. Longgood's house is this blue square just a little bit northeast of location L3. So, that location.

So each one of these blue squares we calculated and expected a worst-case sound level from operation of the -- all the turbines. And at that location, the worst-case sound level was 41 decibels. So what that means to you --
Q. What is the increase?
A. What does that mean to you as a layperson? That means, you know, if you look at the data, for example, in the appendix, sometimes it's going to be 10 to 15 decibels above the very quietest, middle-of-the-night sound levels, and other times it's going to be
[WITNESS: O'NEAL]
similar to what you hear today, and sometimes it's going to be a little bit below it.
Q. Is 10 to 15 decibels something that is an acceptable increase? I don't know if there are measurements out there. Again, I'm not very knowledgeable about any of this. But to me, part of the reason $I$ live there is the quietude as well as for the environment. And this to me seems to -- would have a major impact on my experience of being in my home.
A. I guess one way to answer that is, will you hear it at times? Yes, it will be audible at times. Forty-one decibels, I mean, one way to put that into some perspective is, you know, if I stopped talking, we all stopped talking for a second and just listened to the background, the quiet HVAC system going... (pause)... the sound level in this room is on the order of 40 to 42 decibels. Something like that, just for a rough perspective.
Q. I can't hear the highway from my home. I think out on Salmon Brook itself you can. So I think it's certainly -- my experience might vary from others.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

Have you had experience with people living in close proximity, such as $I$, to the turbines? Have you heard any complaints in terms of nuisance noise?
A. You're almost -- you're on the order of 4,000 feet. The closest turbine --
Q. 3,883 as I was quoted by Mr . Kenworthy.
A. Okay. Call it almost 4,000 feet.
Q. Give or take 200.
A. Works for me.

Well, in general at that distance -- I personally have not talked to people. Certainly I've read the literature, and there are people who complain about sound from wind turbines, at closer distances and further away distances.
Q. I have heard and read that at least a mile or a mile and a half, $I$ certainly -- I have four turbines closer than a mile, and I'm wondering if you can give me any indication of the impact of multiple turbines kind of surrounding my property.
A. Well, the number that $I$ just quoted you takes that into account. In other words, when you
look at the layout here on the map, you see the swing of turbines running generally in a northeasterly to southwesterly alignment along the ridgetop. The sound-level calculations that went into the 41 decibels at your house, and everyone else's house, assumed by standard -- because we're required to do the standard -- that the wind is blowing from every turbine to every house at the same time. In other words, you have a southwest wind or a southeast wind, an easterly wind and a northeast wind, which you'd have to have to get the sound from all those turbines at your house at the same time. Now we know that's a physical impossibility. It can't happen simultaneously. The reality is you may have -- you'll have one of those wind directions. You'll be downwind of some of those turbines, but not all of them. But that's some of that conservatism that's built into the analysis methodology. So the impacts or the contribution from all ten turbines are taken into account at your
house.
Q. And if I heard you correctly, you stated -how were you able to measure what the Acciona, if I'm pronouncing it correctly -these turbines who have not -- they have not been up and they have not been proven. How can you measure the sound of those?
A. Well, that's the purpose of the mathematical computer modeling that's done at this stage of the permitting. The vendor, Acciona in this case, has provided guaranteed sound levels for this project. So that was what was used in the calculations here.
Q. How will that guaranty affect me if it's louder than you state? Is it guaranteed to abutters?
A. Well, I mean, I guess the way to think about that is, I would assume that if the Committee approves this project, they're going to put some sound conditions on, and those sound conditions will have to be verified and tested. And if they're not met, then the burden will come back to the operator to fix it.
Q. All right. I have been told that my home is in an area that is sheltered, so there is no wind on the ground, which would validate then Mr. Tocci's 15 decibels. What is your response to that?
A. I guess my response would be, again, I'd look at the data we collected at Location 3, which is not that far from your house -- it's also in a sheltered location down in the valley -over the course of two and a half weeks, and we never measured a 15-decibel level.
Q. It's uphill from me. It's in a very different location. The topography is very different in different locations on the road, so... thank you very much.
A. You're welcome.

> MS. BAILEY: Mr. Stearns?
> MR. STEARNS: No questions.
> MS. BAILEY: Antrim Planning

Board? Oh, Ms. Pinello.
CROSS-EXAMINATION
BY MS. PINELLO:
Q. I have one question to ask you. And I've looked at the map. I don't have it in front
of me.
Could you tell me why you chose not to measure at individual residences within -say you got -- you're saying, oh, give or take --
(Court reporter interjects.)
Q. Excuse me. I'm sorry.

You said give or take, 4,000 feet, give or take 200 feet. Given that range, can you explain your testing model in such a way that you did not -- you chose not to test at residences within that range?
A. I'm not sure $I$ understand what you mean by "in that range."
Q. If it's within a 400-foot range and you made your choices as to where to select, why didn't you choose to put a monitor at someone's home?
A. I guess there's two answers to that: One is we didn't have permission to be there, for starters. But that's not really that important. What's more important is that, for purposes of collecting pre-construction data where the turbines aren't there yet, in
general, unless you're near some very specific sound source, the offset of a few hundred feet in the woods is not going to make a difference over long-term data collection, you know, over the period of several weeks.
Q. I understand that. I guess my question is: If you have a known, why didn't you collect data at the known when you have the turbines being the unknown?
A. I guess -- I'm sorry. I'm not following you mean by the "known."
Q. The "known" is the residence. The "unknown" is where you're going to have your turbine and the effects of the turbine. So you're saying you're going to test in the area.

I still am not clear, when you and
Antrim Wind have heard concerns from residents, why you chose not to test at those residences as part of your testing strategy?
A. Well, I guess, certainly post-construction, that if permission is granted by residents, the owner and operator would typically test at those locations.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. That's understood. But my question is pre-construction.
A. Well, the testing locations really represent different directions, north, south, east, west of the site, different land uses, and represent the general community sound levels in the areas around those residences. You don't have to be actually in someone's backyard necessarily to understand what the typical sound level is in the area.
Q. Yeah. So am I understanding you correctly, that you understood there were concerns from residents about the sound measurements at their -- what it would be at their homes, and you chose in your pre-construction testing strategy not to test at any residence, but rather to test for other criteria than for citizens who had expressed concerns about sound within a certain distance, who live within certain distance from turbines?
A. Actually, a lot of that testing did occur at residents' houses who were relatively close to other residents.
Q. I understand that. But I also understand you
had been asked about Ms. Longgood's concerns many -- the company had been, as well as you. I'm just curious as to why her home was not tested when it is that close, when you only have 200 feet.
A. And I guess I'll answer it again the same way. For pre-construction, it doesn't matter. The answer --
Q. Thank you. You made that clear.
A. The answer would be the same.
Q. Okay. Thank you. You've made that clear. Thank you.

MS. BAILEY: Ms. Manzelli.
MS. MANZELLI: Yes. Thank you.

CROSS-EXAMINATION
BY MS. MANZELLI:
Q. For the record, my name is Amy Manzelli. I'm here representing New Hampshire Audubon, an intervenor in this matter.

Mr. O'Neal, what is the standard regarding sound that this Committee is asked to rule on in the certification of this project?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
A. There's precedent that the Committee has approved previous projects similar to this one, and the standard of that has been 55 decibels during the day, 45 decibels at night.
Q. What's the legal requirement that needs to be satisfied regarding sound?

MR. PATCH: I'm going to object to that question. I think he's asking -- she's asking for a legal conclusion of the witness, and the witness isn't a lawyer. So I'm not sure I even understand the question.

MS. BAILEY: Ms. Manzelli?
MS. MANZELLI: Thank you. Just give me a moment.

MS. BAILEY: Okay.
BY MS. MANZELLI:
Q. What was the purpose of your direct testimony, your original direct testimony?
A. Give me a minute to go back and --
Q. Sure. I'm struggling to put my fingers on the document also.
A. -- see what I said.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
(Witness reviews document.)
A. So the purpose of the testimony was to lay out in very brief summary form the results of the sound-level assessment that was done that we just referred to as Appendix 13A, which is the detailed Sound-Level Assessment Report. But the prefiled testimony contains that in summary fashion, where we tested what the results were, what some standards could be used to evaluate sound impacts.
Q. Let me ask you directly. Do you understand that this Committee will be evaluating whether this project will have an unreasonable adverse effect on aesthetics?
A. Yes.
Q. And you agree that's the measure that this Committee will be evaluating to decide whether this project is a go or no-go, among other measures?
A. I'm going to leave that to the Committee. That's not my call.
Q. Is it possible that the areas that were tested for sound are quieter at other times of the year than what was measured?
A. Is it possible?
Q. Yeah.
A. Yes, it's possible.
Q. Do you think it's likely?
A. Well, I think one of the things you may take away from looking at the graphs in the back of the study is how much sound levels can vary at any one location at any time. I mean, they vary by 20 to 30 to 40 decibels over the course of two and a half weeks. So I would expect that same to hold true other times of the year as well.
Q. So doesn't that mean if you measured 30 decibels, then it would naturally go as low as 15 decibels?
A. I don't necessarily believe it will go to 15. But it could go lower, sure. And it could go higher.
Q. Well, didn't you just say that the measurements that you have could vary by as much as 20 to 30 , or did you even say 40 decibels?
A. I did say that. And that's -- that was the variation from the low to the high in the
data that's presented.
Q. So how low could it go if what you measured was 30?
A. Well, the limits of instrumentation are generally around 15 to 16 decibels. And, you know, I can't say I personally observed 15 decibels anywhere.
Q. Okay. But given the limits on your instrumentation, if you were measuring 30 , it's possible that what actually existed was 15.
A. No, if we measured 30 , then 30 is what existed at that time.
Q. Explain to me, then, what you mean by the "limits" on your instrumentation?
A. What $I$ mean is that the hardware in any sound-level meter has a physical limitation. It can only measure -- there's a floor, they call it. It can only measure so low. Frankly, it's typically not an issue because there are -- you just don't see locations getting down to much below 20 decibels. Twenty decibels is very quiet.
Q. What's the floor of your instrumentation?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. It's around 15, 16 decibels.
Q. And so how -- strike that.

Do you agree that -- is it your position that you picked the quietest two and a half weeks of the year to measure sound?
A. I don't know the answer to that. You'd have to measure for a lot longer to know if that was the quietest two and a half weeks.
Q. Have you ever measured sound in any site in the northeast over a period of time that expands the entire year, or close to an entire year?
A. No.
Q. So you can't state an opinion as to whether the summer or the first month of the year or the September/October period is quieter or louder?
A. To some degree, it's going to depend on location-specific. Certainly, certain times of the year have insect activity which contributes to higher sound levels.
Q. And the corollary there being certain times of the year don't have insect sounds, and those would be quieter.
[WITNESS: O'NEAL]
A. The off -- to some degree, the offsetting principle that other times of the year it's also windier; there's other events perhaps going on. But everything else being equal, take away the insects, sure, it could be a little quieter.
Q. And do you agree that there are some periods of the year where there are neither insects nor wind?
A. I'm sure you could find them. Sure.
Q. Would they be hard to find, or does that happen pretty much every year?
A. I'm sure you'd find that every year.
Q. Okay. So do you agree that at times Willard Pond could be 15 decibels?
A. If I -- if we put a meter out there for an entire year, $I$ suspect we could find a time where it was 15 decibels, sure.
Q. Can you --
A. I'll agree with that.
Q. I'm sorry. I didn't mean to interrupt you.
A. I'm done.
Q. Can you quantify how much of the year it might be 15 decibels?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. I have no way of quantifying that.
Q. Because you didn't measure sound at Willard Pond; right?
A. We did not, no.
Q. Why not?
A. Well, there's obviously a physical limitation to how many locations you can measure around the site. And that site is further away than a lot of other ones that we measured. And we felt it was more appropriate to include some of the -- the residences that were nearer to the proposed wind turbines.
Q. Why are there physical limitations to how many sites you can measure?
A. There are equipment and logistical
limitations to how much you can be running at a time.
Q. So does that mean your company isn't capable of sampling six sites at once as opposed to five?
A. No, we could certainly do six.
Q. And how far is the -- was there a sampling site on Gregg Lake?
A. Yes, there was.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. And how from the site is that?
A. Just give me a minute. I'll tell you exactly how far it is.
(Witness reviews document.)
A. That information is in the Appendix 13A of the report. I'm looking at Page 5-2. So the Gregg Lake sound-level meter was 8,700 feet from the closest proposed wind turbine.
Q. And could you point out Gregg Lake on the map behind you, and could you also identify the exhibit number of the map behind you?
A. Sure. It's Exhibit AWE 41.

Here's Gregg Lake down here in the southeast corner, and $L 5$ is the measured location that we had at Gregg Lake.
Q. And could you point out Willard Pond on that map also?
A. Willard Pond is over here, the southern edge.
Q. And do you know how far Willard Pond is from the site?
A. I don't know exactly.
Q. Can you guess from looking at that map whether it's closer to the site than Gregg Lake, the same distance to the site as Gregg

Lake, or farther from the site as Gregg Lake?
A. It looks like it might be a little closer to Turbine 10 than the Gregg Lake site is.
Q. And is it an assumption in your analysis that the sound data collected for the five sites applied to Willard Pond?
A. I guess what $I$ would say to that is, Site L3, which was very, very far removed from Route 9, not near any other real man-made sources of sound, would be a reasonable surrogate for other sort of off-the-beaten-path type locations such as Willard Pond.
Q. And could you answer the question. Did you have to make an assumption in your analysis to apply sound data from the other sites to Willard Pond?
A. No, we didn't.
Q. Then how would you characterize the Application of sound data from the other sites to Willard Pond?
A. Well, what we did was use the predicted sound levels from the project, which is what you see here in AWE 41. Those are the sound levels from the turbines, the proposed wind
[WITNESS: O'NEAL]
turbines at every site, including willard Pond. That's what we used to estimate the impacts.
Q. So you -- no data characterizing the sound at Willard Pond, without the turbine impact.
A. In other words, existing background or ambient?
Q. Right.
A. That's correct.
Q. And are you aware that Gregg -- Gregg Lake or Gregg Pond?

MS. BLOCK: Gregg Lake.
MS. MANZELLI: Thank you.
BY MS. MANZELLI:
Q. You're aware that Gregg Lake allows
vehicles -- boats on the lake that are powered by motorized engines?
A. Yes.
Q. And you're aware that Willard Pond does not?
A. I thought -- my understanding was that Willard Pond also allowed motorized.

MR. PATCH: No.
A. My mistake.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

BY MS. MANZELLI:
Q. And that's a pretty big difference; right?
A. I guess for the boaters it is. I'm not sure what you mean by "big difference."
Q. Well, would the sound on and around a lake that allows motorized vehicles -- or let me ask you this: How would the sound around a lake that allows motorized vehicles be different or the same as the sound around a lake that does not?
A. Well, certainly the sound from the motorized vehicles or boats is going to be louder from those sources at a place that allows them than one that doesn't. There could be other things. For example: At Willard Pond, there are certainly planes flying overhead, which $I$ witnessed firsthand when $I$ visited the site during Mr. Tocci's testing.
Q. And did you make any analysis of the topography surrounding willard Pond and how that might affect the sounds that are there, ambient sounds, without turbine sound?
A. Well, once again, the ambient at Willard Pond was -- we did not measure it there. In terms
[WITNESS: O'NEAL]
of predicting the future sound levels for the project, yes, we did. The topography is taken into account and used in the mathematical modeling.
Q. Meaning the shape of the underlying ground, or does that include the type of vegetative cover?
A. The terrain contours, the topography, is taken into account. We don't assume any trees. We don't take any credit for trees.
Q. Now, with respect to the HVAC system running in this room that you mentioned earlier, you characterized it as -- how did you characterize that sound?
A. I said it was 40 to 42 decibels, approximately.
Q. Did you say it was not very loud?
A. I said if we were all very quiet, that's -the point of that was to give the Committee and other folks in the room that maybe don't have an acoustics appreciation or an understanding that we look at sound-level meters all the time, as a point of reference, really.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. Well, have you ever had the experience of being in an office and having an HVAC system going and then it shuts off and you realize, in retrospect really how loud it was compared to now how quiet it is?
A. I have been in the office when the HVAC shut off. And you can tell the difference, certainly.
Q. And you may not realize how loud the HVAC system was, but did you realize in retrospect it was louder than you expected or louder than you thought, something like that?
A. Well, I guess we're getting into saying what's loud and what's not. I'm not necessarily going to agree with that. What I will agree to is that there's a difference in the sound levels, and you notice the difference, yes.
Q. Is the difference that when the HVAC turns off, it's quieter?
A. Absolutely.
Q. Do you know what the Willard Pond Sanctuary is?
A. It's a property maintained by the New

Hampshire Audubon, I believe.
Q. What else do you know about it?
A. People go swimming there.
Q. Would you be surprised to learn that people go there to get away from industrial and heavily developed uses of the land?
A. Okay.
Q. Do you think that part of that is quiet?
A. I would expect so.
Q. And you testified earlier that the wind turbines will be heard at the Willard Pond Sanctuary; right?
A. I did not say that. I said Mr. Tocci said that.
Q. Well, looking at the map behind you, what's your opinion on whether the turbines will be audible at the Willard Pond Sanctuary?
A. So if we look at the predicted sound levels here on Exhibit AWE 41, the sound-level contours -- this is Willard Pond again. This contour right here is the 30-decibel contour that goes towards the southern edge of Willard Pond. The one up here to the north of Willard Pond is a 35-decibel contour.

So I guess I would characterize sound levels around Willard Pond from the project were going to be anywhere from the high 20 s to the 32,33 level.

So if you look at the sound levels that Mr. Tocci's company measured there today --
Q. What I'm asking is your opinion of whether the turbines will be audible.
A. And I'm going to give you that.

If you look at the data that was collected out at Willard Pond to date, you can see the sound levels range anywhere from low 20s, again, up to 50 decibels. So the point of that is that, at times, yes, I would suspect that the sound from the turbines will be audible, that you will hear something from them, yes.
Q. And would that interfere with the purpose that people go to that place?
A. I can't answer that question. I don't know the answer to that question.
Q. Well, didn't you agree earlier that one of the reasons people go to that sanctuary is to enjoy quiet?
[WITNESS: O'NEAL]
A. I'm assuming that is a reason. I don't know. I don't go there.
Q. So let's make it an assumption that people go there to enjoy quiet. Would hearing the turbines interfere with that?
A. That's probably a personal observation question. Some people may not even notice it. For example: I saw plenty of families swimming, splashing, yelling and screaming in the water at Willard Pond. They're not going to hear the turbines over that sound.

Somebody else who's up there taking a nap on the far side, away from everybody else, with no planes flying over at that time, they will probably hear them. Are they bothered by it? I can't say. I don't know.
Q. And why do you think audibility shouldn't be a consideration? Shouldn't the quiet be preserved?
A. I think audibility is a very slippery slope. If we use audibility as a criteria for this project or any project, how do you measure it? How do you quantify that? How do you tell if something is complying with that
criteria? Frankly, there's not going to be much of anything that will comply with the audibility criteria. You're going to hear something sometimes anywhere.
Q. Is 41 -- is the sound of 41 decibels coming from a wind farm, the sound the same as the 41 decibels coming from the HVAC system? Are all 41 decibels the same?
A. No.
Q. How are they different?
A. You could have different frequency content, different octave bands that constitute that 41. That's an A-weighted number.
Q. It's an average number; right?
A. It's not really an average number, per se. What it is, it's a compendium, if you will, of all the different octave bands at different frequencies.
Q. Just trying to sugar that down to something simpler. Does that mean that sometimes -- if you're talking about a 41-decibel level, that sometimes it's louder than 41 and sometimes it's quieter than 41?
A. Not under the explanation $I$ was just giving
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
you, no. No. I guess maybe I misunderstood your question. I'm sorry.

You said what goes into it and that -an A-weighted number is a one-number compendium, if you will, from the different frequencies.
Q. Let me ask you with respect to the map there. So pick a line and tell me what the value is for that line, and then answer me: Does that mean that that will always be the sound level there? Or does that -- could it mean that the sound level will be higher than that sometimes or lower than that sometimes?
A. Okay. So, for example: Pick any of them. This blue one here is the 40-decibel line. Now, in general, the sound level is going to be lower than that. And the reason $I$ say that is, what goes into these lines is the assumption that all 10 turbines are running; all 10 turbines are operating at their maximum sound power. In other words, the wind is blowing up at the hub; the cell is at the maximum speed to generate the most sound. So that's the assumption that we make when we
do this model and we put this map together. All 10 are operating. They're all the maximum sound, and they're all -- as I said before, every one of these points is downwind of every turbine. So there's some conservatism, a little over-estimation in that assumption.

You know, is that condition going to be true all the time, every day of the year? No, certainly not. I'd say a lot of times it's going to be somewhat lower than that.
Q. Would it be higher sometimes?
A. The manufacturer in this case, Acciona, guarantees a sound level. Now, I have to digress just for one second. There's sort of two guaranties. There's what they call the manufacturer's guaranty, which is a sound power level. Excuse me if you've heard this all before. But sound power is like the rating of a lightbulb. So a lightbulb might be rated a hundred watts.

So they do the same thing with wind turbines. This one is rated at 107.4 decibels. It's a sound power level, plus or
minus two. So you could be as high as 109.4 or as low as 105.4. That is the range that they are guaranteeing as a manufacturer.

So we used the higher end of that, the 109.4. We took the plus-two margin that they're guaranteeing. And these calculations assume that every turbine is emitting that 109.4 decibel sound power. That then is brought out to the community to generate these sound pressure-level lines here, which are the ones you see in the community. So that 109.4 is guaranteed by the manufacturer, and that's what went into generating these lines.
Q. So there's no guaranty, then, for anybody that Willard Pond will never go above -- what is it -- at the 30-decibel line?
A. Yeah, Willard Pond has got the 30-decibel line here to the south. The manufacturer does not guarantee -- that's the difference -- does not guarantee the sound pressure levels in the community. That's the purpose of the exercise of taking a conservative assumption and making
[WITNESS: O'NEAL]
calculations out in the community. Because we expect and understand that any approval is going to come with conditions to limit them.
Q. Have you seen a copy of the written guaranty?
A. I have seen a copy of the noise specs which guaranteed the sound level. I haven't seen a copy of any contract or anything.
Q. Well, what do you mean, then, when you say there's a guaranty?
A. Just that. It's pretty standard in the wind turbine business for -- as a developer who's developing a project, when they're talking to different manufacturers to say, you know, what will you guarantee for me from a sound perspective? And they have lots of other criteria, but sound's just one of many.

And as I understand it from Acciona, that's what they're guaranteeing to Antrim Wind in this case.
Q. Is that guaranty somewhere in the Application package for Antrim Wind?
A. It would be contained in one of those two sound-level sheets, which were provided. If you give me a minute, $I$ could find it.
[WITNESS: O'NEAL]
Q. Sure. I would appreciate that.
(Witness reviews document.)
MR. IACOPINO: I believe
you're speaking about a tech session request and so the Committee would not have this in their documents at this point.

THE WITNESS: Okay if I try to go back on the record?

MS. BAILEY: Yes, go ahead.
A. Okay. If you turn -- I don't know if you have the tech session information.

BY MS. MANZELLI:
Q. I do not, so $I$ would appreciate it if you would summarize it for me.
A. Tech session Response 1-42 has a discussion in there about the Acciona sound-level data. And there is some verbiage in there that talks about the 109.4. However, the technical support documents were filed under a protective, confidential order, I guess. So they're not in the record.
Q. Okay. When you say there's verbiage -- let me just ask a clarifying question.

When you said 109.4, you're quoting the
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
level -- the high end of the guaranty level; right?
A. Right. In other words --
Q. Yeah. Okay.
A. Right. Yes.
Q. And when you say there's verbiage, could you just quantify for me, in terms of a half a page, a quarter of a page, five pages, how much verbiage is there?
A. It's very short.
Q. Could you just read it, please?
A. Sure. The wind turbine data they used in the sound modeling is contained in confidential attachment TS1-42A. That's a document number. This had the highest sound power-level data, 107.4 dBA, plus or minus 2 dBA uncertainty. Therefore, the wind turbines were modeled as emitting 109.4 dBA.
Q. So did I miss the description of the guaranty in there?
A. It doesn't -- I didn't use the word "guaranty" in my response. But that's what Acciona has stated.
Q. Okay. And is the -- and before you answer
[WITNESS: O'NEAL]
the question, would you please consult with the attorneys for Antrim Wind. Can you disclose the name of the confidential document?

MR. PATCH: Can you just read what's on the data request?
A. It's in the reply in here. The name of the document is in here.

BY MS. MANZELLI:
Q. Could you read the name of the document?
A. Acciona Document D, as in David, G200266, Revision A, dated 20/05/11.

And then there's a second Acciona document which is also confidential, which is in there, and I can read you that number if you'd like as well.
Q. Yes, please.
A. Acciona Document DG200266, Revision B, dated 28/05/12.
Q. And again, please consult with counsel for Antrim Wind before you answer. Can you identify the parties to both of these documents?

MR. PATCH: The witness
doesn't really have an answer to that. I think in the -- you know, in the interest of trying to advance the proceeding, there aren't any parties to that particular document. It's just a standard document advanced by the manufacturer.

BY MS. MANZELLI:
Q. So I don't understand then. A guaranty is typically an agreement between two parties. I'm trying to get at the basis, Mr. O'Neal, of your knowledge that there's a guaranty. Have you read an agreement or a document that told you there was a guaranty?
A. Without those documents in front of me, I can't remember if they used the word "guaranty" in there or not. But I know from clarification discussions with Acciona, that is what I was told.
Q. So your basis for saying that there's a guaranty on the sound of the turbines is because someone from Acciona told you there was?
A. That is correct.
Q. And do you know how you would go about
cashing in the guaranty and what would happen if you did?
A. That's probably more a question for Antrim Wind.
Q. So you don't know?
A. I don't know.
Q. Have you ever been involved in a project where -- let me step back.

You've testified that it's standard that a turbine manufacturer would guarantee its product?
A. Correct.
Q. Including the sound?
A. Yes.
Q. Have you ever been involved in a project where that guaranty wasn't met -- excuse me. Let me phrase -- where the sound was louder than what was guaranteed?
A. I guess the answer is, I don't know. And the reason $I$ say that, it's not an evasive answer. It's just that, if there's a guaranty, sometimes -- or oftentimes the owner/developer will have another party come in and do some testing to confirm that the
[WITNESS: O'NEAL]

\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]

\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
case?
A. Under some of the older designs of downwind turbines, there was some low-frequency issue with the sound passing over. Under the modern wind design, that level of low-frequency sound has been significantly reduced.

It's important to understand, there's still infrasound and low-frequency sound generated by the wind turbines, just as there is from everything, the HVAC system in this room, et cetera. The point is, they're not at levels that are sufficiently high to be a problem.
Q. It's our understanding that differences in wind speed within the rotator-swept area can substantially increase the modulation of turbine noise and that the frequency of occurrence for this phenomenon increases with the hub height and blade length. Did your modeling scenarios take this phenomenon into account; and if they did, how?
A. There are -- there is no way to model modulation -- amplitude modulation at this
point.
Q. No one in the world for any wind project has been able to model this?
A. Well, you can go out to a wind turbine that's existing and you can measure the modulation. You can't model it, though. There's no -there are no acoustical models that are accepted for regulatory use that handle amplitude modulation that have a standard.
Q. And because this wind turbine is so new and not in use in the industry, nobody's been able to do that; right?
A. Well, nobody's been able to do what? To go measure it?
Q. Yes, make actual measurements related to this particular model that's proposed here.
A. That's correct. It's going to be up and running fairly soon.
Q. How soon?
A. There's two units being built in Iowa right now that are under construction. They're trying to have them up and running by the end of the year.
Q. And how long would it take to do this type of
measurement?
A. I can't say. I don't know.
Q. Have you ever done this type of measurement?
A. What type of measurement are you talking about?
Q. The -- measuring the increase in the modulation of turbine noise and the frequency of occurrence, increasing with the hub height and blade length -- basically the modulation.
A. We have measured amplitude modulation. The answer to that is, yes, from other turbines.
Q. For the model of turbine that's going to be used at Antrim Wind?
A. Well, as I said, it doesn't exist in this country. So, no.
Q. Right. And so then, I thought you said two would be installed in the Midwest and operational by the end of next year.
A. They're under construction right now. They should be up and running by the end of this year.
Q. Excuse me. By the end of this year. So my question was, then -- then let me start with the basic question.

Is it possible to measure this type of modulation on those two turbines?
A. Is it possible? Sure.
Q. Okay. How long would that take?
A. I don't know.
Q. Why don't you know?
A. Well --
Q. I don't know what's involved in making these sort of measurements.
A. The actual process of measuring them wouldn't take that long.
Q. Then what would the process be to convert that, those measurements into meaningful information?
A. Obviously, you'd have to wait until the turbines were fully commissioned, they're up and running and so forth, and they're running in the mode that they were designed to be in, which is a normal shakedown.

I guess the answer is, I don't know when they're ready to do that. They said they'd be up and running by the end of the year. That's the best information $I$ have right now.
Q. In complex topography, such as exists in the
[WITNESS: O'NEAL]
vicinity of the Antrim Wind Energy Project, it's not uncommon for a valley to experience calm conditions, while at the same time strong winds occur on ridge tops and above ridgetop level.

Did your sound-level scenarios take atmospheric stability into account; and if they did, how did they do so?
A. Let me start with the first part of that, in that strong winds up at ridgetop are going to be what produces the largest sound from the wind turbines. In other words, that's going to be what gets them up to that 109.4 sound power level, the maximum sound power level.

So, yes, that was what was assumed in doing the calculations that you see here on Exhibit AWE 41.

The standard of downwind propagation that is used in this country and the industry is this ISO 9613-2 standard propagation, which assumes a moderate ground-based temperature inversion for propagation purposes.

Now, to do the calculations down --
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
going away from the project, it doesn't matter what the actual wind speed is, per se. It's did we use the worst-case sound levels emanating from a source of sound -- the turbine in this case -- and the answer is yes.
Q. In your prefiled direct testimony dated January 31st, you referenced a guidance document from 1974, right -- the U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C., identified with a series of numbers? If you'd like me to read them, I can.
A. You're talking about the levels document, $I$ assume?
Q. Yes. Information on levels of environmental noise requisite to protect public health and welfare, with an adequate margin of safety.
A. Yes.
Q. Now, do you agree that, in 1974, the modern industrial wind energy sector did not exist in the way that it exists today?
A. It has certainly changed a lot since 1974. I'd agree with that.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
Q. Did it even exist in 1974?
A. Nothing like it is today, no.
Q. Meaning that it's substantially a bigger business than today -- than it was then. Excuse me.
A. Right. Sure.
Q. And you agree that government standards and guidance documents, such as this EPA document, don't always keep up with scientific knowledge?
A. Well, I mean, that's a blanket statement. I guess in terms of impacts of interference with activities, that would -- I don't see why that would be any different today versus 1974. The sources of sound are different in 2012 than they were back in 1974, yes.
Q. Well, how can you prepare guidance based on sources of sound that didn't exist at that time?
A. Well, the levels document was looking at things like activity interference, you know, communication between individuals, things like that. That was irregardless of the source of the sound.
Q. And with respect to wildlife, do you agree that just because there aren't any -- in your testimony, anyway -- let me back up.

You testified that there are no applicable regulations or guidelines regarding noise and wildlife; right?
A. There are none that I'm aware of. Correct.
Q. So, do you agree that, if there are no guidelines and there are no legal requirements, that that doesn't necessarily mean that a wind farm shouldn't consider impacts to wildlife from sound?
A. Well, I guess I'd answer that by saying, based on personal observation from what I've seen around a lot of active wind turbines, there's a lot of wildlife that exists around them. It's anecdotal. It's personal firsthand knowledge. I'm not a biologist.

So until animal folks who are smarter than I am about animals come out with some criteria guidelines, I think we're left with, you know, what would we compare it to.
Q. So are you saying that there's not enough data to know how to manage the impacts from
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
the sounds of a wind farm upon wildlife?
A. I'm saying there's nothing out there today in the scientific literature that says you must do that because of these impacts. If you're at this level, there will be impacts.
Q. But my question isn't what the legal requirements are. My question is: Is it possible that there are impacts to wildlife from the sound of wind farms, even though, according to your testimony, there are no legal requirements about that topic?
A. I guess the preface to the question, isn't it possible, the obvious answer is, yes, anything is possible. I don't necessarily agree with that premise. But the way you phrase the question, I have to say anything is possible. But again, absent some -- any kind of peer-reviewed studies documenting that, I guess I wouldn't necessarily go along with that.
Q. And are you aware that the U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines address impact to wildlife related to sound?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. No.
Q. Thanks very much for your time this afternoon. I have no further questions for you.
A. Thank you.

MS. BAILEY: Mr. Edwards or
Ms. Allen.
(No verbal response)
MS. BAILEY: Not here.
Okay. The next up is
Mr. Block. About how long do you think you'll be, because we're in the area of a break --

MR. BLOCK: Probably a break would make sense first.

MS. BAILEY: All right. Let's take a 10-minute break and be back at 25 of.
(Whereupon a brief recess was taken at
4:27 p.m., and the hearing resumed at
4:40 p.m.)
MS. BAILEY: Okay. Mr. Block, you may proceed with your cross-examination.

MR. BLOCK: Thank you very
much.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

CROSS-EXAMINATION
BY MR. BLOCK:
Q. Good afternoon, Mr. O'Neal.
A. Good afternoon.
Q. Can I prevail upon you to help educate me a little here, because there's a bunch of stuff here that I'm really just learning about here.

So, early on, a little while ago, you talked about levels of 55 decibels in day and 45 at night. Could you explain where that comes from, what that's in reference to or what the context is of that?
A. Sure. Those were some of the sound-level
limits that the New Hampshire Site Evaluation Committee ascribed to some of the earlier wind farm projects, the Lempster project and the Groton project. Sound-level limits that they placed upon those projects.
Q. That's the limits. In other words, that's the -- what they're expecting them to be better than or something --
(Court Reporter interjects.)
Q. To be better or to be less than that; is that \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
correct?
A. They shall be equal to or less than those numbers, yes.
Q. Okay. I understand.

Are you aware of the EPA levels document from 1974, which is actually illustrated in Rick James' report to us, which is, I believe, NB 1, and that's on Page 2. NB 1 in the electronic version, and it's on Page 2 of that. And it's a 1974 document that explains that in -- that those -- I guess the 55 and 45 that you're referring to, if I understand this correctly, are actually urban measurements. And in an area which they -which the EPA classifies as "no prior experience with intruding noise," the ambient level would need to be -- have about 15 decibels subtracted, which would end up to be about $40 /$ day and $30 /$ night in an area like Antrim. Does that sound correct?
A. I'm not sure. I'm confused by your question. It sounded like you were bringing in the levels that were imposed as limits for Lempster and Groton and somehow comparing
[WITNESS: O'NEAL]
them to the EPA levels document.
Q. No. I'm asking about these 55, 45 I was led to believe are urban -- are based on EPA's urban measurements.
A. Well, the -- excuse me.
(Witness reviews document.)
MR. PATCH: I'm just showing the witness the document you were referring to, Mr. Block.

MR. BLOCK: Thank you.
A. Are you on Page 2 of Mr. James' report? BY MR. BLOCK:
Q. I am now, yes.
A. Okay.
Q. The chart that shows corrections.
A. Yeah. I mean, this chart from the EPA levels document is a discussion about the day/night sound level, which is something called the LDN, another type of sound-level statistic that's in the industry, and a technique that they -- the EPA put out to estimate what people's reactions to be -- would be to sound levels.

So it has nothing to do with the sound \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
levels -- you mentioned 45 and 55 before. But that was -- those numbers that I gave were in relation to the permit limits that were imposed on other wind projects. But that's not what you're talking about. Am I right?
Q. I understand that. That's what you were talking about with Ms. Manzelli; correct?
A. That's correct.
Q. Now, I just want to know, did those numbers relate to or come from any of the EPA -excuse me -- the EPA levels that are referred to here?
A. I don't believe so, for two reasons: One, the 55 limit in the Lempster -- in the Groton projects is an LEQ. This EPA levels document is an LDN. So it's a different animal altogether.

And then the 45 dBA , at least in the Groton case -- since I was a participant in that case, I can speak to that -- that came more from the wHO guidelines for community noise documents. That's where that number came from.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. Okay. I guess what I'm trying to understand here is if -- are you implying that those similar numbers might be appropriate for Antrim, I guess is the first part of my question?
A. The 45 and 55?
Q. Correct.
A. Mr. Kenworthy's not here. My understanding is that there's an agreement already with the Town of Antrim, which I am not real familiar with. And there may be some additional information that talks about sound levels that the Applicant has agreed to with the Town. So I guess I'd like to see that, if that's possible.
Q. What would your recommendation be -- I guess maybe non-binding at this point. Would 45, 55 be appropriate for the Town of Antrim?
A. Well, I think certainly the 45 is the key number, because since the turbines can run day or night, they have to comply with the nighttime limit, the 45 in this case.
Q. I understand.
A. And so that would be -- and keep in mind that
these numbers are exterior numbers. These are outside the home, as all these numbers are here up on the chart that you've seen. These are all outside. They're obviously going to be 10 to 15 decibels lower inside, whether the windows are open or closed.

So I guess to answer your question, yes, I think 45 would be an appropriate number for a nighttime limit.
Q. So I guess the follow-up to this, and this is what I don't understand, I was led to believe that a number like this is more of an urban number as compared to the chart here, compared to what $I$ see in terms of the EPA classification of an area that has little or no prior experience with noise, intruding noise.
A. Well, I guess, is there a specific question in there? You want me to look at Mr. James' testimony?
Q. No, I guess I'd like to know, do you consider -- I'll word it differently.

Do you consider Antrim an urban area?
A. No.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
Q. Okay. Would you consider noise levels that are acceptable, I guess, in an urban area to be similar to noise levels that would be acceptable in a very rural area?
A. You could certainly have different limits. Like I say, I don't agree with the premise that 45 is an urban area limit. Okay? I don't know where that came from. I'm not sure where you're getting that from.
Q. Okay. Well, earlier I heard you compare this room. You said this room is about 40 decibels if people are not talking.
A. Correct.
Q. Do you agree?
A. Correct.
Q. Okay. Would it surprise you to know that people who are accustomed to a very quiet environmental situation would find -- or do find the sound level in this room, even when people aren't talking, to be quite irritating?
A. Okay.
Q. All right. Isn't it true that rooms like this are actually designed to seem quiet?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. I don't know.
Q. Are you aware of background noise here when it's -- in between when people are speaking?
A. I'm not aware of it, no.
Q. Okay. Do you live in a quiet, rural environment?
A. It's got its ups and downs. Sometimes it's quiet. Sometimes it's got, you know, plenty of human noise.
Q. Okay. Is your house heated with a furnace? Are there refrigerators humming? Are there air conditioners, things like that, that are generally going?
A. I do have those things, yes.
Q. Okay. Is it possible that people who don't live with those kind of things would be very aware when those sounds are in existence around them?
A. If they don't have a refrigerator or a furnace?
Q. Or maybe just a quiet refrigerator, no furnace, no air conditioner.
A. I haven't been in a house yet that doesn't have a refrigerator these days. But if you
have none of those appliances, it's probably going to be pretty quiet in your house. No TV, no nothing.
Q. Let me go to your testing in Antrim, which is listed in your original Antrim noise report, the one you submitted to Antrim Wind. I don't remember the -- Appendix 19, is it, if I have that correct?
A. I believe it's 13A.
Q. That sounds correct.

You tested at five locations in Antrim;
is that correct?
A. That's correct.
Q. I'm interested in all of them. But I live on Loveren Mill Road, so that's the one I know the best.

Could you describe more specifically Location L2, exactly where you placed your testing equipment, so I can visualize this?
A. Sure. I mean, all the -- the discussions of all those, the meters and where they were placed, are in the report. They're on Page 5-3.

But to briefly summarize, the meter was \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
placed about 50 feet back from the road in the woods, just to the north side of the driveway.
Q. Can you be more specific about what was in the immediate surroundings? Was it in a little clearing? Was it in the middle of the trees or what? I know that area, so I'm just curious exactly where, if I went down there, I would have found that, which I didn't. But I'm just curious.
A. It's on the north side of the driveway. There are some trees. It's a lightly wooded area, I guess, so there's some trees around it.
Q. Just above that driveway there's a some, little kind of access road. Was it in that access road, or was it between the driveway and the access road? Do you know?
A. It was between the driveway. I'm not sure where the access road is. So it was --
Q. It's just a little road that used to be for logging, and it sort of dead-ends a little ways in there.
A. Like I said, it's about 20 feet north of the
driveway. So I'm thinking there's probably no access road in between there and the driveway.
Q. Okay. On the next couple pages you describe kind of the results, and you describe things, like that the different testing units were monitored, and you list various sounds that were picked up. L1 says steady fan or water noise, leaf rustle, insect noise, bird calls. L2, traffic noise along Route 9, aircraft, birds chirping, insect noise, rustling vegetation, et cetera, et cetera. Gregg Lake Road says traffic, insects, distant dogs barking, mechanical noise from across the lake to the east.

Can you explain to me how you know what these sounds were? Are they actual recordings that you listened to and analyzed, or is there some other way to tell what sound is what? What is a rustling stream and what is a car, for instance?
A. Those are based on personal observations from multiple visits that we made during the time that the meters were running.
Q. Okay.
A. So those are based on my visits and other technicians' visits and our observations, firsthand observations.
Q. Okay. So it seems to me, when I read -- at some point, I thought I read that field personnel also checked on the integrity of the equipment during the first day and third night of monitoring and during an interim field visit on September 3rd. Is that correct?
A. Correct. And also the final day of --
Q. And the final day. So those are the only times when people were actually there?
A. Right. Four times.
Q. Okay. So in times between that, is there any way for your equipment to know the difference of whether it's hearing crackling branches or rustling, or flowing water from a nearby brook or what?
A. We did not have recorders on them, so we could not go back and replay them and say, oh, that was a dog barking or something. No. It's just a decibel level.
Q. I was curious on that, because I'm just wondering if you were aware that the Loveren Mill Road site, L2, was located about 500 feet from probably about 30 sled dogs; therefore, at least once a day during feeding time, there was quite a ruckus that gets put up at that point. I would think that that would be noticeable.
A. Well, if that's something that goes on there every day, then -- and if it was something that was of sufficient loudness to be captured by the instruments, then it was picked up as part of the measurements.
Q. For about a half-hour to an hour it is every day. But there's no way for your equipment to know the difference between that and, say, a car driving by?
A. That's correct.
Q. Okay. All right. I just want to ask you to comment on this. Our house right above that testing area, at one point we measured with a decibel meter -- and this was indoors, in our living room at night -- a level of 18 decibels. Does this surprise you at all?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Not necessarily, no. I assume nothing was running at that point.
Q. Well, nothing -- no, nothing was running, except our refrigerator basically was the only appliance that runs all the time in there, so...

So it's possible that people who live in a quiet area experience a quiet environment all the time.
A. That actually just kind of reinforces what $I$ said earlier, in these levels are outside levels. And they're going to be lower inside the house by at least 10 , if not 15 decibels, just because of the attenuation of the house.
Q. So do you think that the night when $I$ measured 18 decibels in the house, it might have been 40 or 45 decibels if I had measured it outdoors?
A. It's possible. It could have been 35,40 decibels outdoors. I mean, a reduction of 17 decibels would not be unusual.
Q. And is that effect, is that different in the summer when windows might be open than it
would be in the winter?
A. Well, as I said, a sort of minimum outside-to-inside reduction with the windows open is typically about 10 decibels. That's a conservative estimate.
Q. Here's another technical question. You said you understand -- or I understand you're saying -- you're using a model of 109.4 decibels at the turbines as your basis to start with; is that correct?
A. That's correct.
Q. Okay. Then I'm seeing charts you have projecting what the ambient -- what the sound plus the turbines will be at various locations. Is that true?
A. Right. That's what this figure is right here.
Q. Right. How is this done? Is this a computer program that projects that?
A. The short answer is yes, it is.
Q. Okay. Is topography accounted for in that?
A. Yes, it is.
Q. In what way?
A. The State of New Hampshire has a digital
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
elevation database, and that topography is brought into the software package to account for differences in terrain between sources at locations that it's propagating to.
Q. Does that include vegetation?
A. You have the ability to include vegetation in the model. We did not take any credit for vegetation.
Q. Okay.
A. So in other words, no, zero for vegetation.
Q. There is a paper that we submitted as Exhibit NB 10 electronically. Let me see if I can find it here. And it's a paper presented at Noise Con 2011, called "Dynamic Measurements of Wind Turbine Acoustic Signals Employing Sound Quality Engineering Methods Considering the Time and Frequency Sensitivities of Human Perception." Are you aware of this paper?
A. I have it here. I was -- this paper was submitted as part of a lot of the documentation that came with Mr. James' testimony.
Q. Correct.
A. I have seen it, yes.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
Q. You have seen it. Okay. So you received a copy of that. Have you reviewed it?
A. I scanned it quickly. There were an awful lot of papers submitted by Mr. James.
Q. Okay. I understand it was presented at Noise Con 2011, which I guess is a conference that was held in Portland, Oregon. Were you present at the presentation of this paper?
A. I did not go to that conference, no.
Q. I was led to believe that you were actually one of the session moderators for this. Is that not true?
A. That is not true.
Q. Okay. Are you aware that this presentation and this paper demonstrates that wind turbines are found to produce infrasound pulses lasting less than 100 milliseconds, or one tenth of a second in their frequency range of zero to 200 hertz?
A. I guess I will take your word for it. Like I said, I didn't read every sentence in here. If you're telling me that's part of the paper, then I'll take your word for it.
Q. Are you aware that in this paper it also says
[WITNESS: O'NEAL]
pulses reach sound pressure levels as high as the mid-90 decibel range and sometimes over a 100 decibels?

MR. PATCH: Maybe, Mr. Block, if you actually have a citation where it says that in the paper, that would be helpful to the witness, so he could actually see the words you're --

MR. BLOCK: Okay. It might take me a second to find it.
(Pause in proceedings)
BY MR. BLOCK:
Q. Do you have the paper in front of you?
A. Yes, I do.
Q. Okay. Excuse me one second.

MR. IACOPINO: Mr. Block, on the electronic copy, there are no page numbers, so I think you should use the section number when you make reference.

MR. BLOCK: Okay. I will do that, yes.

MR. BOISVERT: Which exhibit is it?

MR. BLOCK: NB 10, Section 6,
which is labeled "Wind Turbine Results." And there's a figure right after that which shows the red line on there. I guess it's the first chart immediately following the introductory paragraph on Section 6 shown in figure --
A. Okay. I'm on that page.

BY MR. BLOCK :
Q. Okay. Oh, I just lost it. There we go.

So the red level on there is -- mine is kind of reduced here, but it's showing peek levels there. Do you see that?
A. Yes.
Q. Okay. And are you aware that pulses at that peak level exceed thresholds of audibility set for steady pure tones?
A. Right. And I think we talked about this in my supplemental testimony. So if we're going to get into this, I'm going to go back to my supplemental testimony.
Q. I do have your supplemental testimony open here, too, if you want to identify what page you discussed that.
(Witness reviews document.)
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
A. I guess the question came up about infra -this is about infrasound and low frequency. That's a subject of interest and conversation among acoustical scientists for wind turbines and other sources these days. And starting on Page 11 of my supplemental prefiled and going through Page 14, there's a discussion about that. And I guess on Page 14 we get into a little bit more of the nitty-gritty of this paper --

MR. IACOPINO: Mr. O'Neal, just for the Committee's reference, that's AWE 9, and it's Document 34 within that electronic document.

BY MR. BLOCK:
Q. And you're talking about Page 14. Are there specific lines on there you'd like to refer to?
A. Right. I guess Lines 8, 9 and -- 8 through 14. I'm paraphrasing here. But the Bray and the James paper, which is what this is, this NB 10 that we're talking about. And I'm just reading here. It doesn't demonstrate that infrasound can exceed the threshold of
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
perception. They talk about it may affect the likelihood of audibility or other response, and they encourage others to engage in further research.

So this is something they've looked into, they've had some interesting thoughts and ideas on it, but certainly not conclusive that infrasound and low-frequency sound from the turbines is completely audible at these low, low frequencies. I think that's been confirmed in some of the other research by Møller and Pedersen as well.
Q. Since we have one of the authors of that paper here, perhaps it might be more appropriate for that to be addressed later when he's speaking to get into more detail on that. So, thank you.

Filter response time from one-third octave band analyzers require sounds that are being measured to be present and stay for at least a quarter of a second for a 20-hertz signal sound and over a second for sounds below 5 hertz. Is that something you're aware of and agree with?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. What are you reading from?
Q. I'm reading from some notes I made here --
A. Okay.
Q. -- that in trying to educate myself, I found that as you -- as sound levels become lower in frequency for a one-third band analyzer to be able to respond and measure the sound, the sound itself needs to be longer.
A. Okay.
Q. Okay? So I guess the question I have on that is -- and my knowledge on this is based from years ago, being involved in -- with sound companies that do music support for concerts and things like that. I worked with some acousticians that did that. But I understand from them that very low-level sounds take longer to be registered, essentially, on analyzers and microphones and testing equipment. And I remember they had situations with this -- with musical instruments.

So if you've got sounds that are very short in duration, is there a problem with recording them or testing them or analyzing
them?
A. Well, obviously you would have to have the appropriate settings on your equipment to do that. I'm not sure where you're going in terms of the acoustical study that we did for characterizing the existing background, which I thought was what we were talking about.
Q. Well, I guess the question to that is -actually, let me go -- this was mentioned earlier, $I$ think, when you were being questioned by Ms. Manzelli on your own -your report to Antrim Wind at Page 4-1, where you stated infrasound -- sound at frequencies below 20 hertz -- can be neglected in the assessment of modern upwind turbines. Low-frequency sound has been reduced to low levels in modern wind turbines and is generally not an issue. You do state that in there.
A. Yes.
Q. Is that position of yours based on measurements using one-third octave band analyzers that your firm or others have used in order to test this?
[WITNESS: O'NEAL]
A. It's based on a combination of several things. That is one aspect of it. It's also based on some of the other literature that's out there by Leventhal and Møller and Pedersen that confirm it again.

It's important to note that there is infrasound low-frequency energy out. There's no disagreement about that. I think the key question and point is, is that a sufficiently high level that it's injurious to people? And that's where the statement that we make in the report comes from.

When I say "low," low levels may not have been a good choice of words. Low may imply that there's nothing. There is some there, but it's not at such a high level that it's an issue.
Q. Is it your contention that low-level sounds need to be audible to be injurious?
A. Well, there's certainly -- there's different criteria. You can use audibility as one. You've got to be -- again, the levels have to be very high at lower and lower frequencies to be audible.

You can also consider perhaps vibration or rattle for low frequency. Again, if they are at a sufficient level, they could cause your windows to rattle and so forth. Again, the research that's out there has demonstrated that, at the setbacks we're talking about here, the levels are not high enough to cause those phenomenon.
Q. Are you aware of any complaints around the country or so that low-frequency sound is annoying or harmful to people; and if so, how would you explain those?
A. Well, there's certainly a great deal of information out on the Internet and the literature that talks about complaints from certain wind turbines, certain conditions.

However -- I'm sorry, could you read the question back?
Q. I guess are you aware of complaints about low-frequency sounds --
A. Thank you.
Q. -- and how would you explain those complaints?
A. The complaints are certainly out there.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

Whether they are truly due to low frequencies I don't think has been demonstrated. In other words, people have been complaining about sound from wind turbines. And a lot of the research, certainly from, again, Pedersen, has shown that the visibility of turbines contributes to that. People become annoyed when they can see them. Whether the complaints are due just to low-frequency noise I don't think has been proven or demonstrated.
Q. For a minute, if we go afield from that a little, do you know of other situations where low-frequency sounds -- I'm eliminating wind turbines right now from the picture. Do you know of any other situation where low-frequency sounds cause complaints and/or problems in people? Can you describe some, if so?
A. I'm trying to think of any. And I know there was a research paper years ago where workers were working on jet engines. But this was a long time ago, and these are workers who actually worked on the jet engines, who are
[WITNESS: O'NEAL]
very close to and exposed to much, much different levels of sound than we're talking about here with wind turbines. These are jet aircraft engines. And there were some high/low frequency from that.

But in terms of community noise impacts from, say, other sound sources, I'm not aware of any, no.
Q. Have you ever heard of a term called "sick building syndrome"?
A. I've heard of it.
Q. And what do you know about that?
A. My understanding is that's more of an air-quality issue.
Q. So in other words, inhaled -- it's something having to do with the inhaled air, something in the atmosphere itself?
A. Yeah. Has something to do with the quality of the air within a building, a confined space, not being fresh enough. That's my understanding of it. I'm no expert in that area.
Q. So maybe -- so you think it maybe has something to do with oxygen levels or
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
something like that or contaminants in the air? Is that what you believe it has something to do?

MR. PATCH: Madam Chair, I just don't see the relevance of questions about sick building syndrome to noise levels.

MS. BAILEY: Can you tell me why this is relevant?

MR. BLOCK: One second, please.
(Pause in proceedings)
MR. BLOCK: I have information that sick building syndrome and what's being called "wind turbine syndrome" are actually the same thing. And researchers who have been working on it are discovering that --

MS. BAILEY: Okay. Wait a
minute --
MR. BLOCK: -- they are related, and they're both based on low-frequency sounds.

MS. BAILEY: Okay. But that could be in your testimony; right? So --

MR. BLOCK: It can.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

MS. BAILEY: So let's keep
going.
BY MR. BLOCK :
Q. Okay. I just wanted to know if you were aware of, if that was something that you as an acoustician -- all right.

I know parts of this were already brought up. But we heard on Tuesday, I believe it was, from Sean McCabe, that the tech specs, and therefore the sound data for the Acciona AW16 [sic], will be available somewheres around the second quarter of 2013. Are you aware of that?
A. No. I just know it's coming. I don't know. So whatever he said is what I know.
Q. So you know they're working on that right now.
A. I know they're working on it, yes.
Q. In light of that, how can you assure us, at this point, of your predicted sound levels for the turbines in Antrim if we still don't have the final data?
A. I guess a couple of answers to that. No. 1, Acciona has done enough testing on similar
units, that they're willing to guarantee it.
Now, that's a -- that's a big risk for them. But I got to believe that they're not going to take that risk unless they feel confident. That's a big business risk for them. So, you know, I don't think they would do that otherwise.

And No. 2, again, if you look back at the Møller and Pedersen paper that Mr. James submitted as part of some of his exhibits, there's a very nice graph in there that shows you a wide range of turbines that they tested for different sizes, going up to 3 megawatts, and even -- well, they tested them up to 3 megawatts. There's a graph in there that shows the sound power levels. It's in Figure 1 of that paper. And it shows that 109 is on the very, very high end of their conclusions to sound power levels, which I think, again, reinforces the fact that the sound levels that Acciona is putting forth are eminently reasonable.
Q. Now, I actually have that paper open in front of me. If people want to look it up, it's

NB24. And it's called, "Low-Frequency Noise from Large Wind Turbines," by Møller and Pedersen. Is this the paper you're talking about?
A. Yes, it is.
Q. I just wanted to point out in the abstract, in the beginning, it's -- that the premise of this paper is that the relative amount of low-frequency noise is higher for larger turbines than for smaller turbines. So would that be -- fit in with the characteristic with the kind of turbines being proposed here?
A. Yes. And their findings were that they are 1 to 3 decibels higher in some of those lower bands, which is appropriate and understandable. That's not a problem.
Q. Okay. And according to Mr. James, the Møller paper also says the dBA is not a useful way to limit wind turbine noise.

Essentially when I read here -- and see
if you agree with me -- simplifying this down to my level, larger wind turbines make more noise, have more low-frequency sound. Is
that true?
A. That is generally true.
Q. Okay. Going back for a minute to the guaranty from them, I know Ms. Manzelli talked about on a legal basis. I'm talking about that somebody potentially living across from this, if there's a guaranty, what is my option if $I$ bring in -- for instance, that decibel meter I used before. Wind turbines are up and I measure it, and it's higher than what the Town has said or what your guaranty says. How do $I$ address that guaranty?
A. Well, I'm not sure I'm the right person to answer that question. That's more of a legal and a procedural question.
Q. But you're telling me that you personally are willing to stand by this guaranty because you believe what Acciona is telling you.
A. I believe what Acciona is putting forth. I don't think -- I have no reason to believe that it's, you know, bad information. I believe it's good information. And it's consistent with what we see from other wind turbines in the industry. This is -- what we
modeled here, 109.4, is the highest level we've ever modeled for any wind turbine, if that gives you any comfort.
Q. No, none whatsoever. But I guess I'm kind of asking if you're -- are you willing to take some responsibility for recommending this, to say that this is an appropriate wind turbine? Are you willing to take some responsibility for this guaranty so that, you know, I have some insurance?

MR. PATCH: I'm going to
object to the question. I don't quite understand. He's asking this consultant if he will take responsibility for the guaranty from Acciona? I just don't understand the question.

MS. BAILEY: Mr. Block --
MR. BLOCK: Can I rephrase it?
MS. BAILEY: You can try.
BY MR. BLOCK:
Q. Okay. I think you just told me that you believe Acciona -- and you're willing to stand by what they're saying. I guess another way to say this is, if an engineer
came in and told -- in a permitting process said, I am telling you that this project will meet these standards, and those standards were violated once the project is completed, I believe that engineer might be subject to some kind of -- possibly losing a license or so, because an engineer is supposed to know and be able to predict this, and the people who are building a project need to count on that advice before they can take it to completion.

I'm asking you as -- in effect, taking the role of an engineer here of predicting what the sound will be, would you --

MS. BAILEY: Mr. Block, how is an engineer losing his license going to help you? It's not.

MR. BLOCK: It may not.
But -- well, I think the way it would help me is that, if an engineer had the threat or the possibility of losing his license over a recommendation, he or she would not make that recommendation. They would want to make recommendations that they could stand by.
[WITNESS: O'NEAL]

And what I'm looking for here is a guaranty that the recommendation that's being made by the advisors and experts to Antrim Wind are things that they feel are realistic and can really be achieved.

MS. BAILEY: Well, he's giving his testimony under oath.

MR. ROTH: If I may address this momentarily?

I think it's a fair question to ask whether if an engineer puts his stamp on a particular engineered design, is he willing to stand by that, whatever it is, whether it's personal liability or some sort of consequence at the licensing board.

If Mr. O'Neal is putting his
stamp on this figure based on the guaranty from Acciona, $I$ think it's a fair question. What does that mean to him?

MR. PATCH: I think it's an unfair question, you know, to put this particular witness, when he's on the stand, you know, under this kind of scrutiny, and ask him to answer a question about personal
liability or personal responsibility. I just think it's taking us very far afield.

MS. BAILEY: Can we just -how about if I try it?

In general, if a professional, such as yourself testifies that this is what it is, and you end up to be wrong, and -what would be the consequence to your reputation or your -- do you have any licenses that could be affected?

THE WITNESS: Well, certainly if I'm proven to be disastrously wrong -- and I'll say "disastrously," meaning that -- for example: Up near the Blocks' residence -just since Mr. Block is asking me the questions, let's use his as example -- we're calculating a level of around 35 decibels, okay. I'm looking up at the Location L2, which we measured, his next door neighbor. So, actually, his house is a little beyond that. So maybe it's 34 decibels. So if we get out there and this thing gets built and we do post-construction testing and we find out -- we measure a sound level of, you know,
[WITNESS: O'NEAL]

42 decibels from the turbines now -- not just 42 decibels just because it was a windy day that day and the dogs were barking, but 42 from the turbines -- I'd say I did a bad job. That's really a bad job.

If we get out there and it's 35, that's pretty good. If you're off by a decibel or two, that's pretty close. So I guess that's how I would answer that.

MS. BAILEY: What happens if you did a really bad job? That's what I think he wants to know.

THE WITNESS: Well, my
reputation sort of goes in the toilet. I probably won't get hired again, for starters.

Number two is, these machines
do have the capability to go into -- and the developer doesn't want to hear this, but they do have a noise-reduction option, which costs them power production and, therefore, money. But that would lower the sound levels. If we're egregiously wrong and things are way wrong and Acciona -- you know, so I'll leave it at that --
[WITNESS: O'NEAL]

MS. BAILEY: Okay.
THE WITNESS: -- okay? So there is a recourse.

MS. BAILEY: Is that satisfactory?

MR. BLOCK: Yeah. The reputation part is, I guess, where I was thinking this was going to.

BY MR. BLOCK:
Q. Just sort of a corollary question on this is: Can you be as sure about your assurances on this based on the fact that what you're working with is essentially experimental model data as you would be if you were working on actual tested data?
A. Again, since Acciona is guaranteeing this, yes, I do. And, again, that's based on a combination of seeing other turbines in the industry as well as doing a lot of post-construction testing.
Q. So does that mean that if it turns out to be wrong, that you can pass on the responsibility to them --
A. Well --
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
Q. -- reputation-wise?
A. For example: If things don't come out, for whatever reason, as we all expect they will, and the owner comes out and hires a third party to test the turbine and says, $O h, m y$ gosh, it was really 115.4 , we were all wrong. Then Acciona obviously has a major issue, and then I'll look bad for believing them.

But -- okay?
Q. And this is -- probably you're not the one to ask. But will Acciona then buy my house?
A. I can't answer that for you.
Q. Okay.
A. But I have no reason to believe that's going to be the case.
Q. Has you or your firm actually ever handled complaints or worked as experts in response to a lawsuit or complaint having to do with wind turbines?
A. We have worked on several litigation matters.

Do you mean which side we worked on or --
I'm -- what's the question?
Q. If you can tell me -- and in what capacity did you serve in those instances, if that's
something you can reveal?
A. Well, certainly the lawsuit in Texas is well known. That's public knowledge. We worked on the Horse Hollow Wind case where a group of individuals sued the developer, the owner of the wind farm. We worked on that case.
Q. I wasn't knowledgeable. If you could, in one or two sentences, describe that, I would appreciate it.
A. Describe what happened?
Q. What the case was about, yes.
A. The case was a group of 18 plaintiffs that sued the owner and operator of a wind farm in Texas, that noise was a nuisance. And they lost the case.

We did a lot of studies of the wind turbine sounds, presented the results in a court of law before a jury trial, and the jury found that the owner and operator was reasonable in the construction and operation of the wind farm and that noise was not a nuisance. And that was the end of the case.
Q. In that instance in Texas, do you know how far homes were from those turbines?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
A. Yes, I do.
Q. Can you -- and I guess the litigants, I guess, would be the critical ones. Can you tell me what the distances were?
A. They ranged. The closest plaintiff was 1,700 feet away. There was a second -- the second closest plaintiff was 2,000 feet away. And there were numerous other ones at distances out to a few miles.
Q. Who were involved in the case?
A. Yes.
Q. Okay. Can you excuse me one second? (Pause in proceedings)
Q. That's all my questions for now. Thank you.
A. Thank you.

MS. BAILEY: Thank you.
Ms. Linowes.
MS. LINOWES: Thank you, Madam Chair.

CROSS-EXAMINATION
BY MS. LINOWES:
Q. Okay. I wanted to start -- let me tell you the items that I'm going to be referencing during my cross-examination. It will be your
[WITNESS: O'NEAL]

January prefiled direct testimony; your report that was included as part of that submittal, which I don't recall the exhibit number on that; also, IWAG-N1, IWAG-N3, N5 and N7. I'll also be referring to NB -Exhibit NB 10 and also NB 1, which is Mr. James' report.

Before I get started with my questions, I wanted to ask a couple of questions in reference to what was said so far.

That guaranty that you're talking about with regard to the Acciona turbine, you said that Acciona has guaranteed the turbine. Is that guaranty that you're saying that the turbine will produce a sound level of 109.4 decibels -- sound emission, I should say?
A. What that's saying is that, under the maximum sound power level, the maximum wind condition, that's the highest sound level it will be rated at. So in other words, at different wind speeds there will be some lower sound levels.
Q. Right. So that the sound -- but that is the guaranty. All it states is that it
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
guarantees there's a maximum sound emission; is that correct?
A. That's correct.
Q. Okay. And can you just tell me what -- if what occurs in nature somewhere near Tuttle Hill or the surrounding property, the project area, that is at 109 decibels? Is there anything?
A. Well, no.
Q. Can you tell me something that exists in the world that's 109 decibels?
A. See, as I explained a little bit earlier in the proceedings, you got to be very careful. The 109 is sound power --
Q. I understand that.
A. -- it's a rating.
Q. I understand that. And I'm asking you to -you're an acoustician. Can you liken that -I understand there has to be some kind of mapping. Can you liken that sound power to something that exists in the world, other than a turbine?

MS. BAILEY: Ms. Linowes, remember to let him answer the question for \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
the reporter, please.
A. Sure. There are lots of mechanical equipment, for example, that have sound power-level ratings of around 110 decibels and --

Mr. -- I'm sorry.
MS. LINOWES: I apologize,
Madam Chair. The reason I'm a little anxious is that he tends to go on with his -- and he takes a long time to answer questions that are relatively short answers. So --

MR. PATCH: I'm going to
object to that and ask that that be struck from the record. I don't think that's fair at all. And she's just not letting the witness answer the question, and she should allow him to answer the question.

MS. LINOWES: Well, then, if I can rephrase the question.

MS. BAILEY: Wait a minute.
Let's strike that from the record. I don't think that was fair, because I've never heard this witness before. You have to let him answer the question. That's fair.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

MS. LINOWES: Okay. Well, I will rephrase the question then.

BY MS. LINOWES:
Q. Can you name a mechanical structure -- a mechanical device that produces that sound power that many of the people in the room will be able to understand or recognize?
A. There are many. So let me search for one. How's that?
Q. That would be great.
A. Cooling towers that often go on top of an office building, for example. They come in all different sizes and shapes and capacities. But there are many of them that are around 110 decibel -- 109, 110-decibel sound power-level rating.
Q. So you wouldn't find a cooling tower like that on a building in Antrim; is that correct?
A. You might find it on top of a library or a school or something like that, sure.
Q. How about a lawnmower?
A. I am not entirely sure what the sound power level is of a lawnmower. Sound pressure
level, yes, but not the sound power level. I don't know.
Q. Okay. All right. So now I want to go to Page 1 of your January testimony. And on Line 8 you state that you earned a master's in atmospheric science and that you're a certified meteorologist; is that correct?
A. Correct.
Q. How did you get into noise?
A. Through a series of work experience, continuing education, training.
Q. And is there a commonality between modeling meteorological events and noise events? Is that part of what the crossover was?
A. There is some commonality there, yes. Certainly the atmosphere is an area of commonality.
Q. So did you at one time -- do you work as a meteorologist today?
A. Some of the projects $I$ work on -- for example: Some of the wind projects have a meteorological aspect to them. So that type of training and education is very useful.
Q. So are you predominantly working as an
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
acoustician now?
A. More of my time is spent doing community noise, yes, than actual meteorology.
Q. Okay. And now it says on the next -- Page 2, Line 4, that you are a member of the Institute of Noise Control Engineers, Acoustic Society of America, the American Meteorological Society, et cetera; is that correct?
A. That's correct.
Q. As a professional acoustician -- is it appropriate to call you that?
A. That's fine.
Q. Okay -- and a member of INCE, et cetera, is there a certain professional ethic that you commit to?
A. Yes, there is.
Q. Are you licensed?
A. I do not have the board-certification license.
Q. Is that something that one can get?
A. Yes, you can.
Q. Is it a separate step, a testing that you go through?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Yes, it is.
Q. Do many acousticians that you know, are they board-certified?
A. Very few.
Q. And what is the difference between a board-certified acoustician and one that is not?
A. That means that if you've taken and passed the board-certified exam, that's just what that means. You've taken a -- you have the experience, the credentials, the qualifications, and you've taken the one-day licensing test and passed it.
Q. Does it commit you to a higher level of ethics?
A. Beyond being a member of the INCE?
Q. That's correct.
A. I don't recall. I don't know.
Q. Okay. Now, as an acoustician who is a member of INCE and all of these other organizations, and one who is committed to a set of ethics, at what -- you have mentioned several times that it's important that projects meet compliance, permitting compliance. Is that
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
about right, what you said? You agree?
A. Well, of course, if a project has a permit, they must comply with it.
Q. And you have -- you seem to be very comfortable with the limits -- or sound limits that were imposed on the Lempster project, as well as, I believe, the Groton project. You raised both of those. Is that -- you're comfortable with those?
A. Yes.
Q. Okay. And as a professional acoustician, is your obligation to any situation where there is a noise concern, where a complaint has been raised, where someone has stated there is a problem with noise, is your first commitment as a professional acoustician to assure that the project for -- or the source of the noise is in compliance with the permit? Or is your first concern trying to make some understanding as to why the complaint is there and help the person who has the problem with noise? What is your first priority?
A. I'm not sure $I$ understand your question.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]

Under what situation am $I$ working in here? Well, we'll use an example of a noise problem. You were involved, I believe -there was a data request -- let me just find that. This would have been my IWAG6. I didn't intend to bring it up, but let me just pull it out just so we have it. And that would have been 1-18. I believe it was IWAG 6 --

MS. LINOWES: Mike, correct me if I'm wrong.

MR. IACOPINO: Is it 6 or N6?
MS. LINOWES: This would have been where all my data requests were, so -MR. IACOPINO: That is Exhibit 6.

MS. LINOWES: The request number was IWAG 1-18?

MR. IACOPINO: I think that's electronic Page 19.

BY MS. LINOWES:
Q. And you state that you were --

MR. IACOPINO: Wrong one. One
dash what?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]

MS. LINOWES: Eighteen.
THE WITNESS: No. That's a P90 capacity factor question.

MR. IACOPINO: Yeah, that's a tech session request. So we're looking for --

MS. LINOWES: Oh, maybe it's IWAG 5. My apologies. I think I separated them.

MR. IACOPINO: Actually, I think it's four. Michigan Thumb?

MS. LINOWES: Yes, that's correct. Thank you.

MR. IACOPINO: Yes, that's IWAG 4, and it's Page 18 on the electric [sic] version.

THE WITNESS: Okay. I found it.

BY MS. LINOWES:
Q. Now, there is -- I believe the circumstance was that there was a complaint at the Michigan Thumb 1 wind farm; is that correct?
A. There were complaints out there, yes.
Q. So, more than one.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Yes.
Q. Okay. And you went out there. And your obligation, $I$ believe, in reading your response here -- it sounds like your obligation was to determine whether or not the project was in compliance with the permit.
A. The project had a permit limit. And, right, the purpose of what we were hired for was to go out and determine whether the project at all these different locations was in compliance with their permit.
Q. And who was -- who paid you to go out there?
A. John Deere Wind Energy.
Q. So, John Deere owned the project?
A. That's correct.
Q. As a professional acoustician who is obligated to a set of ethics, if you understood that there was a problem with the noise, you found there was a problem that -I don't remember what the decibel limit of 50, 55 -- at any point, would you say, or would it even occur to you to say, there's a problem with the noise here? Or was it only
[WITNESS: O'NEAL]
enough that you said, I represent my client, and I'm telling you today that it's in compliance with the permit?
A. In the case of the Michigan Wind 1 they're talking about, we had no involvement at all in the project until after it was up and operating and built. So --
Q. I understand.
A. -- we were retained to measure at the complainant's house, a non-complainant's house alike. As you see there, we found some locations that were not in compliance.
Q. But you stopped there, though; is that correct? It was not material to you, as an acoustician, outside of your obligation to your client, if you thought that there was a problem with noise?
A. One of the items of discussion we had with the client was, you know, what other sound-level limits are there in other projects that you've seen. And we indicated that 45 was becoming a more common limit than 50. We do see limits of 50 in places, but 45 is more common.
[WITNESS: O'NEAL]

But we were not retained after that. They sold the project and moved on, and we were not brought back.
Q. Okay. And Mr. O'Neal, if I could ask you: Was this the first wind project that you had ever been involved with?
A. No.
Q. All right. So now I want to go through my questions.

There was testimony earlier this week -and I think you might have heard it also today. You're aware that the Acciona AW116, 3-megawatt turbine, is not commercially operating anywhere in the United States, or actually in the world. It might be in Spain or in the process of going online. But is that your understanding?
A. Yes.
Q. So it's accurate to state that your predictive sound modeling was based on the power curve, I think you had stated that earlier?
A. Well, a power curve relates electrical output to wind speed. So we use the maximum sound
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
level in our modeling.
Q. Hmm-hmm. And there is no way for you to validate your model against a working AW116 turbine; is that correct?
A. There's currently two under construction right now in Iowa. And as you said, there is one that's now finished in Spain, and there will be some data available, I'm sure, soon.
Q. After these proceedings?
A. I can't say when they'll be available.
Q. Okay. And the turbine blades with the rotator diameter of 116 meters, is that the longest -- the largest rotor diameter that you have encountered?
A. It's the largest one I've worked on so far, yes.
Q. Now, there are basically two areas that I want to talk to you about. And I just want to check the clock. We might only get to the first half. But I --

MS. LINOWES: You're looking concerned.

MR. IACOPINO: Are you telling us you're going to be -- keep examining him
[WITNESS: O'NEAL]
until 7:00, when it's quarter of six?
MS. LINOWES: I don't know. I
hope not. $I$ just want to characterize $I$ have two sets of -- I only just started. Did I say an hour or an hour and a half?

MR. IACOPINO: I'm checking.
MS. LINOWES: Okay.
MR. IACOPINO: You told us 10 to 20 minutes.

MS. LINOWES: No, not possible.

MR. IACOPINO: No, 90 minutes is what you said.
[Laughter]
MS. LINOWES: That was not
fair.
MR. ROTH: Does the record reflect that laughter?

MS. LINOWES: I am sensitive to burning everyone out, so I --

MS. BAILEY: Well, you
predicted -- if you predicted 90 minutes and you started at 5:30, you should be finished with all your cross by the time we end
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
tonight.
MS. LINOWES: And you're okay with that?

MS. BAILEY: If you can
shorten it and don't be repetitive, that would be appreciated. But if you can't, then we'll go till 7:00 and we'll have to continue tomorrow with Mr. Roth.

BY MS. LINOWES:
Q. Okay. I wanted to talk about two areas that -- there are two components to this process; correct? There is a pre-construction sound survey study; is that correct? That's one component?
A. Yes.
Q. The second component is the predictive modeling of the sound.
A. Yes.
Q. And I'd like to understand exactly the purpose of the pre-construction noise survey. It's -- you went out -- you set up five receptors. You collected noise for a period of 16 days. Somewhere in the -- around -- I don't remember the number of hours. How many
hours is that?
A. It was about 400 hours in each location.
Q. Okay. And you were attempting to understand the background noise level; is that correct?
A. Correct.
Q. Okay. Is it -- and the purpose of understanding the background noise level is why? Why were you trying to do that?
A. Well, the reason is to try to put it in some context. What is the sound level out there today in different points in the community?
Q. Okay. And now the expectation is, once you've done that post -- pre-construction survey, there is going to be some construction, and then there will be an introduction of a new source into the environment; correct?
A. Yes.
Q. Is it fair to say that adverse impacts could occur if the new noise from the project significantly exceeds the background level at the receptors? Is that a fair statement, without defining the word "significantly"?
A. No, it's not a fair statement.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
Q. Okay. What would you expect it to be?
A. For instance --
Q. What would your expectation be?
A. For example: You said 10 decibels over the background. What if the background is 16 decibels and the new project is 26 at the location? I wouldn't characterize that as an adverse impact.
Q. I believe you said it was very diff -unlikely to be 16. But okay. I understand. So if it were at 30 , and it ended up being introduction of a noise source that was 40, would that be problematic?
A. What's going to happen there is that it will be audible at times. Is it a problem? I don't think so.
Q. Now I'm asking you as the point -- as someone who has examined community noise, which I believe you said that you do. In the event that a noise is introduced into an environment that is 10 decibels above the background noise, can you anticipate an adverse reaction?
A. People have adverse reactions for a number of
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
reasons. Sound may be one. The visual, the view. They may not like the view of it. There are a lot of reasons.
Q. I know. But we're talking about sound. I said, if you have a noise source that is introduced into an environment that increases the background noise level by 10 decibels, can you anticipate, as an acoustician who works with community noise, can you anticipate an adverse effect?
A. Some people will probably react adversely to that. Some people won't notice it.
Q. Thank you.

I have a technical question for you.
When you collected the noise at these five receptors, what was the spectra of the noise you collected in your survey, in hertz?
A. Out of the five locations we collected, two of them had one-third octave band data collected. The other three did not. So I can't tell you what the other three were at all. The two that did have the third octave band data, they're not presented in the report. We turned that all over to Mr . Roth
and his consultant. They have that data. I mean, it's -- I'm not sure how I can answer that. There's a lot of different frequency information in there.
Q. I'm not asking you to deliver that information to me. I'm just trying to understand what the spectra was.

So you did two receptors. You did collect the full range of frequency sounds?
A. That's correct. Yes.
Q. But at the other three you did not?
A. Correct.
Q. And why did you do that? Why did you make a distinction between those?
A. We didn't feel that we needed to get one-third octave band sound levels everywhere. Again, particularly since the background is being used more for
informational purposes, the A-weighted values that we were collecting at all five locations would be adequate to characterize what's out there today.
Q. Okay. Then, if I could -- if we can look at your report, $I$ would like to know which
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
locations you did not -- I'm sorry. My apologies.

If we look at your report, I believe it is on Page -- one of the pages. It will be Table 6-2. This would be Page 6-3. You have the five locations.
A. Yes.
Q. And which ones did not have the full spectra? MR. IACOPINO: Just for the Committee, we're looking at AWE 3, and it's Document 25 in the electronic version of that exhibit.
A. I'll actually direct your attention a few pages back in that same report to Page 5-3 and 5-4, where the five locations are discussed. And in those descriptions, it tells you which ones had the third octave band.

BY MS. LINOWES:
Q. Okay. Without reading it, do you happen to know?
A. Location 1 had the one-third and Location 4.
Q. So, Location 1 and Location 4. Okay.

All right. Now I would like to direct
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
your attention to the Exhibit IWAG-N5. This is a letter written by the Massachusetts Department of Environmental Protection. It was in response to noise complaints at an operating wind turbine in Falmouth,

Massachusetts.
A. Can you repeat the exhibit number, please?
Q. Yes, $I$ can. IWAG-N, as in Nancy or noise, 5.

Before I go down my line of questioning --
A. I don't have it yet.
Q. Oh, you don't. I'm sorry. Well, while you're getting it, if I could ask this question for verification: If you conducted the 16 days of noise -- the noise survey unmanned -- is that correct? So those monitors were put out, and no one was at the site or where the monitors were 24/7? You may have gone out to check them, but no one was manning them; is that correct?
A. Right. You don't staff them 24 hours a day for 16 days.
Q. Okay.
A. N5. Okay. I got it.
Q. Now, this letter, just to set it up, as I
said, it's an operating wind turbine. There were complaints that the turbine -- Mass. DEP wanted to go out and take noise measurements at the site, okay.

It's different from attempting to get background sound levels, okay. But I do want to direct you to the second paragraph on the second page and the second sentence which starts, "It is important..." Do you see that? Second page, second paragraph, second sentence.
A. Yes, I see it.
Q. It says, "It is important to note that in most Cases, Mass. DEP relies on attended sound observation studies so that sound observations, slash, decibel readings can be attributed to particular sound sources." See that?
A. Yes.
Q. Okay. And then it goes on into the second paragraph -- second -- excuse me. The sentence after that, it writes, "The limitation of attendant studies is that they are short-term and provide only small amounts
[WITNESS: O'NEAL]
of data for impact evaluation and compliance decision-making," but then explains that long-term unattendant studies, like the one performed by HMMH, another company, can provide substantially more data so impact evaluations can include different sound source operating conditions and more times a day, but can leave questions unanswered regarding $L$ max data observations and data captured related to specific sound source in question.

Now, the difference in this sentence and with the pre-construction sound survey, I believe, is they're looking for $L$ max and you're looking for L90; is that correct?
A. The short answer is yes.
Q. Okay. They are recommending that the noise -- that those be attendant studies. And can you explain a little bit more what their concern is about unattendant studies?
A. Well, I think you said this. But just so everybody was clear, what she's reading is for a post-construction compliance test, which is not what we're talking about here.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. I understand. But I think you agree that the difference between the post-construction and pre-construction would be, instead of looking for $L$ max, you'd be looking at L90? You just agreed to that?
A. So in Massachusetts, the L 90 is the required background level, yes.
Q. Oh, so you don't -- okay. Well, that's -but in any event -- I do want to come back on that.

But in any event, the point being, the difference between the unmanned and manned study, the concern is what?
A. The DEP is interested in making sure that when someone is taking compliance sound-level measurements of a source, that they're there; they know what's going on; they know what sound levels are happening; is it the wind turbine or is it something else.
Q. So the worry is that it might be contaminating the noise -- the noise collection. The noise collection may be contaminated with other noise sources; is that correct?
A. Correct.
Q. Okay. All right. Now, I want to direct you to... excuse me one second.

Okay. Now, $I$ want to direct you now to IWAG-N7 -- dash N7.

Do you know who George Hessler is?
A. I'm at IWAG-N7 and there's nothing in here.
Q. Oh, $I$ can give you a copy if you don't have it.
A. $O h$, I'm sorry. If you turn a few more tabs, there's a Schomer \& Associates - -
Q. Yes, that's it.
A. -- report. Is that what I'm looking for?
Q. That's what you're looking for.
A. Yes. And to answer your question about Mr. Hessler, I have heard of him. I know who he is.
Q. And he's a acoustician?
A. Yes, he is.
Q. And knowing about him, would you characterize him as someone who has done work with regard to turbine noise pre-construction and post-construction?
A. I have seen reports from him on certainly
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
pre-construction. I'm not sure how much post-construction he's done.
Q. Okay. Now I would like to direct you to page -- it's called Page 34. I don't know if you have the whole report, but Page 34 of that report.
A. Okay.
Q. And at the bottom of the page, this report has a -- the last paragraph of a paper written by George Hessler. The paper is called, "Baseline Environmental Sound Levels for Wind Turbine Projects." I can show you the full paper on the iPad, but this is the paragraph that's in that report.

And I want to read this. Now, this is George Hessler's words. It starts, "To exclude" -- excuse me.
"To exclude certain contaminating noise and to correct measured sound levels for self" -- you know what? I'm going to read you from the original paper so that you can -- 'cause I'm -- let's just go to that. Bear with me for one second.

Yeah, it is exactly that. I just wanted
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
to make sure I had that. My apologies.
Okay. The concluding paragraph of this paper that George Hessler wrote reads, "To conclude certain" -- "To exclude certain contaminating noise and to correct measured sound levels for self-induced wind noise, it is necessary to record not only the A-weighted sound level, but also the octave band frequency content of the background sound level."

And then he goes on to explain that this approach allows the mathematical subtraction of high-frequency insect noise from summertime survey results, yielding a modified A-weighted sound level that can be used as a year-round design basis.

Do you understand what he's talking about there?
A. Yes.
Q. Okay. So you did not measure the full octave band frequency for all five locations, did you?
A. That's correct.
Q. You did it for just two locations?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Correct.
Q. So in those other three locations, it is not possible -- you have not collected data that will make it possible for you to subtract out insect noise; is that correct?
A. Correct.
Q. Was it your intent to not subtract out insect noise?
A. Well, by collecting it at other locations, if we felt that insects were present, it would be possible to make an approximate correction at other locations, if that were appropriate. But no, we did not make any corrections for insect noise in the data.
Q. Okay. And then let me read the last paragraph of -- the last sentence of this paragraph.
"Without this adjustment, one might easily over-estimate the long-term background level, particularly the nighttime level that is present at the site." Do you agree with that?
A. You certainly might over-estimate the background level measured when you were out
[WITNESS: O'NEAL]
there, yes.
Q. And then he goes on in the very last sentence, he explains what the long-term background level is. "It is the lowest sound level that is consistently present and available to mask project noise that is sought in every baseline ambient sound survey."

Is that your -- do you agree with his definition of the long-term background level?
A. I think the challenge that everybody has in this is, and he says it in that last sentence, is the lowest sound level that's consistently present. How do you know what's consistently present unless you measure for a long, long time?
Q. Mr. O'Neal, it is apparent in Mr. Hessler's testimony -- or his statement that he doesn't think insects are part of the long-term background level. Do you disagree with that?
A. No, that's a fair characterization. The insects are not there all year long.
Q. Okay. And I'll bring this up again when $I$ have an opportunity to cross-examine Mr .
[WITNESS: O'NEAL]

Tocci and Mr. James.
Okay. I would now -- I would now like to have you look at Page 6.3 [sic] of your report. And this would be Table 6.2. This is what we looked at a little while -- a few moments ago.

MR. IACOPINO: Which exhibit, please?

BY MS. LINOWES:
Q. I'm sorry. It is your report. IW -- I don't know what it is.
A. It's Appendix 13A --
Q. 13A?
A. -- of the Application.

MR. IACOPINO: AWE 1. I'm sorry. What page are we looking at?

MS. LINOWES: 6.3.
MR. IACOPINO: Three.
MS. LINOWES: Yeah, $6.3--6-3$.

MR. IACOPINO: I'm sorry.
It's AWE 3, folks.
BY MS. LINOWES:
Q. Now, do these -- these figures, these are
the -- what you referred to as the minimum L90, the maximum L90, the median $L 90$, and the average 490 that you picked up at those five locations; is that correct?
A. Correct.
Q. So it appears, in looking at this, that the minimum L90 ranges between 27 and 31 ?
A. Actually, 24 and 31.
Q. Oh, I'm sorry, 24 and 31. And that's with insect noise included, or at least not subtracted out?
A. Yeah, we did not make an attempt to determine in each of these if there was insect noise present or not in every 10-minute period. So there may or may not be insect noise present.
Q. And in addition, any other transient noise, such as Ms. Longgood had suggested, that there might have been some timbering going on nearby, a car driving by, dogs barking if they're being fed, those transient noises are also included in these numbers?
A. Generally, no. That's one of the purposes of this L 90 is that generally it does not include those transient noises.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. Mr. O'Neal, if you did not make any adjustments to the corrections, particularly in those three source monitors where you had -- did not have one-third octave band collected, how did you make any adjustments to get rid of those noises?
A. Well, as I said already, these numbers have not been adjusted to eliminate insect noise. The L90, by itself, eliminates brief transient events just by the nature of its statistical -- the way it calculates things.
Q. Okay. And then at the average, the L 90 average -- what does it mean to have L90 average? Did you just average L 90 minimum and 490 maximum? Is that what that 44 is?
A. No. We have to actually go back a page or two, but I'll try to summarize in the interest of time.
Q. That would be good.
A. These two tables, Tables 6-1 and 6-2, the purpose of them was to present a snapshot, or really an idea of how the sound levels vary out there today over time, during a time period when the turbines would be expected to
be blowing at a strong wind speed up on the ridgetop. In other words, we looked at the met tower that acts -- I'm sorry -- that Antrim Wind runs up there on top of the ridge and looked at wind speeds that would have corresponded at times where that high sound level could be expected, and looked at every time that wind was blowing hard, what were the sound levels like down at the five locations in the valley. And so from that, we picked out these sound levels that were going on down in the valley when the winds were blowing strong up on the ridge.

So this is not -- this is not a summary of the entire 16 days' worth of sound levels. Because you have to remember, during some of that time the wind turbines would never operate because the winds were too light.

So the attempt here was really to say, okay, during a time when we think the wind turbines would be operating and at their worst-case sound level, their highest sound level, what do we think the sound levels were down at those five locations around the
[WITNESS: O'NEAL]
project site?
And so we came up with -- I forget the exact number. It's in the report -- but 50 to a hundred different periods and took all those sound levels and sorted them from high to low and came up with a minimum, the maximum, the average, and the median out of all those sound levels.

So this is really a subset of the entire 16-day period. Make that clear for people to understand that.
Q. And you were taking noise levels at that point based on wind data that you -- you were measuring also wind data, and you were based on -- that was -- you were treating that as your loudest noise condition? Is that what that is about; right?
A. Correct. Based on the wind data from the ridge.
Q. And we're talking now about pre-construction, though. So we're not talking about modeling the turbine sounds. I'm talking about pre-construction.
A. These sound levels that we're looking at on
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

Table 6-2 are actually measured. That's what's out there today.
Q. Right. Right. But I guess I'm not clear. Why was -- why were you waiting for winds on the ridgeline? I don't quite understand that. If you -- when you were deciding which -- which sound levels would be incorporated into the average, what -exactly what did you do? I don't quite understand what you did.
A. Sure. It's a little bit complicated. But essentially what we did was, over 16 days, the sound-level meters ran 24 hours a day. And the typical policy for wind products now is to collect data in 10-minute intervals. So that's just what's become the convention and the norm, 10-minute slices, if you will. So, over 16 days, times 24 hours, times --

MR. DUPEE: Six.
A. -- six -- thank you -- I don't know what the number is, but it's a very large number, a couple thousand 10-minute data points.

If we looked at all those data points
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
and said, out of those times, when was the wind blowing at such a wind speed -- and I believe it's 9.3 meters per second. I talk about that in the report at a

9-meter-per-second or thereabouts wind speed or greater -- so anything above that, when was that happening during those 16 days, and then what were the corresponding sound levels during that same time period.

So that was what we extracted to come up with this table. Does that make sense?
Q. Okay. Yes, it does. So you don't know how many hours went into -- that were factored into the --
A. Well, $I$ told you it's in the report. But I'm trying to save time. You can go look it up in the report or we can do it now.
Q. Now, I want to direct your attention to another data request. This was IWAG-6, and it was numbered TS 1-44. Do you have that?
A. Well, I guess I'm confused on the nomenclature. These tabs say IWAG-N6.
Q. Right. Oh, no, no. It's six. It should be six.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Just six.

MR. PATCH: But it's also
Data Request 1-44.
MS. LINOWES: Yes.
MR. PATCH: So that might make it easier.

BY MS. LINOWES:
Q. I think it's TS 1-44.
A. Okay. Yes, I found it.
Q. Okay. Great.

And I had asked in that data request if you -- I was looking at location $\mathrm{L}-3$, which was showing at L90 of 24 decibels, I believe. And I had asked you if you can provide for me the amount of time that that location, $L-3$ location, had experienced a 24-decibel sound level in a pre-construction condition. And you had responded that out of 2,583 10-minute periods, that 24 -decibel sound level occurred twice; is that right?
A. That's correct.
Q. Now, if I had phrased that to be 24 decibels plus or minus 5 , I would have gotten a different answer; correct?
A. Yes.
Q. Were you looking specifically at 24 decibels? Is that why -- when you looked up that data for me, did you look specifically for 24 decibels?
A. That's how I read the request. So, yes.
Q. Okay. I would like to direct your attention to your report again, which is Appendix 13A, AWE 1, I think.

MR. IACOPINO: AWE 3,
electronic Document 25, Appendix 13A.
BY MS. LINOWES:
Q. And I want to have you look at -- go to the appendix, which I believe is Page -- it's showing 34. But Appendix Figure A-2. So this is Appendix A.
A. Okay.
Q. Okay. We can look at the others. But A-2 and then A-3 also. These are -- the A-2 is that location.

Anyway, I want you to -- I'm looking at the magenta-colored lines. Do you see that? The magenta color I believe in your legend is the L90?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Yes.
Q. And so along the bottom of the scale, or the $X$ axis, we see time. That's -- and for the 16 days. And along the $Y$ axis we have the A-weighted sound pressure.

So I'm looking at the magenta line on the down side, where it's down -- where it goes down. And you could see -- when it's going down, that is at nighttime, according to your scale?
A. Yes.
Q. There are a fair number of -- it appears that there are a fair number of periods when that sound is down around 24 decibels. Would you agree? I'm looking at the beginning part of this scale.
A. There's a few occasions there. Absolutely.
Q. Now, we can't know for sure because this is -- you squeezed 2,583 10-minute periods into this one scale. But if we were to look at those individual nights, we would have a fair number of events where the sound level was down at 24 or plus or minus two or three; would you agree?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Well, you would have some number of events. I can't tell you how many. You'd have some.
Q. More than two?
A. Yes, more than two.
Q. Okay. And now I also want to talk to you about the collection process.

MS. BAILEY: Ms. Linowes, it sounds like you're taking a shift, a turn. I just want to check with the court reporter and make sure she's all right.

MS. LINOWES: Oh, sure, sure, sure.

THE COURT REPORTER: Go ahead. Keep going.

MS. BAILEY: Can you keep going till seven?

THE COURT REPORTER: Yeah.
MS. BAILEY: Okay. All right.
Thank you. I'm sorry for interrupting.
THE COURT REPORTER: Thank you.

MS. LINOWES: Please feel free to -- and I know this is --

MS. BAILEY: I just want her
[WITNESS: O'NEAL]
to get it all down.
MS. LINOWES: Okay. Thanks.
BY MS. LINOWES:
Q. So when you're out there collecting this noise, you have the five monitors. And in addition, you have -- you're collecting wind data as well, from what you've told me; correct?
A. Correct.
Q. And did you have -- well, let me go to Appendix 2 of that report. I'm sorry, B. Appendix B. And on the cover of Appendix B it says "NWS Meteorological Data, Jaffrey Muni Airport [sic] Silver Ranch." Is that the location where you collected the wind information?
A. No.
Q. What is that?
A. That is the location that we used to understand when there were events of precipitation that occurred.
Q. Okay. Do you have any of the wind data in this report?
A. Yes.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. Okay. Where would that be?
A. In Appendix A. If you look at the bottom of every one of those five figures, there are two additional lines in the graphs. One is for the ridgetop met tower wind speed, and the second one is the 2 -meter wind tower that we erected during the course of the study.
Q. Okay. And that 2-meter wind tower, how many -- you had one?
A. Correct.
Q. Okay. So if $I$ were to look at this graph, if I look at every one of these figures, A1, 2, 3, 4 and 5, would the orange line referencing the wind blowing at 2 meters be identical on every page?
A. Yes.
Q. Okay.
A. Yeah.
Q. Would you say the same for the green?
A. Yes. There's one ridgetop met station. So that wind speed is the same for every location.
Q. And how far away was that 2 -meter wind -- was that an anemometer?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Yes, it was.
Q. How far away was that from the five collection monitors?
A. It was co-located with Location 5, Gregg Lake. There's a picture of it in the report.
Q. Okay. So it was with one of the five monitors?
A. Correct.
Q. Was it right at it?
A. It was 50 feet away. It was in the park there.
Q. Okay. And did you have a wind screen on your monitors?
A. Yes, we did.
Q. And what size was it?
A. I mean, this was all discussed in record requests.
Q. I understand. But if we could get it on the record --
A. I'm going to go find it so I give you the exact right answer.
Q. Well, $I$ understand it's either a 3-inch or a 7-inch. Do you know what you typically use? (Witness reviews document.)
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Yeah. For these we used the manufacturer's -- the Larson Davis manufacturer, long-term environmental wind screen, which is 3 to 4 inches.
Q. Three to 4 inches. Great.

Now, Mr. O'Neal, do you know what self-generated -- self-induced wind noise is?
A. Yes.
Q. What is it?
A. It's the sound of the wind blowing over the microphone.
Q. This kind of thing?
(Ms. Linowes makes sound in mic.)
Q. That kind of thing?
A. More or less, yes.
Q. Your wind -- so your wind anemometer was located away from the monitors. How can you -- how can you address or deal with wind-induced noise?
A. I'm not sure $I$ understand the question. Do you mean is the wind speed that we measured at the 2 -meter wind tower representative of what the other sound-level measurement locations?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
Q. Yes. If you have a 2-meter anemometer over here measuring wind and some distance away you have a monitor, there's no certainty that the wind blowing over here equals the wind blowing over in this location.
A. For the purposes of this exercise, we absolutely do, and it's fine. If it's off by a few hundredths of a mile per hour or meter per second, that really doesn't matter.
Q. I'm sorry. What do you mean, you do and it's fine? What does that mean?
A. Meaning that, as I said, the 2-meter meteorological tower that we use to measure the wind speeds down near the ground at the height of the microphones was more or less co-located with the sound-level meter at location L5, Gregg Lake.

So the wind speed that we measured down there at this relatively open fetch area by the park is absolutely the same as was experienced at the sound-level meter that was also located at Location 5.
Q. Right. But I'm talking about one, two, three and four.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. Right. Those locations were generally more sheltered, being in the woods. Therefore, the sound -- I'm sorry. The ground-level wind speeds are going to be equal to or lower than what we measured down at the more open and exposed location.
Q. Mr. O'Neal, you're a scientist. Are you just making an assumption here, or did you measure the wind-induced sound?
A. Well, that's the purpose of having the wind screens over the microphones.
Q. Thank you. Okay. So you have those screens on. And those screens, you have a 3- to 4-inch, you said?
A. Yes.
Q. Okay. And then I would like to talk -- just bear with me for a second.

Okay. Do you know what the wind screen is capable of, what wind conditions it can operate in?
A. I don't know, offhand.
Q. Is it your understanding that the wind -that the wind screens will -- a 3 to 4-inch wind screen diameter would block any noise
[WITNESS: O'NEAL]
blowing -- any wind blowing on it?
A. There are charts and graphs for each of the manufacturer's microphones that get into that.
Q. So you don't know.
A. I can't sit here and tell you exactly what it is for every frequency. But what I can tell you is that, for what we did here, wind-induced noise is not an issue.
Q. You haven't proven that to me. I don't understand how you can say that. You have no idea what the winds were at the location of four of those monitors. You're saying they were somewhere in a covered area, so it's -obviously you're thinking the wind won't blow on it. But what are you saying? Do you know if wind was blowing on these monitors or not?
A. If you look at the data that's in the report, it shows you what the wind speeds were at the location that was most exposed.
Q. Location 5? Is that --
A. Right.
Q. I'm asking you about Locations 1, 2, 3 and 4. Do you know -- can you say today, since this
was your study, whether or not noise inside -- in that data represents wind blowing on the monitor that would inflate the sound? Yes or no?
A. Well, the wind speeds were of such a low level, which is the whole point of collecting that data, that -- the answer is no.
Q. Okay. Low level is $2-1 / 2$ meters per second or 5 miles an hour. Is that a low level?
A. Yes.
Q. And would 5 meters per second, or 11 miles an hour, be low?
A. Like $I$ said, $I$ don't know the exact numbers, off the top of my head. We can research that if it's really important.
Q. No, it's okay. Let's stick with 5 miles an hour. You're saying that that's a low level?
A. That's a low level.
Q. Okay. Are you familiar -MS. LINOWES: Now, Madam Chairman, I am referencing a document here that I thought was part of North Branch's exhibits. In fact, I learned today that it was not. And I would like to point to
[WITNESS: O'NEAL]
something in an article written by George Hessler who I mentioned earlier, and I'm wondering if $I$ could bring the report tomorrow. If you would indulge me by allowing me to show Mr. O'Neal on my iPad? I want to show him one chart.

MR. IACOPINO: Why don't you ask him if he's familiar with the report first.

BY MS. LINOWES:
Q. Okay. Are you familiar with the report by George Hessler from February 2008? It's entitled, "Experimental Study to Determine Wind-Induced Noise and Wind Screen Attenuation Effects on Microphone Response for Environmental Wind Turbine and Other Applications." Are you familiar with that report?
A. I'm familiar with the report that he did about studying different wind screens. Whether that's the same one, I can't say.
Q. If $I$ were to show you on the iPad, would you recognize it?
A. I would have to take the time to look through
it to make sure it was the same one that I'm thinking of.

MS. BAILEY: Okay. If you can show him the report and you can verify that you recognize it. You need to bring copies tomorrow.

MS. LINOWES: I will definitely do that. Thank you.
(Ms. Linowes shows iPad to witness.)
MR. IACOPINO: Ms. Linowes, please show it to counsel as well.
(Ms. Linowes complies.)
MS. LINOWES: Thank you, Madam Chair. Appreciate that.

BY MS. LINOWES:
Q. Okay. So what I specifically want to ask you about -- and I will bring the report tomorrow, and I will make sure everyone has a copy.

There is a set of charts that he uses. What he did -- and if you're familiar with the report, he took a series of monitors, such as you used, put various-sized wind screens on them, put these monitors into a
[WITNESS: O'NEAL]
wind tunnel and blew wind over them. And he attempted -- he was testing to see the extent to which wind noise would be blocked by the wind screen and whether or not -- how effective the wind screen was in stopping the wind.

And what I wanted to point out is, in his charts, he looked at 2-1/2 meters per second -- or 5-mile an hour, 11-mile an hour, 22-mile an hour, various levels of wind speed. And what he found at 5 miles an hour was that on a 3-inch filter, it introduced a 28-decibel increase in sound. Do you understand what I'm -- if you -- are you aware of that?
A. Again, $I$ want to have the report in front of me if you're going to ask me specific questions about it.
Q. Okay. And on a 7-inch filter, it increased the noise that was collected at that monitor by 18 decibels.

MS. BAILEY: Ms. Linowes, he doesn't have the report in front of him, so you're kind of testifying here.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]

MS. LINOWES: I'm sorry.
MS. BAILEY: So if you want to ask him the question, give him the iPad.

MS. LINOWES: Oh, can I... all
right. Well, I will bring the report tomorrow.

BY MS. LINOWES:
Q. But if you're familiar with it, his finding was that, in fact, even at very low wind speeds, it introduced noise. Are you aware of that?
A. It's not that simple.
Q. I understand. I'm not asking you to evaluate whether it happens or not. I'm asking you if you're aware of Mr . Hessler's conclusions.
A. What you just said -- and if I'm the Committee listening to this, it sounds like, with that certain wind screen, the sound levels are off by 28 decibels, and that's not true.
Q. I appreciate that. But it is also -- is it also possible that when you're saying you don't know whether the noise -- whether wind around the monitor was introducing
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
contamination, or was it contaminating the noise that you were collecting, there is apparently at least one report out there that says wind screens aren't always a hundred percent.
A. You absolutely have to have the manufacturer's wind screen when you do these outdoor measurements.
Q. Okay. Then if I could just understand then and just clarify. You do not know if there is noise from the wind on the monitor collected in your -- at your five -- four locations; is that correct?
A. I can't tell you to what extent, if any, the wind made a contribution to those levels. I don't believe that it's significant at all.
Q. Okay. Thank you.

MS. LINOWES: Okay. Then I
will finish at seven. I'm changing topics.
BY MS. LINOWES:
Q. Okay. I want to know -- now that we've talked about pre-construction, I would like to talk about post-construction modeling. And I would like to draw your attention --
[WITNESS: O'NEAL]

I'm going to be referencing two exhibits. These will be IWAG-N1 and IWAG-N3. Now, on IWAG-N1, this is a table that $I$ showed you at a technical session back in June. Do you recognize that table -- or that page, rather?
A. Yes.
Q. Okay. And can you tell us what that is?
A. It's an excerpt from the Propagation Standard ISO 9613-2.
Q. Thank you. And that's standard -- that is a standard -- the ISO 9613-2 is a standard for doing what?
A. It's a standard that software developers will take and incorporate the equations of this in propagation modeling to do calculations of sound level.
Q. Great. Okay. So that -- and now, in that table -- by the way, when you say "software development," there is one software product that is most commonly used; is that right?
A. Well, there's -- I think there's two that I'm aware of that are commonly used in this country: CADNA and Sound Plan.
[WITNESS: O'NEAL]
Q. Which one did you use?
A. We used the CADNA.
Q. And that's what you did to model what the turbine would sound like once it was operational; correct?
A. Correct.
Q. Now, there's a table on this page, and it shows -- it is attempting to understand the estimated accuracy for the results of the modeling. And it has two components.

There's the source of the noise -- the height -- the source, at what height. Do you see that's -- you have noise source. It's emanating -- it's putting out noise, and it's at a height either from 0 to 5 meters or from 5 meters to 30 meters. Do you see that?
A. Yes.
Q. Okay. And then it also has the receptor at locations some distance away. And that is either from less than 100 meters or between 100 and 1,000 meters; is that correct?
A. Correct.
Q. And so, if we were to plug in a wind turbine into this, we would have a height of what?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}

Ninety -- what is the height of this turbine?
A. The hub height is 92 meters for these turbines.
Q. Ninety-two meters. And what is the distance that you used for your receptors in meters? Do you know?
A. Well, the distances were set up as a grid. So they range from zero, if you will, or very close to turbines, out into the community several kilometers.
Q. But if I could ask you where your receptors were, though, at least so that -- just so we know at least those.
A. Well, there's really two groups of receptors. There are the five monitoring points which we talked about earlier where the data was measured, the L1 through L5. But we also set up what's called a grid. So every 20 meters we put in a point, a grid. So we set up a grid point to cover this area. And then from that the contours were calculated.
Q. Great. Thank you.

So if I have -- if I'm attempting to model -- predict the noise of my turbine,
which is standing 92 -- the hub height is 92 feet -- 92 meters above ground, and I'm trying to understand where -- how to predict the noise level some 2,000 meters away, what -- how does that fit into this table?
A. What that says is, according to the standard, that the accuracy is unknown. In other words, it doesn't mean you can't do it, but it means the accuracy is not as specified in this table.
Q. If you had -- okay. So you're a scientist; right? So you work with models. Everyone works with models. Do you accept that models have constraints --
A. Yes, they do.
Q. -- in what you input into them and how they operate?

If you look at the ISO model, the ISO standard, it would appear that these are the constraints: That the object that's producing the noise cannot be more than 30 meters above the ground, and the object that's going to be hearing the noise cannot be more than a hundred meters away, and then
[WITNESS: O'NEAL]
we can come up with some conclusion of the plus or minus some decibels that we can predict. We'll get within plus or minus 3 decibels.

What are we talking about when you're talking a kilometer away?
A. Well, as I said, the software is still okay to use. In other words -- but when you're beyond that height and that distance, the ISO standard does not give you a plus or minus estimated accuracy for it.
Q. Mr. O'Neal, can you be off by a hundred percent?
A. Well, I guess the way I would answer that is we've done a lot of measurements and found that, even at turbines that are more than 30 meters tall, which is the only turbines we've marked -- they're all over 30 meters today, and at distances that have been in excess of 1,000 meters, that they -- the measured are still within plus or minus 3 decibels.
Q. Plus or minus 3 decibels. So you've done predictive modeling, and then you've gone
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
back -- you conducted the predictive modeling, you went back and conducted post-construction noise surveys on an existing operating turbine, and you found that you were within plus or minus 3 decibels?
A. The one I'm thinking of is, we did not do the pre-construction but we did the post-construction. I guess where I'm going with this is that -- I mean, yes, the ISO standard has that plus or minus accuracy for a height of a source and a receptor distance. However, $I$ think in reality and practice, with sufficient conservatism, which I believe we've included in this for reasons I've outlined before between downwind distances, no vegetation, using the worst sound power, et cetera, we're still managing to come in reasonably close to the predicted levels.
Q. Mr. O'Neal, in addition to the height and distance, it also has a condition around the weather conditions, the meteorological conditions, when the modeling is done. Is that not correct?
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
A. What are you looking at?
Q. At the -- is this what your paper looks like?
A. (No verbal response)
Q. Yes. You see on the first column there it says -- the bottom, it says throughout this part of the ISO 9613, the meteorological conditions under consideration are limited to only two cases -- do you see that?
A. Yes, I do.
Q. Moderate downwind conditions of propagation or their equivalent as defined and a variety of meteorological conditions as they exist over months or years. What did you model with?
A. We modeled with the downwind conditions of propagation.
Q. So, moderate downward conditions -- okay.
A. That's what's included in the standard, yes.
Q. And so you're up on a ridgeline. The winds are whipping around. You have the turbine going. Is that what you call "moderate downwind conditions"?
A. Well, between the propagation line, the key is how loud is it? In other words, what's \{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
the sound level coming from the source? Did we use the highest sound level from the source? The answer is yes.
Q. No, I didn't ask you that question. I'm asking you -- well, the -- what is the definition of "moderate downward" -"downwind conditions," what is that?
A. If you go back to Clause 5, they talk about it here in this section. It talks about a 1-to-5-meter-per-second wind speed and a moderate ground-base temperature version.
Q. So would that be 1 to 5 meters per second at hub height?
A. No. It's at a 3- to 10-meter height. I believe it's specified in the standard.
Q. Okay. So if it's particularly -- so 1 meter or 5 meters per second, we said that that was quite calm; correct?
A. Five meters per second is around 10,11 miles an hour.
Q. And what is 1 meter per second?
A. About two miles an hour.
Q. So that's pretty calm.
A. I wouldn't say it's calm, but it is what it
is. I mean, it's 2 to 10 miles per hour.
Q. Would a turbine operate at 1 meter per second?
A. Well, again, what you're forgetting is that those aren't the hub-height wind speeds that they're assuming.
Q. I understand. And what I'm trying to understand from you is that the model is designed to work -- designed to predict sound levels when these winds are between 1 and 5 meters per second, when the noise source is 90 meters -- 30 meters or lower, and when the receptor is no more than 1,000 meters away. You're working -- you're modeling something that is completely outside the range of the standard, and you're telling me that it works.
A. I guess what $I$ would suggest is that this has been used by hundreds of other applicants in other projects around the country.
Q. Okay. Well, again, we have our acousticians. I'll talk to them about that.

But I now want to refer to IWAG-N3. MS. LINOWES: And this is my
last set of questions, Madam Chair.
MS. BAILEY: Thank you.
BY MS. LINOWES:
Q. This is an e-mail that I can authenticate because $I$ was on it when it was sent. It was a communication between a colleague of mine in New York state and the CADNA company, the company that manufacturers CADNA.

Do you recognize the name DataKustik, GmbH?
A. They're the developers of the CADNA software.
Q. We had inquired of them about the conditions that the -- the standard. And they responded back, if I may read this.

Long range -- the question raised to them was what happens when you are -- when you have a source that is -- a receptor outside the range, particularly a source that's at hub height, at 90 meters?

MR. PATCH: Madam Chair, I'd just like to object to this. If you look at this exhibit, there doesn't seem to be much there to verify that it is what she says it is. I mean, there's no date, there's --
[WITNESS: O'NEAL]

MS. LINOWES: I can bring the whole e-mail in. I was -- it was a long stream. But I can bring the whole email in tomorrow. I was one of the recipients on it, and I can -- if you would trust me, I'm authenticating it.

MR. ROTH: Madam Chair, I've moved to the back of the room just to get some more fresh air.

This seems to me to be the same kind of problem we had with the photographs earlier today. And if Ms. Linowes is willing to say on the record, as did the witnesses regarding the photographs, that, yes, she received this e-mail, and yes, she received it on a particular date, certainly was good enough for the pictures, it ought to be good enough for her e-mail.

MR. PATCH: Well, she doesn't happen to be a witness at this point in time. She's asking the questions. We had witnesses to verify the photographs. So I think there's a big difference.

MS. BAILEY: Ms. Linowes, I
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
think it might be better for you to bring this exhibit in when you testify and make your point that way, because the witness can't verify that this is an e-mail, and we don't even have -- the first sentence is not a complete sentence.

MS. LINOWES: Actually, it is a sentence. It just doesn't have a cap letter on it.

MS. BAILEY: Okay. Can you do it in your testimony?

MS. LINOWES: I don't know if I -- I don't know if $I$ went into noise in my own testimony. There's...

MS. BAILEY: Can you share with us what you're trying to get out of this?

MS. LINOWES: Yes. Yes, absolutely.

The makers of the CADNA A software -- sorry. The makers of the CADNA A software, which have taken the standard and made it a modeling software, explained why they are unable to model -- their software is
[WITNESS: O'NEAL]
unable to manage anything outside the ISO standard.

MS. BAILEY: And what's your question to the witness?

MS. LINOWES: I wanted to read one sentence from it and then get his reaction.

MR. PATCH: We don't know who "H" is. We have no verification that this is actually somebody at CADNA. So it just seems like it's really very speculative.

MS. BAILEY: Well, how about if we give it the weight it deserves? Why don't you read the sentence, and then you answer it to the best that you can, and we will give it the weight that it deserves.

BY MS. LINOWES:
Q. The sentence is: "Long-range propagation, including atmospheric refraction, is not part of the standards used for normal standard noise calculations." Are you --
A. What's the question?
Q. Do you understand that sentence?
A. Yes.
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
[WITNESS: O'NEAL]
Q. So if you're using the modeling software that is -- you're using a modeling software based on the standard where the modeling -- the makers of the modeling software are saying that the standard does not --

MR. IACOPINO: Ms. Linowes, isn't the question, Do you agree with that -MS. LINOWES: Yes.

MR. IACOPINO: -- rather than you telling us what you want him to say. Why don't you ask that question.

BY MS. LINOWES:
Q. Do you agree with that?
A. No.
Q. Do you agree with that sentence?
A. No.
Q. You don't agree with this sentence?
A. The reason I say that is I've attended training classes that CADNA software, put on by -- I'm not sure it was Mr. Metson, but some of his colleagues -- where they go through some exercises of showing how to model wind turbines. And they routinely put wind turbines into their software package and
use them as examples of one of many sources that can be modeled using the techniques. So I would not agree with that characterization.

MS. LINOWES: Thank you, Madam Chair. I'm all set.

MS. BAILEY: Okay. Thank you.
Mr. Roth, how long do you
have?
MR. ROTH: Hours and hours.
MS. BAILEY: Come on, tell the truth, because we're going to be here hours and hours.

MR. ROTH: Let me just take stock. I could probably do it before seven.

MS. BAILEY: That would be so appreciated. Thank you.

MR. ROTH: I don't know how much more there is to be said about it at this point, but I'll give it a try. CROSS-EXAMINATION

BY MR. ROTH:
Q. Now, Mr. O'Neal, looking at the map behind you and remembering the discussion you had
\{SEC 2010-12\} [AFTERNOON SESSION ONLY] \{11-01-12\}
some hours ago about audibility at Willard Pond -- do you remember that?
A. Yes.
Q. Okay. If you were to remove from that picture Turbines 8, 9 and 10, which I assume are at the southwestern end of the string --
A. Yes.
Q. -- and that would pull all those circles up closer to the nucleus of the amoeba there on the picture; right?
A. Yes, it would.
Q. Okay. Could you hypothesize that, at that point, wind turbine noise would not be audible at Willard Pond?
A. I'm not sure I could hypothesize that. I mean, we're talking about levels today of, say, 29 to 33 or so at Willard Pond. So if we pull the contours further north by removing those three turbines, hypothetically speaking, it's now going to be below 33 . That's for sure. How much below that, I'm not sure.

And to say -- I guess the part that makes me uncomfortable is to say it will
never be audible. That's a very difficult thing to say. I mean, you know, sometimes under the right atmospheric conditions you can hear something very faintly, very far away, even though it may be very low levels.
Q. Because what I thought I heard you say earlier was that you said it will always be audible. And I'm trying to figure out how many of these, if we pulled them off, would it no longer be audible. And I thought, well, maybe we'll start there.

Now, which -- you know, how many
decibels would it have to be before it was not audible with background and just plain faintness?
A. Again, that's a very difficult question to surmise, only because, again, the background level is going to vary. I mean, we've seen that from the various measurements that were done around there. The frequency characteristic could be different with the turbines versus the background; therefore, you could get an A-weighted number that's very low, yet still be faintly audible.
Q. So even if there was just one turbine at the very top of the string, do you think it could be faintly audible that far away?
A. Probably not.
Q. Okay. Well, I guess I'm not going to take the time to go through that. But you would agree with me, at some point, if those turbines were far enough away from Willard Pond, it wouldn't be audible; correct?
A. At some point, any source of noise, if you were far enough away, it will be inaudible. Yes.
Q. Okay. There was some discussion about guaranty. And as I understood it, the guaranty is based upon the modeling; correct?
A. The guaranty is based upon information that the turbine manufacturer, Acciona in this case, has done internally with some type of engineering and blade-foil type of modeling.
Q. Okay. Yeah. And I think in your testimony you described it as "an empirical engineering model" of some sort.
A. I was repeating the language that Acciona had provided, yes.
Q. If the turbine manufacturer begins to conduct what I think were called "typed tests," if I'm right -- if I'm not mistaken, the actual operational testing and measurement, and they come up with different results than the model predicted, will the guaranty that is offered reflect the as-run number or the model number for people who purchase the turbines after those tests are done?

So let's say they do the -- they run the model -- they run the turbine. They find out, oh, no, it's running at 115. Are they going to sell those turbines to Acciona next July and guarantee it at 109, or are they going to guarantee it at 115?
A. Do you mean sell them to Antrim Wind?
Q. I'm sorry. Yeah, Antrim Wind. It is late.
A. I mean, I'm afraid I'm not the qualified witness to answer. That's really a contractual question between Acciona and them. I don't know how that would be handled.
Q. So you don't know whether it would be guaranteed at 115 at the time they purchased
it, based on the actuals, or at 109, based on the experimental models, the black box?
A. Right. I mean, if there's a permit in hand for the project that has a sound-level limit, they'll have to live with that and make that work. That I feel fairly comfortable saying, if the Committee approves the project and puts permit conditions out in the community. But in terms of what the contract limit would be, I can't say.
Q. How would they make the sound level work if, in fact, the turbine is running at 115 and they can't achieve that here, but they haven't bought the turbines yet? Wouldn't that mean they just wouldn't sell the turbines in this particular project? They'd say, oh, can't work?
A. Under the scenario you just described -- for example: If Acciona says, oh, we made a huge mistake, it's really 115 not 109 , but the project hadn't purchase them yet?
Q. Correct.
A. Now I'm surmising here, understand, but my expectation is that the project would have to
look at a different vendor --
Q. Okay.
A. -- and find some turbine they can live with in that number they're already committed to.
Q. Okay. Thank you.

Now, in Mr. Tocci's supplemental
testimony, you probably observed that he did some working of your numbers to model without insect noise.
A. Yes.
Q. Do you agree with the way he did that? Are you comfortable with that? Because I notice that you didn't critique it in your earlier comments when you were first introduced, your rebuttals.
A. I reviewed the literature that Mr. Tocci cites in there, the Schomer, Schloss, Hessler paper that gives the procedure for doing that correction. And it certainly appears that he's applied that correction appropriately.

I think where we disagree is then taking that corrected number and saying that's what it should be for everything going forward.
Q. Okay. I understand. You disagree on sort of
whether it ought to be an absolute number or his relative system.
A. Correct.

MR. ROTH: Okay. That's all the questions I have. Thank you.

MS. BAILEY: Thank you.
Can I just get a show of hands on the Committee of who has questions?
(Committee Members comply.)
MS. BAILEY: All right. So I think we're going to finish with the testimony for today. Thank you.

I'm sorry you have to come back tomorrow.

THE WITNESS: That's no problem.

MS. BAILEY: Now, what are we going to do tomorrow? We need to start at 9:00, and we're planning to go till 6:00. And I think we can -- oh, right. And we're also going to take public comments first thing in the morning at 9:00, like we did today.

So I guess that would conclude
[WITNESS: O'NEAL]

[WITNESS: O'NEAL]

C ERTITICATE
I, Susan J. Robidas, a Licensed Shorthand Court Reporter and Notary Public of the State of New Hampshire, do hereby certify that the foregoing is a true and accurate transcript of my stenographic notes of these proceedings taken at the place and on the date hereinbefore set forth, to the best of my skill and ability under the conditions present at the time.

I further certify that I am neither attorney or counsel for, nor related to or employed by any of the parties to the action; and further, that $I$ am not a relative or employee of any attorney or counsel employed in this case, nor am $I$ financially interested in this action.

Susan J. Robidas, LCR/RPR Licensed Shorthand Court Reporter Registered Professional Reporter N.H. LCR No. 44 (RSA 310-A:173)

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

|  | 68:17 | activities (2) | advanced (1) | 246:7,13,15,17; |
| :---: | :---: | :---: | :---: | :---: |
| [ | Acciona (34) | $34: 19 ; 134: 13$ | 124:6 | 247:3;250:7;253:11 |
|  | 77:24;78:10;94:4, | activity (2) | adverse (6) | agreed (3) |
| [Laughter] (3) | 10;118:13;120:17; | 104:20;134:21 | 101:14;195:19; | $33: 5 ; 142: 13 ; 203: 5$ |
| 45:15;70:17; | 121:16;122:23; | acts (1) | 196:8,23,24;197:10 | agreement (3) |
| 193:14 | 123:11,13,18;124:17, | 212 | adversely (1) | $124: 9,12 ; 142: 9$ |
| [sic] (6) | 21;126:21;166:11, | actual (12) | 197: | ahead (3) |
| 57:19;70:9;166:11; | 24;167:21;169:18, | 88:18;90:3;127:2, | advice (1) | 77:19;121:9; |
| 188:16;209:3;220:14 | $\begin{aligned} & 19 ; 170: 15,22 \\ & 172: 18 ; 174: 23 \end{aligned}$ | $\begin{aligned} & 3,7 ; 129: 15 ; 131: 10 ; \\ & \text { 133:2;148:17; } \end{aligned}$ | 171:10 <br> advisors (1) | $\begin{gathered} 219: 1 \\ \operatorname{air}(6) \end{gathered}$ |
| A | $\begin{aligned} & 175: 16 ; 176: 7,11 ; \\ & 170 \cdot 1212 \cdot 101 \cdot 12 \end{aligned}$ | $\begin{aligned} & 175: 15 ; 184: 3 ; 251: 3 \\ & \text { actually (38) } \end{aligned}$ | $172: 3$ | $145: 12,22 ; 164: 16$ |
| A1 (1) | 250:17,23;251:13,20; | 9:12;18:15;36:2; $39 \cdot 2 \cdot 42 \cdot 14 \cdot 61: 24$ | 101:14 | aircraft (2) |
| 221:12 | accommodate (2) | 39:2;42:14;61:24; <br> 69:13:71:14;73:23; | affect (4) | 148:10;164:4 |
| $\begin{aligned} & \mathbf{A - 2 ( 3 )} \\ & 217: 15 \end{aligned}$ | $\begin{array}{\|c} \text { accommodate (2) } \\ 65: 24 ; 68: 24 \end{array}$ | $\begin{aligned} & \text { 69:13;71:14;73:23; } \\ & 76: 11 ; 78: 23 ; 88: 11, \end{aligned}$ | $\begin{aligned} & 31: 4 ; 94: 14 ; 110: 21 ; \\ & 158: 1 \end{aligned}$ | $\begin{array}{\|c} \hline \text { Airport (1) } \\ 220: 14 \end{array}$ |
| A-3 (1) | accordance (1) | 14;98:8,21;103:10 | affected (1) | air-quality (1) |
| 217:19 | 16:10 | 139:6,13;144:24; | 173:10 | 4:14 |
| Abatement (1) | according (4) | 149:14;151:10; | afield (2) | alignment (1) |
| 133:11 | 136:10;168:18 | 154:10;155:5,7 | 163:12;173: | 93:3 |
| ability (1) | 8:9;23 | 160:9;163:2 | afraid | alike (1) |
| 153:6 | account (12) |  |  | Allen (3) |
| able (11) 55:4;64 | $71: 24 ; 74: 15 ; 92: 24$ | 188:10;191:15; | 4:3;8:17;34:5 | Allen (3) 322,$23 ; 137: 7$ |
| $73: 17 ; 94: 3 ; 129: 3,12$ | 93:24;111:3,9; | 199:13;210:8; | 75:13;137:3;138:3,4 | allow (3) |
| $13 ; 159: 7 ; 171: 8$ | 128:22;132:7;153:2 | 211:16;214:1;244:7; | afterwards (1) | 55:14;82:13; |
| 182:7 | 30:4•152.21 |  | again (45) | allowed (1) |
| above (15) $64 \cdot 13,21 \cdot 73.23$. | $30: 4 ; 152: 21$ accuracy (5) | actuals (1) | $\begin{array}{\|c} \text { again (45) } \\ 25: 3 ; 29: 2 \end{array}$ | allowed (1) 109:21 |
| $\begin{aligned} & \text { 64:13,21;73:23; } \\ & \text { 80:8,21;86:10;90:22; } \end{aligned}$ | accuracy (5) | add (1) | 43:14;44:22;53:6,22; | allowing (1) |
| $119: 16 ; 132: 4$ | 237:11;238:11 | 73:15 | 63:24;65:12,15; | 228:5 |
| 147:15;150:20; | accurate (4) | addition (4) | 66:15;73:4;77:11; | allows (6) |
| 196:21;215:6;236:2, | $\begin{aligned} & 23: 6 ; 27: 12 ; 54: 1 \\ & 191: 19 \end{aligned}$ | $\begin{aligned} & 81: 17 ; 210: 16 ; \\ & 220: 6 ; 238: 20 \end{aligned}$ | $\begin{aligned} & 82: 19 ; 84: 1,6,10,23 \\ & 91: 5 ; 95: 6 ; 99: 6 \end{aligned}$ | $\begin{aligned} & 18: 24 ; 109: 15 ; \\ & 110: 6,8,13 ; 206: 12 \end{aligned}$ |
| $\begin{aligned} & 22 \\ & \text { above-ground (1) } \end{aligned}$ | accurately (1) | additional (6) | $\begin{aligned} & \text { 91:5;95:6;99:6; } \\ & \text { 110:23;113:20; } \end{aligned}$ | $\begin{gathered} \text { 110:6,8,1 } \\ \text { almost (2) } \end{gathered}$ |
| 74:6 | 22:13 | 16:8;17:3,10;78:3; | 114:13;123:20; | 92:5,8 |
| above-grounding (1) | accustomed (1) | 142:11;221:4 | 126:8;136:17;161:5, | alone (1) |
| 73:13 | 144:17 | address | 22;162:2,4;163:5; | 12:16 |
| absent (1) | achieve (3) | 4:14,16;23:3; | 167:8,19,174:15; | along (10) |
| 136:17 | 28:21;72:1;252:13 achieved (1) | $\begin{aligned} & 30: 13 ; 45: 9 ; 60: 24 ; \\ & 61: 24 ; 75: 14,15 ; 79: 8 ; \end{aligned}$ | $\begin{aligned} & \text { 175:16,17;198:17; } \\ & \text { 208:23:217:8: } \end{aligned}$ | $\begin{aligned} & 16: 3 ; 27: 7 ; 28: 11 \\ & 36: 24: 39: 7: 93: 4 \end{aligned}$ |
| absolute (4) $83: 2,9 ; 87: 11 ; 254: 1$ | achieved (1) | $\begin{aligned} & 61: 24 ; 75: 14,15 ; 79: 8 ; \\ & 136: 23 ; 169: 12 ; \end{aligned}$ | $\begin{aligned} & \text { 208:23;217:8; } \\ & \text { 230:16;241:4,21; } \end{aligned}$ | $\begin{aligned} & 36: 24 ; 39: 7 ; 93: 4 ; \\ & 136: 19 ; 148: 10 \end{aligned}$ |
| Absolutely (7) | Acoustic (2) | 172:8;223:18 | 249:16,17 | 218:2,4 |
| 81:3;112:21; | 153:15;184:7 | addressed (2) | against (2) | alteration (1) |
| 218:17;224:7,20; | acoustical (3) | 29:11; adequate (2) | 50:5;192:3 | 51:6 |
| 232:6;244:19 | $\begin{aligned} & \text { 129:7;157:4;160: } \\ & \text { acoustician (12) } \end{aligned}$ | $\begin{array}{\|c} \text { adequate (2) } \\ 133: 18 ; 198: 2 \end{array}$ | $\begin{array}{\|c} \text { Agency (1) } \\ 133: 10 \end{array}$ | $\begin{array}{\|l} \hline \text { alternative (1) } \\ 68: 1 \end{array}$ |
| $\begin{gathered} \text { abstract (1) } \\ 168: 6 \end{gathered}$ | 166:6;180:18; | adhered (1) | ago (8) | altogether (1) |
| abutters (1) | 184:1,11;185:6,19; | 51:23 | 67:20,23;138:9; | 141:18 |
| 94:16 | 186:11,16;189:17; | adjacent (1) | 159:12,163:21,23 | always (10) |
| accept (1) | 190:15;197:8;204:18 | . 23 | 209:6;248: | 33:9;45:10 |
| 236:13 | acousticians (3) | adjourned | agree (42) | 47:8;81:5;89:7; |
| $\begin{aligned} & \text { acceptable (4) } \\ & 32: 23 ; 91: 4 ; 144: 2,4 \end{aligned}$ | $\begin{aligned} & 159: 15 ; 185: 2 \\ & 241: 21 \end{aligned}$ | $\begin{array}{\|c\|} \hline 255: 2 \\ \text { adjusted (5) } \end{array}$ | $\begin{aligned} & 22: 2 ; 24: 2,8 ; 29: 8 \\ & 30: 16 ; 31: 24 ; 32: 9 \end{aligned}$ | $\begin{aligned} & \text { 117:10;134:9;232:4; } \\ & \text { 249:7 } \end{aligned}$ |
| accepted (1) | acoustics (1) | 38:3;71:21,23 | 46:12;47:11;49:2; | ambient (7) |
| 129:8 | 111:21 | 84:5;211:8 | 51:22;101:16;104:3; | 87:11;109:7; |
| access (16) | acres (9) | adjustment (1) | 105:7,14,20;112:15, | 110:22,23;139:16; |
| 56:22;62:3;63:3, | $\begin{aligned} & 9: 22 ; 10: 1,6,10,13, \\ & 21 ; 11: 8 ; 15: 17 ; 29: 18 \end{aligned}$ | 207:18 <br> adjustments (2) | $\begin{aligned} & \text { 16;114:22;133:20, } \\ & \text { 24;134:7;135:1,8; } \end{aligned}$ | 152:13;208:7 <br> America (1) |
| 10;65:17;67:1,8,12; | $\begin{aligned} & \text { 21;11:8;15:17;29:18 } \\ & \text { across (2) } \end{aligned}$ | $\left\lvert\, \begin{array}{\|l\|} \text { adjustments (2) } \\ 211: 2,5 \end{array}\right.$ | $\begin{aligned} & \text { 24;134:7;135:1,8; } \\ & \text { 136:15;144:6,14; } \end{aligned}$ | $\begin{gathered} \text { America (1) } \\ 184: 7 \end{gathered}$ |
| $\begin{aligned} & 68: 8 ; 74: 19,20 \\ & 147: 16,17,18,20 \end{aligned}$ | $148: 14 ; 169: 6$ | advance (7) | $158: 24 ; 168: 22$ | American (1) |
| $\begin{aligned} & \text { 147:1 } \\ & 148: 2 \end{aligned}$ | active (1) | 34:16;35:6,7,9 | 186:1;203:1;207:21; | 184:7 |
| accessible (1) | 135:15 | 60:13;61:3;124:3 | 208:9;218:15,24; | amoeba (1) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 248:9 | apparently (1) | approvals (3) | assembling (1) | 123:2 |
| :---: | :---: | :---: | :---: | :---: |
| among (2) | 232:3 | 12:9;13:4,6 | 72:11 | ttributed (1) |
| 101:18;157:4 | appear | approved (4) | Assessment (7) | 201:17 |
| amount (6) | 46:9;236:19 | 12:22;34:14;53:7 | 27:8;29:5;88:6; | Auburn (1) |
| 13:23;14:3;20:5; | appears (3) | 100:2 | 101:4,6;127:14; | 4:16 |
| 87:1;168:8;216:15 | 210:6;218: | approv | 160:15 | audibility (11) |
| amounts (1) | 253:19 | 17:8;35:21;94:19 | assist (3) | 84:15,17,24; |
| 201:24 | appendix (25) | 252:7 | 51:17;54:1 | 115:17,20,21;116:3; |
| amplitude (3) | 15:11,13,20,22,23; | approximate (2) | Associates (3) | 156:15;158:2; |
| 128:24;129:9 | 87:24;88:1,5,10,14, | 9:6;207:11 | $75: 20 ; 76: 5 ; 204:$ | 161:21;248:1 |
| 130:10 | 21;90:21;101 | approximately | Association (1) | audible (18) |
| Amy (2) | 107:5;146:7;209:12; | 5:17;61:16;81:8 | 8:1 | 84:14,19;91:12; |
| 8:14;99:18) | 217:8,11,14,15,16; | 111:16;127:16 | assume (17) | 113:17;114:8,16; |
| analysis (8) | 220:11,12,12;221:2 | approximation (1) | 16:19,21;21 | 158:9;161:19,24; |
| $9: 14 ; 10: 8 ; 16: 1$ | appliance (1) | 59:14 | 24:6;34:20;35:18 | 196:15;248:14; |
| $33: 16 ; 93: 22 ; 108: 4,$ | 151:5 | area (36) | 53:13,15;57:1;64:6 | $249: 1,8,10,14,24$ |
| 14;110:19 | appliances | 14:11,20;21:14 | 69:5;94:18;111:9; | 250:3,9 |
| analyzed (1) | 146:1 | 28:23;34:19,21 | 119:7;133:15;151:1; | Audubon (4) |
| 148:18 | applicable | 35:10;58:7;64:10 | 248:5 | 8:15;84:12;99:19; |
| analyzer (1) | 23:10;51:3;135:5 | 68:17;72:7;74:4 | assumed (5) | 113:1 |
| 159:6 | Applicant (7) | 81:15,18;95:2;97:16; | 23:24;53:1;72:2 | August (3) |
| analyzers (3) | 45:18;52:1,2 | 98:10;128:16; | 93:7;132:15 | 50:17;79:5,19 |
| 158:19;159:18; | 53:17;75:4;90:7 | 137:12;139:14,19 | assumes (1) | Augusta (1) |
| 160:23 | 142:13 | 143:15,23;144:2,4,7; | 132:21 | 4:17 |
| analyzing | applicants | 147:7,13;150:21; | assuming (3) | authenticate (1) |
| 159:24 | 241:19 | 151:8;164:22;180:7; | 53:23;115:1;241 | 242:4 |
| and/or (1) | application (13) | 183:16;224:19; | assumption (10) | authenticating (1) |
| 163:17 | 22:15;25:24;26:8 | 226:14;235:20 | 16:20;17:2;108:4, | 243:6 |
| anecdotal (1) | 9;30:13;50:24;59:1; | areas (14) | 14;115:3;117:19,24; | authors (1) |
| 135:17 | 87:24;88:10,21; | 13:24;14:4;16:8 | 118:7;119:24;225:8 | 158:13 |
| anemometer (3) | 108:19;120:20; | 17:4,10;20:13;30:6 | assumptions (1) | automobile (1) |
| 221:24;223:16; | 209:14 | 38:18;62:5;65:8; | 53:5 | 48:24 |
| 224:1 | Application | 98:7;101:22;192:17; | assurances (1) | availability (1) |
| animal (2) | 228:17 | 194:10 | 175:11 | 31:4 |
| 135:19;141 | applied (2) | argue (1) | assure (2) | available (7) |
| animals (1) | 108:6;253 | 82:22 | 166:19;186:17 | 7:7;85:5;126:6; |
| 135:20 | apply (3) | around (30) | astray (1) | 166:11;192:8,10; |
| annoyed ( | 22:24;23:1;108:15 | 34:21;42:10;72:8 | $45: 5$ | 208:6 |
| 163:8 | applying (1) | 84:20;98:7;103:5 | atmosphere (2) | Avenue (1) |
| annoying | 83:21 | 104:1;106:7;110:5,7, | 164:17;183:16 | 4:16 |
| 162:11 | appreciate | 9;114:2;135:15,16; | atmospheric (4) | average (9) |
| anticipate (3) | 121:1,13;177:9 | 145:18;147:13; | 132:7;183:6; | 116:14,15;210:3; |
| 196:22;197:8,10 | 229:14;231:21 | 162:9;166:12; | 245:19;249:3 | 211:12,13,14,14; |
| Antrim (33) | appreciated (2) | 173:17;181:4; | attachment (1) | 213:7;214:8 |
| $5: 22 ; 11: 21 ; 15: 1$ | 194:6;247:17 | 182:15;194:23; | 122:14 | avoid (5) |
| 25:24;42:23;43:5; | appreciation (1) | 212:24;218:14; | attempt (2) | 29:12;30:5;38 |
| 76:3;95:19;97:18; | 111:21 | 231:24;238:21; | 210:12;212:19 | 39:9,18 |
| 120:18,21;123:2,21; | approach (2) | 239:20;240:19; | attempted (1) | avoidable (1) |
| 125:3;127:5;130:13; | 15:16;206:12 | 241:20;249:20 | 230:2 | 29:14 |
| 132:1;139:20;142:4, | approaches (1) | article (1) | attempting (4) | avoidance (1) |
| 10,18;143:23;146:4, | 67:6 | 228:1 | 195:3;201:5;234:8; | 39:13 |
| 5,6,11;160:12; | appropriate (16) | ascribed | 235: | avoided (1) |
| 166:21;172:4; | 48:7;52:20;83:10 | 138:16 | attendant (2) | 25:9 |
| 182:18;212:4; | 84:3,10,15;106:10 | aside (1) | 201:23;202:18 | avoiding (1) |
| 251:16,17 | 142:3,18;143:8; | 25:12 | attended (2) | 71:19 |
| anxious (1) | 158:15;160:3; | aspect (2) | 201:14;246:1 | AW116 (2) |
| 181:8 | 168:16;170:7; | 161:2;183:22 | attention (7) | 191:12;192:3 |
| apologies (3) | 184:12;207:12 | as-run (1) | $8: 19 ; 16: 4 ; 199: 13 ;$ | AW16 (1) |
| 188:8;199:2;206:1 | appropriately (2) | 251: | 200:1;215:18;217:7; | 166:11 |
| apologize (2) | 127:19;253:20 | assemble | 232:24 | aware (42) |
| 66:23;181:7 | approval (5) | 73:3 | attenuation (2) | $11: 19,23 ; 18: 5$ |
| apparent (1) | 35:20;50:18,23; | assembled (2) | 151:14;228:15 | 30:20,24;31:2,3,5,6, |
| 208:17 | 60:12;120:2 | 63:9;72:15 | attorneys (1) | 10,14,19,23;32:3; |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 50:6,10;109:10,15, | 17:21 | 130:24 | 148:9 | boats (2) |
| :---: | :---: | :---: | :---: | :---: |
| 19;126:17;135:7; | backyard (1) | basically (6) | birds (1) | 109:16;110:12 |
| 136:21;139:5;145:2, | 98:9 | 51:14;71:6;79:20; | 148:11 | BOISVERT (2) |
| 4,17;150:2;153:18; | bad (5) | 130:9;151:4;192:17 | bit (10) | 80:23;155:22 |
| 154:14,24;156:14; | 169:21;174:4,5,11; | basis (5) | 17:21;72:4,24; | botanist (2) |
| 158:24;162:9,19; | 176:8 | 124:10,19;152:9; | 73:19;90:10;91:2; | 24:7;25:3 |
| 164:7;166:5,13; | BAILEY (89) | 169:5;206:16 | 157:9;180:12; | both (7) |
| 191:12;230:15; | 4:3,8,21;7:8,11,14, | Bear (2) | 202:19;214:11 | 7:1;37:13;78:17; |
| 231:10,15;233:23 | 17,19,21,24;8:3,6,9; | 205:23;225:17 | black (1) | 79:17;123:22; |
| away (27) | 21:11;33:21;34:1; | beaver (1) | 252:2 | 165:20;186:8 |
| 37:9;61:20;62:20; | 40:1,5;49:10;50:13 | 87:20 | blade (3) | bothered (1) |
| 86:5;92:16;102:6; | 54:11;56:8;58:20; | Beblowski (2) | 55:9;128:20;130:9 | 115:15 |
| 105:5;106:8;113:5; | 67:17;69:12,18,24; | 7:11;85:9 | blade-foil (1) | bottom (5) |
| 115:13;133:1;178:6, | 70:6,21;75:1;76:12, | become (3) | 250:19 | 77:21;205:8;218:2; |
| 7;221:23;222:2,10; | 15,18,21;77:1;82:13; | 159:5;163:7 | blades (1) | 221:2;239:5 |
| 223:17;224:2; | 85:6,9,12,14,16,23; | 214:16 | 192:11 | bought (1) |
| 234:19;236:4,24; | 86:15;95:17,19; | becoming (1) | blanket (1) | 252:14 |
| 237:6;241:13;249:5; | 99:13;100:14,17; | 190:22 | 134:11 | boulder (2) |
| 250:3,8,11 | 121:9;137:6,9,16,21; | bedrock (4) | blasted (3) | 37:16;38:23 |
| AWE (22) | 165:7,17,22;166:1; | 29:5,21;30:9;60: | 11:8;37:9;59:22 | boulders (2) |
| 6:10,16;15:2,7; | 170:17,19;171:15; | begin (1) | blasting (29) | 36:23;37:5 |
| 42:5;71:6;76:10; | 172:6;173:3;174:10; | 74:10 | 11:12;13:2,5; | box (1) |
| 77:6,11;86:19;88:4, | 175:1,4;178:16; | beginning (6) | 34:10,13,15,19,21; | 252:2 |
| 12;107:12;108:23; | 180:23;181:20; | 63:7;65:20;74:7; | 35:19,20,21;45:21; | branches (1) |
| 113:19;132:17; | 193:21;194:4;219:7, | 78:24;168:7;218:15 | 51:8;52:15,17,24; | 149:18 |
| 157:13;199:10; | 15,18,24;229:3; | begins (4) | 53:6,10;57:23,24; | Branch's (1) |
| 209:15,22;217:9,10 | 230:22;231:2;242:2; | 16:6;65:6;86:10; | 58:2;59:13,15;60:3, | 227:22 |
| A-weighted (7) | 243:24;244:10,15; | 251:1 | 11,14,17,22;61:4 | Bray (1) |
| 116:13;117:4; | 245:3,12;247:7,11, | behind (5) | blew (1) | 157:20 |
| 198:19;206:8,15; | 16;254:6,10,17 | 62:13;107:10,11; | 230:1 | break (7) |
| $218: 5 ; 249: 23$ | balanced (1) | $113: 15 ; 247: 23$ | Block (36) | $4: 2 ; 69: 14,19$ |
| awful (1) | 72:1 | believing (1) | 34:2,4;36:5,6,8; | 73:18;137:13,14,17 |
| 154:3 | ballpark (2) | 176:8 | 109:12;137:11,14,21, | brief (8) |
| axis (2) | 66:1,8 | belongs (1) | 23;138:2;140:9,10, | 5:12;69:21;75:21; |
| 218:3,4 | band (10) | 70:11 | 12;155:4,9,12,16,20, | 77:22;79:13;101:3; |
| B | $\begin{aligned} & 158: 19 ; 159: 6 \\ & 160: 22 ; 197: 19 \end{aligned}$ | below (8) <br> 18.23.4 | $24 ; 156: 8 ; 157: 15$ <br> 165:9, 12, 19,24; | $137: 18 ; 211: 9$ |
| B | 198:16;199:18; | 103:22;158:23; | $\begin{aligned} & 165: 9,12,19,24 ; \\ & 166: 3 ; 170: 17,18,20 \end{aligned}$ | $70: 9$ |
| back (38) | 206:9,21;211:4 | 160:14;248:20,21 | 171:15,18;173:15; | briefly (2) |
| $11: 5 ; 13: 21 ; 17: 11$ | bands (3) | best (13) | 175:6,9;225:24 | $42: 9 ; 146: 24$ |
| $36: 10,16 ; 38: 15,16$ | 116:12,17;168:16 | 23:4;27:11;29:12 | blocked (1) | bring (14) |
| 64:12;69:20,24; | barking (4) | 44:16;45:3;51:7,22; | 230:3 | 25:18;54:19;55:8, |
| 70:11;73:19;86:7; | 148:14;149:23 | 52:14;72:5;86:1; | Blocks' (1) | 15;169:8;187:6; |
| 94:23;100:21;102:6; | 174:3;210:19 | 131:23;146:16; | 173:14 | 208:23;228:3;229:5, |
| 121:8;125:8;134:16; | base (10) | 245:15 | blow (1) | 17;231:5;243:1,3; |
| 135:3;137:17;147:1; | 17:23;18:3,12,23; | better (6) | 226:15 | 244:1 |
| 149:22;156:19; | 19:6,12;20:6;21:15; | 43:2;64:15;76:24 | blowing (14) | bringing (3) |
| 162:18;167:8;169:3; | 55:3;90:8 | 138:22,24;244:1 | 93:9;117:22;212: | 30:17;72:2;139:22 |
| 191:3;199:14;203:9; | based (26) | beyond (11) | 8,13;215:2;221:14; | Brook (2) |
| 211:16;233:4;238:1, | 13:17;16:9;33:8 | 28:4;48:2;63:2; | 223:10;224:4,5; | 91:22;149:20 |
| 2;240:8;242:14; | 64:17;134:17; | 64:1;65:15,19;70:8; | 226:1,1,17;227:3 | brought (6) |
| 243:8;254:14 | 135:14;140:3; | 74:20;173:20; | blue (4) | 48:15;63:8;119:9; |
| background (31) | 148:22;149:2; | 185:16;237:9 | 90:5,9,12;117:15 | 153:2;166:8;191:3 |
| 68:4;79:3,11,16; | 159:11;160:21; | big (5) | BMP (2) | buffers (1) |
| 81:12,15;83:1,22; | 161:1,3;165:20; | 110:2,4;167:2,5; | 53:19;58:16 | 27:10 |
| 91:17;109:6;145:2; | 172:17;175:12,17; | 243:23 | Board (2) | build (5) |
| 160:6;195:4,7,21; | 191:20;213:13,14,18; | bigger (2) | 95:20;172:15 | 47:17;62:4,17; |
| 196:5,5,22;197:7; | 246:2;250:15,16; | 28:24;134:3 | board-certification (1) | 63:17;68:8 |
| 198:18;201:6;203:7; | 252:1,1 | bingo (1) | 184:19 | building (10) |
| 206:9;207:19,24; | baseline (6) | 70:15 | board-certified (3) | 55:18;62:2;74:18; |
| 208:4,10,20;249:14, | 80:7,9;84:5,7; | biologist (2) | 185:3,6,9 | 164:10,19;165:6,13; |
| 17,22 | 205:11;208:7 | 24:6;135:18 | boaters (1) | 171:9;182:12,18 |
| Backing (1) | basic (1) | bird (1) | 110:3 | built (10) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 30:12;40:20;47:24; | calm (4) | 5:6;75:19;176:23; | 148:12,12;184:8,14; | 248:8 |
| :---: | :---: | :---: | :---: | :---: |
| 60:1,1;61:23;93:21; | 132:3;240:18,23, | 88:3 | 238:18 | circumstance (2) |
| 129:20;173:22;190:7 | 24 | captions | Chair (9) | 24:23;188:20 |
| bunch (1) | came (9) | 36:23 | 82:9;165:4;178:19 | citation (2) |
| 138:6 | 68:10;141:21,24; | captured (2) | 181:8;229:14;242:1, | 26:1;155:5 |
| burden ( | 144:8;153:21;157:1; | 150:12;202:1 | 20;243:7;247:6 | cited (1) |
| 94:23 | 171:1;213:2,6 | car (3) | Chairman (8) | 82:18 |
| burning (1) | Can (157) | 148:21;150:1 | 58:20,22,23;70:2,4, | cites (1) |
| 193:20 | 9:6;10:5,12;13:17 | 210:19 | 7,12;227:21 | 253:17 |
| business (5) | 14:11,16,17,18; | careful (1) | challenge (1) | citizens (1) |
| 4:15;75:15;120:11 | 16:19;17:6,11;20:11, | 180:13 | 208:11 | 98:18 |
| 134:4;167:5 | 15,19;24:19,23; | cars (1) | change (11) | Civil (4) |
| Butler (49) | 26:13;28:16;29:10; | 47:20 | 28:3,10,22;30:14, | $5: 8,10,14,18$ |
| 4:5,15,15,24;5:3,7, | 34:18;40:11;42:8,12, | case (20) | $16,24 ; 31: 3,6,10,14$ | clarification (1) |
| 14,24;6:4,7,12,19,23; | 14,15,19;45:1;51:11, | 38:12;46:12;94: | 32:3 | 124:17 |
| 7:4;9:1,10;10:14; | 17,17,19,20;55:10; | 118:13;120:19 | changed (2) | clarify (2) |
| 11:13;12:14;13:2,4, | 61:20;62:7,13;63:17, | 128:1;133:5;141:20, | 33:6;133:23 | 73:19;232:10 |
| 7;18:22;19:11,15; | 18;65:12;66:1;67:1; | 21;142:22;176:15; | changing (1) | clarifying (1) |
| 29:23;30:2;32:23; | 69:19;73:18;79:16, | 177:4,6,11,12,15,22; | 232:19 | 121:23 |
| 37:2;42:21;43:2,4,8, | 24;88:3,16;89:1; | 178:10;190:4;250:18 | Chapters (2) | classes (1) |
| 13,19,22;51:13,16, | 91:22;92:20;94:7; | cases (4) | 22:18;23:18 | 246:19 |
| 23;52:3,7;54:2,8; | 96:9;102:7;103:18, | 61:17;83 | characteristic (2) | classification (1) |
| 55:21;56:19,23;57:2; | 19;105:19,23;106:7, | 201:14;239: | 168:11;249:21 | 143:15 |
| 60:8;69:10 | 14,16;107:22;112:7; | cashing | characterization (2) | classifies (1) |
| buy (1) | 114:12;123:2,5,15, | 125:1 | 208:21;247:4 | 139:15 |
| 176:11 | 21;127:24;128:16; | categoriz | characterize (7) | classify (1) |
| C | 129:4,5;133:13; 134:17;138:5; | 31: | 11:14; | $18: 18$ |
|  | 141:21;142:20; | 32:4;162:3, | 198:21;204:20 | 240:8 |
| cabin-side | 146:19;147:4; | 163:17;205:2 | characterized (1) | cleaning (2) |
| 37:20 | 148:16;153:12; | cautioned (2) | 111:13 | 25:16,22 |
| CADNA (9) | 157:24;160:14; | 4:24;75:8 | characterizing (4) | clear (8) |
| 233:24;234:2; | 161:21;162:1;163:8, | cell (1) | 22:13;109:4; | 23:13;49:19;97:17; |
| $242: 7,8,11 ; 244: 20$ | $18 ; 165: 7,24 ; 166: 19$ | $117: 22$ | $127: 19 ; 160: 6$ | 99:9,11;202:22; |
| $21 ; 245: 10 ; 246: 19$ | 170:18,19;171:10 | certain (14) | chart (6) | $213: 10 ; 214: 3$ |
| calculate (1) | 172:5;173:3;175:11, | $20: 10 ; 32: 12,15$ | 140:15,16;143:3 | clearance (2) |
| 20:21 | 22;176:23;177:1; | 98:19,20;104:19,22; | 13;156:4;228:6 | 63:20;66:17 |
| calculated (2) | 178:2,3,12;180:4,10, | 162:16,16;184:15; | charts (4) | clearer (2) |
| 90:13;235:21 | 18,20;181:19;182:4; | 205:18;206:4,4; | 152:12;226:2 | 66:22;87:13 |
| calculates (1) | 184:21,22;194:4; | 231:18 | 229:20;230:8 | clearing (10) |
| 211:11 | 196:22;197:8,9; | certainly (30) | check (6) | $47: 6,13 ; 61: 15$ |
| calculating (1) | 198:2,23;200:7,8; | 80:3,4;81:19; | 41:2;50:2,3 | 62:7;63:1,4;64:11; |
| 173:17 | 201:16;202:4,6,8,19; | 82:20;89:24;91:23 | 192:19;200:18;219:9 | 74:8,14;147:6 |
| calculation | 204:8;205:12,22; | 92:13,18;97:21; | checked (1) | clearings (1) |
| 21:1 | 206:15;215:16,17; | 104:19;106:21; | 149:7 | 47:16 |
| Calculations (11) | 216:14;217:18; | 110:11,16;112:8 | checking (1) | client (8) |
| 16:1;21:3;57:9; | 219:15;223:17,18 | 118:10;133:23; | 193:6 | 12:21;13:16;35:17; |
| 93:5;94:13;119:6; | 225:19;226:7,11,24; | 142:19;144:5;158:7; | chemical (2) | 41:15;68:3;190:1,16, |
| 120:1;132:16,24; | 227:14;229:3,4; | 161:20;162:13,24; | 11:15,17 | 19 |
| 233:16;245:21 | 231:4;233:8;237:1,2, | 163:5;173:11;177:2; | chirping (1) | clients (1) |
| call (7) | 12;242:4;243:1,3,5; | 183:16;204:24; | 148:11 | 50:3 |
| 64:5;92:8;101:21 | 244:10,15;245:15; | 207:23;243:17; | choice (1) | climate (8) |
| 103:19;118:16; | 247:2;249:4;253:3; | 253:19 | 161:14 | 30:14,16,24;31:3,6 |
| 184:12;239:21 | 254:7,20 | certainty (1) | choices (1) | 10,14;32:3 |
| called (9) | cap (1) | 224:3 | 96:16 | Clock (2) |
| 140:18;153:14; | 244:8 | certificated (1) | choose (1) | 75:16;192:19 |
| 164:9;165:14;168:1 | capability | 12:8 | 96:17 | close (16) |
| 205:4,11;235:18; | 174:17 | certification (2) | chooses (2) | 30:8;37:21;39:3,8; |
| 251:2 | capable (2) | 50:8;99:23 | 11:10;12: | 43:7;85:21;86:12; |
| calling (1) | 106:18;225:19 | certified (1) | chose (4) | 88:19;92:2;98:22; |
| 67:4 | capacities (1) | 183:7 | 96:2,11;97:19; | 99:4;104:11;164:1; |
| calls (2) | 182:14 | cetera (7) | 98:15 | 174:8;235:9;238:19 |
| 17:15;148:9 | capacity (4) | 45:22;128:12; | circles (1) | closed (1) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 143:6 | 185:21;253:4 | completio | 25 | 169:23 |
| :---: | :---: | :---: | :---: | :---: |
| closer (7) | Committee (19) | 171:11 | 53:1 | onsistently (3) |
| 76:13;87: | 5:12;41:5;49:11 | complex | -120 | 208:5,14,15 |
| 19;107:23;108:2; | 75:21;90:2;94:18 | 9:8;10:3,7,20;1 | 132:3;162:16;202:7; | constitute (1) |
| 248:9 | 99:22;100:1;101:12, | 2:18;131:24 | 225:19;238:22,23; | 116:12 |
| closest (5) | 17,20;111:19;121:5; | compl | 39:7,10, 12, 15,17, | constrained (1) |
| 87:7;92:6;107:8 | 138:16;199:10; | 34:12;52:5;185:24, | $2 ; 240: 7 ; 242: 12$; | 29:23 |
| 178:5 | 231:17;252:7;25 | ;186:18;189:6,12; | 49:3;252 | onstraint |
| colleague | 9 | 00:3,12;202:1,23; | conduct | 29:22 |
| 242:6 | Com | 03:15 | 251:1 | constraints |
| colleagues | 85:20;157:1 | complicat | conduct | 29:7,10;236 |
| 246:2 | common (2) | 214:11 | 35:2;200:13;238:1, | construct (1) |
| collect | 90:2 | complies | 2 | 9:19 |
| 97:8;198:9;214 | commonality | 229:12 | conduit | constructed |
| collected (17) | 183:12,15,17 | co | 73:22;74:6, | 62:9 |
| 80:14;82:1; | comm |  | conference (2) | constructing (2) |
| 90:4;95:7;10 | 233:21,23 | 142:21;186:3;254:9 | 154:6,9 | 63:2;127:9 |
| 114:11;194: | communication | complying (1) | confident | construction (24) |
| 197:15,17,18,20 | 134:22;242:6 | 115:24 | 167:5 | 9:9;25:16;38:14 |
| 207:3;211:5;220:15; | community (14) | co | confidenti | 18;40:18;41:18; |
| 230:20;232:12 | 75:23;98:6;119 | 39:6;194:14,16 | 121:20;122:1 | 53:19,24;55:18,19 |
| collecting (7) | 11,22;120:1;141:22; | components (5) | 123:3,14 | 59:20;62:16;65:2 |
| 96:23;198:20 | 164:6;184:2;195:11; | 38:20;39:12;71:17 | configurations ( | 66:11,14;69:5;70: |
| 207:9;220:4,6;227:6; | 196:18;197:9;235:9; | 194:11;234:10 | 62:1 | 72:23;129:21; |
| 232:2 | 252:8 | compo | confined | 130:19;177:20; |
| collection | compac |  | 164:19 | 192:5;195:15 |
| 61:17;62:5 | 19:9 | computer (3) | confirm (5) | consult (2) |
| 65:11;97:5;203:22 | comp | 59:9;94:9;152 | 17:13;26:7;125:2 | 123:1,20 |
| 22;219:6;222:3 | 159:1 | Con | 127:12;1 | consultant (2) |
| collections (1) | comp | 15 | confirmati | 170:13;198:1 |
| 89:16 | 45:20;49:19;50:1 | concer | $26: 2$ | contained (5) |
| co-located | 51:24;52:13,17; | 186:13,19;202:20; | confirme | 15:3;78:17;88:15; |
| $222: 4 ; 224: 1$ | 53:10,23;79:5;82:1; | 203:13 | 58:11 | 120:22;122:13 |
| color (1) | 99:2;106:18;114:6; | concerned | confirming | contains (1) |
| 217:23 | 202:4;242:7,8 | 192:22 | 24:1 | 101:7 |
| column (1) | compa | concerns (5) | confused | contaminants (1) |
| 239:4 | 135:22;144 | 51:7;97:18 | 139:21;215: | 165:1 |
| combina | compared (3) |  | confusion (1) | contaminated (1) |
| 64:8;161:1;175 | 112:4;143:13 | conc | $42 \cdot 11$ | 203:23 |
| comfort (1) | comparing (1) |  | connecti | contaminating (4) |
| 170:3 | 139: | co | 82:2 | 203:21;205:18; |
| comfortable (4) | compendiu | 254: | consequenc | 206:5;232:1 |
| 186:5,9;252:6 |  | conc | 172:15;173: | contamination (1) |
| 253:12 | comp |  | Conservation | 232:1 |
| coming |  |  | $9 \cdot 1$ | content (2) |
| 31:24;116:5,7 | com | 00:10; | conservatism | 116:11;206:9 |
| 166:14;240:1 | 190 | co | 93:21;118:6; | contention (1) |
| comment (3) | complai | ;-231:1 | 238 | 161:18 |
| 82:19;84:6;150:20 | 163:3 | conclusive (1) | conservative | context (2) |
| comments (4) | com |  | 119:24;152 | 138:13;195:10 |
| 51:6;83:20;25 | , | cond | consider | continuation (1) |
| 254:21 | . 21 |  | 135. | 66:16 |
| commercia | complaints (13) | condition (12) | 3:22,23;1 | continue (2) |
| 191:13 | 50:4;92:3;162:9 | 38:21;46:6;51:11 | 162 | 4:4;194:7 |
| Commissi | 15,19,23,24;163: | 24;53:19; | con | continuing (2) |
| 50:15 | 17;176:17,188:23; | 126:13; | 66:19 | 22:2;183:11 |
| commissioned (1) | 200:4;201:2 | 9;213:16; | considerati | contour (3) |
| 131:16 | complet | 216:17;238:21 | 85:1;115:18;23 | 113:21,21,24 |
| commit (2) | 244:6 | conditioner (1) | considered (2) | contours (4) |
| 184:16;185:14 | comp | 145:22 | $29: 7 ; 71: 18$ | 111:8;113:20; |
| commitment (1) | 17 | conditioners (1) | Considering (1) | 235:21;248:18 |
| 186:16 | completely (2) | 145:12 | 153:16 | contract (2) |
| committed (2) | 158:9;241:15 | conditions (25) | consistent (1) | 120:7;252:9 |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| contractor (17) | costs (1) | crossover (1) | 123:11 | decide (1) |
| :---: | :---: | :---: | :---: | :---: |
| 11:10;12:2,10,11, | 174:19 | 183:14 | Davis (1) | 101:17 |
| 15,16;13:12,15,18; | counsel (3) | crushed (5) | 223:2 | deciding (1) |
| 34:11;35:2,17;45:20, | 15:1;123:20; | 18:6,9,10,13;19:9 | day (16) | 214:6 |
| 21;46:1;57:24;58:2 | 229:11 | culvert (1) | 89:14;100:4;118:9; | decision-making (1) |
| contractors (1) | count (1) | 57:13 | 138:10;142:21; | 202:2 |
| 46:8 | 171:9 | Culverts (3) | 149:8,12,13;150:5, | decommissioning (5) |
| contractual (2) | country (5) | 16:6,7,18 | 10,15;174:2,3; | 16:13,16;17:8,15, |
| 126:19;251:20 | 130:15;132:19; | curiosity (1) | 200:20;202:8;214:13 | 19 |
| contributes (3) | 162:10;233:24; | 68:13 | day/night (1) | Deere (2) |
| 80:5;104:21;163:7 | 241:20 | curious (5) | 140:17 | 189:14,15 |
| contribution (2) | couple (10) | 49:20;99:3;147:8, | days (9) | defined (2) |
| 93:23;232:15 | 40:8;78:21;79:13, | 10;150:1 | 145:24;157:5; | 18:7;239:11 |
| control (4) | 15;80:11;83:20; | currently (1) | 194:23;200:14,21 | defining (1) |
| 40:15,20;133:11; | 148:4;166:23;179:9; | 192:5 | 214:12,18;215:7; | 195:23 |
| 184:6 | 214:23 | curve (2) | 218:4 | definitely (2) |
| controlled (1) | course (6) | 191:21,23 | days' (1) | 72:9;229:8 |
| 48:14 | 80:2;88:24;95:10; | curves (2) | 212:15 | definition (2) |
| convention (1) | 102:10;186:2;221:7 | 48:18,19 | daytime (1) | 208:10;240:6 |
| 214:16 | Court (10) | cut (1) | 81:19 | definitive (1) |
| conversation (1) | 5:1;14:1;75:8; | 60:2 | dBA (6) | 70:5 |
| 157:3 | 96:6;138:23;177:18; | cuts (2) | 78:13;122:16,17, | degree (3) |
| conversion (1) | 219:9,13,17,20 | 47:16;71:24 | 18;141:19;168:19 | 89:8;104:18;105:1 |
| 81:7 | cover (3) |  | DC (1) | delineated (3) |
| convert (1) | 111:7;220:12; | D | 133:12 | 20:18;71:21;73:10 |
| 131:12 | 235:20 |  | dead (1) | deliver (1) |
| Cooling (2) | covered (2) | Daniel (4) | 67:11 | 198:5 |
| 182:11,17 | 14:21;226:14 | 4:15,23;5:3;6:4 | dead-ends (1) | delta (3) |
| coordinate (1) | covers (1) | dark (1) | 147:22 | 80:8;83:1,21 |
| 12:20 | 41:10 | 46:14 | deal (5) | demonstrate (1) |
| copies (1) | crackling (1) | dash (2) | 16:13;31:7;35:3; | 157:23 |
| 229:5 | 149:18 | 187:24;204:5 | 162:13;223:18 | demonstrated (3) |
| copy (7) | crane (13) | data (62) | dealing (1) | 162:6;163:2,11 |
| $120: 4,5,7 ; 154: 2$ | 59:19;61:18;62:9 | 32:9,17;77:23; | 43:5 | demonstrates (1) |
| 155:17;204:8;229:19 | 63:3,5;64:2;65:16; | 78:2;80:13,13;82:1, | deals (1) | 154:15 |
| coring (1) | 72:12,15,22;73:1; | 1;88:18;90:5,8,21; | 26:10 | DEP (3) |
| 58:7 | 74:18,20 | 95:7;96:24;97:4,9; | decibel (10) | 201:2,14;203:14 |
| corner (2) | create (1) | 103:1;108:5,15,19; | 83:6;119:8;149:24; | Department (6) |
| 86:18;107:14 | 59:18 | 109:4;114:10; | $150: 22 ; 155: 2 ; 169: 9$ | $5: 9 ; 34: 15 ; 35: 23,$ |
| corollary (3) | credentials (1) | 121:16;122:12,16; | 174:8;182:15; | $24 ; 50: 15 ; 200: 3$ |
| 44:23;104:22; | 185:11 | 123:6;127:7,12; | 189:21;201:16 | depend (2) |
| 175:10 | credit (2) | 135:24;166:10,22; | decibels (77) | 39:16;104:18 |
| corrected (2) | 111:10;153:7 | 175:14,15;187:4,14; | 78:7,13;80:1,2,7, | dependent (1) |
| 82:4;253:22 | criteria (15) | 192:8;197:19,23; | 11;83:8,23;84:8; | 43:13 |
| correction (5) | 62:2;83:1,2,16,22; | 198:1;202:1,5,9,9; | 89:3,4;90:16,22;91:3, | Depending (1) |
| $78: 15,16 ; 207: 11$ | 84:15,16;85:2;98:17; | 207:3,14;213:13,14, | $13,19 ; 93: 5 ; 95: 4$ | $37: 12$ |
| 253:19,20 | 115:21;116:1,3; | 18;214:15,23,24; | 100:4,4,102:9,14,15, | depends (1) |
| corrections (5) | 120:16;135:21; | 215:19;216:3,11; | 22;103:5,7,23,23; | 24:4 |
| 6:20;77:14;140:15; | 161:21 | 217:3;220:7,13,22; | 104:1;105:15,18,24; | depicted (1) |
| 207:13;211:2 | critical (1) | 226:18;227:2,7; | 111:15;114:13; | 87:21 |
| correctly (10) | 178:3 | 235:16 | 116:5,7,8;118:24; | DES (12) |
| 9:24;14:6;19:19; | critique (1) | database (1) | 138:10;139:18; | 13:3,4,4;18:15,18; |
| 38:3;40:20;94:2,4; | 253:13 | 153:1 | 143:5;144:12; | 23:3;25:8;32:24; |
| 98:11;126:24;139:13 | cross (4) | DataKustik (1) | 150:24;151:13,17,18, | 33:1;41:5;46:6;50:23 |
| corresponded (1) | 7:7;20:14;85:5; | 242:9 | 21,22;152:4,9;155:3; | describe (11) |
| 212:6 | 193:24 | date (5) | 168:15;173:17,21; | 19:3;29:10;49:21; |
| corresponding (1) | CROSS-EXAMINATION (12) | 32:21;114:11; | 174:1,2;179:16; | 61:12,21;146:17; |
| 215:8 | 8:12;34:3;40:6,10; | 126:2;242:24;243:16 | 180:7,11;181:5; | 148:4,5;163:18; |
| corridor (6) | 86:22;95:21;99:16; | dated (9) | 196:4,6,21;197:7; | 177:8,10 |
| 59:19;61:16,18; | 137:22;138:1; | 6:9,14;50:16;76:9; | 216:13,22;217:2,5; | described (4) |
| 62:18;63:15;65:10 | 178:20,24;247:21 | 77:10;79:2;123:12, | 218:14;230:21; | 9:22;42:8;250:21; |
| corridors (2) | cross-examine (1) | 18;133:7 | 231:19;237:2,4,22, | 252:18 |
| 61:7,22 | 208:24 | David (1) | 23;238:6;249:13 | description (1) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 122:19 | differences (3) | 123:3 | $25: 23$ | $147: 3,11,15,17,19$ |
| :---: | :---: | :---: | :---: | :---: |
| descriptions (3) | 27:21;128:15; | discovering (1) | documenting (1) | $148: 1,3$ |
| 9:12,12;199:16 | 53:3 | 65:16 | 136:18 | driving (3) |
| deserves (2) | different (44) | discussed (6) | documents (7) | 56:3;150:1 |
| 245:13,16 | 26:5;43:9,14,15, | 8:21;17:17;47:4 | 121:6,19;123:23 | 210:19 |
| design (17) | 15;61:10;62:1;89:4; | 66:23;199:16; | 4:14;126:19; | drop-off (3) |
| 6:1,2;23:23;29:7 | 95:13,14,14;98:4,5; | 222:16 | 134:8;141:23 | 28:14,20,22 |
| 33:7,8;48:22;49:3; | 110:9;116:10,11,12, | discussion (11) | dog (1) | droughts (1) |
| 57:19;62:2;67:22,24; | 17,18;117:5;120:13; | 17:22;18:2;61:14 | 149:23 | 31:7 |
| 71:7;80:7;128:5; | 127:11;134:14,15; | :22;80:3;121:15 | dogs (4) | due (2) |
| 172:12;206:16 | 141:17;144:5;148:6; | 140:17;157:7; | 148:13;150:4 | 163:1,9 |
| designed (8) | 151:23;161:20; | 190:18;247:24 | 174:3;210:19 | duly (2) |
| 20:12;22:11;23:11; | 164:2;167:13; | 250:13 | dominate (1) | 4:24;75:7 |
| 30:5;131:18;144:24; | 179:21;182:13; | discussions (3) | 10:21 | DUPEE (1) |
| 241:9,9 | 189:11;195:11; | 78:3;124:17; | done (36) | 214:20 |
| designer (1) | 198:3;201:5;202:6; | 146:20 | 9:14,17,19;10:8; | duration (1) |
| 16:16 | 213:4;216:24; | dismissed (1) | 13:9,11;20:22;24:20; | 159:23 |
| designs (1) | 228:20;249:21; | 75:2 | 34:11;37:8;54:6; | during (27) |
| 128:2 | 251:5;253:1 | disposed (1) | 56:12;58:6,9;61:15; | 9:8;16:10;48:22; |
| detail (2) | differential (1) | 16:22 | 66:15;83:11;86:2,10; | 62:16;65:2;66:11; |
| 19:15;158:16 | 48:10 | disruption (1) | 94:9;101:4;105:22; | 73:18;79:18,22;80:2, |
| detailed (2) | differently (1) | 39:14 | 126:2,3;130:3; | 19;89:11,14,16; |
| 88:22;101:6 | 143:22 | distance (11) | 152:18;166:24; | 100:4;110:18; |
| details (2) | difficult (7) | 89:20;92:11;98:19, | 195:13;204:21; | 148:23;149:8,9; |
| 64:24;126:20 | 43:11,17;54:18,21 | 20;107:24;224:2; | 205:2;237:15,23 | 150:5;178:24; |
| determine (5) | 89:5;249:1,16 | 234:19;235:4;237:9; | 238:23;249:20; | 211:23;212:16,20; |
| 12:16;189:5,10; | difficulties (1) | 238:12,21 | 250:18;251:9 | 215:7,9;221:7 |
| 210:12;228:13 | 82:24 | distances (7) | door (1) | Dynamic (1) |
| determined (1) | difficulty (1) | 92:15,16;178:4,9 | 173:19 | 153:14 |
| 56:16 | 81:16 | 235:7;237:19;238:16 | DOT (1) |  |
| develop (1) | digital (1) | distant (1) | 12:24 | E |
| 68:2 | 152:24 | 148:13 | double (1) |  |
| developed (3) | digress (1) | distinction (1) | 66:13 | earlier (19) |
| $38: 19 ; 53: 7 ; 113: 6$ | 118:15 | 198:14 | down (32) | 29:16;40:9;46:23; |
| developer (8) | dip (1) | distributed (2) | 13:8,10;28:18 | 51:5;111:12;113:10; |
| 41:16,21,22,24; | 48:13 | 13:24;14:4 | 44:1;64:23;67:7 | 114:22;138:16; |
| 53:10;120:11; | DIR (4) | disturbance (4) | 73:14;86:7,9;87:18, | 144:10;151:11; |
| 174:18;177:5 | 49:13,15;50:11,14 | 27:24;28:1,2,8 | 19;95:9;103:22; | 160:10;180:12; |
| developers (2) | DIRECT (18) | disturbed (7) | 107:13;116:19; | 191:10,22;228:2; |
| 233:14;242:11 | 4:11;8:19;34:6; | $9: 8,23 ; 10: 2 ; 27: 22$ | 132:24;147:8; | 235:16;243:12; |
| developing (2) | 49:17;75:11;82:10 | 28:6,23;42:16 | 168:22;200:9;212:9, | 249:7;253:13 |
| 57:24;120:12 | 100:19,20;133:7; | ditches (2) | 12,24;218:7,7,8,9,14, | early (1) |
| development (2) | 179:1;199:13,24; | 57:1,18 | 23;220:1;224:14,18; | 138:9 |
| 5:20;233:20 | 201:7;204:2,4;205:3; | ditching (1) | 225:5 | earned (1) |
| device (1) | 215:18;217:7 | 56:18 | downs (1) | 183:5 |
| 182:5 | directing (2) | docket (4) | 145:7 | easier (2) |
| DG200266 (1) | 8:18;16:4 | 6:6;76:8;77:5;79:2 | downward (2) | 62:15;216:6 |
| 123:18 | direction (1) | document (40) | 239:17;240:6 | easily (1) |
| diagram (2) | 66:7 | 11:3;14:24;22:8 | downwind (9) | 207:19 |
| 63:13;67:2 | directions (2) | 27:3;41:7;51:9; | 93:19;118:4;128:2; | east (2) |
| diameter (3) | 93:19;98:4 | 57:12;64:16;100:23; | 132:18;238:16; | 98:4;148:1 |
| 192:12,13;225:24 | directly (1) | 101:1;107:4;121:2; | 239:10,15,22;240:7 | easterly (1) |
| diameters (1) | 101:11 | 122:14;123:4,8,10, | draw (1) | 93:12 |
| 127:11 | disagree (4) | 11,14,18;124:5,5,12; | 232:24 | edge (4) |
| diff (1) | 84:23;208:20 | 133:9,14;134:9,20; | drawings (2) | 27:22,24;107:18; |
| 196:9 | 253:21,24 | 139:5,10;140:1,6,8, | 19:15;56:19 | 113:22 |
| difference (16) | disagreement (1) | 17;141:16;156:24; | Drive (4) | educate (2) |
| 78:9;97:4;110:2,4; | 161:8 | 157:13,14;199:11; | 4:19;56:3;68:6 | 138:5;159:4 |
| 112:7,16,18,19; | disastrously (2) | 217:11;222:24; | 72:21 | education (2) |
| 119:21;149:17; | 173:12,13 | 227:21 | driven (1) | 183:11,23 |
| 150:16;185:5; | disclaimers (2) | documentation (1) | 64:2 | Edwards (2) |
| $202: 12 ; 203: 2,12 ;$ $243: 23$ | $126: 9,12$ | 153:21 | driveway (11) | $33: 23 ; 137: 6$ |
| 243:23 | disclose (1) | documented (1) | 86:10,11,11;87:19; | effect (4) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 101:14;151:23; | emission (2) | 20:8;62:17;104:11, | 148:12,12;184:8,14; | 16:18;28:7;39:2; |
| :---: | :---: | :---: | :---: | :---: |
| 171:12;197:10 | 179:16;180:1 | 12;105:17;212:15; | 238:18 | 42:22;84:22;90:21; |
| effective (2) | emitting (2) | 213:9 | ethic (1) | 110:15;115:8; |
| 126:14;230:5 | 119:7;122:18 | entirely (2) | 184:15 | 117:14;173:14,16; |
| effects (2) | empirical (1) | 49:2;182:23 | ethics (3) | 176:2;181:3;182:12; |
| 97:15;228:15 | 250:21 | entitled (1) | 185:15,21;189:18 | 183:21;187:2;196:4; |
| efficiency (1) | employed (4) | 228:13 | Europe (1) | 252:19 |
| 68:7 | 5:5,7;67:20;75:18 | environment (6) | 81:5 | examples (1) |
| efforts (1) | Employing (1) | 91:8;145:6;151:8; | evaluate (3) | 247:1 |
| 25:13 | 153:15 | 195:17;196:21;197:6 | 12:3;101:10; | excavated (1) |
| egregiously (1) | enclosed (1) | environmental (15) | 231:13 | 60:3 |
| 174:22 | 51:1 | 25:20;40:10,11,14, | evaluating (2) | exceed (2) |
| eight (1) | encountered (1) | 24;41:11,13;50:16; | 101:12,17 | 156:15;157:24 |
| 76:1 | 192:14 | 133:10,16;144:18; | Evaluation (2) | exceeded (1) |
| Eighteen (1) | encourage (1) | 200:3;205:11;223:3; | 138:15;202:1 | 126:15 |
| 188:1 | 158:3 | 228:16 | evaluations (1) | exceeds (1) |
| either (16) | end (20) | envision (1) | 202:6 | 195:21 |
| 6:21;10:10;20:3; | 38:17;55:7,11,19; | 48:12 | evasive (1) | except (1) |
| 28:15,23;35:17; | 65:2,6;67:11;119:4; | EPA (11) | 125:20 | 151:4 |
| 37:12;44:5;46:20; | 122:1;129:22; | 31:19;134:8;139:5, | even (18) | excerpt (1) |
| 49:16;57:1;71:3; | 130:18,20,22;131:22; | 15;140:1,16,21; | 28:15,15;74:21; | 233:9 |
| 77:15;222:22; | 139:18;167:18; | 141:11,12,16;143:14 | 81:11;87:18;100:12; | excess (1) |
| 234:15,20 | 173:7;177:22; | EPA's (1) | 102:21;115:7;134:1; | 237:20 |
| elaborate (1) | 193:24;248:6 | 140:3 | 136:9;144:19; | exclude (3) |
| 71:8 | ended (1) | Epsilon (4) | 167:14;189:23; | 205:17,18;206:4 |
| electric (1) | 196:11 | 75:20;76:5;80:13; | 231:9;237:16;244:5; | Excuse (20) |
| 188:15 | ends (1) | 82:1 | 249:5;250:1 | 4:21;22:6,15;23:7; |
| electrical (2) | 64:4 | equal (3) | event (3) | 26:18;54:23;76:10; |
| 65:18;191:23 | Energy (7) | 105:4;139:2;225:4 | 196:19;203:9,11 | 80:23;96:7;118:18; |
| electricity (1) | 11:21;76:2;132:1 | equals (1) | events (9) | 125:16;130:22; |
| 64:7 | 133:21;136:22; | 224:4 | $30: 18 ; 32: 11 ; 105: 3 ;$ | 134:5;140:5;141:12; |
| electronic (6) | 161:7;189:14 | equations (1) | 183:13,13;211:10; | 155:15;178:12; |
| 139:9;155:17; | engage (1) | 233:15 | 218:22;219:1;220:20 | 201:21;204:3;205:17 |
| 157:14;187:20; | 158:3 | equipment (11) | Everybody (4) | exercise (2) |
| 199:11;217:11 | engineer (21) | 6:3;55:8,15; | 83:7;115:13; | 119:23;224:6 |
| Electronically (3) | 5:11,14,18,24;6:1; | 106:15;146:19; | 202:22;208:11 | exercises (1) |
| 36:6,12;153:12 | 52:4,8,10;53:8,9,23; | 149:8,17;150:15; | everyone (5) | 246:22 |
| elevation (5) | 54:4,4;58:4;170:24; | 159:19;160:3;181:3 | 9:3;93:6;193:20; | Exhibit (30) |
| 27:21;28:3,10; | 171:5,7,13,16,20; | equivalent (1) | 229:18;236:12 | 6:10,16;15:2; |
| 43:4;153:1 | 172:11 | 239:11 | everywhere (2) | 21:10,19;36:3,10,12, |
| elevations (2) | engineered (1) | erected (1) | 84:17;198:17 | 16;41:5;76:10;77:6, |
| 27:16;43:6 | 172:12 | 221:7 | evidence (2) | 11;86:15;87:22; |
| eliminate (1) | Engineering (11) | erosion (2) | 32:2,8 | 107:11,12;113:19; |
| 211:8 | 5:9;26:6;29:7; | 40:15,19 | exacerbate (1) | 132:17;153:11; |
| eliminates (1) | 53:1;54:3;56:11; | erratic (2) | 31:1 | 155:22;179:3,6; |
| 211:9 | 58:3;127:13;153:16; | 37:20;39:17 | exact (4) | 187:16;199:12; |
| eliminating (1) | 250:19,21 | erratics (2) | 70:13;213:3; | 200:1,7;209:7; |
| 163:14 | engineers (2) | 37:5;38:23 | 222:21;227:13 | 242:22;244:2 |
| else (9) | 35:4;184:6 | essentially (6) | exactly (12) | exhibits (4) |
| $45: 24 ; 67: 15 ; 68: 13$ | engines (4) | 67:11;72:1;159:17; | $12: 19 ; 13: 10 ; 28: 5$ | 41:5;167:10; |
| 83:7;105:4;113:2 | 109:17;163:22,24; | 168:21;175:13; | $30: 2 ; 107: 2,21$ | 227:23;233:1 |
| 115:12,13;203:19 | 164:4 | 214:12 | 146:18;147:8; | exist (5) |
| else's (1) | enjoy (2) | establish (3) | 194:19;205:24; | 130:14;133:21; |
| 93:6 | 114:24;115:4 | 25:1;34:21;61:15 | 214:9;226:6 | 134:1,18;239:12 |
| email (1) | enough (12) | established (2) | exam (1) | existed (2) |
| 243:3 | 55:14;65:17;70:22; | 73:6;83:17 | 185:9 | 103:10,13 |
| e-mail (5) | 135:23;162:8; | estimate (3) | EXAMINATION (3) | existence (2) |
| 242:4;243:2,15,18; | 164:20;166:24; | 109:2;140:21; 152.5 | 4:11;71:1;75:11 | 11:20;145:17 |
| 244:4 emanating (2) | 190:1;243:17,18; | $152: 5$ estimated (2) | examined (1) | existing (9) |
| emanating (2) | 250:8,11 | estimated (2) | 196:18 | 27:15;28:19;29:21; |
| 133:4;234:14 | ensure (2) | 234:9;237:11 | examining (1) | 31:11;63:14;109:6; |
| eminently (1) | 51:19;53:21 | et (7) | 192:24 | 129:5;160:6;238:4 |
| 167:21 | entire (7) | 45:22;128:12; | example (18) | exists (5) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 131:24;133:22; | extracted (1) | 138:17;177:6,13,21; | 83:13;149:12,13; | 94:23 |
| :---: | :---: | :---: | :---: | :---: |
| 135:16;180:10,21 | 215:10 | 188:22 | 166:22 | flat (1) |
| expands (1) | extreme (5) | farms (1) | finalized (1) | 20:10 |
| 104:11 | 30:18;31:16,21; | 136:9 | 60:7 | flatbed (2) |
| expansive (1) | 32:5;33:3 | farther (2) | finally (3) | 63:9;73:2 |
| 14:5 | extremely (5) | 13:8;108: | 62:8;71:20;84:11 | flooding (1) |
| expect (7) | 81:13,13;84:9,9; | fashion (1) | find (20) | 31:8 |
| 20:11;42:23; | 87:17 | 101:8 | 14:17;36:15;72:5; | floor (2) |
| 102:11;113:9;120:2; |  | fate (1) | 81:14;105:10,11,13, | 103:18,24 |
| 176:3;196:1 | F | 16:17 | 17;120:24;144:18, | flow (4) |
| expectation (4) |  | features (1) | 19;153:13;155:10; | 18:24;19:23,24; |
| 60:15;195:12; | facility (1) | 16:14 | 173:23;182:17,20; | 20:11 |
| 196:3;252:24 | 9:20 | February (1) | 187:4;222:20; | flowing (1) |
| expected (15) | fact (11) | 228:12 | 251:11;253:3 | 149:19 |
| 30:24;31:3,6,10, | 33:1;51:20;52:10; | fed (1) | finding (2) | flows (1) |
| 15;32:4,6;33:4;45:9; | 69:7;70:3;82:22; | 210:20 | 69:1;231:8 | 19:12 |
| 61:21;78:12;90:13; | 167:20;175:12; | feeding (1) | findings (1) | flying (3) |
| 112:11;211:24;212:7 | 227:23;231:9;252:12 | 150:5 | 168:14 | 69:3;110:16; |
| expecting (1) | factor (2) | feel (5) | fine (5) | 115:14 |
| 138:21 | 29:24;188:3 | 167:4;172:4; | 19:9;51:4;184:13; | focusing (1) |
| experience (15) | factored (1) | 198:15;219:22;252:6 | 224:7,11 | 76:1 |
| 5:17,19;13:17; | 215:13 | feet (43) | fines (1) | folks (4) |
| 33:8;50:2;91:10,23; | faintly (3) | 28:8,11;55:3,11,11, | 18:14 | 56:11;111:20; |
| $92: 1 ; 112: 1 ; 132: 2$ | 249:4,24;250:3 | 12,13,14,21,22;61:9, | fingers (1) | 135:19;209:22 |
| 139:16;143:16; | faintness (1) | 9,10,19;62:4,11;63:1, | 100:22 | follow (1) |
| 151:8;183:10;185:11 | 249:15 | 21;64:1;65:16,20; | finish (2) | 57:5 |
| experienced (7) | fair (15) | 66:4;70:13;74:5,14, | 232:19;254:11 | followed (3) |
| 34:11;45:19,21; | 43:10;45:16; | 15;86:9;87:3,8;92:6, | finished (2) | 22:22;53:12;61:11 |
| 46:5,10;216:16; | 172:10,18;181:14,22, | 8;96:8,9;97:3;99:5; | 192:7;193:23 | Following (4) |
| 224:21 | 24;193:16;195:19,22, | 107:7;147:1,24; | firing (1) | 46:15;51:1;97:11; |
| experimental (3) | 24;208:21;218:12,13, | 150:4;178:6,7; | 84:22 | 156:4 |
| 175:13;228:13; | 22 | 222:10;236:2 | firm (7) | follow-up (1) |
| $252: 2$ | fairly (5) | felt (2) | 41:18;51:18;53:2; | 143:10 |
| expert (3) | 20:10;86:12;88:19; | 106:10;207:10 | 54:3;79:17;160:23; | forced (1) |
| 20:23;69:4;164:21 | $129: 18 ; 252: 6$ | fetch (1) | 176:16 | 20:13 |
| experts (2) | fall (2) | 224:19 | first (35) | forest (2) |
| 172:3;176:17 | 25:3;26:22 | few (10) | 9:4;13:13;42:7,22; | 27:23;28:11 |
| explain (15) | falls (1) | 18:14;83:4;97:2; | 44:2,21;50:19;62:15, | forested (1) |
| 24:19;51:11;72:13; | 19:24 | 178:9;185:4;199:13; | 23;63:5,18,22;65:15; | 27:10 |
| 77:19;87:12;96:10; | Falmouth (1) | 204:10;209:5; | 67:5;73:23;74:13,16, | forget (1) |
| 103:14;126:11; | 200:5 | 218:17;224:8 | 17;79:15;104:15; | 213:2 |
| 127:24;138:11; | familiar (16) | field (2) | 132:9;137:15;142:4; | forgetting (1) |
| 148:16;162:12,22; | 16:15,17;17:16; | 149:6,10 | 149:8;156:4;186:15, | 241:4 |
| 202:19;206:11 | 33:12;42:2;44:4; | fields (1) | 19,23;191:5;192:20; | forgot (1) |
| explained (2) | 47:1;60:21;142:10; | 38:23 | 228:9;239:4;244:5; | 70:10 |
| 180:12;244:23 | 227:19;228:8,11,17, | Fifteen (1) | 253:14;254:21 | form (2) |
| explains (3) | 19;229:21;231:8 | 21:2 | firsthand (3) | 82:6;101:3 |
| 139:10;202:2; | families (1) | figure (9) | 110:17;135:18; | Formula (1) |
| 208:3 | 115:8 | 23:3;76:23;152:16; | 149:4 | 47:20 |
| explanation (1) | fan (1) | 156:2,6;167:16; | Fish (1) | forth (8) |
| 116:24 | 148:8 | 172:17;217:15;249:8 | 136:21 | 22:12;23:7,9; |
| exposed (3) | far (20) | figures (3) | fit (2) | 64:12;131:17;162:4; |
| 164:1;225:6; | 40:23;56:12;63:13; | 209:24;221:3,12 | 168:11;236:5 | 167:21;169:19 |
| 226:20 | 68:4;95:8;106:22; | filed (4) | five (23) | Forty-one (1) |
| expressed (1) | 107:3,19;108:8; | 78:4,22,24;121:19 | 28:7;54:15;106:20; | 91:13 |
| 98:18 | 115:13;173:2; | filled (1) | 108:5;122:8;146:11; | forward (2) |
| expression (3) | 177:24;179:10; | 60:1 | 194:21;197:15,18; | 12:10;253:23 |
| 44:16,20;45:3 | 192:15;221:23; | fills (2) | 198:20;199:6,15; | found (11) |
| extent (4) | 222:2;249:4;250:3,8, | 47:16;71:24 | 206:21;210:3;212:9, | 147:9;154:16; |
| 19:4;24:17;230:2; | 11 | Filter (3) | 24;220:5;221:3; | 159:4;177:19; |
| 232:14 | farm (10) | 158:18;230:12,19 | 222:2,6;232:12; | 188:17;189:20; |
| exterior (1) | $47: 22 ; 116: 6 ; 126: 4$ | final (7) | 235:15;240:19 | 190:11;216:9; |
| 143:1 | 135:11;136:1; | 38:19;39:5;66:18; | fix (1) | 230:11;237:15;238:4 |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| four (9) | 141:2 | 169:22;174:7; | 43:8 | 45:14 |
| :---: | :---: | :---: | :---: | :---: |
| 14:4;42:7;44:2; | GEIGER (1) | 211:19;243:17,18 | grows (1) | guys (2) |
| 92:18;149:15; | 15:8 | gosh (1) | 25:6 | 45:23;68:22 |
| $\begin{aligned} & 188: 11 ; 224: 24 \\ & 226: 13: 232: 12 \end{aligned}$ | general (10) $44: 19 \cdot 45 \cdot 19: 61: 1 ;$ | 176:6 government (1) | $\begin{gathered} \text { growth (1) } \\ 25: 1 \end{gathered}$ | H |
| fourth (1) | 79:19,23;92:11;97:1; | $134: 7$ | guarantee (7) | H |
| 6:16 | 98:6;117:16;173:5 | grade (2) | 119:20,21;120:14; | half (13) |
| Frankly (2) | generally (16) | 17:12;56:22 | 125:10;167:1; | 11:1;45:14;80:14; |
| 103:20;116:1 | 22:23;26:15;29:9; | graded (3) | 251:14,15 | 88:20;89:1;92:18; |
| free (1) | 47:10;53:17;57:5; | 17:11;19:7;28:18 | guaranteed (8) | 95:10;102:10;104:4, |
| 219:22 | 81:4;93:2;103:5; | grades (4) | 78:14;94:11,15 | 8;122:7;192:20; |
| frequencies (6) | 127:18;145:13; | 27:15;48:6,7;56:16 | 119:12;120:6; | 193:5 |
| 116:18;117:6; | 160:18;169:2; | granted (1) | 125:18;179:13; | half-hour (1) |
| 158:10;160:13 | 210:22,23;225:1 | 97:22 | 251:24 | 150:14 |
| 161:23;163:1 | generate (2) | graph (4) | guaranteeing (5) | Hampshire (21) |
| frequency (17) | 117:23;119:9 | 88:22;167:11,15 | 78:10;119:3,6; | 5:15;8:15;18:6; |
| 31:21;32:11; | generated (1) | 221:11 | 120:18;175:16 | 22:5,10,18,21;23:8; |
| 116:11;128:18; | 128:10 | graphs (4) | guarantees (2) | 30:18;31:20;32:24; |
| 130:7;153:17; | generating (1) | 79:24;102:6;221:4 | 118:14;180:1 | 33:12;34:15;46:17; |
| 154:18;157:2;159:6; | 119:13 | 226:2 | guaranties (1) | 50:7;60:22;84:12; |
| 162:2;164:5;198:3,9; | Genest (1) | grass (2) | 118:16 | 99:19;113:1;138:15; |
| 206:9,21;226:7; | 7:22 | 25:5;56:4 | guaranty (36) | 152:24 |
| 249:20 | gentle (1) | gravel (8) | 94:14;118:17; | hand (1) |
| frequent (4) | 48:6 | 18:6,8;19:2,2,8 | 119:15;120:4,9,20; | 252:3 |
| 30:17;31:16;32:4; | Gentlemen (3) | 55:2;56:4;65:5 | 122:1,19,22;124:8, | handle (1) |
| 33:3 | 8:14;33:18;34:5 | great (6) | 11,13,16,20;125:1, | 129:8 |
| frequently (2) | George (6) | 162:13;182:10 | 16,22;126:1,7,14; | handled (2) |
| 32:1;40:15 | 204:6;205:10,16 | 216:10;223:5; | 169:4,7,11,12,17; | 176:16;251:22 |
| fresh (2) | 206:3;228:1,12 | 233:18;235:22 | 170:9,14;172:2,17; | hands (1) |
| 164:20;243:9 | geotechnical (1) | greater (1) | 179:11,14,24;250:14, | 254:7 |
| Frohling (4) | 58:8 | 215:6 | 15,16;251:6 | happen (6) |
| 7:9,10,13;70:10 | gets (4) | Green (6) | guess (69) | 93:16;105:12; |
| Froling (2) | 63:23;132:13; | 56:8,9,10;63:11 | 24:4;38:22;45:4; | 125:1;196:14; |
| 85:7,8 | 150:6;173:22 | 14;221:19 | 51:3;52:18;58:10; | 199:20;243:20 |
| front (6) | GIS (1) | Gregg (22) | 80:9;81:9;82:19; | happened (2) |
| 95:24;124:14; | 90:7 | 8:1;26:22;79:6,18 | 83:8;84:14;88:16; | 37:13;177:10 |
| $155: 13 ; 167: 23$ | gist (1) | 84:20;106:23;107:7, | 89:21;91:11;94:17; | happening (2) |
| 230:16,23 | 78:5 | 9,13,15,23,24;108:1, | 95:6;96:19;97:7,11, | 203:18;215:7 |
| full (5) | given (7) | 3;109:10,10,11,12, | 21;99:6;107:22; | happens (3) |
| 45:14;198:9;199:8; | 20:6;60:13;61:4; | 15;148:12;222:4; | 108:7;110:3;112:13; | 174:10;231:14; |
| 205:13;206:20 | 71:9;87:6;96:9;103:8 | 224:17 | 114:1;117:1;121:20; | 242:16 |
| fully (2) | gives (2) | grid (4) | 125:19;131:20; | happy (1) |
| 44:14;131:16 | 170:3;253:18 | 235:7,18,19,20 | 134:12;135:13; | 42:17 |
| functioning (1) | giving (2) | Groton (6) | 136:12,19;139:11; | hard (3) |
| 40:21 | 116:24;172:6 | 83:12;138:18 | 142:1,4,14,16;143:7, | 69:1;105:11;212:8 |
| functions (1) | glacial (3) | 139:24;141:15,20; | 10,18,21;144:2; | hardware (1) |
| 54:7 | 37:5,20;38:23 | 186:7 | 147:13;154:6,20; | 103:16 |
| furnace (3) | glass (1) | ground (10) | 156:3;157:1,8,19; | harmful (1) |
| 145:10,20,22 | 45:14 | 28:19;64:13,21 | 159:10;160:8; | 162:11 |
| further (9) | GmbH (1) | 73:23;80:21;95:3; | 162:19;166:23; | head (3) |
| 33:18;44:1;50:12; | 242:10 | 111:5;224:14;236:2, | 170:4,23;174:9; | 11:19;72:21; |
| 72:13;92:15;106:8; | goal (1) | 22 | 175:7;178:2,3;214:3; | 227:14 |
| 137:3;158:4;248:18 | 80:7 | ground-base (1) | 215:21;237:14; | health (2) |
| furthest (1) | goes (11) | 240:11 | 238:9;241:18; | 24:3;133:17 |
| 54:17 | 64:12;74:2;113:22 | ground-based (1) | 248:23;250:5;254:24 | hear (11) |
| future (1) | 117:3,18;150:9; | 132:21 | guidance (3) | 29:19;87:18;91:1, |
| 111:1 | 174:14;201:20; | ground-level (1) | 133:8;134:8,17 | 12,21;114:16;115:11, |
| G | 206:11;208:2;218:8 Good (17) | $\begin{gathered} \text { 225:3 } \\ \text { group (2) } \end{gathered}$ | $\begin{array}{\|l\|} \hline \text { guidelines (5) } \\ 135: 5,9,21 ; 136: 23 ; \end{array}$ | $\begin{aligned} & 15 ; 116: 3 ; 174: 18 ; \\ & 249: 4 \end{aligned}$ |
|  | 4:3;8:16;34:5; | 177:4,12 | 141:22 | heard (19) |
| G200266 (1) | 44:13;46:10;50:3; | groups (1) | gunshots (1) | 21:11;24:18;44:16; |
| 123:11 | 69:17;75:13;127:12 | $235: 14$ | 84:21 | 57:7;84:21;92:3,17; |
| gave (1) | 138:3,4;161:14; | growing (1) | guy (1) | 94:2;97:18;113:11; |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 118:18;144:10; | 80:16 | huge (2) | Impact (12) | 197:6 |
| :---: | :---: | :---: | :---: | :---: |
| 164:9,11;166:8; | highway (1) | 70:8;252:19 | 27:8;29:3,4;82:3; | increasing (2) |
| 181:22;191:11; | 91:21 | human (2) | 87:14;91:10;92:21; | 31:15;130:8 |
| 204:16;249:6 | Hill (3) | 145:9;153:17 | 109:5;136:23;196:8; | increasingly (4) |
| hearing (8) | 44:4;48:12;180:6 | humming (1) | 202:1,5 | 30:17;31:16;32:4; |
| 4:1;21:4;69:22; | hire (1) | 145:11 | impacted (2) | 33:3 |
| 115:4;137:19; | 45:24 | hundred (8) | 29:18;89:15 | increment (1) |
| 149:18;236:23;255:2 | hired (5) | 23:22;38:5;97:3; | impacts (15) | 80:8 |
| heated (1) | 12:10,15;68:7; | 118:21;213:4;232:4; | 16:9;71:22;73:5; | independent (3) |
| 145:10 | 174:15;189:9 | 236:24;237:12 | 83:24;93:23;101:10; | 41:17,20,23 |
| heavily (1) | hires (2) | hundreds (1) | 109:3;134:12; | indicated (2) |
| 113:6 | 41:13;176:4 | 241:19 | 135:12,24;136:4,5,8; | 72:14;190:21 |
| height (16) | hiring (1) | hundredths (1) | 164:6;195:19 | indication (1) |
| 128:20;130:8; | 49:24 | 224:8 | impervious (5) | 92:20 |
| 224:15;234:12,12,15, | hit (2) | HVAC (8) | 13:24;14:4,11,21; | individual (2) |
| 24;235:1,2;236:1; | 60:4;76:17 | 91:17;111:11; | 18:7 | 96:3;218:21 |
| 237:9;238:12,20; | HMMH (1) | 112:2,6,9,19;116:7; | implies (1) | individuals (4) |
| 240:13,14;242:19 | 202:4 | 128:11 | 22:4 | 35:9;54:8;134:22; |
| held (1) | Hmm-hmm (1) | hypothesize (2) | imply (1) | 177:5 |
| 154:7 | 192:2 | 248:12,15 | 161:15 | indoors (1) |
| helicopters (3) | hold (1) | hypothetically (1) | implying (1) | 150:22 |
| 68:19;69:4,8 | 102:11 | 248:19 | 142:2 | indulge (1) |
| help (7) | hollow (2) |  | important (9) | 228:4 |
| 15:16;87:22;88:16; | 87:20;177:4 | I | 70:3;96:22,22; | industrial (2) |
| 138:5;171:16,19; | home (8) |  | 128:8;161:6;185:23; | 113:5;133:21 |
| 186:21 | 86:9;87:7;91:10, | IACOPINO (35) | 201:9,13;227:15 | industry (5) |
| helpful (1) | 21;95:1;96:18;99:3; | 21:18,22;36:4; | imposed (3) | 129:11;132:19; |
| 155:6 | 143:2 | 41:4;67:18,19;86:3, | 139:23;141:4; | 140:20;169:24; |
| helps (1) | homes (3) | 13,17,20;88:11; | 186:6 | 175:19 |
| 66:9 | 83:5;98:14;177:24 | 121:3;155:16; | impossibility (1) | infiltrate (2) |
| Here's (2) | hope (2) | 157:11;187:12,15,19, | 93:16 | 19:22;20:1 |
| 107:13;152:6 | 43:3;193:3 | 23;188:4,10,14; | inaudible (1) | infiltrates (1) |
| hertz (6) | Horse (1) | 192:23;193:6,8,12; | 250:11 | 19:14 |
| 127:16,16;154:19; | 177:4 | 199:9;209:7,15,18, | INCE (3) | inflate (1) |
| 158:23;160:14; | hour (16) | 21;217:10;228:7; | 184:14;185:16,20 | 227:3 |
| 197:17 | 81:1,7;150:14; | 229:10;246:6,9 | inches (4) | influence (1) |
| Hessler (7) | 193:5,5;224:8;227:9, | idea (3) | 28:16;70:14;223:4, | 82:21 |
| $204: 6,16 ; 205: 10$ | 12,17;230:9,9,10,11; | 61:1;211:22; | $5$ | information (23) |
| $206: 3 ; 228: 2,12$ | 240:20,22;241:1 | 226:12 | include (8) | 14:16;51:20,21; |
| 253:17 | hours (12) | ideal (1) | 34:16;51:21; | 52:17,19;87:2,6; |
| Hessler's (3) | 194:24;195:1,2; | 44:11 | 106:10;111:6;153:5, | 88:23;107:5;121:11; |
| 205:16;208:17; | 200:20;214:13,18; | ideally (1) | 6;202:6;210:24 | 127:13;131:14,23; |
| 231:15 | 215:13;247:10,10,12, | 72:3 | included (8) | 133:16;142:12; |
| high (13) | 13;248:1 | ideas (1) | 18:16;20:13;60:19; | 162:14;165:12; |
| 102:24;114:3; | house (20) | 158:7 | 179:2;210:10,21; | 169:21,22;198:4,6; |
| 119:1;122:1;128:13; | 88:20;89:7;90:9; | identical (1) | 238:15;239:18 | 220:16;250:16 |
| 155:1;161:10,16,23; | 93:6,6,9,14;94:1; | 221:14 | including (3) | informational (1) |
| 162:7;167:18;212:6; | 95:8;145:10,23; | identified (1) | 109:1;125:13; | 198:19 |
| 213:5 | 146:2;150:20; | 133:12 | 245:19 | infra (1) |
| high/low (1) | 151:13,14,17;173:20; | identify (3) | incorporate (1) | 157:1 |
| 164:5 | 176:11;190:10,11 | 107:10;123:22; | 233:15 | infrasound (7) |
| higher (9) | houses (1) | 156:22 | incorporated (4) | 128:9;154:16; |
| 102:18;104:21; | 98:22 | Ignatius (7) | 33:15;39:10,20; | 157:2,24;158:8; |
| 117:12;118:12; | house-side (1) | 58:21,22,23;70:2,4, | 214:8 | 160:13;161:7 |
| 119:4;168:9,15; | 37:5 | 7,12 | incorrectly (1) | infrastructure (1) |
| 169:10;185:14 | How's (1) | illustrated (1) | 78:8 | 31:12 |
| highest (6) | 182:9 | 139:6 | increase (5) | inhaled (2) |
| 31:20;122:15; | hub (7) | imagine (2) | 90:18;91:4;128:17; | 164:15,16 |
| 170:1;179:19; | 117:22;128:20; | 22:20;49:24 | 130:6;230:13 | initial (4) |
| 212:22;240:2 | 130:8;235:2;236:1; | immediate (1) | increased (1) | 62:16,19,22;72:23 |
| high-frequency (1) | 240:13;242:19 | 147:5 | 230:19 | Initially (2) |
| 206:13 | hub-height (1) | immediately (1) | increases (3) | 58:24;59:20 |
| high-level (1) | 241:5 | 156:4 | 31:20;128:19; | injurious (2) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 161:10,19 | Internet (1) | 132:20;233:10,12; | 189:14,15 | 146:18;148:10; |
| :---: | :---: | :---: | :---: | :---: |
| input (1) | 162:14 | 236:18,18;237:9; | joins (1) | 150:3;173:18 |
| 236:16 | INTERROGATORIES (6) | 238:10;239:6;245:1 | 13:18 | L3 (5) |
| inquired (1) | 49:15;50:14;54:14; | issue (11) | Jones (2) | 87:3;88:19;90:3, |
| 242:12 | 56:10;58:23;67:19 | 24:3,9;73:16; | 7:14;85:12 | 11;108:7 |
| insect (15) | interrupt (1) | 103:20;127:18; | July (1) | L-3 (2) |
| 80:4;84:5;104:20, | 105:21 | 128:3;160:18; | 251:14 | 216:12,15 |
| 23;148:9,11;206:13; | interrupting (1) | 161:17;164:14 | jump (1) | L5 (3) |
| 207:5,7,14;210:10, | 219:19 | 176:7;226:9 | 59:10 | 107:14;224:17; |
| 13,15;211:8;253:9 | intervals (1) | issued (2) | June (1) | 235:17 |
| insects (7) | 214:15 | 13:20;35:19 | 233:5 | L90 (19) |
| 82:20;105:5,8; | intervenor (2) | Item (2) | jury (2) | 79:19,20,22; |
| 148:13;207:10; | 8:16;99:20 | 41:10;56:2 | 177:18,19 | 202:15;203:4,6; |
| 208:19,22 | into (46) | items (2) |  | 210:2,2,2,3,7,23; |
| inside (3) | 19:14;20:1;33:15; | 178:23;190:18 | K | 211:9,12,13,14,15; |
| 143:5;151:12; | 38:19;39:11,20; | iterations (1) |  | 216:13;217:24 |
| 227:2 | 48:21;74:3;85:1; | 71:12 | keep (9) | labeled (1) |
| inspection (1) | 91:14;92:24;93:5,22, | iterative (2) | 33:9;73:1;86:4; | 156:1 |
| 53:20 | 24;111:3,9;112:13; | 71:16;72:9 | 134:9;142:24;166:1; | laid (2) |
| inspector (1) | 117:3,18;119:13; | IW (1) | 192:24;219:14,15 | 44:17;45:4 |
| 51:24 | 128:21;131:13; | 209:10 | Kenworthy (2) | Lake (25) |
| installed (2) | 132:7;153:2;156:19; | IWAG (4) | 87:7;92:7 | 8:1;26:22;79:6,18; |
| 69:8;130:17 | 157:9;158:6,16; | 187:9,18;188:8,15 | Kenworthy's (1) | 84:20;106:23;107:7, |
| instance (4) | 174:17;183:9; | IWAG6 (1) | 142:8 | 9,13,15,24;108:1,1,3; |
| 148:21;169:8; | 195:16;196:20; | 187:5 | key (3) | 109:10,12,15,16; |
| $177: 23 ; 196: 2$ | 197:6;201:20;214:8; | IWAG-6 (1) | 142:19;161:8; | 110:5,8,10;148:12, |
| instances (3) | 215:13,14;218:20; | 215:19 | 239:23 | 15;222:5;224:17 |
| 37:8;84:19;176:24 | 226:3;229:24; | IWAG-N (1) | Kibbe (3) | land (5) |
| instead (2) | 234:24;235:9;236:5, | 200:8 | 42:2,7;43:14 | 5:20;28:4;69:2; |
| 56:4;203:3 | 16;244:13;246:24 | IWAG-N1 (3) | kilometer (1) | 98:5;113:6 |
| Institute (1) | introduced (5) | 179:4;233:2,3 | 237:6 | Land-Based (1) |
| 184:6 | 196:20;197:6; | IWAG-N3 (3) | kilometers (1) | 136:22 |
| instrumentation (4) | 230:12;231:10; | 179:4;233:2; | 235:10 | language (1) |
| 103:4,9,15,24 | 253:14 | 241:23 | kind (25) | 250:23 |
| instruments (2) | introducing (1) | IWAG-N5 (1) | 37:10;42:9;44:11; | Large (5) |
| 150:12;159:21 | 231:24 | 200:1 | $45: 14 ; 46: 14 ; 59: 21$ | $36: 23 ; 37: 16 ; 62: 12$ |
| insurance (2) | introduction (2) | IWAG-N6 (1) | 69:4;71:16;87:19; | $168: 2 ; 214: 22$ |
| 126:6;170:10 | 195:16;196:12 | 215:22 | 92:21;136:18; | largely (1) |
| insure (1) | introductory (1) | IWAG-N7 (2) | 145:16;147:16; | 14:5 |
| 126:7 | 156:5 | 204:5,7 | 148:5;151:10; | larger (2) |
| $\begin{gathered} \text { integrity (1) } \\ 149: 7 \end{gathered}$ | intruding (2) 139:16:143. | J | 156:11;168:12; $170: 4 \cdot 171 \cdot 6 \cdot 172 \cdot 23$. | 168:9,23 |
| intend (1) | invasive (3) | J | $\begin{aligned} & 170: 4 ; 171: 6 ; 172: 23 \\ & 180: 19 ; 223: 12,14 \end{aligned}$ | $132: 11 ; 192: 13,15$ |
| 187:6 | 24:2,8;25:14 | Jaffrey (1) | 230:24;243:11 | Larson (1) |
| intent (1) | inversion (1) | 220:13 | knowing (1) | 223:2 |
| 207:7 | 132:22 | James (5) | 204:20 | last (10) |
| interest (3) | involved (10) | 154:4;157:21; | knowledge (13) | 39:1;58:10;73:3; |
| 124:2;157:3; | 44:6;57:22,22; | 167:9;168:18;209:1 | 25:19;26:3,4; | 76:1;205:9;207:15, |
| 211:18 | 125:7,15;131:8; | James' (5) | 27:11;30:15;33:6,10; | 16;208:2,12;242:1 |
| interested (2) | 159:12;178:10; | 139:7;140:11; | 87:1;124:11;134:10; | lasting (1) |
| 146:14;203:14 | 187:3;191:6 | 143:19;153:21;179:7 | 135:18;159:11;177:3 | 154:17 |
| interesting (2) | involvement (1) | January (9) | knowledgeable (2) | late (2) |
| 45:10;158:6 | 190:5 | 6:9;8:20;11:3; | 91:6;177:7 | 79:19;251:17 |
| interfere (2) | Iowa (2) | 34:8;45:17;76:9; | known (5) | Later (3) |
| 114:18;115:5 | 129:20;192:6 | 133:8;179:1;183:4 | 97:8,9,12,13;177:3 | 22:15,15;158:15 |
| interference (2) | iPad (5) | Jeeps (1) | knows (1) | laughter (1) |
| 134:12,21 | 205:13;228:5,22; | 47:20 | 90:1 | 193:18 |
| interim (1) | 229:9;231:3 | jet (3) |  | law (2) |
| 149:9 | irregardless (1) | 163:22,24;164:3 | L | 18:6;177:18 |
| interjects (3) | 134:23 | job (8) |  | lawnmower (2) |
| 14:1;96:6;138:23 | irritating (1) | 25:21;50:3;51:14, | L1 (2) | 182:22,24 |
| internally (1) | 144:21 | 15;52:1;174:4,5,11 | 148:8;235:17 | lawsuit (2) |
| 250:18 | ISO (9) | John (2) | L2 (4) | 176:18;177:2 |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| lawyer (1) | 79:21,22;81:12; | license (4) | 21;180:23;181:7,18; | 173:18;195:2;196:7; |
| :---: | :---: | :---: | :---: | :---: |
| 100:12 | 83:10;88:24;89:1; | 171:6,16,21; | 182:1,3;187:10,13, | 199:22,22,23,23; |
| lay (1) | 90:14,16;91:18; | 184:20 | 17,21;188:1,7,12,19; | 216:12,15,16;217:20; |
| 101:2 | 95:11;98:10;114:4; | licensed (3) | 192:21;193:2,7,10, | 220:15,19;221:22; |
| layout (1) | 116:21;117:10,12,16; | 34:11;45:21; | 15,19;194:2,9; | 222:4;224:5,17,22; |
| 93:1 | 118:14,18,24;120:6; | 184:18 | 199:19;209:9,17,19, | 225:6;226:12,20,21 |
| layperson (2) | 122:1,1;127:17; | licenses (1) | 23;216:4,7;217:12; | locations (36) |
| 86:24;90:19 | 128:5;132:5,14,14; | 173:10 | 219:7,11,22;220:2,3; | 12:1;64:5,14;68:5, |
| LDN (2) | 136:5;139:17; | licensing (3) | 223:13;227:20; | 9;71:11;79:23;95:14; |
| 140:19;141:17 | 140:18;144:19; | 50:8;172:15; | 228:10;229:7,9,10, | 97:24;98:3;103:22; |
| leading (1) | 149:24;150:23; | 185:13 | 12,13,15;230:22; | 106:7;108:12; |
| 82:6 | 156:10,15;161:10,16; | lift (1) | 231:1,4,7;232:18,20; | 146:11;152:15; |
| leaf (1) | 162:3;168:23;170:1; | 69:6 | 241:24;242:3;243:1, | 153:4;189:11; |
| 148:9 | 173:17,24;179:15,18, | light (4) | 13,24;244:7,12,18; | 190:12;197:18; |
| learn (1) | 19;182:24;183:1,1; | 49:1;80:19;166:19; | 245:5,17;246:6,8,12; | 198:20;199:1,6,15; |
| 113:4 | 185:14;192:1;195:4, | 212:18 | 247:5 | 206:21,24;207:2,9, |
| learned (1) | 7,10,21;197:7;203:7; | lightbulb (2) | list (3) | 12;210:4;212:10,24; |
| 227:23 | 206:8,10,15;207:20, | 118:20,20 | 25:4;51:2;148:7 | 223:24;225:1; |
| learning (1) | 20,24;208:4,5,10,13, | lighting (2) | listed (1) | 226:23;232:13; |
| 138:7 | 20;212:7,22,23; | 26:17,19 | 146:5 | 234:19 |
| least (9) | 216:17,19;218:22; | lightly (1) | listened (2) | location-specific (1) |
| 92:17;141:19; | 227:6,8,9,17,18; | 147:12 | 91:16;148:18 | 104:19 |
| 150:5;151:13; | 233:17;236:4;240:1, | likelihood (1) | listening (1) | loggers (1) |
| 158:21;210:10; | 2;249:18;252:11 | 158:2 | 231:17 | 50:8 |
| 232:3;235:12,13 | leveling (2) | likely (2) | literature (5) | logging (8) |
| leave (3) | 86:2;87:9 | 13:18;102: | 92:13;136:3;161:3; | 45:20;49:19,24; |
| 101:20;174:23; | levels (89) | liken (2) | 162:15;253:16 | 51:18;52:12;89:13, |
| 202:8 | 78:1,6,11;79:17,20 | 180:18,20 | litigants (1) | 18;147:22 |
| led (3) | 23;80:5;81:10,20; | limit (13) | 178:2 | logistical (1) |
| 140:2;143:11; | 82:21;83:3;84:1,5,7; | 25:19;120:3; | litigation (1) | 106:15 |
| 154:10 | 89:22;90:24;94:12; | 126:15;141:15; | 176:20 | long (16) |
| ledge (2) | 98:6;102:7;104:21; | 142:22;143:9;144:7; | little (25) | 20:24;54:20;62:12; |
| 58:7;60:5 | 108:22,24;111:1; | 168:20;189:8,21; | 48:12,13;67:9; | 67:20;129:24;131:4, |
| left (2) | 112:17;113:18; | 190:22;252:4,9 | 72:24;80:9;90:10; | 11;137:11;163:23; |
| 63:13;135:21 | 114:2,5,12;119:22; | limitation (3) | 91:2;105:6;108:2; | 181:10;208:16,16,22; |
| legal (8) | 127:1;128:13;133:3, | 103:17;106:6; | 118:6;138:6,9; | 242:15;243:2;247:8 |
| 16:22;100:6,10; | 14,16;134:20; | 201:23 | 143:15;147:6,16,21, | longer (4) |
| 135:9;136:6,11; | 138:10;139:5,23; | limitations (2) | 22;157:9;163:13; | 104:7;159:8,17; |
| 169:5,14 | 140:1,16,23;141:1, | 106:13,16 | 173:20;180:12; | 249:10 |
| legend (1) | 12,16;142:12;144:1, | limited (1) | 181:8;202:19;209:5; | longest (1) |
| 217:23 | 3;151:11,12;155:1; | 239:7 | 214:11 | 192:13 |
| Lempster (5) | 156:12;159:5; | limits (13) | live (10) | Longgood (13) |
| 83:12;138:17; | 160:17;161:13,22; | 103:4,8,15;138:15, | 85:21;87:17;91:7; | 7:19,20;85:17,18, |
| 139:24;141:15;186:6 | 162:7;164:2,24; | 18,20;139:23;141:3; | 98:19;145:5,16; | 24;86:3,6,19,21,23; |
| length (5) | 165:6;166:20; | 144:5;186:5,6; | 146:14;151:7;252:5; | 89:10;90:1;210:17 |
| 20:21;55:2;62:17; | 167:16,19,20;174:21; | 190:20,23 | 253:3 | Longgood's (2) |
| 128:20;130:9 | 179:22;198:16; | Line (18) | lives (1) | 90:9;99:1 |
| LEQ (1) | 201:6;203:18; | 9:1,22;26:14;34:9; | 90:1 | Long-range (1) |
| 141:16 | 205:11,19;206:6; | 38:17;49:18;117:8,9, | living (4) | 245:18 |
| less (10) | 211:22;212:9,11,15, | 15;119:17,19;156:3; | 35:9;92:2;150:23; | long-term (7) |
| $10: 12 ; 11: 1 ; 47: 7$ | 23;213:5,8,12,24; | 183:5;184:5;200:9; | 169:6 | $97: 4 ; 202: 3 ; 207: 19$ |
| 66:19;138:24;139:2; | 214:7;215:8;230:10; | 218:6;221:13;239:23 | loading (1) | 208:3,10,19;223:3 |
| 154:17;223:15; | 231:19;232:15; | linear (1) | 52:16 | look (40) |
| 224:15;234:20 | 238:19;241:10; | 20:3 | located (10) | 22:2;28:7;36:10; |
| letter (8) | 248:16;249:5 | Lines (16) | 14:12;26:18,19; | 37:14;42:5,8,24; |
| 50:16,18,20,22; | Leventhal (1) | 9:2;13:21;16:4; | 27:1;30:8;39:2;87:3; | 43:2;44:1;50:1; |
| 51:1;200:2,24;244:9 | 161:4 | 17:22;24:11;34:9; | 150:3;223:17;224:22 | 62:12;80:16;83:2; |
| letting (1) | Levesque (1) | 61:13;73:14;77:21; | location (40) | 90:20;93:1;95:6; |
| 181:15 | 8:4 | 117:18;119:10,14; | 43:15;65:15;71:23; | 111:22;113:18; |
| level (94) | liability (2) | 157:17,19;217:22; | 72:5,14;73:12;86:8; | 114:5,10;143:19; |
| 16:7;17:3,5;31:20; | 172:14;173:1 | 221:4 | 88:19;90:3,11,11,15; | 167:8,24;176:8; |
| 39:14;44:8;56:20; | library (1) | Linowes (68) | 95:7,9,13;102:8; | 198:23;199:3;209:3; |
| 58:11;78:12,13; | 182:20 | 40:2,3;178:17,18, | 107:15;146:18; | 215:16;217:4,13,18; |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 218:20;221:2,11,12; | lower (14) | 22;52:14;58:16 | 23;12:6,13,19,24; | 179:17,18;180:1; |
| :---: | :---: | :---: | :---: | :---: |
| 226:18;228:24; | 102:17;117:13,17 | manager (2) | 13:3,8,12,16,20;14:7, | 91:24;210:2; |
| 236:18;242:21;253:1 | 118:11;143:5; | 5:8;53:24 | 10,14,17,22;15:4,12, | 211:15;213:7 |
| looked (10) | 151:12;159:5 | managing (1) | 17,19,24;16:7,15,19, | may (27) |
| 10:15;95:24;158:5; | 161:23,23;168:1 | 238:18 | 21;17:5,11,18,24; | 4:9;11:11,12 |
| 209:5;212:2,5,7 | 174:21;179:22; | mandate | 18:4,8,10,13,20;19:6, | 9:22;46:9;84:1 |
| 214:24;217:3;230:8 | 225:4;241:12 | 61:3 | 21;20:2,9,16,18;21:2, | 89:19,23;93:17; |
| Looking (33) | lowest (2) | man-made | 6,16;22:14,20,23; | 102:5;112:9;115 |
| 8:24;29:3;42:18 | 208:4,13 | 08:9 | 23:12,17,21;24:4,6, | 137:22;142:11; |
| 45:16;56:15;65:2,7; | low-frequency (16) | manned (1) | 10,14,23;25:11,15; | 158:1;161:13,14; |
| 102:6;107:6,22; | 127:15;128:3,6,9; | 203:12 | 26:4,11,20;27:2,4,13, | 171:18;172:8;197: |
| 113:15;134:20; | 158:8;160:16;161:7; | manner (1) | 17,19,24;28:4,9,12, | 2;200:18;203:22 |
| 172:1;173:18;188:5; | 162:10,20;163:9,14, | 16:23 | 17;29:2,9,12,15,19, | 210:15,15;242:14; |
| 192:21;199:10; | 17;165:21;168:1,9,24 | manning | 24;30:3,5,11,15,19, | 249:5 |
| 202:14,15;203:3,4; | low-level (2) | 200:19 | 21;31:2,5,9,13,18,23; | maybe (17) |
| 204:13,14;209:16; | 159:16;161:18 | Manual (6) | 32:2,6,8,12,16,21; | 15:16;47:8;50:2 |
| 210:6;213:24; | lunch (1) | 9:13;22:10,19,22 | 33:6,11,14,17;34:20; | 62:14;66:5,15;76:18; |
| 216:12;217:2,21 | 4:2 | 23:9,15 | 35:1,7,12,16,23; | 111:20;117:1; |
| 218:6,15;239:1; |  | manufact | 36:14,17;37:3,7,12, | 142:17;145:21; |
| 247:23 | M | 77:24;118:13; | 18,23;38:2;39:1,9,16, | 155:4;164:23,23 |
| looks (5) |  | 19:3,12,19;12 | 24;40:14;41:2,6,8,15, | 173:21;188:7;249:11 |
| 42:17;44:13;64 | ma'am (4) | 5:10.223.3. | 19,22;42:4,12,17; | Maynard (1) |
| 108:2;239:2 | 15:24;17:2 | 250:17;251 | 43:7,23;44:6,10,13, | 75:16 |
| loop (2) | 31:9 | manufacturers ( | 18,21;45:1,8;46:2,6, | McCabe (1) |
| 67:9,10 | machine (1) | 120:13;242:8 | 12,18,20,22;47:3,10, | 166:9 |
| losing (3) | 78:1 | manufacturer's ( | 14,17;48:1,7,17,21; | mean (55) |
| 171:6,16,21 | machinery | 8:17;223:2; | 49:2,7,9,23;50:10,18, | 33:22;44:20;45:6; |
| lost (2) | 48:15 | 226:3;232:7 | 21,23;51:10;53:4,16; | 49:4;51:23;52:15,20, |
| 156:9;177:15 | machines (1) | many (18) | 54:22;55:10,13,17; | 22;54:2;68:21;69:3; |
| $\boldsymbol{l o t}(22)$ | 174:16 | 10:10;31:12;46:1 | 56:7,13;57:5,11,13, | 72:14,16;90:19; |
| 43:8;59:24;60: | Madam (10) | 99:2;106:7,14 | 16,19;58:1,8,13,15, | 91:13;94:17;96:13; |
| 64:23;68:22;81:10; | 82:9;165:4;178:18 | 120:16;182:6,8,1 | 18;59:6,17,23;60:19; | 97:12;102:9,13; |
| 88:22;98:21;104:7; | 181:8;227:20; | 185:2;194:24; | 61:6,24;62:19,22; | 103:14,16;105:21 |
| 106:9;118:10; | 229:13;242:1,20 | 215:13;219:2;221:9; | 63:8,12,14,21;64:1,8, | 106:18;110:4; |
| 133:23;135:15,16 | 243:7;247:5 | 247:1;249:9,12 | 12,17;65:14;66:3,8, | 116:20;117:10,11; |
| 153:20;154:4;163:4; | magenta (2) | Manzelli (23) | 21;67:4,10,14,22; | 120:8;126:11; |
| 175:19;177:16; | 217:23;21 | 8:10,11,13,1 | 68:3,11,20;69:1,9; | 134:11;135:11; |
| 197:3;198:3;237:15 | magenta-colored (1) | 21:13,24;22:1;99:13, | 71:14;72:17,20; | 140:16;146:20; |
| lots (4) | 217:22 | 14,17,18;100:14,15, | 73:17;74:12 | 151:21;172:19; |
| 72:6;84:19;120 | main (1) | 18;109:13,14;110:1; | mask (1) | 175:21;176:21; |
| 181:2 | 67:5 | 121:12;123:9;124:7; | 208:6 | 198:2;211:13; |
| loud (5) | Maine | 141:8;160:11;169:4 | Mass (2) | 222:16;223:21; |
| 111:17;112:4,9 | 4:17,20;5:19 | $\boldsymbol{m a p}(15)$ | 201:2,14 | 224:10,11;236:8 |
| 239:24 | maintained (2) | 62:12;85:20;86:1 | Massachusetts (4) | 238:10;241:1; |
| louder (7) | 16:10;112:24 | 89:23;90:6;93:1; | 75:17;200:2,6; | 242:24;248:16 |
| 94:15;104: | maintenance | 95:24;107:9,11,17 | 203:6 | 249:2,18;251:16,18; |
| 110:12;112:11,11 | 48:2;53:20;55:5 | 22;113:15;117:7; | master's | 252:3,15 |
| 116:22;125:17 | 56:2;72:18;73:4 | 118:1;247:23 | 183:5 | Meaning (4) |
| loudest (1) | major (2) | mapping (1) | material (2) | 111:5;134:3; |
| 213:16 | 91:9;176:7 | 180:20 | 72:2;190:1 | 173:13;224:12 |
| loudness (1) | makers (3) | margin (2) | mathematical (3) | meaningful (1) |
| 150:11 | 244:20,21;246: | 119:5;133:1 | 94:8;111:4;206:1 | 131:13 |
| Loveren (2) | makes (3) | marked (6) | matter (10) | means (7) |
| 146:15;150:2 | 18:12;223:13 | 6:10,15;76:10 | 8:16;21:5;24:15 | 11:13;70:18;90:17, |
| low (28) | 248:24 | 77:6,11;237:18 | 27:7;33:16;49:5; | 20;185:8,10;236:9 |
| 84:2,9;102:14,24 | making (5) | Mars (1) | 99:8,20;133:2;224:9 | measure (24) |
| 103:2,19;114:13; | 52:19;119: | 44:4 | matters (1) | 94:3,7;96:3; |
| 119:2;127:17;157:2; | 131:8;203:14;225:8 | Martin (237) | 176:20 | 101:16;103:18,19 |
| 158:10,10;160:16; | manage (2) | 4:5,18,18,23;5:2 | $\boldsymbol{\operatorname { m a x }}$ (3) | 104:5,7;106:2,7,14; |
| 161:13,13,14;162:2; | 135:24;245: | 10,18;6:1,5,8,18,24; | 202:9,14;203: | 110:24;115:22; |
| 163:1;213:6;227:5,8, | management (11) | 7:5;8:23;9:5,11,18, | maximum (14) | 129:5,14;131:1; |
| 9,12,17,18;231:9; | 14:19;15:3;18:1; | 21;10:4,8,11,15,19, | 59:2,3,6;117:21, | 159:7;169:10; |
| 249:5,24 | 22:3,6,16;32:10;51:8, | 22,24;11:2,9,15,18, | 23;118:3;132:14; | 173:24;190:9; |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 206:20;208:15; | 73:24;80:16;94:22 | $64$ | 152:8;153:7; | 25:21 |
| :---: | :---: | :---: | :---: | :---: |
| 224:13;225:8 | 16:17. | 81:14;87:14;89:14; | 92.3.234.3. | month (1) |
| measured (28) | 212:3;221:5,2 | 91:23;105:24;108:2; | 235:24;236:18; | 104:15 |
| 28:16;79:17;80:1 | meteorological (8) | 110:21;118:20; | 39:13;241:8; | months (1) |
| 95:11;101:24; | 183:13,22;184:8 | 142:3;151:17,2 | 44:24;246:2 | 239:13 |
| 102:13;103:2, | 220:13;224:13; | 155:9;158:14;171:5; | 250:22;251:5,7, | moose (2) |
| 104:9;106:9;107: | 238:22;239:6,1 | 182:20;191:11,15; | 253:8 | 42:9,13 |
| 114:6;127:7;130:10; | meteorologist (2) | 92:19;203:20; | odeled (5) | ore (52) |
| 150:21;151:17,18; | 183:7,19 | 207:18,23;210:1 | 122:18;170:1, | 10:12;19 |
| 158:20;173:19 | , | 216:5;244: | 239:15;247: | 25:20;32:1;38:15; |
| 205:19;206:5; | 75:24;184:3 | Mike (1) | modeling (23) | 39:22;43:20,24; |
| 207:24;214:1 | meter (14) | 87:10 | 94:9;111:4;122 | 5:12;47:7;62:6 |
| 223:21;224:18 | 7 | (4) | 183:1 | 23;72:24; |
| 225:5;235:17;237 | 105:16;107:7; | 92:17,18,19;22 | 191:20;192:1 | 73:19;83:10;96:22; |
| measurement (8) | 146:24;150:22 | miles (10) | 194:17;213:21 | 106:10;125:3; |
| 20:4;70:5;88:18; | 169:9;224:8,16, | 81:1,6;17 | 232:23;233:16 | 141:22;143:12; |
| 130:1,3,4;223:23 | 240:16,21;241:2 | 227:9,11,16;230 | 234:10;237:24 | 146:17;147:4;157:9; |
| 251:4 | mete | 40:19,22;241 | 38:2,23;241:1 | 158:14,16;164:13; |
| measurements | 80:20,21,24;81 | Mill (2) | 244:23;246:1,2,3, | 168:23,24;169:14; |
| 70:9;79:4,12; | 11:23;146:2 | 46:15 | 250:15,19 | 184:2;188:24; |
| 89:12;91:5;98 | 148:24;192:12 | milliseco | models ( | 190:22,24;198:18; |
| 102:20;127:3; | 21 | 154:17 | 7. | 02:5,7,19;204:10 |
| 129:15;131:9, | 221:14;227:8, |  | 36:12,13,13 | 19:3,4;223: |
| 139:14;140:4; | 230:8;234:15,16, | 42:13;65:1;142 | moderate (6) | 24:15;225:1, |
| 150:13;153:14 | 20,21;235:2,4,5, | m | $39:$ | 36:21,24;237:1 |
| 160:22;201:3; | ,22,24; | 156:10; |  | 41:13;243:9 |
| 203:16;232:8; | ,20;2 | m |  | morning (1) |
| 237:15;249:19 | 17,19;241:11,12,12, | 73:5 | 154:11 | 254:22 |
| measures (1) | 13;242:19 | minimi | m | Morse (1) |
| 101:19 | metho | 71:22 | 28 | 36:3 |
| measuring ( | 11:12,24;12:17 | minimu | 133:20;160:15 | most (7) |
| 103:9;1 | 18:14 | 152.2.210. | modified (1) | 23:23;65:21; |
| 131:10;213:14 | methodo | 211:14;213 | 206:15 | 7:23;201:14 |
| mechanical (4) | 93:22 | minor (1) | modulation (9) | 226:20;233:21 |
| 148:14;181:2; | me | 77:1 | 128:17,24,24 | motorized (5) |
| 182:4,5 | 13,14,15,16 | minus | 29:5,9;130:7, | 99:17,21;11 |
| median (2) | 27:13;40:20;153: | 78.78 | 131:2 | 11 |
| 210:2;213 | Metson (1) | 22:16;216:23 | Maller | Mount (1) |
| meet (5) | 246:20 | 218:23;237:2,3,10, | 58:12;1 | 49:6 |
| 22:12;23:1 | m | 21,23;238:5,11 | 167:9;168:2, | Mountain (3) |
| 171:3;185:23 | :20;2 | minut | moment (1) | 7:17;38:24;42:8 |
| megawatts (2) |  | , | 00:16 | mountainside (1) |
| $167: 13,15$ | :17; | 120.24. | momentar | 48:24 |
| member (4) | Michigan (3) | 63:12;165:18 | 172:9 | mouth (1) |
| 184:5,14;185 | 8 | 3;181:20 |  | 23:6 |
| 19 | microphone (4) |  | 209 | moved (3) |
| Member | :13;86:5;223 | 1:2,2;193:9,12,22 |  | 37:10;191:2;243:8 |
| 254:9 | 228:15 |  |  | Moving (2) |
| memorize | microphones (4) | 22:1 | monitor (13) | 16:3;27:7 |
| 25:4 | 9:18;224:15 | mistake |  | much (29) |
| men (2) | 225:11;22 | 9:23;2 | 1,14;53:13;96:17; | 9:14;15: |
| 44:17;45: | m |  | 24:3;227:3;230:20; | 2:22;54:18;56:11 |
| ention |  |  | 231:24;232:1 | 9:15,23;65:3;66:15 |
| 22:17 | mid | misunderstoo | monitored (1) | 68:13;84:17;95:15; |
| mentioned (8) | 155:2 | 17 | 18 | 102:7,21;103:22; |
| 25:23;40:9; | middle (3) | mix (6) | monitoring (2) | 105:12,23;106:16; |
| 111:12;141:1;160: | 47:8,8; | 8:14 | 149:9;235:1 | 116:2;122:9;137:2, |
| 185:22;228:2 | middle-of- | 22;25:1 | monitors (12) | 4;164:1,1;205:1; |
| mentions (1) | 90:23 | mode ( | 200:16,17;21 | 242:22;247:19; |
| 29:5 | Midwes | 31. | 220:5;222:3,7,13; | 248:21 |
| merrimen | 130:17 | model (24) | 23:17;226:13,17; | multiple (2) |
| 70:22 | might (30 | 96:10;118:1;127: | 229:22,24 | 92:21;148:23 |
| met (9) | 12:4;18:20;26:8; | 128:23;129:3,6,16; | monitor's (1) | Muni (1) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 220:14 | necessary (5) | 13:9 | 93:3 | observation (3) |
| :---: | :---: | :---: | :---: | :---: |
| music (1) | 34:10;49:20;55:15; | nobody's (2) | note (3) | 115:6;135:14; |
| 159:13 | 59:16;206:7 | 129:11,13 | 89:15;161:6; | 201:15 |
| musical (1) | need (23) | no-go (1) | 201:13 | observations (5) |
| 159:20 | 9:19;13:14;14:22; | 101:18 | notes (1) | 148:22;149:3,4; |
| must (2) | 25:24;28:23;29:19, | noise (114) | 159:2 | 201:16;202:9 |
| 136:3;186:3 | 24;41:2;43:23;45:9; | 75:23;80:4;84:13; | notice (10) | observed (2) |
| myself (1) | 48:5,19;59:19;60:3; | 92:4;120:5;128:18; | 35:6,7,9;60:13,16; | 103:6;253:7 |
| 159:4 | 62:19;65:9,16,22; | 130:7;133:11,17; | 61:3;112:17;115:7; | obvious (1) |
| N | $\begin{aligned} & 139: 17 ; 161: 19 \\ & 171: 9 ; 229: 5 ; 25 \end{aligned}$ | $\begin{aligned} & 135: 6 ; 139: 16 ; \\ & 141: 23 ; 143: 16,1 \end{aligned}$ | 197:12;253:12 <br> noticeable (1) | $136: 13$ |
| N | needed (4) | 144:1,3;145:2,9; | $150: 8$ | 68:6;106:6;131:15 |
| N5 (2) | 16:8;25:1;71:18; | 146:5;148:9,9,10,11, | notification (2) | 143:4;160:2;176:7; |
| 179:4;200:23 | 198:15 | 14;153:14;154:5; | 34:17,24 | 226:15 |
| N6 (1) | needs (4) | 163:10;164:6;165:6; | notified (1) | occasions (1) |
| 187:12 | 56:1;63:19;100:6; | 168:1,9,20,24; | 34:19 | 218:17 |
| N7 (2) | 159:8 | 177:14,21;183:9,13; | notify (1) | occur (5) |
| 179:5;204:5 | neglected (1) | 184:3,6;186:13,15, | 34:22 | 34:24;98:21;132:4; |
| name (9) | 160:14 | 18,22;187:2;189:20, | nucleus (1) | 189:23;195:20 |
| 4:14;8:14;75:14; | negotiate (1) | 24;190:17;194:20, | 248:9 | occurred (2) |
| 99:18;123:3,7,10; | 25:8 | 22;195:4,7,20; | nuisance (3) | 216:19;220:21 |
| 182:4;242:9 | neighbor (1) | 196:12,18,20,22; | 92:4;177:14,22 | occurrence (2) |
| name's (1) | 173:19 | 197:5,7,9,15,16; | number (41) | 128:19;130:8 |
| 4:18 | neighborhood (1) | 200:4,8,14,14;201:3; | 15:11,19;59:4; | occurring (1) |
| Nancy (1) | 26:21 | 202:18;203:21,21,22, | 70:15;71:10;86:14, | 32:7 |
| 200:8 | neither (1) | 23;204:22;205:18; | 16;88:3;92:23; | occurs (1) |
| nap (1) | 105:8 | 206:5,6,13;207:5,8, | 107:11;116:13,14,15; | 180:5 |
| 115:12 | New (30) | 14;208:6;210:10,13, | 117:4;122:15; | octave (11) |
| narrow (1) | 5:15;8:15;13:23; | 15,16;211:8;213:12, | $123: 15 ; 141: 23$ | 116:12,17;158:19; |
| $65: 12$ | 14:3;18:5;22:5,10,18, | 16;220:5;223:7,19; | 142:20;143:8,12,13; | 160:22;197:19,22; |
| narrower (1) | 21;23:8;30:18;31:19; | 225:24;226:9;227:1; | 155:19;174:16; | 198:16;199:17; |
| 63:23 | 32:24;33:12;34:15; | 228:14;230:3,20; | 179:4;187:18; | 206:8,20;211:4 |
| narrowest (1) | 46:17;50:6;54:19; | 231:10,23;232:2,11; | 194:24;196:24; | October (6) |
| 74:8 | 55:15;60:21;84:12; | 234:11,13,14;235:24; | 200:7;213:3;214:22, | 6:15;26:13;77:10, |
| native (6) | 99:19;112:24; | 236:4,21,23;238:3; | 22;218:12,13,22; | 18;78:24;79:2 |
| 24:12,16,19,21; | 129:10;138:15; | 241:11;244:13; | 219:1;249:23;251:7, | off (16) |
| 25:4,12 | 152:24;195:16,20; | 245:21;248:13; | 7;253:4,22;254:1 | 11:18;16:14;20:20; |
| naturally (1) | 196:6;242:7 | 250:10;253:9 | numbered (2) | 66:3;72:20;89:20; |
| 102:14 | next (9) | noise-reduction (1) | 21:19;215:20 | 105:1;112:3,7,20; |
| nature (4) | 21:19;37:14;59:11; | 174:19 | numbers (14) | 174:7;224:7;227:14; |
| 19:17;39:16;180:5; | 130:18;137:10; | noises (3) | 51:2;133:12;139:3; | 231:19;237:12;249:9 |
| 211:10 | 148:4;173:19;184:4; | 210:20,24;211:6 | 141:2,10;142:3; | offered (1) |
| NB (10) | 251:13 | nomenclature (1) | 143:1,1,2;155:18; | 251:6 |
| 36:3,7;139:8,8; | nice (1) | 215:22 | 210:21;211:7; | offhand (1) |
| 153:12;155:24; | 167:11 | non-binding (1) | 227:13;253:8 | 225:21 |
| 157:22;179:5,6,6 | night (8) | 142:17 | numerous (1) | office (4) |
| NB24 (1) | 80:19;87:16;100:5 | non-complainant's (1) | 178:8 | 112:2,6;133:10; |
| 168:1 | 138:11;142:21; | $190: 10$ | NWS (1) | $182: 12$ |
| near (6) | 149:9;150:23;151:16 | none (3) | 220:13 | Officially (1) |
| 89:19;97:1;108:9; | nights (1) | $135: 7 ; 146: 1 ; 170: 4$ | 0 | $48: 1$ |
| nearby (3) | nighttime (5) | $80: 13 ; 105: 9$ |  | $97: 2$ |
| 84:21;149:19; | 81:20;142:22; | norm (1) | oath (3) | offsetting (1) |
| 210:19 | 143:9;207:20;218:9 | 214:17 | 7:2;78:18;172:7 | 105:1 |
| nearer (1) | Nine (1) | normal (2) | object (7) | off-the-beaten-path (1) |
| 106:11 | 55:21 | 131:19;245:20 | 82:5;100:9;170:12; | 108:11 |
| nearest (1) | Ninety (1) | north (7) | 181:13;236:20,22; | often (2) |
| 83:5 | 235:1 | 98:4;113:23;147:2, | 242:21 | 45:5;182:11 |
| necessarily (10) | Ninety-two (1) | 11,24;227:22;248:18 | obligated (1) | oftentimes (1) |
| 17:14;60:18;98:9; | 235:4 | northeast (3) | 189:18 | 125:22 |
| 102:16;112:15; | nitty-gritty (1) | 90:10;93:12; | obligation (4) | older (1) |
| $126: 5 ; 135: 10$ | $157: 9$ | 104:10 | 186:12;189:3,5; | $128: 2$ |
| 136:14,19;151:1 | nobody (1) | northeasterly (1) | 190:15 | onboard (1) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 68 | one-t |  |  | 66:3 |
| :---: | :---: | :---: | :---: | :---: |
| Once (12) | 158:18;159:6 | or |  | ckage (3) |
| 13:12;65:4;66:14 | 160:22;197:19 | 5:20 | outside-to-inside (1) | 120:21;153:2 |
| 68:21;71:9,20; | 198:16;199:22;211:4 | origin | 152:3 | 6:24 |
| 106:19;110:23; | online (1) | 1;17:12;34:7; | over (34) | pad (3) |
| 150:5;171:4;195:12; | 191:16 | 100:20;146:5;205:2 | 11:5;3 | 62:23;63:6,18 |
| 4:4 | on | Osler (2) | :16;83:1,21;87:11; | pads (2) |
| one (1 | 20:9;24 | 7:24;85 | 8:24;89:4;95:10; | 6:3;30:8 |
| 13 | 28:15,16;38:8, | others (6) |  | age (67) |
| 27:13;38:15;39:1,2 | 42:4;59:23;60:4 | 43:21;91:2 | 04:10;107:18 | 8:24;9:3 |
| 21;40:12,16;44:3; | 62:2;63:19,19;67 | ;3;160:23;217: | 5:11,14;128 | :21;15 |
| 47:20;49:16;51:16 | 74:4;99:4;103:18,19 | otherwise (2) | 55:2;158:22 | 17:21;22:3,9;24:11; |
| 52:7,11;54:12,16; | 149:13;151:5; | 10:17;167 | 71:21;196 | 26:14;34:7;36:11,22 |
| 57:4;59:10;61:9,11 | 189:24;192:19 | ought (2) | 7:24;211:23 | 37:15;38:16;41:9; |
| 64:15,20;67:7;70:8; | 193:4;201:24;206:7; | 243:18;25 | 214:12,18;223 | 45:17;49:17;59:10; |
| 71:15,18;73:20; | 237:17;239:8;249:17 | out (73) | 24:1,4,5;225:1 | 1:12;77:18,21;79:1 |
| 77:16;78:8,14;79:18; | onto (1) | 23:3;28 | 230:1;237:18;239: | 24;80:18;81:24; |
| 80:11;82:24;88:2,16; | 19:24 | 46:10;53:11;63:22; | over-estimate (2) | 83:21;84:4,11;107:6 |
| 89:20,23;90:12; | open (8) | :12;68:13 | 7:19,23 | 22:8,8;127:20,22; |
| 91:11,13;93:18; | 19:7;143:6;151 | 80:15;82:23;84:2 | over-estimation | 139:8,9;140:11; |
| 95:23;96:19;100:3; | 152:4;156:21; | 87:22;88:17;90:2 | 118:6 | 146:22;155:17; |
| 102:5,8;110:14; | 167:23;224:19;225:5 | 91:5,22;101 | overhead (1 | 56:7,22;157:6 |
| 113:23;114:22; | operat | 105: | :6;64:6,8;65 | 6;160:12;183 |
| 117:15;118:4,15, | 12:18 | 114:11;119:9;120: | ,22,24;74:16,1 | 84:4;187:20; |
| 120:16,22;129:2; | 225:20;236:17;241:2 | 129:4;135:20;136:2; | 110:16 | 188:15;199:4,5 |
| 141:14;146:6,15; | oper | 140:21;161:4, | overly (1) | 01:8,10;205:4,4,5 |
| 150:21;154:11,18 | 117:20;118: | 162:5,14,24;168 | 60:20 | 209:3,16;211:16; |
| 155:15;158:13; | 190:7;191:14;200 | 173:22,24;174:6; | oversaw | 17:14;221:15; |
| 161:2,21;165:9 | 201:1;202:7;212:21 | 175 | 6:2 | 233:6;234:7 |
| 176:10;177:7; | 238:4 | 178:9;187:7;188: | oversee | Pages (7) |
| 178:12;182:8; | oper | 189:2,10,13;193:20; | 52:5 | 36:12;79:15;83: |
| 183:18;184:21; | 89:13,18;90:1 | 194:21;195:10; | overseein | 2:8;148:4 |
| 185:6,21;187:23 | 177:20 | 197:18;198:21 | 53:24 | 14 |
| 188:24;190:18; | opera | 20 | oversig | paid (1) |
| 192:7,15;194:14 | 38:19;39:5,12 | 207:4,7,24;210:1 | 53:2 | 189:13 |
| 197:1;199:4;200: | 130:18;234:5; | 211:23;212:11; | oversimplifie | panel ( |
| 18;202:3;204:3; | operations (1) | 213:7;214:2;215: | 71:15 | 4:5;75:2 |
| 205:23;207:18; | 16 | 216:18;220:4;230:7; | overwhel | paper (27) |
| 210:22;218:20; | operator | 232:3;234:14;235:9; | 31:11 | 153:11,13,18,1 |
| 221:3,4,6,9,12,20 | 94:23;97:2 | 244:16;249:8; | own (3) | $4: 8,15,23,2$ |
| 222:6;224:23;228:6, | 177:13,19 | 251:12;252:8 | :1;1 | 55:6,13;157:10,21 |
| 21;229:1;232:3; | opinion (7) | outcrop (14) | 244:1 | 58:14;163:21 |
| 233:20;234:1;238:7; | 9:21;30:19,21,23 | 9:7,7;10:2,3,6,6,20 | owned | 67:9,17,23;168:3,8, |
| 243:4;245:6;247:1; | 104:14;113:16;114:7 | 20;11:6,7,7;12:17,18; | 189: | 9;205:9,10,13,21; |
| 250:1 | opinion | 29:1 | owner | 206:3;239:2;253:18 |
| O'Neal (22) | 46:3 | outcrop | :17;52:12;97:23 | apers (1) |
| 75:5,7,10, | opportunit | 8:21 | 6:20;176:4;177:5, | 154:4 |
| 76:7,12;77:4;99:21; | 79:7;208:24 | ou | 13,1 | paragraph (10) |
| 124:10;138:3; | opposed | , | owner/developer (1) | 1:9;156:5;201:7 |
| 157:11;172:16; | 106:19 | outdoor (1) | 5.23 | ,21;205:9,14; |
| 191:4;208:17;211:1 | optio | 32. | own | 206:2;207:16,17 |
| 223:6;225:7;228:5; | 24:2 | outdoors (2) | 34:22;52: | paraphrasing (1) |
| 237:12;238:20; | 4:19 | 1:19,2 | o | 157:20 |
| 247:23 | orange (2) | outer (2) | 52:8,10;53:9;54:3, | (2) |
| one-day (1) | 86:18;22 | 55:1,20 | 4;58:3 | 222:10;224:20 |
| 185:12 | order | outermost (1) | oxygen (1) | part (29) |
| one-number | 59.18.68 | 28:8 | 164:24 | 26:6,9; |
| 117:4 | 92:5;121:20;160:24 | outline |  | 40:16;47:15,15;77 |
| ones (7) | ordina |  | P | $87: 24 ; 88: 4 ; 89: 15$ |
| 39:7;10 | 35:3 | outpu |  | $91: 7 ; 97: 20 ; 113: 8$ |
| 178:3,8;199:8,17 |  |  |  | $132: 9 ; 142: 4 ; 150$ |
| ne's (1) | 47:20 | outside (7) | 88:3 | 153:20;154:22 |
| 82:22 | Oregon (1) | 143:2,4;151:11; | pace (1) | 167:10;175:7;179:2; |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 183:14;208:19; | 151:7;161:10; | 169:16 | 56:24;59:14;60:12, | policy (1) |
| :---: | :---: | :---: | :---: | :---: |
| 218:15;227:22; | 162:11;163:3,7,18; | personnel (1) | 23;233:24 | 214:14 |
| 239:6;245:19;248:23 | 167:24;171:8;182:6; | 149:7 | planes (2) | Pond (41) |
| participant (1) | 196:24;197:11,12; | perspective (5) | 110:16;115:1 | 14:8,13,20;27:5; |
| 141:20 | 213:10;251:8 | 44:12;45:10;91:14 | planning (3) | 79:6,18;81:17;84:20; |
| particular (14) | people's (1) | 20;120:15 | 25:10;95:19 | 87:20;105:15;106:3; |
| 12:1;18:13;22:17; | 140:22 | phase (6) | 254:19 | 107:16,18,19;108:6, |
| 23:18;26:1;73:16; | per (20) | 62:16;65:3,5; | plans (11) | 12,16,20;109:2,5,11, |
| 81:10;124:4;129:16; | 80:20,24;81:1,5,6 | $66: 11,14 ; 67: 22$ | 13:5;20:18,20 | $19,21 ; 110: 15,20,23$ |
| 172:12,22;201:17; | 116:15;133:2;215:3; | phenomenon (3) | 34:16;40:23;44:17; | 112:22;113:11,17,20, |
| 243:16;252:16 | 224:8,9;227:8,11; | 128:19,21;162:8 | 45:4,23;60:6;64:18; | 23,24;114:2,11; |
| particularly (7) | 230:8;240:12,17,19, | photographs (10) | 73:18 | 115:10;119:16,18; |
| 48:5,19;198:17; | 21;241:1,2,11 | 36:17,18,19,20; | plants (1) | 248:2,14,17;250:9 |
| 207:20;211:2; | percent (10) | $37: 1 ; 42: 6,7 ; 243: 12$ | $56: 4$ | pool (1) |
| 240:16;242:18 | 23:22;38:5;56:23, | 14,22 | play (1) | 70:15 |
| parties (3) | 24;59:2,4,7,8;232:5; | phrase (2) | 72:8 | portion (1) |
| 123:22;124:4,9 | 237:13 | 125:17;136:16 | please (24) | 73:9 |
| parts (2) | percentage (2) | phrased (1) | 4:13,22;8:23 | portions (1) |
| 34:9;166:7 | 10:5;20:4 | 216:22 | 15:18;20:3;21:14; | 82:10 |
| party (2) | Perception (2) | physical (4) | 36:14;45:2;55:10; | Portland (2) |
| 125:23;176:5 | 153:18;158:1 | 93:15;103:17 | 62:21;75:13;81:1; | 4:19;154:7 |
| pass (1) | performed (1) | 106:6,13 | 122:11;123:1,17,20; | position (2) |
| 175:22 | 202:4 | pick (3) | 126:11;127:24; | 104:3;160:21 |
| passed (3) | perhaps (5) | 61:20;117:8,1 | 165:10;181:1;200:7; | possibility (1) |
| 126:5;185:8,13 | 62:13;83:5;105:3 | picked (5) | 209:8;219:22;229:11 | 171:21 |
| passing (1) | 158:14;162:1 | 104:4;148:8 | plenty (2) | possible (26) |
| 128:4 | period (10) | 150:13;210:3;212:11 | 115:8;145:8 | 24:17;25:5;30:6,7; |
| PATCH (42) | 79:22;89:11;97:5; | picture (7) | plug (1) | 37:13;69:5;72:18; |
| 4:7,9,10,12;5:4; | 104:10,16;194:22; | 37:15;42:22;44:2; | $234: 23$ | 101:22;102:1,3; |
| 7:6;15:6,10,15;21:8, | 210:14;211:24; | 163:15;222:5;248:5, | plus (18) | 103:10;131:1,3; |
| 18,21;69:13,16; | 213:10;215:9 | 10 | 66:15;78:7,7,13 | 136:8,13,14,17; |
| 70:23,24;71:2;75:6, | periods (5) | pictures (2) | 80:8;81:15;118:24; | 142:15;145:15; |
| 12;77:3;81:22;82:8, | 105:7;213:4; | 44:9;243:17 | 122:16;152:14; | 151:7,20;193:11; |
| 15;85:4;88:2,9,13; | 216:19;218:13,19 | pieces (1) | 216:23;218:23; | 207:3,4,11;231:22 |
| 100:8;109:22;123:5, | permanent (1) | 63:8 | 237:2,3,10,21,2 | possibly (2) |
| 24;140:7;155:4; | 58:15 | pin | 238:5,11 | 17:7;171:6 |
| 165:4;170:11; | permeable (12) | 64:23 | plus-two (1) | post (1) |
| 172:20;181:12; | 17:23;18:3,12,19, | Pinello (5) | 119:5 | 195:13 |
| 216:2,5;242:20; | 23;19:5,6,11,13,20; | 8:4,5,8;95:20,22 | pm (6) | post-construction (11) |
| 243:19;245:8 | 20:6;21:15 | pinpoint (1) | 4:2;69:22,23 | 66:16;97:21; |
| Patrick (4) | permission (2) | 64:22 | 137:19,20;255 | 173:23;175:20; |
| 4:18,23;5:2;6:5 | 96:20;97:22 | place (5) | point (36) | 202:23;203:2; |
| pause (4) | permit (16) | 69:2;72:22;75:16; | 59:17;64:3,22 | 204:23;205:2; |
| 91:18;155:11; | 35:19;46:7;51:2; | 110:13;114:19 | 74:4;81:9;107:9,16; | 232:23;238:3,9 |
| 165:11;178:13 | 56:19,20;59:1;61:2; | placed (4) | 111:19,23;114:14; | potentially (1) |
| paying (1) | 141:3;186:2,19; | 138:19;146:18,22; | 121:6;128:12;129:1; | 169:6 |
| 41:22 | 189:7,8,12;190:3; | 147:1 | 142:17;149:6;150:7, | power (20) |
| peak (1) | 252:3,8 | places (5) | 21;151:2;161:9; | 78:12;117:21; |
| 156:15 | permits (2) | 31:12;43:20;47:5 | 166:20;168:6; | 118:18,19,24;119:8; |
| Pedersen (5) | 13:20;40:22 | 65:13;190:23 | 189:22;196:17; | 132:14,14;167:16,19; |
| 158:12;161:5; | permitting (4) | plain (1) | 203:11;213:13; | 174:20;179:18; |
| 163:6;167:9;168:3 | 60:9;94:10;171:1; | 249:14 | 227:6,24;230:7; | 180:14,20;182:6,23; |
| peek (1) | 185:24 | plaintiff (2) | 235:19,20;243:20; | 183:1;191:21,23; |
| 156:11 | persistent (1) | 178:5,7 | 244:3;247:20; | 238:17 |
| peer-reviewed (1) | 43:24 | plaintiffs (1) | 248:13;250:7,10 | powered (1) |
| 136:18 | person (2) | 177:12 | pointed (2) | 109:17 |
| Pelletier (1) | 169:13;186:21 | plan (30) | 88:17;90:2 | power-level (3) |
| 50:17 | personal (9) | 13:2;15:3;16:13, | points (8) | 122:16;181:4; |
| people (30) | 30:19,21;115:6; | 16;17:8,15,19;18:1 | 48:9,11;82:23; | 182:16 |
| 46:5;92:1,12,14; | 135:14,17;148:22; | 22:3,6,16;23:1,14; | 118:4;195:11; | practice (4) |
| 113:3,4;114:19,23 | 172:14,24;173:1 | 32:10;34:13;35:20, | 214:23,24;235:15 | 16:24;17:17,20; |
| 115:3,7;144:12,17, | personally (4) | 21;38:22;45:8,12; | pole (2) | 238:13 |
| 20;145:3,15;149:14; | 54:9;92:12;103:6; | 46:4;53:6,11,20,21; | 62:8,8 | practices (2) |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 51:8;52:16 | 119:10 | 18:17;35:20,22; | pronouncing (1) | $156: 16$ |
| :---: | :---: | :---: | :---: | :---: |
| precedent (1) | pressuri | ,24,24,71:8,17, |  | purpose (10) |
| 100:1 | 11:16 | 72:9;127:9;131:10, | propagating (1) | $94: 8 ; 100: 19 ; 101: 2$ |
| precipitation | pretty | :1;191:16 | 153:4 | 114:18;119:23; |
| 31:17,22;32:5,17; | 39:3;52:22;84:17 | 194:12;219:6 | propagation (9) | 189:9;194:20;195:6; |
| 33:4;220:21 | 105:12;110:2; | produce | 132:18,20,22; | 211:21;225:10 |
| pre-construction (17) | 120:10;146:2;174:7, | 154:16;179:15 | 233:9,16;239:10,16, | purposes (6) |
| 38:21;96:23;98:2, | 8;240:23 | produces (2) | 23;245:18 | 61:10;96:23; |
| 15;99:7;194:13,20 | prevail | 132:11;182 | properly (1) | 132:23;198:19 |
| 195:13;202:13; | 138:5 | producing (1) | 40:21 | 210:22;224:6 |
| 203:3;204:22;205:1; | prevent (1) | 236:21 | property (4) | put (19) |
| 213:20,23;216:17; | 25:14 | product (3) | 34:22;92:22 | 23:5;70:10;75:4 |
| 232:22;238:8 | previous (4) | 125:11;126: | 112:24;180 | 91:14;94:19;96:17; |
| predict (5) | 46:16;50:2;83:1 | 233:20 | proportions (1) | 100:22;105:16; |
| 171:8;235:24; | 100:2 | production (1) | 9:7 | 118:1;140:21;150:6; |
| 236:3;237:3;241:9 | primarily | 174:20 | proposed (9) | 172:21;195:9; |
| predicted (10) | 81:19 | products | 20:9;28:24;36:2 | 200:16;229:23,24; |
| 83:4;89:22;108: | Primer (2) | 214:14 | 37:21;106:12;107:8; | 235:19;246:19,23 |
| 113:18;127:1; | 33:2,1 | professional (7) | 108:24;129:16; | puts (2) |
| 166:20;193:22,22; | principal | 30:22;173:5; | 168:12 | 172:11;252:8 |
| 238:19;251:6 | 75:20 | 4:11,15;186:11,16 | protect (1) | putting (7) |
| predicting (2) | principle | 189:17 | 133:17 | 57:23;59:19;65:5; |
| 111:1;171:13 | 105:2 | profile (1) | Protection (2) | 167:21;169:19; |
| predictive (4) | Prior (3) | 71:23 | 133:10;200:3 | 172:16;234:14 |
| 191:20;194:16; | 24:15;139:15 | $\underset{38.1}{\text { prognosis (1) }}$ | $\begin{aligned} & \text { protective (1) } \\ & 121 \cdot 20 \end{aligned}$ |  |
| 237:24;238:1 | 143:16 | 38:1 | $121: 20$ | Q |
| $183: 24$ | $39: 15 ; 186: 2$ | $51: 2 ; 152: 19$ | 94:6;163:10 | qualifications (5) |
| preface (1) | privy (1) | Project (83) | 173:12;226:10 | 5:13;49:21;50:7; |
| 136:12 | 126:19 | 5:23;6:2;12:8 | provide (13) | 75:22;185:12 |
| preferable (1) | probably (16 | 13:22;14:2;18:16 | 9:6;14:11,16;21:4, | qualified (6) |
| 39:21 | 13:13;38:13;53:9 | 22:11;23:4,10,11 | 9;51:19;52:13,17; | $11: 22 ; 45: 20 ; 46: 5 \text {, }$ |
| preference (1) | 115:6,15;125:3; | 29:22;30:23;34:13; | 54:8;68:8;201:24; | 9;49:18;251:18 |
| 39:13 | 137:14;146:1;148:1; | 37:12;38:20;39:6,12; | 202:5;216:14 | quality (5) |
| prefiled (20) | 150:4;174:15; | 40:13,17;41:1,9; | provided (11) | 24:9;31:1;53:22; |
| $6: 5,13,21,22 ; 8: 19$ | 176:10;197:11; | $42: 3 ; 48: 5 ; 52: 5$ | $34: 13 ; 35: 11 ; 40: 12$ | 153:16;164:18 |
| 11:4;26:12;34:6; | 247:15;250:4;253:7 | $53: 24 ; 55: 5 ; 60: 7$ | 68:5;72:10;79:3; | quantify (7) |
| 38:16;49:17;76:8; | problem (15) | 61:22;67:21;68:2,7; | 83:15;90:7;94:11; | 10:9;14:19;20:16; |
| 77:5,9,17;78:18; | 61:5;80:10;128 | 71:18;76:4,6;82:2,3; | 120:23;250:24 | 21:14;105:23; |
| 79:8;101:7;133:7; | 159:23;168:17; | 83:4,10,17,24;84:1; | provides (1) | 115:23;122:7 |
| 157:6;179:1 | 186:15,22;187:3 | 94:12,19;99:24; | 67:7 | quantifying (1) |
| premise (3) | 189:19,20,24;190:17; | 101:13,18;108:22 | proximity (2) | 106:1 |
| 136:15;144:6 | 196:15;243:11; | 111:2;114:2;115:22, | 86:12;92:2 | quarter (4) |
| $168: 7$ | 254:16 | 22;120:12;125:7,15; | PSNH (1) | 122:8;158:21 |
| premised (1) | problematic (1) | 129:2;132:1;133:1; | 74:3 | 166:12;193:1 |
| 46:4 | 196:13 | 138:17,18;171:2,4,9; | public (5) | questioner (1) |
| prepare (1) | problems (1) | 180:6;186:2,7,8,17; | 24:3;67:12;133:17; | $46: 16$ |
| 134:17 | 163:18 | 189:6,8,10,15;190:6; | 177:3;254:21 | quick (3) |
| present (11) | procedural (1) | 191:2,5;195:20; | publication (1) | 49:14;64:17;83:20 |
| 55:4;154:8;158:20; | 169:15 | 196:6;208:6;213:1; | 33:1 | quickly (6) |
| 207:10,21;208:5,14, | procedure (1) | 252:4,7,16,21,24 | pull (4) | 25:2,6;32:14,18; |
| 15;210:14,15;211:21 | 253:18 | projecting (1) | 76:13;187:7;248:8, | 64:22,154:3 |
| presentation (2) | procedures (2) | 152:13 | 18 | quiet (18) |
| 154:8,14 | 52:15,15 | projects (19) | pulled (1) | $81: 13 ; 87: 17 ; 91: 17$ |
| presented (5) | proceed (4) | 5:21;37:6;44:7; | 249:9 | 103:23;111:18; |
| 103:1;153:13; | 4:9;70:1;82:14 | 48:2;54:6;73:21; | pulses (3) | 112:5;113:8;114:24; |
| 154:5;177:17; $197: 23$ preserved (1) | 137:22 | 76:2;100:2;138:17, | 154:17;155:1; | 115:4,18;144:17,24; |
| preserved (1) | proceeding (1) | 19;141:4,16;152:19; | 156:14 | 145:5,8,21;146:2; |
| 115:19 | 124:3 | 183:20,21;185:23; | purchase (2) | 151:8,8 |
| pressure (4) | proceedings (6) | 190:21;205:12; | 251:8;252:21 | quieter (6) |
| 119:22;155:1 | $4: 4 ; 155: 11 ; 165: 11$ | 241:20 | purchased (1) | $101: 23 ; 104: 16,24$ |
| 182:24;218:5 | 178:13;180:13;192:9 | project's (2) | $251: 24$ | 105:6;112:20;116:23 |
| pressure-level (1) | process (15) | 16:9;54:15 | pure (1) |  |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 79:21;90:23;104:4, | react (1) | rebuttals (1) | 151:21;152:3 | relatively (5) |
| :---: | :---: | :---: | :---: | :---: |
| 8 80, | 197:11 | 253:15 | re-established (1) | 13:23;14:3;98:22; |
| quietude (1) | reaction (2) | recall (5) | 73:7 | 181:11;224:19 |
| 91:8 | 196:23;245:7 | 23:19;38:3;89:18 | refer (2) | relevance (1) |
| quite (7) | reactions (2) | 179:3;185:18 | 157:17;241:23 | 165:5 |
| 65:14;144:20; | 140:22;196:24 | received (3) | reference (12) | relevant (1) |
| 150:6;170:12;214:5, | ad (25) | 154:1;243:15,16 | 8:23;10:1;15:5; | 165:8 |
| 9;240:18 | 14:6;16:5,14 | recently (1) | 23:18;24:12;36:2 | relies (1) |
| quote (2) | 20:20;34:8;92:13,17; | 32:1 | 61:13;111:23; | 201:14 |
| 24:17;42 | 122:11;123:5,10,15; | receptor | 138:12;155:19; | relying (1) |
| quoted (2) | 124:12;133:13; | 234:18;238:12 | 157:12;179:10 | 126:21 |
| $92: 7,23$ | 149:5,6;154:21; | 241:13;242:17 | referenced (1) | remain (2) |
| quoting (1) | 162:17;168:21; | receptors (7) | 133:8 | 30:9;38:10 |
| 121:24 | 205:15,20;207:15; | 194:22;195:22 | referencing (6) | remark (1) |
| $\mathbf{R}$ | 217:6;242:14;245:5, | 197:16;198:8;235:5, 11,14 | 29:4;34:6;178:23; 221:13;227:21;233 | $\begin{aligned} & \text { 84:11 } \\ & \text { remarks (1) } \end{aligned}$ |
| R |  | 11,14 | $221$ | $\underset{79 \cdot 14}{\operatorname{remarks}}(\mathbf{1})$ |
| radar (1) | 31:7 | 69:21;137 | 23:20;101:5; | remember (8) |
| 12:6 | reading (9) | recipients (1) | 141:12;210:1 | 124:15;146:7; |
| radar-activated (2) | 15:18;87:2;127:20; | 243:4 | referring (7) | 159:19;180:24; |
| $26: 17,18$ | 157:23;159:1,2; | recognize (5) | 57:13;62:14;67:3; | 189:21;194:24; |
| radii (1) | 189:3;199:20;202:22 | 182:7;228:23 | 88:8;139:12;140:8; | 212:16;248:2 |
| 48:20 | readings (1) | 229:5;233:5;242: | 179:5 | remembering (1) |
| radius (2) | 201:16 | recommend (1) | refers (1) | 247:24 |
| 34:21,23 | reads (1) | 50:22 | 61:9 | remind (1) |
| rainwater (1) | 206:3 | recommendation (4) | reflect (2) | 15:2 |
| 19:14 | ready (2) | 142:16;171:22,23; | 193:18;251:7 | remote (1) |
| raised (3) | 75:4;131:21 | 172:2 | refraction (1) | 81:15 |
| 186:8,14;242:15 | real (2) | recommendations (1) | 245:19 | removal (2) |
| ran (1) | 108:9;142:1 | 171:24 | refrigerator (4) | 11:9;12:1 |
| 214:13 | realistic (1) | recommending (2) | 145:19,21,24; | remove (3) |
| Ranch (1) | 172:5 | 170:6;202:17 | 151:4 | 49:19;68:16;248:4 |
| 220:14 | reality (2) | recommends (2) | refrigerators (1) | removed (10) |
| range (17) | 93:17;238: | 50:23;80:6 | 145:11 | 9:15;16:21;17: |
| 80:1;83:6;84:22 | realize (3) | reconstruct (1) | regard (8) | 30:7;38:12;39:4,19; |
| 96:9,12,14,15; | 112:3,9,10 | 68:15 | $53: 21 ; 71: 6 ; 72: 1$ | 68:18;84:6;108:8 |
| 114:12;119:2; | really (29) | record (14) | 13;78:1;79:11; | removing (2) |
| 154:19;155:2; | 19:10;21:22;25:20 |  | 179:12;204:21 | 12:17;248:19 |
| 167:12;198:9;235:8; | 43:13;51:7;52:18; | 99:18;121:8,21; | regarding (9) | Rene (1) |
| 241:15;242:15,18 | 61:21;64:24;66:3; | 181:14,21;193:17; | 32:10;79:3;87:1 | 50:17 |
| ranged (1) | 96:21;98:3;111:24; | 206:7;222:16,19; | 99:22;100:7;126:9; | reopened (2) |
| 178:5 | 112:4;116:15;124:1; | 243:13;255:1 | 135:6;202:9;243:14 | 54:19,23 |
| ranges (1) | 138:7;172:5;174:5, | recorders (1) | registered (3) | repeat (4) |
| 210:7 | 11;176:6;211:22; | 149:21 | 5:15,18;159:17 | 36:14;45:1;55:10; |
| rare (1) | 212:19;213:9;224:9; | recording | regular (3) | 200:7 |
| 84:9 | 227:15;235:14; | 159:24 | 19:8;25:16,22 | repeating (1) |
| rarely (1) | 245:11;251:19; | recordings (1) | regulations (1) | 250:23 |
| 47:22 | 252:20 | 148:18 | 135:5 | repetitive (1) |
| rated (3) | reason (12) | recourse (1) | regulatory (1) | 194:5 |
| 118:21,23;179:20 | 73:1;83:9;91:7; | 175:3 | 129:8 | rephrase (3) |
| Rather (7) | 115:1;117:17; | recreation | reinforces (2) | 170:18;181:19 |
| 61:20;66:3;69:14; | 125:20;169:20; | 81:18 | 151:10;167:20 | 182:2 |
| 98:17;127:2;233:6; | 176:3,14;181:8; | red (2) | relate (1) | replace (2) |
| 246:9 | 195:9;246:18 | 156:3,10 | 141:11 | 54:20;55:8 |
| rating (3) | reasonable (3) | Redirect (4) | related (4) | replaced (2) |
| $118: 20 ; 180: 16$ | $\begin{aligned} & 108: 10 ; 167: 22 ; \\ & 177 \cdot 0 \end{aligned}$ | $69: 12,15 ; 70: 2 ; 71: 1$ | $\begin{aligned} & 129: 15 ; 136: 23 ; \\ & 165 \cdot 20 \cdot 20 \cdot 10 \end{aligned}$ | $54: 16 ; 68: 18$ |
| $182: 16$ ratings (1) | 177:20 reasonably (1) | reduce $55: 2$ | $\xrightarrow{\text { relates (2) }}$ | $149: 22$ |
| 181:4 | 238:19 | reduced (6) | 19:17;191:23 | reply (1) |
| rattle (2) | reasons (6) | 38:13;39:19; | relation (2) | 123:7 |
| 162:2,4 | 80:11;114:23; | 127:17;128:7; | 72:17;141:3 | report (48) |
| reach (2) | 141:14;197:1,3; | 156:11;160:16 | relative (2) | 14:15,19;15:21,22; |
| 74:2;155:1 | 238:15 | reduction (2) | 168:8;254:2 | 88:6;101:6;107:6; |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 127:14;139:7; | 162:5;163:5,21; | 46:9;71:5,9;76:5; | 166:6,16;169:13; | 5:22;76:3;171:13 |
| :---: | :---: | :---: | :---: | :---: |
| 140:11;146:5,22; | 227:14 | 190:9;191:1 | 179:23;183:3;186:1; | room (15) |
| 160:12;161:12; | researchers (1) | retention (3) | 189:8;191:8;192:6; | 66:1,20;70:6,13, |
| 179:2,7;197:24; | 165:15 | 16:8;17:3,1 | 199:24;200:20; | 20;91:18;111:12,20; |
| 198:24;199:3,14; | reseeding (5) | retrospect (2) | 204:2;213:17;214:3, | 128:12;144:11,11,19; |
| 204:13;205:5,6,8,14; | 24:13,16,20,22; | 112:4,10 | 3;215:23;216:20; | 150:23;182:6;243:8 |
| 209:4,10;213:3; | 25:13 | reveal (1) | 219:10,18;222:9,21; | rooms (1) |
| 215:4,15,17;217:8; | reserve (1) | 177:1 | 224:23;225:1; | 144:23 |
| 220:11,23;222:5; | 21:9 | revegetate (1) | 226:22;231:5; | rotator (1) |
| 226:18;228:3,8,11, | residence (4) | 43:12 | 233:21;236:12; | 192:12 |
| 18,19;229:4,17,22; | 87:14;97:13;98:16 | revegetated | 248:10;249:3;251:3; | rotator-swept (1) |
| 230:16,23;231:5; | 173:14 | 42:20,24;55:2 | 252:3;254:10,20 | 128:16 |
| 232:3 | residences (7) | 58:14 | right-hand (1) | Roth (15) |
| reporter (11) | 83:22;90:6;96:3 | revegetation (2) | 86:18 | 40:5,7;70:18;82:5 |
| 4:22;5:1;14:1; | 12;97:20;98:7; | 43:18;65:5 | right-of-way (1) | 172:8;193:17;194:8; |
| 75:9;96:6;138:23 | 106:11 | review (2) | 74:3 | 197:24;243:7;247:8, |
| 181:1;219:9,13,17,20 | resident (4) | 58:4;64:17 | risk (3) | 10,14,18,22;254:4 |
| reports (1) | 52:4;53:1,8,23 | reviewed (3) | 167:2,4, | rotor (2) |
| 204:24 | residents (7) | 34:14;154:2 | road (102) | 127:11;192:13 |
| represent (5) | 34:18;35:6,15; | 253:16 | 6:2;13:8,10;17:23; | rough (2) |
| 8:15;90:6;98:3,6 | 97:19,22;98:13,23 | reviewer (1) | 18:3,12,19;19:4,9,13, | 59:14;91:20 |
| 190:1 | residents' (1) | 23:3 | 14,18,19,23,24;20:4, | roughly (5) |
| representative (1) | 98:22 | reviews (12) | 5,6,8,12,19;21:15; | 62:11,24;63:21; |
| 223:22 | residual (1) | 14:24;27:3;41:7 | 23:2;27:19;28:18; | 74:15;81:6 |
| representing (1) | 79:21 | 51:9;57:12;64:16; | 30:5;36:24;37:9; | rounds (1) |
| 99:19 | Resources (2) | 101:1;107:4;121:2; | 38:3,14;39:10,11,20; | 78:2 |
| represents (1) | 33:2,13 | 140:6;156:24;222:24 | 46:24,24;47:2,7,17, | Route (7) |
| 227:2 | respect (5) | Revision (2) | 18,20,23;48:4,10,16, | 54:17;63:10,12,18; |
| reputation (3) | 46:3;48:3;111:11 | 123:12,18 | 19,24;49:4,6;54:18, | 67:13;108:8;148:10 |
| 173:9;174:14; | 117:7;135:1 | Rick (1) | 22;55:3,19;56:22; | routinely (1) |
| 175:7 | respond (1) | 139:7 | 57:6;58:24;59:20; | 246:23 |
| reputation-wise (1) | 159:7 | rid (1) | 62:3,4,10,18,22;63:3, | ruckus (1) |
| 176:1 | responded (2) | 211:6 | 7,10,11,19,23;64:10; | 150:6 |
| request (12) | 216:18;242:13 | ridge (4) | 66:18,18;67:1,5,5,6, | rule (1) |
| 21:8,12,23;121:4 | response (26) | 132:4;212:4,13 | 12;68:8,15;70:19; | 99:23 |
| 123:6;187:4,17; | 7:16,18;8:2;33:24 | 213:19 | 71:11,21,24;73:2,22, | run (6) |
| 188:5;215:19;216:3, | 37:10;72:10;73:11; | ridgeline (2) | 24;74:5,11,12,13,17, | 62:7;68:2;80:22; |
| 11;217:6 | 79:10;82:17;83:18; | 214:5;239:19 | 18,20;95:14;146:15; | 142:20;251:10,11 |
| requested (1) | 85:11,13,15,17;95:5, | ridgetop (6) | 147:1,16,17,18,20, | running (17) |
| 18:15 | 6;121:15;122:22; | 93:4;132:5,10 | 21;148:2,13;150:3 | 54:15;81:11;93:2; |
| requests (2) | 137:8;158:3,18; | 212:2;221:5,20 | roadbed (1) | 106:16;111:11; |
| 187:14;222:17 | 176:17;189:4;200:4; | right (103) | 28:17 | 117:19;129:18,22; |
| require (5) | 228:15;239:3 | 4:8;8:22;9:3;12:6 | roads (6) | 130:20;131:17,17,22; |
| 57:19;60:10;62:4, | responsibility (7) | 19;18:3;22:7,14; | 18:8,10;61:18 | 148:24;151:2,3; |
| 24;158:19 | 35:14,16;170:6,8, | 24:13,24;28:6,24 | 62:9;67:1;71:7 | 251:12;252:12 |
| required (11) | 14;173:1;175:23 | 32:13;37:21;39:22 | roadway (4) | runoff (3) |
| 9:15;11:10;12:9; | responsible (1) | 41:6;43:3;45:6; | 18:24;56:17;62: | 19:12;27:9;57:10 |
| 35:8;40:16;60:4,16; | 53:2 | 47:18;53:15;58:5; | 73:10 | runs (3) |
| 62:7,11;93:7;203:6 | restore (1) | 59:4,9,11;60:6;63:12, | roadways (1) | 65:18;151:5;212:4 |
| requirement (5) | 38:23 | 17;64:4,10;66:7; | 19:2 | rural (2) |
| 23:7;52:6;60:11; | restored (3) | 67:9;69:14,18;70:14; | ROBERT (5) | 144:4;145:5 |
| 61:2;100:6 | 38:20;42:23;55:23 | 76:20;87:16;95:1; | 75:7,10,15;76:7 | rustle (1) |
| requirements (8) | result (2) | 106:3;109:8;110:2; | 77:4 | 148:9 |
| 16:11;22:24;35:18; | 13:23;14:2 | 113:12,21;116:14; | Robinson (4) | rustling (3) |
| 49:3;60:21;135:10; | results (8) | 122:2,3,5;126:23; | 54:11,12,14;56:5 | 148:11,20;149:19 |
| 136:7,11 | 101:3,9;148:5 | 127:10;129:12,20; | rock (23) | rye (1) |
| requires (4) | 156:1;177:17; | 130:16,19;131:23; | 8:21;9:7,7,14;10:2, | 25:5 |
| $\begin{aligned} & 40: 24 ; 41: 11 ; 51: 11 ; \\ & 53: 19 \end{aligned}$ | $\begin{aligned} & \text { 206:14;234:9;251:5 } \\ & \text { resumed (3) } \end{aligned}$ | $\begin{aligned} & 133: 9 ; 134: 6 ; 135: 6 ; \\ & 137: 16 ; 141: 6 ; \end{aligned}$ | $\begin{aligned} & 3,6,6,20,20 ; 11: 6,7,7, \\ & 9,24 ; 12: 17,17: 29: 17 \end{aligned}$ | S |
| requisite (1) | 4:1;69:22;137:19 | 144:23;149:15 | 21;30:3,7,12;39:17 |  |
| 133:17 | retain (2) | 150:19,20;152:16,16, | rocks (1) | Safety (4) |
| research (7) | 27:15;45:19 | 18;156:2,17;157:19; | 39:14 | $34: 15 ; 35: 23,24$ |
| 68:4;158:4,11; | retained (6) | 163:15;165:23; | role (3) | $133: 18$ |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| sake (1) | 222:12;223:4; | self (1) | 36:11,22 | signal (1) |
| :---: | :---: | :---: | :---: | :---: |
| 85:20 | 225:18,24;228:14; | 205:20 | several (6) | 158:22 |
| Salmon (1) | 230:4,5;231:18; | self-generated (1) | 71:17;97:6;161:1; | Signals (1) |
| 91:22 | 232:7 | 223:7 | 176:20;185:22; | 153:15 |
| same (38) | screens (7) | self-induced (2) | 235:10 | significant (1) |
| 6:4;7:1,3;11:3; | 225:11,12,13,23; | 206:6;223:7 | shakedown (1) | 232:16 |
| 17:2;18:21;49:3,4; | 228:20;229:24;232:4 | sell (3) | 131:19 | significantly (3) |
| 57:5;72:22;76:7; | scrutiny (1) | 251:13,16;252:15 | shall (1) | 128:6;195:21,23 |
| 77:4;78:17,19,23; | 172:23 | sense (6) | 139:2 | Silver (1) |
| 81:23;93:10,14;99:6, | se (2) | 19:13;53:6;65:1; | shape (1) | 220:14 |
| 10;102:11;107:24; | 116:15;133:2 | 80:10;137:15;215:11 | 111:5 | similar (6) |
| 110:9;116:6,8; | Sean (1) | sensitive (1) | shapes (1) | 84:7;91:1;100:2; |
| 118:22;127:4,8; | 166:9 | 193:19 | 182:13 | 142:3;144:3;166:24 |
| 132:3;165:15; | search (1) | Sensitivities (1) | share (1) | similarly (2) |
| 199:14;215:9; | 182:8 | 153:17 | 244:15 | 48:18;53:18 |
| 221:19,21;224:20; | season (1) | sent (1) | sheets (1) | Simpkins (4) |
| 228:21;229:1;243:11 | 43:8 | 242:5 | 120:23 | 49:12,13,15;50:11 |
| sampling (3) | SEC (1) | sentence (18) | sheltered (3) | simple (1) |
| 53:21;106:19,22 | 83:11 | 16:5;154:21;201:8, | 95:2,9;225:2 | 231:12 |
| Sanctuary (4) | second (44) | 11,22;202:12; | shift (1) | simpler (1) |
| 112:22;113:12,17; | 41:9;67:7;80:20, | 207:16;208:3,13; | 219:8 | 116:20 |
| 114:23 | 24;81:5,6;89:23; | 244:5,6,8;245:6,14 | short (6) | simplifying (1) |
| satisfactory (1) | 91:16;118:15; | 18,23;246:15,17 | 59:7;122:10; | 168:22 |
| 175:5 | 123:13;154:18; | sentences (1) | 152:20;159:23; | simultaneously (1) |
| satisfied (1) | 155:10,15;158:21,22; | 177:8 | 181:11;202:16 | 93:17 |
| 100:7 | 165:9;166:12;178:6, | separate (1) | shorten (1) | sit (2) |
| save (1) | 7,12;194:16;201:7,8, | 184:23 | 194:5 | 86:7;226:6 |
| 215:16 | 8,10,10,10,20,21; | separated (1) | shorter (1) | site (41) |
| saw (1) | 204:3;205:23;215:3; | 188:8 | 43:9 | 9:15;10:18;16:22; |
| 115:8 | 221:6;224:9;225:17; | September (1) | short-term (1) | 17:7;27:9,15,17,22; |
| saying (21) | 227:8,11;230:9; | 149:10 | 201:24 | 37:10,21;40:18; |
| 26:8;38:11;55:17; | 240:12,17,19,21; | September/October (1) | shot (1) | 41:12;42:19;48:8; |
| 96:4;97:16;112:13; | 241:3,11 | 104:16 | 46:14 | 56:12;63:9;64:2,3; |
| 124:19;135:13,23; | Section (10) | series (4) | show (12) | 69:6;72:2,3;98:5; |
| 136:2;152:8;170:23; | 18:2;22:21;26:5; | 42:6;133:12; | 62:13;64:14;67:2; | 104:9;106:8,8,23; |
| 179:14,17;226:13,16; | 41:8;61:8;74:1; | 183:10;229:22 | 85:21;86:6;205:12; | 107:1,20,23,24; |
| 227:17;231:22; | 155:19,24;156:5; | serve (1) | 228:5,6,22;229:4,11; | 108:1,3,7;109:1; |
| 246:4;252:6;253:22 | 240:9 | 176:24 | 254:7 | 110:17;138:15; |
| scale (4) | sections (5) | Service (2) | showed (1) | 150:3;200:17;201:4; |
| 218:2,10,16,20 | 20:10,11;47:1; | 9:13;136:22 | 233:4 | 207:21;213:1 |
| scanned (1) | 64:20;65:21 | Services' (1) | showing (5) | sites (8) |
| 154:3 | sector (1) | 50:16 | 140:7;156:11; | 25:18;44:5;47:22; |
| scenario (1) | 133:21 | session (6) | 216:13;217:15; | 106:14,19;108:5,15, |
| 252:18 | sediment (1) | 121:4,11,15; | 246:22 | 20 |
| scenarios (2) | 40:19 | 154:11;188:5;233:4 | shown (4) | sits (1) |
| 128:21;132:6 | seeds (1) | set (18) | 59:1;80:17;156:5; | 87:19 |
| Schloss (1) | 25:18 | 22:12;23:7,9;68:9, | 163:6 | sitting (1) |
| 253:17 | seeing (2) | 12;81:8;87:15; | shows (9) | 32:18 |
| Schomer (2) | 152:12;175:18 | 156:16;185:21; | 88:23;140:15; | situation (5) |
| 204:11;253:17 | seem (3) | 189:18;194:21; | 156:2;167:11,16,17; | 28:21;144:18; |
| school (1) | 144:24;186:4 | 200:24;229:20; | 226:19;229:9;234:8 | 163:16;186:12;187:1 |
| 182:21 | 242:22 | 235:7,17,19;242:1; | shut (1) | situations (2) |
| science (1) | seems (4) | 247:6 | 112:6 | 159:20;163:13 |
| 183:6 | 91:9;149:5;243:10; | setbacks (1) | shuts (1) | $\boldsymbol{\operatorname { s i x }}$ (9) |
| scientific (3) | 245:10 | 162:6 | 112:3 | 36:24;106:19,21; |
| 33:9;134:10;136:3 | segments (1) | sets (1) | sick (3) | 193:1;214:20,21; |
| scientist (2) | 59:7 | 193:4 | 164:9;165:6,13 | 215:23,24;216:1 |
| 225:7;236:11 | select (1) | settings (1) | side (8) | Sixteen (1) |
| scientists (1) | 96:16 | 160:3 | 57:1;66:6,6 | 55:14 |
| 157:4 | selected (2) | seven (3) | 115:13;147:2,11; | sixth (2) |
| screaming (1) | 13:12,15 | 219:16;232:19; | 176:21;218:7 | 36:11,22 |
| 115:9 | selection (1) | 247:15 | sides (1) | size (2) |
| screen (9) | 51:18 | seventh (2) | 19:23 | 48:14;222:15 |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| sizes (2) | somewhere (6) | 153:16;155:1;158:8, | 89:4;108:9;110:13; | 215:2,5;221:5,21; |
| :---: | :---: | :---: | :---: | :---: |
| 167:13;182:13 | 25:23;89:20; | 22;159:5,7,8,12; | 134:15,18;153:3 | 223:21;224:18; |
| sizing (1) | 120:20;180:5; | 160:13,16;162:10 | 157:5;164:7;201:17; | 230:11;240:10 |
| 57:14 | 194:23;226:14 | 163:4;164:2,7; | 203:23;247:1 | speeds (10) |
| skirt (1) | somewheres (1) | 166:10,20;167:16,19, | South (3) | 80:17,18;179:21 |
| 39:8 | 166:12 | 20;168:24;171:14; | 4:19;98:4;119:19 | 212:5;224:14;225:4; |
| slash (1) | soon (3) | 173:24;174:21; | Southborough (1) | 226:19;227:5; |
| 201:16 | 129:18,19;192:8 | 179:15,16,18,19,22, | 4:19 | 231:10;241:5 |
| sled (1) | sorry (27) | 23;180:1,14,20; | southeast (2) | spent (2) |
| 150:4 | 17:21;33:23;66:17 | 181:3;182:5,16,23, | 93:11;107:14 | 72:4;184:2 |
| slices (1) | 77:2;88:13;96:7; | 24;183:1;186:5; | southern (2) | splashing (1) |
| 214:17 | 97:11;105:21;117:2; | 191:20,24;194:13,17; | 107:18;113:22 | 115:9 |
| slightly (1) | 162:17;181:6;199:1; | 195:10;197:1,4; | southwest (1) | spread (1) |
| 74:1 | 200:11;204:10; | 198:16;201:6,15,15, | 93:11 | 17:7 |
| slippery (1) | 209:10,16,21;210:9; | 17;202:6,10,13; | southwesterly (1) | spreaders (4) |
| 115:20 | 212:3;219:19; | 203:18;205:11,19; | 93:3 | 16:7;17:3,5;58:11 |
| slope (4) | 220:11;224:10; | 206:6,8,10,15;208:4, | southwestern (1) | spur (5) |
| 57:5;59:2,3;115:20 | 225:3;231:1;244:21; | 7,13;211:22;212:6,9, | 248:6 | 67:1,5,6;73:24; |
| slopes (3) | 251:17;254:13 | 11,15,22,22,23; | space (3) | 74:17 |
| 28:18;29:6;60:2 | sort (15) | 213:5,8,24;214:7; | 61:8;65:11;164:20 | square (1) |
| SM (2) | 18:17;28:15;47:6 | 215:8;216:16,19; | Spain (2) | 90:10 |
| 36:10,16 | 50:5;73:9;108:11; | 218:5,14,22;223:10, | 191:15;192:7 | squares (2) |
| small (3) | 118:15;131:9; | 13;225:3,9;227:4; | speak (3) | 90:5,12 |
| 13:23;14:3;201:24 | 147:22;152:2; | 230:13;231:18; | 11:22;42:12; | squeezed (1) |
| smaller (1) | 172:14;174:14; | 233:17,24;234:4; | 141:21 | 218:19 |
| 168:10 | 175:10;250:22; | 238:17;240:1,2; | speaking (4) | stability (1) |
| smarter (1) | 253:24 | 241:9;252:11 | 121:4;145:3; | 132:7 |
| 135:19 | sorted (1) | sounded (2) | 158:16;248:20 | staff (1) |
| snapshot (1) | 213:5 | 57:7;139:22 | spec (2) | 200:20 |
| 211:21 | sought (2) | sound-level (28) | 57:23,24 | stage (1) |
| Society (2) | 13:6;208:7 | 76:6;79:4,11; | specialist (1) | 94:9 |
| 184:7,8 | sound (222) | 87:23;88:5;90:4; | 40:15 | stake (1) |
| software (15) | 45:12;76:22;78:1, | 93:4;101:4,6;103:17; | specialized (1) | 38:8 |
| 153:2;233:14,19, | 2,6,12;79:17,20,21, | 107:7;111:22; | 11:24 | stamp (2) |
| 20;237:7;242:11; | 21,23;81:9,20;82:3, | 113:19;120:23; | species (6) | 172:11,17 |
| 244:21,22,23,24; | 21;83:1,2,3;84:1,5,6, | 121:16;126:1; | 24:2,4,8;25:4,14,18 | stand (5) |
| 246:1,2,4,19,24 | 16;86:2;87:9,11; | 127:14;132:6; | specific (11) | 169:17;170:23; |
| soil (3) | 88:23;89:1,5,6,12,22; | 138:14,18;140:19 | 22:24;41:9;82:17; | 171:24;172:13,22 |
| 9:12,13;60:2 | 90:13,16,23;91:18; | 190:20;203:15; | 83:15,19;97:2; | standard (33) |
| sold (1) | 92:14;93:13;94:7,11, | 214:13;223:23; | 143:18;147:4; | 16:24;17:17,20 |
| 191:2 | 20,20;97:2;98:6,10, | 224:16,21;252:4 | 157:17;202:10; | 19:8;23:8;93:7,8; |
| somebody (5) | 13,19;99:22;100:7; | sounds (25) | 230:17 | 99:21;100:3;120:10; |
| 45:23;70:8;115:12; | 101:10,23;102:7; | 32:13;84:19; | specifically (10) | 124:5;125:9;129:9; |
| 169:6;245:10 | 104:5,9,21;106:2; | 104:23;110:21,22 | 11:19;36:9;38:2 | 132:18,20;233:9,11, |
| somehow (1) | 108:5,10,15,19,21, | 136:1;145:17; | 60:22;76:1;82:10; | 12,12,14;236:6,19; |
| 139:24 | 23;109:4;110:5,7,9, | 146:10;148:7,17; | 146:17;217:2,4; | 237:10;238:11; |
| some-odd (1) | 11,22;111:1,14; | 158:19,22;159:16,22; | 229:16 | 239:18;240:15; |
| 29:17 | 112:17;113:18; | 161:18;162:20; | specifications (1) | 241:16;242:13; |
| someone (9) | 114:1,5,12,15; | 163:14,17;165:21; | 47:19 | 244:22;245:2,20; |
| 41:17,20,24;89:6; | 115:11;116:5,6; | 177:17;189:4;198:9; | specified (2) | 246:3,5 |
| 124:21;186:14; | 117:10,12,16,21,23; | 213:22;219:8;231:17 | 236:9;240:15 | standards (10) |
| 196:17;203:15; | 118:3,14,17,19,24; | sound's (1) | specs (3) | 22:12;23:23;33:7, |
| 204:21 | 119:8,10,21;120:6, | 120:16 | 59:1;120:5;166:10 | 9;53:22;101:9;134:7; |
| someone's (2) | 14;122:13,15; | source (25) | spectra (3) | 171:3,3;245:20 |
| 96:18;98:8 | 124:20;125:13,17; | 32:19,19,21,23; | 197:16;198:7 | Standing (2) |
| sometimes (19) | 126:7,10,15,24; | 97:2;133:4;134:24; | 199:8 | 84:20;236:1 |
| 43:10,17,23;46:8, | 127:15;128:4,6,9; | 186:17;195:16; | speculating (1) | start (8) |
| 12;90:21;91:1;116:4, | 132:11,13,14;133:3, | 196:12;197:5;202:7, | 60:24 | 8:18;44:13;130:23; |
| 20,22,22;117:13,13; | 4;134:15,18,24; | 10;203:16;211:3; | speculative (1) | 132:9;152:10; |
| 118:12;125:22; | 135:12;136:9,24; | 234:11,12,13;238:12; | 245:11 | 178:22;249:11; |
| 145:7,8;155:2;249:2 | 139:20;140:18,22,24; | 240:1,3;241:11; | speed (13) | 254:18 |
| somewhat (2) | 142:12;144:19; | 242:17,18;250:10 | 117:23;128:16; | started (4) |
| 11:11;118:11 | 148:19;152:13; | sources (11) | 133:2;191:24;212:1; | 81:4;179:8;193:4, |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 23 | 227:16 | 100:22 | 7:17;85:16 | surmising (1) |
| :---: | :---: | :---: | :---: | :---: |
| starters (2) | sticker (1) | studies (7) | summarize (3) | 252:23 |
| 96:21;174:15 | 86:18 | 136:18;177:16; | 121:14;146:24; | surprise (2) |
| starting (2) | still (13) | 201:15,23;202:3,18, | 211:17 | 144:16;150:24 |
| 63:6;157:5 | 54:24;55:3,24; | 20 | summary (6) | surprised (1) |
| starts (2) | 74:17,22;78:6;97:17; | study (9) | 5:13;24:18;75:22; | 113:4 |
| 201:9;205:16 | 128:9;166:21;237:7, | 76:6;87:23;102:7 | 101:3,8;212:14 | surrogate (1) |
| state (25) | 21;238:18;249:24 | 160:5;194:13; | summer (2) | 108:10 |
| 4:13;10:5;13:17, | stock (1) | 203:13;221:7;227:1; | 104:15;151:24 | surrounding (3) |
| 22;16:11;20:3;32:24; | 247:15 | 228:13 | summertime (1) | 92:22;110:20; |
| 42:10,13,24,24;50:4; | stone (10) | studying (1) | 206:14 | 180:6 |
| 53:8,13;60:12;75:14; | 17:6;18:6,9,10,13; | 228:20 | summit (2) | surroundings (1) |
| 87:10;94:15;104:14; | 19:7,9;38:13;39:20; | stuff (1) | 37:16,20 | 147:5 |
| 152:24;160:18; | 58:17 | 138:6 | supervise (1) | survey (8) |
| 183:5;187:22; | stop (1) | subdivision (1) | 45:24 | 194:13,20;195:14; |
| 191:19;242:7 | 88:2 | 23:1 | supplement (1) | 197:17;200:14; |
| stated (7) | stopped (3) | subject (2) | 6:17 | 202:13;206:14;208:8 |
| 78:8;87:2;94:2; | 91:15,15;190:13 | 157:3;171:5 | supplemental (14) | surveys (1) |
| 122:23;160:13; | stopping (1) | submit (2) | 6:13,22;26:12; | 238:3 |
| 186:14;191:21 | 230:5 | 6:13;77:9 | 77:9,17;78:4,9;79:1; | Susan (1) |
| statement (13) | stops (3) | submittal (2) | 83:14;156:18,20,21; | 36:3 |
| 22:4,9,13;27:11; | 28:1,2;59:1 | 52:13;179:3 | 157:6;253:6 | suspect (4) |
| 29:8;33:4;47:11; | storm (5) | submitted (8) | supplied (2) | 52:7;60:8;105:17; |
| 127:15;134:11; | 32:11;57:8,10,17, | 6:5;76:8;77:5; | 77:24;78:2 | 114:15 |
| 161:11;195:22,24; | 20 | 146:6;153:11,20; | supplier (2) | swear (1) |
| 208:18 | storms (6) | 154:4;167:10 | 126:1,20 | 4:22 |
| states (4) | 31:16,21,24;32:5; | subset (1) | support (2) | swimming (2) |
| 14:2;33:2;179:24; | 33:3;46:16 | 213:9 | 121:19;159:13 | 113:3;115:9 |
| 191:14 | stormwater (20) | substantially (3) | suppose (3) | swing (1) |
| state's (1) | 14:14,19;15:2,20, | 128:17;134:3; | 44:23;47:6;68:20 | 93:2 |
| 35:24 | 22;18:1;19:22,24; | 202:5 | supposed (2) | sworn (5) |
| station (2) | 22:3,5,10,16,19,22; | substation (6) | 82:9;171:7 | 4:24;5:2,3;75:8,10 |
| 64:14;221:20 | 23:9,15;27:8;31:11; | 65:23;72:5;74:4,7, | Sure (74) | syndrome (4) |
| stationed (1) | 32:10;58:15 | 9,13 | 8:24;9:3;12:20; | 164:10;165:6,13, |
| 20:19 | strange | subtract (2) | 14:17;15:8;17:1; | 14 |
| stations (1) | 42:10 | 207:4,7 | 22:7;23:22;25:17; | system (12) |
| 20:21 | strategy (2) | subtracted (2) | 27:1;29:21;30:11; | $26: 17,19 ; 61: 17$ |
| statistic (1) | 97:20;98:16 | 139:18;210:11 | 38:5;40:19;41:3; | 62:5;64:6;91:17; |
| 140:19 | stream (2) | subtraction (1) | 49:23;52:19;53:11; | $111: 11 ; 112: 2,10$ |
| statistical (1) | 148:20;243:3 | 206:12 | 61:11,24;71:21; | $116: 7 ; 128: 11 ; 254: 2$ |
| 211:11 | stretch (1) | succeed (1) | 75:23;76:14;77:21; |  |
| stay (2) | 62:22 | 44:21 | 87:15,21;96:13; | T |
| 40:17;158:20 | strict (1) | successful (1) | 100:12,22;102:17; |  |
| stays (1) | 34:12 | 43:20 | 105:5,10,10,13,18; | Tab (6) |
| 72:3 | strike (2) | sued (2) | 107:12;110:3;121:1; | 6:11,16;15:9; |
| steady (2) | 104:2;181:21 | 177:5,13 | 122:12;126:11,13; | 76:11;77:7,11 |
| 148:8;156:16 | string (2) | sufficient (3) | 127:22;131:3;134:6; | table (11) |
| Stearns (4) | 248:6;250:2 | 150:11;162:3; | 138:14;139:21; | 84:4;199:5;209:4; |
| 7:21,23;95:17,18 | strong (4) | 238:14 | 144:9;146:20; | 214:1;215:11;233:3, |
| steep (2) | 132:4,10;212:1,13 | sufficiently (2) | 147:19;160:4; | 5,19;234:7;236:5,10 |
| 29:6;57:3 | strongly (1) | 128:13;161:9 | 169:13;175:11; | tables (2) |
| steepest (2) | 84:23 | sugar (1) | 181:2;182:21,23; | 211:20,20 |
| 56:21;57:3 | struck (1) | 116:19 | 186:24;192:8;198:2; | tabs (2) |
| step (3) | 181:13 | suggest (4) | 203:14;205:1;206:1; | 204:10;215:22 |
| 62:19;125:8; | structurally (2) | 82:24;83:9;84:18; | 214:11;218:18; | talk (11) |
| 184:23 | 55:4,24 | 241:18 | 219:10,11,11,12; | $40: 11 ; 45: 18 ; 158: 1 ;$ |
| steps (1) | Structure (9) | suggested (2) | 223:20;229:1,18; | 192:18;194:10; |
| 53:12 | 26:21;62:23;64:19, | 84:8;210:17 | 246:20;248:15,21,22 | 215:3;219:5;225:16; |
| Stetson (1) | 19;67:8;72:18;73:3; | suggesting (1) | surface (5) | 232:23;240:8;241:22 |
| 44:3 | 74:16;182:4 | 43:16 | 14:12,21;18:22,23; | talked (8) |
| Stewart (3) | Structures (1) |  | $19: 2$ | $58: 12 ; 73: 12 ; 92: 12$ |
| 50:13,14;66:7 | 67:6 | 81:12;84:14,24 | surmise (1) | $138: 10 ; 156: 17$ |
| stick (1) | struggling (1) | Sullivan (2) | 249:17 | 169:5;232:22;235:16 |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| talking (34) | 19,23;98:16,17 | 229:2;238:7 | 110:18;114:6;253:6 | 48:24;49:1;87:18; |
| :---: | :---: | :---: | :---: | :---: |
| 18:20,22;19:1; | 160:24;176:5; | third (6) | today (24) | 148:10,13 |
| 81:21;91:15,16; | 185:13;202:2 | 17:9;66:15;149:8; | 7:2;10:11;91:1 | rails (1) |
| 116:21;120:12; | tested (8) | 76:4;197:22;199:17 | 114:6;133:22;134:2, | 84:13 |
| 127:1;130:4;133:14; | 94:22;99:4;101:8, | Thirteen (2) | 4,14;136:2;183:19; | training (3) |
| 141:5,8;144:12,20; | 23;146:11;167:12 | 56:23,24 | 190:2;191:12; | 183:11,23;246:19 |
| 157:16,22;160:7; | 14;175:15 | though (10) | 195:11;198:22 | transient (4) |
| 162:7;164:2;168:3; | testified (4) | 12:7,12;41:3 | 211:23;214:2; | 210:16,20,24; |
| 169:5;179:11;190:5; | 11:6;113:10;125: | 74:21;129:6;136:9 | 226:24;227:23; | 211:10 |
| 197:4;202:24; | 135:4 | 190:13;213:21; | 237:19;243:12; | translate (1) |
| 206:17;213:20,21,22; | testifies (1) | 235:12;249:5 | 248:16;254:12,2 | 80:24 |
| 224:23;237:5,6; | 173:6 | , | 255:1 | Transmission (1) |
| 248:16 | testify (2) | 66:12;83:16 | together | 5:8 |
| talks (5) | 9:16;2 | 109:20;112:1 | 118:1 | transport (1) |
| 83:21;121:18; | testifying (1) | 130:16;149:6;160:7; | toilet (1) | 73:10 |
| 142:12;162:15;240:9 | 230:24 | 190:16;227:22; | 174:14 | travel (2) |
| tall (1) | testimonies (3) | 249:6,10 | told (9) | 55:7,11 |
| 237:17 | 7:2;77:15;78:1 | thoughts (1) | 95:1;124:13,18,21; | TRC (2) |
| team (2) | testimony (74) | 158:6 | 170:21;171:1;193:8; | 5:7,10 |
| 11:21;13:19 | 6:6,14,22;8:19,22 | thousand | 215:15;220:7 | treated (2) |
| tech (5) | 11:4;16:3;17:13,18 | 214:23 | tomorrow (8) | 21:23;27:9 |
| 121:4,11,15 | 20:7;22:17;23:15; | threat (1) | 194:8;228:4;229: | treating (1) |
| 166:10;188:5 | 24:11,15;26:10,13; | 171:20 | 18;231:6;243:4; | 213:15 |
| technical (6) | 34:7,8;36:3,9;38:16; | three (14) | 254:14,18 | trees (6) |
| 47:19;77:23; | 45:17;46:23;49:18; | 23:16,16;62: | tones (1) | 49:19;111:10,10 |
| 121:19;152:6; | 59:2;60:10;61:8; | 75:16;197:20,2 | 156:16 | 147:7,12,13 |
| 197:14;233:4 | 66:24;72:11;73:9 | 198:11;207:2 | tonight (1) | tremendous (1) |
| technicians' (1) | 75:3;76:8;77:5,10,17, | 209:18;211:3 | 194:1 | 86:24 |
| 149:3 | 18;78:5,22,24;79:1,3, | 218:23;223:5 | took (4) | trial (1) |
| technique (1) | 8,10,16;80:18;81:23, | 224:23;248:1 | 45:11;119:5;213:4; | 177:18 |
| 140:20 | 24;82:11,17;83:15, | threshold (1) | 229:22 | trouble (1) |
| techniques (1) | 19;100:20,20;101:2, | 157:24 | top (12) | 76:22 |
| 247:2 | 7;133:7;135:3; | thresholds | 11:18;19:7,18,19; | truck (1) |
| telling (9) | 136:10;143:20; | 156:15 | 20:1;37:15;72:20; | 49:1 |
| 126:16;154:2 | 153:22;156:18,20,21; | Throughout (2) | 182:11,20;212:4; | trucks (1) |
| 169:16,18;171:2 | 165:23;172:7;179:1; | 27:17;239:5 | 227:14;250:2 | 56:2 |
| 190:2;192:23; | 183:4;191:10; | Thumb (2) | topic (1) | true (12) |
| 241:16;246:10 | 208:18;244:11,14 | 188:11,22 | 136:11 | 47:10,23;48:3; |
| tells (2) | 250:20;253:7;254:12 | thus (1) | topics (1) | 02:11;118:9 |
| 126:21;199:17 | testing (20) | 40:23 | 232:19 | 144:23;152:15; |
| temperature (2) | 96:10;97:20;98 | tightly (1) | topography (7) | 154:12,13;169:1,2; |
| 132:22;240:11 | 15,21;110:18; | 48:13 | 95:13;110:20; | 231:20 |
| temporarily (1) | 125:24;126:2;146:4, | till (3) | 111:2,8;131:24; | truly (1) |
| 56:1 | 19;148:6;150:21; | 194:7;219:16 | 152:21;153:1 | 163:1 |
| ten (1) | 159:18,24;166:24 | 254:19 | tops (1) | trust (1) |
| 93:23 | 173:23;175:20; | timbering | 132:4 | 243:5 |
| tends (1) | 184:23;230:2;251 | 210:18 | toward | truth (1) |
| 181:9 | tests (2) | times (22) | 65:19 | 247:12 |
| tenth (1) | 251:2,9 | 81:10;90:24;91:12 | towards (4) | try (14) |
| 154:18 | Texas (3) | 13;101:23;102:12; | 36:10,16;77:21 | 14:17;15:16;43:12; |
| term (1) | 177:2,14,23 | 104:19,22;105:2,14; | 113:22 | 44:21,22;76:16; |
| 164:9 | Thanks (5) | 114:14;118:10; | tower (13) | 88:16;89:21;121:7; |
| terms (13) | 15:14;27:6;58: | 149:14,15,16;185:22; | 26:19,20;39:3; | 170:19;173:4;195:9; |
| $\begin{aligned} & 10: 9 ; 47: 18 ; 51: 18 \\ & 81: 2 ; 87: 22 ; 92: 4 \end{aligned}$ | $137: 2 ; 220: 2$ | 196:15;202:7;212:6; | $73: 24 ; 75: 16 ; 80: 16$ <br> $182 \cdot 17 \cdot 212 \cdot 3 \cdot 221 \cdot 5$, | $211: 17 ; 247: 20$ |
| $\begin{aligned} & \text { 81:2;87:22;92:4; } \\ & 110: 24 ; 122: 7 \end{aligned}$ | $\begin{aligned} & \text { thereabouts (1) } \\ & 215: 5 \end{aligned}$ | $\begin{aligned} & 214: 18,19 ; 215: 1 \\ & \text { title }(2) \end{aligned}$ | $\begin{aligned} & 182: 17 ; 212: 3 ; 221: 5 \\ & 6,8 ; 223: 22 ; 224: 13 \end{aligned}$ | $\begin{aligned} & \text { trying (22) } \\ & 48: 11 ; 52: 22 ; 64: 23, \end{aligned}$ |
| 134:12;143:14; | therefore (7) | 15:23;22:7 | towers (2) | 24;72:4;82:11,24; |
| 160:5;164:6;252:9 | 35:14;122:17; | Tocci (7) | 69:7;182:11 | 116:19;124:3,10; |
| terrain (6) | 150:5;166:10; | 79:2;80:6,17; | Town (8) | 129:22;142:1;159:4 |
| $\begin{aligned} & 37: 11 ; 51: 6 ; 59: 21 ; \\ & 68: 23 ; 111: 8 ; 153: 3 \end{aligned}$ | $174: 20 ; 225: 2 ; 249: 22$ thinking (8) | $\begin{aligned} & 83: 15 ; 113: 13 ; 209: 1 \\ & 253 \cdot 16 \end{aligned}$ | $\begin{aligned} & 12: 24 ; 34: 14 ; 35: 10, \\ & 11: 142: 10,14,18 \end{aligned}$ | $\begin{aligned} & 163: 20 ; 186: 19 \\ & \text { 195:8:198:6:215:16; } \end{aligned}$ |
| st (11) | $11: 5 ; 72: 20,2$ | Tocci's (6) | 169:11 | 236:3;241:7;244:16; |
| 31:7;96:11;97:16, | 148:1;175:8;226:15; | 79:10;81:23;95:4; | traffic (5) | 249:8 |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012 SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

TS (2)
215:20;216:8
TS1-42A (1)
122:14
Tuesday (1) 166:8
tunnel (1)
230:1
turbidity (1)
53:21
turbine (82)
30:8;37:9,22;38:9; 54:17,19;55:16;63:6,
18,22;65:15;68:5,9,
16,18;71:10;74:13;
77:24;78:12;81:11;
84:13;87:4,7,8;92:6;
93:9;97:14,15;107:8;
108:3;109:5;110:22;
118:5;119:7;120:11;
122:12;125:10;
127:4,8;128:18;
129:4,10;130:7,12;
133:5;153:15;156:1;
165:14;168:20;
170:2,7;176:5;
177:17;179:12,13,15;
180:22;191:13;
192:4,11;200:5;
201:1,2;203:19;
204:22;205:12; 213:22;228:16; 234:4,23;235:1,24; 238:4;239:20;241:2; 248:13;250:1,17; 251:1,11;252:12; 253:3
turbines (89)
54:16;62:17;69:7; 71:10;73:14;74:10; 80:22;81:4;85:22; 90:15;92:3,15,19,21; 93:2,14,20,24;94:5; 96:24;97:9;98:20; 106:12;108:24; 109:1;113:11,16; 114:8,15;115:5,11; 117:19,20;118:23; 122:18;124:20; 127:3,17;128:3,10; 130:11;131:2,16; 132:12;135:15; 142:20;152:9,14; 154:16;157:4;158:9; 160:15,17;162:16; 163:4,7,15;164:3; 166:21;167:12; 168:2,10,10,12,23; 169:9,24;174:1,4; 175:18;176:19; 177:24;211:24; 212:17,21;235:3,9; 237:16,17;246:23,24;

248:5,19;249:22;
250:8;251:8,13;
252:14,16
turn (5)
8:7;45:11;121:10;
204:10;219:8
turned (1)
197:24
Turning (3)
11:4;16:3;26:12
turns (2)
112:19;175:21
Tuttle (1)
180:5
TV (1)
146:3
Twenty (1)
103:23
Twenty-five (1) 57:11
twice (1)
216:20
two (51)
23:16;48:9,10;
59:7;64:20;67:1;
77:15;78:2,7;79:23;
80:14;88:20,24;
95:10;96:19;102:10;
104:4,8;118:16;
119:1;120:22;124:9;
129:20;130:16;
131:2;141:14;174:8,
16;177:8;192:5,17;
193:4;194:10,11;
197:18,22;198:8;
206:24;211:17,20;
218:23;219:3,4;
221:4;224:23;233:1,
22;234:10;235:14;
239:8;240:22
two-to-one (1)
81:7
type (17)
23:1;37:4;43:9;
48:4,4;55:5;68:23;
108:11;111:6;
129:24;130:3,4;
131:1;140:19;
183:22;250:18,19
typed (1)
251:2
typical (3)
48:23;98:10;
214:14
typically (15)
34:16;35:1;58:2; 60:13,17,19;61:15; 62:3,10;82:21;97:23; 103:20;124:9;152:4; 222:23
unable (2)
244:24;245:1
unanswered (1)
202:8
unattendant (2)
202:3,20
uncertainty (2) 78:6;122:17
uncomfortable (1) 248:24
uncommon (1) 132:2
under (24)
7:2;18:5;19:12,23; 20:10;41:9;73:22;
78:18;83:23;116:24; 121:19;126:13; 128:2,4;129:21; 130:19;172:7,23; 179:17;187:1;192:5; 239:7;249:3;252:18
underground (8) 64:9,13,19;65:9, 13;73:22;74:2,21
undergrounding (1) 73:13
underlying (1) 111:5
underneath (2) 18:24;20:8
understandable (1) 168:17
understate (1) 82:3
understood (7) 24:15;29:20;82:8; 98:1,12;189:19; 250:14
undeveloped (1) 14:5
undisturbed (5) 27:10,23;28:4,11; 30:10
unfair (1) 172:21
United (1) 191:14
units (4) 127:10;129:20; 148:6;167:1
unknown (3) 97:10,13;236:7
unless (4) 82:3;97:1;167:4; 208:15
unlikely (1) 196:10
unmanned (2) 200:15;203:12
unreasonable (1) 101:14
unusual (1) 151:22
up (89)
11:5,11;13:16; 17:7,21;19:6;33:9; 37:19;46:15;48:15, 24;49:6;54:15,19; 57:23;62:22;63:5,8, 18;64:4,14;65:2,6,11, 23;68:16,21,22;
71:11;72:22;73:19; 74:9;80:20;85:20; 86:4,4;89:3,23;94:6; 113:23;114:13; 115:12;117:22; 129:17,22;130:20; 131:16,22;132:10,13; 134:9;135:3;137:10; 139:18;143:3;148:8; 150:7,13;157:1; 166:8;167:13,14,24; 169:10;173:7,14,18; 187:6;190:6;194:21; 196:11;200:24; 208:23;210:3;212:1, 4,13;213:2,6;215:10, 16;217:3;235:7,18, 19;237:1;239:19;
248:8;251:5
update (2)
77:16,20
updates (2) 6:20;77:14
uphill (1)
95:12
upon (6) 46:4;136:1;138:5, 19;250:15,16
Upper (1)
86:17
ups (1)
145:7
upwind (1) 160:15
urban (7)
139:13;140:3,4; 143:12,23;144:2,7
use (26)
12:4;24:24;27:14;
49:5;68:18;69:8;
73:2;81:5,19;108:21;
115:21;122:21;
129:8,11;133:3;
155:18;161:21;
173:16;187:2;
191:24;222:23;
224:13;234:1;237:8;
240:2;247:1
used (37)
12:1;24:16,22;
25:7,13;32:9,22;
38:13;55:5;56:1;
57:8,16;94:13;
101:10;109:2;111:3;
119:4;122:12;

124:15;127:4,5;
130:13;132:19;
147:21;160:23;
169:9;198:18;
206:16;220:19;
223:1;229:23;
233:21,23;234:2;
235:5;241:19;245:20
useful (2)
168:19;183:23
uses (3)
98:5;113:6;229:20
using (11)
22:7;25:12;39:1; 46:4;127:2;152:8;
160:22;238:17;
246:1,2;247:2
usual (1) 48:23
utility (1) 63:15
utilizing (1) 27:10

| $\mathbf{V}$ |
| :---: |
| vaguely (1) |
| 42:4 |
| validate (2) |
| 95:3;192:3 |
| valley (4) |
| 95:9;132:2;212:10, |
| 12 |

value (1) 117:8
values (1) 198:19
variation (1) 102:24
varied (2) 88:24;89:2
variety (2) 5:20;239:11
various (4) 148:7;152:14; 230:10;249:19
various-sized (1) 229:23
vary (7)
89:8;91:24;102:8, 9,20;211:22;249:18
vegetated (1) 44:14
vegetating (1) 55:1
vegetation (11)
42:21;43:9,11; 44:8;73:6;148:12; 153:5,6,8,10;238:17
vegetative (1) 111:6
vehicles (6)
25:17,22;109:16;

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 110:6,8,12 | wants (1) | 198:21;203:17; | $11,11,12,12,18 ; 95: 3$ | 64:7 |
| :---: | :---: | :---: | :---: | :---: |
| vendor (2) | 174:12 | 208:14;214:2,16; | 97:18;105:9;106:12; | within (12) |
| 94:10;253:1 | Washington (2) | 235:18;239:18,24; | 107:8;108:24; | 14:20;96:3,12,15; |
| verbal (10) | 49:6;133:11 | 245:3,22 | 113:10;116:6; | 98:19,20;128:16; |
| 7:16,18;8:2;33:24; | water (13) | whatsoever (1) | 117:22;118:22; | 157:13;164:19; |
| 85:11,13,15,17; | 11:16;18:24;20:11; | 170:4 | 120:10,19,21;122:12, | 237:3,21;238:5 |
| 137:8;239:3 | 24:9;26:16;31:1,4; | Whereupon (6) | 17;123:2,21;125:4; | without (9) |
| verbiage (4) | 33:2,13;53:22; | 4:1,23;69:21;75:7; | 126:4;127:5,17; | 63:6;74:5;109:5; |
| 121:17,22;122:6,9 | 115:10;148:8;149:19 | 137:18;255:2 | 128:5,10,16;129:2,4, | 110:22;124:14; |
| verification (2) | watershed (7) | whipping (1) | 10;130:13;132:1,12; | 195:23;199:20; |
| 200:13;245:9 | 14:9,13,20;15:24 | 239:20 | 133:2,21;135:11,15; | 207:18;253:8 |
| verified (1) | 26:16,23;27:5 | whole (5) | 136:1,9,22;138:17; | Witness (43) |
| 94:21 | watersheds (2) | 59:24;205:5;227:6; | 141:4;146:6;153:15; | 14:24;15:12,16; |
| verify (5) | 14:5,8 | 243:2,3 | 154:15;156:1;157:4; | 27:3;41:7;51:9; |
| 14:22;229:4 | watts (1) | who's (2) | 160:12,17;162:16; | 57:12;64:16;76:14, |
| 242:23;243:22;244:4 | 118:21 | 115:12;120:1 | 163:4,14;164:3; | 16,20,23;81:3;82:7, |
| verifying (1) | way (35) | whose (2) | 165:14;168:2,20,23; | 10;85:4;88:7;100:11, |
| 27:6 | 20:21;28:15,23; | 35:14;51:1 | 169:9,23;170:2,7; | 11;101:1;107:4; |
| version (4) | 38:7,9;39:7,9,18; | wide (8) | 172:4;176:19;177:4, | 121:2,7;123:24; |
| 139:9;188:16 | 55:7,11;73:2;87:19; | 5:20;47:6;48:20 | 6,13,16,21;179:18, | 140:6,8;155:7; |
| 199:11;240:1 | 91:11,13;94:17; | 55:14,18;65:3,16 | 21;183:21;188:22; | 156:24;172:22; |
| versus (3) | 96:10;99:7;106:1; | 167:12 | 189:14;190:4;191:5, | 173:11;174:13; |
| 83:1;134:14 | 128:23;133:22; | widened (1) | 24;200:5;201:1; | 175:2;181:16,23; |
| 249:22 | 136:15;148:19; | 55:8 | 203:18;205:12; | 188:2,17;222:24; |
| vibration (1) | 149:17;150:15; | widens (1) | 206:6;212:1,4,5,8,17, | 229:9;243:20;244:3; |
| 162:1 | 152:23;168:19; | 65:12 | 20;213:13,14,18; | 245:4;251:19;254:15 |
| vicinity (1) | 170:24;171:19; | wider (7) | 214:14;215:2,2,5; | witnessed (1) |
| 132:1 | 174:22;192:2; | 63:4,23;65:9,23 | 220:6,15,22;221:5,6, | 110:17 |
| view (2) | 211:11;233:19; | 70:19;74:1,19 | 8,14,21,23;222:12; | witnesses (4) |
| 197:2,2 | 237:14;244:3;253:11 | width (17) | 223:3,7,10,16,16,21, | 4:22;7:6;243:14,21 |
| violated (1) | ways (3) | 54:24;55:24;61:7, | 22;224:2,4,4,14,18; | wonder (2) |
| 171:4 | 68:1;88:16;147:23 | 22;62:10,24;66:1,19; | 225:4,10,18,19,22,23, | 71:7;73:14 |
| visibility (1) | weather (2) | 70:13;74:8,9,11,12, | 24;226:1,15,17,19; | wondering (6) |
| 163:6 | 30:18;238:22 | 14,14,20,22 | 227:2,5;228:14,16, | 35:13;37:4;38:6; |
| visit (1) | website (1) | widths (1) | 20;229:23;230:1,1,3, | 92:20;150:2;228:3 |
| 149:10 | 32:17 | 73:10 | 4,5,6,10;231:9,18,23; | wooded (1) |
| visited (1) | week (3) | wilderness (1) | 232:4,7,11,15; | 147:12 |
| 110:17 | 79:18;80:2;191:10 | 81:15 | 234:23;240:10; | woods (3) |
| visits (3) | weeks (8) | Wildlife (11) | 241:5;246:23,24; | 97:3;147:2;225:2 |
| 148:23;149:2,3 | 80:14;88:20;89:1 | 27:8;29:3,4;135:1 | 248:13;251:16,17 | word (7) |
| visual (3) | 95:10;97:6;102:10; | 6,12,16;136:1,8,22, | windier (1) | 18:4;122:2 |
| 66:9;85:22;197:1 | 104:5,8 | 23 | 105:3 | 124:15;143:22; |
| visualize (1) | weight (2) | Willard (41) | wind-induced (4) | 154:20,23;195:23 |
| 146:19 | 245:13,16 | 14:8,12,20;27:5; | 223:19;225:9; | words (22) |
| voice (1) | welcome (2) | 37:16;38:24;79:6,18; | 226:9;228:14 | 23:5;78:11;80:20; |
| 86:4 | 86:21;95:16 | 81:17;84:20;105:14; | windows (4) | 83:23;92:24;93:10; |
| Volume (6) | welfare (1) | 106:2;107:16,18,19; | 143:6;151:24; | 109:6;117:21;122:3; |
| 6:11;15:4;23:19, | 133:18 | 108:6,12,16,20; | 152:3;162:4 | 132:12;138:20; |
| 21;76:11;88:15 | west (1) | 109:1,5,19,21; | winds (8) | 153:10;155:8; |
| volumes (3) | 98:5 | 110:15,20,23;112:22; | 132:4,10;212:12, | 161:14;163:3; |
| 22:5,10;23:16 | Western (1) | 113:11,17,20,23,24; | 18;214:4;226:12; | 164:15;179:20; |
| voluntary (1) | 4:16 | 114:2,11;115:10; | 239:19;241:10 | 205:16;212:2;236:8; |
| 50:9 | wetlands (4) | 119:16,18;248:1,14, | windy (1) | 237:8;239:24 |
| W | $\begin{aligned} & 20: 14 ; 71: 19,20 ; \\ & 72: 6 \end{aligned}$ | 17;250:8 <br> willing (7) | $174: 2$ <br> winner | work (19) <br> $4 \cdot 18 \cdot 5 \cdot 10 \cdot 46 \cdot 10$. |
|  | whatnot (1) | 167:1;169:17; | 70:16 | 52:12,18;53:9,11; |
| wait (3) | 55:9 | 170:5,8,22;172:13; | winter (2) | 67:20;75:23,24; |
| 131:15;165:17; | what's (23) | 243:13 | 25:2;152:1 | 183:10,18,20;204:21; |
| 181:20 | 28:5;61:21;96:22; | Wind (171) | wire (1) | 236:12;241:9;252:6, |
| waiting (1) | 100:6;103:24; | 5:22;11:21;15:1; | 65:24 | 11,17 |
| 214:4 | 112:14,14;113:15; | 25:24;37:21;42:23; | wires (1) | worked (13) |
| wandering (1) | 123:6;131:8;165:13; | 69:7;76:2,3;80:17, | 62:7 | $23: 2 ; 37: 6 ; 61: 1$ |
| 42:10 | 176:22;196:14; | 18;84:13;92:14;93:8, | wiring (1) | 69:6;126:4;159:14; |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS

| 163:24;176:17,20,21; | Yup (1) | 167:17;180:7,11, | 16 (24) | 228:12 |
| :---: | :---: | :---: | :---: | :---: |
| 177:3,6;192:15 | 27:18 | 14;182:15;251:14; | 38:17;53:18,19; | 2010 (1) |
| workers (2) |  | 252:1,20 | 55:3,11,12,13;65:20; | 46:21 |
| 163:21,23 | $\mathbf{Z}$ | 109.4 (11) | 74:5,14;77:18,22; | 2011 (3) |
| working (11) |  | 119:1,5,8,12; | 103:5;104:1;194:23; | 80:15;153:14; |
| 163:22;165:16; | zero (3) | 121:18,24;122:18; | 196:5,10;200:14,21; | 154:6 |
| 166:16,18;175:13,15; | 153:10;154:19; | 132:13;152:8;170:1; | 212:15;214:12,18; | 2012 (8) |
| 183:24;187:1;192:3; | 235:8 | 179:15 | 215:7;218:4 | 6:9,15;8:20;11:3; |
| 241:14;253:8 |  | 10-meter (1) | 16-day (1) | 50:17;76:9;77:10; |
| works (5) | 0 | 240:14 | 213:10 | 134:16 |
| 41:24;92:10;197:9; |  | 10-minute (9) | 16-foot (5) | 2013 (1) |
| 236:13;241:17 | 0 (1) | 69:19;79:22; | 46:24;62:3,24; | 166:12 |
| work's (1) | 234:15 | 137:17;210:14; | 63:19;73:2 | 20-hertz (1) |
| 58:9 | 037 (1) | 214:15,17,23;216:18; | 17 (5) | 158:21 |
| world (4) | 15:17 | 218:19 | 13:21;53:18,20; | 20s (3) |
| 129:2;180:11,21; |  | 10-year (1) | 84:8;151:21 | 83:24;114:3,13 |
| 191:15 | 1 | 57:19 | 18 (9) | 21 (3) |
| worry (1) |  | 11 (6) | 13:22;17:22,24; | 5:16;83:14;84:11 |
| 203:20 | 1 (29) | 24:12;45:18;49:17; | 81:24;150:23; | 2-1/2 (2) |
| worst (1) | 6:10,11;22:10; | 157:6;227:11;240:19 | 151:17;177:12; | 227:8;230:8 |
| 238:17 | 64:19;76:10,11;77:7; | 110 (2) | 188:15;230:21 | 22 (1) |
| worst-case (5) | 80:20;83:20;88:4; | 181:4;182:15 | 19 (5) | 77:22 |
| 83:3;90:13,16; | 139:8,8;166:23; | 110-decibel (1) | 83:14,21;84:8; | 22-mile (1) |
| 133:3;212:22 | 167:17;168:14; | 182:15 | 146:7;187:20 | 230:10 |
| worth (1) | 179:6;183:4;188:22; | 115 (5) | 1974 (8) | 22nd (1) |
| 212:15 | 190:4;199:22,23; | 251:12,15,24; | 133:9,20,23;134:1, | 79:5 |
| writes (1) | 209:15;217:9; | 252:12,20 | 15,16;139:6,10 | 24 (12) |
| 201:22 | 226:23;240:12,16,21; | 115.4 (1) | 1986 (2) | 89:3;200:20;210:8, |
| written (4) | 241:2,10 | 176:6 | 32:11,19 | 9;214:13,18;216:13, |
| 120:4;200:2; | 1,000 (3) | 116 (1) | 1-to-5-meter-per-second (1) | 22;217:2,4;218:14,23 |
| 205:10;228:1 | 234:21;237:20; | 192:12 | 240:10 | 24/7 (1) |
| wrong (8) | 241:13 | 1-18 (2) |  | 200:17 |
| 173:7,12;174:22, | 1,700 (1) | 187:8,18 | 2 | 249 (1) |
| 23;175:22;176:6; | 178:6 | 11-mile (1) |  | 4:16 |
| 187:11,23 | 1:35 (1) | 230:9 | 2 (19) | 24-decibel (2) |
| wrote (1) | $4: 2$ | 11th (6) | 15:4,7;22:10,18; | 216:16,19 |
| 206:3 | 10 (38) | 6:15;26:13;77:10, | 23:18,21;67:6;78:13; | 25 (6) |
| Y | 10:13;24:11;26:21; | 18;78:24;79:2 | 122:16;139:8,9; | 66:4,12;89:3; |
|  | 49:17;61:12,14; | 5:19;41:5,9;50:15; | 220:11;221:12,14; | 217:11 |
| yards (2) | 64:19;70:14;72:18; | 55:11;59:3,6 | 226:23;241:1 | 25-year (1) |
| 37:24;38:8 | 76:11;77:7,12;81:6; | 13 (2) | 2,000 (2) | 57:16 |
| Year (23) | 90:22;91:3;108:3; | 59:2,7 | 178:7;236:4 | 26 (3) |
| 54:15;67:23; | 117:19,20;118:2; | 13A (9) | 2,583 (2) | 5:17;75:24;196:6 |
| 101:24;102:12; | 127:16;143:5; | 88:5,10;101:5; | 216:18;218:19 | 27 (1) |
| 104:5,11,12,15,20, | 151:13;152:4; | 107:5;146:9;209:12, | 2:53 (1) | 210:7 |
| 23;105:2,8,12,13,17, | 153:12;155:24; | 13;217:8,11 | 69:22 | 28 (1) |
| 23;118:9;129:23; | 157:22;179:6;193:8; | 14 (6) | 20 (14) | 231:19 |
| 130:18,21,22;131:22; | 196:4,21;197:7; | 34:9;51:5;157:7,8, | 5:15;17:22,24; | 28/05/12 (1) |
| 208:22 | 240:19;241:1;248:5 | 16,20 | 21:2;80:1;83:7;84:4; | 123:19 |
| year-round (1) | 100 (4) | 1-42 (1) | 102:9,21;103:22; | 28-decibel (1) |
| 206:16 | 154:17;155:3; | 121:15 | 147:24;160:14; | 230:13 |
| years (10) | 234:20,21 | 1-44 (3) | 193:9;235:18 | 29 (1) |
| 5:16,17,19;32:1; | 100-foot (1) | 215:20;216:3,8 | 20/05/11 (1) | 248:17 |
| 50:1;75:24;76:1; | 47:6 | 15 (21) | 123:12 | 29th (1) |
| 159:12;163:21; | 100-foot-wide (1) | 38:17;42:5;80:7, | 200 (5) | 79:6 |
| 239:13 | 47:13 | 11;81:13;84:8;90:22; | 92:9;96:9;99:5; | 2B (1) |
| yelling (1) | 105.4 (1) | 91:3;95:4;102:15,16; | 127:16;154:19 | 15:13 |
| 115:9 | 119:2 | 103:5,6,11;104:1; | 2000 (1) | 2-meter (6) |
| yielding (1) | 107.4 (3) | 105:15,18,24;139:17; | 46:17 | 221:6,8,23;223:22; |
| 206:14 | 78:13;118:23; | 143:5;151:13 | 2005 (1) | 224:1,12 |
| York (1) | 122:16 | 15-decibel (1) | 46:19 |  |
| 242:7 | 109 (8) | 95:11 | 2008 (1) |  |

DAY 4 - AFTERNOON SESSION ONLY - November 1, 2012
SEC 2012-01 ANTRIM WIND ENERGY HEARING ON THE MERITS


