

161117 Final SEC Brief

17 November 2016

Mr. Robert Scott, Chair
Site Evaluation Committee
21 South Fruit Street
Concord, NH 03301-2429

Dear Mr. Scott:

Re: 2015-02 Brief

The AWE application is a meteorological problem from start to finish, and both pre- and post-construction. Both the generation and broadcast of noise depend completely on the wind and temperature. The shadow flicker is totally a meteorological and astronomical problem. Do I even have to state that icing and its ejection are meteorological problems?

The METEOROLOGY of NOISE

Not only did Antrim Wind Energy fail to determine the worst case noise scenario from the turbines, either singly or collectively, as required by 301.18 (c) (3), they even failed to determine the meteorological event(s) which would produce the worst case noise scenario. Determination of those meteorological event(s) would be required in order to determine the circumstances under which particular neighbors would be affected by the worst case noise, and how often. Post construction, this information would be vital in determining which turbines were responsible for excessive noise reports. Short of shutting down all the turbines when a noise report is received, AWE will need the wind speed and direction and the temperature structure, and a serious analysis to determine the specific meteorological event(s) which conspired to produce excessive noises.

In addition, there are serious meteorological issues which were handled in a cavalier way. AWE ignored the well-known fact that snow-covered surfaces produce strong temperature inversions on long clear winter nights. These regular temperature inversions will form ducts, and combine with the highly (sound) reflective snow surfaces below and on the sides of the hills, to carry sound long distances. The AWE aversion to determining these "worst case" noise scenarios appears to have grown directly from their knowledge of the likely result of such a analysis! On questioning, Mr. O'Neal stated that he did "not believe it's (ducting) going to have any type of material effect on the residents that are closest" (Day 3, p140). Mr. O'Neal also used a G factor of 0.5, which ignored the frequent wintertime occurrence of ice-covered snow surfaces, and their highly reflective sound characteristics.

The METEOROLOGY of SHADOW FLICKER

The AWE application, and their responses to my data requests of 20 September and 29 September 2016 (received 7 November) show little or no understanding of the meteorology of shadow flicker. Whether this is due to meteorological ignorance, a reluctance to face up to a complex issue, or a deliberate attempt to undercount both the predicted and postdicted number of hours of flicker, is difficult to determine, and it may be a combination of all three.

An example of AWE meteorological ignorance occurred in my cross-examination of Ms. Linowes (Day 13, PM, p64/65). Ms. Linowes noted (Linowes Ex 22) that using Mr. O'Neal's instructions (28 September response to my data request of 20 September) for calculating the percent sunshine, are completely wrong. She also noted in the same Exhibit, a day on which the numbers said the day was completely cloudy, but on which the actual percent sunshine was measured at 73%. These two examples, and there are many more in Exhibit 22, show that Mr. O'Neal does not understand that fractional cloudiness and percent sunshine are totally different measurements, and cannot be combined to calculate the hours of shadow flicker.

An example of the AWE reluctance to face up to the complexity of the issues is best illustrated in their proposal for post-construction monitoring. After outlining a rather complex plan, they chose to take some interesting shortcuts in defining the most basic quantities. Flicker or no flicker depends on two basic parameters, (1) how much sunlight is required for it to be judged "sunny", and (2) how deep need the shadow be to be discernible as a shadow. Yet the AWE post-construction model selects both critical parameters with little or no data to back them up. The only studies are related to epilepsy!

These arbitrarily selected threshold levels of solar brightness and contrast cutoffs are breathtaking, and unsupportable! Most importantly, they guarantee a substantial undercount of the hours of shadow flicker.

There are a number of specific problems with the AWE approach. They used a model for Shadow Flicker which ignored the supersizing of the solar disk when seen through high thin clouds, leading to a serious undercount of the number of hours of shadow flicker. (Ward, Day 11, PM, p202) The AWE model also assumes a minimum threshold level for solar illumination of 323 lux, below which they claim there is insufficient sunlight to cause flicker. They say 323 lux "is approximately the equivalent of low light conditions at sunrise and sunset". But the requirement for the operation of automobile headlights (one-half hour before sunrise and after sunset) is set at a tiny fraction of the light available at sunrise and sunset, yet the only times when shadow flicker can be a problem is near sunrise and sunset. Taking their definition at face value, just a few clouds or a little haze in front of the solar disk will reduce the light level below their defined (323 lux) limit, meaning there isn't enough light to cause a shadow flicker. That will eliminate many actual hours when shadow flicker can be detected, resulting in substantial under-reporting of the real number of hours of shadow flicker. The 323 lux level appears to have been selected to guarantee the "right" result.

Their model also states its "contrast threshold is 10%. Flicker ceases to be provocative at luminance contrasts less than 10%". This statement is made in spite of everyone's observation that a single flickering fluorescent bulb in a roomful of dozens of such bulbs will drive people crazy. Where did this number come from? The AWE response to my request of 29 September, in which I asked about the sunlight threshold, and the diminution required to make a flicker, were supplied on 7 November 2016. In that response were references to articles in the scientific literature, but mostly from studies of epilepsy. There were no cites which dealt simply with the levels of flicker as a perceptible phenomenon. Is epilepsy to be the determining criterion for shadow flicker???

EJECTED ICE SHEETS

Antrim Wind Energy did not even attempt to calculate how far ice can be thrown from the turbine blades, and a simple calculation of the speed of such a lateral ejection (Ward, Day 11, PM, p 171) requires the ice to impact the ground in only 2 ½ seconds from its ejection 500 feet above the ground. .

OTHER SAFETY ISSUES (Lempster experience is not applicable to Antrim)

Antrim Wind Energy totally ignored the road safety problems from shadow flicker when the sun would be shining directly into the eyes of eastbound drivers on Route 9 in Stoddard, on many mornings.

SUMMARY

1. The AWE application shows little recognition of serious meteorological issues, each one of which would take the proposed facility outside of the bounds prescribed by the SEC. There isn't a shoehorn big enough to squeeze this huge facility into such a populated area. AWE also misuses and/or misunderstands most of the relevant meteorological information.

2. Approval of the AWE application, with all its errors and omissions would leave this Committee with little choice but to approve all such future applications. It would send an unambiguous message that IWF applicants do not have to do the hard work of determining the "worst case" noise levels, the real shadow flicker, or the ice throw to be inflicted on their neighbors. And the post construction monitoring would never be able to acquire the fundamental information needed for the Committee to determine whether, and how, complaints should be adjudicated. Approving this application means ceding effective control of this project, and sets a terrible precedent for all that follow.

3. As meteorologists, we cannot pass up the opportunity to compare the visual impact of this huge facility against the visual impact of a huge cumulonimbus cloud (thunderstorm). Both are huge, both stretch many miles across the landscape, both make noise, both have flashing lights, both move constantly, both show different perspectives as time goes by, both stretch well above the horizon, and both are impossible to ignore! But the cumulonimbus cloud provides some rain for your garden, is gone in an hour, not to return for a week or a month, while the turbines will be there every hour of the day, AND NIGHT, 24/7/365! Hmmm.

The Meteorologist Intervenors

Robert Copeland
Joseph D'Aleo
Richard Hendl
Bruce Schwoegler
Fred Ward

Exhibits:

MI 18 Response to Data Request Re: Jaffrey Weather Data and the source for the data
MI 19 Attachment 6 Table 4-2 "Operational Hours per..... page 4-3
MI 20 Drawing of Wind Turbine with Various Calculations
MI 21 Applicant Response to SEC Data Request, Committee 1-1
MI 22 Letter to Administrator, with Official Weather Data