STATE OF NEW HAMPSHIRE

SITE EVALUATION COMMITTEE

September 22, 2016 - 12:45 p.m. **DAY 4**
Public Utilities Commission
21 South Fruit Street, Suite 10 **Afternoon Session**
Concord, New Hampshire **ONLY**

IN RE: SEC DOCKET NO. 2015-02.
ANTRIM WIND ENERGY, LLC;
Application of Antrim Wind Energy, LLC for a Certificate of Site and Facility.
(Hearing on the merits)

PRESENT FOR SUBCOMMITTEE:	**SITE EVALUATION COMMITTEE:**
Cmsr. Robert R. Scott *(Presiding as Presiding Officer)*	Public Utilities Commission
Cmsr. Jeffery Rose	Dept. of Resources & Economic Development
Dr. Richard Boisvert (Designee)	Dept. of Cultural Resources/ Div. of Historical Resources
John S. Clifford (Designee)	Public Utilities Commission
Dir. Eugene Forbes (Designee)	Dept. of Environmental Services/Water Division
Patricia Weathersby	Public Member

Also Present for the SEC:

Michael J. Iacopino, Esq. (Brennan...
Pamela G. Monroe, SEC Administrator
Marissa Schuetz, SEC Program Specialist

COURT REPORTER: Cynthia Foster, LCR No. 014

I N D E X

I N D E X (Continued)

EXHIBITS

DATA REQUEST

PRESIDING OFFICER SCOTT: We're back on the record. I think we left off with Ms. Lenowes.

MS. LENOWES: Yes, Mr. Chairman. Thank you. It's not going to take long hopefully.

BY MS. LENOWES:

Q Mr. O'Neal, I wanted to call your attention to your two shadow flicker records. The most recent one is App. 33 Attachment 6, and the other one is App. 33 Appendix 13 B.

A I don't have them listed as appendix numbers. I have the copy of the one that's revised February 17, 2016. That's the most recent one, obviously.

Q Yes. Do you have the one from the fall?

A I do not. Perhaps I could borrow a laptop again.

PRESIDING OFFICER SCOTT: We'll go off the record while we're all finding this. Let me know when you're there, and I'll go back on the record.

(Off-the-record discussion)

PRESIDING OFFICER SCOTT: Back on the record.

BY MS. LENOWES:

Q In the most recent report which is the February 2016 report, if you can go to PDF page 14 there's a table there. Table 5-1.
A Okay, I'm there.
Q You see that? Okay. Now in this table it lists the ID number of structures that are going to receive shadow flicker, and then you have the amount of expected shadow per year, hours, minutes there. So in the first one, Model ID 87 it's going to incur 13 hours and 48 minutes of shadow flicker during the year. Do you see that?
A I do.
Q That's based on your model?
A Yes.
Q Now, I want to, now, you don't have this in front of you, but what, and I don't know if you need to have it, but let me set it up. For anyone else who's interested, if you could look, I hope you're interested, look at my Prefiled Testimony. This would be WA-01. And in that, go to page 9 of 20. It's up in the upper right-hand corner.
MR. NEEDLEMAN: Can we go hang on for one

minute so Rod can grab this?
A Do I need this to answer a question?
Q I was thinking not, but I think you should have it if that's okay.
PRESIDING OFFICER SCOTT: Yes. Please, go off the record.
(Off-the-record discussion)
PRESIDING OFFICER SCOTT: Back on the record.
MS. LENOWES: Thank you, Mr. Chairman.
BY MS. LENOWES:
Q If you could look at that Table 2. Do you see? That is on page 9?
A I'm reading your May 23rd, 2016, Prefiled Testimony.
Q That's correct. That's correct.
A Page 9?
Q Correct.
A Okay. I'm there.
Q So now what I did here, and we can validate the numbers if we need to, but I took the, that table that you had in your Attachment 9 report, and I put it into this table and I added a fifth column there that has the shadow flicker that

was expected to be impacting that property or that ID based on the old model done last year. Do you see that?
A I do, yes.
Q Do you want to validate those numbers or do you trust that they're accurate?
A I've already validated them.
Q Okay. Thank you. All right. So now what, if we look at ID 87 it is saying that the shadow flicker based on the old model that you had run would, that home would receive zero hours of shadow flicker a year, and then under the new one it will receive 13 hours and 48 minutes, you see that?
A Yes.
Q And the difference being that when you ran the model last year, or whenever you did it, you were using a distance out to which shadow flicker would extend of ten times rotor diameter which would have been 113 meters times ten. Is that correct?
A That's correct.
Q As opposed to a mile which is what you used based on the new rules, is that correct?

A Correct.
Q Okay. So I can understand where a home might go from 0 to 13 hours, and I want to explore that a little bit later, but I have a question for you. Let's look at ID number 3. That home went from 9 hours and 23 minutes up to 13 hours and 18 minutes. Do you see that?
A Yes.
Q If that structure didn't move at all, obviously it did not move, how is it that by extending the distance in which you're studying shadow flicker could the number of hours increase?
A Sure. Because what you're doing is you're as you change the distance there, you went from 1130 meters to approximately 1610 meters which is a mile. So when you do that, a location such as a residence could now be potentially experiencing shadow flicker from another turbine that wasn't included in the analysis before. In other words, a turbine that is located somewhere between 1130 meters away and a mile away which was not included in the earlier analysis. Now it is included, in not all cases of course, but in some cases it could potentially be in line to

cause some additional hours or minutes of shadow flicker.

Q Okay. Great. That makes sense. Thank you. Now, what I wanted to do now, looking at your first shadow flicker study, this was from fall, and this will be App. 33 Appendix 13 B, and if we can go to PDF page 11. This is the map where you show the contours of the hours of shadow flicker. Do you have that?

A Is this Figure 4-2?

Q Yes, it is.

A Okay. I'm there.

Q Okay. Good. Now, I want you to see that there is the outermost contours, the yellow line, you're saying at that point no properties would experience any shadow flicker, is that correct, beyond that point?

A That's the extent of the 1130 meters. Right.

Q So no properties beyond the 1130 meters would experience any shadow flicker under the old model; is that correct?

A Correct.

Q And if you fell between the yellow line and the orange line, you would have some hours of shadow

flicker, correct, but less than 10 according to your legend?
A That's correct.
Q And then when you move in increasingly more experiencing of shadow flicker number of hours?
A Yes, according to the legend there.
Q Now I want you to take note of the fact that that yellow line goes out to -- I'm looking on the far right-hand side of the map. It goes out to Reed Carr Road. Do you see that as coincident with Reed Carr Road? You may have to zoom in a little bit.
A I can see it, yes.
Q So if you kind of have a mental thought of what that looks like, I'd ask you to now go to App. 33 Attachment 6 which is your newest report, the newer report, and we will be looking again at Figure 4.2. So it's the same figure but in a different point. You see that?
A Yes.
Q Now we have the yellow line which is zero shadow flicker extending to Old Carr Road. Do you see that?
A Yes.

Q So it's going from the 1130 meter mark to the one mile mark, right?
A Correct.
Q Now all those homes that were outside of the 8-hour shadow flicker or that, you had ten hours, using a slightly different legend, but that orange line which in the previous map was ten hours of shadow flicker, you now set it to 8 hours, but you see there are many more homes encompassed there, do you see that?
A Yes.
Q Okay. Now, here's a concern, a question I have for you. The homes that are magenta are the ones that will get shadow flicker detection and mitigation, correct?
A The ones that are shown in magenta, those are the 24 locations that we were just looking at in the table that have the potential to have 8 hours or more per year.
Q So there's mitigation that is expected --
A So they're part of the mitigation package proposed by Antrim Wind, yes.
Q Now, the home that, I want you to, can you zoom in and see, for instance, 56 and 57. Do you see

those homes? Again, they're on Reed Carr Road.
A I'm holding my paper copy so I have a hard time zooming in beyond what I can do.
Q All right. So there are several magenta dots and residences and structures that are immediately adjacent to blue structures. Do you see that?
A Yes.
Q So those structures get no mitigation, correct?
A So it's not, just to clarify, it's not the home per se that gets the mitigation. The mitigation is going to be tied to a location. The location of the home and the turbines. So, for instance, if you have a neighbor that's right next door, if they were to have shadow flicker or experience some shadow flicker, you would expect it to be from the same turbine that's going to affect their neighbor so really they would still benefit from any kind of shadow flicker mitigation or shutdown.
Q There's no assurance of that, though. The only ones that you are feeding into your shadow flicker detection system are those that are highlighted in magenta?

A That's correct.
Q Okay. So now, and just so, now, what I'd like to do is read you the rule, the New Hampshire site rule, okay? You have stated that the rule only required you to go out to one mile, is that correct?
A Correct.
Q So it is conceivable that if you went out to 1.1 miles or 1.05 miles, let's say, more homes would appear in magenta, is that correct?
A I guess what I would say to answer that question is it's a line of sight exercise. Keep in mind this is what's called a bare earth scenario. There's no vegetation, there's no trees. None of that is assumed. So it's just a possibility that these locations could experience that. It doesn't mean they will, and as you increase the distance, it just suggests that there's a line of sight under a bare earth case.
Q I understand, but can you answer the question, please?
A I'm sorry. Could you remind me of the question again?
Q If your shadow flicker model were to go out to

1.1 miles as opposed to one mile, would we see more magenta homes appearing in the scene?

A If there's a line of sight, possibly.

Q Just a possibly?

A Right. I can't tell you for sure they would.

Q I want to read the rule to you if I could. This is Rule 301.8A2 addressing shadow flicker and this is what it says. An assessment that identifies the astronomical maximum as well as the anticipated hours per year of shadow flicker expected to be perceived at each residence, learning space, workplace, health care setting, outdoor or indoor public gathering area, other occupied building and roadway within a minimum of one mile of any turbine based on shadow flicker modeling that assumes an impact distance of at least one mile from each of the turbines.

So you have insisted that that rule says all you have to do is look out one mile, but is it, it appears in the reading where it says assumes an impact distance of at least one mile that the rule at least contemplates shadow flicker going beyond a mile. Would you agree with that?

MR. NEEDLEMAN: Mr. Chair, I'm going to object. This is an issue of regulatory interpretation. The rule speaks for itself.

MS. LENOWES: I understand that, but in his own testimony he objects to comments about the rule, and I can bring that up, but he puts in his own interpretation of the rule.

MR. NEEDLEMAN: I think he stated that he complied with the rule, and I understand Ms. Lenowes has a different view, but it's still an issue of regulatory interpretation.

MS. LENOWES: Should I read from his testimony, Mr. Chairman?

PRESIDING OFFICER SCOTT: Tell you what, Mr. Mr. O'Neal. If you have anything more to add, why don't you do that. Otherwise, we'll move on.

A Sure. My answer to that would be really that if the SEC wanted people to evaluate out beyond a mile, they would have written the rule that way. So that's my interpretation.

BY MS. LENOWES:

Q Okay. And then if I can, I'm hesitant to bring this up, but here goes. What are the tolerances

built into your shadow flicker model, do you know? Is there a plus or minus hours?

A There are no tolerances per se in the WindPro software package. I guess what I would say is it's obviously a matter of geometry. You know, latitude, longitude, sun angle. Those things are all very crystal clear. They don't vary. They're well known. So those kinds of things don't have any tolerance.

Q So is it exact?

A Those calculations are exact, yes.

Q So you're confident that the number of hours that you have placed into this are including some of -- let me step back.

You're sure that the number of hours that you're stating that each residence or receptor will be impacted by shadow flicker is accurate to the minute.

A To the minute. No, I would not say that. It's a program that does the calculations. Could it vary by a few minutes over a course of a year? Of course.

Q Could it vary by an hour?

A I don't know that.

Q So in your discussion with Dr. Fred earlier today regarding bright sun, some clouds, all of that, you're saying that you are confident that you have not misunderstood the amount of sunlight or conditions where shadows can be cast. That you have, the number you have is conservative here.
A I am confident of that, and I think the mitigation package that Antrim Wind is going to be required to use on it is going to actually measure directly the sunshine. So if the conditions are met, once they hit 8 hours, they will shut down.
Q Mr. O'Neal, have you ever worked with a shadow detection system?
A No. I have not.
Q So you've never worked on a wind project that has one?
A I have not.
Q So you don't know the success rate of those systems?
A I do not. I'm relying, obviously, on other engineers to inform me.
Q So you don't -- you can't say today whether in

hazy conditions the shadow detection systems tend to get confused?

A I can't speak to the technology, no. You'll have to ask Mr. Kenworthy.

Q Okay. Now, I did want to -- I have one more question and then I will be done, and I would like to direct your attention to WA-29 X, and this gets back to the one-mile question.

A I don't know what 29 X is.

Q Oh, it was handed out earlier today.

A I have a copy now.

Q Okay. Thank you. This is a letter from Mary Riley. She is a Zoning and Building Director in Mason County, Michigan, and this letter is part of the rulemaking record for the Site Evaluation Committee, and I wanted to direct your attention to the 6th paragraph down. She's talking about a situation where they had a problem with shadow flicker and ended up implementing the shadow flicker detection system for Vestas turbines, okay? So not Siemens. In this case, the project had already had shadow detection on some turbines but not all.

And so it begins, shortly after the

turbines started to spin, complaints were filed with the zoning office. It was then that we realized that turbines more than a mile away could cast shadows on properties. When the county and the public reported this to Consumers Energy, which is the owner of the project, the modeling was recalculated from an original thousand meter distance, which is what you originally used, to 1646 meters to be inclusive of flicker already actually observed. 1646 is beyond a mile. Okay?

Now, is it conceivable that when the committee had received this input from Mason County that it made the decision to set a minimum of one mile rather than an absolute mile distance on shadow flicker?

MR. NEEDLEMAN: I'll object to the question. Asking the witness to speculate what was in the minds of the committee is not appropriate.

PRESIDING OFFICER SCOTT: Sustained.

MS. LENOWES: All right. I'm all set then, Mr. Chairman. Thank you.

PRESIDING OFFICER SCOTT: Does the Audubon

Society have any questions for this witness?

SPEAKER: No questions.

PRESIDING OFFICER SCOTT: Counsel for the Public?

CROSS-EXAMINATION

BY MS. MALONEY:

Q I just have a couple questions, and it's about the mitigation. I'm not sure you can answer them but try.

As I understand it, a potential receptor or sensitive area can receive shadow flicker from several different turbines.

A Yes, at different times of the day. In other words, depending on the sun angle it could be a different turbine at a different time of the day.

Q Right.

A Just one at a time.

Q Okay. So that can contribute to the 8 hours, different turbines?

A Oh, absolutely, yes.

Q So this system, is it designed so that -- I guess I'm a little confused about how it's designed. The detection system, how does it

know which turbine to shut off?
A That all has to be programmed into the nine turbines before the project would come online. So, in other words, there's enough factual information from running the model. It knows exactly what day of the year. It's all in the back of the report, actually, if someone's really interested. It tells you what day of the year, what time of the day and which turbine could contribute to shadow flicker at any of those particular residences. So that will all get programmed into their system.
Q And so this is designed then to shut off the appropriate turbine that will push it over the threshold?
A Correct.
Q And this system hasn't yet been put in practice anywhere?
A Again, Mr. Kenworthy is probably a better person to answer that question. I'm not aware of any myself personally. Obviously, you've seen the letter from Michigan where they've used a similar system successfully out there.
Q Okay. That's all I have for shadow flicker.

I just wanted to ask you a question about sound, and did you do any study about the effects of wind turbines, wind turbine noise on wildlife?

A We did not.

Q So not on small or large mammals?

A No.

Q Okay. I have nothing further.

PRESIDING OFFICER SCOTT: Okay. Members of the committee? Dr. Boisvert?

BY DR. BOISVERT:

Q Thank you. A few questions. In regard to the lengthy discussions about sunlight and so forth, and the quality of the light, what I did not hear was discussion of sunlight at the times when the shadow flicker would take place which to say a limited time in the morning for some people and a limited time in the evening for other people, and my question is, meteorologically, is there a difference in the average amount of sunshine, we'll use your definition of it, for that period in the morning or evening that would be different from the daytime full day length period? In other words,

might it be more sunlight deprived in the end of the day than during the rest of the day?

A I think we had a little bit of that discussion perhaps on Tuesday with Dr. Ward. He made a comment, I was actually observing it Tuesday night as I was driving home. That oftentimes at sunset due to just the way you look through the atmosphere you can have more clouds at sunset on the horizon just due to the way the earth curves. So it's not explicitly accounted for in the modeling per se, but meteorologically speaking, you could have more clouds, a few more clouds at the end of the day, sure. Again, the sensor, the sunlight sensor that's going to be installed on the turbines is what's going to measure the light. That will be the ultimate arbiter, if you will, of its receiving any sunlight.

Q Likewise, is fog more common in the morning than during the day or the evening? When I say day, I mean midday?

A Right. I don't have an answer. I don't know the answer to that here in Antrim. My general experience with fog is you often get it at

night. Radiational cooling, the atmosphere cools down.
Q But that wouldn't apply to shadow flicker.
A That wouldn't.
Q I'm only asking questions in regards to the times when there's an opportunity for shadow flicker.
A Right. Well, there was no, fog was not taken into account, if you will, in the modeling. I can't speak, I can't answer you in terms of what time of day it might occur.
Q In terms of the mitigation, does the limit of 8 hours per year, I assume it's calendar year, the clock or the calendar starts on January 1st and would then proceed through the year. Is there a literal clock for each location that keeps track of the amount of shadow flicker received at that location and at the end of that accumulated 8 hours, then the software proceeds to affect the offending turbine and shut it off?
A Correct. The clock is kept at the, what's called the SCADA system. Supervisory Control And Data Acquisition system which is in the control building associated with the wind farm

on the property. So that would monitor real word time, every day of the year, that would have some kind of software device, I don't know what it is, that's going to keep track of those and the Counsel for the Public asked that similar question that if you have to program into it what are the geographic locations in the community that you want it do the calculations for. So once you give it that latitude and longitude it will then know and do those calculations and determine if you made those 8 hours then or not.

Q Right. So that the clock is filled, as it were. That location has received its maximum allowable 8 hours of shadow flicker. Does the software then monitor just those days when there's the sunshine availability for shadow flicker or if it's a cloudy day during the time when there might be shadow flicker, they just skip right over it and wait to shut off the turbine when there is enough sunlight to cause shadow flicker?

A Getting a little bit beyond my technical expertise with the mitigation package. My

understanding, and you may want to ask Mr. Kenworthy a followup question when you have a chance, is that, again, the solar measuring device on the top of a turbine is going to tell you whether it's cloudy or not, and if it's, my assumption now, is if it's cloudy and you've reached the 8 hours at a certain house but it tells you hey, on November 14th at 5 p.m. there is the potential for shadow flicker because everything is lined up, but it's a cloudy day, my assumption is the turbine would continue to operate.

Q So it's not as though the turbine is turned off at every potential shadow flicker time once the 8 hours is achieved. It's only turned off when there's sufficient light to cause shadow flicker.

A That is my understanding. Yes.

Q Okay. I think that's all I have. Thank you.

PRESIDING OFFICER SCOTT: Any other committee member? I will hand over the microphone.

BY MR. CLIFFORD:

Q I just wanted to follow up on that line of

questioning. So I would expect that after one year period of time, assuming there's an installation, you would be able to map pretty precisely, correct me if I'm wrong, when shadow flicker would occur at each and every turbine because the sun, and I'm not a meteorologist or study planets, but I would assume that for each day, every day of the year, you could map exactly the point at which the sun would hit the turbine and you would expect that to occur every single day that the sun is out thereafter, given some accommodation for tilt in the earth and that kind of thing but pretty precisely, right?

A That's correct. Yes. It's known with certainty every day of the year when that, where the sun is in the sky every hour, where it could be shining at a turbine and subsequent to that a house that's behind it in line so you would know that, and my understanding is at the end of a year Antrim Wind will be able to do a report, print out a report that documents what happened during that year.

Q So then would it be consistent that you would be able to either map out or foresee potential

shadow flicker in the future such that no one turbine would potentially following year two assuming you caught all the shadow flicker data points, you would know when those turbines would theoretically have to be turned off to fall within the 8-hour guideline period?

A Yes and no. I mean, say in 2019 was your first year of operations, and those few days in January when the sun was real low in the sky it was always sunny so you started using up your 8 hours early in the year. Say in 2020, the next year, what if it's always cloudy those days so there's really no shadow flicker so you haven't used up your 8 hours yet. Maybe you use them up in the fall, for example. So the chance of it happening is the same each year day after day but whether it does or not would depend on the actual meteorology.

Q And then my other point goes to noise, and just so I have complete understanding, can you give me some frame of reference of what, say, 35 dBr or 40 dBr or 50 in real world terms that I can get my arms around? You know, just give me some real world examples that have a constant noise

level of 35 DB.

A Boy. So if this room were completely silent, we all stopped talking, no stenographer, nothing going on and we just had a sound level meter in the middle of the room, going to be in the low to mid 40s from the HVAC system so 35 is quieter than that. Normal conversation, if I have my sound meter right between us, normal conditions would be 55 to 60 decibels. Is that helpful?

Q Yes. Thank you.

BY PRESIDING OFFICER SCOTT:

Q I can't find it, but I seem to remember in your sound recording there was a chart showing generically when was the train going by and another one a jet, et cetera; does that sound right?

A That is correct. I can tell you the figure, that number exactly if folks are interested in looking back at it later. Figure 2-1 in the sound report has a noise thermometer with some typical sound levels in there so both indoors and outdoors.

Q Thank you for that. On shadow flicker, and, again, I don't have this in front of me, but I

seem to remember on the different iterations that I understood we passed rules and things have changed, I seem to remember an earlier report suggested there would be like ten hours and ten minutes maximum shadow flicker and then it progressed in a subsequent report to over 13 hours; am I correct in that memory?

A The current report is a little over 13 hours. You're right. I don't recall what the maximum was in the 2014 version. I don't have that one in front of me, but, again, if you increased what you did, the SEC increased the distance from, well, you set a distance of one mile, then that is, to bring an additional turbine which would potentially increase the numbers.

Q So that's why the 2014, if I recollect correctly, had less hours, the supplement had 13 hours, 48 minutes, I think, and that's where the difference?

A That's correct.

Q All right. Thank you. I'll ask this question. I understand the rules don't require this, you know, our definition of shadow flicker talks about the sun. Are you aware of any issues with

like a moonlight night with flicker from that? Is that a problem? Is that something we should be concerned about?

A Moon flicker? I don't think so. I haven't witnessed that at these types of installations.

Q Okay. Back to sound. The sound analysis you've done, is there any bleed over from one turbine to the other so one turbine has whatever the noise is making, and you're also hearing the other one in the background? Is that additive effect an issue?

A Well, that additive effect is taken into account in the modeling.

Q Okay.

A We look at all nine turbines and pick any one of the 344 residents that we looked at. Every one of those, we modeled all nine turbines at every one of those houses. Obviously, some of them have more contribution than others, but, yes, all nine were looked at.

Q And I've been doing this for longer than I care to remember for the Site Evaluation Committee. I remember in past hearings we've heard a lot about a potential for, at some frequency blades

do have a beating effect because they end up, again, it's an additive effect, and they happen to be in sequence at once. Is that an issue?

A Generally, what I experience them out there is the whoosh, whoosh sound of the aerodynamic sound of the blades passing through the air if you're close enough to hear them. I have heard, I've read some papers on the beating phenomena which is possible under certain conditions. It's not something that I would characterize as frequently occurring.

Q Just to clarify, you've had a lot of discussion about ducting or temperature inversions. Am I correct, what I thought I heard you saying is the model that you use assumes that that ducting or temperature inversion is happening. Is that not correct?

A The standard, the 9613 standard which the SEC requires everyone to use includes as part of it it's assumed to be valid under temperature inversion conditions. So de facto the temperature inversion conditions are assumed as part of doing those propagation calculations.

Q So would you consider that like a worst case

analysis then?
A Yes, as I maybe answered earlier, there's no, you don't put it in a number for grade of inversion, but it's a temperature inversion condition which is generally going to be worst case. If you've got a bright sunny day, the atmosphere is well-mixed, there's no temperature inversion, the sound level is going to be quite a bit lower than these numbers that are shown in the report. These are worst case conditions. Turbines operating at maximum sound power. Every one of them up on the ridge cranking out full bore under a moderate temperature inversion.
Q So you had a discussion about K factors also. Let me ask you this. Is the K factor developed for, you just bought the turbine, it's new, here's the variance? Or let me ask, actually, my real question is as the turbine gets older, do the sound characteristics change as bearings gets older and that type of thing? Is it understood that things will get louder or is that, is that a misconception in my eyes because if you follow good maintenance practices that

won't happen?
A Well, that's the key. If you did nothing for 20 years, never maintained it and let things go, then there could be issues certainly with a deterioration of the equipment. Either bearings or the blades gets bad after a while. But that's also going to affect the performance of the turbines so they'll generate less electricity so it costs the owner/operator so it's in their best interest to do maintenance and keep them running well which will then keep them true to the sound conditions that they were tested under.
Q So on that same line, am I to understand then that I should be concerned about the sound getting, for a given turbine getting louder between maintenance cycles as things wear? I wonder if, is it cyclic or is it pretty standard?
A It's a pretty standard maintenance schedule. My understanding it's about a six-month maintenance schedule for every unit, and obviously, if there's something unusual going on in between, they will have to address it and deal with it at

the time, but for a typical maintenance, no, you wouldn't experience that.

Q Do you remember with Ms. Lenowes you had a discussion about the, I'll call them outliers, the data points in the Massachusetts study? Do you remember that?

A Yes.

Q And at the end of that discussion, there was a discussion about turning off and on and do you remember that?

A Yes.

Q So help me here. What I heard Ms. Lenowes at the end suggesting, okay, when the wind dies down it will be off, when the winds comes back up it will cut back in, is that the same on and off you were talking about?

A No. It's definitely not.

Q Can you explain that to me?

A Sure. So the on and off I was talking about with Ms. Lenowes was on and off testing we did as part of the research study under full bore conditions. In other words, maximum wind speed of the hub height so it's putting out maximum sound level, and then to get an idea of what the

sound was with the turbines off we asked for a shutdown and they shut them down for a period of time. When we were done, they turned it back on but, of course, the winds are still blowing very fast so they come on so there's an initial period where there's a little blip in the sound levels as shown in the report.

The other condition when the wind dies down to below the cut-in speed which is three meters per second, once you get to that, they're gradually slowing down and slowing down anyway so the sound level is getting lower and lower and lower, and when you get to 3 meters per second or below they just turn off. There's no sudden jump or discontinuity like that at all.

Q So in a situation where the winds are high, you're getting near the cutout speed, I guess, wouldn't you have that type of situation where you could have the wind putting the wind turbine in and out and in and out of service?

A So cutout wind speed is 25 meters per second which is 56, 58 miles an hour, and that's not often attained. It's very rarely attained from what I understand, but if it were to happen,

yes, they would shut down, and there is, I can't speak to Siemens exactly, but there is some period of time that the wind has to stay below that cutout speed. It wouldn't just keep ratcheting back and forth if it's blowing around 24 and a half, 25, 25 and a half. It's going to stay below 25 for a certain period of time until it's died down enough and then it will turn back on.

Q So you don't envision a situation where the outliers in that report would be functionally achieved?

A I don't because the condition that you're hypothetically describing, if you've got winds of 58 miles per hour you're going to, you're going to have so much sound that your probably not, I shouldn't say you would never hear them, but hearing wind turbines is probably certainly not an issue.

Q You discuss a little bit about mitigation for sound. I was wondering if you could elaborate for me. What are the types of things that can be done that would mitigate sound, obviously once the turbines were installed and

operational.
A Sure. So if for some reason there was a need to reduce sound, again, we've got margin of safety already in the results for a couple of decibels below the standard at the closest location so I feel confident, but if for whatever reason they needed to do some noise reduction, it's always possible. For example, first thing they would do is have Siemens come out and make sure they were meeting their noise guarantee because if they were too high that would be the first place you'd look. So they would do that.

If that doesn't fix the problem, then there's this NRO option, noise reduction option, that everybody has, and you could step down each turbine in one decibel increments and turn it down. There's obviously a penalty for that in terms of the electricity produced, but you can reduce sound levels as well.
Q Is that envisioning feathering the blades? Is that what we're talking about?
A I believe it's feathering the blades, yes, and it reduces some of the power hopefully. Yes.
Q Okay, thank you. Mr. Iacopino, do you have any

questions? Hold on. Commissioner Rose has some.

BY COMMISSIONER ROSE:

Q Thank you. I just had a couple of questions with regards to shadow flicker, and could you explain the mechanism by which you measure the shadow flicker? That's by the minute? Is that per each of the residents or properties?

A It's measured minute by minute, yes.

Q Is that, that's on a daily basis?

A Yes. Every day.

Q Okay. And then that produces a report then of the shadow flicker from each one of those measured properties?

A That's my understanding. I have not seen one, but it's supposed to be able to, it will keep track of all that at every property, and it will produce a report at the conclusion of the year, yes.

Q And so that's a report would that would be provided at the end of a year? Is that what you just stated?

A I assume it's whatever the Committee's desire it. I assume that, yes, you asked for it, they

would provide it, sure.
Q So would there be an ability to produce a report on the cumulative amount of flicker that a residence has received to date in a calendar year?
A You're getting a little beyond my expertise. I would assume since it's just a software issue, a software program, that you could probably look at it at any point during the year. I would think you would be able to do that, sure.
Q Are those types of reports ever made available to the public, say, on a weekly, monthly, quarterly, basis or is it typically an annual basis?
A I guess this really hasn't been something that's been done much at all. This is sort of a relatively new area, if you will, with New Hampshire having probably the distinction of having the most stringent shadow flicker requirements in the United States. I haven't really seen this done before, but I don't see why a report couldn't be produced at the right times.
Q I guess where I was, my thinking was that if I

were one of the 69 properties that have some level of shadow flicker based on the report, that may be an interesting data point to know what that cumulative amount of flicker that you have so you could gauge when and if there were going to be cutting in and out based on some of the, that 8-hour tolerance. Would that seem something that would be reasonable based on your expertise?

A I don't know how burdensome or not the software program is. I have no experience with it. No familiarity. Perhaps it might be reasonable to let the operation run for a year or so and see how it's doing and then maybe fine-tune it if you need to.

Q Would you explain to me what the different mitigation measures are if you did have a property that is expected to exceed that 8-hour threshold that would be something that you would be looking to try to implement to reduce that impact?

A Yes. So the mitigation is actually pretty simple. You'd turn the turbine off. It just stops. It doesn't spin.

Q So there's not any additional mitigations that you would be doing ahead of time. It would just be once you hit that threshold, the offending turbine would then be shut down if one of the residents exceeded that 8-hour threshold?
A That's right. Yes.
Q Thank you.
A You're welcome.
MS. WEATHERSBY: Bob?
PRESIDING OFFICER SCOTT: Mr. Iacopino? I'm sorry. We have some more from the Committee. Change of heart. They now want to ask questions.
MS. WEATHERSBY: Keeping you on your toes.
BY MS. WEATHERSBY:
Q Just a couple questions. The Siemens shadow control method that you reference in your testimony, that is the SCADA system?
A The shadow control technology piece of it would be linked to the SCADA system. So the SCADA system is sort of the overarching computer brain behind the entire wind farm. That's measuring power output from all the turbines. It's measuring all kinds of other interesting

engineering parameters to the owner and operator, but that shadow flicker technology would tie into the SCADA system so they would have the ability to read and understand it down at the O&M building.

Q So part of that system is the detectors on the turbines for the amount of sunlight that area is receiving?

A Correct. There's going to be, and, again, Mr. Kenworthy, I think explained -- I wasn't in the room when he did, but I think there's just one module that goes on top of a turbine somewhere on the wind farm that measures the solar input.

Q Okay. And so are any of the receptors that are out in the field or at people's residences, are any of those to remain or any other field studies done as a followup?

A So the locations of those 24 residents that are predicted to be over 8 hours would be programmed in that SCADA system with the latitude and longitude, and then you would just keep track of how many minutes or hours each one of the locations received in real world time. You

know, until it got to the 8 hours.
Q That's calculated. It's not, you have no receptor at their site, at their home, that measures that amount of flicker. That's calculated based on the software package.
A I apologize. I didn't understand your question. Yes. So there's no device, if you will, in the backyard of a home owner that's going to try to measure flicker. No.
Q In the 8 hours per year, is that indeed a calendar year or is it a running year?
A My understanding is it's a calendar year.
Q So it would be possible for someone to have 8 hours in December and 8 hours in January. It's not a -- you answered the question. Sorry.

For noise, I think you testified that you have projected data for noise levels at the participating landowners? And can you confirm that the worst case that is under the maximum decibel levels required? Maximum decibel level for the participating landowners.
A Yes. Even for the participating landowners they are below the 40 nighttime limit of the SEC.
Q Thank you.

A Your welcome.

PRESIDING OFFICER SCOTT: Mr. Forbes?

BY MR. FORBES:

Q Thank you. I also have a couple questions about this device and system to measure shadow flicker. I know you're not an expert in technology, it's fairly new, but I'm curious about the sensor, if you will. I think as I understand it, there's just one going to be on some part of the site there, not on each of the nine turbines, but could you elaborate a little bit about that sensor, its reliability, calibration? How do you get past this conversation we had earlier or you had earlier with regard to bright sunlight versus filtered sunlight versus -- I would think that there's a calibration that's going to be part of that, and, then, of course, reliability of the information coming in is something that even when these reports are completed, we'd want to have some confidence that they are accurate and meaningful. So could you comment on how those kind of issues are addressed?

A I'm afraid I'm not going to really give you a, I

can't give you good solid technical answer on maintenance and calibration of the sensor. I don't know enough about it. Again, probably a question Mr. Kenworthy can give you more details on. We know for a fact what days and what hours of the year it's possible at every single one of the homes, and, that's, again, that's in the shadow flicker report. That's not going to change. So one could say okay, I'm at home number 24. The report says on January 22nd late in the afternoon there's a possibility of shadow flicker. You could sort of round tooth a little bit like that; otherwise, I think we're going to have to rely on the technology. I guess I can't answer any more about that. I'm sorry.

Q Thank you.

PRESIDING OFFICER SCOTT: Dr. Boisvert?

BY DR. BOISVERT:

Q One more bite at the apple. This may be a matter of policy. You may not be the appropriate person to answer this question. But what would be the treatment for a new home built within the zone where there would be shadow flicker? Would there be an obligation on the

part of Antrim Wind to do the calculations and include them in the flicker mitigation if necessary? And, again, you may not be the person to answer this, but I'd like to find out who would know.

A Yeah. I guess my first thought is I'm not the right person to answer that type of policy procedural question.

Q We're looking at at least 20, possibly 25 or 30 years, and it's quite conceivable that residences would be constructed and that would a new owner be not included in the pool is my question; and sort of parallel to that, if a residence is removed, not just not inhabited for a while but removed, would it be taken out of the pool, if you will? Easy come, easy go, I suppose. That would be a question that I would have.

A I guess one way to answer your question is in the shadow flicker study there is that Figure 4-2 that I was looking at earlier with Ms. Lenowes which has the contour lines. So this is a public record so anybody could look at this and say I'm thinking of putting a home somewhere

here within this study area. You could very easily see if you're going to have 8 hours or more of possible shadow flicker by just looking at this map. That would be one tool that someone could use.

Q That would be incumbent upon the potential buyer or builder of a home, and they would have to be proactive on that, and over the passage of time this may not be in the forefront of people's minds. Yet someone could put the home up and then discover, oops, there's that shadow flicker. Why didn't somebody tell me about that. And it will come back to this Committee as to whether or not they should have been told.

So there may be a provision already in the application. I confess I didn't look for it because it didn't occur to me until just now, but that would be to me a reasonable question. Would they be included, and, if not, maybe that would be something that would be suggested as a condition on the certificate.

A Sure.

PRESIDING OFFICER SCOTT: Mr. Boisvert, we do have, Mr. Kenworthy is scheduled to come back

to the panel so we could have that discussion then unless you prefer to answer it now. I guess I'll leave that to the Applicant.

MR. NEEDLEMAN: It might be more efficient if we did all this at once when he's back up there.

PRESIDING OFFICER SCOTT: Okay. I didn't mean to cut off your question.

Q No, that's fine, and as I said, this occurred to me during the discussion and as I had mentioned I wasn't sure.

And the actual calibration to decide whether or not flicker does occur, is that something that is already in the standards for, developed with the operating software? Do we know what the light value, however it's calibrated, I'm familiar with the ones they use in photography, but is that set, is it available?

A Again, those kind of details I'm really not familiar with that so perhaps Mr. Kenworthy can help out.

Q It strikes me that with that threshold it sort of renders almost irrelevant the question of is

it a sunny day, a bright sunny day, a hazy day, if the light value is of a certain amount, doesn't matter what a meteorologist would call it, it gets to a certain level because it's strong enough to cause a shadow flicker and the definitional terms fall away to it either is a pass or fail. Is that not correct?

A I would agree with that, yes.

Q Thank you.

PRESIDING OFFICER SCOTT: Mr. Iacopino?

BY MR. IACOPINO:

Q First question, Mr. O'Neal, is you indicated during your cross-examination by Dr. Ward today that you had gone back and looked at the NOAA or NCDC definition for possible sunshine, and where did you get that definition? Can you give us a reference?

A I can, I can't give it to you on the fly here, but we can provide that. Yes.

Q All right. Did you have to look it up in a book or did you find it on the internet?

A It's from the internet from the National Climactic Data Center. That's a very tortuous website to go look at. There's very, very many

paths you can go down so it might be useful if I could provide you the specific reference if that's what you're interested in.

MR. IACOPINO: Mr. Chairman, would you like that?

PRESIDING OFFICER SCOTT: Sure. Why don't we do that as a data request.

Q Also Dr. Ward had asked you about the, he asked the question about whether or not the rule would apply, but I'm more interested in the phenomenon. The question he asked you is whether the Site Evaluation Committee rule would apply to shadows reflecting off of like a body of water or ice or something like that, and I'm sure he didn't mean that the shadow was reflecting. I'm sure what he meant was that the sun was reflecting off something shiny or something that would give a reflective surface, and would the reflection off of that cause what I consider to be like a secondary shadow flicker, if you will.

A Yeah. I've never seen that.

MR. WARD: I didn't hear the answer. I'm sorry.

SPEAKER: He said he'd never seen it.
MR. WARD: Thank you.
Q You were shown, I believe it is Non-Abutters 30, the photograph that was attached to Mrs. Block's testimony, do you recall that photograph?
A Yes, I do.
Q And that's a photograph from some photograph from some portion of Gregg Lake, the far side from the turbines because you can see a large portion of the lake in that photo. Do you remember that?
A I do remember that. Yes.
Q In your sound study, did you in fact consider what the modeled sound impacts would be to properties that are between the turbines and Gregg Lake?
A Oh, yes. Absolutely.
Q And you used, in doing that you used your G factor of .5, correct?
A That's correct.
Q Am I correct if I assume that if those properties that were between the turbines and the lake modeled less than the 40 dBA that the lake wouldn't increase the sound to properties

on the other side, would it? Or am I wrong about that?

A No. No. In fact, the best answer for that is in the report, Table 7-6, there's a calculated sound level on the north side of the lake, so the side facing the turbines, and that sound level is 30.5. So about 30 decibels. So even if you had some strange reflections going on and you add a couple more decibels, you're obviously way, way below 40 decibels because you're so far, far away on Gregg Lake.

Q Given that result, would there be any reason to change the G factor that you used?

A No.

Q You were also asked by Ms. Lenowes about the Wallace report, the Minnesota report that has the NARUC cover page and I believe one other report, the CEC report, which at least in her questions suggested that you relied on those reports for your conclusion that sound modeling is generally confirmed with postconstruction readings, and she pointed out particular portions of those reports that, albeit they undermine that position a little bit, so my

question is can you tell us where in those reports supports your position that postconstruction sound readings generally confirm the modeling that's done?

A Sure. Taking the Wallace report, for example, the last figure in that report, Figure 16 that we were looking at at Stetson Mountain, that that one showed that when you add all the extra conservative factors on top that have been suggested we should add, that you way, way overpredict, and that's not necessary. So that's at Stetson Mountain in the Wallace paper.

Q Okay. What about the other papers?

A So in the MassCEC, for example, we participated in that and did a lot of measurements and we did some modeling for that, and, once again, if you go to the end of Chapter 6 there's a summary discussion of the modeling in there, and there's a conclusion that says that the ISO 9613 using a G factor of .5 and the K uncertainty is the best way to estimate the one hour leq, the equivalent sound level which is the standard that the SEC has.

Q What about the NARUC report. That's the one

from Minnesota?

MS. LENOWES: Excuse me, if I could, I'm sorry to intersect, but he said best for the one hour leq.

MR. IACOPINO: I heard him.

MS. LENOWES: New Hampshire standard is not an leq one hour standard.

MR. IACOPINO: I heard him.

A So this 2011 NARUC report that you mentioned, obviously, I don't have the whole thing so I can't, unless I point to a place where it might confirm what we say, I think it does say in here --

Q Are you familiar with this report? Have you seen it before?

A I have heard of it. I haven't read it in its entirety, and I haven't looked at it in years.

Q I'm not going to ask the question then if you're not familiar with it and you only have three pages. I was just curious if you knew what the conclusion was as far as confirmatory results of postconstruction readings with preconstruction modeling.

A Right. I'm not sure the author gets into that.

Again, I haven't read it for a while so I don't know, and it's probably worth noting that it's his opinion. It says here on the cover that it's not a NARUC position. Whatever that means.

Q Actually, it's prepared for Minnesota PUC, I guess. Okay. Thank you. And the other thing, and I may have to defer to Mr. Kenworthy when he comes back to this question, too, but you mentioned a guarantee. If I understood your testimony correctly, you don't know what the terms of the guarantee are and whether the guarantee is based upon being plus or minus, whether the guarantee is subject to what the company represented within its error factor, what I'd like to think of it as, or if it's something else.

A So my understanding is the guarantee is the apparent sound power legal of 106 decibels plus the uncertainty of 1.5 equals 107.5. That's what Siemens is guaranteeing. It won't be any louder than 107.5 per sound power level, and that's the number we used to do our modeling predictions.

Q Let me ask you a question about guarantees

because there's a couple of them that are being bandied about here. One on the sound. On the shadow flicker, there's going to be the mitigation package that I assume has some kind of warranty with it, but these things don't go into effect until the project is up and running, correct?

A Correct.

Q So if for some reason they can't meet the guarantee, and I'm not saying that they can or can't, but if for some reason they could not meet the guarantee, the community is left with a project that is built, environmental damage that has been done, and not meeting the performance promises that are made in a proceeding like this. That's a pretty bad situation, would you agree with that?

A Yes. I would agree with that.

Q And so I guess my question is why should this committee put any faith in those guarantees? Can you tell us what leads you to sort of fall back on these guarantees?

A Sure. Sure. Fair question. Two reasons really. Number one, we've worked on dozens and

dozens of wind farms and done the modeling using these guarantees. The manufacturers have a lot of financial risk at stake if they don't meet those guarantees. There's a, I don't know the contract terms. I'm not privy to any of that. I just know there's huge liquidated damages type possibilities so they have to get it right. Again, they have Siemens and General Electric, Vestis, and all these turbines manufacturers, they've done it long enough now. They know, they understand, so they're going to get it right.

Again, if for whatever reason they didn't get it right, they would have to make it right, and I can't imagine that the operator of the wind farm is just going to put all that money into it, build it and just let it go at a financial loss. I imagine they would make sure it gets made right and meet the guarantees.

Q I don't have any other questions.

PRESIDING OFFICER SCOTT: Attorney Needleman, do you have redirect?

MR. NEEDLEMAN: I do. Just a couple.

REDIRECT EXAMINATION

BY MR. NEEDLEMAN:
Q So, Mr. O'Neal, a moment ago Mr. Iacopino asked you about this NARUC report and you made a reference and I just want to make sure it was clear on the record. The second page of the report, the second paragraph, it's right behind the cover page. It says the report, and I'm paraphrasing, was prepared by Mr. Hessler with input from NARUC, but it says that the views and opinions are strictly those of the authors and may not agree with NARUC. Is that what you meant, that this is the author's opinion?
A That's what I was referring to, yes.
Q And then you were also speaking with Mr. Iacopino about the CEC report which I think is WindAction 12, and I wanted to make sure the reference was clear. You were referencing what you said was the best standard in the conclusions. Is that on page 76 of the report, page 88 of the PDF, the 6th bullet point done?
A Yes. Yes it is.
Q It says the ISO 9613 with mixed ground, parentheses, (G equals 0.5), close parentheses, plus 2 dB is the most precise at modeling the

one hour leq. That's what you were referring to?
A That's what I was referring to. Yes.
Q Ms. Lenowes presented you with a couple of her exhibits, WA-13 and WA-14. Wind WA-13 was a 2009 Sound Assessment Report for an Ohio wind farm, the other one, WA-14, was a 2013 sound assessment for a wind farm in Prince Edward Island. Do you recall those?
A I do.
Q And you were asked some questions about some of the conclusions that the author was reaching in those reports; do you remember that?
A I do.
Q First of all, do you have any knowledge at all of what regulations pertaining to sound reporting and sound monitoring for wind farms were in effect in those jurisdictions at the time those reports were prepared?
A I do not. No.
Q So you have no idea whether regulations at that time may have dictated in any way how those reports were prepared?
A I don't know.

Q And then Ms. Lenowes pointed you to various portion of those reports which seemed to be conclusions that the author was drawing or beliefs that the author had which I understood you disagreed with. Now, having had the chance to review the sections that Ms. Lenowes pointed you towards, did it cause you in any way to change the views that you have here?
A No. Did not change them.
Q The SEC recently adopted its own comprehensive set of regulations to deal with the noise modeling, and we talked a lot about those, but I want this to be clear on the record. Is it your opinion that you have fully complied with those SEC regulations?
A Yes, it is.
Q And we've also heard a lot about this 3 decibel correction, I think is the term that was used. I'm not even sure anymore, but with respect to that 3 dBA correction that we've talked about in the context of the ISO 9613-2 standard, is there anything in the S SEC regulations that relates to that correction and tells you whether to use it or not use it under any circumstances?

A No. There isn't.
Q So things like that are then left to professional judgment in the regulations; is that right?
A That's right.
Q Okay. And then one last set of questions. In your report for this matter, at Section 7.4, that's the part where you provide this chart that shows all of the numbered modeling identifications, structure types and then the predicted noise level at each of those locations; do you recall that?
A Yes, I do.
Q And there are 344 locations with predicted sound levels, is that right?
A That's right.
Q And I skimmed through this chart. I'm sure you know better than I do, but is it correct that the highest predicted number at any of those locations is 38.1?
A That's right.
Q And I also did a rough count at lunch, and it seems that there are about 7 or so locations, give or take, where the predicted number is 37

or higher. Is that correct?
A That's correct.
Q So of the 344 locations, something like 335 or more are at least 3 dBA below the required standard here; is that right?
A That's correct.
Q So to the extent that this facility, once constructed, picking up on what Mr. Iacopino asked you a moment ago, to the extent that the facility despite your best work still ends up having some sort of issue with sound compliance, is it at least reasonable to assume that under that worst case situation that issue would be very limited based on this assessment?
A Oh, absolutely.
Q I have no further questions.

PRESIDING OFFICER SCOTT: Before we dismiss the panelists, so we have one data request. I'm just curious, what type of time frame you think that would take to get to us.

MR. O'NEAL: I could get it to you tomorrow.

PRESIDING OFFICER SCOTT: Okay. With that and, Mr. Needleman, my understanding is

Mr. Raphael is next, is that correct?

MR. NEEDLEMAN: That's right.

PRESIDING OFFICER SCOTT: So how about we take a 5-minute break. Everybody please get back soon in that time frame, and that will allow you to change out your panels.

(Recess taken)

PRESIDING OFFICER SCOTT: On the record, we're now with Mr. Raphael and if you want to swear in the witness.

DAVID RAPHEAL, DULY SWORN

DIRECT EXAMINATION

BY MR. NEEDLEMAN:

Q Thank you. Could you please state your name for the record?

A My name is David Raphael.

Q And where do you work?

A I work at LandWorks in Middlebury, Vermont.

Q And could you briefly summarize the purpose of your testimony here today?

A The purpose of my testimony is to support and answer questions with regard to the Visual Assessment I conducted of the proposed Antrim Wind Energy Project.

Q And do you have any changes today to the Prefiled Testimony and any of the supplements that you filed here?
A No. I do not.
Q Do you adopt that testimony and swear to it as your own?
A Yes, I do.
Q Okay. Thank you.
PRESIDING OFFICER SCOTT: Mr. Richardson.

CROSS-EXAMINATION

BY MR. RICHARDSON:
Q Thank you, Mr. Chairman. Good afternoon, Mr. Raphael.
A Good afternoon.
Q I have a few questions for you. I'm going to refer to Terraink, but I think there's two different organizations that Counsel for the Public used in those questions. If I get them wrong, just correct me as we go, but I understand from reading Counsel for the Public's report that the methodology that was employed included using two visibility raters or rankers. Is that what they're called?
A I think the term was a rating panel.

Q A rating panel. So there were two members of the panel who had not visited the sites that they were rating or ranking, is that right?
A That's my understanding, yes.
Q Now, is that methodology or approach one that is generally recognized in the scientific or professional community?

MS. LENOWES: Can I make a point of order here? There was a little bit of discussion, actually quite a bit of discussion in the prehearing conference about friendly cross and not regurgitating what was in the Prefiled Testimony, and I think that's exactly what's happening here. I think the person that raised it the most was Attorney Richardson. He didn't want the Intervenors doing that.

MR. RICHARDSON: Right, and this witness, I think, talked about some of the flaws with that methodology, but I don't believe his testimony covered whether it was generally accepted or used in the professional community, and I thought that was an important question to ask.

PRESIDING OFFICER SCOTT: So go ahead and ask your question.

Q So is that methodology and approach one that is generally recognized or used in the scientific community or the professional community of people who rate visibility impacts?
A No, it is not.
Q Is it accepted by agencies like regulatory bodies like the Bureau of Land Management or others?
A No, not that I'm aware of. The Bureau of Land Management actually specifically states in some of its narrative with regard to process that raters and those evaluating visual effect should be familiar with the site and have visited the site and the project area.
Q Okay. And so set aside for the moment the discussion that is in your Supplemental Testimony about some of the reasons and photographs and issues that occurred in this case, and just give me a sense of is that a reliable methodology in your opinion?
A No. It is not.
Q Why is that?
A Well, I think common sense would say to fully understand visual change, visual impact, visual

effect, one has to understand the full resource, be familiar with the resource in the flesh, and not base an opinion on a single view or a static simulation from afar.

Q Isn't one of the objectives in that approach to come up with raters or rankers that are not biased, and isn't that a good thing to remove bias?

A Certainly, well, I mean, I think bias is not really a question here. It's familiarity with the resource. One assumes that any individual evaluating a visual change would come to it without a bias, with an objective approach to trying to base that visual evaluation on objective criteria and facts that are observable in the field.

Q So what happens then if the photographs are not representative of what you observe in the field?

A Well, then those relying on the photographs for their assessment are not provided with an appropriate or accurate representation of the resource.

Q If you had never been to a site and you were just shown a single photograph, would that

impair your ability to make a professional judgment?

A It certainly would, yes.

Q Would adding more raters or more persons reviewing, a reviewing panel who hadn't been in the site, you know, I believe in this case there were two, but if you added four, what effect would that have on the conclusions as you added more and more kind of opinions from people who had not actually seen the locations?

MS. LENOWES: Objection. Foundation. It's not a process he's used so I'm not understanding how he's --

PRESIDING OFFICER SCOTT: Your response?

MR. RICHARDSON: He's offering his opinion on it, and I want to know if it adds to the process or makes it better or it's adding more people who haven't been there and forming a report and rating of his ability and makes it worse.

MS. LENOWES: I think it calls for speculation.

PRESIDING OFFICER SCOTT: I'll allow it. Go ahead. What's your answer?

Q So does adding reviewers, in this case you had one reviewer who had visited the site, right?
A Correct.
Q And then you had two that had not.
A Correct.
Q So what is the effect on the validity of the results of adding more reviewers who have not been to the site? Does that make it more valid or less valid?
A I don't think it would have any effect on the validity. I don't think it would add value. You know, if anything it could actually further compound the basis for that evaluation which is flawed to begin with.
Q Okay. You gave an example in your Supplemental Testimony and I believe it was at Bald Mountain where the person's rating, it looked only at a single photograph that was well off the trail. Why was that a problem?
A Well, again, it does not provide a representative view of the resource. It really actually misrepresents the total experience of the resource. It does not provide the raters with an understanding that that is perhaps the

only view that they're going to have directly of the project which is, again, from an area that is not readily accessible or immediately clear that there is a view to that resource. So it suffers from that lack of breadth and understanding of really what that resource is all about, and it's not about that one single view that you have to know where it is to actually find it and see it.

Q So you have to be there to know what those limitations or weaknesses might be in the picture?

A Absolutely.

Q At Meadow Marsh I think you mentioned that there was a photograph which appeared to show the location as remote that was actually on a maintained road.

A Correct.

Q What was that road?

A I can't remember the exact name of the road, but it is a road that leads past that location and, you know, the context that the visual simulation provides is only part of the picture that's present there, and even though visual simulation

is a valuable tool for understanding visual change, it's only one of many tools that we rely on, and the presence of a reviewer at that site would also then understand, from that presence the viewer would understand, the evaluator understand, that there are other elements in that context which speak to either the sensitivity of the view or the nature of that view that informs the evaluation of the visual effect.

Q And I'm sorry. What I was trying to get at because as I read your Supplemental Testimony I couldn't figure out what the nature of the road was. Was it likely a town road? Was it paved? I mean, could you --

A It wasn't paved. You know, it's just a, it's a developed road. It's not a trail, and there are other elements of development in the vicinity, and so, again, the visual simulation does not accurately portray that context.

Q I'd like to show you and I believe you have in front of you the May 23rd testimony from the town Board of Selectmen which I believe it's Antrim Exhibit 2 on page 4.

A Yes, I have that right here.
Q So down at the bottom or I think before you get to page 4, you'll see a question is asked, and it might start on 3, why does the Antrim Board of Selectmen support the Antrim Wind Project, and then when you, so that's the question being asked, and then you get to the answer. At the bottom of page 4 there's a bullet where it says promotion of conservation.
A Yes. I see that.
Q Could you read that bullet or that paragraph for me, and then I'd like to ask you about it.
A Sure. Upon approval by the SEC, the Antrim Wind project will help conserve 908 acres of continuous land through conservation easements while providing an additional hundred thousand dollars for conservation land acquisition by the New England Forestry Foundation within the project area. While these parcels of lands are currently undeveloped, they're not presently protected by a conservation easement and as such are exposed to potential future development. In the absence of conservation easement protection such as Antrim Wind and property owners have

proposed, these land areas may face future development pressure. We believe that the conservation easements that Antrim Wind has proposed will have lasting economic and social benefits because they will promote tourism, recreation and responsible forestry.

Q I gather from your Supplemental Testimony that you would agree with that statement; is that right?

A Yes.

Q And you would agree that that's an appropriate consideration to look at when you're performing a Visual Impact Assessment?

A Certainly it is one of the things you would look at. It's a mitigation measure.

Q So I want to ask you about the opposite. What would happen if you performed a Visual Impact Assessment and you didn't consider whether resources were protected, like you were protecting an area like Willard Pond but it had no conservation protections? Is that, would there be problems in kind of ignoring these types of benefits?

A Oh, I think it is important to include and

understand these types of benefits in your evaluation. They certainly inform the overall benefits of the project and what it would bring to the town.

Q And it's important to consider what, I assume, what might happen to the land if it were not protected because if it could be developed, then that would be something that could harm aesthetics.

A Certainly a different type of development would propose different types of impacts but impacts nonetheless.

Q Okay. So in the Town's Supplemental Testimony which is Antrim Exhibit 3 dated August 18th, 2006, page 10, could you turn to that, please? And you see where it's in the Selectmen's testimony and it states what would happen to these lands if the project were not approved?

A Yes.

Q Could you read the answer to me, please?

A Sure. We do not know for certain. However, the 908 acres of proposed conservation land is located within the town's rural conservation district, RCD, which allows construction of

roads, single family residences, public and private schools, kennels and other uses. Other uses may be permitted if a variance is issued by the Zoning Board of Adjustment. The minimum lot size in the RCD is 130 square feet, 2.9 acres. The minimum road frontage is 300 feet. This means that an owner or developer could propose a subdivision with 2.9-acre lots or larger lots by building a road to meet town standards under its subdivision regulations.

Q Okay. Now, I don't want you to speculate about whether this would or wouldn't occur, but is it possible in your opinion or perhaps likely, I don't know, that 50 or 100 lots if they were to be developed in an area like this, is that something that could affect the aesthetic resources that Antrim Wind is seeking to protect through its conservation easement?

A There is no question of that, and, in fact, in many areas around New England, Vermont, New Hampshire and Maine, towns have actually implemented regulatory processes which address potential impacts from residential development on hillsides and ridgetops.

Q I think this is a point that's not mentioned anywhere in your testimony, but I think it's a fair question. The Antrim Wind project is expected to have a life of about 50 years, and then it will be decommissioned. So I assume the answer I would say is what would the effect on visibility and aesthetics be once the project is decommissioned?
A For the most part and based on the decommissioning plan elements that I'm aware of, it will for all intents and purposes and certainly from the viewpoints and the perspective we've been evaluating the project, you know, all evidence of the project would be removed from those views.
Q So 50 years from now, then those 908 acres would be permanently protected and any visibility impacts will effectively be going away?
A Yes.
Q And are you aware in your experience of any regulatory agency, like the Site Evaluation Committee, developing a rule or a practice or a recommendation disregarding permanent conservation measures as a mitigation approach?

A No, I am not.
Q I assume there are many others that use it?
A Yes. There are.
Q Thank you.
PRESIDING OFFICER SCOTT: Is Mr. Enman here? How about Mr. Giffin or Mr. Pratt? Giffin. How about the Harris Center for Conservation Education?
MR. NEWSOM: No questions.
PRESIDING OFFICER SCOTT: Thank you. Now I think we're on to Ms. Berwick. Do you have any?

CROSS-EXAMINATION

BY MS. BERWICK:
Q Mr. Raphael, first, Mr. Richardson just asked you some questions about Meadow Marsh. Is it not true that Meadow Marsh is at the end of Reed Carr Road?
A I'm sorry?
Q Is it not true that Meadow Marsh is at the end of Reed Carr Road where Reed Carr turns into Pound Round and Craig Road goes off to the right?
A Forgive me. I'm not specifically familiar with the exact location of the road names so I would

certainly take your word for that.
Q You stated that it was on a paved road. Isn't it true that all of the roads at that point are dirt roads?
A I did not state that it was a paved road. I did not, I specifically said it was not paved actually.
Q Okay. I misunderstood. Have you ever driven on Craig Road which is one of the roads right there that intersects?
A I have driven, you know, again, I've driven many of the roads in that area. I don't necessarily know if it was Craig Road. I know I've been on Reed Carr Road. I've been on the road that goes around Gregg Lake to that point.
Q From Gregg Lake to Meadow Marsh?
A I believe so. Yes.
Q That is Craig Road. Would it surprise you that I once backed up almost the entire length of Craig Road when we first moved to Antrim because after driving forward all that distance going through numerous mud puddles I was afraid that I was going to get stuck so bad and have no way of getting out.

A I would have to take your word for that.
Q I'm asking if the condition of that road, if I said that, would it surprise you related to the condition of that road?
A You know, I really don't want to speculate on that, frankly, without knowing the specifics of the road itself.
Q All right. In the 2011 flicker study report and I realize you did not do the flicker study, Attachment Abutter 5, Figure 4.2, Page 7, and I don't think you need to go there, but if you need, want to, it basically says that our house, number 58, will have no visibility of the project. I understand that you did not do the flicker study, but Mr. O'Neal does not know where this assessment came from. He stated that he did not do this flicker study. Did this information come from anything that you supplied for the flicker study report of 2011?
A Not that I'm aware of, no.
Q Nobody knows where it came from. Okay. Could you explain this last statement in your summary on attachment 2. Attachment 2 in the Application. It's the end of the last

paragraph.

MR. NEEDLEMAN: Which document is that?

Q It's from your Applicant's Application. Attachment 2 is what it's stated as. It's called the Cumulative Impacts Visual Assessment.

MR. NEEDLEMAN: So this is the February 19th Supplement, I think.

MS. BERWICK: I don't know the date. I'm sorry.

A Could you refer me to the actual reference?

Q I can read you what you wrote and probably you don't need to look at it, but if you do you can tell me that later.

MR. NEEDLEMAN: I think just to be clear, I think you're referring to the Supplement that Mr. Raphael filed in order to comply with the new SEC rules.

Q All I know is it's called Attachment 2 in your Application. It's page 2 that I'm talking about. The very, very end.

A I'd like to look at a copy. Yes, please.

PRESIDING OFFICER SCOTT: Why don't we go off the record while we find what you're talking about, Ms. Berwick.

(Off-the-record discussion)

PRESIDING OFFICER SCOTT: Back on the record.

Q At the very end, on page 2, you write, even from the few high points that might have views of both projects -- and may I just put in here you're talking about the Lempster wind turbines and the Antrim Wind project -- neither project will be seen in the same view and arc, and the distance of the resources from either project will diminish any combined impact. Therefore, we conclude that there will be no material cumulative impacts in the project viewshed affecting aesthetics or scenic beauty.

My question is, are you saying that there is no way that you could have found this project to have, quote, material cumulative impacts unless a person could view all nine of these turbines plus Lempster's towers?

A No. That's not what I'm saying.

Q What is that statement saying?

A It's basically a conclusion that reflects our understanding of the region, our analysis of the project area, our specific review of cumulative

impact in the context of the only other potentially visible wind energy project within that area.

Q But it states, even from the few high points that might have views of both impacts, neither project will be seen in the same viewing arc, and the distance of the resources from either project will diminish any combined impact. Therefore, we conclude that there is no material cumulative impacts in the project viewshed.

It seems to be saying that you need to be able to see both Lempster and Antrim Wind turbines for it to be a cumulative impact.

A Well, the cumulative impact criterion here is based, from where I am asked to review it, is based on visibility, and so what I am referring to is the fact that at the few locations where you are able potentially to see both projects, you would have to turn into a different direction to see them unless you were to the west or northwest of Lempster and that would be quite some distance, and I am not sure because I didn't evaluate it from that perspective whether there would be any effect at all cumulatively,

but in terms of the project area that we are charged to analyze, I'm very confident with this statement and its conclusions and stand by them.

Q Okay. If there were a turbine situated on the lawn of the James A. Tuttle Library in the center of town, according to your rating system, would that receive a high impact rating?

A I can't speculate on that. That's a hypothetical that is highly unlikely to ever occur in the context of a grid scale energy project so I really can't answer that question based on that.

Q In this statement from your Prefiled Testimony, Line 17 through 21, and that is App. 9 on your thing that Mike gave us.

MR. IACOPINO: Master Exhibit List.

Q Thank you. Master Exhibit List.

MR. NEEDLEMAN: Which page of the testimony?

Q It's Line 17 through 21 so that's probably on the PDF one that I'm looking on the computer.

MR. NEEDLEMAN: No, I understand. I'm wondering which page of testimony.

Q Line 17 would probably be on page 1, wouldn't it

be?

MR. NEEDLEMAN: No. Each page renumbers.

MR. IACOPINO: Each page has 24 lines. 1 through 24.

Q I think it's the first page. I'm pretty sure it's the first page. I'll start reading and you guys can tell me if I'm in the right place.

The change in number of turbines has obviously dropped.

Is that page 1? Okay. Hold on. It's line 17. The question is what page is it.

PRESIDING OFFICER SCOTT: Supplemental or the Prefiled?

Q I have it being the Prefiled.

PRESIDING OFFICER SCOTT: Thank you.

Q Just when I thought it I had it all ready.

PRESIDING OFFICER SCOTT: So I see that is page labeled 20, and if you're looking at the PDF it's page 21, I think.

Q Thank you. All right. The change in the number of turbines has obviously dropped by one with the elimination of turbine 10 and up to two from most locations on the pond. This is talking about Willard Pond. Since the reduction in the

height of turbine 9 results in the entire tower and hub now being screened from view by the tree line practically eliminating its visual presence.

PRESIDING OFFICER SCOTT: I'll interject. I gave, where you read is a page beyond what I just gave you for numbers, but I have the language. Thank you.

Q Okay. Thank you. Are you saying that seeing a wind turbine blade rising 56 meters, 183 feet, out of the trees would not have a visual impact?

A That's not, I don't think, what I'm saying, but again, okay. Forgive me just for a minute.

Q No, that's okay.

A You know, I think a keyword or phrase before that is "when viewed from some locations" so definitely if you have eliminated the view of the hub which is a more prominent visual form or feature in the turbine structure, the visibility, again, depending on your vantage point is definitely diminished because then you're only looking at the blade which again, depending on your orientation can be either full frontal or it can be a side view in which the

blade visibility is diminished substantially so it really depends on where you're viewing it from, but as a general statement it is definitely a change that has reduced the visible presence of the turbine 9 from certain locations.

Q Have you ever driven up Route 31 into the town of Washington from Route 9?

A Town of?

Q Washington?

A I believe so. Yes.

Q I ask because there are no turbine hubs visible, but as you approach the town there's a huge blade of a turbine that goes over the top of the town center as you approach the town. It actually, I find it, actually rather startling when driving up the road. Would you not agree that this would be a huge visual impact?

A I can't agree with that. No. Again, that's your experience and certainly that's a valid experience for you. I have to use, again, a certain protocol and the tools that I've presented in our methodology to ascertain what the visual effect is, and again, you know, the

view of a turbine really depends on your predilection towards that form of energy and its role and purpose in the landscape and in our energy generation so that can vary from person to person.

Q Have you ever been hired or found a significant visual impact, have you ever been hired and found a significant visual impact to be significant enough to falter or stop a project for which you've been hired?

A Yes.

Q Did you visit -- how many times has that happened?

A Several times, actually.

Q I seem to remember asking this question during the technical session and being told no, but that you had turned down jobs.

A Well, that would certainly be included. I was asked to review a project, if I would support a wind installation in a certain location, reviewed the project and found that I could not support the conclusion or the proposal that the individuals were hiring me to support or not to support but to find positively in terms of

aesthetics.

PRESIDING OFFICER SCOTT: Mr. Raphael, why don't you get closer to the microphone.

A I'm sorry. The first project I was ever involved with which was the first grid scale energy project in New England at Searsburg, I worked for the State of Vermont and found that if the project design was not altered, the potential was possible that there would be an undue adverse impact from the project. So those are two instances. At least.

Q Did you visit the area before accepting this job?

A I have grown up in New England. I know the area very well. I did not visit the area specifically with regard to this job, but I was fairly familiar with the area.

Q Okay. That's all my questions. Thank you.

PRESIDING OFFICER SCOTT: Thank you. Mr. Block?

MR. BLOCK: Perhaps we could go off the record for a couple of minutes. I have a few exhibits I'd like to distribute. May we do that first before we start?

PRESIDING OFFICER SCOTT: Let's do that.

(Off-the-record discussion)

PRESIDING OFFICER SCOTT: Back on the record.

CROSS-EXAMINATION

BY MR. BLOCK:

Q Good afternoon, Mr. Raphael.

A Good afternoon.

Q Do you have a copy of your full Visual Assessment dated September 3rd, 2015?

A I do.

Q Good. I will probably refer to that. Do you know what was the overall height of the Acciona turbines in the original Antrim Wind proposal which was denied by the SEC?

A I believe it was, well, according to your documents, you're saying 492 feet.

Q That's my recollection. Yes. What would be the height of the Siemens turbines, particularly numbers 1 through 8 in the current proposal?

A Those are 488.3 to the top of the blade.

Q So the difference between the two is what?

A It is about four feet or so.

Q I measured it at about 38 inches.

A Okay.
Q Does that sound logical that that's less than two thirds of one percent difference?
A I will take your word for that.
Q Okay. For your Visual Assessment, I believe you created four different viewshed maps. You have Exhibit 1, the topography only from the tip; Exhibit 2, topography only from the hub; Exhibit 3 was topography and vegetation from the tip; Exhibit 4 was topography and vegetation from the hub. In your opinion, would it be logical and fair for me to use only Exhibit 1 to determine the visibility of the project and therefore the aesthetic impact of the project on the region? Exhibit 1 would be the topography only from the tip.

MR. IACOPINO: Which testimony are you taking this from?

Q This is in his Visual Assessment. These are actually the viewshed maps. So it's the Exhibits 1 through 4 in the back of his, of the other Visual Assessment.

MR. IACOPINO: That's Appendix 9 A to the application?

MR. BLOCK: I guess it is.
MR. IACOPINO: September 3, 2015?
MR. BLOCK: September 3rd, 2015. Correct.
MR. IACOPINO: Thank you.
BY MR. BLOCK:
Q So the question would be, in your opinion would it be logical and fair if I were to use only that first map, Exhibit 1, to determine the visibility of the project, and, therefore, the aesthetic impact of the project on the region?
A Not necessarily, no. We use all four of the maps to inform our understanding --
Q Well, would it be logical if I were to use --
A We use all, we use all formats to help inform our understanding of visibility, but that's only one way in which we review visibility certainly.
Q If I were to use only Exhibit 2, do you think that would be fair and logical?
A I've already stated that I think using all four is probably appropriate.
Q Okay. In your opinion, then, I was going to ask the same question about Exhibit 3 and Exhibit 4 as they stand by themselves, but in your opinion is one of these four maps, does one of these

four maps most realistically display the overall visibility of the turbines?
A Well, certainly the topography-only tends be a more reliability source of actual visibility, but even with that, we understand that there is some margin of error when you're using GIS data to produce these maps. So they are always worded as, you know, potential visibility when we refer to them, and as such are relied on as a point of departure for an assessing visibility.
Q Okay. You seem to have used to achieve your final conclusions your map number 4, topography and vegetation from the hub, and I believe it's in this Visual Assessment on page 10 you describe that as, quote, the most reasonable approach to potential visibility. Does that sound correct?
A That sounds correct if you've quoted it from my report. Absolutely.
Q Okay. Also on that page 10 of this Visual Assessment, you state, quote, it is agreed by most experts that viewsheds generated from the hub provide a more realistic representation of potential visibility since the view of a hub and

rotor has a greater effect than turbine blades because turbine blades that rise above tree line are not typically visible or dominant, and the difference in overall percent of visibility between hub and tip of blade is usually insignificant, unquote.

A That's from my report?

Q Yes.

A Yes.

Q Can you identify any of these experts you referred to?

A There's precedent, and I could, if you, if I had some time I could pull it up. For example, before the Public Service Board in Vermont on several projects I have been involved with, I think there is reference to the fact that most of us in presentations and testimony before that Board has relied on the visibility of the hub as being a reliable test of visibility, but, again, you have to acknowledge that this is only potential visibility and does not represent how we actually evaluate the visual effect or the true visibility from any one location.

Q So are you able to at this point to identify any

of the publications where these experts have published their agreement about hub views having the greater effect?

A I can't identify them off the top of my head, no.

Q Can you explain to us why the view of a static hub has more visual dominance and attracts more attention than the view of spinning 180 foot blades?

A I have never said that. That's not implicit in the references you stated. So, again, it really, as I say all along, it really depends on where the view is from, the distance to that moving set of blades, how many of those, how much of the blades are visible. So there are a lot of variables that are really looked at on site on the ground to fully assess the visual quality and effect from that type of structure and/or movement associated with it.

Q Okay. There were four Visual Assessments done for the Antrim Wind Project proposals. Saratoga Associates did one, Jean Vissering did one, Terraink, Incorporated, did one and LandWorks. Can you explain why the LandWorks viewshed

analysis seems to be the only one that uses hub height instead of turbine height?

A Uses hub rights for what?

Q To determine turbine visibility.

A No. We didn't use hub heights only to determine visibility. We have four visibility maps to determine visibility. So we state and in terms of understanding overall visibility, we find that the hub height and hub visibility is an important consideration because of the scale of the hub itself, and the fact that I think most people agree its mass and presence as you look at visual simulations tends to draw the eye more specifically, and so that seems to be and it's agreed upon and has been, again, established in precedent and we could find them for you. I can't find publications, but I'm sure I can find you precedent before the Public Service Board where that has been accepted and acknowledged as a reliable point of departure but remember, this is a point of departure. It's only potential visibility and it guides our process, but it's not the means by which or the only criterion by which we evaluate visual effect.

Q Would there be any difference in the overall visibility of a turbine installation which consists of turbines that are 489 feet tall as opposed to an installation of turbines that are only 300 feet tall?
A Could you repeat the numbers again? I'm sorry.
Q Sure. Would there be any difference in a 489-foot turbine installation as opposed to a 300-foot high turbine installation?
A Well, certainly from certain vantage points, you would note the difference.
Q The difference between 489 feet and 300 feet is the difference between the blade tips and the hub height on AWE's project. So on page 10 of your Visual Assessment you state, quote, and I quoted this earlier, the difference in overall percent of visibility between hub and tip of blade is usually insignificant, unquote.

How can you characterize that 189 foot difference as insignificant?
A Well, first of all, I think you're talking about two different things, if I'm not mistaken, but, again, you know, over distance, for example, you might not detect a dramatic difference in

turbine height. You'd be more, I think, focused on seeing the turbines, perhaps the number of turbines that you see. Certainly as you are closer in, if you had the opportunity to compare two of them side-by-side you might note the difference, but that's not usually the case in real world where you have two dramatically different sized turbines in an array, you know, continuously alternating or the like so that really doesn't happen per se. Obviously, in this particular instance, one turbine was reduced to address a particular visual effect and to provide a mitigation of that visual effect.

Q A 300-foot turbine would only be 60 percent of the height of a 489 foot turbine. Since the hub height of the Siemens turbines is about 300 feet and every time you mention it you seem to be considering the turbines as if they were only visible to hub height. Doesn't your viewshed analysis essentially reduce the effective height by Antrim Wind's turbines by 40 feet therefore treating them as if they were only 60 percent as tall?

A No, it does not.
Q Why does it not?
A Because we don't just base our analysis on the hub. Certainly when we look at the project and its visibility from around the region and we rely on both visual simulations and field work, we're really looking at the whole structure, the whole project and not making the differentiation between hub height and blade height or blade tip height, but having said that, there's certainly, I think most people would agree, there's a different form at work between a blade and a hub, and that difference is part of what we know in our evaluation.
Q I will actually come back to that later.
A Okay.
Q Right now I'd like to call your attention to an Exhibit I entered earlier but I just rehanded it out now, Exhibit NA-10. Just for convenience, it's the one with the data map color coding. It's got the two color maps on it.
A Yes.
Q On the left is a map which I took from Wikipedia which represents patterns of population density

in New Hampshire. Can you see how the numerical data has been color-coded to illustrate a logical progression and that the variation in population density is readily apparent as the density moves from sparse to dense?

A Yes, I can see that.

Q Does a reader of this map need to refer back to the key in order to discern overall patterns of population density as they apply across the state?

A Based on the color coding you see here, no.

Q The map on the right is the exact same map but with the color coding changed. So that, what I did is I applied instead the coding utilized in your LandWorks viewshed maps in the same order as you provided them on those maps. Can you see how the color patterns now do not follow any logical progression?

A In terms of the density map, you're correct.

Q Okay. So there isn't any overall patterns readily discernible just by looking at the colors on the map?

A Not with regard to population density, but our, the visibility map is different, and it's not

about density.
Q I understand that, but in a way it is, because you're talking about rather than numbers of people living in a certain area, you're talking about numbers of turbines visible from a certain area.
A But it's not apples to apples, with all due respect, and, in fact, the reason, so you know, the reason for the differentiation in color is partly for me because I'm color blind, and we found that because we're looking at very large scale maps with a very fine pattern of turbine numbers that it was really hard sometimes to distinguish if we use the gradual shading that you propose in the density map which is, again, a different source of information that you're trying to present, that works, but if you're really trying to understand how many turbines are visible and in any one location, if you get to a gradated color, it's very hard to distinguish between 8 versus 9 turbines or 7 versus 8 turbines. So we actually developed the different color patterns to make those numbers more readibly visible so you could really use

the map. It wasn't about displaying population density. It was about having an understanding of how many turbines might be visible from a particular surface, and that color differentiation, and I'm sure you would understand this as a graphic designer, really helps someone with visual acuity issues read that map better.

Q If I wanted to look at and I have to do this on your map to determine in a particular area whether there's a high density of turbines visible or low density, I have to refer in every instance back to the key; is that correct?

A I mean, I suppose you could look at color code, if you're concerned about the highest densities, or numbers which is different than density, highest number visible, then you might say okay, you know, the red and the yellow and maybe the green represent 7, 8 and 9, and so maybe if your memory is good, you might not have to go back to the key, but, again, if you have to go back to the key in order to understand the map, you know, I apologize for that inconvenience, but it's done with a distinct purpose to make the

map more readable and understandable to those of us who don't see color very well, in part, and also to just make that distinction because as I said, it's very hard, we've done this before, and that's why we went to this scheme. People were having trouble understanding where you went from 7 to 8 or 8 to 9, and so we decided to make very distinct color differences to assist that process.

Q I think, and this is what I want to ask you about. What I have more of a problem with is not so much the color. In this case, I would use the term hue. In other words, where on the spectrum it is, but rather the value. How light or dark it is. On the map on the left you can see a change in the value as you go down the color scale. You go up from the green to the yellow gets lighter and it gets darker again and some people have red/green problems so they might have a hard time differentiating that. But on your color key and the map on the right, the colors and value jump up or down. For instance, the 1 to 10, that light green, the 25 to 50, 100 to 250, the 1000 to 2500, those are

all very similar value. If you removed the hue from there, it would be almost impossible to tell the difference whether you're talking about a low level or a high level.

That is a problem I had on your map. I have a hard time seeing in one area are we looking at the view of two turbines here or the view of 8 turbines, and sometimes you even had to fold the map over and hold the map close to the key. Is there, bottom line, I feel and I would like to ask, was there any, seems to me there is an attempt on your map to be purposely deceptive and remove from there, obscure any possibility of determining a pattern or patterns across the landscape, that as we go to this area we are now seeing more or seeing less as opposed to just random placement of color which it comes out to be.

A That never ever crossed our mind or my mind. That was never the intention. All we're trying to do is provide data and show where number of turbines are visible. There was no attempt to deceive or weight or do anything. This is just a factual map that we are not using in any way

to skew an understanding of the project.
Q All right. Let me go to a new Exhibit I just submitted which is Exhibit NA-15. It says on the top and this is actually part of the State of New Hampshire Site Evaluation Committee Docket number 2012-01, Order on Pending Motions. This was issued on September 10th, 2013. If you would do me a favor. Could you read all the text that I've highlighted in red on this document? Can you determine what's red and what's not on there? Just on the front. The one page.
A Yes. I think I can.
PRESIDING OFFICER SCOTT: You'll have a question out of this, correct, Mr. Block?
Q Yes, I do. Several.
A The Subcommittee considered the height of the turbines as proposed by the Applicant together with the surroundings and found that the project will have an unreasonable adverse effect on the aesthetics of the region. The Subcommittee specifically explained that the project will have an unreasonable adverse effect on the aesthetics of the overall community in the area

referred to as Willard Pond and the dePierrefue Wildlife Sanctuary. The Subcommittee also found that the Application lacked satisfactory mitigation for the aesthetics impact of the facility. The Subcommittee further considered the fact that the turbines as proposed would be approximately 492 feet tall when measured at the tip of the blade and would make up between approximately 25 and 35 percent of the elevation of the ridgeline where they would be located. The subcommittee concluded that the size of the proposed turbines would appear out of scale and out of context with the local topography.

Q Thank you. Can you continue with the short paragraph at the end also?

A Sure. In considering the aesthetic impact of the project on the area, the Subcommittee concluded that the offered mitigation plan was not of a sufficient nature or quality to adequately offset the unreasonable adverse impacts of the project on the aesthetics and viewsheds in the region. The Applicant failed to satisfy its burden to prove that the project along with the mitigation plan would not impose

an unreasonable adverse impact on the aesthetics of the region.

Q Before today, were you familiar with this document and the Committee's decision?

A I was familiar with the Committee's decision. Yes.

Q Do you believe that this decision was based on the impact of any one of the ten turbines in this project in particular?

MR. NEEDLEMAN: I'm going to object at this point. I think, first of all, it speaks for itself. Second of all, we're talking about a decision in a prior docket. Mr. Raphael is here to talk about the current proposal.

PRESIDING OFFICER SCOTT: Do you want to answer?

A I was going to just say I can't speculate on this. I was not part of that docket so I can't answer that question.

Q Well, actually, what I'm talking about is your current Visual Impact Assessment which I believe, I don't have a page, states that a number of changes were made to this project based on this decision in order to mitigate and

change the impact, and that's what I'm basing my questions on. So I'm basing that on this.

A Okay.

Q So I'd like to know, do you believe that this decision was based on the impact of any one of ten turbines in this project in particular.

A Again, I can't speculate on the decision.

Q Okay. Can you explain how the removal of one turbine and the 40-foot reduction of another can completely change the overall aesthetics of the project enough to mitigates its unreasonable adverse impact?

A First of all, I don't look at that one item as part of the overall conclusion. What goes into an overall conclusion by virtue of the rules that are now before us and we much observe are there are 7 key points that we have to address and satisfy. This consideration is only one of those. So, again, I can't respond to the specifics of that question except to say at the beginning of that question I do, I do believe that the reduction of turbines, one turbine and the removal of another, had a substantial difference on the visual effect on Willard Pond

without question. Without question.
Q Okay. I can call your attention now to again, this was earlier, the Exhibit NA-13, which has a comparison of the turbines, one side, it's the turbines 1 through 8 compared to the original Accionas and the other side is the reduction of turbine 9, and just as a reference to look at that, given the inaccuracies that you have already admitted to in your viewshed maps, can the shortening of 8 turbines by only 38 inches as you can see in the front here to scale, it's pretty small or close to 500 feet, do you think that that can have any measurable effect on the overall visibility?
MR. NEEDLEMAN: Object to the form of the question.
PRESIDING OFFICER SCOTT: Understood. You can answer.
A First of all, I admitted to no inaccuracies. There are no inaccuracies in our viewshed map. There's a color call or a color differentiation that we relied on and which I explained to you why we relied on it. There are no inaccuracies in the viewshed map more so than what the data

and the software provide for. As I mentioned, there is a margin of error sometimes in topography that we have to account for. But the second part of the question is what? Because I was pretty startled by the first part.

Q Well, I would call your attention to the bottom of page 8 in your Visual Assessment. The last paragraph has referring to the viewshed mapping. The last paragraph, they show that -- actually, I'll jump ahead. The last sentence. Due to the coarseness and uncertainty of the quality of the data viewsheds cannot be relied upon to represent what will actually be seen on the ground from a specific location.

So perhaps my term inaccuracy wasn't good but you're admitting here to a coarseness and an approximation. Does that sound correct?

A I've said again, I'll repeat it. The viewshed map is a point of departure. We use the viewshed map to assess whether certain resources have visibility or not. Even ones that don't have visibility on the viewshed map that emerge as potentially sensitive resources and may be in the project area, we also visit or review. So,

again, just so you're more familiar with our methodology, and this is I think standard practice, the viewshed maps provide a point of departure. They're not relied on to test or to ascertain the visibility from any one location. They provide us a point of departure so that we then can go out and review all the potential resources that might have visibility and then go through the next steps of the methodology to really assess visual effect and visual change on those resources.

Q Saratoga Associates did viewshed maps before you did; is that correct?

A I believe so. Yes.

Q I believe you claimed in your assessment that your viewshed maps now for the current project show a significant change, a significant reduction in the overall visibility of the turbines; is that correct?

A Compared to what?

Q Compared to the Saratoga Associates viewshed maps on the original project?

A Well, certainly when you remove a turbine and lower another one, there will be a reduction in

visibility for the project, inherently, yes.
Q In my view, the biggest change you've made here over a large area is the shortening of 8 turbines by only 38 inches, and I'm asking you, do you think that can have any measurable effect on the overall visibility? A thirty-eight inch difference?
A You know, it's probably only visible again, if you were comparing side-by-side examples in an approximate location. Certainly over distance, as I said before, that 38 inches is not going to be discernible, but, again, you don't see the differences in front of you between one and the other so it's kind of hard to really assess that.

However, I think common sense would tell you that over a long period of viewing or long distance of viewing, that would not be as discernible as it might make a difference close up. The other things that make a difference might be the width of the turbine tower, the actual design of the blades, width length, thickness and the nacelle itself, the hub and its form and size and scale and mass.

Q I believe you're turning my question around because the question was not in terms of visibility of the project from specific locations. The question was the slight shortening of these turbines. Do you think that can have that great an effect on the viewshed map and what you've indicated on the viewshed map is visible, I believe you claim a 12 percent reduction in overall visibility area on the map from the Saratoga.

A Yeah, but, again, that incorporates the fact that we've removed a turbine and shortened another one more than 38 inches. So yes. There is a reduction in visibility. I think that's logical that if you take one turbine at the end of a string of turbines off and away, I think it's fair to say that you're going to eliminate visibility from certain locations that might have had it before or eliminate the total visibility of the project.

Q Doesn't it change in the methodology from considering turbines as being as high as their blade tips to considering only the hub height, essentially the same as treating those turbines

as if they were 190 percent or 40 percent shorter and wouldn't that account for much of the difference in the viewshed maps?

A No. It does not. It doesn't change the methodology because the methodology doesn't assess hub heights. Our methodology through the steps that we take looks at the entire project, looks at the entire structure. The question, I think you're integrating one question with another. We can discuss at length what the value or issue is with doing a viewshed analysis from hub height versus blade tip height, but that's only one first step. It's not an evaluation step. It is a way to ascertain overall generalizes ability that provides a point of departure than for our assessment of resources that might fall within the potentially visible areas that the project might create.

Q I'd like to call your attention again to what you call the title of your Exhibit 4, Topography and Vegetation from the Hub, and that you stated that that particular view, that particular map is the one that you thought was the most reasonable approach to potential visibility.

Isn't that correct?

A I think of all the visibility viewshed maps you use, you know, because, for example, we, I think most people who do any mapping are familiar with GIS recognize that you can't rely on the land cover data, you can't necessarily rely on tree height data, and so that's one reason there are four different viewshed maps because we're looking at any variations that might occur between topography only, hub height, with vegetation, without vegetation.

So my earlier statement spoke to the fact that when you eliminate trees and land cover from the analysis, you have a slightly more reliable data set on which to base visibility because you're using topography which is reasonably immutable, reasonably reliable. Once you plug in tree heights that's much less reliable, and as you know, it can change from, you know, one acre to the next in terms of whether it's been recently cut or it's mature, that type of thing.

Q Once again, I'll come back to this point. But right now I'd like to call your attention to my

Exhibit NA-16 which I just submitted. It's on the stapled pack up there. It's the second page of that behind the -- there's a few pages that are stapled together.

A Oh, okay, I'm sorry. Got it.

Q You just read from the second page on that. It's just a quote from the rules cite 301.05, Effect on Aesthetics. Just in the first paragraph, which is (8)(a), would you read, please, the highlighted text in that first paragraph?

A Photographs used in the simulation shall be taken under clear weather conditions at a time of day that provides optimal clarity and contrast and shall avoid if feasible showing any utility poles, fences, walls, trees, shrubs, foliage and other foreground objects and obstructions.

Q If you could go to your Visual Assessment and look on pages 105 to 107 up there. There's a series of photographs. Looking across Butterfield Pond towards Lempster project, Lempster Wind from Butterfield Pond. There's just about six photographs on those pages. Do

you see those?
A Yes. I do.
Q Did you or someone from LandWorks take these photos?
A I believe that I took four out of the six of them, and another staff member took the other two.
Q Would you say these were taken under clear weather conditions?
A Yes.
Q Okay. Page 128 to 130. Same document. There's about five photos of around Willard Pond. Same question. Did you or someone from LandWorks take these photos?
A Yes.
Q Were they taken under what you would call clear weather conditions?
A I mean, you know, again, all of these photographs are not perfectly blue sky. They have some background, dare I say, haze, that is in the background or cloud cover. So they are clear. They provide clear views of the subject, but they do have atmospheric conditions shown in them certainly.

Q Okay. Your Visual Assessment contains a number of photographic simulations. So now I'd like to refer to the revised simulations submitted on February 23rd, 2016. These are the ones that were submitted as Attachments 4 and 5. Exhibits 6 through 13. These are the ones that you submitted after the rule change. You know which ones I'm referring to?
A I do believe so. I'm just trying to think if I have them right here.
Q Essentially your photographic simulations. Exhibit 6, 7, 8, 9, 10, 11, 12, 13.
A Yes, I've got my --
Q Then 24, 25, 26.
A Yes. I've got them.
Q Can you identify which if any of these photographs were taken on, quote, under clear weather conditions, unquote?
A Well, again, they're all taken under clear weather conditions in which the project and the project site is clearly visible.
Q I didn't say whether or not the site was visible. I asked under clear weather conditions.

A Yes. The answer is yes.
Q You say yes. My examination of these photographs shows that every one was taken on either a very cloudy or very hazy day, and I'd like to ask you, is there a reason why LandWorks didn't use photographs as clear as the ones on page 128 and 130 for the base photographs in your visual simulations?
A These photographs were taken on various days that we went out during summer and different seasonal periods. You know, finding a perfectly blue cloudless day in New England is, I think we all know, is not a regular occurrence. There's usually, even on a clear blue day, there is as those photographs you pointed out, there are clouds, there are haze. I mean, look at the picture on 130 that you yourself called attention to. There's a low bank of clouds beyond the view of the lake, and, in fact, that's roughly where the project would be located, and that's a clear day with a clear view, but you're confusing -- I think I see clear, a clear day as a day in which you can clearly see the project. It doesn't, the rules

do not say cloudless. The rule says clear view. And these are all clear views.

Q No, the rule says clearly weather conditions.

A Clear weather conditions.

Q All right. Page 11 of your Visual Assessment, down at the bottom it says the visual simulations depict a range of weather and light conditions that are typical of the area, unquote, which I believe you just basically stated there. Do you consider, quote, a range of weather and light conditions, unquote, to be the same thing the SEC intended in Site 302.05 Paragraph (8)(a) when it stipulates, quote, under clear weather condition as a time of day that provides optimal clarity and contrast?

A Yes. I believe we conformed with those regulations, with those rules.

Q Okay. I'd like to draw your attention to the back of your Visual Assessment. Exhibit 21 in here which is close to the very end, and I'm looking at Exhibit 21, visual ratio comparison. Sheet 1 of 2.

MR. IACOPINO: When you say Exhibit 21, what are you referring to?

Q Exhibit 21 from the Visual Assessment. Towards the very back and it's a visual comparison of the simulation on Willard Pond and a photograph taken, it says taken by LandWorks on May Pond, and right now I'm looking here only at the weather conditions displayed in those two photographs.

A For some reason I'm not locating it right on my record.

PRESIDING OFFICER SCOTT: I believe on the PDF it's page 180.

Q The top of the page says Exhibit 21, Visual Ratio Comparison, sheet 1 of 2.

A For some reason I skipped. I don't know. It's in here somewhere, but it's out of order.

PRESIDING OFFICER SCOTT: We'll go off the record while he finds it.

(Off-the-record discussion)

PRESIDING OFFICER SCOTT: Back on the record.

Q Again, here I'm looking only at the weather conditions displayed in those two photographs. Can you explain why the turbines in the Antrim simulation on the top half are so low contrast

and faded out into the cloudy overcast sky in the background as to be barely visible while the Lempster turbines on the bottom are crisp and plainly demonstrate, quote, optical clarity and contrast.

PRESIDING OFFICER SCOTT: Mr. Block, when you read, you'll have to slow down for the transcriptionist.

Q Okay. I'll read that again. Can you explain why the turbines in the Antrim simulation on the top are so low contrast and faded out into the cloudy overcast sky in the background so as to be barely visible while the Lempster turbines in the bottom are crisp and plainly demonstrate, quote, optimal clarity and contrast, unquote.

A First of all, I would not characterize the views in the way you just did at all. Okay? For example, if you look at the Lempster turbines, they are not as crisp as the simulation turbines shown in the picture above. They are certainly not as crisp. There's a blurring around the rotors, in particular. There's a little blurring around the towers themselves. As opposed to the simulation on the top which has a

very sharp shadow line, which clearly delineates the rotors in spite of a cloud condition in the background, and it's also a result of where the lighting was and the time of day. I mean, this was a little bit earlier in the day, I think, when the simulation was prepared and taken, and this was later in the day when I took that photo at Lempster, and that is actually, that's a photo of an actual project, and so I think you can see from that that actually the simulations often are portrayed sharper than what the photo or what the eye might actually see because of changes in atmospheric conditions.

Q Perhaps we're looking at different pictures, but when I look at these, the turbines that are simulated and imposed on the top are very, very little different in grayness in what the term is is contrast from the sky behind it. Whereas the turbines on the bottom are quite a different contrast. Quite darker than the blue sky behind it. Is that the way it appears to you?

A No. It is not. Because, again, as I said a moment ago, I feel that the turbines on the top are portrayed accurately and sharply. There is

a cloud, you know, sort of cloud conditions well behind it, and because the turbine color is white, in this instance, it blends in perhaps a bit better which actually supports some of our evaluation conclusions. That under certain conditions, atmospheric, you know, light and moisture in the air can alter how a turbine is viewed in the flesh, and I think that's something that everyone in this industry recognizes, that turbines are slender in profile. They are reflective. They are white in color. And at times, because of those conditions they're going to fade into a backdrop. So that's, I think, a fairly realistic preparation of a situation that's not uncommon to see.

In contrast, and I think this is a great example, the photograph below is with sun behind; therefore, the view that I'm having of those turbines puts them in shadow. They're white colored, but you can see the shadow gives them a gray cast. It's a photograph. It doesn't, I didn't doctor the photograph. So you can just, again, see that visual simulation

looks at a turbine in one static view, and as such, it's a tool that we use to evaluate, but it shouldn't be relied on to portray how these turbines are going to look at any given day under any given weather condition.

Q Well, perhaps it's your color blindness that's affecting it, but if I hold these pictures at arm length, I can hardly see the turbines on the top.

A Well, they're not meant to be held at arm length. These are not presented as simulations.

Q I understand that.

A Okay. Well, then good.

Q Do you interpret the SEC's rules on photo simulations to say that when you create a photo simulation, you are supposed to create it at, essentially, the worst case scenario. When the turbines are the most visible, not as you were mentioning here, oh, at different times the turbines will be gray and fade out into the background?

A Let me just go back to something before I answer that question. Forgive me for one minute, if I might have a minute, please. I'm just trying to

find, I want to be -- yeah, I mean, I think the rules and as stated specifically do not use the term worst case, and, in fact, as I've been reviewing this, it uses the term photo simulations from representative key observation points from other scenic resources for which the potential visual impacts are characterized as high. So I don't see the worst case reference here. Forgive me.

But even with that, I think there is language, in fact, I was just reading, I believe, BLM's, some of their guidelines indicates it's worthwhile to show turbine simulations under a variety of conditions. You know, worst case can be interpreted in a number of different ways, but I think this particularly says high visibility, or high sensitivity, and we certainly complied with that aspect of the rules.

Q We read this already but the rules basically say a time of day that provides optimal clarity and contrast. Do you find anything in the SEC rules that says that different times it should, that you should use different times? I don't say

worst case scenario because it says that in there. I'm trying to interpret optimal clarity and contrast.

A These simulations were not developed at sunset or sunrise or at dusk or -- they were, you know, developed in the middle of the day for the most part, if not in every instance. There was no intention or certainly any variation or deviation from that requirement in that regard.

Q Have you ever done a photo simulation for any project at dusk or another time of day?

A Actually I have. Done a photo simulation at night.

Q Okay. Moving on to a different topic. Several of your photo simulations, these are the big exhibits here at the back here, specifically Exhibit 8, Gregg Lake; Exhibit 11, Summit Trail, Crotched Mountain; Exhibit 25, Private Residence on East Washington Road; and Exhibit 26, Private Camp on Waterfront Road. Can you explain each one of these photographs has been taken with various distracting objects in the foreground even though Site 301.05 rules expressly prohibit showing, quote, any utility poles, fences,

walls, trees, shrubs and other foreground objects and obstructions, unquote?

A Let's take Exhibit 8. I don't think the rules intentionally meant to disregard a normal use in a normal land use pattern or elements that would be likely to be in the view of the project and the simulation point. So here you say boat, you know, moored in the lake, and, you know, we can't move the boat. Any vantage point in this general area that we're charged to evaluate in terms of a high sensitivity has some sort of foreground element.

We did our best and I think we wouldn't, there would be no upside for us to intentionally obscure a view or clutter a view with irrelevant objects. This is an actual element that is present in the land, and I think is germane to understanding the visual effect from this particular vantage point so using that as an example, I would definitely, you know, refute your claim that we intentionally or there was any purpose in obscuring any of these simulations with clutter or unnecessary elements.

Q Do you dispute that if the photographer of this picture moved 15 or 20 feet to the right that that boat would not be directly in the view? It would be off to the side?
A If you move 15 or 20 feet to the right, something else would be in the view most likely or that same view would not be the best view from which to assess the simulations. So I can't speculate specifically the exact point at which we took these photos and whether moving one direction or another would bring in other objects or eliminate others. Again, you know, I don't know how many times I can say it, but our intentions were to respect the rules, follow the rules and portray the project in an accurate manner that you would experience in the field.
Q So you're saying that the view with the boat in the foreground you think is the best view in this picture?
A I'm not saying it's the best view. I'm saying it is a reasonable view from which to conduct a simulation. I don't know how you would -- best view in terms of what? You know. The best view might be in a different direction, you know, is

if you're on the lake or I don't know what that means. Best view.

Q Well, I can understand that some of these photographs were actually taken long before the rules were changed. On December 29th, 2015, Antrim Wind submitted a letter to the committee stating that additional supplemental information would be submitted by February 19th to comply with the revised site rules. The last two photos in the group I've just mentioned, Exhibits 25 and 26, were taken on February 12th. So these were taken, these were added on an addition in order to comply with the rules. Is that correct?

A Correct.

Q Okay. Since you knew the revised rules at that time, why weren't the base photographs for these taken to comply with the rules of not having any objects in the foreground?

A You know, do you want us to move trees? I mean, honestly, with all due respect, this is a representative photograph from a point at which to view the project, and, again, I don't see that any of the items or elements in Exhibit 25

are an attempt or somehow diminish what you are seeing or diminish the ability of a reviewer to assess the visual effect from that location. And, again, if you look at this photo, again, if you moved in any direction forward or back or side to side, you'd still, you might eliminate the birch trees on the left, but you'd probably bring in more of the forest on the right.

So, again, I'll say it again, that there was never any intention to do anything but follow the rules and provide as accurate a representation of what the project would look like from these visual simulations.

Q Okay. Following the rules, Rule (8)(d)(4) calls for recording of the time each photograph was taken. Can you read for us the times you recorded for Exhibits 24, 25 and 26 when the base photographs were taken.

A This must be a mistake. Hillsboro was, I think it meant to say and I know now that I see it, 12:46 a.m. That would not be possible. 12:46 p.m. I'm sure that was the correct -- the next one, why does it say a.m., 1:23 p.m. Forgive me. I realize I didn't catch that. Which ones

I did --
Q You gave me 24 and 25.
MR. IACOPINO: Which document are you gentlemen looking at?
Q This is actually the, it's in their submitted revisions. I'm trying to remember where.
MR. IACOPINO: So it's one of the Supplements of the Application?
Q This one is actually, this was the Addendum to the Application, and we're talking here on, what is now called Attachment 5, I believe it is, which was Exhibits 24, 25 and 26. The new simulation photographs were added from private properties.
A 26 was taken at 1:23 p.m. I guess we should go back to the beginning when Attorney Needleman asked me if I wanted to make any changes and I see that we put a.m. and it should have been p.m. Forgive me for that.
Q Okay, if this obviously incorrect data, do you think it's a result of faulty equipment or less than competent recording?
A I think it was just an innocent mistake in recording.

Q So why wasn't this caught when you were preparing the final exhibits?
A You know, I didn't review every single detail and line and clearly we missed that.
Q Okay. So --
A Forgive me for that.
Q If this data is incorrect, can we be assured that there aren't any errors in this or other exhibits from LandWorks?
A Yes. You can. And the, I don't think anyone would suggest that we were trying to misrepresent that. I think that's an innocent mistake, and, obviously, it was taken during the day.
Q Going back to the first Paragraph (8)(a) here in the Site 301.05 rules, it states that, quote, photographs used in the simulation shall be taken under clear weather conditions with the time of day that provides optimal clarity and contrast.

If you can look at all of these exhibits, 6, 7, 8, 9, 10, 11, 12, 13, 24, 25, 26 in your photo simulations, can you honestly state that the turbines in those simulations are all

rendered with optimal clarity and contrast?
A Yes, I can.
Q Okay.
A To the best of our ability, you know, given the methodologies of visual simulation. Absolutely.
Q (8)(e)(1) states that photograph simulations can have, quote, no haze or fog effect applied. Can you honestly state that absolutely no haze or fog effect has been applied to any of these simulations?
A Absolutely. We never doctor the photographs.
Q Can you explain, therefore, what methods you used to achieve minimal contrast on a hazy day looking at the turbines in these photos?
A We do not employ efforts to minimize the contrasts for the visibility of the turbines in our simulation.
Q So can you explain why some of these turbines, as an example go back to those last few, 24, 25, 26. If you look at those turbines, they're almost invisible.
A Let's look at 24. I don't see those turbines are invisible.
Q Look at 25.

MR. IACOPINO: We have no idea what documents you guys are referencing.

Q What I'm looking at is the visual simulation of proposed conditions from private residents East Washington Road, Antrim, Exhibit 25.

MR. IACOPINO: Is that an attachment to something?

MR. BLOCK: I'll find it.

PRESIDING OFFICER SCOTT: Let's go off the record.

(Off-the-record discussion)

PRESIDING OFFICER SCOTT: Back on the record.

Q All right. Exhibit 25, Visual Simulation of Proposed Conditions from Private Residents, East Washington Road, Antrim, New Hampshire. I'm looking at Sheet 3 of 3. There are some turbines in there, and they're slightly right of center. They are not at all clear to me. Can you see them really crisply and clearly?

A Well, you know what? These turbines are 7 miles away. So in a simulation you're not necessarily going to see them as crisply and as cleanly as if they were two or one mile away. Having said

that, if you look closely, these are very sharply rendered. You can see them standing out against the backdrop. You can even see the turbines standing out in front of the hillside. So there's no misrepresentation here. To the best, again, of what simulation techniques provide for, this provides, I think, an accurate and fair simulation of what the project would look like at almost 7 miles distant from this particular location.

Q You said if I look closely. I believe you specifically instruct viewers to hold this 11-17 page at arm's length to see it.

A Right.

Q I'm not looking closely. At arm's length, I can almost not see those turbines.

A And that's right because at 7 miles, the visibility and the presence of the turbines substantially diminish, and there's agreement that after 6 miles in particular that the visibility and the presence and the clarity of turbines diminish. You know, you're talking about a fairly long distance for the eye to discern detail, and there's plenty of

documentation about how over distance the eye cannot detect, you know, the decreasing ability of an eye to detect detail, and I think this represents the fact that at 7 miles distant the turbines will actually look in that manner, not prominent and not high contrast. They're 7 miles away.

Q In your Supplemental Prefiled Direct Testimony, and you don't need to go to there if you don't want, but on page 48, lines 5 and 6, you state quote, the photographs represent the atmospheric conditions that existed on the day the photograph was taken. Do you recall that?

A Sure.

Q And I believe you said something to that just a little while ago. Further down, on lines 10 through 12 you state that the intent is to remain, quote, as consistent as possible with the reality based on the weather and lighting conditions present in the photograph, unquote. Do you recall that?

A Yes.

Q If you had taken all of your base photographs under clear weather conditions, blue skies,

optimal clarity and contrast as specified in the rules, do you think these turbines would have been represented with any more contrast and clarity than they were in this case?

A No.

Q All right. Site rule 301.05, paragraph (8)(e)(3) down towards the bottom says, turbine blades shall be set at random angles with some turbines showing a blade in the 12 o'clock position.

Can you point out for us which turbines on your photo simulations are set at the 12 o'clock position?

A You want me to go through all 26 simulations and do that?

Q I can give you the answer. I mean --

MR. RICHARDSON: Mr. Chairman, I'm wondering if we're going over the same ground, and I'm not sure the witness has testified, although I'll confess I don't know for certain, he's really relied on the visual simulations in forming his conclusions. They're just pictures. I think he employed a different methodology to reach his conclusion. So I just wonder, you

know, obviously different people can have different opinions about something, but I wonder if we're using our time --

MS. MALONEY: I'm objecting to that objection. I think this is a perfectly reasonable line of questioning, and again, with the speaking objections here, I'm not sure, what is the basis of your objection?

MR. RICHARDSON: 541(a) allows the Presiding Officer to exclude evidence that's repetitious, and I just wonder if the cumulative value is being lost as we go over every single picture. I'm not trying to suggest an answer to the witness. I'm just wondering if we maybe can cut to the chase.

PRESIDING OFFICER SCOTT: Mr. Block's last question was regarding a very specific part of the rules. He's asking the witness did you follow that and can you show me. I don't find that part of that repetitious. So press on, please.

Q Thank you. I can give you the answer. There are only three turbines in all of these. There's one each on Exhibit 24, 25 and 26.

Those are the last ones done after the rules.

PRESIDING OFFICER SCOTT: We want you to ask questions, Mr. Block.

Q The question was can you tell us which turbine. I'm trying to save some time here.

PRESIDING OFFICER SCOTT: Why don't you wait until Mr. Raphael is ready.

Q Okay.

A You know, I'm willing to certainly take your word for it, but I would also point out to you the wording of that rule which says some turbines, and as you've just indicated, some turbines are shown at 12 o'clock so I think we've satisfied that.

Q So it guess the interpretation is open to whether it intends to be some turbines in an entire document or some turbines on each photo simulation, correct?

A Well, it doesn't specify. Let's put it that way.

Q Until the new rules came out and you submitted things, there were no turbines at 12 o'clock since the only ones that were done at 12 o'clock were on the later ones. When you were supposed

to or had promised, when Antrim Wind had promised to go back and submit supplements in order to correct that, you did make no attempt to change any of the earlier photographs to include something that was at 12 o'clock. Did you not?

A Well, again, I guess we had interpreted that rule, and we felt we complied with that unequivocally, and, again, I'll state that there was no intention to skirt, avoid or ignore those rules. The intent was to follow them and provide a representative sampling of visual simulations which I believe we did.

Q In your Supplemental Prefiled Testimony, again, page 47, lines 12 and 13, you state, quote, in my professional opinion these photo simulations meet SEC criteria, unquote. Do you recall saying that?

A Yes.

Q In light of all these errors, discrepancies, can you just elaborate on how you can claim complete compliance with these prescribed rules?

MR. NEEDLEMAN: I'm going to object to the form of the question.

PRESIDING OFFICER SCOTT: I think that this has been asked and answered so unless the Applicant would like to -- I think we can move on.

Q All right. I'll continue.

Going back to your Visual Assessment, different section starting at the beginning here early, Table 2 which continues from page 49 through 59 contains an inventory of 290 scenic resources. Do you recall that?

A Yes.

Q On page 48 of your Visual Assessment, just before this list begins, you state this inventory is, quote, comprehensive, unquote, and that, quote, the resource list presented in Table 2 is considered to be all inclusive, unquote. I believe that's at the very bottom of the page. You see that?

A Yes. I do see that.

Q The resource list is considered to be all inclusive. Can you tell me who it is that considers this list to be all inclusive?

A We consider the list to be all inclusive. We used all the literature and Town Plan

information, regional plan information, website information and maps to identify scenic resources in the area.

Q Can you just elaborate who "we" is?

A Myself and my staff.

Q So LandWorks, essentially.

A Yes.

Q I'd like to look at Exhibit NA-17 which is the third last page of the stapled-together ones was my responses to technical session requests. On the front page here, the first page, our list in response of 17 scenic resources in publicly accessible locations within the study area which I couldn't find on the LandWorks resource inventory. So how can you consider the list all inclusive when there's at least 17 obvious resources in the area that were omitted?

A Well, I'd have to examine this a little further. For example, these resources were reviewed, but they weren't included perhaps in the analysis because there was no visibility. I'd have to --

Q Could you please repeat the last statement?

A I've got to read -- you know.

PRESIDING OFFICER SCOTT: After you're

reading, when you do speak, make sure you use the microphone, please.

A Yeah. I'm sorry.

Well, for example, let's just take, I think we did come to the conclusion that these projects either had no visibility at all or such negligible visibility that it wouldn't warrant any further examination. For example, let's take Manahan Park. We all went to Manahan Park with the SEC on the site visit, and I think everybody understood and saw that there was no project visibility from Manahan Park. So if there's no project visibility, I think it follows that you wouldn't do a Visual Assessment from that resource.

Q I believe you're misunderstanding my question because your list, Table 2, contains 290 scenic resources in the area, regardless. At that point I believe you are not yet determining whether there is visibility. In fact, you claim that quite a number on that list I'll get to in a minute have no visibility. Your original 290 resource list is resources without yet factoring in whether or not there's visibility; is that

correct?
A I'd have to go back and look. Hold on one second. So I think you have to look at the opening paragraph. A comprehensive inventory of potential local, state and national scenic recreational and publicly accessible resources was conducted for the ten-mile study area.
PRESIDING OFFICER SCOTT: You want to bring the microphone closer to where you are.
A Sorry. And again, we reviewed any resources that were listed as a scenic resource and a recreational resource. I believe, I mean, I have to go through every inventory to see that they are here or not here. I know Loveren's Mill was in here. So I just have to go back. I'd have to get back to you on that. I have to go back and just review the basis for that inventory, but I think we listed all the resources that had visibility and potential visibility or were in the ten-mile project area, and many of these do look familiar, but they could have, I don't know if they were outside of the ten-mile area, some of them. Some of them may not be so I can't comment on that list.

Q I believe that your list of 290, though, is listed prior to any consideration of whether or not there's project visibility. Isn't that true?
A I think that is true, yes. I mean, we typically do try to list all the potential resources that might be affected within the project area of the ten-mile radius.
Q Do you include some local roads in there; for instance, Deering, Francestown, Greenfield?
A It would not be included if it was not identified as a scenic road by a municipal plan or some other established document.
Q Do you include --
A Because we have no basis for knowing that it's a scenic road or that it's a publicly designated resource in that regard so that could be one reason why that isn't in there.
Q Did you include any town properties?
A If they were listed as scenic resources.
Q Meeting House Hill Town Cemetery, the first one I listed there, is not on there. Is that an omission?
A I wouldn't consider that a scenic resource.

Q It was used in the Saratoga, in fact there was, the Saratoga assessment, I believe, had a photo simulation from there. So it was considered a scenic resource and part of the important town properties back then.
A That strikes me more as a historic resource, and, therefore, would not fall under our review.
Q So you ignore historic resources?
A We didn't ignore historic resources. We were not charged by the rules to review historic resources. This is a scenic assessment, not a historic assessment.
Q All right. So let's start with your 11-page list of 290 resources which is on page 49 through 59. Now, immediately the next --
MR. IACOPINO: Wait a minute. Mr. Block. Mr. Block. Is it your intention to go through the 290 list?
Q No. No.
MR. IACOPINO: You know there's a rule that defines what scenic resources is.
Q Yes. I'm going to a slightly different topic now.
MR. IACOPINO: You're aware of that,

Mr. Raphael, that we have a rule that defines scenic resources.

A Yes, I am.

Q I'm moving away from that a little bit. So you have an 11-page list of 290 resources. The very next page, immediately that list is winnowed down to a list of only 30 resources. So can you tell us the methodology you used to almost immediately quickly eliminate 90 percent of the resources on that list?

A Yes. These were resources, the resources that were eliminated were determined to not have project visibility.

Q Okay. Did you use your Exhibit 4 viewshed map for this elimination process?

A In part, but we also used field assessment. We went to many of the projects that we thought might have visibility or any substantive visibility, and we either included them in the list or crossed them off the list if they didn't meet that criteria. So yes, as I said earlier, we did use the viewshed map as a point of departure, but then we field checked these resources.

Q Did you field check all of them?
A Some that were very clearly not visible and had no possible visibility, of course not. We couldn't go to 290 resources to check that because we didn't need to.
Q Well, I'll quote again from the bottom of page 8 in your Visual Assessment. Quote, due to the coarseness and uncertainty of the quality of the data viewsheds cannot be relied upon to represent what will actually be seen on the ground from a specific location, unquote. Yet isn't relying on your viewshed data exactly what you did to summarily eliminate 90 percent of your review inventory?
A No, we did not. We relied on the viewshed, field work and local knowledge.
Q If your viewshed map, which you've already characterized as coarse and uncertain, was or was not the only criterion, am I correct in saying that turbine visibility at this stage was the only factor that you analyzed for 90 percent of this inventory, in order to eliminate 90 percent of the inventory?
A This is a Visual Assessment so if a resource has

no visibility to the project, then I think the next step is you would eliminate it from consideration.

Q If you would look at my Exhibit NA-17 again. This time go to the second side, the back of that, and that's, again, my technical session request response there. This is a list of 20 resources taken out of Table 2. These are resources that were eventually eliminated, not eventually, were immediately eliminated, did not make it to Table 3 because LandWorks determined there was no project visibility from them. However, if you locate these on your Exhibit 4 viewshed map, it can be seen that a number of them would according to that map have some turbine visibility. If it shows on it on there, how can you explain their immediate elimination?

A Because, again, as I said a moment ago, we went and field-checked many of these to see whether they were in or out of the visibility area of being visible.

Q A field visit to the remaining resources which I did on this list demonstrate that they have a clear view of the Tuttle Hill Road Ridge. Isn't

it logical to assume that if you can stand at a resource and see the ridge from these locations, then one would be able to see any turbines that were installed on that ridge?

A No, and we were at Manahan Park in the field trip a couple weeks ago and there was no visibility of the project. So how are we to trust your list when we saw with our own eyes that there was no visibility from that park? So I can't, you know, I can't agree with your statement.

Q All right. I'll leave that.

In your Supplemental Prefiled Direct Testimony, page 45, lines 15 and 16, if you would like to look at that. You state, this is page 45.

A Give me a second here.

Q Lines 15 and 16. You state, quote, to that end, the visibility or lack thereof of every scenic resource identified was verified in the field and through 3-D modeling. Yet Exhibit 22 of the Visual Assessment in the back of your Visual Assessment admits that only 127 of the 290 identified resources was visited. Which of

those statements are we to believe?
A Both. Because, again, as I said to you earlier, you know, we did both a desktop, a viewshed, 3-D modeling review and field review and that winnowed it down to one level and then we tested those 127, and, again, went through a similar process that got us to the 30 that we finally evaluated in detail.
Q So you would like me to interpret that 127 of 290 is the same as all?
A I don't understand the question. Would you state that in a way that I could --
Q Your statement said, to that end, the visibility or lack thereof of every scenic resource identified, and I take that to mean 290. Every scenic resource was verified in the field and through 3-D modeling.
A Well, I think in that particular answer, it was probably referring to the 127. Didn't specifically state that.
Q All right. Doesn't say that, but -- by page 82 of your Visual Assessment you've now cut another two thirds of the list leaving only ten resources to consider. Do you recall that part?

A Yes, I do.
Q Okay. So these ten resources are then analyzed for six criteria in order to determine whether each resource has a low, moderate or high rating; is that correct?
A That's correct.
Q In looking at your overall visual effect rating chart on page 87 of the Visual Assessment, am I correct in interpreting that your rating system will eliminate any and all resources that score a low rating in any category at all?
A No. If it's toward a low and it had all highs, it wouldn't be eliminated.
Q Are there any things on this list that have a low in them that made it to the next page?
A Let's see the next page was just Willard Pond, obviously. Obviously, no, Willard Pond was the only one that went to the viewer effect evaluation.
Q Okay. So these resources, these ten, in order to assess them, I believe they were first rated by determining how many turbines are potentially visible; is that correct?
A No. They were rated, you know, we used, going

back to the methodology, you can follow it through, we used a number of criteria to rate them.
Q I understand that. Which is the first one that you referred to in the book? It's on page 82.
A Number of turbines visible.
Q I'm just, among others, you did consider that?
A Number of turbines visible.
Q Okay. Your methodology in justification for your number of turbines visible rating is outlined on page 17. Only back in the beginning. And I believe you divide the average size of all wind projects in the state and divide this average into thirds; does that sound accurate?
A Yes, it does.
Q How many wind projects in New Hampshire did you average?
A I believe we averaged, what was stated in New Hampshire, there were three built wind projects at the time that we did this and we used those.
Q Okay. I believe you attribute this approach to a Dr. James Palmer, and say that this has been used in Maine?

A Yes.
Q Is that correct? Do you know if Dr. Palmer considers visibility of the entire turbine or does he only consider visibility of the turbines as you've done here?
A Again, this isn't visibility from the hub. This is how many turbines are visible from the resource. It doesn't differentiate hub and blade.
Q So he doesn't differentiate. Do you differentiate between the entire turbine and the hub?
A We do not. The only differentiation of that is in the viewshed maps. In this, we consider the whole turbine. We don't evaluate it just from the nacelle. The hub.
Q On page 17 it lists number of turbines visible, and it just says low, 1 to 7 turbine hubs. Moderate. Turbine hubs. It refers to hubs there. It does not refer to turbines.
A Regardless, we evaluate the whole turbine through this process.
Q On page 82 you have the same thing. Turbine hubs.

A I think we use the turbine hub as the marker and evaluate the entire turbine throughout the rest of the evaluation.
Q Do you know how many wind projects there are in Maine?
A I don't off the top of my head.
Q Wikipedia lists 12 projects in Maine. So if he uses this method in Maine, he's sampling 12 projects, you sampled three. Is a sampling of only three projects as thorough as a sampling of 12 in terms of finding an average?
A I think a sampling of three is appropriate given that we're talking about New Hampshire. New Hampshire is distinct from Maine. As you know, Maine is a much larger state. It has larger landscapes, and Maine also has had a program in effect called the Expedited Wind Energy Statute which really was encouraging large scale wind projects and the landscape there better accommodates that. So that's why we chose to select New Hampshire and what's here in the state as a point of departure for that analysis.
Q Given that the result of your sampling gives you a rating system where visibility of one to 7

turbine hubs you say is considered low, 8 to 15 hubs moderate and 16 or more high, do you consider this a logical rating system for a project consisting of only nine turbines?

A Yes, we do.

Q Under this system, is it possible that any resource could achieve a high impact rating for turbine visibility?

A I'm sorry. Say the question again.

Q Under this system, is it possible that any resource here could achieve a high impact rating for turbine visibility?

A Well, if there were more turbines it would, yes.

Q I'm not saying if there were more turbines. I'm saying in this project, would any of these resources, is it possible that anyone could achieve a high rating?

A No, because in this particular category and that's actually what recommends the project. It's a smaller scale project, and, therefore, in an evaluation like this it's going to come out at the low end rather than the high end in terms of that particular criterion.

Q As an aside, isn't that rather taking the

conclusion first and applying it to the --
A No. I'm just articulating that in this instance, in this particular project, that would be the case.
Q Doesn't this rating scale make it difficult for any resource to even achieve a moderate rating?
A Not necessarily. Again, it depends on the project.
Q So it would have to be 8 turbines and above to, 8 to 15 to be considered moderate. Are there many areas which you could see 8 turbines?
A I don't want to speculate on that.
Q Okay. Is it conceivable that there could be any locations in Antrim which, and I'm not talking about this rating system, that any location in Antrim which you would consider has a high visual dominance from the turbines?
A You mean in considering this project?
Q In considering, in this proposed project, and I'm not talking about the rating scale.
A Again, I don't want to speculate. I really, you know, an evaluation is done on a site or resource by resource basis.
Q Would you look at page 27 in your Visual

Assessment? There's a photograph there. This is Diagram 11. The picture here represents what you call, quote, an example of high visual dominance, unquote. Can you tell us how many turbines are visible in this photo?

A Two with a little peek of a blade or another peek of another blade just above the horizon line.

Q So I count about four.

A Yes.

Q Okay.

A But two which are primarily visible. Four where the blade as you can see is really not a factor in that consideration.

Q Okay. So if you were to apply that rating system for turbine visibility in your Visual Assessment, what rating would this picture achieve?

A Again, I don't want to go there because you're asking me to, you know, rate a project that I'm not there on site and I haven't really evaluated so I don't want to go there.

Q I'm just saying because there's --

A I've already stated in the photograph that this

does, this picture is a good example of visual dominance. I don't know what else you are asking me.

Q It would fit into the low, the 1 to 7.

A But that's not, that's a separate category. You're conflating the two. You're taking one category and mixing it with another. So that's a separate -- in visual dominance, in our category in visual dominance and prominence, this would rate a high, and we have that category as part of our methodology.

Q Don't you think it might be conceivable for one to see this visibility rating system that you set up here where it's impossible to get a high, difficult to get a moderate, rather arbitrary and designed to skew all the results down to a lower rating which you sort of already admitted because you said it's a low impact project?

MR. NEEDLEMAN: I'll object to the form of the question.

Q I'll go on to the next question.

PRESIDING OFFICER SCOTT: All right. Thank you.

Q Page 88 of your Visual Assessment. You

described threshold ratings for extent of use. That's at the bottom of the page where it says number two. Extent of use. You're describing what is a low or moderate or high. Okay. A high rating is granted if, quote, access is quick, obvious and easy. Interaction between users is moderate to high, unquote. Do you see that?

A Yes.

Q The facing page, page 89, you describe the threshold ratings for remoteness, and here the high rating is granted, quote, access is generally difficult and off the beaten path. Interactions between users is extremely rare. Aren't these two ratings mutually exclusive and contradictory?

A Well, no. They're two separate categories again. So they're not comparable in that regard. They're in and of themselves separate. So they don't necessarily, you apply these, they might be applicable to one resource and not another, but they're applied separately so they're not.

Q Is it possible that any one resource could be

rated high in both of these categories?
A Probably not. It does seem to be contradictory although there are some interesting instances where you can have a very remote location that has a high level of use that's very difficult to get to. In fact, I just heard a piece on the radio about a warm springs out in the west, I think it was maybe on Public Radio that's a long hike, very remote, but is experiencing quite a bit of use. Quite a bit of high use. So you could actually have that. Not very often, I would admit, but it could occur.
Q But you couldn't have a place where access is quick, obvious and easy and access generally different and off the beaten path.
A Well, of course not. These two are different, but, again, they go to one is dealing with activity and the other is dealing with the quality of the landscape and its position in the overall landscape as to whether it's near, far remote, pristine, developed that type of thing.
Q So hasn't this system really been designed so that no resource could possibly achieve a high rating in every category?

A Absolutely not. Absolutely not. There could be a project, in fact, the project that got a high rating in every one of these categories is the project that no one would propose perhaps, but I'm sure that somebody in your chair could, from your perspective, could find high in every instance, you know, in a category like this just because of your, perhaps your perception or your attitudes and philosophy about wind energy. So, you know, I don't think it's at all possible, and, by the way, we did not invent these categories. These are things that we are charged by the rule making to review and analyze, and there's ample precedent in the literature of Visual Assessment to address these particular items. We didn't intentionally bring these in to skew anything, to misrepresent anything. These are things we did not invent but are based on tried and true methodologies that we've used in other projects successfully and it's been accepted before review and regulatory bodies as reliable and appropriate.

Q Let's go back to your Prefiled Direct Testimony. September 10th. You state in the section of

Potential Visual Effect of the project. This is page 9.

A Go ahead.

Q I'm looking at lines 13 and 14. Quote, in the region there are numerous other resources. Lakes, ponds, summits that offer surprisingly similar opportunities, unquote.

Are you implying here that those who have enjoyed Antrim's natural assets such as Gregg Lake, Willard Pond, Bald Mountain and many other local trails should go elsewhere if they wish to avoid the impact of these turbines or are you implying that since other resources exist in the region that Antrim's are less valuable and unique?

A So that's a two-part question. Let me try and I didn't -- I'm sorry. I didn't quite get the reference. First of all, I guess I'm not implying that people should go elsewhere. I'm just saying that if someone is so indisposed to having a wind energy project in view, then they can choose to go elsewhere. I mean, just like, for example, I won't go to Lake George anymore to kayak. I mean, you might be a paddler. You

might be able to relate to this. I won't go to Lake George anymore to kayak because there are too many boats and motorboats and it's too busy, and so I choose not to go to a place I really love to paddle and hike because of that factor, and so other people could exercise that opportunity. So that's number one.

Number two, I think your second question had to do with the value of the resource. You know, these resources are certainly valued, and I'm not saying that they're not sensitive, but Willard Pond I do not consider to be a unique, one-of-its-kind resource. There are many similar resources elsewhere in the state, elsewhere in New England, that have very similar values. If you look at the scenic quality evaluation and the elements that go into making a unique and outstanding landscape, they're not there at Willard Pond. That's not to say that Willard Pond isn't beautiful in its own way and an enjoyable place to go and visit.

So I think I want to make that very clear. I'm not trying to diminish the fact that people enjoy that resource and that some people find it

to be aesthetically pleasing. I mean, for crying out loud, all of us live in this part of the world because we find New England and New Hampshire and Vermont to be scenically aesthetically pleasing as a whole, but we're reviewing wind energy projects in a larger context and as it relates to scenic qualities and scenic values, and in this regard, Willard Pond is really, doesn't rise to the level of being, you know, unique and special from that framework, and I'm not implying that it might not feel unique and special to the individual experience, but overall, it's a fairly typical type of pond in terms of the real values it provides and the sense of landscape that it provides.

In fact, having gone to May Pond now and spent some time there, I find that pond actually to have more scenic value and interest for me personally and I think for others because there's more topography. The shoreline is perhaps a bit more compelling. You can have a longer paddle or experience on the lake. So, you know, we look at these things in that

overall context.
Q So you're saying if I decide I don't want to experience the turbines, and, therefore, I don't want to go and use our town beach, I'm free to go to another town and use their town beach where I may not have a parking sticker. So is that what you're saying?
A No. That's not what I'm saying. In fact, you know, at a place like the town beach or at Willard Pond for that matter, you know, the good news is having spent time at both and particularly at Willard Pond, you know, I believe unequivocally that the recreational activities and the use and enjoyment of that pond will continue after this pond is built and people will continue to enjoy the fishing, will continue to enjoy the paddling and don't need to go anywhere else. That's not what I'm implying, no.
Q Do you think that -- let's use the examples of Gregg Lake and Willard Pond. Do you think those recreational opportunities will be enhanced and better after a construction of this wind project?

A You know, on one level, you know, I think a wind energy proponent if I were to put that hat on, if you will, I mean, I think we have this quote from Alex Wilson who wrote the book Quiet Waters, and he said seeing a wind energy project on a lake in Maine would not deter or take away from his experience. In fact, he equates that with an effort to address things like climate change so that that lake's fishery will remain the same going forward with those kinds of efforts to address climate change and global warning.

So you can make a connection between wind energy. In the BLM manual at the very beginning of the updated manual to deal with wind energy, there's a discussion about how some people find wind energy pleasing to see and actually go to visit wind energy projects. So, again, it kind of depends on your personal opinion as to whether it would enhance, detract or have no effect on your use and enjoyment.

Q I'll move on to my final section here. I'd like to call your attention to Exhibit NA-13 which I did not hand out today. It was looked at the

other day. It's from my Supplemental Prefiled Testimony. It's Exhibit RB(Supp.) 3 which is an article entitled Siting a Wind Farm in the Most Challenging Place in the US. It was published in Renewable Energy World magazine on March 2nd, 2016.

You were interviewed in that; do you recall that?

A I don't actually. Specifically. I haven't seen it, to be honest with you.

PRESIDING OFFICER SCOTT: Mr. Block, NA-13, you said?

Q It was in my Supplemental Prefiled Testimony which is under NA-13, and it's one of the exhibits in there. It's Exhibit RB(Supp.)3.

PRESIDING OFFICER SCOTT: I know I've seen it. Thanks.

Q On the last page of that article it says, quote, proving a wind farm won't have an adverse impact is a responsibility of the developer, but by the same token, proving that it will is a responsibility of the individual organization that is claiming the impact is unacceptable, unquote.

Mr. Raphael, you are then quoted as saying, quote, if individuals are aggrieved or parties are aggrieved, then the onus is on them to create a case for the extent to that grievance and whether that grievance is outweighed by the benefits of the project, unquote.

Do you recall saying that at all?

A Vaguely, yes.

Q How does this philosophy of yours fit into the model of the Site Evaluation Committee?

A You know, I can't, I really want to think about that. That's a, I haven't read the article. I want to see that in context in its full view. I think that how it is, quick answer is that you're here questioning me, and you're here creating, presenting your case. I think that's a perfectly good example of what I'm talking about is you have that opportunity to question, you know, our analysis and question the project and to state your concerns with regard to it. So I think that's, in part, what I was referring to.

Q How does this philosophy of yours address the role of the Counsel for the Public?

MR. NEEDLEMAN: I'm going to object at this point.

A That's going beyond any thought I've given to that. I'm sorry.

Q Okay. Do you think you're saying here that Antrim Wind's Application imposes a responsibility on anyone opposing the project to provide all of the data necessary to defeat it?

A I'm not saying that. No.

Q I'll read again. The onus is on them to create a case for the extent of that grievance and whether that grievance is outweighed by the benefits of the project.

Can you tell us how much money Antrim Wind had invested thus far to determine what the benefits of the project will be?

A You know, again that's out of my area of responsibility.

Q I don't expect an exact answer to that, but are you saying here that aggrieved parties will have to invest similar amounts of money to make the case against the project proposal?

MR. NEEDLEMAN: Objection.

A I'm not saying that.

PRESIDING OFFICER SCOTT: Mr. Block, I would like you to ask questions that you do expect an answer to based on the testimony.

Q Final question. Don't you consider this a rather arrogant stance considering that the developer imposes an Application on a community with the expectation that he will eventually make a lot of money from his project, but the aggrieved residents who never sought out this kind of development will be the ones whose lives and properties are imposed upon against their will for decades?

MR. NEEDLEMAN: I'll object.

PRESIDING OFFICER SCOTT: Mr. Block, this is not your time to testify.

Q I'll let it stand at that. Thank you. No further questions.

PRESIDING OFFICER SCOTT: All right. Is anybody here from the Stoddard Conservation Commission? Okay. I see Mr. Levesque here or Ms. Allen. I don't know if either one of you want to speak.

MR. LEVESQUE: Yes, we do. We have a few questions, Mr. Chairman. Given the time, I

don't know what you want to do, but I've got two of the exhibits that we want to use here, and I know one of them may take a few minutes to pull up. So I don't know if you want to go off the record for a second here. I don't have handouts, but it may take a second for Mr. Raphael to get the second one.

PRESIDING OFFICER SCOTT: Why don't we do that so we can all be on the same page.

(Off-the-record discussion)

PRESIDING OFFICER SCOTT: Back on the record.

BY MR. LEVESQUE:

Q Thank you, Mr. Chairman. So in that paragraph, that sentence begins the Antrim 2010 master plan. Would you just read the rest of that paragraph starting with that sentence?

A Sure. The Antrim 2010 master plan also does not highlight Willard Pond for its scenic and visual attributes nor does it include clearly written community standards that seek to preserve its scenic beauty. Rather it is described as an excellent cold water fishery and noted for its fly fishing. Typically when there's public

documentation of a particular scenic or recreational resource, especially in local, regional or state planning documents or publications, it indicates broad public consensus of the value of that resource.

Q Thank you. So you know which section of the master plan that came from or do you just have an excerpt in what you have there?

A You know, I know yeah, it's an excerpt. I don't know --

Q I'll give you a hint. It's from the water resources section.

A Yeah, that makes sense.

Q So do you have that whole section?

A I can dial that up here, I guess.

Q Okay. So if you've got the PDF --

A I see. Yeah. Do you want me to get to that section?

Q No, I just want to you to look at page 39. I'm just confirming that that's where you referenced in the Visual Assessment. I believe it is. I'm just confirming.

A Actually, I do think I have that page.

Q You're going to need the electronic one on a

couple other questions so I'll leave it up to you.
A Bear with me here for a minute. Page 39, did you say?
Q Yes. So page 39 which is V 7, again, the Antrim master plan is numbered by chapter and page, but in the PDF it comes out with sequential pages.
A I see it. Hold on. Give me a second to get there. Other water resources. Is that where you want me to be?
Q Actually, I just want to, I believe your reference comes from the bottom of page 39 only where there's a title called Willard Pond. I'm just confirming that that's where you found it from.
A I think that's right.
Q Okay. Is that correct?
A Yes.
Q So take that section, go to the top of that section where you just first reference which is where it begins on now page 37. Other water resources. You see where that title was? I think you were there first?
A Yes. Hold on one sec. Got it.

Q And see the first paragraph that begins, like the two major rivers. Would you read that paragraph, please?
A Sure. Like the two major rivers in town, Antrim's lakes, ponds and streams are important water, recreational and scenic resources. It is vital that they be recognized for the value they provide to the town and in so doing protected from overdevelopment and pollution.
Q So it does reference scenic resources there as it relates to these water resources in that section, does it not?
A In a general sense, yes.
Q In a general sense. Right. You imply that it doesn't reference it at all for Willard Pond, but does this statement not apply to Willard Pond? As I read it, it applies to all of the water resources in that section.
A I mean, I think it's a general statement. Typically, a community standard has to specifically identify the actual resource to determine whether we would consider it primarily a scenic resource or water resource and that doesn't do this. So that we don't have that

guidance and, you know, general statements in town plans are good as points of departure, but really what the Town Plan has to say is that Willard Pond is an important scenic resource to us, and no where in the Town Plan does it say that.

Q Well, it says it right here.

A No, it does not. It's a general statement, and we're not left to understand whether Franklin Pierce Lake is more scenic or importantly scenic versus Willard Pond and that's -- we need more certainty in Visual Assessment to go there because these types of general statements are often implied, and, in fact, they are applied to the town as a whole. I mean, the town as a whole is considered to be scenic. So where are we to determine which parts of the town are valued primarily for their scenic resources.

And my observations of Willard Pond from many trips there now is that yes, as I said earlier, it has scenic values, it is a sensitive resource, but it seems to me its value is primarily for fishing and water-based recreation.

Q So you're a bit of a planning expert, as I understand it. You've been involved with local planning boards for an extended period, is that correct?
A Yes, it is.
Q So you know as I have having looked at many master plans in many communities that they are all styled differently. They probably cover the same topics, but they are styled differently, and whereas some master plans may get very specific about resources, others like this one are much more general. Isn't that correct?
A That's correct.
Q So this one here, you again chose to excerpt out of the water resources section. Would you now go to chapter 3 which is page 14 if you're going on page numbers. It's actually page III-8 but it's, again, sequentially numbered 14, I guess, is what I'm showing.
A I'm getting there. Close.
Q On the PDF. 14.
A Okay. Got it.
Q And are you at the section that says preserving scenic areas and views?

A Yes.
Q Would you agree that this is actually the section that talks about scenic resources in the Antrim master plan, not the section you referenced before?
A Certainly, yes, it talks about scenic areas and views, absolutely. Yes.
Q So the other section was about water resources and not scenic specifically. It talked generally about scenic resources as part of that, but this is the section that is talking about scenic views. So the first paragraph of that section reads Antrim's scenic areas. Would you just read that paragraph, please?
A I'm sorry. I scrolled down and got lost there. Antrim's scenic areas and views should be preserved. In the survey for the master plan, an overwhelming number of residents, 102 to 31, wanted some sort of protection for the town's views.
Q Would you go to the bottom of that page, the paragraph that begins certainly preserving? You see that one?
A Yes.

Q Would you read the last sentence of that paragraph, please?
A Antrim should consider encouraging the protection of its scenic views through conservation easements.
Q So again, this master plan, the author, I was not one of the authors of the master plan. I was involved with one of the sections of it, but would you agree that the authors chose to be much more general about this topic of scenic resources throughout the plan because I believe these are the only two sections that really talk about that and they seem to both be general. Would you agree on that?
A Yes.
Q So in this case, the master plan doesn't get specific, and so even though they've chosen to do it as a matter of tone and approach, you totally ignore it because they haven't specifically identified a resource as scenic even though they infer that Willard Pond is a scenic resource in the other section and here more generally?
A We didn't ignore it. We understood it. We

registered it, you know, and as I've said, we're not saying that Willard Pond isn't scenic, but again, we use a methodology and evaluation process to determine many different aspects of that scenic value and then integrate and consider how it's used and then compare it, you know, region-wide as part of that methodology.

What we're finding in Visual Assessment, and this is holding up certainly in my experience most recently in Vermont, is that a town has to be specific in saying that Willard Pond and the view from point X of Willard Pond is incredibly valuable or an important view to the town which then means we have to perhaps elevate its value with that kind of nomenclature, but generalized statements like this do not hold up under the scrutiny of a community standard. It's a generalized standard. It's a desire and a wish of a community, but it doesn't provide us with any specificity as to what view we're preserving, for example, of Willard Pond. Is it the view from the boat launch? Is it the view from Bald Mountain? Is it a view from the water?

So that's the trouble that we have, and now in Vermont we're going through a process where all of the towns are charged with specifically identifying those locations, not in a general sense, not an introductory paragraph, but specifically identifying what road sections, what resources and what views are important to the community for those to have standing in a review process like this.

Q So that's Vermont. Would you agree that we're in New Hampshire today?

A But I think, I would agree, but there are so many similarities between this -- and you admitted yourself that plans have these types of general statements, and this is not dissimilar to many plans that I see in New Hampshire, in Maine, in Vermont and elsewhere, and I think it does provide a sense of the community's will, don't get me wrong, and I respect that, and we do consider that, but it doesn't provide us with any specificity or guidance when it comes to the actual evaluation and the actual change or effect on the resource from the proposed project.

Q So it sounds like there is a Vermont standard that you have in mind, both because you live there and it's a process going on there, and you're trying to apply it here in New Hampshire, is that what you're doing?
A No. Actually, I'm using the rules that are applicable here in which it's an identified scenic resource, and, again, there's a general identification of every pond and every mountain in Antrim here it seems as having scenic value. So there's no specificity in that, and because Willard Pond is not specifically identified as a scenic green source in and of itself or a view from Willard Pond, that had to be taken into account.
Q I think you just said it both ways. The other section, water resources, actually identified all of the water resources as scenic. That's what you just said.
A No. I said there's a general statement about scenery, but, again, I think you would agree that the scenic quality on Franklin Pierce Lake is different from that of Willard Pond so what does that mean? If Franklin Pierce Lake is

considered of scenic value and development is of concern to Antrim, then maybe no more camps should be developed on Franklin Pierce Lake, but we're not given that guidance or that specificity. So I don't have anything to work with in that regard.

Q Thank you. So going back to your statement again on page 126, do you still, after reading these other sections that I've pointed you to, do you still stand by that first sentence in there? The Antrim 2010 master plan?

A Well, it doesn't specifically highlight Willard Pond for its scenic attributes. It makes a general statement about all ponds in Antrim. Not specifically -- or water bodies.

Q Okay. We obviously disagree about that.

At the end of that sentence, you also say, nor does it include clearly written community standards that seek to preserve its scenic beauty. Isn't it true that that whole area, all of the land that surrounds Willard Pond is in fact permanently protected?

A Not the, well, I guess, no, I think some of the land, some is in the wildlife refuge, the pond

is a water body in the State of New Hampshire. There are private lands obviously just beyond where the project is being proposed which is part of the overall viewshed of the pond.

Q But the surround shore land, the upland that is surrounding that entire pond?

A Correct.

Q Isn't it all protected?

A Right, and the development's not proposed for those lands.

Q Right, but suggesting here that there needs to be some kind of community standard when the resource is actually already protected and nothing more needs to be done seems a little out of place here.

A Actually, what I would say to you in that regard is that if the area around Willard Pond and views in the direction of this project were of critical value to the town, then perhaps the area that the project's now being proposed for should have been conserved by the town or could have been conserved by the town, and that's what we're doing in our community, and that's what I see other communities doing. Where they are

concerned about viewshed and any intrusion to that viewshed or change to that viewshed, they can enact certain, they can take certain steps to address that, and, again, there's no guidance that says don't develop in the lands beyond those conserved lands. So, therefore, what does a developer, you know, if there's no constraints or specific restrictions, then somebody is free to build homes or develop lands beyond the particularly conserved lands as they see fit.

Q So would you agree that zoning ordinances are, in fact, those kinds of tools that you're referring to?

A In part, yes. Absolutely.

Q And so the zoning ordinance for the ridgetop that the project is proposed for, does it, in fact, right now allow that as a permitted use in the zoning ordinance?

A Well, there's the conflict because the Town Plan does address, does cite that public utilities are possible in that district.

Q So when you've got a master plan which is just a plan versus an ordinance which is essentially local law, which one supersedes?

A The master plan is the governing authority in that regard.
Q So it supersedes --
A I don't know in New Hampshire, but I think you know as a planner, if you are, that a master plan provides the basis for zoning, and in fact, zoning needs to be changed to reflect the representations and the goals and vision of the master plan, and the master plan says public utilities are appropriate or acceptable in that area. The zoning is silent on that particularly.
Q No, it's not. The zoning is very specific in that the zoning in Antrim does not allow this development as a permitted use, and so the zoning is law and it actually trumps master plan in New Hampshire. Would you agree with that?

MR. NEEDLEMAN: Mr. Chairman, I'm going to object on a number of bases. First of all, he's asking for conclusions of law, and second of all, I think this is beyond Visual Impact Assessment. Sounds like we're talking about orderly regional development, and Mr. Kenworthy will be up next to address that.

Q I'll end my questions right there, Mr. Chairman. Thank you very much. Thank you Mr. Raphael.

PRESIDING OFFICER SCOTT: Thank you. I think we're now on Mr. Ward. How much do you have, Mr. Ward?

MR. WARD: Might I make a statement? If we were to leave ten minutes early, I would be able to go home and share a nice bottle of wine with my bride. If we leave ten minutes late, she'll break it over my head. So I think I would prefer that we break now. I need about a half hour, maybe 40 minutes, and that is going to go well beyond the time.

PRESIDING OFFICER SCOTT: What's the mood of the Committee? I think we will end for the day then. So again, tomorrow, 9 o'clock. Tentatively, my intent is to go to 4, 4:15 tomorrow. Before we go, Ms. Berwick?

MS. BERWICK: Could I just ask about the order of the upcoming witnesses or whatever you call these people that's how we're doing this.

PRESIDING OFFICER SCOTT: My understanding is after Mr. Raphael, Mr. Kenworthy will be back up. Is that correct, Mr. Needleman?

MR. NEEDLEMAN: Yes.

PRESIDING OFFICER SCOTT: So Mr. Kenworthy will be back up after we finish with this witness.

MS. BERWICK: But after that. I knew that much. Then is it Mr. Enman?

PRESIDING OFFICER SCOTT: Good question. So on the 28th, I know we had a request to move Mr. Will and Mr. Stevenson to the 28th. What's the order there that you plan on presenting, Mr. Needleman?

MR. NEEDLEMAN: Those two are the Cultural Resource witnesses so we hope to present them as a panel, and I think they're only available on the 28th. Is that right?

PRESIDING OFFICER SCOTT: But you also show Mr. Enman -- I'm sorry.

MR. NEEDLEMAN: That would be the end of our witnesses.

PRESIDING OFFICER SCOTT: That's not your witness. So we will start with your, we'll finish up with the Applicant witnesses so those two will be first on the 28th. Correct?

MR. NEEDLEMAN: I would hope so, but I know

that the town witnesses seem to have some constraints also.

MR. RICHARDSON: The main constraint is with Everett Thurber who is, I believe, having surgery on the 29th so I have to get him in because we lose him after that date and I don't know for how long.

PRESIDING OFFICER SCOTT: Does he have time constraints on the 28th?

MR. RICHARDSON: No, as long as he can go the 28th, I think he's fine. I just want to make sure we don't miss that date because the 29th is -- he wouldn't even answer my phone call so --

PRESIDING OFFICER SCOTT: My understanding is that the Mr. Will and Mr. Stevenson are scheduled for roughly an hour and a half based on the Prehearing Conference. So that would mean, so I think we should start with them. That way we can finish up with the Applicant's witnesses on the 28th. So does that answer your question, Ms. Berwick?

MS. BERWICK: I just wondered if tomorrow if we finish with Mr. Raphael, Mr. Kenworthy

stops, is there a chance that we'd be finished with him? We were going to try to get, I don't think it's possible. My son is not here for the entire month of October so we had actually been told the 28th, too, way back when, but it doesn't look like that's going to happen.

PRESIDING OFFICER SCOTT: I think we can go off the record for this conversation.

(Hearing adjourned at 4:49 p.m.)